Master Resolution Table

Revision by amendment of 3 Specific Safety Guides on Nuclear Fuel Cycle Facilities:

DS517-B

SSG-6: Safety of Uranium Fuel Fabrication Facilities

STEP 7

COMMENTS BY REVIEWER					RESOLUTION			
No.	**Country**	**Para/ Line**	**Proposed new text**	**Reason**	**Accepted**	**Accepted, but modified as follows**	**Rejected**	**Reason for modification/rejection**
1.	BRA01	5.6 / 2	The specification of a design basis accident (or equivalent) will depend on the facility design and on regulatory requirements.	Regulatory requirements are legal, determined and more specific than national criteria.	X			
2.	BRA02	5.64 (former 4.69)	Remove the paragraph number and renumbered all succeeding paragraphs	The text of the paragraph was removed and the identification of the paragraph remained	X			
3.	BRA03	Annex I	Figure with few details	Figure is very simple and needs more details.	X			

4.	CAN01	SSG-6, Para 5.11	Technical: Add highlighted text, as follows: 5.11. If a fuel fabrication facility processes natural or depleted uranium only, criticality safety would not need to be taken into consideration. For further guidance see Exemption criteria in Para 6.138 of SSR-4 and para 2.8 of SSG-27 [2].	The most important guidance is provided in the IAEA standard SSR-4; thus, it needs to be references along with a supplemental guidance from SSG-27.	X			
5.	CAN02	SSG-6, Para 5.15	Editorial: Several methods can be used to perform the criticality analysis, such as the use of experimental data, reference books or consensus standards, hand calculations and calculations by means of deterministic or probabilistic computer codes. For more extensive guidance on performing a criticality safety assessment, including guidance on validation of computer codes see section 4 of SSG-27 [2]. No new text is proposed. See column "Reason" and adjust text accordingly.	Same as comment 2: In the draft, the following three different terms are used to characterize the same process: "criticality safety analysis", "criticality analysis" and "criticality safety assessment". For consistency of terminology throughout the guide, one term should be selected and used. As per consensus of the criticality safety experts, criticality safety analysis was decided to be a specific reference to the numerical calculations, coding, etc.; whereas, the criticality safety assessment includes the crit. analysis as well as all other aspects (identification of normal and credible abnormal conditions, process description, etc.).	X			

6.	CAN03	SSG-6, Para 5.35	Editorial: Special equipment to detect hydrogen fires, should be considered and the design of hydrogen piping should avoid joints prone for failures. For the purpose of suppressing metallic fires appropriate firefighting equipment should be considered.	Provide clarification for the following question: What is technical description of "special" in special equipment? Is the intent "separate" or "specialized"?	X			
7.	CAN04	SSG-6, Para 5.82	Technical: Change text, as follows: (1) Criticality ~~control.~~ detection	Radiation detectors are not related to any criticality controls.		X		I&C relating to criticality detection and alarm
8.	CAN05	SSG-6, Para 5.82	Technical: Change text, as follows: …shall cover all the areas where a significant quantity of fissile material is present~~, unless it can be demonstrated that a criticality accident is highly unlikely to occur~~ unless the safety analysis demonstrates that no reasonably foreseeable set of circumstances can initiate a criticality accident, or that a large radiation dose to personnel in the event of criticality is not credible, [para 6.173 of SSR-4].	The terminology and technical content of the text (to be deleted) is in contradiction with requirement of Para 6.173 of SSR-4, and with national standards or regulations; see, for example, CNSC regulatory document REGDOC-2.4.3, chapter 3 or ANS/ANSI-8.3 standard. SSR-4, para 6.173: […], unless the safety analysis demonstrates that no reasonably foreseeable set of circumstances can initiate a criticality accident, or that a large radiation dose to personnel in the event of criticality is not credible.		X		See the revised text;
9.	CAN06	SSG-6, Para 5.82	Technical: Radiation detectors (gamma and/or neutron detectors), with audible and, where necessary, visible alarms for initiating	Mixing of "should" in previous paragraph and "shall". Either remove "shall" or use quotes to reference SSR-4.	X			

