

Form for Comments

Investigation of Site Characteristics and Evaluation of Radiation Risks to Public and Environment in Site Evaluation of Nuclear Installations (DS529)

General Comments

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Marcus Grzechnik (EPRReSC) Page..1.. of..1. Country/Organization: ARPANSA, Australia Date: 6/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	General	This document refers appropriately to GSR Part 7 and GSG-10 (on prospective assessment), however consideration should be given to including referral to GSG-8 (protection of people and the environment).	Impacts on and protection of people and the environment should be at the forefront of any new siting.	x			This document support mainly SSR-1. It also supports SSR-3, SSR-4, GSR Part 3 and GSR Part 7. It also refers to several IAEA safety guides including SSG-18, GSG-10, GSG-9. Reference to GSG-8 is added in para 7.25.

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: FRANCE		Date: 6 Oct 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	General	There would be benefit in refining the detailed structure of the draft guidance to enhance the similarities and differences mentioned when considering normal operation and when considering accident conditions	The similarities and differences between works to be performed for normal operation, accidental situations for safety case and emergency preparedness. This would be still consistent with the DDP			x	Proposal makes sense however is not easy to do in short time.
2.	General	Is the guidance fully relevant to SMR, including: <ul style="list-style-type: none"> - Relocable SMRs - SMRs that would be installed with public in a very short vicinity and many buildings around... 	For relocable SMRs, there will uncertainty on the environment where they will operate (or may be subject to an accident). Para 2.30 and 4.30 address, to some extent, the issue of defining the source term, with the potential, for some design, to scale the source term.... What about the other parameters that influence impact on people and the environment? For SMR that may be used for heat generation at industrial sites, or even in very urban areas, with people in a very close neighborhood, modeling dispersion (CFD) is more challenging...	x			This Safety Guide is intended for use primarily for land based stationary nuclear installations. The process presented in the guide is applicable for all nuclear installations including SMRs using graded approach.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Sh. Sheikhi Country/Organization: IRAN/ INRA Date: 6 Oct 2023							
Comm ent No.	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejec tion
1.	General	The recommendations are also applicable to other stages of site evaluation and other assessments performed during the lifetime of a nuclear installation (e.g. periodic safety review operational stage) or following a change in the site characteristics.	Periodic safety review is not a stage of site evaluation.		x		In the sentences, periodic safety review is given example to other assessments performed during the lifetime of a nuclear installation. Text is revised.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member Page 36 Country/Organization: Japan / NRA Date: 06, Oct., 2023							
No.	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	General	From the perspective of developing a practical guide, especially for the states' embarking on the construction of new nuclear installations, the IAEA safety guide should be one that describes commonly implemented practices. Specific practices performed only in a few states should be moved to the Annex. Comment #4,12,13,14,19,22,23,24,27,28,29,45,46,47 are related to this general comment.				x	Document seeks to capture evolving practices in MSs.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRsC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRsC; Date:06/10/2023							
Comment No.	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejecti on
1	General	The main purpose of this specific safety guide is the revision of the current Safety Guide NS-G-3.2 and it will expand the scope from NPPs to all				x	As it was mentioned GSG-10 provides recommendations

		<p>nuclear installations based upon the graded approach.</p> <p>We already have the General Safety Guide GSG-10 that provides recommendations and guidance on a general framework for performing radiological and environmental impact assessments for facilities and activities both in normal operations and potential exposures, to estimate and control the radiological effects on the public and on the environment.</p> <p>In this regard, it is suggested that this Specific Safety Guide, which should provide recommendations and guidance on the requirements of SSR-1 for the process of site evaluation, be consistent with GSG-10 and refer to GSG-10 to avoid duplication as much as possible. In particular, we believe that chapters 2 and 7 should be carefully reexamined, including their titles.</p>					<p>and guidance on a general framework for performing radiological and environmental impact assessments for facilities and activities both in normal operations and potential exposures, to estimate and control the radiological effects on the public and on the environment. This publication is revision of NS-G-3.2. This publication provides specific recommendations and guidance for nuclear installations. There is no overlap or duplication. It complements each other. It was ensured working together with relevant sections in IAEA. Both documents cross reference each other.</p>
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/ Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	General	Recommend that consideration be given to introducing some type of roadmap to DS529 early in the document that helps to assist the analyst on the types of contaminant fate and transport analyses commonly that might be appropriate for the type of nuclear installation under review. The roadmap envisioned would clarify what types of nuclear installations DS529 applies to. Having done that, it is recommended that there is text describing the types of release vectors expected at those facilities. Lastly, having introduced this new material, recommend that consideration be given to introducing a matrix that identifies the applicable guidance chapters in DS529 that would potentially be applicable to the type of nuclear installation under review.	It is understood that DS529 would apply to different types of nuclear installations. In the case of conventional nuclear power stations (NPPs), they are typically located near some source of cooling water such as a river, lake, or the ocean. By contrast, access to water is not an issue nor is it desirous in the operation of waste management facilities. As the contaminant fate and transport events to be evaluated are necessarily common to all facilities, it would be useful for DS529 to provide some additional guidance on how the document's recommendations be implemented. For example, radon releases are not likely to be significant at a NPP whereas they might be significant at an engineered waste disposal site.			x	In section 7, Figure 1 show a type of road map on data used and modelling performed at the various stages of radiological environmental impact assessment for normal operation and accident conditions. This can be moved to section 2 and elaborated with text. However, it need more time to implement. Please see para. 1.13. The recommendations provided in this document are applicable to all types of nuclear installation as defined in the IAEA Nuclear Safety and Security Glossary [6]. Although they are predominantly written with nuclear power plants in mind, they are also applicable to other nuclear installations through the use of a graded approach (see section 10). Nuclear installations includes nuclear power plants; research reactors (including subcritical and critical

							assemblies) and any adjoining radioisotope production facilities; storage facilities for spent fuel; facilities for the enrichment of uranium; nuclear fuel fabrication facilities; conversion facilities; facilities for the reprocessing of spent fuel; facilities for the predisposal management of radioactive waste arising from nuclear fuel cycle facilities; and nuclear fuel cycle related research and development facilities.
29.	General	See comment.	It is observed that the text of the draft document is written in a tone that reflects a reactor perspective while there are multiple statements acknowledging that that the guidance is supposed to apply to all types of nuclear installations. It is recommended that the tone of the text and guidance be generalized to reflect the intended generic scope of the document. For example, see paragraph 2.30.			x	This is a specific safety guide for nuclear installations. Although they are predominantly written with nuclear power plants in mind, they are also applicable to other nuclear installations through the use of a graded approach (see section 10).

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS		Page 1 of 17		ENISS			
Country/Organization: ENISS		Date:					
06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	General comment	It does not seem to be the usual practice to quote requirements as first paragraphs of chapters in a safety guide. Please ensure consistency with the usual/agreed practice.				x	Safety specialist checked the document.

2 General comment	Chapter 8 deals with monitoring. However, monitoring is the subject of DS505. The whole chapter 8 should be deleted. If there is some valuable text it needs to be added to DS 505.			x	RS-G-1.8 (DS505) is for nuclear facilities. This guide provides specific guidance for nuclear installations. DS505 reference this document for nuclear installations. There is no overlay. It complements each other.
3 General comment	The document deals with exposure in normal operation and in accident situations, sometimes in the same paragraphs. It is not always clear to understand what type of exposure is considered, this has to be clearly indicated in each case.			x	It is already done as applicable.
4 General comment	The document is very detailed, in some case “should” has to be replaced by “could” to avoid difficulties in applying the document.			x	“Should” or “Could” are used as appropriate.

Comments on Section 1

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page.... of....					
Country/Organization: Belgium		Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1.11	Although they are predominantly written with nuclear power plants in mind, they are also applicable to other nuclear installations through the use of a graded approach (see section 10).	For better readability as the § 1.11 is before the § 1.13 on the document structure.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: FRANCE		Date: 6 Oct 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3.	1.9	Although an environmental impact assessment covers potential radiological and non-radiological impacts, the latter are out of the scope of this Safety Guide. <u>Nevertheless, attention should be paid to ensure the non radiological impact assessment is performed in a consistent way with the radiological impact assessment in terms of transfer in the environment and representative person.</u>	For chemical substances, assessments have to be made with the same assumptions than those used for radiological assessment	x			

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany				Pages: 10 Date: 06.10.2023				
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	1.	1.10	In an environmental impact assessment, in addition to analysing the environmental impacts of the proposed actions (in this case, the construction, operation and decommissioning of a nuclear installation at the proposed site) alternative actions are also considered, such as the use of other nuclear technologies or non-nuclear technologies, and the ‘do-nothing’ scenario³. This publication does not address the conditions that would prevail at the site under the ‘do-nothing’ scenario. <u>Environmental impacts of alternative actions, that need to be considered as part of the</u>	The sentence “ <i>This publication does not address the conditions that would prevail at the site under the ‘do-nothing’ scenario.</i> ” needs further explanation, especially as it is not repeated within the guide. If the ‘do nothing’ scenario is not addressed in this guide, what is? Other alternative actions like the use of other nuclear or non-nuclear technologies? Or are the recommendations of the guide just limited to environmental impacts of the	x			

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Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany Pages: 10 Date: 06.10.2023								
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			<u>environmental impact assessment, are not subject of this Safety Guide.</u> The conditions at the site and in the vicinity could change over time (e.g. population size and distribution); however, this Safety Guide covers existing conditions (e.g. current nuclear facilities on the site) as part of the assessment of environmental impacts from the proposed actions.	proposed actions? In this case we suggest to rewrite this part of the para.				

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Radiation and Nuclear of Safety Directory (RNSD) Page of Country/ Organization: IRAQ/ Iraqi Atomic Energy Commission (IAEC)/ Radiation and Nuclear of Safety Directory (RNSD) Date: 2023/10/09								
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection	
4	Para 1.3	Adding a paragraph about the impact of radioactivity and discharges from nuclear facilities in the environment on the public. An example of this is groundwater and its relationship to agriculture as food for the population.	Because groundwater is connected in channels that reach tens of kilometers from the nuclear facility. This water may used to irrigate agricultural areas.			x	It is included in the document (please see Section 6.	

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Reviewer: Sh. Sheikhi Country/Organization: IRAN/ INRA Date: 6 Oct 2023							
Comment No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	1.7/line 5	Stages of site evaluation needs to be clarified or referred to other IAEA documents needs to be provided.	A number of Stages for site evaluation are introduced in SSG-12 paragraph 3.6 which seems to be different from the intend of this section.		x		Text is revised.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRcSC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRcSC; Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	Page. 1 1.1.	1.1 IAEA Safety Standards Series No. SSR-1, Site Evaluation for Nuclear Installations [1] establishes requirements on the potential effects of a nuclear installation on people and the environment to be considered in site evaluation, and requirements on the investigation of site characteristics and assessment of the radiological environmental impact of nuclear installations. for : <u>(a) Defining the information to be used in the site evaluation process;</u> <u>(b) Evaluating a site such that the site specific hazards and the safety related site characteristics are adequately taken into account, in order to derive appropriate site specific design parameters;</u> <u>(c) Analysing the characteristics of the population and the region</u>	Appropriate descriptions in para. 1.4 of SSR-1 might be used.		x		Para 1.1. is revised.

		<u>surrounding the site to determine whether there would be significant difficulties in implementing emergency response actions effectively.</u>					
3	Page. 2 1.3.	Delete the following items in the paragraph 1.3.: (c) Linking of results of analyses with assessment of overall radiological impact (including dose assessment); (d) Full spectrum of potential release scenarios;	Paragraph 1.3. should be described based on the 3. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT in DPP.			x	During development of the document, scope was enhanced.
4	Page. 2 1.5.	1.5. The main objective of this Safety Guide is to provide recommendations on the investigation of site characteristics that could affect the safety of the nuclear installation and the evaluation of potential radiation risks to the public and the environment in site evaluation for nuclear installations in order to meet the applicable safety requirements established in SSR-1 [1], SSR-3 [2], SSR-4 [3], GSR Part 3 [4] and GSR Part 7 [5]. It provides recommendations on the identification and evaluation of direct and indirect pathways by which a radioactive release from a nuclear installation could potentially affect the public and the environment during operational states and in accident conditions. It also provides specific recommendations on radiological environmental impact assessment for nuclear installations. <u>how to apply the existing IAEA guidance on radiological environmental impact assessment in the process of site evaluation and how to do it in a graded way.</u>	Clarification of the description based on the requirement 5 of SSR-1. Too specific as a guide. The description in DPP might be used.		x		Para. 1.5 is revised. During development of the document, objective was revised based on feedbacks from MSs during technical meetings on the scope of document.
5	Page. 2 1.7.	1.7. ... It also provides recommendations on the development of the radiological impact assessment, which is part of the environmental impact assessment report, and relevant sections of the safety analysis report.	The scope of this guide should be clearly distinguished from the scope of GSG-10. The description of 1.16. in SSR-1 might be used since			x	Scopes of GSG-10 and this publication are clearly distinguished. They are complement each other. This document

		input to the preliminary safety analysis report and the final safety analysis report.	it is not appropriate to include recommendations and guidance that are beyond the requirements of SSR-1.				covers radiological environmental impact assessment of nuclear installations.
6	Page.2 1.8.	...The feasibility of <u>planning</u> effective emergency response actions and the application of a management system for those actions are also addressed.	Consistency with the term of SSR-1 below: Requirement 13: Feasibility of <u>planning</u> effective emergency response actions	x			

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
12.	1.3	Recommend the following word change (underlined) to item (b): “ <u>Methodologies</u> for analysis of dispersion and transport of radionuclides;”	Filling of gaps is an issue rather than a topic as other items in the list.	x			
13.	1.8	Recommend that the third sentence in §1.8 be treated as a separate/distinctive item ... a new §1.10 as follows: “1.10 This Safety Guide covers analysis of the dispersion of radionuclides in the atmosphere, analysis of the transport of radionuclides in surface water and groundwater and assessment of overall radiological impact and dose assessment in the process of site evaluation.”	The review topics enumerated in §1.8 are each unique. These topics could be treated as separate topics as individual paragraphs.	x			
14	1.8	Recommend that the fourth sentence be treated as a	The review topics enumerated in §1.8 are each unique. These topics	x			

		separate/distinctive item ... a new §1.11 as follows: “1.11 The feasibility of effective emergency response actions and the application of a management system are addressed.”	could be treated as separate topics as individual paragraphs.				
15	1.10	See comments.	This publication does not address the conditions that would prevail at the site under the ‘do-nothing’ scenario.” It is not clear why this statement or approach is taken. The information that is likely applied to action scenarios such as atmospheric transport will also apply to no action scenarios. It is recommended that the third sentence in this section be deleted.	x			
16	1.10	See comments.	Doesn't the assessment of environmental impacts include an assessment of potential future impacts, such as after closure of a disposal facility? Therefore, shouldn't this guide cover existing <u>and</u> projected future conditions?		x		Disposal facility is not a nuclear installation, and it is out of scope of the document. Text amended to acknowledge that changes over time should be considered.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS		Country/Organization: ENISS		Page 1 of 17		ENISS	
06/10/2023				Date:			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection

5	1.8	This Safety Guide provides recommendations on how to assess the radiological environmental impact of a new or existing nuclear installation on people and the environment <u>due to discharges or after</u> during discharges and accidental releases	This is not about making evaluation in real time during releases.	x			
6	1.11	The recommendations provided in this Safety Guide are applicable to all types of nuclear installation as defined in the IAEA Nuclear Safety and Security Glossary [6]. Although they are predominantly written with nuclear power plants in mind, they are also applicable to other nuclear installations through the use of a graded approach.	Are the NORM installations embraced by this safety guide? If the answer is "yes", it should be written.	x			NORM is not covered.

Comments on Section 2

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page.... of....					
Country/Organization:		Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	2.8	In addition, there may be exposure due to activity directly deposited on skin and direct exposure from activity on the site (i.e. direct exposure to gamma radiation, <u>see the additional exposure pathways described in para. 5.29 of [8]</u>) without any activity having been released. These would also be the expected pathways for accidental	It is proposed to add a reference to IAEA GSG-10 as done already in para. 2.7. The last sentence of para. 2.8 could be misinterpreted. By writing that these would also be "the" expected pathways, this could be read as "the only" or "the main"	x			

		releases although their relative importance might differ.	pathways whereas the pathways mentioned in para. 2.7 are also to be considered (and often more important). Hence, it is proposed to delete the word "the".				
3	2.13	During normal operation, there are usually authorized and regulated effluent discharges to the atmosphere and surface water. In accidental releases, there might also be direct releases to groundwater or to the ground surface. The initial release into each of these media and the resulting important exposure pathways are discussed in paras 2.14–2.31.	Proposed modification for better understanding and context of what was intended as “authorized discharges”.	x			
4	2.14	The pathways that are significant depends on the nature of the atmospheric release, ...	Typographical comment (delete “s” at the end of “depends”)	x			
5	2.18	... become part of the food chain. 2.18 . The radionuclide radiocarbon (14C) has a long half-life (~5000 years): ...	Typographical comment (delete “2.18” in the middle of the text)	x			
	2.21	Exposure via the other pathways listed in para 2.7 usually involves deposition of radionuclides from the plume. Deposition can be either ‘dry’ or ‘wet’. Dry deposition occurs when contaminants in the plume adsorb to suspended particulates in the air which are then deposited on the ground (for an elevated release this may be some distance from the release point). Wet deposition occurs when precipitation (e.g. rain, snow) washes material from the plume. The consideration of “wet” or “dry” deposition induces a plume depletion.	The wet & dry deposition to be considered for the other pathways indicated in § 2.21 could have an effect on the other pathways (a depletion of the plume induces lower doses for inhalation and cloud shine).	x			
6	2.28	As with releases to groundwater (see paras 2.5+15 and 2.35+227), planned direct discharges to the ground surface are unlikely to be permitted or authorized...	Typographical comment. It is supposed that it was the intention to refer to paras 2.15 and 2.27 instead of	x			

			2.51 and 2.352 (non-existing).				
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: M-L Järvinen		Page.... of....					
Country/Organization: STUK/Finland		Date: 2nd October 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	2.36	Climate change in the terms of the meteorological and hydrological conditions in the region of the nuclear installation site over the lifetime of the installation should be taken into consideration in the radiological impact assessment. <u>Due to dynamic nature of the climate change the plans for continuous monitoring of the changes in the conditions, identifying significant changes, updating the assessment and taking necessary actions should be made.</u>	Please add a sentence on planning the monitoring significant changes. The changes caused by climate change is a dynamic, continuous process and there should be plans in place to recognize significant changes. Periodic safety review takes place typically for NPPS every 10 years and for nuclear waste facilities every 15 year. This time interval may be too long capture significant changes in due time.	x			

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS)		Pages: 10						
Country/Organization: Germany		Date: 06.10.2023						
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.	New 2.6	<u>Paragraphs 5.1-5.14 of SSR-3 [2] provide requirements for the site evaluation specific to research reactors.</u>	Since there are further IAEA Specific Safety Requirements than SSR-1 that provide requirements for a site evaluation and the	x			

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Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
				information acquisition necessary to do it, it might be useful to mention them here.				
1	3.	New 2.7	<u>Paragraphs 5.1-5.12 of SSR-4 [3] provide requirements for the site evaluation specific to nuclear fuel cycle facilities.</u>	Since there are further IAEA Specific Safety Requirements than SSR-1 that provide requirements for a site evaluation and the information acquisition necessary to do it, it might be useful to mention them here.	x			
1	4.	2.8.	In addition, there may be exposure due to activity directly deposited on skin <u>or clothing</u> and direct exposure from activity on the site (i.e. direct exposure to gamma radiation) without any activity having been released.	Activity directly deposited on clothing should be mentioned here too.	x			
2	5.	2.8 3 rd line	<u>As t</u> These would also be the expected pathways for accidental releases, although their relative importance <u>is much higher during such situations</u> might differ.	The essence of this sentence should be that these pathways are more important during accidental releases.	x			
3	6.	2.10	Although the exposure pathways listed in para 2.7 are usually the most significant, there might be other pathways. It should therefore be confirmed that all significant pathways have been identified, especially if there are specific features <u>characteristics</u> about the reactor design, its operation, the site, land use around the site, farming practices or the surrounding location.	The term "feature" has a bit of a positive connotation and is it the context of reactor design usually used for safety features.	x			
1	7.	2.11 8 th line	However, if the conditional probability of a consequence <u>is determined</u>	We propose to rewrite to provide a specific	x			

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Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			entirely with a certain level of confidence being fully realized is assumed to be unity, and it still does not make a significant contribution to the overall risk, then detailed analysis of the consequence may not be needed.	recommendation for establishing a value for the required certainty.				
2	8.	2.17.	Normal Discharges from nuclear installations are expected to continue throughout the lifetime of nuclear installations, from construction to decommissioning, and therefore accumulation of activity in the environment over this period should be considered for longer lived nuclides.	What is meant by “normal” discharge? Is it an authorized discharge? Please clarify.	x			It was intended to refer to release during operation. “Normal” is deleted.
3	9.	2.18	The radionuclides radiocarbon (14C) and tritium (3H) can be particularly difficult to model in the environment because, whatever chemical form they are released as, they can soon be incorporated into CO2 or water, respectively, or be incorporated in organic molecules in environmental media and become part of the food chain. 2.18. The radionuclide radiocarbon (14C) has a long half-life (~5000 years): therefore, collective doses should be assessed over large geographical areas and long integration periods.	Editorial	x			
1	10.	2.20	Another pathways that can lead to exposure <u>are ground shine (radiation from activity deposited on the ground) sky shine (radiation deflected by the air) and cloud shine (radiation from activity in an airborne plume) in the very short term is direct radiation (i.e.</u>	It might be useful to list all common indirect exposure paths at this point, as they need to be considered.	x			

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Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			cloud shine) from the plume. These pathways is <u>are</u> usually less significant than direct inhalation.					
2	11.	2.23 6 th line	[...] however, monitoring of commercially produced food, <u>milk and drinking water</u> and the application of operational intervention levels (see GSR Part 7 [5]), <u>see also IAEA Safety Glossary concerning ingestion and commodities planning distances ICPD.</u>	To stick with GSR Part 7 and with IAEA Safety Glossary (ingestion and commodities planning distance (ICPD)).	x			
2	12.	2.29	The components of radiological environmental impact assessment for protection of the public and of non-human species in normal operation, and for consideration of potential exposure are shown in <i>Fig. 2 and 3 of GSG-10</i> [8].	The figures should be copied to this document from GSG-10. Same in para 7.24.			x	In the first draft of the document, those figures were reproduced. However, IAEA technical editors warned that reproducing figures from other IAEA publications is not appropriate. That is why they are just referenced.
2	13.	2.30 1 st line	The first step in conducting the assessment is to select the source term(s). The selection process might be complex, taking into account factors such as reactor design, materials used and additives to the coolant: <u>and</u>	At this point, the changes in the source term due to decay can be mentioned, which is the main reason for the complexity of its determination.	x			

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Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			<u>changes of inventory during operation of the facility (e.g. due to fission products).</u> For nuclear power plants employing technology that is known and used elsewhere, the data from these other operations should be used to select and provide certainty in the source term.					
2	14.	2.35	Existing sites have the advantage that the environment should already have been characterized and there may be some data from measured discharges and environmental monitoring that can inform the modelling of proposed discharges. <u>This affects the two general cases in which new environmental impact assessments may be required for an existing site:</u> <ol style="list-style-type: none"> 1. <u>For sites with existing facilities due to a modification that affects the potential for releases.</u> 2. <u>For existing sites that a new facility is planned for. In this case</u> Cumulative impacts from new and existing installations should also be considered. 	Maybe it should be mentioned that “existing sites” not only applies on existing sites with new facilities, but also for existing facilities that require a new EIA due to modifications. Furthermore this is not limited to existing sites of nuclear installations.	x			
1	15.	2.36	Climate changes in terms of the meteorological and hydrological conditions <u>and other changes in environmental conditions</u> in the region of the nuclear installation site over the lifetime of the installation should be taken into consideration in the radiological environmental impact	Other natural changes like land subsidence should be considered in the environmental impact assessment. In addition, these changes should also be considered in	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany Pages: 10 Date: 06.10.2023								
Rele - vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			assessment <u>as well as in the safety assessment (see further recommendations on this topic in paragraphs 8.1-8.11 of SSG-18 [15]).</u>	the site evaluation of the safety assessment and its revisions.				

