Master Resolution Table

EPRESC DS518B Safety of Nuclear Fuel Cycle Research and Development Facilities (Revision of SSG-43)– Step 11

COMMENTS BY REVIEWER Reviewer: All Country/Organization: All				Date: 16 May 2024	RESOLUTION			
No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
1.	IDN1	Page 16, Line. 20 Para 5.12	(see para. 6.124 of SSR-4 [1]).	There is no closing bracket in Draft Documents	X			
2.	IRN1	5.67/Bullet (f)	"(f) Radiation monitoring ~~Monitoring~~ systems ~~for radiation protection~~;	The term 'radiation monitoring systems' is more common (please consider requirement 37 of SSR-4).	X			

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1.	GER1	1.4	Nuclear fuel cycle R&D facilities can operate over extended periods of time to provide analytical services, materials and testing services, and the inventories of radioactive and other hazardous materials in such facilities can be significant. Such facilities are subject to the safety requirements established in SSR-4 [1] relating to the management of nuclear fuel cycle facilities and activities in general, and to the safety requirements of specific types of nuclear fuel cycle ~~R&D~~ facility where similar operations are performed.	Clarification	X			
2.	GER2	1.6	This Safety Guide supersedes IAEA Safety Standards Series No. SSG-43, Safety of Nuclear Fuel Cycle Research and Development Facilities.	Editorial	X			
3.	CAN1	2.2(a)	"Heat removal systems ~~in storage areas~~ that remove decay heat from heat generating materials, and from heat producing experimental apparatus;"	"Heat producing experimental apparatus" are not for storage purpose.	X			
4.	EGY1	Page 7 (new item)	• A complete set of national safety regulations should be developed and implemented to ensure that the	It is proposed to add this new item for licensing of an R&D facility to be			X	Recommendations related to national

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			safety of an R&D facility is maintained for its full lifetime; see Section 3 of SSR-4. The regulatory body should establish the basic requirements for protection of workers and members of the public against the hazards of the R&D facility (e.g. based on assessments of the doses arising from normal operations and postulated accidents). • The licensing of an R&D facility should be based on a complete and adequate safety case produced by suitably qualified personnel. This safety case should include the safety analysis report, any operational limits and conditions and a listing of the safety procedures to be followed. The safety analysis report should consider safety during normal operations and in the event of accidents. Postulated initiating events should be analysed to ensure that accidents are adequately prevented and detected and that their consequences are	consistent with internationally agreed approaches.				regulations are not in the scope of this safety guide. The suggested aspects are already addressed in GSR Part 1 Rev.1, SSR-4 for all nuclear fuel cycle facilities including R&D facilities.

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			mitigated. Detailed requirements for the licensing documentation are established in Sections 2 and 9 of SSR-4.					
5.	GER3	Title for para 3.1	MANAGEMENT SYSTEM~~S~~ FOR NUCLEAR FUEL REPROCESSING FACILITIES	Please check if plural "management systems" is relevant here.	X			
6.	GER4	3.3 Line 12	… This includes the system of nuclear material accounting and control, for which information security should be coordinated in a manner ensuring that subcriticality and ~~other~~ safety and security measures in place are not compromised.	Subcriticality is not a measure. We suggest a rewording.		X This includes the system of nuclear material accounting and control, for which information security should be coordinated in a manner ensuring that safety and security measures are not compromised.		
7.	GER5	3.5 Line 3	.. This should address all aspects of safety (including ~~radiological~~ radiation safety, nuclear criticality safety and	Terminology issue. The Safety Fundamentals SF-1, the Safety Requirements SSR-4 and valid	X			

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			chemical safety).”	Safety Guides for other types of nuclear fuel cycle facility consistently use the term “radiation safety”. Compare also with para. 7.9 (2nd sentence) and para 8.19 of this Safety Guide, both of which refer to “radiation safety” as well.				
8.	JPN1	3.8.	The documentation of the management system is required to describe the interactions among the individuals managing, performing and assessing the adequacy of the processes and activities important to safety (see para. 4.16 of GSR Part 2 [9]). The documentation should also cover other management measures, including planning, scheduling and resource allocation (see also para. 9.9 of SSR-4 [1]).	To keep a consistency with DS518A para. 3.8. As with the DS518A, para. 9.9 of SSR-4 should be referred.	X			
9.	GER6	3.11 Line 4	… Audits should also be performed by the personnel who performed the criticality safety analyses to confirm that the data used and the implementation of criticality safety measures are correct. Other types of a~~A~~udits should be performed by personnel who are independent of those that performed the safety assessments or conducted the safety activities.	Not clear what exact personnel should perform the audits – independent or involved one. Please clarify.		X Checks should be performed by the personnel who performed the criticality safety analyses to confirm that the data used		Clarity See JPN2

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						and the implementation of criticality safety measures are correct. Audits should be performed by personnel who are independent of those that performed the safety assessments or conducted the safety activities. The data from audits should be documented and submitted for management review and for action, if necessary.		