			immediate evacuation from the affected area, shall cover all the areas where a significant quantity of fissile material is present.					
10.	CAN07	SSG-6, Para 8.16	Change text, as follows: 8.16. For maintenance performed in areas containing or near enriched uranium, criticality safety ~~personnel~~ staff	To make terminology consistent with that of SSR-4, paras 9.23-9.24. Similar to comment 7.	X			
11.	CAN08	SSG-6, Para 8.20	Change text, as follows: When maintenance is performed on installation that may contain enriched uranium or near a storage location of enriched material, criticality safety ~~personnel~~ staff	To make terminology consistent with that of SSR-4, paras 9.23-9.24. Similar to comment 7 and 13.	X			
12.	CAN09	SSG-6, Para 9.3	Editorial: Highlighted text is unclear 9.3. Special procedures should be implemented during the preparatory works for decommissioning to ensure that criticality control is maintained when handling equipment whose criticality is controlled by geometry.	Provide clarifications for the following questions: What is technical description of "special" in those special procedures? Why is a criticality control needed for handling equipment rather than for fissionable materials associated with, located near, or contaminating, the handling equipment?	X			The text was revised to address the comment.
13.	FIN01	Through out the docume nt	Correct the notation for chemical compounds to use superscripts or subscripts for the numbers (eg.UF_6 or ^{235}U)	Consistency with other sections, and clarity	X			
14.	FIN02	Whole docume nt	-	The SSG-6 and SSG-7 standards should be reviewed together. A consistency between the two should be ensured. The	X			

				order of various contents should be the same in the two as well as the order of paragraphs as far as possible. In addition, it would be helpful if the wordings of the 'similar' paragraphs would be as far as possible, the same. It should also be checked and ensured that no requirements given to one and relevant also to the other are left out. Now it seems to me the case.				
15.	FIN03	3.12/4	… through audits, that suppliers have management systems that are adequate for ensuring safety of ~~conversion facilities and uranium enrichment facilities~~ fuel fabrication facilities.	Do you really mean to refer here to conversion and enrichment facilities? Or should this read fuel fabrication facilities?	X			
16.	FIN04	5.4	For a facility licensed to use uranium from sources other than natural uranium, particular care should be taken to minimize contamination because of the different isotopic compositions.	Clarity and clearer relation between the various parts of the sentence. It is not that the *facility is licensed to use uranium from sources other than natural uranium because of different isotopic composition* but rather that they *should take particular care because of the different composition.*	X			
17.	FIN05	5.8	The events listed in para. 4.4 External natural or human induced events may occur as a consequence of a postulated initiating event (PIE)	Para 4.4 only names "risks related to external natural and human induced event". For clarity and easier reading, please consider rewriting the sentence with these written out. Or if the reference is wrong please check and correct it	X			
18.	FIN06	5.12/5	-	This sentence does not make sense! "For the following parameters should be subject to control: "	X			

19.	FIN07	5.12/bullet 2	… vessels, control of slabs and appropriate separation distances between containers in storage; the loss of confinement/geometry due to leaks or breaks should also be accounted for	addition	X			
20.	FIN08	5.63 (d)	The effect on criticality safety functions such as geometry and/or moderation of the following: i) deformation (geometry control); ii) displacement (geometry control, fixed ~~poisons~~ absorbers); iii) loss of material (geometry control, soluble ~~poisons~~ absorbers).		X			
21.	FIN09	5.65	Hazards from external fires and explosions could arise from various sources in the vicinity of uranium fuel fabrication facilities, such as petrochemical installations, forests, pipelines ~~and~~ road, rail or sea routes used for the transport of flammable material such as gas or oil, and volcanic hazards.	Please reconsider the place of the word 'and' in the list. The clarity might also need some reordering of the items in the list.	X			
22.	FIN10	5.67	Dashed bullets should be numbered (a), (b), (c).,,	Clarity and consistency with SSG7 5.77	X			
23.	FIN11	5.68/4	… with specific national regulations relating to hazards from tornadoes.	Clarity and consistency with SSG7 5.78	X			
24.	FIN12	5.69/3	… The possibility of impacts of tornado missiles such as these should be taken into consideration	Clarity and consistency with SSG7 5.79	X			
25.	FIN13	5.72	The occurrence of snowfall and ice storm and its effects should be taken into account in the design and safety analysis. Snow and ice are ~~is~~ generally taken into account as an additional load on the roofs of buildings. The neutron reflecting effect, or the	Consistency with the heading and SSG7 5.82	X			