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Radiation and Nuclear of Safety Directory (RNSD) Page of Country/ Organization: IRAQ/ Iraqi Atomic Energy Commission (IAEC)/ Radiation and Nuclear of Safety Directory (RNSD) 2023/10/09 Date:								
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection	
3	Para 2.14 Line No. 8	2.14. The pathways that are significant depends on the nature of the atmospheric release, including the source term, location and medium into which the release is made. Recommendations on the determination of the source term for releases to the environment for anticipated operational occurrences and accident conditions are provided in IAEA Safety Standards No. SSG-2 (Rev. 1), Deterministic Safety Analysis for Nuclear Power Plants [10]. The source term defines the quantities and physical, isotopic and chemical forms of the radionuclides released, the time profile of the release, and other factors that affect its subsequent transport and behavior in the environment (e.g. physical stack height, energy associated with the atmospheric release).	External exposure due to immersion in the atmospheric plume <ul style="list-style-type: none"> • Inhalation of radionuclides in the atmospheric plume • External exposure due to deposition of radionuclides onto the ground surface • Ingestion of radionuclides in terrestrial foods (vegetables, milk, and meat) following Deposition onto the ground surface. 			x	Para 2.7 covers all those aspects.	

5	Page (4) added after req. 2.2	Requirement 6 of SSR-1 states that “Potential external hazards associated with natural phenomena, human induced events and human activities that could affect the region shall be identified through a screening process.”	add			x	Requirement 6 of SSR-1 does not address the radiological environmental impact assessment.
6	Page (4) added after req. 2.3	Requirement 8 of SSR-1 states that “If the projected design of the nuclear installation is not able to safely withstand the impact of natural and human induced external hazards, the need for site protection measures shall be evaluated.”	add			x	Requirement 8 of SSR-1 does not address the radiological environmental impact assessment.
7	Para 2.33 lineNo.5	Add a sentence. Collects information on the current and expected population distribution in the area, including resident population groups. This information will be updated regularly throughout the life of the nuclear site. Special attention will be given to institutions such as schools, hospitals, and nursing homes. When evaluating the potential release of radioactive materials and considering the possibility of implementing prevention and safety measures.	Protection of the public			x	Further recommendations on population distribution are provided in Section 3. Those topics are well addressed in paras. 3.16-3.22.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Sh. Sheikhi Country/Organization: IRAN/ INRA Date: 6 Oct 2023							
Comm ent No.	Para/L ine No.	Proposed new text	Reason	Accepte d	Accepted, but modified as follows	Rejected	Reason for modification/rejec tion
4.	2.36/li ne 1	Climate changes in terms of the meteorological, and hydrological and geological conditions in the region of the nuclear installation site over the lifetime of the installation should be taken into consideration in site evaluation radiological environmental impact assessment site evaluation radiological environmental impact assessment	Geological conditions can be affected by climate changes. It is not only related to the “radiological environmental impact assessment”		x		This part of comment is incorporated. For second part of the comment, sentence refer to climate changes consideration for the radiological environmental impact assessment.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member Page 36 Country/Organization: Japan / NRA Date: 06, Oct., 2023							
No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	2.18.	The radionuclides radiocarbon (¹⁴ C) and tritium (³ H) can be particularly difficult to model in the environment because, whatever chemical form they are released as, they can soon be incorporated into CO ₂ or water, respectively, or be incorporated in organic molecules in environmental media and become part of the food chain. 2.18. The radionuclide radiocarbon (¹⁴C) has a long half life (~5000 years): therefore, collective doses should be assessed over large geographical areas and long integration periods.	Guidance on the use of collective dose is provided in GSG-9. No need to describe assessment methods for the specific radionuclides in the site evaluation guide.	x			
3.	2.23.	The quantities of nuclides deposited by deposition are also important in determining the dose by ingestion. Compared with direct inhalation, the impact is usually less since only a small fraction of the plume will be deposited and incorporated into the food chain and there is some time delay before consumption, during	Collective dose is not explicitly described in SSR-1. Not necessary to be considered at the initial site evaluation stage.	x			SSR-1 require the radiological environmental impact assessment for nuclear installations. Other

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		which short lived nuclides can decay. Contamination and consumption of crops is a pathway that can lead to exposure far from the release point as the produce is transported; however, monitoring of commercially produced food and the application of operational intervention levels (see GSR Part 7 [5]) should lead to the control of exposure via this pathway. Ingestion of forest food might be less amenable to control, but its impact is usually limited to areas close to the original contamination. Ingestion can be a significant contributor to the total collective dose, and hence to population risk, but this might be the result of aggregating very low doses over large numbers of people, which is advised against.					IAEA safety standards provide acceptance criteria to reach this requirement.
4.	2.34.	It might not be necessary to model explicitly every single process involving the transfer of radioactivity between different environmental compartments. However, all processes should be considered, and their relative significance assessed, allowing some Processes might to be discounted if their significance is small, in terms of the impact on the end points being considered. If the effort involved would be disproportionate to the difference in the calculated end points — and considering other uncertainties, such as those in the source term — then few insights would be gained from detailed modelling.	Related to the general comment #1. Relevant process should be included.			x	This is considered as good practice.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Haruyuki Ogino (Japan RASSC) Page.... of... Country/Organization: Nuclear Regulation Authority Date: 6 Oct 2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.18	2.18. The radionuclides radiocarbon (¹⁴ C) and tritium (³ H) can be particularly difficult to model in the environment because, whatever chemical form they are released as, they can soon be incorporated into CO ₂ or water, respectively, or be incorporated in organic molecules in environmental media and become part of the food chain. 2.18. The radionuclide radiocarbon (¹⁴ C) has a long half-life (~5000 years): therefore, collective doses should be assessed over large geographical areas and long integration periods. <u>Further guidance on the use of collective dose is provided by IAEA Safety Standards Series No. GSG-9.</u>	Clarification. A new sentence should be added as paras. 5.40 – 5.42 of GSG-9 provide further guidance for collective dose to members of the public and cautions when using them.	x			
2	2.18	2.18. The radionuclides radiocarbon (¹⁴ C) and tritium (³ H) can be particularly difficult to model in the environment because, whatever chemical form they are released as, they can soon be incorporated into CO ₂ or water, respectively, or be incorporated in organic molecules in environmental media and become part of the food chain. 2.18. —The radionuclide radiocarbon (¹⁴ C) has a long half-life (~5000 years): therefore, collective doses should be assessed over large geographical areas and long integration periods.	Editorial.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: WASSC member of 1 Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety Date: October 04, 2023				Page 1			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.18/4	o The following is suggested. (before) ~~ and become part of the food chain.2.18. (after) ~~ and become part of the food chain. 2.18	o I think that it is a typo.	X			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Carl-Henrik Pettersson, Aino Obenius Mowitz Page.... of.... Country/Organization: Swedish Radiation Safety Authority (SSM) Date: 2023-10-06							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.36	Climate changes in terms of the meteorological, and hydrological conditions and changes in land use	Future climate change during the lifetime of the nuclear facility can also lead to changed land uses (change the proportions of forestry and arable farming, changed cultivation patterns and suitability of crops) in the surrounding area which can influence radionuclide impact.			X	Section 2.36 is dedicated only for climate changes. Changes in land use is addressed in section 3.25.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: SSTC NRS		Page 1 of 1					
Country/Organization: Ukraine		Date:28 September					
2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Para. 2.25 (title)	Releases Releases Discharges to surface water	The paragraph deals primarily with discharges and not with atmospheric deposition of releases to surface water.		x		Title is changed to accommodate both normal and accidental releases
2	Para. 2.28 (title)	Releases Releases Discharges to ground surface	If the paragraph refers to the discharge of radioactive material in liquid form, it seems appropriate to use the term discharge.		x		Please see above resolution.
3	Para 2.28/ Line No.2	Accidental releases releases discharges to the ground ...	If the paragraph refers to the discharge of radioactive material in liquid form, it seems appropriate to use the term discharge or to add clarifying wording.		x		Text is revised.

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
17.	2.7 (a)	See comments.	In reference to the parenthetic phrase “(e.g., gases, vapours, aerosols),” particulates can also be important in accident scenarios. It is recommended that the parenthetic phrase be expanded as follows: “(e.g., gases, vapours, aerosols, particles)”.	x			

18.	2.9	See comments	Consider mentioning cloud shine in this paragraph as it can be important for some systems.			x	Cloud shine is mentioned in new para. 2.9 (j).
19.	2.9	See comments	In reference to the first sentence of this section, the “identification” action and the determination of “significance” are two different points/activities of which both are very important. It is recommended that these concepts be treated separately in separate sentences in this section.	x			
20.	2.9	See comments.	It is recommended that the second sentence be treated as a new §2.10 as this is an activity separate and distinctive from the actions described in the first sentence of this section.	x			
21.	2.11	It is recommended that the phrase “due to design extension conditions” be deleted.	The intent of this statement is unclear and reflects a concept (terminology) that is not commonly used.	x			
22.	2.13	See comments.	We question the validity of the first sentence. Its validity depends on the type of nuclear facility in question (non-reactor). It is observed that many other types of non-nuclear facilities have no radioactive releases to the surface water pathway.			x	This is a specific safety guide for nuclear installations.
23.	2.14	See comments.	The guidance is understood to apply to all types of facilities systems not just power reactors. It is recommended that the second sentence be moved to the end of the section and be modified as follows with the following addition (underlined): “ <u>For reactors or similar systems, recommendations on the determination of the source term for releases to the environment for anticipated operational occurrences and</u> ”			x	This is a specific safety guide for nuclear installations.

			<i>accident conditions are provided in IAEA Safety Standards No. SSG-2 (Rev. 1), Deterministic Safety Analysis for Nuclear Power Plants [10].”</i>				
24.	2.16	See comments.	In references to the second sentence, it is recommended that examples be provided of appropriate timeframes for monitoring.		x		The appropriate time frame will be highly dependent on the local site conditions.
25.	2.18	See comments.	If the last sentence is retained, it is recommended that additional guidance should be provided on collective doses. For some facilities, such as a disposal facility (which is a nuclear installation), the impacts can extend over very long periods. Integration of very small doses over very long times may produce impacts that are perceived as meaningful when they are not.	x			Disposal facility are out of scope of the document. However, sentence is deleted.
26.	2.20	It is recommended that the following revision to this section be considered: “Cloud shine can lead to exposure by direct radiation from the plume or other radiation source. This pathway is usually less significant than direct inhalation for accidental releases, and the significance is dependent on the type of facility.”	This is contextual based topic on a short-term accidental release. At a disposal facility for example, sky shine could be the most important pathway because accident scenarios are very limited.			x	Disposal facility are out of scope of the document.
27.	2.23	See comments in reference to the last sentence.	Consider providing a lower threshold for doses that should not be considered in collective dose calculations.	x			That part of the para. Is deleted due to comment by other MS.
28.	General, around §2.25	Consider introducing a pathways diagram to the discussion of surface water releases.	It is common practice when publishing guidance on dose assessments to provide a diagrams illustrating the elements and relationships of those assessments.			x	Proposal makes sense however is not easy to do in short time.

			We believe that the use of graphics is an effective communication tool to identify the pathways that are usually more or less significant rather than relying extensive text.				
30.	2.32	It is recommended replacing the phrase “a high rate consumer” with alternative text such as “a consumer who ingests a high fraction of locally produced food” or comparable text.	It is observed that the terminology in the draft is not in common use in the description of dose assessment methods.	x			
31.	2.35	It is recommended that the following revision to this section be considered: “Existing sites have the advantage over new sites that the environment should already have been characterized and there may be data from measured discharges and environmental monitoring that can inform the modelling of proposed discharges.”	Slight wording change for readability, break into two paragraphs as they are different thoughts.	x			
32.	2.36	It is recommended that the following revision to this section include text that addresses the cumulative impacts from new and existing installations.	Slight wording change for readability, break into two paragraphs as they are different thoughts.	x			
33.	2.36	Change the phrase “extensive site characterization” to simply “site characterization”	“Extensive” is a subjective term and may not be necessary depending on the facility and the risk. In addition, the latter part of the paragraph mentions that investigations should continue, but not all of them would be expected to continue such as geologic characterization that happens up front.	x			The term “Extensive site characterization” does not exist in para. 2.36. It exists in para. 3.6. “Extensive” is deleted in para. 3.6.
90.	2.30 / 11	Ensure that the source term estimates are <u>conservative</u> .	“Not overly optimistic” is an ambiguous phrasing and using “conservative” is better suited.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS Country/Organization: ENISS 06/10/2023		Page 1 of 17 Date:		ENISS			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
7.	2.8	In addition, there may be exposure due to activity directly deposited on skin and direct exposure from activity on the site (i.e. direct exposure to gamma radiation) without any activity having been released. These would also be the expected pathways for accidental releases although their relative importance might differ.	This para is confusing. If there was no release there will be no radiation. The direct radiation from a NPP in operation is neglectable for members of the public. Members of the staff will be monitored.			x	We cannot assume that exposure from direct radiation will be negligible. In fact, there are cases, where this pathway has been the most dominant. For example, Sizewell A in UK
8.	2.9	The first step in evaluating a site for a nuclear installation should be to identify all possible exposure pathways and then determine the most significant ones in terms of the exposure of the public or the environment. The significance of the pathway depends on the quantities and the chemical and physical form of the radionuclides released and other characteristics of the release that might affect the subsequent dispersion of radionuclides and their behaviour in the environment, the location and	It is noted that “ <i>exposure of the public or the environment</i> ” is concerned. But in 2.7 and 2.10, it looks as if the environment is not taken into account.		x		“of” is corrected. These paras. are dealing with human exposures.

		medium into which the release is made, and the characteristics of the environment and population around the site					
9.	2.15	(...) For this reason, some less obvious radionuclides that might accumulate in the environment during the lifetime of the installation (e.g. radionuclides radiocarbon (¹⁴C) and tritium (³H)), which can be difficult to remove) and/or less obvious pathways might become more significant. (...)	There is no accumulation of H3 nor C14 in the environment.		x		Text is revised.
10.	2.15	(...) However, radionuclides might enter groundwater indirectly, for example via an atmospheric release and subsequent deposition on the ground.	This sentence is correct, but it is more likely for RN to enter in the groundwater through the exchange with river in which discharges are allowed.	x			
11.	2.18	The radionuclides radiocarbon (¹⁴ C) and tritium (³ H) can be particularly difficult to model in the environment because, whatever chemical form they are released as, they can soon be incorporated into CO ₂ or water, respectively, or be incorporated in organic molecules in environmental media and become part of the food chain. 2.18. The radionuclide radiocarbon (¹⁴ C) has a long half-life (~5000 years): therefore, collective doses should be	According to the ICRP, collective effective dose is a tool for optimising and comparing radiological technologies and protective procedures, mainly in the context of occupational exposure. Collective effective dose is not designed as an epidemiological risk assessment tool, and it is inappropriate to use it in risk projections. So, the collective dose is not the appropriate tool to assess C14 and H3 impact... The dose to the representative person should be considered. But it should be kept	x			Text is deleted.

		assessed over large geographical areas and long integration periods.	in mind that dose due to C14 and H3 is extremely low and is absolutely not a major concern.				
12.	2.20	Another pathway that can lead to exposure in the very short term is direct radiation (i.e. cloud shine) from the plume. This pathway is usually less significant than direct inhalation <u>for members of the public under normal operating conditions.</u>	It is suggested to add this information.	x			
13.	2.22	(...) The relative significance of different nuclides also depends on the time frame over which the dose is integrated: nuclides with longer half-lives become increasingly important for longer integration times. (...)	And what about biological half-life? Why not talk about “effective half-life” that accounts for biological and physical half-life of a RN?	x			
14.	2.23	(...) Ingestion can be a significant contributor to the total <u>effective</u> collective dose, and hence to population risk, but this might be the result of aggregating very low doses over large numbers of people, which is advised against.	According to the ICRP, collective effective dose is a tool for optimising and comparing radiological technologies and protective procedures, mainly in the context of occupational exposure. Collective effective dose is not designed as an epidemiological risk assessment tool, and it is inappropriate to use it in risk projections. Using effective dose avoids this misuse of the collective dose		x		Societal risk used in some MSs may be an important metric in assessing the acceptability of nuclear installations and needs to be considered.
15.	2.24	Resuspension of deposited radionuclides which are then inhaled leads to a longer term impact to the public, but	What is the case: accidental release?	x			Text is revised.

		given that only a small fraction of the plume is deposited and then resuspended, the impact on any individual is insignificant in comparison with direct inhalation. For those people who do not inhale the plume directly, resuspension should be considered as a possibly significant pathway.					
16.	2.26	Activity might also accumulate in sediments and in the food chain as a result of releases to surface water. This activity should also be considered when determining the relative significance of surface water pathways	Sediments are in fact a matrix of accumulation, but this is rarely the fact in food chain. So, what is the meaning of this sentence?	x			Text is revised.
17.	2.27	Discharges to groundwater are unlikely to be permitted or authorized, as explained in para 2.15, although there might be indirect pathways via atmospheric releases and then rainfall. Accidental releases to groundwater could occur, for example as a result of spillage of radioactive waste or core melt through the basemat. Unlike direct releases to the atmosphere, which lead to immediate exposure, activity released to groundwater might be transported through the groundwater for many years before it reaches a location where exposure of the public could occur. During this time,	Cf. comment above on 2.15, concerning the transfer of RN to groundwater	x			Text is revised.

		short lived radionuclides decay, and the shielding of the ground will significantly limit exposure by direct radiation. These accidental releases could, however, lead to long term contamination with few, if any, remediation solutions. These factors should be considered in determining the significance of this pathway.					
18.	2.31	These activity concentrations are then used to calculate the doses to a <u>representative person</u> exposed individuals (see Section 7).	Clarification needed	x			
19.	2.32	The doses from all the significant pathways that lead to exposure of the representative person should be added together to give <u>the a total effective</u> dose	Clarification needed	x			
20.	2.32	Releases to the atmosphere or water could lead to many people being exposed by several pathways. To assess the risk to the public, a representative person is selected, for whom the individual dose is calculated. Representative persons can be identified by determining the most significant exposure pathways (see para. 2.11); for example, for the inhalation pathway the representative person could be somebody living close to	The representative person should be identified considering all exposure pathways and not one representative person for each exposure pathways. As mentioned in ICRPaedia, a representative person is an individual receiving a dose that is representative of the doses to the most highly exposed individuals in an exposed group from a given source, excluding extreme habits.	x			Text is revised.