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10.	JPN2	3.11.	The operating organization of a nuclear fuel cycle R&D facility is required to audit all safety related matters on a regular basis (see paras 4.2(d) and 4.23 of SSR-4 [1]). This includes the examination of arrangements for emergency preparedness and response at facility, such as emergency communications and evacuation routes (including signage). ~~Audits~~ Confirmation should also be performed by the nuclear criticality safety staff who performed the criticality safety analyses to ~~confirm that~~ be the data used and the implementation of criticality safety measures ~~are~~ correct. Audits should be performed by personnel who are independent of those that performed the safety assessments or conducted the safety activities. The data from audits should be documented and submitted for management review and for action, if necessary.	Missing the subject. The same comment on DS518A para.3.11.		X Checks should be performed by the personnel who performed the criticality safety analyses to confirm that the data used and the implementation of criticality safety measures are correct. Audits should be performed by personnel who are independent of those that performed the safety assessments or conducted the safety activities. The data from		Clarity See GER6

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						audits should be documented and submitted for management review and for action, if necessary.		
11.	US3	Section 3, Item 3.16	Relocate new item 3.16 since it still appears to not belong within the section titled "PROCESS IMPLEMENTATION FOR THE MANAGEMENT SYSTEM FOR A NUCLEAR FUEL CYCLE R&D FACILITY. The discussion in this section starts referring to the development of procedures for management of all aspects of safety but item 3.16, although it is a very valuable piece of information, is misplaced since it focuses only on criticality safety. We suggest the following solution: A) Delete item 3.16. B) Relocate only the second sentence as a footnote to item 3.5 as follows: "…This should address all aspects of safety (including radiological safety, criticality	The item appears to be inconsistent with the discussion in the section. Relocating as suggested makes the information consistent with the discussion in item 3.5.	X			

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			safetyfootnote…". The footnote should read as follows: "Further recommendations on the management system for criticality safety are provided in paras 2.17–2.40 of SSG-27 (Rev. 1)"					
12.	JPN3	3.19.	The audits performed by the operating organization (see para. 3.11), as well as proper control of modifications (see para. 3.18) are particularly important for ensuring ~~subcriticality.~~ the safety of the nuclear fuel cycle R&D facility.	To keep a consistency with DS518A para. 3.21. It is preferable because the hazard of nuclear fuel cycle R&D facility is not only criticality accident.	X			
13.	JPN4	3.23.	Requirement 6 of SSR-4 [1] states that **"An independent safety committee (or an advisory group) shall be established to advise the management of the operating organization on all safety aspects of the nuclear fuel cycle facility."** The safety committee of a nuclear fuel cycle R&D facility should have members, or access to persons, who are suitably qualified and experienced in relevant areas including human factors, criticality safety and radiation protection. Such persons should be available during commissioning and operation (including modifications) of the facility.	To keep a consistency with DS518A para. 3.25. DS518A states the availability of the safety committee members during commissioning and operation.	X			

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14.	GER7	4.2	The site evaluation process for a nuclear fuel cycle R&D facility will depend on a large number of variables. At the earliest stage of planning a facility, a list of potential hazards due to external events (e.g. earthquakes, accidental aircraft crashes, fires, nearby explosions, floods, extreme weather conditions) is required to be developed, all significant hazards and combination of them are required to be evaluated and the design basis for the facility carefully determined (see section 5 of SSR-4 [1]). In addition, the radiological risk posed by the facility to workers, the public and the environment in both operational states and accident conditions is required to be evaluated (see Requirement 12 of SSR-1 [16] SSG-64).	Clarification			X	The text is consistent with SSR-4 SSG-64 (Protection against Internal Hazards in the Design of Nuclear Power Plants) is not applicable to NFCFs. See response to GER8
15.	GER8	4.5 (b)	The periodic review of all natural and human induced external hazards, combination of them and site conditions in the design basis for the facility;	Clarification		X (b) The periodic review of all identified natural and human induced external		Clarity. See also RUS3

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						hazards, and their credible combinations; and site conditions in the design basis for the facility;		
16.	JPN5	4.5.(e)	Consideration of future changes to site characteristics that could have an impact on emergency arrangements and the ability to ~~perform emergency response actions for the facility.~~ take mitigatory actions on the site and perform emergency response actions for the facility on the site and off the site.	To keep a consistency with DS518A para. 4.5. (e).			X	The difference in the recommendations is due to varied nature of the hazards at R&D facility. Off-site actions are not generally envisaged in R&D facilities
17.	JPN6	5.24.	In the design of a nuclear fuel cycle R&D facility, consideration should be given to maintenance, calibration, periodic testing and inspection, with the aim of ~~optimizing~~ minimizing the dose to workers and other persons. Requirements for the design of items important to safety to facilitate maintenance of nuclear fuel cycle	To keep a consistency with Principle 6 of SF-1. Paragraph 3.25 under Principle 6 states “Justification and optimization of protection do not in themselves guarantee that no individual bears an unacceptable risk of harm. Consequently, doses and radiation risks must be controlled within specified limits.”. This leads to ALARA	X			

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			facilities are established in Requirement 26 of SSR-4 [1]. Examples of provisions to meet these requirements in a nuclear fuel cycle R&D facility include connection junctions at containment boundaries and easily cleanable surfaces.	principle.				
18.	GER9	5.27 Line 6	… ~~The requirements for the designation of areas inherently apply a graded approach~~ Graded approach is inherently being applied to the requirements for the designation of areas, based on the radiation and contamination levels.	To our understanding graded approach is being applied to the requirement, not vice versa, please verify		X The designation of areas inherently uses a graded approach based on the radiation and contamination levels.		
19.	CAN2	5.33, line 3	"This equipment should provide an immediate alarm on detection of airborne contamination above a ~~low~~ threshold."	The threshold here is an up-limit for airborne contamination. The word "low" here could cause confusion.	X			
20.	FIN1	General comment: To ensure consistency		Consistency between DS518B and DS518A, please use same formulation of paragraphs as far as possible. Especially the following paragraphs should be considered (following	X			