			interspersed moderation effect of the snow, if relevant, should be considered.					
26.	FIN14	5.81	Control rooms and Human-Machine-Interface panels should be provided to centralize the availability of information and monitoring of actions. Occupational exposure and safety of personnel should be considered in the location of control rooms in the facility. Where applicable, it may be useful to have dedicated control rooms to allow for the remote monitoring of operations, thereby reducing exposures and risks to personnel. Particular consideration should be paid to identifying those events, both internal and external to the control rooms, that may pose a direct threat to the operation of control rooms. Human Ergonomic factors should be taken into account in the design of control rooms and the design of control room displays and systems	Consider using the same the formulation as in SSG7 5.91	X			
27.	FIN15	8.2	-	This sentence does not make sense to me: “In a uranium fuel fabrication facility, recent developments have made full automation of individual processes serves mainly to improve productivity and reduce human interaction with radioactive material.”	X			
28.	FIN16	8.4	The safety committee in a ~~conversion facility or an enrichment facility~~ fuel fabrication facility, as defined in SSR-4	This is a standard for a fuel fabrication facility	X			
29.	FIN17	8.19	-	The dashed bullets should be numbered a), b) etc. for clarity and to make it	X			

				easier to refer to them. See SSG-7 para 8.27				
30.	FIN18	8.32/5	foreseen effects on the overall safety of the facility. This should be part of (or additional to) periodic safety review or an equivalent process.	Give a time frame for the requirement, like in SSG-7 8.40	X			
31.	FIN19	8.36	-	The dashed bullets should be numbered a), b) etc. for clarity and to make it easier to refer to them. See SSG-7 para 8.52	X			
32.	FIN20	8.36/10	Specifying in the work permit ~~the procedures~~ protective measures for the intervention	As in SSG-7 8.52	X			
33.	FIN21	8.37/2-3	The risks of exposure of members of the public should be ~~controlled~~ minimized by ensuring that, as far as reasonably practicable, radioactive material is ~~removed~~ kept away and/or removed from ventilation exhaust gases to prevent its being discharged to the atmosphere.	I think you really want to minimize the dose as far as possible. The wording is taken from SSG 7 8.53	X			
34.	FIN22	8.43 and 8.45	-	Why are paras .43 and 8.45 in different order than 8 in SSG6 8.60 and 8.62. Consistency between the two standards is needed.	X			
35.	FIN23	8.49	-	The dashed bullets should be numbered a), b) etc. for clarity and to make it easier to refer to them. See SSG-7 para 8.65	X			
36.	FIN24	8.52	-	The dashed bullets should be numbered a), b) etc. for clarity and to make it easier to refer to them.	X			
37.	FIN25	8.52/bullet 2	…and leakages of oils from gear boxes or use of a water or CO_2 based firefighting system (e.g. automatic sprinklers)	CO_2 is equally bad as water in firefighting because carbon is a very good moderator	X			