		<p>the site in the prevailing wind direction, and for the ingestion pathway it could be a high rate consumer of locally produced food. Further recommendations on selecting the representative person are provided in Section 7, and guidance is also given in Ref. [14]. The doses from all the significant pathways that lead to exposure of the representative person should be added together to give a total dose.</p>					
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Comments on Section 3

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: B. Ahier / K. Henderson Page.... of... Country/Organization: CANADA				Date:6 Oct 2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3.10	<p>The extent of the geographic area over which these data are compiled should be based on the anticipated effects of the environment on the safety of the proposed nuclear installation and the anticipated effects of the nuclear installation on the environment <u>under normal operation and accident conditions</u>. The geographic extent of the investigations should be at least wide enough to include both the peak radionuclide concentration and the maximum predicted dose plotted as a function of distance from the installation</p>	<p>Completeness and clarity. Investigations should not be limited to normal operations</p>	x			

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: M-L Järvinen		Page.... of....					
Country/Organization: STUK/Finland		Date: 2nd October 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	3.25	Please change radioactive material discharged to radioactive substance discharged.	To be consistent with the IAEA glossary. Radioactive material is the material under regulatory control. There may be radioactive substance discharges from the facilities.	x			

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS)		Pages: 10						
Country/Organization: Germany		Date: 06.10.2023						
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	16.	3.6 5 th line	However, the investigations should continue during the construction, operation and decommissioning of the installation to confirm that the public and the environment continue to be protected and that the environmental impacts are as predicted. <u>This can be done as part of a review of the site evaluation within the framework of the periodic safety review as stated in para 4.48 of SSR-1 [1].</u>	SSR-1 offers a good specific approach for continuing investigations that should be mentioned.	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	17.	3.19	The information collected on the temporary population should cover the short-term temporary population (e.g. tourists, nomads) and the long term temporary population (e.g. seasonal inhabitants, students). The maximum size of the temporary population and its periods of occupancy in the external zone should be estimated. Particular types of institutions such as schools, hospitals, prisons and military bases within the external zone should be identified for the purposes of emergency planning. In the area outside the external zone, estimates of the approximate size of the temporary population together with its periods of occupancy should also be made.	This is already mentioned in para 3.17 line 6, except for military bases, which could be added there.	x			
2	18.	3.24 (i)	Foraged foods such as mushrooms, berries Forest food and seaweed.	In para 2.23, the term forest food is used (as it is in GSG-10). We suggest using it throughout the whole document.	x			
2	19.	3.34	If there are other sources of human-made radioactivity or enhanced natural radioactivity (e.g. another nearby nuclear installation or industrial facility or natural occurring radioactive materials) that contribute to the radioactivity levels in the vicinity of the site, this should also be measured to determine the cumulative exposure of people around the site to human-made radiation.	To specify and give an example for the “enhanced natural radioactivity”.	x			
1	20.	New 3.45	<u>If the meteorological investigation is to be conducted for a new facility at an</u>	Recently, there has been an increase in new NPP projects	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			<u>existing site and there is a certain distance between the meteorological equipment of the existing facility and the proposed location of the new facility, it may be appropriate to conduct a validation study to utilize the existing meteorological data. This validation should be based on measurements to be made at the location of the new facility at a scale that provides a certain level of confidence.</u>	planned at old, existing sites. As in some cases (e.g. the SMR-project in Wyoming, USA) the new facility has to be planned in some distance to the old one, there are attempts to use the collected meteorological data through validation measurements. This should be covered by a new recommendation in this guide, that could look like this.				
1	21.	3.60 New bullet	For sites on rivers, the hydrological and other information should cover the following: <u>(p) Dams located upstream and the water volumes in the adjacent lakes.</u>	Dams should be identified during the site evaluation.	x			
1	22.	3.61 New bullet <u>(j) If applicable, the extent of the seasonal ice formation.</u>	At least for NPP, data on ice formation should be collected. This also applies to para 3.65.	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS and BASE) Country/Organization: Germany					Page 1 of 1 Date: 2023-09-26			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	1	3.65	For sites located on the shores of seas and oceans, the information should include the following:	Clarification	x			

		<p>(a) The general shore and bottom configuration in the region, and unique features of the shoreline in the vicinity of the discharge.</p> <p>(b) Data on bathymetry out to a distance of several kilometres, and data on the amount and character of sediments in the shallow shelf waters.</p> <p>(c) Speeds, temperatures and directions of any near shore currents <u>and tides</u> that could affect the dispersion of discharged radioactive material. Measurements should be made at appropriate depths and distances, depending on the bottom profile and the location of the point of discharge.</p>					
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Radiation and Nuclear of Safety Directory (RNSD) Page of Country/ Organization: IRAQ/ Iraqi Atomic Energy Commission (IAEC)/ Radiation and Nuclear of Safety Directory (RNSD) 2023/10/09				Date:			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Para 3.18	The government is responsible for developing and preparedness strategy Assess the risks associated with the facility. Nuclear activities and radioactive sources within or outside the country's borders	This should be considered for a number of reasons. For example, the facility may have a large workforce that would need to be evacuated in an emergency, or the facility may be hazardous and need its own emergency arrangements that will need to be coordinated with the emergency plan of the nuclear installation			x	This document covers only evaluation of the feasibility of planning effective emergency response actions. Other aspects of emergency response action are covered in other IAEA safety standards.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Sh. Sheikhi Country/Organization: IRAN/ INRA Date: 6 Oct 2023							
Comm ent No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejecti on
3.	3.6/lin e 3	The investigations for site characterization should begin several years before the application for a license license to construct	Document needs some editorial amendments.	x			

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Reviewer: Japan NUSSC member Page 36 Country/Organization: Japan / NRA Date: 06, Oct., 2023							
No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
5.	3.5.	Paragraph 4.46 of SSR-1 [1] states: “At a minimum, the data collection process shall include the following: <u>(a) Information on natural and human induced external hazards, including information on sources of hazards, propagation of hazards and the potential effects on the nuclear installation and on people and the environment;</u> (d) Information on the potential impact of the nuclear installation on people and the environment for operational states and accident conditions; (e) Information required for planning effective emergency response actions on the site and off the site in all environmental conditions and for all states of the nuclear installation”.	To keep a consistency with para. 3.37. (a) should be added considering the content of para. 3.37.			x	Para. 4.46 (a) of SSR-1 addresses natural and human induced external hazards. It is out of scope of this guide.
6.	3.8.	For the purposes of assessing the radiological environmental impact of a nuclear installation, background environmental data on the areas listed below should be compiled:	To keep a consistency with para. 1.9. “Data collection for non-radiological impacts” should be deleted considering the content of para. 1.9.			x	Para. 1.9 is revised. Attention should be paid to ensure the non radiological impact assessment is

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No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		(a) Population distribution; (b) Uses of land, flora and fauna, and water in the region of the site; (c) Background radioactivity in environmental media; (d) Meteorological characteristics of the region; (e) Hydrological and hydrogeological characteristics of the site catchment for surface water and groundwater. The background environmental data needed for assessing non-radiological impacts (see para. 1.9), such as socioeconomic impacts and the impact on culturally and historically significant properties at or near the site, should be compiled contemporaneously with the data needed for radiological impact assessments.					performed in a consistent way with the radiological impact assessment in terms of transfer in the environment and representative person.
7.	3.10.	<u>The extent of the geographic area</u> over which these data are compiled should be based on the anticipated effects of the environment on the safety of the proposed nuclear installation and the anticipated effects of the nuclear installation on the environment.	Clarification for the “geographic area”.			x	It is clear. It is investigation area.
8.	3.17.	Data on the present population in the external zone should be obtained from census data, local authorities or by means of special field surveys, and those data should be as accurate and as up to date as possible. Similar data should also be collected for the region outside the external zone to distances determined in accordance with national practice and regulatory requirements, and the expected range of the impact of the project. The data should include the number of people normally present in the area, and the location of; vulnerable populations and	To keep a consistency with para. 6.8 of SSR-1, which states schools, hospitals, nursing homes and prisons as examples for special attention for information collection.			x	Safety guide provides recommendations, guidance on how to fulfill requirements giving elaborations, examples, etc.

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No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		residential institutions (e.g. schools, hospitals, nursing homes and prisons), other institutions and recreational facilities such as parks and marinas.					
9.	3.20.	A projection of the present population in the region should be made both for the expected year of commissioning of the nuclear installation and for selected years (e.g. every tenth year) over the lifetime of the installation. Projections should be made on the basis of population growth rate, migration trends and plans for possible development in the region, including the project itself. The projected figures for permanent population and temporary population should be extrapolated separately if <u>these population</u> data are available.	Clarification. The sort of data should be specified.	x			
10.	3.22.	The population data collected should be presented in a suitable format and scale to permit their correspondence with other relevant data, such as data on atmospheric dispersion and on uses of land and water. The data on permanent population and temporary population should be clearly indicated. In general, population data should be presented either in tabular form or graphically, for example using concentric circles and radial segments with the site as the origin. More details <u>on population data</u> should be given for areas closer to the site, especially within the external zone.	Clarification. The sort of data should be specified.	x			
11.	3.23.	The operation of a nuclear installation might affect the uses of land and water in the surrounding area. The availability of cooling water is an important consideration for the siting of a nuclear power plant. In addition, the characteristics of the land and water utilized in the region should be addressed in demonstrating	Related to the comment No. 6. “Data collection for non-radiological impacts” should be deleted considering the content of para. 1.9. describes that non-			x	Para. 1.9 is revised. Land use and water use are within the scope of radiological environmental impact assessment.

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		the feasibility of the emergency plan. Therefore, as part of the site evaluation, the site topography (e.g. flat plains, mountains, hills, creeks, wetlands, valleys, forests) should be described, and the uses of land and water should be investigated.	radiological impacts are out of scope of this guide. Thus, use of water is out of scope.				
12.	3.24.	<p>The <u>detailed investigations should be written in the Annex.cover the following:</u></p> <p><i>The followings are moved to the Annex.</i></p> <p>(a) <u>Land devoted to agricultural uses, its extent, the main crops and their yields;</u></p> <p>(b) <u>Land devoted to dairy farming, its extent and its yields;</u></p> <p>(c) <u>Land devoted to industrial, institutional and recreational purposes, its extent and the characteristics of its use;</u></p> <p>(d) <u>Bodies of water used for commercial, individual and recreational fishing, including details of the aquatic species fished, their abundance and their yields;</u></p> <p>(e) <u>Bodies of water used for commercial purposes (e.g. navigation), community water supply, irrigation, and recreational purposes such as bathing and sailing;</u></p> <p>(f) <u>Land and bodies of water supporting wildlife and livestock;</u></p> <p>(g) <u>Direct and indirect pathways for potential radioactive contamination of the food chain;</u></p> <p>(h) <u>Products imported to or exported from the region that may form part of the food chain;</u></p> <p>(i) <u>Foraged foods such as mushrooms, berries and seaweed.</u></p>	<p>Related to the general comment #1.</p> <p>Too specific as a guide.</p> <p>Move the detail information to the Annex.</p>			x	We should keep this information. This is response to MSs' request.

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13.	3.25.	Present uses of water that could be affected by changes in the water temperature and by radioactive material discharged from a nuclear installation, together with the location, nature and extent of usage, should be identified. Expected changes in uses of water in the region, such as for irrigation, fishing and recreational activities, should also be considered.	Related to the general comment #1. Water temperature is related to the non-radiological impacts. It should be deleted.			x	Para. 1.9 is revised.
14.	3.28.	The data on different water uses are written in the Annex. should include the following: <i>The followings are moved to the Annex.</i> <u>(a) For water used for drinking by humans and animals, and for municipal and industrial purposes:</u> <u>(i) Average and maximum rates of water intake by humans and animals;</u> <u>(ii) Distance of the intake from the potential source of radioactive discharges;</u> <u>(iii) Mode of water consumption;</u> <u>(iv) Number of water users.</u> <u>(b) For water used for irrigation:</u> <u>(i) Rate of water use;</u> <u>(ii) Area of irrigated land;</u> <u>(iii) Types and yields of agricultural products, and their usual consumers.</u> <u>(c) For water used for fishing:</u> <u>(i) The aquatic species fished, and their abundance and yields in water used for commercial, individual and recreational fishing.</u> <u>(d) For water used for recreational purposes:</u> <u>(i) The number of persons engaging in swimming, boating and other recreational uses, and the time spent on these activities.</u>	Related to the general comment #1. Move the detail information to the Annex.			x	We should keep this information. This is response to MSS' request
15.	3.37.-3.52.	The recommendations on data collection are appeared in paras 3.37.-3.52. and paras 4.29. - 4.45. separately, but some paragraph is	The recommendations on data collection are appeared in paras 3.37.-3.52. and paras	x			

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	4.29.- 4.45.	overlapped with each other; it is suggested to realign the contents.	4.29. - 4.45. separately, but some paragraph is overlapped with each other; it is suggested to realign the contents.				
16.	Before 3.37.	<i>Change subtitle as follows:</i> METEOROLOGICAL CHARACTERISTICS OF THE REGION <u>AND DATA COLLECTION</u>	See the comment # 13. The recommendations on meteorological information collection should be stated inclusively under this subtitle.	x			
17.	New para before para 3.37. (4.29.)	<i>Move para 4.29 before para 3.37.</i> 4.29. 3.36a Paragraph 6.2 of SSR-1 [1] states: “A programme for meteorological measurements shall be prepared and carried out at or near the site using instrumentation capable of measuring and recording the main meteorological parameters at appropriate elevations, locations and sampling intervals. Data from at least one representative full year shall be collected and used in the analyses of atmospheric dispersion, together with any other relevant data available from other information sources. The meteorological data shall be expressed in terms of appropriate meteorological parameters.”	See the comment # 14. Move para. 4.29 before para. 3.37 without any modification as this para refer to underlying requirement for data collection, and then should be appeared just before the recommendations for meteorological data -related paragraphs..	x			Yes, with other changes.
18.	3.37.	<u>3.36A (new para.) The general objectives of meteorological investigations should be the collection of meteorological data to derive extreme and rare meteorological hazards for the nuclear installation, and the continuous collection and evaluation of data on site-specific meteorological parameters needed to calculate atmospheric dispersion of radionuclides discharged from a nuclear installation during normal operation and accident conditions. For these objectives, programme for meteorological</u>	Move latter part of para 3.37. This part states objectives of collection of meteorological data and should be first stated just before any recommendations of data collection, and therefore suggested to be moved as new paragraph with adding a recommendation for	x			Yes, with other changes.

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		<p><u>measurements should be developed respectively, that are a programme for evaluation of natural external events, and a programme for evaluation of radiological exposures. The former is addressed in SSG-18, and the latter is addressed in this Safety Guide. Alternatively, one programme including two objectives may be developed.</u></p> <p>3.37. Investigations should be undertaken in the region of the site to collect specific meteorological information. This information should be compiled in catalogues or databases for analysis and estimation of site-specific values of meteorological parameters. Further recommendations are provided in IAEA Safety Standards Series No. SSG-18, Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations [15]. The general objectives of such investigations should be the collection of meteorological data to derive extreme and rare meteorological hazards for the nuclear installation, and the continuous collection and evaluation of data on site-specific meteorological parameters needed to calculate atmospheric dispersion of radionuclides discharged from a nuclear installation during normal operation and accident conditions (see Section 4).</p>	developing a programme for meteorological measurements, required above (new para 3.36a).				
19.	3.54.	<p><i>The following underlined sentences are moved to the Annex.</i></p> <p>Meteorological data from numerical models supporting local weather forecasts should be collected to complement field measurements. <u>The detailed information is in the Annex. These models would usually be run by the national meteorological organization and involve</u></p>	<p>(1) Related to the general comment #1.</p> <p>Too specific as a guide. Move the detail information to the Annex.</p>		x		Text is revised but not created Annex.

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		<u>numerical interpolation of the meteorological data using the existing network of meteorological stations and meteorological data from other sources which may include satellites and observations from commercial aircraft, ships, buoys, radiosondes, light detection and ranging (LIDAR) and radar. Historical data can usually be obtained for any coordinates within the geographical scope of the data, and for as far back in time as data exist, which may be several decades if available.</u>	(2)The last sentence is necessary to enhance the reliability of the data; however, “several decades” is too long time.				
20.	3.54A	<i>The new paragraph by moving para 4.35.</i> 4.35. 3.54.A <u>The programme for regional meteorological investigation and all information relating to it should be documented for the purposes of site evaluation and design, and for use in emergency plans</u>	This message is one element of data collection management. (see comment # 40)		x		Yes, with other changes.
21.	3.58.	Typical surface water bodies in the vicinity of a nuclear installation range from rivers to inland freshwater lakes (natural or human-made) or to marine systems (e.g. estuaries, seas, oceans). Recommendations on the collection of background hydrological data for sites on these types of water bodies are provided in paras 3.60–3.65.	This sentence should be structured to connect lakes and marine system with or.			x	We should keep “to”.
22.	3.60.	<i>The following underlined sentences are moved to the Annex.</i> <u>Rivers</u> 3.60. <u>For sites on rivers, the hydrological and other information should cover the following:</u> <u>(a) The channel geometry, defined by the mean width, the mean cross-sectional area and the mean slope over the river reaches of interest (the water level can be computed from the channel geometry and the river flow rate). If there are important irregularities such</u>	Related to the general comment #1. Too specific as a guide. Move the detail information to the Annex.			x	We should keep this information. This is response to MSS’ request

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		<p><u>as dead zones or hydraulic equipment in the stream that could influence the dispersion of the plume, they should be described.</u> <u>Additional downstream measurements of channel geometry should be made as necessary to assess the dispersion process in the river.</u></p> <p><u>(b) The river flow rate presented as monthly averages of the inverse of daily flows. The inverse rate of flow should be used, since the fully mixed concentration is proportional to the reciprocal of the flow rate if sediment sorption effects are not considered. The flow rates of other relevant and important water bodies (e.g. downstream tributaries of the river) should be measured if they affect dispersion.</u></p> <p><u>(c) Extremes in the flow rate evaluated from available historical data.</u></p> <p><u>(d) Seasonal variation of the water level over the reaches of interest.</u></p> <p><u>(e) Tidal variations in water level and flow rate in the case of a tidal river.</u></p> <p><u>(f) Data to describe possible interactions between river water and groundwater, and the identification of those reaches of the channel where the river might gain water from or lose water to groundwater.</u></p> <p><u>(g) River temperature, measured at representative locations (e.g. one location representative of upstream and one representative of downstream in the river) over at least a year and expressed as monthly averages of daily temperatures.</u></p> <p><u>(h) The thickness of the top layer, if thermal stratification of water in the river occurs.</u></p>					

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		<p><u>(i) Extreme temperatures evaluated from available historical data.</u></p> <p><u>(j) The concentrations of suspended matter measured:</u></p> <p><u>(i) At Locations downstream of sections where the river is slowed, depleted, or fed by tributaries;</u></p> <p><u>(ii) In discrete samples at appropriate time intervals (e.g. every two months for at least a year);</u></p> <p><u>(iii) Over a sufficient range of flows to establish curves of flow versus sedimentation and/or erosion rate.</u></p> <p><u>(k) The characteristics of deposited sediments, including mineral and/or organic compositions and size classification.</u></p> <p><u>(l) The distribution coefficients for sediments and for suspended matter for the various radionuclides that might be discharged.</u></p> <p><u>(m) The background levels of activity in water, sediment and aquatic food due to natural and artificial sources.</u></p> <p><u>(n) Seasonal cycles of phytoplankton and zooplankton, with at least the periods of their presence and cyclical evolutions of their biomass.</u></p> <p><u>(o) Spawning periods and feeding cycles of major fish species.</u></p>					
23.	3.61.	<p><i>The following underlined sentences are moved to the Annex</i></p> <p>The natural lakes that are used as a source of cooling water for nuclear power plants tend to be large lakes. The information to be collected for such lakes should include the following:</p> <p>.....</p> <p>Other detailed information is in the Annex.</p>	<p>Related to the general comment #1.</p> <p>(h) and (i) are too specific information as a guide for the use of cooling water.</p> <p>Move the detail information to the Annex.</p>			x	We should keep this information. This is response to MSs' request

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No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p><u>(h) Seasonal cycles of phytoplankton and zooplankton, with at least the periods of their presence and cyclical evolutions of their biomass.</u></p> <p><u>(i) Spawning periods and feeding cycles of major fish species</u></p>					
24.	3.62.	<p><i>The following underlined sentences are moved to the Annex.</i></p> <p>For sites on human-made lakes, the information should include the following: other detailed information is in the Annex.</p> <p><u>(a) Parameters of the lake geometry, including length, width and depth at different locations;</u></p> <p><u>(b) Rates of inflow and outflow;</u></p> <p><u>(c) Expected fluctuations in water level on a monthly basis;</u></p> <p><u>(d) The water quality at inflows, including temperature and suspended solids;</u></p> <p><u>(e) Data on thermal stratification and its seasonal variations;</u></p> <p><u>(f) Interaction with groundwater;</u></p> <p><u>(g) Characteristics of bottom sediments (type and quantity);</u></p> <p><u>(h) The distribution coefficients for sediments and for suspended matter for the various radionuclides that may be discharged;</u></p> <p><u>(i) The rate of sediment deposition;</u></p> <p><u>(j) The background levels of activity in water, sediment and aquatic food due to natural and artificial sources;</u></p> <p>k) Seasonal cycles of phytoplankton and zooplankton, with at least the periods of their</p>	<p>(1) Related to the general comment #1.</p> <p>Too specific as a guide. Move the detail information to the Annex.</p> <p>(2) (k) and (l) beyond the requirements of SSR-1. These paras are not necessary for assessing the availability of cooling water.</p>			x	We should keep this information. This is response to MSS' request

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No.	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		presence and cyclical evolutions of their biomass; (f) Spawning periods and feeding cycles of major fish species.					
25.	3.63.	<p>Estuaries For sites on estuaries, the following information should be collected: (a) The salinity distribution determined along several verticals covering different cross= sections of the salinity intrusion zone. The data should be sufficient to delineate the flow pattern, which is directed towards the estuary mouth in the upper layer and towards the inner reaches in the lower layer of a fully or partially mixed estuary. (b) Evaluations of sediment displacements, the load of suspended matter, the rate of buildup of deposited sediment layers and the movement of these sediments with the tide. (c) Channel characteristics sufficiently upstream of the site to model the maximum upstream travel of radioactive effluents, if applicable. (d) The distribution coefficients for sediments and for suspended matter for the various radionuclides that may be discharged. (e) The background levels of activity in water, sediment and aquatic food due to natural and artificial sources. (f) Seasonal cycles of phytoplankton and zooplankton, with at least the periods of their presence and cyclical evolutions of their biomass. (g) Spawning periods and feeding cycles of major fish species.</p>	The reason for separating the estuary is unclear. Should be combined with “Open shores of seas and oceans.”			x	The estuaries are separated based on the fact that they do not belong to open seas and oceans but they form a transitional feature. EPA describes an estuary as “a partially enclosed, coastal water body where freshwater from rivers and streams mixes with salt water from the ocean. Estuaries, and their surrounding lands, are places of transition from land to sea. Although influenced by the tides, they are protected from the full force of ocean waves, winds and storms by land forms such as barrier islands or peninsulas.”.. Estuaries are different in their hydrological behavior as well as their function as an special ecosystem.