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		between DS518B and DS518A		comments):				
21.	FIN2	DS518B para 5.39 DS518A para 5.55 and		Consistency between DS518B and DS518A (UK1 comment for DS518B relevant also for 518A?)			X	The comment UK1 for DS518B has been incorporated in both DS518 A&B. Consistency between DS518A and DS518B checked and ensured as applicable.
22.	GER10	5.43	For Case 2 nuclear fuel cycle R&D facilities, the recommendations on the control of criticality provided in relevant facility-specific Safety Guides (i.e. IAEA Safety Standards Series Nos SSG-5 (Rev. 1), Safety of Conversion Facilities and Uranium Enrichment Facilities [21], SSG-6 (Rev. 1) [5], SSG-7 (Rev. 1), Safety of Uranium and	Case 2 are facilities involving R&D on processes and equipment envisaged for use on an industrial scale. A Graded approach is expected rather for Case 1 facilities. Please verify if the statement of this para should be adjusted accordingly.	X			

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			Plutonium Mixed Oxide Fuel Fabrication Facilities [22], and SSG-42, Safety of Nuclear Fuel Reprocessing Facilities [23]) should be implemented ~~in accordance with a graded approach~~.					
23.	JPN7	5.43. (a) footnote	The mass margin is the difference between the safety limit (the maximum amount allowed within the operational limits and conditions) and the subcritical limit (amount corresponding to effective neutron multiplication factor *k*eff < 1, often taken as *k*eff < 0.95).	"Subcritical limit" should correspond to the amount corresponding to the subcritical multiplication factor (keff < 1 or 0.95).	X			
24.	JPN8	5.43. (b)	(b) Geometry or shape: The safety analysis should give consideration to the layout of the facility, the dimensions and locations of pipes, vessels and other laboratory equipment. ~~Control by geometry~~ Geometry control could be used, for example, in the design of furnaces and dissolvers.	To keep a consistency with para5.34. and 5.82. (e).	X			
25.	GER11	5.62 Line 4	… As part of the design, the failure of all SSCs important to safety is required to be assessed (see paras 6.1 and 6.80 of SSR-4 [1]) and consideration given (in accordance with ~~a graded approach~~ results of safety assessment) ~~to the design or procurement of items that fail~~	This statement is difficult to comprehend. It is also difficult to bring together, in one sentence, paras 6.1, 6.80 and 6.89 of SSR-4. We made a suggestion, please verify.		X As part of the design, the failure of all SSCs important to safety is		Clarity The requirement 6.89 in SSR-4 can't be rephrased as

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			~~to a safe configuration. Where no safe configuration can be assured,~~ that the functionality of SSCs important to safety ~~is required to~~ should be maintained ~~(see para. 6.89 of SSR-4 [1])~~, for example by redundancy, separation, diversity and independence, as necessary. Additionally, (see para. 6.89 of SSR-4 [1]), items important to safety either should be capable of functioning after a loss of support systems, e.g. compressed air, or, if not, should be designed to fail to a safe configuration, with acceptable positions, settings and signals (or clear indication of their failed status).			required to be assessed (see paras 6.1 and 6.80 of SSR-4 [1]) and consideration given (in accordance with the results of safety assessment) to the design or procurement of items that fail to a safe configuration. Where no safe configuration can be assured, the functionality of SSCs important to safety is required to be maintained (see para. 6.89 of SSR-4 [1]), for example by		recommendation in the Guide. See also JPN9

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						diversity, redundancy, physical separation, and independence, as necessary.		
26.	JPN9	5.62	Paragraphs 6.80–6.89 of SSR-4 [1] establish requirements to address equipment failure among the initiating events considered in the design of a nuclear fuel cycle R&D facility. Thus, an R&D facility is required to be designed to cope with the failure of equipment that would result in a degradation of confinement, shielding or criticality control or a reduction in defence in depth. As part of the design, the failure of all structures, systems and components important to safety is required to be assessed and consideration given (in accordance with a graded approach) to the design or procurement of items that fail to a safe state. Where no fail-safe state can be defined, the functionality of structures, systems and components important to safety is required to be maintained (e.g. by redundancy, ~~separation,~~ diversity, physical separation and functional	Completeness regarding to the design concept to enhance reliability in nuclear installations.		X Where no safe configuration can be assured, the functionality of SSCs important to safety is required to be maintained (see para. 6.89 of SSR-4 [1]), for example by diversity, redundancy, physical separation, and independence, as necessary.		Clarity

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			independence, as necessary).					
27.	CAN3	5.63, line 1	"Failure due to fatigue or ~~chemical~~ corrosion or lack of mechanical strength should be considered in the design of containment systems for a nuclear fuel cycle R&D facility."	Corrosion can be a chemical process; but in most cases, corrosion is an electrochemical process.	X			
28.	FIN3	DS518B para 5.68 and DS 518A para 5.93		Consistency between DS518B and DS518A Shouldn't these be equivalent?	X			
29.	FIN4	DS518B para 5.73 and DS518A para 5.97?		Consistency between DS518B and DS518A			X	Consistency between DS518A and DS518B checked and confirmed that the text is as applicable to the type of facility.
30.	FIN5	DS518B para 5.83 and DS518A para 5.109		Consistency between DS518B and DS518A			X	Consistency between DS518A and DS518B checked and confirmed that the text is as applicable to