38.	FIN26	8.56	~~8.33.~~ The requirements relating	There is an extra number	X			
39.	FIN27	8.57		The dashed bullets should be numbered a), b) etc. for clarity and to make it easier to refer to them. See SSG-7 para 8.67	X			
40.	FIN28	8.65/3	material is transferred to contaminated areas.	Preposition missing	X			
41.	FIN29	8.73	8.73. Requirements on feedback of operating experience are listed in SSR-4 [1], paras. 9.133 – 9.137. Further guidance on operational experience program is provided in SSG-50 [9]. 8.74. The programme for the feedback of operational experience at uranium fuel fabrication facilities should cover experience and lessons learnt from events and accidents at the nuclear facility as well as from other nuclear fuel cycle facilities …	I suggest you divide this paragraph into two for clarity.	X			
42.	FIN30	9.4	-	The dashed bullets should be numbered a), b) etc. for clarity and to make it easier to refer to them.	X			
43.	FIN31	9.4/bullet 3	~~Preparation of~~ risk assessments and method statements for the licensing of the decommissioning process.	Preparatory steps of preparation of risk assessment? There is an extra preparation.	X			
44.	FIN32	Ref[2]	SSG-27 is under review, if published before this one, the reference should be updated.			X		The reference may be updated only after the publication of revised SSG_27
45.	FRA01	5.5/ p 12	5.7. **All these** ~~**The first two types of**~~ events ~~**((a) and (b)) could result in radiological consequences to personnel but might also**~~	All these evets may have on-site and off-site consequences. Only the (d) type can have only chemical impact. All the other		X		The comment was

			~~**result in some adverse off-site consequences to the public or the environment. The last five types of events ((c) (g))**~~ could lead to both on-site and off-site consequences.	events may have radiological and chemical impac.2t				accepted, the (d) type of event is specified as chemical impact only.
46.	FRA02	5.6/ p 12	.5.8. The events listed in para. **5.7** ~~4.4~~ may occur as a consequence of a postulated initiating event (PIE). Selected PIEs are listed in Appendix I of SSR-4 [1].	The events are listed in § 5.7 due to the change in the numbering.	X			
47.	FRA03	5.20/ p16	4.17.5.20. The use of an appropriate containment system(s) should be the primary method for protection against the spreading of contamination from areas where significant amounts of either uranium powders or hazardous substances in dispersible form are handled. When practicable, and to improve the effectiveness of the static containment system (physical barriers), a dynamic containment system should be used, ~~**along with personal protective equipment,**~~ to create pressure gradients to cause a flow of air towards parts of equipment or areas that are more contaminated. A cascade of reducing absolute pressures can thus be established between the environment outside the building and the hazardous material inside.	Personal protective equipment has no effect on the pressure gradient. And a dedicated § dealing with personal protective is given in 5.23.	X			
48.	FRA04	5.29/ p18	5.29. The number of physical barriers for containment should be adapted to the safety significance of the hazard. The minimum number of barriers is **generally** two (e.g.	Because there are exceptions, the word “generally” should be added.	X			

			ventilation system and the building structure). The optimum preferred number of barriers is often three. **But sometime only one barrier is sufficient (e.g. cylinder containing solid UF6)**					
49.	FRA05	5.57 / p 24	— The loss of process media such as hydrogen, nitrogen or steam or any excess of these media may have consequences for safety. Some examples are:	This alinea is presented as a part of the list, but it should not.	X			
50.	FRA06	5.97	Analysis of Design extension conditions 5.97. The safety analysis should also identify design extension conditions followed by an analysis of their progression and consequences in accordance with Requirement 21 of SSR-4 [1]. The objective is to analyse additional accident scenarios to be addressed in the design of a uranium fuel fabrication facilities to ensure that the design is such that, for design extension conditions, off-site protective actions that are limited in terms of times and areas of application shall be sufficient for the protection of the public, and sufficient time shall be available to take such actions. Moreover, the possibility of conditions arising that could lead to early releases of radioactive material or to large releases of radioactive material is practically eliminated…	In accordance with SSR-4, the objective of analysis of DEC is to demonstrate that the consequences are limited (according to the additional text "copy/paste" from SSR-4). Practical elimination is a specific approach	X			
51.	GER01	3.19	Paragraph to be added: VERIFICATION OF SAFETY (cf. revision of SSG-7, 3.20-3.22)	According to requirement 5 of SSR-4, the adequacy of the design of any kind of nuclear fuel cycle facility should be verified. The addressed paragraph			X	Section 3 includes Verification of safety. No