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							So this division is mainly based upon the universally accepted classification of surface water bodies... BESIDES, the IAEA, and specifically the IAEA Guides which are referred to in this draft Guide (such as NS-G-3.2, SRS-19, GSG-10) consider the same separation. The proposal is therefore rejected, also to avoid inconsistency between guides of the Agency.
26.	3.64.	Measurements of water temperature, salinity and other relevant water quality parameters in estuaries should be made at appropriate depths, distances and times, depending on the river flow, tidal levels and the configuration of the water body in different seasons. Open shores of seas and oceans	The reason for separating the estuary is unclear. Should be combined with “Open shores of seas and oceans.”			x	Please see the explanation for Comment 25.
27.	3.65.	<i>The following underlined sentences are moved to the Annex.</i> For sites located on the shores of seas and oceans, the <u>detailed information is in the Annex.</u> should include the following: (a) <u>The general shore and bottom configuration in the region, and unique features of the shoreline in the vicinity of the discharge.</u>	Related to the general comment #1. Too specific as a guide. Move the detail information to the Annex.			x	We should keep this information. This is response to MSS’ request

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		<p><u>(b) Data on bathymetry out to a distance of several kilometres, and data on the amount and character of sediments in the shallow shelf waters.</u></p> <p><u>(c) Speeds, temperatures and directions of any near shore currents that could affect the dispersion of discharged radioactive material. Measurements should be made at appropriate depths and distances, depending on the bottom profile and the location of the point of discharge.</u></p> <p><u>(d) The duration of stagnation and characteristics of current reversals. After stagnation, a reversal in current usually leads to a large scale mass exchange between inshore and offshore waters that effectively removes pollutants from the shore zone.</u></p> <p><u>(e) The thermal stratification, if it exists within a reasonable distance from the shoreline, of water layers and its variation with time, including the position of the thermocline and its seasonal changes.</u></p> <p><u>(f) The load of suspended matter, sedimentation rates and sediment distribution coefficients, including data on sediment movements characterized by defining at least the areas of high rates of sediment accumulation.</u></p> <p><u>(g) The background levels of activity in water, sediment and aquatic food due to natural and artificial sources.</u></p> <p><u>(h) Seasonal cycles of phytoplankton and zooplankton, with at least the periods of their presence and cyclical evolutions of their biomass.</u></p> <p><u>(i) Spawning periods and feeding cycles of major fish species.</u></p>					

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No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
28.	3.66.	<p><i>The following underlined sentences are moved to the Annex.</i></p> <p>Groundwater A conceptual model of the hydrogeological conditions at and around the site where the installation is proposed should be developed. This <u>detailed information of conceptual model is in the Annex.</u> should indicate the following (see also Section 6);</p> <p><u>(a) Hydrostratigraphical description of lithological units;</u> <u>(b) Water inflows and outflows;</u> <u>(c) Connectivity and interaction between the surface water bodies and groundwater;</u> <u>(d) Spatial distribution of potentiometric level and groundwater flow direction.</u></p>	<p>Related to the general comment #1.</p> <p>Too specific as a guide. Move the detail information to the Annex.</p> <p>It seems that conceptual model has not been established. If it is established, the method to use it for site evaluation for nuclear insulations is unclear.</p>			x	<p>These are very general requirements that a conceptual model should fulfill. For a hydrogeologist they are not specific. What are in the documented are not details of a conceptual model, nor a “specific conceptual model”.</p> <p>The guide gives a guideline to ensure a representative model of the site is constructed.</p>
29.	3.69.	<p><i>The following underlined sentences are moved to the Annex.</i></p> <p>Data should be obtained on the various types of geological formations in the region and their stratigraphic distribution in order to characterize the regional groundwater system and its relationship with the local hydrogeological units. Detailed information is in the Annex. These data should include the following:</p> <p><u>(a) Geological data: lithology, thickness, extent and degree of homogeneity of the geological units.</u> <u>(b) Hydrogeological data: description of the unsaturated zone, hydraulic conductivities and transmissivities, specific yield and storage coefficients, dispersion parameters, and hydraulic gradients of the saturated zone for the geological units that form a flow domain.</u></p>	<p>Related to the general comment #1.</p> <p>Too specific as a guide. Move the detail information to the Annex.</p> <p>Or, paras 3.66, 3.67, 3.69, and 3.70 should be reconstructed.</p>			x	<p>The Paragraphs 3.68, 3.69 and 3.70 provides a generic guidelines for construction of a hydrogeological conceptual model for the site of interest. The practice shows that the prepared reports are mainly have problems with developing a representative conceptual model for the site.</p>

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<u>(c) The chemical composition of groundwater from the respective aquifers.</u> <u>(d) Variations of water levels in wells and in the discharges of springs and rivers.</u> <u>(e) Morphological features in karstic terrains, locations of closed depressions and active and potential sinkholes in the region.</u>					
30.	3.70.	For the relevant hydrogeological units, information should be collected on the following chemical and physical properties of the groundwater: (a) Physical properties of groundwater (e.g. pH, redox potential, temperature); (b) Concentrations of major anions and cations; (eb) Sorption characteristics, when necessary for the selected grade of modelling.	(b) is not directly related to site evaluation. The purpose and necessity for collecting each data should be clearly written.			x	Concentrations of major anions and cations are required as a part of construction of a hydrogeological model of the site. At the same time it is useful to have this information to describe the background quality of groundwater. Therefore this is a part of site evaluation and not a detail.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Haruyuki Ogino (Japan RASSC)							
Page.... of....							
Country/Organization: Nuclear Regulation Authority							
Date: 6 Oct 2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
5.	3.3	3.33. The natural background of a site area should be measured as early as possible, before the proposed nuclear	Clarification	x			

		<p>installation starts operation and any release to the environment from the nuclear installation occurs. Information should be collected and recorded on the levels of background radioactivity and activity concentrations of relevant radionuclides in environmental media within the zone around the installation that is likely to be affected by any planned or potential releases from the installation, in particular in locations where exposure is expected to be higher (e.g. downwind from the proposed stack location, in sediments near outfalls from the proposed aquatic discharges). This zone <u>should extend by applying a graded approach, for example, generally extends</u> up to 20 km from the site (the location or the postulated location of the representative person). However, some of the environmental sampling locations should extend further to serve as control locations that could indicate potential changes in the natural background during the operation of the installation.</p>	<p>The basis of the distance “20 km” is unclear. Thus, an appropriate reference should be added to this sentence if it is to remain as it is now, or this sentence should be modified as proposed.</p>				
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRReSC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRReSC; Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
7.	Page.11 3.7.	(c) Ascertaining the feasibility of emergency response capabilities at the site <u>Evaluating the feasibility of planning effective emergency response actions;</u>	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site	x			

			and in the external zone shall be <u>evaluated</u> , ...				
8.	Page.11 3.10.	... The geographic extent of the investigations should be at least wide enough to include both the peak radionuclide concentration and the maximum predicted dose plotted as a function of distance from the installation.	Too specific as a guide. It is not clear what conditions produce both the peak radionuclide concentration and the maximum predicted dose.			x	This is response to MSs' request.
9.	Page.12 3.16.	...and help demonstrate the feasibility of the emergency plan evaluate the feasibility of planning effective emergency response actions.	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			
10.	Page.12 3.17 Footnote 5	..., and land and water uses are considered in relation of implementing emergency measures with respect to their impact on planning effective emergency response actions.	Consistency with the term of SSR-1 below: 1.10. The 'external zone' is the area immediately surrounding a proposed site area in which the population distribution and density, and land and water uses, are considered <u>with respect to their impact on planning effective emergency response actions</u> [9]. ⁴	x			
11.	Page.13 3.18.	... This should include information on major places of work, means of communication, typical living habits such as recreational and work activities and the fraction of time spent indoors versus outdoors, and typical diet of the	Too specific as a guide. Delete or write them in footnote.			x	This is response to MSs' request.

		inhabitants. Typical production rates of food items locally grown, and the fractions locally consumed should be given. If a city or town in the region is associated with a major industrial facility, this should be considered. for a number of reasons. For example, the facility may have a large workforce that would need to be evacuated in an emergency, or the facility may be hazardous and need its own emergency arrangements that will need to be coordinated with the emergency plan of the nuclear installation.					
12.	Page.13 3.23.	...In addition, the characteristics of the land and water utilized in the region should be addressed in demonstrating the feasibility of the emergency plan <u>evaluating the feasibility of planning effective emergency response actions.</u>	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: WASSC member of 1 Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety Date: October 04, 2023				Page 1			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	3.27/1	o The following is suggested. (before) 3.27 The movement ~ by radioactive releases from the nuclear ~~~. (after) 3.27 The movement ~ by radioactive material releases or leakages from the nuclear ~~~.	o Groundwater could be contaminated by the releases or leakages. So, it is recommended that those are added.	X			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Carl-Henrik Pettersson, Aino Obenius Mowitz Page.... of.... Country/Organization: Swedish Radiation Safety Authority (SSM) Date: 2023-10-06							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	3.6.	The investigations for site characterization should begin several years before the application for a licence to construct the proposed nuclear installation is submitted to the regulatory body. The majority of the investigations should be conducted before construction begins. However,—— selected investigations and monitoring the investigations should continue during the construction, operation and decommissioning of the installation to confirm that the public and the environment continue to be protected and that the environmental impacts are as predicted.	Clarification.	x			
3	3.69	Geological data: lithology, thickness, faults and fracture systems , extent and degree of homogeneity of the geological units.	Faults and fracture systems are the main water conducting features in crystalline rocks.	x			

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/ Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
4.	p. 21 Sec. 3.69	Recommend that consideration be given to introducing language should be introduced to DS529 that discusses the different types of groundwater systems potential at a nuclear installation site.	In the area of groundwater characterization, DS529 does not acknowledge the different type of groundwater regimes (confined, unconfined, perched, artesian) and the implications for characterization as well as potential implications for contaminant fate and transport studies.			x	Conceptualization and characterization of a groundwater system results in definition of the groundwater regime that prevails at the site of interest. Implications for characterization and potential implications for contaminant fate and transport studies would be details for a guide, which is avoided also for the integrity of the guide and for the sake of “balance” among chapters. A text can be added in this regard, without violating the integrity of the guide. However is not easy to do in short time.
5.	p. 19, Sec. 3.60(b) and p. 36,	Recommend that consideration be given to amending the text in question to call for the analyst to understand what	In the matter of open channel flow, the 2012 flood hazard revaluations at one site revealed the sensitivity of the river discharge estimates to			x	In most cases instantaneous flow data is not available. Even

	Sec. 5.21	effect instantaneous stream flow data might have, if any, on estimated dose assessments. Those flow data that result in higher predicted doses should be relied on for the purposes of DS529.	the use of instantaneous flow data. The use of instantaneous flow data demonstrated higher flow rates for the river system in question. DS529 recommends the use of monthly flow averages.				if such a gauge is installed for this purpose, the time-series of the flow data will be limited when the timeline of the site evaluation is considered. Daily flow measurement, however can be recommended. it is not practically applicable to suggest instantaneous flow gauging for all sites. A text can be added for further clarify, however is not easy to do in short time.
34.	3.33	It is recommended that the following sentence be modified as follows: “This area generally extends up to 20 km from the site (the location or the postulated location of the representative person)”	This text implies that the representative person is located 20 km from the site, which is usually not the case. Potential receptor locations my extended at distances greater than 20 km. Consider revising.	x			
35.	3.34	See comments	The draft text assumes that the same organization (entity) is responsible for all sources of radiation. What if different organizations (entities) are responsible and not bound by the guidance?			x	Text do not say same organization (entity) is responsible for all sources of radiation.

36.	3.37	It is recommended that the second sentence be modified as follows: “This information should be compiled for analysis and estimation of site-specific values of meteorological parameters.”	The words “in catalogues or databases” is unnecessarily limiting.	x			
37.	3.38	It is recommended that the first sentence be modified with the following addition: “ ...to obtain <u>representative</u> data...”	It is observed that if “one full year of” of data collection is necessary then maintain, it isn’t clear that a year of this type of data is necessary (justified) for all cases.			x	To obtain one full year of representative data is necessary.
38.	3.40	It is recommended that the second sentence be modified as follows: “Building wake effects might also influence the representativeness of the data obtained. “	Not all types of facilities are constructed reflecting initial site characterization results. It is unclear what the basis for the recommendation to account for building wake effects as the site evolves?			x	Comment is not clear. “Building wake effects might also influence the representativeness of the data obtained’ is existing text.
39.	3.57	In reference to the following (third) sentence: “Areas from which contaminated surface water might directly enter an aquifer should be determined.”	The intent of this text is unclear. Surface water does not always directly enter an aquifer. Clarification is recommended.			x	The text intends to refer to sinking streams in karstic terrains. This needs to be clarified. however is not easy to do in short time
40.	3.58	See comments.	This draft guidance applies mostly to facilities that use water, especially for cooling. Many nuclear installations don’t have water needs and aren’t located near surface water bodies, such as disposal facilities. It is recommended that language be added to this section to qualify the			x	This is a specific safety guide for nuclear installations. Disposal facilities are not nuclear installations as per IAEA definition.

			text here, if retained in its current form.				
41.	3.62	It is recommended that the proposed guidance in §3.61 and §3.62 be combined.	<p>It isn't clear why there are significantly different lists for man-made or natural lakes. Shouldn't the requirements be mostly the same with perhaps some differences for man-made where it could be indicated that that in addition to list A the items in list B apply to man-made lakes.</p> <p>Perhaps the best approach is to provide a general list that applies to each water body type, then provide specific additional items that are unique to each water body type.</p>			x	This needs to be clarified however is not easy to do in short time
42.	3.68 (b)	It is recommended that the phrase “dispersion parameters” be deleted.	Dispersion is more something that results from the hydrodynamics of a flow domain rather than defining the flow domain.		x		What is meant is “transport parameters”. “dispersion parameters” is replaced by “dispersivity”
91.	3.13	Please consider adding military installations to the list of examples because military installations are included in paragraph 3.19.	Residential institutions (e.g., schools, hospitals, nursing homes, prisons, and military installations)		x		Para. 3.13 is quoted from SSR-1. However, full list is included in para. 3.16. Since it is repetition, relevant sentence deleted from 3.19.
92.	3.47	It is recommend that the first sentence be deleted: Meteorological data should be obtained at least hourly.	Since the instruments should provide continuous recording of data and be readily available, there is no need to require obtaining hourly measurements.		x		Text is revised. First sentence is written to be sure the requirement for at least hourly data is retained.

93.	3.62	This section is titled <i>Human-made lakes</i> . Please consider adding “dams” which can be human-made lakes. Sections 5.13 and 5.22 use the term: human-made impoundments. Are these “dams”?	Dams can fail or discharges can be timed. These releases can affect the ecosystem. Dams should be included in this guide.	x			Yes. human-made impoundments and lakes refers to dams.
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS				Page 1 of 17		ENISS	
Country/Organization: ENISS				Date: 06/10/2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
21	3.9	Efforts should be made to collect data that will allow transboundary impacts to be assessed.	The transboundary impact studies could be mentioned but it has to be performed in a frame specific to each country (for example Article 37 Euratom).			x	No need to change the text.
22	3.11	The spatial and temporal intensity of data collection activities should follow a graded approach, as described in Section 10; consequently, more data should be collected for locations with a higher radiological impact.	It is not necessarily the amount of data that makes the quality of an assessment. The representativeness of the sample, the type of matrices sampled and their location, the type of analysis performed, and the analytical performance are playing an important role. These are aspects that should be emphasized.			x	This para. is discuss baseline environmental data. Further aspects are discussed in other part of the document.
23	3.13, 3.14, 3.19, 3.20	3.13 Information on the existing and projected population distribution in the region, including resident populations and (to the extent possible) transient populations, shall be collected and kept up to date over the lifetime of	The representative person covers all the cases in normal and accidental situations. For normal operation it is not relevant to make dose calculations for special populations (like vulnerable or			x	Paras 3.13 and 3.14 are quoted from SSR-1. This document cannot change them. Modification of para. 3.13 can be considered

	<p>the nuclear installation. Special attention shall be paid to vulnerable populations and residential institutions (e.g. schools, hospitals, nursing homes and prisons) when evaluating the potential impact of radioactive releases and considering the feasibility of implementing protective actions.</p> <p>3.14 The most recent census data for the region, or information obtained by extrapolation of the most recent data on resident populations and transient populations, shall be used in obtaining the population distribution. In the absence of reliable data, a special study shall be carried out.</p> <p>3.19. The information collected on the temporary population should cover the short-term temporary population (e.g. tourists, nomads) and the long term temporary population (e.g. seasonal inhabitants, students). The maximum size of the temporary population and its periods of occupancy in the external zone should be estimated. (...).</p> <p>3.20. A projection of the present population in the region should be made both for the expected year of commissioning of the nuclear installation and for selected years (e.g. every tenth year) over the lifetime of the installation. Projections should be made on</p>	<p>transient populations). Additional collected information can be provided for emergency planning, but it is necessary to separate and precise the two situations (accidental and normal operation).</p>				<p>in the next revision of SSR-1. Temporary population may still need to be considered for normal operation and accidental situation.</p>
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		the basis of population growth rate, migration trends and plans for possible development in the region, including the project itself. The projected figures for permanent population and temporary population should be extrapolated separately if data are available.				
24	3.16	<u>In the case of an accident during</u> the operation of a nuclear installation, <u>the discharges/releases</u> might affect the population <u>and the environment</u> in the surrounding area.	As the annual doses to the population under normal operating condition is low and below regulatory limits (in the order of $\mu\text{Sv/y}$), such wording appears as inappropriate. See suggestion		x	Test is revised. Normal operation still has the radiological environmental impact that need to be assessed.
25	3.22	The population data collected should be presented in a suitable format and scale to permit their correspondence with other relevant data, such as data on atmospheric dispersion and on uses of land and water. The data on permanent population and temporary population should be clearly indicated. In general <u>For example</u> , population data should be presented either in tabular form or graphically, for example using concentric circles and radial segments with the site as the origin. More details should be given for areas closer to the site, especially within the external zone.”	Clarification needed	x		
26	3.23 to 3.29	To be minimized	The chapter USES OF LAND AND WATER IN THE REGION OF THE SITE comprises a large number of information and the objective behind collecting so many data is not relevant. The parameters to be determined should be reduced	x		These paras. mainly comes from existing guide (NS-G-3.2). Text is revised.

			to those that are really needed to make a dose assessment due to normal and accident releases.				
27	3.25	Present uses of water that could be affected by changes in the water temperature and by radioactive material discharged from a nuclear installation, together with the location, nature and extent of usage, should be identified. Expected changes in uses of water in the region, such as for irrigation, fishing and recreational activities, should also be considered.	Water temperature (river) is not in the scope of this IAEA SG. It should be deleted, and the subject treated in another document.			x	Changes of water temperature will affect water use which will affect the radiological environmental impact.
28	3.26	Special consideration should be given to any population centres for which drinking water is obtained from water bodies that might be affected by a nuclear installation. To the extent possible, future water flow and water uses should be projected over the lifetime of the installation. This may lead to a change in the representative person.	The transcription and processing of such a request in regulatory files for an operator is complicated and its application not well defined. We propose to delete 3.26.			x	[This para. mainly comes from existing guide (NS-G-3.2).
29	3.33	However, some of the environmental sampling locations should extend further to serve as control locations that could indicate potential changes in the <u>composition of the natural</u> background during the operation of the installation.	Before an NPP enters in operation, the background, in term of radioactivity, is not only composed of natural radionuclides and NPPs do not have any impact on the level of <i>natural</i> radioactivity.	x			
30	3.69 b)	Hydrogeological data: description of the unsaturated zone, hydraulic conductivities and transmissivities, specific yield and storage coefficients, dispersion parameters, and hydraulic gradients of the saturated zone for the geological units that form a flow domain <u>and inventory of wells used around the</u>	These data are necessary to define a robust conceptual model (water inflow and outflows)	x			

		<u>site as well as chronicles and pumping rates.</u>					
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Comments on Section 4

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page.... of....					
Country/Organization: Belgium		Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
7	4.3	For long range dispersion analysis (which is typically needed for evaluating societal impacts or transboundary impact), time and spatially gridded data for use in Lagrangian modelling (see para. 4.21 4.22) may need to be acquired from national or international meteorological organizations.	Typographical comment, the paragraph was referring to § 4.21 which is Gaussian model instead of 4.22.	x			
8	4.5	... (g) To assist in demonstrating the feasibility of an emergency plan (based on para. 2.7) ...	Typographical comment. Unless there would be a reason to refer specifically for point (g) to para. 2.7 (discussing the exposure pathways), it is proposed to remove this.	x			
9	4.15 (d)	Activation products formed by the activation of water in water cooled reactors, which can be released when coolant is released or by off-gassing (e.g. radionuclides tritium (³ H), radiocarbon (¹⁴ C), Argon-41 (⁴¹ Ar)).	Typographical comment (suppression of the last bracket and suppression of a gap after the (³ H) and the comma).	x			
10	4.16	Radionuclides can also be released through fuel handling faults, radioactive waste handling faults, or accidents involving waste or effluent storage.	Added effluent as gaseous and liquid tank failure is usually a Design Basis Accident (at least for light water reactors).	x			
11	4.41	...The wind speed and atmospheric stability are correlated, with higher	Typographical comment. Reference in para. 4.41 to the same paragraph should	x			It refers to para. 4.44. Corrected.

		wind speeds leading to more stable conditions (see para 4.41) ...	be deleted or adapted by referring to another relevant paragraph (if any).				
12	4.48	... are used in the form of source terms and their corresponding frequencies from a series of accident scenarios ⁶ .	Typographical comment (reference to the footnote was not superscript).	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: B. Ahier / K. Henderson Page.... of.... Country/Organization: CANADA				Date:6 Oct 2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2.	4.3	Generally, different dispersion models are used to assess the <u>potential</u> impacts from planned continuous discharges and accidental short term discharges. However, the meteorological data that need to be acquired for each type of model are usually the same. In both cases, typical rather than extreme data are used and can be collected from the site itself or by numerical weather prediction models if sufficient quality data are available. <u>However, as accidental releases are typically short-term and may be potentially significant, assessments of accidental releases should consider the likelihood and potential effects of unusual meteorological conditions that could lead to higher doses.</u>	Clarity. This paragraph appears to refer to prospective dose assessment, and so should refer to potential impacts. With respect to the meteorological conditions, accident analysis should consider the likelihood of unusual weather conditions that could lead to higher doses. Averaging of weather conditions may mask the impacts of such conditions.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: M-L Järvinen Page.... of.... Country/Organization: STUK/Finland				Date: 2nd October 2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
4.	4.15 d	Activation products formed by the activation of <u>substances present in the coolant water</u> , which can be released when coolant is released or by off-	To clarify, that e.g. 14C and 41Ar are not formed from the water itself (H or O),	x			

		gassing (e.g. radionuclides tritium (³ H), radiocarbon (¹⁴ C), Argon-41 (⁴¹ Ar)).	but from the substances present in the water.				
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COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: FRANCE pages			Date: 6 Oct 2023				
Comm ent No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
4.	4	1. ANALYSIS OF THE TRANSPORT OF RADIONUCLIDES IN THE ATMOSPHERE Additional paragraph proposal: <u>The parameters to consider when addressing discharges from normal operation or releases related to an accident may be different. For instance, meteorological conditions are likely to differ</u>	The similarities and differences between works to be performed for normal operation, accidental situations for safety case and emergency preparedness		x		Partially addressing the comment adding a new para. 4.4.
5.	4.46	e) assumptions about countermeasures applied	In some countries, regulations specify that the radiological consequences in the event of an accident are estimated without taking into account the possible implementation of countermeasures.			x	Text is referring to typical sensitivity studies.