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								the type of facility.
31.	US1	5.84	Replace “forests” with “combustible vegetation”	To add context and extend scope beyond forests	X			
32.	FIN6	DS518B 5.103 and DS 518A 5.132 (a) (i)		Consistency between DS518B and DS518A	X			
33.	JPN11	5.103. (a)(i)	Safety related instrumentation and control systems for a nuclear fuel cycle R&D facility include the following, as determined by the application of a graded approach: (a) Criticality control, criticality detection and alarm: (i) Depending on the method of criticality control, the monitoring and control parameters include mass, concentration, acidity, (which might have an impact on solubility, extraction, stripping or precipitation), isotopic composition or fissile content, burnup and quantity of reflectors and moderators as appropriate……	To keep a consistency with DS518A 5.128(a)(i). This modification has been already captured by member state comments.	X			
34.	IDN1	5.108 after paragraph d	(d1) Optimised layout of facilities and equipment and procedures to ensure ease of maintenance, inspection, and testing activities.	To accommodate requirements in Para 6.107 of SSR-4: The design process shall give due consideration to the layout of facilities and equipment, and	X			

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				to procedures, including procedures for maintenance and inspection, facilitating the interaction between the operators and the facility in all facility states.				
35.	GER12	5.110	Requirement 14 of GSR Part 4 (Rev. 1) [14] states that "The performance of a facility or activity in all operational states and, as necessary, in the post-operational phase shall be assessed in the safety analysis." The safety analysis for a nuclear fuel cycle R&D facility should cover the various hazards for the whole facility, combination of them (see Section 2) and all the activities performed within the facility.	Please include the issue of combination of hazards.			X	Recommendations on consideration of credible combinations of hazards are appropriately included in relevant sections on design basis and safety analysis (5.11), postulated initiating events (5.66), analysis of design extension conditions (5.162, 5.163), Emergency preparedness and response (5.180)

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36.	IDN2	5.112. (c)	(c) That appropriate operational limits and conditions are developed in accordance with Requirement 57 and paras 9.27–9.37 of SSR-4.	Appropriate reference to the requirement to establish operational limits and conditions in nuclear fuel cycle facilities	X			
37.	JPN10	5.145.	~~For both Case 1 and Case 2 n~~Nuclear fuel cycle R&D facilities, the R&D personnel running experiments should inform the operating organization of the hazards and the shutdown arrangements (i.e. to achieve a safe state) for the experiments under their control.	No meaningful.		X The R&D personnel running experiments should inform the operating organization of the hazards and the shutdown arrangements (i.e. to achieve a safe state) for the experiments under their control.		
38.	IDN3	5.149/1	The design of a nuclear fuel cycle R&D facility is required to take into account the effects of ageing on SSCs important to safety to ensure their reliability and availability during the lifetime of the facility (see Requirement 32 of SSR-4 [1]).	add “R&D” to keep the text consistent.	X			
39.	IDN4	6.2/2	For a complex nuclear fuel cycle R&D	Replace “sought” with “obtained”.				To be

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			facility (e.g. a Case 2 facility), authorization by the regulatory body should be obtained in several stages.					addressed by the professional editors at Step 12.
40.	IDN5	6.6 after paragraph g	h. Receipt, handling, transport, storage, preservation and maintenance of SSCs.	additional requirement since modular components could be used in the construction of a nuclear fuel cycle R&D facility.	X			
41.	GER13	8.1	The specific hazards and their combinations associated with a nuclear fuel cycle R&D facility described in Section 2 should be taken into account in meeting the safety requirements for operation of nuclear fuel cycle facilities established in section 9 of SSR-4 [1].	Please add combination of hazards		X 8.1. The specific hazards and their credible combinations associated with a nuclear fuel cycle R&D facility described in Section 2 should be taken into account in meeting the safety requirements for operation of nuclear fuel		Clarity

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						cycle facilities established in section 9 of SSR-4 [1].		
42.	JPN12	8.12.	In order to ensure that, under normal circumstances, the nuclear fuel cycle R&D facility operates well within its operational limits and conditions (see Requirement 57 of SSR-4 [1]), limiting conditions for safe operation are required to be defined by the operating organization (see para. 9.31 of SSR-4 [1]). The margins should be derived from the design considerations and from experience of operating the facility (both during commissioning and subsequently). The objective should be to ~~maximize~~ set ~~the~~ a sufficient safety margin while avoiding breaches of the limiting conditions for safe operation. ……	Clarification for the object. "Object" of this sentence is to set a sufficient margins without breaches of OLCs. The same comment on DS518A para. 8.18.	X			
43.	US2	8.9 & 8.26(b)	Replace term "master-slave manipulators" with a more inclusive language term or delete	This term has negative racial connotations and does not align with inclusive language practices		X Changed the term to 'manipulators'		Clarity
44.	IDN6	8.52	The operating organization of a nuclear fuel cycle R&D facility is required to ensure doses are below authorized limits and are as low as reasonably	Workers may find themselves undertaking tasks across various nuclear fuel cycle R&D facilities or intermittently working on these sites. It			X	Para 3.83 (d) of GSR Part 3 addresses the requirement on