				should be considered for both conversion facilities and uranium enrichment facilities, as well. Corresponding system- specific aspects should be adjusted.				further specific guidance for conversion facilities and enrichment facilities was suggested by experts. The paragraph in SSG-7 was drafted in line with graded approach. We believe it is fine not to have in in SSG5.
52.	GER02	3.7 first item	… of management necessary to achieve the safety objectives of the operating organization….	Clarification	X			
53.	GER03	3.7 second item	… that the resources essential to the implementation of safety strategy and the achievement of the safety objectives of the operating organization…	Clarification	X			
54.	GER04	3.7 third item	…to achieve the safety goals of the organization.	Clarification	X			
55.	GER05	5.22 et seqq.	Protection of personnel etc.	Add a new paragraph with the corresponding references to Requirement 8 and para. 6.6 – 6.7 in SSR-4 (radiation protection during design), GSR Part 3 and GSG-7		X		Reference to requirement 8 added, SSR-4 refers further to GSR Part 3.

				(consistent with para. 8.34 of this document).				
56.	GER06	5.71		The headline states “Snowfall and ice storms” while in the paragraph only snow is mentioned. Please extend the para. also to ice storms.	X			
57.	GER07	8.27	… should include a standard process for all modifications (see para. ~~3.14~~ 3.15).	Wrong reference.	X			
58.	GER08	General (e.g. 3.17, 5.62, 6.1)	In many paragraphs the text refers to conversion facilities and uranium enrichment facilities which are covered by DS517 – Revision of SSG-5. It should be made clear that guidance for these facilities is covered in the revision of SSG-5.	Avoid conflicts with other Safety Guides	X			
59.	GER09	5.1	Main safety functions i.e. the functions against the loss ~~of~~ which may lead to releases of radioactive material or chemical releases having possible radiological or associated chemical consequences for personnel, the public or the environment, are provided in Requirement 7 of SSR-4 [1].	Sentence not clear.			X	The sentence with word “against” would not be correct.
60.	GER10	5.6	Crosscheck the wording and definitions with para. 5.8 of the Revision of SSG-5. E.g. the terms design basis and design basis accident are not used consistently.	Consistency with other Safety Guides	X			
61.	GER11	8.4	The safety committee in a conversion facility or an enrichment facility, as defined in SSR-4 [1], para. 4.29, should ~~be developed~~ emanate from the safety committee established for commissioning.	Clarification		X		created
62.	GER12	9.3	Special procedures should be implemented during the preparatory works for decommissioning to ensure that criticality control is maintained when handling	Sentence not clear. What type of equipment could become critical?	X			

			equipment whose criticality is controlled by geometry.					
63.	GER13	1.2 Line 4	… The fuel fabrication processes rely to a large extent on operator intervention and administrative controls to ensure safety, in addition to passive and active ~~and passive~~ engineered safety measures.	Clarification – passive safety measures should be mentioned first	X			
64.	GER14	2.4 Line 3	….However, certain accident conditions involving hazardous chemicals, also criticality accidents, can potentially result in adverse off-site consequences.	Clarification. Consider Tokai-mura criticality accident, with gaseous fission product release for many hours.	X			
65.	GER15	3.3	The integrated management system should be established and put into effect by the operating organization in a timely manner before transitions between major stages ~~early~~ in the lifetime of a MOX fuel fabrication facility, to ensure that safety measures are specified, implemented, monitored, audited, documented and periodically reviewed throughout the lifetime of the facility.	Please put in accordance with Requirement 4 of SSR-4	X			
66.	GER16	3.7 Line 4	…. In general: — Management responsibility includes the support and commitment of management necessary to achieve the objectives of the operating organization in such a manner that safety is not compromised by other priorities. — Resource management includes the measures necessary to ensure that the resources essential to the implementation of strategy and the achievement of the safety objectives of the operating organization are identified and made available.	In this paragraph priority to safety is missing. The proposed modification will align the draft with Requirement 5 of GSR-Part 2 and Requirement 3 of SSR-4.	X			