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Pages: 10 Country/Organization: Germany 06.10.2023			Date:					
Rele- vanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/r ejection
2	23.	4.3 1 st line	Generally, different dispersion models are used to assess the impacts from planned continuous discharges and accidental short term discharges <u>releases</u> .	The term "accidental discharge" is used several times in this draft. This is not consistent with IAEA terminology, where "discharge" describes a	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Pages: 10 Country/Organization: Germany 06.10.2023					Date:			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
				planned or controlled release (see IAEA Safety Glossary).				
3	24.	4.41	The wind speed and atmospheric stability are correlated, with higher wind speeds leading to more stable conditions (see para 4.41). ...	The reference needs to be updated.	x			Corrected.
2	25.	4.50	For simple assessments of low hazard installations, a conservative approach might be possible. In a conservative graded approach, the following conservative assumptions can be made: ...	What is meant by “low hazard installation”? There seems to be no official definition. Alternatively please consider using “installations with low potential hazard“, as in SSG-22, Rev.1.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Sh. Sheikhi Country/Organization: IRAN/ INRA Date: 6 Oct 2023							
Comm ent No.	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejecti on
5.	4.9	For sites with multiple units and installations with multiple facilities, the site as a whole need to be evaluated for interactions between the nuclear installations , there might be multiple discharges from several locations which all need to be analysed. Accident conditions might also include scenarios involving releases from multiple units which are either simultaneous or offset in time, which again might need to be analysed if these releases are significant contributors to the overall risk.	Consideration shall be given to the potential for a ‘domino effect’ (i.e. an accident at one nuclear installation affecting other nuclear installations on the site), shared services, cumulative effects of discharges and common cause failures.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member Page 36 Country/Organization: Japan / NRA Date: 06, Oct., 2023							
No	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
31.	4.3.	Generally, different dispersion models are used to assess the impacts from planned continuous discharges and accidental short term discharges. However, the meteorological data that need to be acquired for each type of model are usually the same. In both cases, typical rather than extreme data are used and can be collected from the site itself or by numerical weather prediction models if sufficient quality data are available. The meteorological site data should be collected over several years so that it is possible to select a representative year or years from the records. The extreme data used for external hazard analysis need a much longer duration data set that is typically only available on a regional basis. For long range	While there are several long-range diffusion models, there is no rationale for introducing only the Lagrangian modelling here.		x		Text is modified.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		dispersion analysis (which is typically needed for evaluating societal impacts or transboundary impact), time and spatially gridded data for use in Lagrangian modelling (see para. 4.21) may need to be acquired from national or international meteorological organizations.					
32.	4.13.	When selecting the <u>source parameters</u> , therefore, consideration should be given to the following: (a) Physical and chemical processes occurring during the accident sequence; (b) Behaviour of any safety features or the effects of any mitigatory measures;	Clarification. Define the “source parameter.”	x			Text is revised.
33.	4.14. (d)	Flow speed and the thermal energy associated with the release (these may also be necessary to determine the effective height of the radioactive plume);	It’s better to describe the contents not as sentence but terms.	x			
34.	4.15. (c)	Sources of radioactivity in a nuclear installation such as a nuclear power plant might include the following: (c) Radionuclides from the fuel matrix, fuel cladding, coolant circuit or containment. Volatile radionuclides can be released into coolant through small pin fuel rod failures or by tramp uranium and therefore can be released when coolant is released or by off-gassing <u>during normal operation. Large release</u> This can <u>also</u> occur in severe accidents, when the fuel matrix and fuel cladding fail, and the coolant circuit and containment might be breached.	(1) "Small pin failures" is difficult to understand, so it should be changed to "fuel rod failures" to include pinholes, vertical cracks, etc. (2) “This” in not clear. May be large release.	x			
35.	4.18.	Source term data may be available from reactor vendors or from assessments in other Member States, but they should be supported by well documented numerical modelling and physical	(1) Unnecessary information such as “vendor” should be deleted.	X			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		assumptions. For small modular reactors, based on current light water reactor designs, a scaling approach may be possible according to the effectiveness and reliability of the safety systems and barriers, whereby the source term from a large reactor is scaled by the relative power and possibly also burnup. For evolutionary and innovative designs, this may not be possible, and a detailed analysis should be performed.	(2) Regarding the case of "small modular reactor," it is too early to mention it here since the design concept is not clear. There is no need to describe the feasibility of uncertain technologies.				
36.	4.23.	The advantages of the Gaussian model are as follows: (a) It is a simple mathematical expression that is easy to implement; (b) It can be modified to take into account, in a simple way, effects such as plume rise, building wake effects, and dry and wet deposition; (c) It is fast to execute so there is no need to sample from a meteorological data set; it is quite feasible to perform calculations for every hour of a data set of several years; (d) It is considered to be generally conservative with respect to more detailed models; (e) It needs a relatively simple meteorological data set of hourly data for the point of release, comprising data such as wind direction, wind speed, atmospheric stability category, mixing layer height and precipitation; (f) It can be adapted to model temporal and spatial changes in meteorological conditions during the release (Gaussian puff models); (g) There are also 'new generation' Gaussian models that have the ability to take account of more complex terrain and buildings in the vicinity of the release.	It is unclear what "new generation Gaussian models" are and should be removed. Citing a specific references for the model could be acceptable.			x	'new generation' is changed to more advanced. How those new models are expected to improve the analysis is written in the para. 4.24. (g). References are available however, in the guide, we cannot reference to specific models or software.
37.	4.27.	The decision on the model to use depends on the type of analysis needed and the characteristics of the site and surrounding area. If only assessment of	The decision-making factor in using the model depends on the resolution of the		x		Para. is revised.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		short-range impacts is needed, and the surrounding area is reasonably flat, then the Gaussian model approach may be sufficient. If the <u>site surrounding area</u> has complex topography, long-range results are needed for a transboundary assessment, or an assessment of population risks in a large area is needed, then the Lagrangian model may be more appropriate, if the necessary meteorological data are available. For sites with complex topography and short range analysis, then the ‘new generation’ Gaussian model should be used.	meteorological data used, but it is very difficult to represent the impact of the terrain on the weather within a site. This technically inaccurate description should be removed.				
38.	4.28.	However, use of the new generation Gaussian model might lead to large uncertainties associated with the source term, especially for accidental releases. Consequently, the extra insights gained from performing more sophisticated or more extensive analysis might not be commensurate with the extra effort and should be carefully evaluated.	It is unclear what new generation Gaussian models are and should be removed. Citing a specific references for the model could be acceptable.		x		See above resolution in Comment 36. Text is also revised.
39.	Before 4.29.	<i>Modify subtitle as follows:</i> DEFINITION AND COLLECTION OF METEOROLOGICAL AND OTHER DATA FOR MODELLING ATMOSPHERIC DISPERSION	Recommendation on data collection is suggested to be merged in Section 3, and then this portion should be devoted to recommendations on modelling-related issues.		x		Title is revised.
40.	4.29.	<i>Para 4.29 is suggested to be moved before para 3.27.</i> 4.29. Paragraph 6.2 of SSR-1 [1] states: “A programme for meteorological measurements shall be prepared and carried out at or near the site using instrumentation capable of measuring and recording the main meteorological parameters at appropriate elevations, locations and sampling intervals. Data from at least one representative full year shall be collected and used in the analyses of atmospheric dispersion, together with any other relevant data available from other information	See comment # 13.	x			Yes, with other changes.

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Reviewer: Japan NUSSC member		Page 36					
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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		sources. The meteorological data shall be expressed in terms of appropriate meteorological parameters."					
41.	4.31.	To conduct the programme for meteorological measurements, a meteorological tower should be installed at the site. To ensure the measuring of meteorological parameters at appropriate elevations in order to obtain realistic dispersion parameters, data should be collected at least at 10 m above ground (to compare with data from the synoptic network of meteorological stations) and at the heights of the proposed buildings and stack.	"proposed buildings and" should be removed since there would be several building heights that have not been determined at the siting stage.	x			
42.	4.30. – 4.34.	<p>Delete 5 paragraphs and merged into paras 3.42. – 3.47 with some modification.</p> <p>4.30. In order to have data for at least one representative full year, at least three years and ideally up to ten years of data need to be collected. The collection of data should continue for the lifetime of the nuclear installation to confirm that conditions have not changed significantly and that updated assessments can be performed using the latest data as necessary.</p> <p>4.31. To conduct the programme for meteorological measurements, a meteorological tower should be installed at the site. To ensure the measuring of meteorological parameters at appropriate elevations in order to obtain realistic dispersion parameters, data should be collected at least at 10 m above ground (to compare with data from the synoptic network of meteorological stations) and at the heights of the proposed buildings and stack.</p> <p>4.32. The data collected should adequately represent local meteorological conditions. Meteorological measurements are often affected by terrain, and local features such as vegetation and ground cover, orographic features and plant structures (such as cooling towers and masts</p>	<p>The most of the descriptions in paras 4.30 – 4.35 overlap with paras 3.42. – 3.47. and suggested to be merged corresponding paras in chapter 3, as follows.</p> <p>4.30. à 3.38 4.31. à-3.45. 4.32. à3.50 4.33. à 3.42 4.34. à 3.47.</p>	x			Yes, with other changes.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>supporting meteorological sensors) as well as building wake effects might influence the representativeness of the data obtained. Activities should be undertaken in accordance with accepted international standards, for example Ref. [17].</p> <p>4.33. The local data collected should be compared with any available concurrent and long term data from synoptic meteorological stations in the surrounding area to determine long term trends for the site or, if the local results seem anomalous, to investigate possible causes.</p> <p>4.34. Meteorological data should be obtained at least hourly. Instruments should be provided for continuous recording in order to ensure that the data collected can be readily available at the locations where they are used. The raw data should be stored until data qualification and statistical analysis have been performed. Hourly mean values derived from the programme for meteorological investigation should be stored for the lifetime of the installation. Data averaged over shorter periods of time (less than one hour) should be stored continuously for purposes of emergency response and recovery, as they can be used to assess the plume dispersion in the event of an accidental release.</p>					
43.	4.35.	<p><i>Move after para 3.54.</i></p> <p>4.35. The programme for regional meteorological investigation and all information relating to it should be documented for the purposes of site evaluation and design, and for use in emergency plans.</p>	This message is one element of data collection management. (see comment # 40)	x			Yes, with other changes.
44.	4.41.	The wind speed and atmospheric stability are correlated, with higher wind speeds leading to more stable conditions (see para 4.41). Higher wind speeds may also have the effect of inhibiting plume	The lower the wind speed, the more stable the atmosphere is, at night. Reference error.	x			Reference is corrected.

COMMENTS BY REVIEWER				RESOLUTION			
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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		rise effects. Higher wind speeds mean that nuclides reach locations quicker, affording less time for any radioactive decay but this is not usually significant unless very short lived nuclides are involved.					
45.	4.41. – 4. 43.	<p><i>The following sentences are moved to the Annex.</i></p> <p>Wind speed</p> <p><u>4.41. The wind speed and atmospheric stability are correlated, with higher wind speeds leading to more stable conditions (see para 4.41). Higher wind speeds may also have the effect of inhibiting plume rise effects. Higher wind speeds mean that nuclides reach locations quicker, affording less time for any radioactive decay but this is not usually significant unless very short lived nuclides are involved.</u></p> <p><u>Wind direction</u></p> <p><u>4.42. Wind direction can be very important if there is an uneven population distribution around the site, since the probability of exposure at any given location depends on the probability that the wind blows in that direction.</u></p> <p><u>Boundary layer height</u></p> <p><u>4.43. The boundary (or mixing) layer height is the height at which a temperature inversion occurs, creating an effective boundary for dispersion in the vertical direction. Gaussian dispersion models generally assume that the plume reflects down from the boundary layer with no transfer across the boundary, and up from the ground until fully mixed in the vertical direction. Lagrangian dispersion models, on the other hand, may model transfer across the boundary and subsequent dispersion of material above the layer. The boundary layer height is important since it effectively determines the volume of air that the plume of radioactivity has available to disperse at sufficient distances</u></p>	<p>(1)Related to the general comment #1.</p> <p>(2)Too specific as a guide. Move the detail information to the Annex.</p>			x	We should keep this information. This is response to MSs' request

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<u>downwind where the plume is fully mixed vertically; at these distances, the boundary layer height is correlated with the atmospheric stability, with more unstable conditions leading to higher boundary layer heights.</u>					
46.	4.44.	<p><i>The following sentences are moved to the Annex</i></p> <p>Atmospheric stability</p> <p>Atmospheric stability is usually the most important atmospheric dispersion parameter after wind direction and should be considered in modelling. Unstable conditions lead to increased dispersion in both the vertical and crosswind directions and hence lower ground level concentrations. For elevated releases (e.g. from a stack), unstable conditions increase the vertical dispersion which causes the plume to reach ground level at shorter downwind distances than would be the case for more stable conditions, <u>hence can lead to higher concentration close to the release</u>. For ground level releases, more stable conditions lead to higher plume centreline concentrations but with lower crosswind spread. For elevated releases, unstable conditions can lead to higher concentration close to the release than would be the case for stable conditions.</p>	<p>Related to the general comment #1.</p> <p>Too specific as a guide. Move the detail information to the Annex.</p> <p>Duplication.</p> <p>The condition described in the last sentence is the same as third sentence (i.e. elevated releases and unstable conditions). It seems easier to understand if these sentences are combined.</p>		x		We should keep this information. This is response to MSs' request
47.	4.45.	<p><i>The following sentences are moved to the Annex</i></p> <p>Precipitation</p> <p><u>4.45. Precipitation enhances the deposition of activity on the ground by washing material out of plume. Precipitation can also transfer activity to surface water and/or groundwater systems and should be carefully modelled.</u></p>	<p>Related to the general comment #1.</p> <p>Too specific as a guide. Delete or write them in the Annex.</p>			x	We should keep this information. This is response to MSs' request

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRcSC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRcSC; Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
13	Page.23 4.5.	(g) To assist in demonstrating the feasibility of emergency plan <u>evaluating the feasibility of planning effective emergency response actions</u> (based on para. 2.7).	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			
14	Page.30 4.48. and 4.49.	Delete these paragraphs.	The application of L3 PSA has not been discussed in any safety guides and draft standards. The details of how to analyse the transfer of radionuclides in the atmosphere in the safety evaluation should be discussed in light of the development of relevant publication.			x	The application of L3 PSA has been discussed in IAEA safety Series No. 50-P-1'2. IAEA works on revision of this publication. For accidental releases, a Level 3 probabilistic safety assessment is some MSs practice and increasingly so.

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
7.	Multiple Sections (4.23, 4.24,	If emphasis concerning the availability of new Gaussian-based models is to be retained in a future update, then it is	Multiple sections (4.23, 4.24, 4.27, 4.28, 4.39) discuss the use of "new generation Gaussian models" use in the atmospheric dispersion analysis		x		'new generation' is changed to more advanced.

	4.27, 4.28, 4.39)	recommended that consideration be given to providing more detail concerning how those new models are expected to improve the analysis.	in areas of complex terrain and/or short time scales. These “new generation” models are not discussed or explained in the document and no examples of “new generation Gaussian models” are provided.				How those new models are expected to improve the analysis is written in the para. 4.24. (g). References are available however, in the guide, we cannot reference to specific models or software.
8.	p. 27, Sec. 4.30	It is recommended that consideration be given to replacing the word “need” with “should” or “are recommended.”	Existing language reads, “In order to have data for at least one representative full year, at least three years and ideally up to ten years or data need to be collected.” It is agreed that multiple years of data are needed to ensure a reliable dataset, but there are other ways of demonstrating the representativeness of the data used in dispersion modeling.	x			
9.	p. 27, Sec. 4.28	It is recommended that consideration be given to clarifying the statement “... the use of a gaussian model would lead to uncertainties in the source term...”	Generally, the atmospheric and dispersion modeling is independent of the source term selected for the analysis as an input parameter. It is not clear how the use of a Gaussian model would lead to uncertainties in the source term. Do the IAEA authors believe that the use of new generation Gaussian models might lead to large uncertainties associated with the source term, especially for accidental releases?	x			Text is revised.

10.	p. 28, Sec. 4.41	It is recommended that consideration be given to clarifying this statement	The following cited statement is questionable: "The wind speed and atmospheric stability are correlated, with higher wind speeds leading to more stable conditions." This statement appears to be factually incorrect. Higher wind speeds are not indicative, and do not lead to more stable conditions. Low wind speeds are a result of stable conditions.	x			Text is revised.
11.	p. 28, Sec. 4.41	See next column. It is recommended that consideration be given to additional editing of the draft document.	The first sentence in paragraph (4.41) references itself.	x			Reference para is corrected.
43.	4.2	It is recommended that the second sentence be modified (underlined text) as follows: " <u>Atmospheric transport of released radionuclides is a pathway by which radioactive material that are either routinely discharged under authorization or accidentally released from a nuclear installation could be transported to locations where they expose the public.</u> "	Dispersion isn't really a transport pathway. Dispersion is something that happens during advective transport.		x		Text is revised.
44.	4.15	See comments.	The discussion concerning the sources of radioactivity seem to have been written for a nuclear reactor and may not align for other types of nuclear installations envisioned by this document. It is recommended that the text (discussion) here be broadening to be more technically agnostic.			x	This is a specific safety guide for nuclear installations.
45.	4.26	It is recommended that the following statement be added to the beginning of this section:	The discussion is good but gives the wrong impression about the different modeling techniques, which is secondary.	x			Proposal text is added to para. 4,21.

		“The most important factor in atmospheric dispersion modeling is to ensure that the model can simulate the important processes with sufficient accuracy.”					
46.	4.41	It is recommended that the use of the term ‘correlated’ be reconsidered in favor of another term.	Correlated can be positive or negative, suggest properly explaining or use the word "related" or similar. Also, please define or provide a numerical example for “very short-lived”.	x			
47.	4.44	It is recommended that the guidance be expanded to include discussion on stability classes, potentially with an example such as an Annex or Appendix).	Understanding stability classes is very important to implementation of many regulatory programs for atmospheric dispersion.			x	There is more elaboration in IAEA safety report No.19 which is under revision.
48.	4.44	See comments.	Wind speed can also be very important in dose assessments for a variety of reasons. It is recommended that the first two sentences in this section be amended to reflect consideration of wind speed.			x	Text do not say wind speed is not important.
49.	4.48 7.18	In reference to Level 2 and Level 3 PSAs	Level 2 and Level 3 PSAs are introduced without explanation of what they are or the differences in the two. Perhaps proper references would work. In addition, this section mentions core melt which only applies to reactors.		x		This is a specific safety guide for nuclear installations. Definitions of Level 1, 2, and 3 PSAs are given as footnote with reference.
50.	4.50	It is recommended that the following be added to the beginning of this section: “(d) Iterative screening calculations may be necessary to identify conservative parameters or conditions.”	When the system is non-linear, it may not always be clear what is a conservative selection.	x			

94.	4.19-4.28	This section focuses on the Gaussian model, the Lagrangian model, and the new generation Gaussian model. But what if new models are built? Can we make this section more open to new models?	Possibly include a new paragraph allowing for new innovative computational models to also be used.			x	This document reflects current good practices.
95.	4.30	The collection of data should continue for the lifetime of the nuclear installation to confirm that conditions have not changed significantly and that updated assessments can be performed using the latest data as necessary. When a change has been identified, a new assessment should be performed using the latest data.	This paragraph describes the need to collect data and update assessments, but it did not include when a new assessment should be performed.	x			
96.	4.34	It is recommended that the first sentence be deleted: Meteorological data should be obtained at least hourly.	Since the instruments should provide continuous recording of data and be readily available, there is no need to require obtaining hourly measurements.		x		Repetitions are eliminated.