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			achievable within any dose constraints set by the operating organization (see paras 9.91 and 9.93 of SSR-4 [1]). Dose constraints are formulated, including for workers employed across multiple facilities, to ensure that the cumulative dose of such workers does not surpass the prescribed dose limits (see para 3.22 (c) of GSR Part 3 [7]). The operating organization should establish a policy to ensure that protection and safety is optimized using a systematic approach.	is imperative for the operating organization of each facility to maintain dose records or provide accurate dose estimates, as well as to establish dose constraints for these workers to prevent exceeding dose limits.				providing information on the worker's past and present work, for ensuring effective and comprehensive protection and safety.
45.	KOR1	Page 51, Para 8.52 Line	Behind the para 8.52, 8.XX. Requirement 67 of SSR-4 states that "The operating organization shall establish and implement a radiation protection programme.' This programme should be established and maintained to fulfil the management's responsibility for protection and safety and should take into account the inventory and the variety of sources involved in the fuel cycle research and development facilities. The radiation protection programme for fuel cycle research and development facilities is expected to include the following elements:	o Suggestion to add new paragraph for the radiation protection programme for a nuclear fuel cycle research and development facilities : New paragraph to incorporate the radiation protection programme based on the Requirement 67 of SSR-4 : Consider the paragraph 8.64 of DS518A (Safety of Nuclear Fuel Reprocessing Facilities) effectively addresses requirements pertaining to radiation protection programs, aligning well with Requirement 67 outlined in SSR-4.	X			

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			(a) ...					
46.	JPN13	8.46.	~~Documentation and records associated with modifications should be retained at the nuclear fuel cycle R&D facility in accordance with regulatory requirements.~~	To retain the document and records is not recommended practice but requirement, as stated in Requirement 62 and para 9.62. (e) of SSR-4. This paragraph does not include any added value, and then suggested to be deleted. The same comment on DS518A para. 8.53.	X			
47.	JPN14	8.56.	Intrusive maintenance and modifications should be regarded as major activities that involve justification by facility management. The procedures for such activities should include the following: (a) Estimation of doses .... (b) Preparatory activities to ~~optimize~~ minimize individual and collective dose, including:……	To keep a consistency with SF-1. The subject to be optimized is protective safety measures (Principle 5), meanwhile doses and radiation risks must be controlled within specified limits (Principle 6), which leads to ALARA principle. The same comment on DS518A para. 8.81.	X			
48.	JPN15	8.57.	During operation of a nuclear fuel cycle R&D facility (including maintenance and modifications) internal exposure should be controlled by the following means: …… (j) Careful consideration should be given to ~~the combination of radiological hazards and~~ non-radiological hazards	Better understanding. The same comment on DS518A para. 8.80.			X	Completeness and clarity

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No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
			(e.g. oxygen deficiency, heat stress) with particular attention paid to balancing the risks and benefits associated with the use of personnel protective equipment, especially for air-fed systems.					
49.	GER14	8.93	Useful information on the causes and consequences of many of the most important anomalies and accidents that have been observed in nuclear fuel cycle R&D facilities and other nuclear fuel cycle facilities is provided in the Fuel Incident Notification and Analysis System (FINAS) database ~~Ref.~~ [40].	For consistency reasons, it is advisable to keep the wording of this sentence as close as possible to the one found in valid IAEA Safety Guides for other types of nuclear fuel cycle facilities; for instance, see e.g. • Para. 8.86 (last sentence) in SSG-6 (Rev. 1); Para. 8.97 (last sentence) in SSG-7 (Rev. 1).	X			
50.	GER15	List of references, Ref. [31]	INTERNATIONAL ATOMIC ENERGY AGENCY, UNITED NATIONS ENVIRONMENT PROGRAMME, Prospective Radiological Environmental Impact Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSG-10, IAEA, Vienna (2018).	In addition to the IAEA, Safety Guide GSG-10 was co-sponsored by another international organization (UNEP) which needs to be added in Ref. [31].				To be addressed by the professional editors at Step 12
51.	GER16	List of references, Ref. [40]	"INTERNATIONAL ATOMIC ENERGY AGENCY, OECD NUCLEAR ENERGY Agency,	The given link in Ref. [40] directs the reader to a restricted website (i.e. the homepage of the FINAS database) to			X	The FINAS guidelines do not provide

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			IAEA/NEA Fuel Incident Notification and Analysis System (FINAS) Guidelines, Services Series No. 14, IAEA, Vienna (2006). ~~http://finas.iaea.org/.~~"	which only registered users from Contact Points nominated by Member States have access. For maintaining consistency with the approach in valid IAEA Safety Guides for other types of nuclear fuel cycle facility, it would be preferable to refer to the FINAS Guidelines instead; see e.g. • Ref. [29] in SSG-5 (Rev. 1); • Ref. [29] in SSG-6 (Rev. 1); • Ref. [34] in SSG-7 (Rev. 1); • Ref. [A–7] in SSG-50.				information events that have been observed in reprocessing facilities and other nuclear fuel cycle facilities
52.	CAN4	Annex III, page 67	"Non-destructive ~~analysis~~ examination or sampling of imported fissile material for isotopic or chemical characterization"	Terminology	X			

Master Resolution Table

RASSC DS518B Safety of Nuclear Fuel Reprocessing Facilities (Revision of SSG-42)– Step 11