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Reviewer: ENISS		Page 1 of 17					
Country/Organization: ENISS		Date:					
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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
31	4.41	... (see para 4.44) ...		x			Corrected.
32	4.41	with higher wind speeds leading to more stable conditions (see para 4.44). Higher wind speeds may also have the effect of inhibiting plume rise effects.	Higher wind speeds lead to neutral conditions. Lower wind speeds can lead to more stable conditions. That is		x		Text is revised.

			better explained in the para. 4.44.				
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Comments on Section 5

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: FRANCE		Date: 6 Oct 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
6.	5.16	<u>(d) unintentional water ingestion</u>	Addition to be comprehensive			x	Para. Refers to GSG-10.

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS)		Pages: 10						
Country/Organization: Germany		Date: 06.10.2023						
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	26.	5.4	In an accidental release, radionuclides may be transferred to surface water bodies either directly or indirectly by atmospheric deposition and deposition;	"Atmospheric deposition" seems redundant. Perhaps "atmospheric dispersion" is meant. This concerns several other paras in chapter 5 as well.	x			
1	27.	5.18	Accident conditions involving a direct release to surface water should be considered if their likelihood <u>or consequences</u> is <u>are</u> such that they could make a significant contribution to the overall risk.	The contribution to the overall risk depends not only on the probability of occurrence, but also on the extent of the possible consequences. Scenarios with low frequency and	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
				high consequences should be considered as well.				
3	28.	5.20 4 th line	The specific parameters necessary for modelling radionuclide transfer in various aquatic environments are provided in paras 5.22 1 –5.26 5 .	Some of the references in this document need to be updated.	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Japan NUSCC member Country/Organization: Japan / NRA					Page 36 Date: 06, Oct., 2023			
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection	
48.	5.2.	The hydrological dispersion and transfer of radionuclides should be estimated using relevant models, considering the defined hydrological conditions. The output of atmospheric dispersion models may also be used as input for transport in surface water if considered significant; this is probably necessary for only continuous discharges . As discussed in Section 7, the relevant exposure pathways and the representative person should then be identified. Finally, the estimated dose (and, in some cases, a measure of the risk of health effects based on the estimated doses), should be derived and compared with the applicable established criteria. Possible exposure pathways for a representative person through surface water include consumption of drinking water, fisheries, aquatic food, irrigation and recreation.	Since the output of atmospheric dispersion models can be important input information, technically inaccurate descriptions should be removed.	x				
49.	5.4.	In an accidental release, radionuclides may be transferred to surface water bodies either directly or indirectly by atmospheric deposition and deposition; however, the overall radiological impact of the latter is	Since it is possible for radionuclides deposited during the accident to shadow as a source to surface	x				

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		likely to be trivial in comparison with that from a direct atmospheric release. In addition, some of the radionuclides on the ground surface, either due to deposition from atmospheric releases or direct release to the ground might enter surface water through surface runoff due to precipitation. Such surface runoff should be considered after an accidental release to the ground surface.	water for a long period of time after the accident, technically inaccurate descriptions should be removed.				
50.	5.6.	<p>In respect of the source term and receiving water, there should be representative values for all the parameters that affect the dispersion of radionuclides in surface water, including the following:</p> <p>(a) Radionuclides: the nuclides and the amounts that could be released (e.g. corrosion products, fission products, activation products).</p> <p>(b) Chemical properties, which control the behaviour of radionuclides in surface water, such as adsorption affinity, biological uptake and chemical form of radionuclides, whether in dissolved or particulate form:</p> <p>(i) Major anion and cation concentrations, which control adsorption of radionuclides;</p> <p>(ii) Organic content, which is important for biological uptake of radionuclides by aquaculture;</p> <p>(iii) pH, which controls the behaviour of radionuclides in surface water (dissolution affinity of nuclides);</p> <p>(iv) Concentration of dissolved oxygen, conductivity, suspended substance;</p> <p>(v) Salinity, which is important for the marine environment and estuarine area where the fresh water and sea water mix. The water mass characteristics that control the distribution patterns of radionuclides are determined mainly by salinity and temperature.</p>	<p>(1) Since migration to body and deposition/adsorption to the bottom of the water are evaluated with reference to distribution coefficients, technically inaccurate descriptions should be removed.</p> <p>Note that (iv) in (b) and (c) should be listed in the notes as a parameter that affects the distribution coefficient.</p>		x		<p>Comment 1: The comment that migration depends on the distribution coefficient is correct and it is agreed. However, the descriptions in the draft guide do not disagree with this comment. The guide describes inclusively all possible processes and factors that might control the migration of a radionuclide. (iv) describes the physical processes and sediment load is defined as a physical property, apart from the</p>

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>(eb) Physical properties, which determine the distribution, dispersion pattern and concentration of nuclides in the surface water:</p> <p>(i) Temperature at multiple depths, which could define the thermocline and vertical distribution pattern of radionuclides in the water;</p> <p>(ii) Density is determined by temperature, salinity and water depth, which control the mixture of water parcels with each other; water parcels with different density values never exchange; the distribution of radionuclides in surface water elongate within the zone of equal density (isopycnal water parcel);</p> <p>(iii) Water flow characteristics, which control the dispersion pattern of radionuclides in the surface water;</p> <p>(iv) Sediment load parameters, which control the removal process of radionuclides from surface water to the bottom sediment;</p> <p>(dc) Sedimentation properties:</p> <p>(i) Distribution coefficient (Kd), which determines the removal of radionuclides from surface water to the bottom sediment;</p> <p>(ii) Particle size distribution of sediment or surface area of sediment, as indices for adsorption of radionuclides.</p>	(2) "is" could be deleted, considering the form of the other items in (c) of this para.				process of partition between water and solid. Comment 2 is accepted.
51.	5.7.-5.8.	<p>5.7. There are three basic types of model to estimate radionuclide transport through surface water:</p> <p>(a) Numerical models usually transform the basic equations describing radionuclide dispersion into finite difference or finite element forms.</p> <p>(b) Box type models treat the entire water body or sections of a water body as homogeneous compartments. These models often include some sediment radionuclide interactions.</p>	Description in 5.7 is unclear in terms of technical intention, should be removed.			x	The classification and definition of commonly applied models comply with the current relevant literature. Modelers are familiar with

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Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>(c) Analytical models solve the basic radionuclide transport equations. Simplifying assumptions are made regarding water body geometry, flow conditions and dispersion processes to obtain analytical solutions to the governing equations.</p> <p>5.8. Other Various types of model can be used for assessing radionuclide dispersion in surface water systems (e.g. rivers, human-made impoundments, lakes, estuaries, open shores, oceans). Their selection should be based on the quality of results needed for risk assessment.</p>					these definitions. The guide provides a basic information of the types of models that can be chosen for the site and guide the practitioner on the most appropriate one based on their advantages and disadvantages). Therefore this information is what is expected to be in the guide and should not be removed.
52.	5.13.	<p>Appropriate models should be selected. <u>Detailed information shown in the underline is in the Annex.</u> The typical models for dispersion in lakes along with their advantages and disadvantages for different situations are discussed below:</p> <p><u>(a) Box model: The water body is divided into multiple boxes in the longitudinal direction and the water quality changes associated with the inflow and outflow within each box are calculated. Hydraulic quantities are only used for inflow and outflow only. The water quality is calculated by taking an average of all the boxes. The advantages of this model are that the calculation time is short, and long term prediction is possible. Its disadvantages are that the model is not suitable for</u></p>	Detailed information of the model should be moved to the Annex.		x		This part should be included in the main body of the guide. However, it can be rephrased to include only the advantages and disadvantages

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		<p><u>stratified lakes, cannot represent the heterogeneity within a box, and cannot represent the effects of flow changes.</u></p> <p><u>(b) Vertical one dimensional model: The water body is divided into layers and the vertical distribution of hydrology and water quantity is calculated. The hydrology and water quantity are established using stratigraphic averages. The advantages of this model are that the calculation time is short, and long term prediction is possible. Its disadvantages are that the model cannot represent the distribution within a box, and it is difficult to take into account the effects of flow changes (horizontal variation).</u></p> <p><u>(c) Horizontal two dimensional model: The horizontal distribution of hydrological and water quantity is calculated by dividing the water body into horizontal meshes. The hydrology and water quality are determined for each mesh, but the vertical distribution is assumed to be uniform. The advantages of this model are that the calculation time is shorter than for three dimensional models, and medium term (1–10 year) prediction is possible. The disadvantage of this model is that it is not suitable for stratified lakes.</u></p> <p><u>(d) Vertical two dimensional model: The vertical distribution of hydrological and water quality parameters are calculated by dividing the water body into vertical meshes. The hydrology and water quantity are determined for each mesh, but the horizontal distribution is assumed to be uniform. The advantages of this model are that the calculation time is shorter than for three dimensional models, medium term (1–10 year) prediction is possible, and the stratification is represented. A disadvantage is that transverse variation such as horizontal flow is not represented in this model.</u></p>					

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		<u>(e) Three dimensional model: The hydrology and water quality is calculated by dividing a water body into meshes in the longitudinal, transverse, and vertical directions. The three dimensional distribution of hydraulic and water quantity is needed. The advantages of this model are that it can describe local hydrology and water quality characteristics, can take into account density flow and drift current, and can reproduce complex phenomena in the lake. A disadvantage of the model is that a long calculation time is needed, so it is not suitable for long term calculations (over 10 years).</u>					
53.	5.15.	<p>Appropriate models should be selected. <u>Detailed information shown in the underline is in the Annex.</u> There are three main types of ocean general circulation models that could be used to model dispersion of radionuclides in the sea, depending on the vertical coordinate system. These models along with their advantages and disadvantages for different situations are discussed below:</p> <p><u>(a) Z coordinate model, in which the vertical coordinates are perpendicular to gravity. This model is suitable for long term calculations. The z coordinate model utilizes the characteristics of the ocean so that local pressure is expressed as a function of depth by zero-order approximation, which makes implementing the equation of state straightforward. The implementation of bottom topography and drawing of results are also straightforward. This is the most widely used ocean general circulation model because of its versatility. The main disadvantages of this model, however, are that the vertical resolution in shallow seas and near the sea floor tends to be low, and the processes that</u></p>	<p>Using a general circulation model that includes marine areas in the site evaluation does not necessarily provide the adequate information needed for the evaluation and seems unpractical.</p> <p>These unpractical methods should be moved to the Annex.</p>			x	<p>The comment can be addressed, and text can be modified. However, however is not easy to do in short time..</p> <p>The guide does not impose the use of these models, but it states they could be used when appropriate.</p>

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		<p><u>arise near the coast and the sea floor tend to be poorly reproduced.</u></p> <p><u>(b) Sigma coordinate model, in which the vertical coordinates are the planes along the sea floor. The number of vertical layers to be calculated in shallow water is the same as for deep water. Since the number of vertical grid points is invariable throughout the model domain, sigma models are widely used for coastal ocean simulations. The main disadvantages of this model are that an accurate representation of the horizontal pressure gradient is difficult near steeply sloping bottom topography, and the lateral mixing along the same vertical layer near the continental slope region might lead to the mixing of the shoreward light water and the seaward dense water.</u></p> <p><u>(c) Isopycnal coordinate model, in which the vertical coordinates of the surfaces are along the isopycnal plane. The development of this class of model is based on the fact that seawater moves along isopycnal surfaces in the interior. Thus, the characteristics of a water mass are well maintained in the ocean interior. Since many theoretical studies of physical oceanography use an isopycnal coordinate framework, the isopycnal models have the great advantage of providing good correspondence between theory and numerical models. The main disadvantage of this model is that a surface mixed layer model cannot be incorporated into an isopycnal model.</u></p>					
54.	5.24.	<p>All oceanic phenomena affecting dispersion should be considered. The representative physical factors for developing the oceanic models in terms of their space and time scales are given in Table 2.</p>	<p>Using a general circulation model that includes marine areas in the site evaluation does not necessarily provide the information needed for</p>			x	<p>The comment can be addressed, and text can be modified. However,</p>

2.	p. 37 Sect. 5.28	Recommend that consideration be given to introducing language be introduced to DS529 that elaborates on the technical basis/reasoning for the type of release scenario being modeled. In particular, consideration should be given concerning the basis for the amount of material (source term) accidentally discharged and subsequently analyzed. Also recommend that consideration be given to evaluating the potential impact of instantaneous vs. long-duration releases as indefinite releases seem to be an unrealistic modeling scenario.	It is not clear whether the 2023 guide distinguishes between two common contaminant fate and transport events analyzed—specifically, an instantaneous (slug) but limited duration releases event versus constant relatively longer duration releases. For surface water discharges, DS529 calls for modeling of that release over an indefinite period of time. In the case of a groundwater discharge scenario, it is unclear if a similar (continuous) release scenario is to be modeled by this safety guide. In reality, it might be more likely that a radioactive release in the subsurface will go unrecognized (until such time where it might be identified through a groundwater monitoring program) compared to a surface water release. Both scenarios can have different consequence outcomes (doses) to receptors depending on the transport mechanism (groundwater vs. surface water).			x	Para. Is discussing the normal authorized operational discharge which is assumed to be continuous for the life time of installation; This does not seem to be unrealistic assumption.
3.	p. 37 Sect. 5.28	Recommend that consideration be given to introducing language should be introduced to DS529 that explains why this scenario is a realistic event to model.	Related to comment #2 above, this review comment questions whether the modeling recommendation for a constant rate over the lifetime of the facility is a realistic release/accident scenario to model. At some point, it would be expected that a facility operator would recognize that an accidental release has taken place. Is this scenario intended to emulate the unique Fukushima accident?			x	Please see above resolution.
51.	5.3	It is recommended that the parenthetic phrase "... (e.g. gas, aerosol, liquid) ..." be deleted.	It is observed that the forms cited are states of matter and not physical properties.		x		Text is revised.

52.	p. 33 5.9	It is recommended that the paragraph be revised as follows (new proposed text has been underlined): The modelling approach and level of accuracy of <u>transport modeling</u> depends on the purpose of the model and the accuracy needed. <u>Simplified models may be developed to represent steady or unsteady flow in one or two dimensions.</u> Detailed modelling typically needs more specific data and more detailed knowledge of the river system. For more detailed studies, one- or two-dimensional models should be used to obtain a preliminary <u>understanding</u> of the behaviour of the hydraulic system and to support a more refined analysis based on three dimensional models.	Suggest modification for better understanding and readability.	x			
53.	Between §§5.12 and 5.13	See comments.	The distinction between natural lakes and man-made lakes does not seem to be necessary as there isn't specific guidance to each.			x	What are written in the text are applicable both.
54.	5.14	See comments.	There seems to be very little guidance on modeling estuaries which is a very complex topic. Suggest expanding the guidance.			x	Proposal makes sense however is not easy to do in short time
55.	5.19	See comments.	It isn't clear that the temporal aspect of some scenarios is appropriately reflected in this guidance. For example, an accidental release with atmospheric deposition can be a short-term event. How is the surface water system appropriately modeled with annual average flow rates? See 5.21 (b).			x	There is no proposed text.

56.	5.24	Change Table 2 to Table 1.	It appears this is the first table in the document	x			
57.	5.26	It is recommended that additional guidance is needed in the draft document with respect to (model) calibration.	For a facility to be built or licensed, there are no (baseline) releases to be compared against for the purposes of decision-making. For an existing facility, there may be no planned/continuous releases only events such as accidents, that once again have no data available.			x	Proposal makes sense however is not easy to do in short time.
58.	5.28, 5.29	It is recommended that guidance on event scenarios for surface water releases be added to the guidance document.	The guidance provided is for continual releases not for discrete events.			x	Proposal makes sense however is not easy to do in short time.
59.	5.32	The intent of the following (second) sentence is unclear: "These flow phenomena can be simplified according to their complexity."	Recommend clarification.			x	Proposal makes sense however is not easy to do in short time.

Comments on Section 6

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Reviewer: M-L Järvinen		Page.... of....					
Country/Organization: STUK/Finland		Date: 2nd October 2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3.	6.11	(a) Please change radioactive material discharged to radioactive substance discharged.	To be consistent with the IAEA glossary. Radioactive material is the material under regulatory control. There may be radioactive substance discharges from the facilities.	x			

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Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
56.	Before 6.1.	<p>When conducting hydrogeological surveys on the premises of nuclear installations, it is necessary that "the resources devoted to assessment and control, and the scope and rigor of regulation, be consistent with the magnitude of the radiation risk and the extent to which the exposures are amenable to control".</p> <p>For nuclear installations installed on a land basis, the radioactive releases from the surface of the installations are assumed to be more dominant than the groundwater transportation route, both in normal and accident conditions. It is assumed that the transport of radionuclides in groundwater has little impact on the site evaluation for nuclear installations.</p> <p>Therefore, from the perspective of a graded approach, hydrogeological surveys should be conducted corresponding to their grade. (e.g., Characteristics of the site in 10.5. (j))</p> <p>When conducting a hydrogeological survey, groundwater contamination from nuclear installations should be examined and determined. Then, it is necessary to assess the risk stemming from the groundwater contamination and compare it with other risk. It is important to select appropriate surveys and evaluations for individual sites based on these assessments.</p> <p>This chapter provides examples of investigation evaluation methods when detailed investigation is necessary.</p>	<p>The application of the graded approach in the conduct of hydrogeological study is described in parts of Chapter 6 (Section 6.43 and Appendix).</p> <p>It should be stated at the beginning of Chapter 6 that this basic concept will be consistently applied to the overall hydrogeological study described in Chapter 6.</p>			x	The comment can be addressed, and text can be modified. However, however is not easy to do in short time.
57.	6.1.	The objectives of conducting a hydrogeological study in a nuclear installation site <u>and in the vicinity of the site</u> are to determine the following:	Since hydrogeologic boundaries typically exceed the extent of the site.	x			

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Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
58.	6.6.	The direction of groundwater movement and of radionuclide transport in isotropic media is orthogonal to the contours at the hydraulic head. In this case, the standard calculational models may be applied. If the aquifers are strongly anisotropic, however, and the water and transported effluents can move over a limited domain through fractures and/or karstic conduits , most calculational models are not valid.....	Too specific to the safety guides.			x	Karstic media are not specific areas. On the contrary they are quite widespread in the world and should be mentioned in this guide. They are as general as fractured rock aquifers. Therefore the guide should mention karst as other IAEA guides do. Lacking karst would be a sort of ignoring a major fact.
59.	6.7.	The objectives outlined in paras 6.1–6.4 can may be achieved primarily by mathematical models that produce groundwater flow velocity vectors in the flow domain. These models should then be coupled with transport models to assess the spatial and temporal variations in the concentrations of radionuclides.	The derivative value, the flow velocity vector, is useful but not usually measurable. It should be interpreted in conjunction with an integral value such as mass balance, and in some cases, mass balance alone is sufficient for study.	x			
60.	6.10.	Considering their limitations, analytical models for groundwater flow and radionuclide transport should be applied as an initial prediction because, in most cases, they involve a high level of simplification of the real system. Additionally, the assumptions in these models limit their application to relatively simple systems. Therefore, they should be considered as inappropriate for most practical groundwater problems.	Given that sometimes a simple model is sufficient to achieve the objective, the descriptions that is not technically rational should be removed.			x	Inappropriateness of analytical models for groundwater problems is a commonly known fact and regarded as technically rational. Therefore, it is useful to keep it in the guide. It can be clarified adding additional text however is not easy to do in short time.
61.	6.13.	The following properties and parameters should be estimated for radioactive discharges:	(1) Assumptions about releases (location, amount,		x		Comment 2 is accepted..

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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		(a) Radioactivity: (i) <u>Rate of discharge of each important nuclide;</u> (ii) <u>Total activity discharged in a specific period-</u> and its fixation capacity on soils.	and concentration) are important since the nuclear facilities covered by this guide do not directly discharge radioactive materials into the groundwater system during their normal operation. However, these descriptions are not included in (a) (i) and (ii). Please add the method for these items. (2) In addition, the items and content of the descriptions do not match. "fixation capacity on soils" should be deleted.				Comment 1 is also reasonable but however is not easy to do in short time.
62.	6.17.	Inadequate conceptualization is one of the main sources of uncertainty and unreliability in the analysis of the transport of radionuclides. A lack of well represented spatial variations of hydrogeological parameters might also adversely affect the results. It should also be considered that simple hydrogeological models might not produce a conservative assessment of the system behaviour.	The inability to evaluate properly is not an issue with the simple hydrogeological models themselves. It would be a problem that occurs when the evaluator does not give sufficient consideration when simplifying the model while ensuring maintainability.			x	What is meant here is not related to the incompetence of the modeler. A competent modeler sometimes may use simple models (not complicated ones) to make a conservative prediction. It can be clarified adding additional text however is not easy to do in short time.
63.	6.19.	To decide on the extent of the study area, first the hydrogeological domain to which the nuclear installation site belongs should be defined. A model area should then be determined for hydrogeological conceptualization and	(1) "on" could be deleted. (2) In this para, dynamical effects is not explained, but		x		In hydrogeological modeling jargon, the system is stressed but not disturbed...