COMMENTS BY REVIEWER Reviewer: All Country/Organization: All				Date: 16 May 2024	RESOLUTION			
No.	Country	Para/Line No.	Proposed new text	Reason	Accep-ted	Accepted, but modified as follows	Rejec-ted	Reason for modification/ rejection
1.	GER1	5.29 (b)	Mobile area monitors (for gamma and neutron radiation) and mobile air samplers (for beta/gamma and alpha activity) for personnel protection purposes and for evacuation purposes during maintenance;	Please add "for personnel protection purposes". See also DS518A (para. 5.53 (b)).	X			Clarity
2.	GER2	5.103 (e)	(v) Portable equipment and installed equipment to monitor whole body exposures (and, where appropriate, exposures of the hands and/or lens of the eye) to gamma radiation and neutron emissions;	Please add this new bullet point. See also DS518A (para. 5.132 (f) (ii)).			X	This is not considered as necessary recommendations for R&D facilities because of varied level of hazard in various R&D facilities, needs a graded approach.
3.	GER3	5.109	(c) The maintenance requirements for glovebox seals and glovebox window seals, including the need for personal protective equipment during these operations. (d) The number and location of glove ports and posting ports that are necessary for the operating and maintenance activities within the	Please add these new bullet points (see also para 5.147 (c), (d), (e) of DS518A).			X	These are not considered as necessary recommendations for R&D facilities because of varied level of hazard in various R&D facilities, needs a

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No.	Country	Para/Line No.	Proposed new text	Reason	Accep-ted	Accepted, but modified as follows	Rejec-ted	Reason for modification/ rejection
			glovebox. (e) The possible use of mock-ups and extensive testing of glovebox ergonomics at the manufacturer before finalizing the design.					graded approach.
4.	GER4	new 7.11	The full operational radiation protection programme (see Requirement 67 of SSR-4 [1]) should be implemented, including individual monitoring.	Please add this new para. after para. 7.10 (see also DS 518A para. 7.34).	X			
5.	GER5	8.9 line 4	This training should include personal radiation protection procedures such as self-monitoring and the use of personal protective equipment as well as the actions to be taken in response to anticipated operational occurrences …	Please add the personal protection procedures (see also DS518A para. 8.14 (f)).		X Included in 8.7 The training should also include procedures for self-monitoring and the use of personal protective equipment.		Clarity

Master Resolution Table

WASSC DS518B Safety of Nuclear Fuel Cycle Research and Development Facilities (Revision of SSG-43)– Step 11

COMMENTS BY REVIEWER Reviewer: All Country/Organization: All				Date: 16 May 2024	RESOLUTION			
No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
1.	IND1	Para - 2.1 / Line-2	The main hazards are potential criticality, loss of confinement, radiation exposure (both internal exposure and external exposure), **radioactive personal contamination**, fire, floods, chemical hazards and explosive hazards.	Nuclear fuel cycle R&D facilities are often highly reliant on human operations. Hence, personal contamination is inevitable if protective wear is not used or gets damaged.		X The main hazards are potential criticality, loss of confinement, radioactive contamination, radiation exposure (both internal exposure and external exposure), fire, floods, chemical hazards and explosive hazards.		Clarity
2.	RUS1	3.11	The operating organization of a nuclear fuel cycle R&D facility **should** audit all safety related matters on a regular basis (see paras 4.2(d) ~~and 4.23~~ of SSR-4 [1]).	The audits could be carried out by the organization itself, the regulatory authority or independent organization on behalf of the operating organization (see footnote to para 4.2 SSR-4). Thus,			X	Safety requirements cannot be paraphrased as recommendati

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No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
				this has to be expressed as "should" statement. Reference to para 4.23 is more appropriate in Measurement, assessment, evaluation and improvement.				ons with 'should' statements.
3.	IND2	Para-3.12 / Line-6, 7, 8	**(a) Analyse the operational hazards and based on that, prepare and issue the limits and conditions for safe operation with approval of the regulatory body.** (b) Prepare and issue procedures for safety related activities and operations **(for normal and off-normal conditions)**. **(c) Perform the preliminary safety assessment of proposed modifications and submit the same to the regulatory body for approval.** (d) Engage in frequent personal contact with personnel, including observation of work in progress. **(e) Monitor the compliance with the recommendations of**	(a) Safety analysis is also the prime responsibility of the senior management of the operating organization based on which, the limiting conditions for safe operations are derived. Hence, the words "prepare and issue specifications" may be replaced as suggested in the proposed text. (b) Preparation and issue of procedure is proposed to be included as a separate point with slight modification in the text. (c) Facility authority is responsible for performance of safety assessments of modifications, if any. Hence the word "support" may be removed. (d) Point same as the original text (e) **, (f) & (g) are the additional Points** suggested for inclusion in		X The management of the operating organization should also have frequent personal contact with personnel, including observing work in progress.		The other items suggested are paraphrasing of safety requirements in SSR-4.

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No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
			safety committee / regulatory inspection team **(f) Periodically update/ revise the safety documents/procedure as per the regulatory guidelines** **(g) Periodically report the safety performance of the activities to the regulatory body**	the text as these responsibilities of the senior management of the operating organization, are not addressed anywhere in the document.				
4.	IND3	Para-3.17 / Line-3	Modifications of safety significance are required to be subjected to safety assessment and regulatory review and, where necessary, they are required to be ~~**authorized**~~ **approved** by the regulatory body before they are implemented	The type of consent issued by the regulatory body for proposals for modification are approval.			X	'Authorized' is the appropriate term used in (9.57(h) of SSR-4)
5.	IND4	Para - 3.5/ Line-2	This should address all aspects of safety (including radiological safety, criticality safety, chemical safety, **fire and industrial safety and training /refresher training of staff).**	Fire and industrial safety are included. Training is essential for development and maintenance of strong safety culture.		X This should address all aspects of safety (including radiation safety, criticality safety,		The aspects of safety are given as examples. The context is the need to develop and maintain safety culture in all aspects of

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						chemical safety, fire and industrial safety).		safety. Methods to achieve this (e.g. training, .retraining) are not addressed here. Training and refresher training are addressed in other places (e.g. 3.15, 8.8)
6.	RUS2	3.22	The safety of a nuclear fuel cycle R&D facility is required to be **systematically assessed and** verified ~~by means of comprehensive safety assessment and systematically assessed~~, **in accordance with regulatory requirements,** throughout the lifetime of the facility~~, for example by periodic safety reviews~~ (see Requirement 5 of SSR-4 [1]). The operating organization should establish a process for periodic safety reviews as part of the management system.	If this is positioned as a requirement, the proper wording from SSR-4 should be used, see Requirement 5: "The operating organization shall conduct systematic safety assessments of the facility, in accordance with regulatory requirements, throughout the lifetime of the facility". Periodic safety reviews are mentioned in the second sentence of this paragraph.			X	The text in par 3.22 is consistent with requirement 5 of SSR-4
7.	IND5	Para-4.2/ Line-2	At the earliest stage of planning a facility, a list of potential hazards due to external events (e.g. earthquakes,	Typographic- to add-"is"				To be addressed by the

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No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
			accidental aircraft crashes, fires, nearby chemical hazards and explosions, floods, extreme weather conditions) is required to be developed, all significant hazards are required to be evaluated and the design basis for the facility **is** carefully determined (see section 5 of SSR-4 [1]).					professional editors at Step 12
8.	RUS3	4.5	(b) The periodic review of all **identified** natural and human induced external hazards and site conditions in the design basis for the facility;	Section 5 of SSR-4 calls for identification and assessment of hazards and conditions: "5.1. The main safety objective in site evaluation for a nuclear fuel cycle facility is the protection of the public and the protection of the environment against the radiological and associated chemical hazards arising from normal and accidental releases of radioactive material (see NS-R-3 (Rev. 1) [5]). This requires the identification and assessment of site characteristics affecting, or potentially affecting, the facility and the effects that the facility has, or may have, on its surroundings". See also the wording in 5.11.	X			
9.	IND6	Para-5.1/ Line-1	Requirement 7 of SSR-4 [1] states:	(b) Suggested inclusion in the text			X	The requirements

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			"The design shall be such that the following main safety functions are met for all facility states of the nuclear fuel cycle facility: (a) Confinement and cooling of radioactive material and associated harmful materials; (b) Protection against radiation exposure **during all stages of normal and off-normal conditions;** (c) Maintaining subcriticality of fissile material." **(d) Preparedness and response mechanism for major accident, if any** **(e) Provisions to facilitate surveillance of SSCs important to safety** **(f) Provisions for easy replacement of some of the old components/ equipment to extend the operating life time** **Design provisions to facilitate decommissioning of the facility in future**	**(d), (e), (f) & (g) are the additional points for consideration** during design.				are quoted verbatim and cannot be rephrased.

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No.	Country	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
10.	RUS4	5.2 / 3-5	The need to rely on personal protective equipment **should** be minimized (see para. 3.93 of IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards [20]).	Has to be expressed as "should" as para. 3.93 of GSR Part 3 provides for minimization of the need for both administrative control and personal protective equipment: "Employers, registrants and licensees shall minimize the need to rely on administrative controls and personal protective equipment for protection and safety by providing well engineered controls and satisfactory working conditions, in accordance with the following hierarchy of preventive measures…"			X	Safety requirements cannot be paraphrased as recommendations with 'should' statements.
11.	IND7	Para – 5.4 / Line-2	Depending on the specific design of a nuclear fuel cycle R&D facility and the inventory of radioactive material, a combination of source limitation, **area ventilation with negative pressure and specified air changes**, shielding, distance and time may be necessary for the protection of personnel within the facility	Area ventilation with negative pressure and specified air changes are important for protection of working personnel.			X	This para is about external radiation exposure.
12.	IND8	Para – 5.16 / Line- 1	Specific attention should be paid (particularly at the design stage) to maintaining containment during operations that involve the transfer of radioactive material through or out of the static containment. Where	Secondary containment is necessary for Pu solution transfers			X	Para 5.13 is sufficient. Specific recommendation not necessary.

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			appropriate, equipment should be designed to withstand radiation damage and contamination by highly radiotoxic nuclides. **Secondary containment through pipe-in-pipe arrangement is essential for transfer of Pu solutions.**					
13.	IND9	Para – 5.20 / Line-3	The ventilation system should include a final monitoring stage and should be designed in accordance with accepted standards, ~~**such as those of the International Organization for Standardization (ISO)**~~ and relevant national requirements.	Example of ISO may not be needed as relevant national requirements need to be met.			X	Example provided for clarity, if the Member State does not have specific national requirements.
14.	IND10	Para – 5.25 / Line-2	(e.g. in process equipment, fume hoods, gloveboxes, hot cells, and secondary systems such as ventilation **duct**~~**work**~~)	The word "ductwork" may be replaced by "duct"	X			
15.	IND11	Para – 5.29	**(d) Gate monitor at the exit of nuclear fuel cycle R&D facility for final check-up**	**New point may be included**. Gate monitors conform personnel and material free from radiation contamination.			X	Covered in bullet (a) as Fixed area monitor
16.	IND12	Para 5.108 Point (a)(i)	Design of human–machine interfaces (e.g. well laid out electronic control panels displaying all the necessary information ~~**and no more**~~)	For clarity	X			