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Country/Organization: Japan / NRA

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		characterization. The conceptual model should extend to natural boundaries (e.g. topography such as topographical divide, geological structure or lithological contact, or surface water features like streams, rivers or lakes). The model should also consider the extent of the potential impact of <u>stress disturbance</u> generated at the site. To reduce the impact of boundary conditions on the model, the extent of the hydrogeological domain to study should be larger than the model domain.	disturbances that threaten the stability of the system				
64.	6.21.	An iterative approach should be used in the process of construction of a hydrogeological conceptual model. The preliminary conceptual model should be tested by an appropriate mathematical model (defined in paras 6.26–6.34) using the monitored data and refined until minor improvements in the predictive capability of the model are, <u>practically, not necessary-achieved.</u>	It seems hard to understand the meaning of “minor improvements are achieved”.	x			
65.	6.24.	Interpretive (also known as informative) and predictive models can be used to model radionuclide transport in groundwater. Interpretive models are used to obtain a thorough understanding of the hydrogeological system dynamics. They help to construct and to test the hydrogeological conceptual model of the site. This type of model does not necessarily need to be calibrated. Predictive models, on the other hand, need to be calibrated.	"interpretive and predictive models" are not common terms, being unclear, need to be explained. The basis for “need to be calibrated “ is also unclear. Should be deleted.			x	On the contrary, these terms are common in hydrogeological modeling. They can be found in every basic modeling book and even in the standards such as the ASTM... Similarly, calibration is one of the main steps of modeling and clear to modelers. Therefore it is not convenient to remove these lines.
66.	6.28.	Stochastic models are <u>may be</u> usually used to consider strong heterogeneity and occurrence of preferential flow paths.	The method of giving parameters probabilistically is used for the	x			

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Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			consideration of various characteristics.				
67.	6.29.	Deterministic models can be subcategorized as (a) lumped (or black box, grey box) models and (b) distributed parameter (process-based) models. Mathematical (partial differential) equations simulating groundwater flow and solute (radionuclide) transport are the most used distributed parameter models. These equations are solved either analytically (exact solutions) or numerically (approximate solutions, commonly known as mathematical models).	Lumped model and distributed parameter model are used for river hydrology and not for groundwater flow.			x	This comment is not correct.
68.	6.30.	Analytical models are solutions that satisfy certain geometry and specific boundary conditions of the flow domain, and generally <u>limited in its</u> they do not <u>consideration of</u> heterogeneity and anisotropy.	The description should be corrected to be technically accurate.		x		Meaning do not change however text is revised.
69.	6.31.	Numerical flow and transport models can be applied with different levels of simplification. Flow and solute transport phenomena in the subsurface environment might involve various processes. In particular, the transport models are commonly known by the process(es) involved, such as advective, dispersive, sorptive, reactive and radioactive, or a combination of some or all of these processes. The following assumptions determine the level of simplification or complication of the hydrogeological model: (a) Ignoring the role of the vadose zone; (b) <u>Considering a conservative contaminant</u> ; (c) Assuming a homogenous and <u>isotropic uniform</u> flow domain.	(1) The purpose of "consider" in (b) is unclear, and the intent to consider should be clarified. (2) For (c), technical correction since the flow is not isotropic.			x	1)Considering means here "assuming" 2) the guide does not say "isotropic flow", it says "isotropic flow domain" which means the medium.
70.	6.32.	Modelling should start with the simplest model — advective — which assumes that the transport is governed only by the mean velocity of groundwater flow. Therefore, it does not need descriptions of <u>parameters of nuclide properties</u> transport parameters and variables.	Parameters related to groundwater flow are obviously necessary, meaning that if the simplest assumption in evaluating radionuclide migration in			x	Advective transport does not need "transport parameters" which includes the parameters of the medium (aquifer) such

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			groundwater as a medium is that radionuclides move with the water at all, then parameters related to radionuclides are not necessary.				as dispersivity, distribution coefficient and properties of the radionuclide such as decay coefficient, adsorption etc.
71.	6.33.	In order to use more complicated models (e.g. a combination of all processes), more hydraulic and transport parameters need to be determined, such as dispersivity, distribution coefficients, kinetic reaction rates and half-lives. See Section 10 and the Annex Appendix for recommendations on the application of a graded approach for different reporting stages.	There is no Annex but Appendix in this Safety Guide.	x			

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Reviewer: Japan-EPRReSC;							
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Country/Organization: Japan / Nuclear Regulation Authority - EPRReSC;							
Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
15	Page.39 6.4.	(e) To assist in demonstrating the feasibility of emergency plan <u>evaluating the feasibility of planning effective emergency response actions;</u>	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/ Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
6.	p. 45, Sec. 6.31(a)	Recommend that consideration be given to amending the text in question to better understand what the IAEA's intent is in the matter of vadose zone characterization.	In the case of unconfined aquifer systems, the vadose (unsaturated) zone can potentially have a significant effect on contaminant fate and transport in groundwater modeling owing to the presence of sorption coefficients or K_{ds} (or R_{fs} as described in DS529). It is not clear why DS529 acknowledges the potential for ignoring this key aspect of the groundwater system in connection with the abstraction process of the subsurface geology.			x	The guide suggests to characterize the unsaturated (vadose) zone due to its effect on the fate and transport of contaminant. The vadose zone is the zone where processes that significantly affects the concentration of the contaminants in general. It, for most of the contaminants reduces the concentration and retards its movements toward the saturated zone. Therefore, ignoring the effect of the vadose zone leads to higher concentration and faster movement of the contaminant in the groundwater (saturated zone) system. In turn this allows to make a conservative prediction (staying at the safe side) at the first stage of site evaluation. A text can be added for further clarify,

							however is not easy to do in short time.
60.	6.1(d)	Recommend revision of this item as follows (underlined text): “The susceptibility to contamination <u>of an aquifer or</u> aquifers at different levels”	It should be recognized that there may be only one aquifer present at a particular site. Also, is the use of the term “level” in reference to an elevation below grade?	x			
61.	6.5(d)	Recommend deleting §6.5(d)	If this section concerns groundwater, shouldn't it be focused on consumption and use of contaminated groundwater rather than fishing and recreational use of groundwater, which can only happen through discharge of contaminated water to surface water?	x			
62.	6.7	See comments.	It is observed that many state-of-of-the art software packages in use have the capability of evaluating groundwater by combining flow and transport. Suggest modifying paragraph to reflect current capabilities.	x			
63.	§6.13(b)	Recommend adding “chelating agents” to the list of properties.	Chelating agents are used in different applications and can greatly impact transport.	x			
64.	After §6.13	Suggest renaming this section as “CONCEPTUAL MODEL DEVELOPMENT”	It is recommended that that the recommended section title change aligns better with the discussion.	x			
65.	6.17	Recommend changes to this paragraph to improve readability, as follows: “Inadequate conceptualization is one of the main sources of uncertainty and may result in models for the transport of radionuclides that are unreliable. Inadequate consideration of spatial variations of hydrogeological parameters might also adversely affect the	As stated.	x			

		results. Simple hydrogeological models might not produce a conservative assessment of the system behaviour.”					
66.	6.21	See comments.	In reference to the phrase “the predictive capability of the model,” how does one do this if there are no observations, such as for facilities where the only releases will be accidental? It is recommended that additional guidance (text) elaborating on this point be provided.			x	The iterative approach is recommended to test the accuracy (representativeness) of the conceptual model. Prediction refers to mainly the flow (head distribution). Monitoring the temporal variation of groundwater levels provide the time-series needed to check the capability of the model by comparing the predicted head with the monitored data. The issue can be elaborated in the text however is not easy to do in short time.
67.	6.24	See comments.	In reference to the last sentence “ <i>Predictive models, on the other hand, need to be calibrated,</i> ” For most facilities, especially new ones, there is no data on radionuclide transport. While the hydrology can be calibrated the transport cannot. We suggest rethinking this point.			x	Calibration mainly refers to flow models, with the assumption that a calibrated flow model will provide a substantial basis for a successful transport model. On the other hand, calibration of transport models can be achieved by

							tracer tests, considering advective and dispersive transport only. This can be elaborated accordingly, however is not easy to do in short time
68.	6.28	See comments.	In reference to the following sentence “ <i>Stochastic models are usually used to consider strong heterogeneity and occurrence of preferential flow paths,</i> ” it is observed that stochastic models are used when there are significant sources of uncertainty, which may have nothing to do with preferential pathways. Suggest revising to make more general. In addition, the term “probabilistic” is typically used in place of “stochastic” which is usually limited to hydrology.			x	“occurrence of preferential flow paths” is considered as one of the sources of heterogeneity. The recommendation to make it more general is acceptable however is not easy to do in short time.
69.	6.34	Recommend adding a reference to discharges to the sea or estuaries.	It is observed that estuaries are not mentioned/referenced in this section.			x	A text can be modified, however is not easy to do in short time
70.	Between §§ 6.38 & 6.39	Recommend renaming this section as follows: SCENARIO BASED SIMULATION OF RADIONUCLIDE TRANSPORT IN GROUNDWATER	We recommend that either the term “scenario-based” be described or defined as it is observed that the concept has not been addressed in the text or the title be amended.			x	A definition of the scenario-based will be added to the text. It actually means to run the calibrated model to simulate different regular and/or accidental release scenarios (plausible cases) of contaminants. however is not easy to do in short time.
71.	6.40	See comments.	The draft text here is a mixed and in our view is an incomplete representation and discussion of			x	The guide is normally designated to

			uncertainty. For example, there are many types of uncertainty commonly encountered in contaminant flow and transport analyses, such as: conceptual model uncertainty, numerical model uncertainty, parameter uncertainty, exposure scenario uncertainty, exposure parameters uncertainty, etc. We recommend that this paragraph be revised and expanded.				provide guidelines rather than giving details of the steps, procedures and methodologies. For the sake of integrity of the guide and not to violate the “balance” among chapters, some further explanation have been avoided. A text can be added to make the analyst analyze different sources of uncertainty, however is not easy to do in short time.
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Reviewer: ENISS				Page 1 of 17		ENISS	
Country/Organization: ENISS				Date: 06/10/2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
33	6.2	The transport of radionuclides in groundwater is very slow compared to transport in surface waters <u>(except in karst topography)</u> .	The transport of radionuclides in a karst aquifer could be very rapid.	x			
34	6.4	The results of the hydrogeological investigation <u>can</u> should be used for the following purposes: (a) To confirm the suitability of the site;	For clarification (c) direct link made here with limits for radioactive discharges not understood. It does not seem relevant.		x		Using the results from dose assessment, a limit needs to be established for regular releases during operation,

		<p>(b) To select and calibrate an appropriate flow and transport model for the site;</p> <p>(c) To establish limits for radioactive discharges into pathways that ultimately reach the groundwater;</p> <p>(d) To assess the radiological consequences of releases;</p> <p>(e) To assist in demonstrating the feasibility of an emergency plan;</p> <p>(f) To develop a monitoring programme and a sampling strategy for use in <u>normal operating condition and also in</u> the event of an accidental radioactive release.</p>				Hydrogeological modeling study is required to provide such limit. Therefore, one of the objectives of the hydrogeological investigation is to help establish such a limit.
35	6.5	<p>The information necessary to perform dose assessment relating to exposure pathways in the hydrogeological system includes the following (see Section 7 for assessment of doses using the radionuclide concentrations calculated from groundwater transport analyses discussed in this section):</p> <p>(a) <u>The source term for the discharge of radioactive material to the groundwater system;</u></p> <p>(b) Hydrological, physical, physicochemical and biological characteristics governing the transport, diffusion and retention of radioactive material;</p> <p>(c) Relevant food chains leading to humans;</p>	<p>(a) It is not allowed to make discharges in groundwater under normal operating condition. What about the source term? Precisions should be added to better understand.</p> <p>(d) fishing and watersport in groundwater ? Should bullet point d) be kept?</p>		x	<p>Accidental release can occur from tank or pipe leaks... and this may not be aware of ...</p> <p>d) is deleted.</p>

		(d) Dietary and other relevant habits of the population, including special occupational activities such as fishing and recreational pursuits such as water sports.					
36	6.11	A discharge of radioactive material from a nuclear installation might contaminate the groundwater system in the region either directly or indirectly, via soil, the atmosphere atmospheric fallout or surface water, in the following ways: (...)		x			
37	6.13	(h) Distribution coefficient(s) between the liquid phase and solid phase. <u>(cf. IAEA-TECDOC-1616)</u>	This document is useful for determining the distribution coefficients for each radionuclide and could be referenced : IAEA, Quantification of Radionuclide Transfer in Terrestrial and Freshwater Environments for Radiological Assessments, IAEA-TECDOC-1616, 2009.			x	In safety guides, we cannot give reference to TECDOC.
38	6.34	Possible exposure pathways for releases of radionuclides to groundwater during normal operation of nuclear installations such as nuclear power plants are as follows: (a) Boreholes, wells and galleries used to abstract water for drinking; (b) Springs captured for drinking water; (c) Ground water used for agriculture; (d) Discharge (or emergence) as base flow to streams, rivers, lakes or	6.34 is not understood. It looks as if there is confusion between exposure pathway and the means for contamination to reach groundwater. Content to be reconsidered			x	A text can be further modified for clarification, however is not easy to do in short time.

		<p>wetlands (ingestion of drinking water and/or aquatic food such as fish, crustaceans and molluscs;</p> <p>(e) Discharge to sea (ingestion of aquatic food, external exposure through activities such as swimming and fishing).</p>					
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Comments on Section 7

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page.... of....					
Country/Organization: Belgium		Date:					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
13	7.4(d)	Age-dependent inhalation dose coefficients for each radionuclide and its chemical and physical form (see e.g. Ref. [23]).	It could be useful to add in the example of relevant reference a reference to organ specific (mainly for thyroid) dose conversion coefficients (e.g. ICRP Publication 71).			x	Text is revised. Reference 23 is compilation of several ICRP report including 71.
14	7.6 (e)	(e) The dose rate coefficients for each nuclide (see e.g. Ref. [24] which provides values for typical environmental geometries and shielding situations).	It seems the reference [24] is not the good one, we are not sure which reference was expected to be used (maybe the [26]). ICRP 114 does not provide geometrical and shielding situations. It is a publication that provides transfer Parameters for Reference Animals and Plants. More related to ingestion and environment impact than external exposure.	x			ICRP 144 is added as reference.

15	7.6	Age-dependent conversion dose coefficients for each radionuclide (see e.g. Ref. [XX]).	We propose to replace the bullet § 7.6 (e) by the conversion dose factors due to exposure (air, soil and water) and refer to the ICRP Publication 144 “ <i>ICRP, 2020. Dose coefficients for external exposures to environmental sources. ICRP Publication 144. Ann. ICRP 49(2).</i> ”, which provides in its supplemental material 1 & 2 all dose conversion coefficients relevant to the external exposure.	x			ICRP 144 is added as reference. Text is revised.
16	7.7	For normal operation , the total dose for any given individual is the sum of all contributions listed in paras 7.3–7.6. If the collective dose is needed, then the dose calculations should be integrated over the necessary geographical scope and temporal scope using the population and habit data.	For normal operation added at the beginning of the paragraph. Under accidental conditions, the ingestion is usually not included in the effective dose of the event (considered in the lifetime effective dose following the event).			x	The ingestion is often included in the effective dose.

COMMENTS BY REVIEWER				RESOLUTION			
Country/Organization: FRANCE		Date: 6 Oct 2023					
pages							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
7.	7.4	7.4. The inhalation dose for an individual at a particular location should be determined by combining the following: ... e/ Any location factors applied (e.g. being indoors effectively reduces the activity inhaled);	This parameter is difficult to estimate, to be considered only in the graded approach. This parameter could be transferred into chapter 10			x	Simple factors are usually available, so not difficult to estimate.
8.	7.6	7.6. External exposure should be calculated using the following: ... (d) Any location factors for shielding applied (e.g. being indoors);	As this parameter is difficult to estimate, to be considered only in the graded approach. This parameter could be transferred in chapter 10			x	Please see above resolution.

COMMENTS BY REVIEWER				RESOLUTION				
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS)				Pages: 10				
Country/Organization: Germany				Date: 06.10.2023				
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3	29.	7.2 6 th line	These characteristics are covered in more detail in SSG-18 [15], and IAEA Safety Standards Series Nos SSG-9 (Rev.1), Seismic Hazards in Site Evaluation for Nuclear Installations [18], SSG-21, Volcanic Hazards in Site Evaluation for Nuclear Installations [19], NS-G-3.6 DS531 , Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants [20] and SSG-79, Hazards Associated with Human Induced External Events in Site	New DS552 Safety Evaluation of Nuclear Installations for External Events Excluding Earthquakes might be worth mentioning here once finalized. NS-G-3.6 is also currently being revised (DS531).			x	References are given to published IAEA safety standards. Just before publication of this documents, references will be updated.

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) (with comments of GRS) Country/Organization: Germany					Pages: 10 Date: 06.10.2023			
Relevanz	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			Evaluation for Nuclear Installations [21].					
1	30.	7.28	For nuclear power plants, since it is difficult to exclude the possibility of any public exposure in neighbouring States, a transboundary assessment should be performed. However, for low hazard installations, such a transboundary assessment might not be necessary. <u>For nuclear installations, other than nuclear power plants, a transboundary assessment should be conducted, if a facility has the potential to affect an area across borders.</u>	Please consider the proposed should-statement.	x			

COMMENTS BY REVIEWER					RESOLUTION			
Reviewer: Haruyuki Oginō (Japan RASSC) Page.... of.... Country/Organization: Nuclear Regulation Authority Date: 6 Oct 2023								
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection	
3	7.5	7.5. The ingestion dose of an individual consumer of a particular food type should be determined by combining the following: (a) The activity <u>concentration</u> of each nuclide in that food type (as a function of time if long term exposure is being evaluated) determined by the dispersion and transport modelling and food chain models;	For consistency with para. 7.3. Para. 7.3 states “The endpoints for analysis of the atmospheric dispersion and transport in groundwater and/or surface water should be <u>activity concentrations</u> in the environmental media that could lead to	x				

		(b) The ingestion rate for an individual food consumer, usually determined from the habit surveys; (c) Age-dependent ingestion dose coefficients for each radionuclide (see e.g. Ref. [23]).	radiological exposure of people.”.				
4	New 7.24	<u>7.24. The requirements for a graded approach for the control of exposure should apply to the assessment of radiological environmental impacts. The use of a framework for the prospective assessment of radiological environmental impact in planned exposure situations should not impose an unnecessary burden on registrants and licensees or on the regulatory body. Further guidance on protection of the environment is provided by IAEA Safety Standards Series No. GSG-8.</u>	Clarification. A new paragraph should be added to describe what GSG-8 provides for protection of the environment.		x		Reference was given to GSG-8 and para.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRcSC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRcSC; Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
16	Page.51, 52 7.18., 7.19., 7.20	Delete these paragraphs.	Too specific as a guide. The application of L3 PSA has not been discussed in any safety guides and draft standards.			x	Please see above resolution for Comment 14.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: WASSC member of 1 Country/Organization: Republic of Korea/Korea Institute of Nuclear Safety Date: October 04, 2023				Page 1			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3	7.2/2	o The following is suggested. (before) 7.2 They relate to natural hazards and ~~~. (after) 7.2 They relate natural external hazards and ~~~.	o It is recommended that in order to clarity, the word of external is added.	X			
4	7.31/1	o The following is suggested. (before) 7.31 As part of the application ~~, an environmental management plan. (after) 7.31 As part of the application ~~~, an environmental management plan which could be defined as the document that deals with and includes ~~~.	o Environmental management plan seems a new concept. That term is not found in the IAEA glossary 2022. So, if it is rephrased, it may be helpful to understand it.		X		Para. 7.31 include a sentence already explain what environmental management plan deals and includes. That sentence moved up in the para.

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
72.	7. Figure 1	See comments.	In our view this figure needs to be revised. It does not show the proper connections and flow of information within a radiological environmental impact assessment.		x		There is no proposal on how the figure should be modified. However, Figure is revised.
73.	7.19	In reference to the following sentence: This procedure should be repeated for every accident scenario considered, and the conditional risks for each scenario multiplied by their	The guidance provided is this sentence is good but, in our view, out of place without additional explanation or references.		x		References are added.

		respective frequencies (derived from the Level 1 and/or Level 2 probabilistic safety assessment) to give the risk for each scenario.					
74.	7.21,7.22	See comments.	It is our understanding that not all member states evaluate exposures to plants and animals. Perhaps a different (new) section should be introduced that focuses on these topics.		x		Text is modified. WE do not need to add a new section since it is discussed in Annex I of GSG-10 and reference is given in..
75.	7.25	See comments.	We agree that this is an important topic. Consequently, for important information such as this we recommend that be summarized (abstracted) in this document so the reader doesn't have to refer to a large number of other references to implement.			x	IAEA style is that information in other guides is not repeated in this guide as it may be updated. So, reference is given.

COMMENTS BY REVIEWER				RESOLUTION ENISS			
Reviewer: ENISS Country/Organization: ENISS				Page 1 of 17 Date: 06/10/2023			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
39	7. Table 3	TABLE 3. OVERVIEW OF SITE CHARACTERISTICS AND THEIR USE IN RADIOLOGICAL <u>IMPACT</u> ASSESSMENTS FOR NUCLEAR INSTALLATIONS		x			
40	7.3	The endpoints for analysis of the atmospheric dispersion and transport in groundwater and/or surface water should be activity concentrations in the environmental media that could	For comprehensiveness	x			

		lead to radiological exposure of people <u>and biota</u> .					
41	7.6	Ref. [24] which provides values for typical environmental geometries and shielding situations)	ref. [26]? Now, for example, the ICPR144 provides external coefficients (or others, as indicated in the previous figure 1). It is proposed to remove ref. [24] and replace it by a more relevant one.	x			
42	7.7	The total dose for any given individual is the sum of all contributions listed in paras 7.3–7.6. If the collective dose is needed, then the dose calculations should be integrated over the necessary geographical scope and temporal scope using the population and habit data.	The collective dose is used in radiation protection. It does not fit for the present purpose.	x			
43	7.9	For normal operation of a nuclear installation, the regulatory a criterion for a single source or site <u>can be</u> is usually a dose constraint that is a fraction of the 1 mSv limit for public exposure (see para. III.3. of GSR Part 3 [4]).	This is not the case in all countries.	x			
44	7.14 to 7.22	IDENTIFICATION OF THE REPRESENTATIVE PERSON AND REFERENCE ANIMALS AND PLANTS	RAPs is a concept used for the environmental impact assessment and it should be clearly indicated (Cf. ICRP 103)			x	Reference is given to ICRP 108 in para 7.22.
45	7.30	For impacts on animals and plants, Ref. [25] defines criteria for assessing and managing the radiological impact in the form of 'derived consideration reference levels'.	A reference or a link to the ERICA method could help.			x	Giving reference to specific software is not possible.

Comments on Section 8

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Marcus Grzechnik (EPRSC) Page..1.. of..1. Country/Organization: ARPANSA, Australia Date: 6/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	Chapter 8	Suggest including reference to DS505 in the Sections on monitoring in different exposure situations. Also confirm consistency between the two documents as they develop.	References pointing to DS505 (on monitoring), also at Step 7, would enhance the usability of the document.	x			Reference is given to RS-G-1.8, Environmental and Source Monitoring for Purposes of Radiation Protection. (DS505, Radiological Monitoring for Protection of the Public and the Environment). 505 is also gives reference to this document. They complement each other.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member Page 36 Country/Organization: Japan / NRA Date: 06, Oct., 2023							
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
72.	8.12.	The monitoring programmes started during the pre-operational stages of a nuclear installation and continued during operation should focus on those radionuclides that are important contributors to the total dose of the representative person. In addition, those parameters that are identified as important to this dose calculation through modelling studies and	“installations” should be added.	x			

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/L ine No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		sensitivity analyses should be sampled more frequently and in more locations. The distance of the sampling locations from the nuclear installation should be determined by the results of the pathway analyses. If the results indicate that an individual could receive a substantial dose through a pathway at some distance, the environmental samples should be extended to that distance. These distances are different for different types of nuclear installation depending on the source terms and site environmental factors. The control locations (see para. 3.26) that are outside the region of influence of the nuclear <u>installations</u> should continue to be sampled regardless of their distance from the installation.					

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Jan Johansson and Peder Kock (EPRéSC)							
Pages 57 and 59-62 of DS529							
Country/Organization: Sweden, Swedish Radiation Safety Authority							
Date: 6 October 2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	8.19	It could be considered to harmonize the objective in this paragraph with 6.12 in DS505, which also covers the objectives for monitoring in emergency exposure situations.			x		Text is revised and reference is given to DS505.
2	8.23	It could be considered to harmonize the text in this paragraph with 6.13-6.15 in DS505.	Generally, urgent public protective actions will be taken based on prevailing conditions at the facility and the emergency class. Estimation of source term		x		Para. is deleted.

magnitude by source monitoring is unlikely to affect decisions on public urgent protective actions.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS		Page 1 of 17		ENISS			
Country/Organization: ENISS		Date: 06/10/2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
46	8.2 to 8.13	ENVIRONMENTAL MONITORING PROGRAMME DURING THE SITE CHARACTERIZATION AND PRE - OPERATIONAL STAGES OF A NUCLEAR INSTALLATION	It should be written in this chapter that the monitoring program is adapted and commensurate to the types of discharges and their composition in terms of radionuclides to follow in the environment. The choice of matrices to be taken from the environment and the level of analytical performance of the measures to be carried out must also be based on the objectives assigned to the measurement (alert, routine monitoring, expertise monitoring or radioecological studies). The sampling locations, upstream and downstream, or under the prevailing winds, the seasons, the sampling frequencies, etc. should also be mentioned.			x	Guidance on those aspects is given in DS505 (revision of RS-G-1.8). Reference is given to DS505 in this document.
47	8.15	During the operation of a nuclear installation, monitoring programmes should be used to verify compliance with <u>regulatory limits of exposure</u>	It could be precised that the results of the monitoring program play an important role for the information of the public	x			

		dose constraints and to confirm that levels of radionuclides in the environment are consistent with the discharges reported by the operating organization <u>and the results of the impact study</u> , to check the predictions of environmental models, and to provide a warning of unusual or unforeseen conditions. In an emergency, additional monitoring activities should be established.	and that they should be accessible to the public.				
48	8.16	The environmental monitoring programme established during the site characterization and pre-operational stages of a nuclear installation should be continued during the operation of the installation. Samples from the environmental media should be taken and analysed on a schedule that depends on the half lives of the radionuclides that could potentially be discharged from the installation, <u>its way of discharge and also in correspondence to the objective of the analysis to be made</u> . However, the frequency and the number of samples taken during the early stages of operation of the installation should be relatively high to confirm the predictions made by modelling conducted during the site characterization and pre-operational stages. As experience is gained, the scale of routine monitoring could be reduced and the locations amended to reflect actual discharge patterns identified during monitoring activities.	Some clarification	x			

Comments on Section 9

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Radiation and Nuclear of Safety Directory (RNSD) Page of Country/ Organization: IRAQ/ Iraqi Atomic Energy Commission (IAEC)/ Radiation and Nuclear of Safety Directory (RNSD) Date: 2023/10/09							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
2	Para 9.6	The company that manufactured the nuclear facility should include in its calculations the infrastructure around the facility's location, including engineering to draw the nearest roads and places for distributing food and emergency materials (radioactive iodine, stable iodine)... and the necessary materials for the residents living near the facility, in this case. It helps facilitate response to radiation emergencies.	The feasibility of planning effective emergency arrangements off the nuclear installation site should be demonstrated on the basis of the specific natural and infrastructural conditions in the region. In this context, infrastructure means transport and communications networks, industrial activities and anything that might influence the rapid movement of people and vehicles in the region of the site. Other information on the region, such as information on the availability of The factors that affect the radionuclides subsequent transport and behavior in the environment should be clearly specified in the draft safety guide by more information's like			x	Guidance on the evaluation of the feasibility of planning effective emergency response actions are given.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan-EPRéSC; Page 1 of 9; Country/Organization: Japan / Nuclear Regulation Authority - EPRéSC; Date:06/10/2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
17	Page.59 9.2.	Any adverse conditions surrounding the site that could hinder off-site emergency response action such as the sheltering or evacuation of the population in the region, or the access of external services needed to deal with an emergency should be <u>identified and evaluated (e.g. in a transport analysis)</u> and it should be confirmed that <u>planning</u> effective emergency response actions remain feasible.	<p>“A transport analysis” is not clear at this stage. The following 9.6 provides details.</p> <p>Consistency with the term of SSR-1 requirement 13.</p>		x		Cross reference is given to relevant para.
18	Page.60 9.3.	<p>...There should be at least two evacuation routes in different directions</p> <p>It is preferable to have different evacuation routes in order to offer various itinerary options for the implementation of precautionary urgent or urgent protective actions that involve road transportation (especially in case of changing weather conditions) during a nuclear or radiological emergency. If this is not possible owing to geographical features, administrative restrictions or other reasons, the site should be considered unsuitable for a nuclear installation. Examples for an unsuitable site are provided in Fig. 2 and 3. Example for a suitable site are provided in Fig. 4.</p>	<p>Too specific as a guide.</p> <p>The reason that this is a case of changing weather conditions is not clear.</p>		x		This is response to MSs’ request. “especially in case of changing weather conditions” is deleted.
19	Page.60 9.5.	... In case stable iodine tablets have not been predistributed and an <u>ingestion intake</u> order is issued during a nuclear or radiological emergency, an absence of infrastructure (e.g. insufficient road	<p>Clarification.</p> <p>There is no relationship between taking stable iodine</p>		x		Test is revised. Last sentence is moved to a new para.

		options to get access to the tablets) might hinder access to stable iodine tablets for the local population. There is normally more time to implement protective actions such as food bans, as any deposited activity takes time to transfer through the food chain.	tablets and restriction of foods.				
20	Page.61 9.6.	The feasibility of planning effective emergency arrangements <u>response actions</u> off the nuclear installation site should be demonstrated <u>evaluated</u> ..., should be collected for demonstrating the feasibility of an off-site emergency plan <u>evaluating feasibility of planning effective emergency response actions.</u>	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			
21	Page.62 9.9.	Many site related factors should be taken into account in demonstrating the feasibility of an off-site emergency plan <u>evaluating the feasibility of planning effective emergency response actions.</u>	Consistency with the term of SSR-1 below: Requirement 13: The feasibility of planning effective emergency response actions on the site and in the external zone shall be <u>evaluated</u> , ...	x			
22	Page.62 9.12.	Delete this paragraph.	This is not a level of recommendation in safety guide. The paragraph 4.7 in SSR-1 indicates the requirement for this recommendation.			x	Similar guidance was available in existing guide (NS-G-3.2) para. 6.6.
23	Page.62 9.13.	Delete the following paragraph: <u>The feasibility of planning effective response actions</u> Level 3 probabilistic safety assessment may be <u>reassessed on the basis of reviewed the site</u>	The application of L3 PSA has not been discussed in any safety guides and draft standards. The detail of how to review the site characteristics during periodical review should be			x	Please see above resolution for Comment 14.

		characteristics used in performing such reassessments.	discussed in light of the development of relevant publication.				
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Jan Johansson and Peder Kock (EPRéSC) Pages 57 and 59-62 of DS529 Country/Organization: Sweden, Swedish Radiation Safety Authority Date: 6 October 2023							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3	9	It may be considered to add a paragraph describing how to interpret the external zone in practice when the sizes of the emergency planning zones are not known.	According to the IAEA Safety Glossary, the external zone is the area that would be the emergency planning zones if the facility were in place. However, the sizes of the emergency planning zones are unlikely to have been determined when the site evaluation report is developed. The area that should be considered in relation to the feasibility of implementing emergency measures is therefore not defined. It may be considered to add a paragraph describing how to interpret the external zone in practice when the sizes of the emergency planning zones are not known.	x			
4	9:3	It may be considered to include less details on conditions for evacuation	Many factors need to be considered when evaluating the feasibility		x		Figures are useful especially for

		<p>routes and possibly remove figures 2-4.</p>	<p>to implement effective evacuation, including evacuation routes, the number of persons at different locations, etc.</p> <p>The suggested requirements in the paragraph are quite far-reaching. It may be that a site could be considered suitable even if at least two evacuation routes in different directions are not available for all concerned locations where people live or stay temporarily.</p>				<p>embarking countries. Figure are modified to include a notional EPZ.</p>
5	9:4	<p>Suggestion to include “as appropriate” at the end of the sentence.</p>	<p>There may be many possible sites where no buildings suitable for sheltering exist.</p> <p>In case of smaller emergency planning zones around a nuclear facility in emergency preparedness category II, it may also be more efficient to advise people to leave the zone rather than implementing a plan requiring buildings to stay open 24/7, even though such building may exist.</p>	x			
6	9:5	<p>Suggestion to replace “stable iodine” with “ITB” (iodine thyroid blocking) and “food bans” with “food restrictions”.</p>	<p>Adjustment to IAEA Safety Glossary.</p>	x			

		It could also be considered to clarify that planning for ITB is not required for all types of nuclear installations discussed in this safety guide.					
7	9:7	Suggestion to replace “alert” in bullet point (e) with “upon declaration of the appropriate emergency class”.	The emergency class “alert” is only used for on-site response according to GSR Part 7.	x			

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
76.	9.7	See comments.	There are at least two types of transport phenomena generally described in this document— radionuclide transport and human transport. As a matter of transparency (and readability), it is recommended that some additional detail be introduced in this section.	x			Text is revised.
77.	9.11	See comments.	Because the initiating event for a radioactive release may be an external event such as an earthquake, shouldn't the transport analysis discussed earlier also evaluate the potential for damage to key infrastructure such as bridges when considering alternative transport scenarios?	x			Text is revised.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: ENISS		Page 1 of 17		ENISS			
Country/Organization: ENISS		Date: 06/10/2023					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
49	9. Fig 2, p.60 and Fig.3 and Fig.4, p.61	<u>To be deleted.</u>	Fig.2 and 3 look as inappropriate examples as there seems to be evacuation routes in three directions. More generally such approximate figures do not help and may be misleading.			x	It is MS request.

Comments on Section 10

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
78.	10.4	In reference to the second sentence, it is recommended that it be revised as follows: “The transport mechanisms that should be included will be based on the complexity of the system. Also, as part of the revision, it is recommended that the following additional sentence be added: “The transport mechanisms included must achieve acceptable accuracy.”	We believe that the original text is mixing certain key concepts with respect to scope of the analyses and purpose. In our view, the accuracy of the models used will be (extremely) difficult to demonstrate for many situations.		x		Text is revised.
79.	10.4	In reference to the seventh sentence, it is recommended that it be revised as follows: “Analytical models may be used for low to intermediate hazard installations,”	Perhaps an Annex should be developed that provides examples or guidance on what constitutes low, medium, and high nuclear installation. In our view, it is a complex function of the type of radiation source, the release		x		Text is revised.

			mechanisms (scenarios), transport characteristics, and exposed populations.				
80.	10.5	See comments.	It is recommended that consideration be given to revising the text in question to indicate that to do the analysis properly, the analysis process is almost always performed iteratively where complexity is sequentially added until no more complexity in the analysis is necessary.	x			
81.	10.5(i)	See comments.	It is recommended that consideration be given to adding new text to explain cliff edge effects in dynamic responses. These concepts may not be familiar to many readers.	x			Footnote is added.
82.	10.6(b)	Suggest deleting the phrases “presence and characteristics of receptors (e.g., demography, population habits and living conditions” and “land use and other activities (e.g., agriculture, food processing, other industries) and characteristics of other installations in the vicinity”.	These topics are not typically considered to be environmental characteristics.			x	These topics are environmental characteristics.

Comments on Section 11

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Japan NUSSC member		Page 36					
Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
73.	11.14.	Two methods of peer review should be used: participatory peer review and late stage peer review. The participatory peer review should be conducted during the implementation of the project, allowing <u>to resolve the most of the</u>	The reviewer(s) would not resolve their own comments. Reason to conduct the review during the	x			

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Reviewer: Japan NUSSC member		Page 36					
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		comment before the end of the project. the reviewer(s) to resolve comments. The late stage (follow-up) peer review should be conducted towards the end of the project. Participatory peer review decreases the likelihood of the results of the investigation of site characteristics and evaluation of radiation risks from the nuclear installation being found unsuitable at a later stage.	implementation of the project could be to resolve the comment in early phase, at least before the end of the project.				

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Reviewer: USNRC		Date: 10/6/2023					
Country/Organization: USNRC							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
83.	11.6	It is recommended that a new point be added to address "Validity and quality of data."	Model validity is provided but not data quality.	x			
84.	11.11	In reference to the last two sentences: "An electronic copy of a ready-to-run model should be provided as an appendix to the documentation. The electronic copy should include the data files and model files of each run."	We observe that these recommendations could be difficult to implement for some modern tools, as they are not amenable to inclusion as a hard-copy document. The code is a binary *.exe file. The users should provide inputs, outputs, and a description of the version of software used and operating system it was used on.	x			Text is modified.

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Reviewer: ENISS		Page 1 of 17		ENISS			
Country/Organization: ENISS		Date: 06/10/2023					
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50	Chapter 11	APPLICATION OF THE MANAGEMENT SYSTEM TO INVESTIGATION OF SITE CHARACTERISTICS AND EVALUATION OF RADIATION RISKS FROM A NUCLEAR INSTALLATION	All essential items regarding management systems are addressed in GSR Part 2. This chapter adds no value to the safety guide. It is suggested to consider its removal.			x	IAEA safety standards usually have this section.
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Comments on Appendix

COMMENTS BY REVIEWER				RESOLUTION			
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Country/Organization: Japan / NRA		Date: 06, Oct., 2023					
No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
74.	Appendix A.4.	Three reporting stages are also assumed in this Appendix. Reporting Stage 1 relates to the site characterization phase, which involves a detailed study of the hydrogeological domain. Site specific data for hydrogeological conceptualization, characterization and modelling should be collected, evaluated, and reported during this stage. Reporting Stage 2 relates to the construction and operation phases. For <u>conformity of the analysis of radionuclide transport in groundwater</u> , this stage should include validation of the predictive model constructed for the site, using well established monitored observations of flow, hydraulic heads and concentrations. Validation is used 74here to mean a post-audit to assess the predictive accuracy of a site-specific model based on long term monitoring data. Reporting stage 3 relates to the closure of the installation. The validated model should simulate radionuclide dispersion in groundwater from new source terms that might be created or effectuated during the closure of the installation <u>If there might</u>	The consequences of a possible release of radioactive material during the in-service and closure of a nuclear installation should already have been presented in Reporting Stage 1. In Reporting Stage 2 and 3, the validation phase is based on monitoring data. The confirmation in Reporting Stage 2 is important because the groundwater flow regime usually changes before and after the installation of the facility due to the influence of buildings and pumping.	x			

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Reviewer: Japan NUSSC member		Page 36					
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No	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<u>be new source term, its dispersion in groundwater should be simulated by a validated model.</u>					
75.	Appendix A.5.	A.5. The complexity of the hydrogeological configuration refers to the variety and contact relations of hydrostratigraphical units. Factors such as dual porosity, fracture and/or karst permeability, heterogeneity and anisotropy significantly complicate the hydrogeological setting, and <u>should be considered</u> . The ease of construction of a representative hydrogeological conceptual model without oversimplification <u>should also be considered</u> .	The description "should be considered" should clarify whether it is at the time of evaluation or at the time of the decision of siting.	x			"during the evaluation stage" is added at the end of the last line.
76.	Appendix A.6.	A.6. Depending on the objective defined for the groundwater modelling study, the mathematical model should be selected to simulate different flow domains: saturated or a combination of saturated and unsaturated. In most cases, <u>s</u> Simulating the flow and transport in the saturated flow domain <u>is could be</u> sufficient to achieve the objectives. A simulation including the unsaturated flow domain is more complicated and needs data that is more difficult to acquire.	In the most cases, radioactive materials leaked from nuclear installation on surface reach the groundwater system through the unsaturated layer at the surface. Transportation of nuclides in the unsaturated layer is an extremely complex phenomenon with large uncertainties. In addition, they often do not need to be considered explicitly as a result. Therefore, it requires careful consideration.	x			
77.	Appendix A.8.	A.8. The objective and the level of hazard category may necessitate groundwater modelling in one, two or three dimensions. One dimensional models simulate flow and transport in the mean flow direction and <u>should can</u> be used <u>only</u> for the low hazard category or for the <u>screening stage_ making preliminary determinations of the hazard level through groundwater transport paths.</u>	If it is confirmed that the hazard due to the groundwater transportation path will not be significant by the simplified model in terms of dimensions, phenomena, parameters,			x	Changing the phrase leads to misconception of the guide: 1D models should only be used for low hazard OR for screening stage for

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		Dimensionality should be selected on the basis of the objective, expected impact and level of hazard. The higher the hazard category, the more dimensions the model should have.	then further detailed study is not necessary.				higher hazard category. The suggested wording can be taken as the 1D models for high hazard category can be used at all stages if the results reveal acceptable level of contamination. This is not acceptable.
78.	Appendix A.11.	A.11. A mathematical model to simulate the flow and transport processes should be selected on the basis of the level of hazard of the installation and the expected impact. The transport and fate of radionuclides in groundwater are primarily affected by advection, <u>sorption</u> and radioactive decay, but processes such as dispersion and sorption should also be included if the results of groundwater modelling show that the site is not acceptable for a nuclear installation. In some cases, transport models that include a reactive transport term may be selected.	Major radionuclides such as Co-60, Cs-137, and Sr-90 often show significant sorption to soil, and their properties should be considered from the beginning.	X			That is true.. the logic behind this ordering of the processes is the start with the most conservative approach. That is if sorption is not considered at the beginning the model will give conservative results that makes it stay at the safe side in terms of concentration of the contaminant. Sorption is a removal process therefore it should be considered if advection and dispersion gives unacceptable results. The radioactivity is a property of the radionuclide that we cannot avoid considering by nature.

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79.	Appendix x FIG A.1.- A.3.	Difficult to understand these figures. More detailed information should be added in the Annex.				x	A text can be elaborated, however is not easy to do in short time.

Reviewer: USNRC							
Country/Organization: USNRC			Date:10/6/2023				
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
85.	Appendix	See comments	We observe that this appendix is a excellent complement to the guidance document. We recommend that the body of the guidance document be better aligned with the appendix. For instance, the body of the guidance document mentions stages in the nuclear facility lifecycle without defining or elaborating on their functions. In the appendix those functions are clearly defined.			x	This recommendation is worth to consider. Should be discussed with the drafters. however is not easy to do in short time
86.	A.4	See comments.	In reference to the last sentences, it is observed that it is very rare that radionuclide transport (models) will be validated. Alternatively, it is observed that the hydrologic model may very well be validated. It is recommended that the sentence in question be revised.			x	Text can be revised however is not easy to do in short time.
87.	A.6	See comments.	In reference to the second sentence, in many geologic (hydraulic) systems in the United States, the unsaturated system is thick and consequently provides significant			x	Correct. The vadose zone provides significant delays and

			<p>delay in the transport for many radionuclides. It is recommended that the sentence in question be revised.</p>				<p>therefore it has a reductive effect on the contaminant transport. To be on the safe side (for a conservative prediction) we recommend to ignore this reductive effect by ignoring it at the first stages. Thus, the prediction is a conservative one. If the result is acceptable in terms of contaminant concentration then it means that the results in the real case the concentration will be even lower concentration. Text can be elaborated however is not easy to do in short time.</p>
88.	A.9	See comments.	<p>The term 'verification' is used here in a broad sense to mean checking the model against an independent set of data. Verification is simply confirming that the equations in question are correctly solved whereas validation is solving the correct equations.</p>			x	<p>There are different definitions of these terms. They may even be used interchangeably. It is convenient to make a short</p>

							definition as they are used in the text. However is not easy to do in short time.
89.	Appendix Figures	See comments	<p>There are only marginal differences in these flowcharts for low, intermediate, and high hazard categories. Therefore, it is our view that they could be combined with the same block used but with a distinction made. For example, the block on dimensionality (D) could be as follows:</p> <p>LOW - 1D INTERMEDIATE - 2D HIGH - 2D/3D</p> <p>At a minimum those steps that are different for each hazard level should be made a different color from the rest in the charts so the user can clearly see what would be different.</p>			x	It worth to work on it if it will make the diagram more easily readable and straightforward understandable. However is not easy to do in short time