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17.	RUS5	5.117	The calculation of estimated public dose should include all the exposure pathways associated with the facility, namely external exposure through direct or indirect radiation, and internal exposure through intakes of radioactive material (e.g. received through **inhalation or** the food chain as a result of authorized discharges of radioactive material).	For more consistency with 8.53: "In a nuclear fuel cycle R&D facility, the possible exposure pathways (for both workers and members of the public) include internal exposure (through inhalation or ingestion of particulates, aerosols and gases) and external exposure".	X			
18.	RUS7	Subsection "Safety analysis for accident conditions" Paras 5.119-5.122	This subsection is encouraged to supplement with guidelines on how to implement the steps of safety analysis for accident conditions for nuclear fuel cycle R&D facility (as stated in paras 6.60-6.67 of SSR-4): – identification of hazards; – identification and selection of postulated initiating events; – evaluation of event sequences – analysis of facility states; – evaluation of consequences; – comparison against acceptance criteria; – presentation of safety analysis and conclusions, and/or at least provide a link to the Section 3 "Performing	Seems reasonable to give link to SRS No. 102 because the subsection doesn't give comprehensive recommendations on safety analysis for accident conditions to support implementation of requirements of paras 6.60-6.67 of SSR-4.		X Added reference to SRS 102 in para 5.124. Information on methods and practices, based on the IAEA safety standards and current international good practice, for performing safety analysis and preparing		Clarity

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			safety analysis for nuclear fuel cycle facilities" of Safety Reports Series No. 102 "Safety Analysis and Licensing Documentation for Nuclear Fuel Cycle Facilities" where relevant comments are given. .			licensing documentation for nuclear fuel cycle facilities is provided in Ref. [33]		
19.	RUS 8	Subsection "Safety analysis for accident conditions" Paras 5.119-5.124	Consider to supplement this subsection with recommendations how to apply deterministic and probabilistic methods in relation to nuclear fuel cycle R&D facility, and/or at least provide a link to relevant section of SRS No. 102 "Safety Analysis and Licensing Documentation for Nuclear Fuel Cycle Facilities" (as stated in Req. 20 SSR-4) where such explanations are given.	Seems reasonable to give link to SRS No. 102 because the subsection doesn't give any recommendations on application of deterministic and probabilistic methods (as stated in Req. 20 SSR-4).		X Added reference to SRS 102 in para 5..124. Information on methods and practices, based on the IAEA safety standards and current international good practice, for performing safety analysis and preparing licensing documentation		Clarity

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						for nuclear fuel cycle facilities is provided in Ref. [33]		
20.	IND13	Para 5.140	i) **Design provision should be considered for providing maintenance tent for isolating glove box or hot cell from rest of the area.**	**New point may be added.** If maintenance to be carried out in one glovebox in a glovebox train or hot cell compartment, a maintenance tent can be provided to isolate and avoid cross contamination to rest of the area.		X (d) Design provisions for isolation of the work area from rest of the areas, during maintenance or replacement.		Clarity
21.	IND14	Para 8.16	**i) organization chart indicating the line of command and line of communication** **j) surveillance requirements of safety related systems and equipment** **k) limits on radiation field and fixed contamination in different area** **l) criteria for reporting of events** **m) level of training and certification of operational staff** **n) availability of standby equipment** **o) administrative control including minimum manpower requirement for safe operation/ shut down of critical operation** **p) availability of radiation**	**Additional points from (i) to (r) may be added in "Operational limits and conditions"**		X Included item (i) Specific limits on radiation and contamination levels in different areas.		Other points are covered under various requirements of SSR-4.

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			monitoring instruments in different areas **q) limits on radioactive waste disposal to the environment** **r) limits on chemical waste disposal**					
22.	IND15	Para 8.63(b)	(b) Avoiding unnecessary occupation of controlled areas, limiting the working time near radiation sources, **using direct reading dosimeters with alarm** and maximizing the distance from such sources;	Direct Reading Dosimeters should be used to control external radiation exposure.		X (b) Avoiding unnecessary occupation of controlled areas, limiting the working time near radiation sources (e.g. by administrative control, or by using direct reading dosimeters with alarm), and maximizing the distance from such sources;		Clarity

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23.	RUS6	8.87	Suitable, reliable and diverse means of communication **should** be established with local authorities and response organizations (see para. 5.43 of GSR Part 7 [20]).	Has to be expressed as "should". Para. 5.43 of GSR Part 7 does not specify local authorities and response organizations: "The operating organization of a facility in category I, II or III shall ensure that suitable, reliable and diverse means of communication are available at all times, under the full range of emergency conditions, for use in taking protective actions and other response actions on the site and for communication with off-site officials…".			X	Safety requirements cannot be paraphrased as recommendations with 'should' statements.
24.	RUS9	p.57 /lines 8-10 from the bottom	The operating organization of a nuclear **fuel cycle R&D** facility is required to **allocate** adequate financial resources for safe decommissioning where these are not provided by the government (see para. 4.2(e) of SSR-4 [1]).	For consistency with para. 4.2(e) of SSR-4: "Shall allocate adequate financial resources to ensure safety, including provision for financial resources for decommissioning where these are not provided by the government".	X			
25.	IND16	Para 9.4(b)	(b) Post-operational clean-out to remove all bulk quantities of radioactive material and other hazardous materials, **followed by their segregation and transfer to authorised waste management**	Solid radioactive material should be segregated as per different categories before transfer to WMA.		X (b) Post-operational clean-out to remove all bulk quantities		Clarity

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			agency (WMA),			of radioactive material and other hazardous materials, followed by their segregation, and storage, disposal or transfer to a authorized waste management facility, as necessary		