			— Process implementation includes the activities and tasks necessary to achieve the goals of the organization. — Measurement, assessment, evaluation and improvement provides an indication of the effectiveness of management processes and work performance compared with objectives or benchmarks; …..					
67.	GER17	After 3.9 New item	<u>There should be clear, written assignment of responsibilities, as criticality safety officer, radiation protection officer, and others.</u>	Please add this important item	X			
68.	GER18	3.10 Line 3	… The management of operating organization should: — participate in the activities by determining the required personnel competence and providing <u>initial and periodic</u> training, as necessary; ….	Clarification	X			
69.	GER19	3.18	Deviation from operational procedures and unforeseen changes in operations or in operating conditions should be reported and authorized by the management. Such events should be promptly investigated by the operating organization to analyse the causes of the deviation, to identify lessons to be learned, and to determine and implement corrective actions to prevent recurrences. There is also a danger that conditions may change slowly over time in response to factors such as ageing of the facility or owing to increased production pressures<u>, or complacency.</u>	Clarification			X	Such term is not used in IAEA Safety Standards.
70.	GER20	5.17 Line 4	…	Wording	X			

			— *Mass.* The mass margin should be more than twice ~~100% of~~ the maximum mass value attained in normal operation (to compensate for possible 'double batching', i.e. the transfer of two batches of fissile material instead of one batch in a fuel fabrication process) or equal to the maximum physical mass that could be present in the equipment. (see also para. 3.17 of SSG-27 [2])					
71.	GER21	5.17 Line 13	…. *Moderation.* The analysis should cover the presence of moderators that are commonly present in uranium fuel fabrication facilities, such as water, oil, additives to the fuel, and other hydrogenous substances, or that may be present in accident conditions (e.g. water from firefighting). Special consideration should be given to cases of inhomogeneous moderation, in particular when transfers of fissile material take place.	Additives to the fuel should be included		X		Additives added in the brackets
72.	GER22	5.17	…. *Neutron absorbers.* The neutron absorbers that may be used in uranium fuel fabrication facilities include e.g. cadmium, boron, gadolinium and polyvinyl chloride (PVC) used in 'spiders' inside powder drums, plates in the storage areas for pellets or fuel assemblies and borosilicate glass rings ('Raschig' rings) in tanks for liquids. Presence (and effectiveness) of absorbers should be verified on a periodic basis and before batching of containers or vessels relying on those absorbers. The effects of the inadvertent removal of the neutron	Presence and effectiveness of absorbers should be verified	X			

			absorbers should be considered in the analysis.					
73.	GER23	5.21	In the design of the ventilation and containment systems for the uranium fuel fabrication facility, account should be taken of criteria such as: (i) the desired pressure difference between different parts of the premises; (ii) the air replacement ratio in the facility; (iii) the types of filters to be used; (iv) the maximum differential pressure across filters; (v) the appropriate flow velocity at the openings in the ventilation and containment systems (e.g. the acceptable range of air speeds at the opening of a hood); and (vi) the dose rate at the filters. Additionally, generation of smoke in case of fire should be considered which could pose different requirements to the ventilation system (cf. para 5.44).	Generation of smoke in case of fire should be considered in the design of ventilation system	X			
74.	GER24	5.42 Line 8	….. — Compartmentalization of buildings and ventilation ducts as far as possible to prevent the spreading of fires. Buildings should be divided into fire zones. Measures should be put in place to prevent or severely curtail the capability of a fire and smoke to spread beyond the fire zone in which it breaks out. The higher the fire risk, the greater the number of fire zones a building should have.	This statement should be a dedicated paragraph, not only a dash within 5.42			X	This is an existing text approved before. We do not see any benefit of making it separate paragraph.
75.	GER25	5.48	Flooding in a uranium fuel fabrication facility may lead to the dispersion of radioactive material and to changes in the conditions for neutron moderation.	Please point out the necessity to consider the intrusion of rainwater as well		X		Intrusion of rainwater is within the flooding hazards.

			Inadvertent intrusion of rainwater should be considered.					
76.	GER26	5.76	Instrumentation should be provided to monitor the relevant ~~variables~~ parameters and systems and general conditions of the facility over their respective ranges for: …..	Clarification	X			
77.	GER27	5.77	Instrumentation should be provided for measuring all the main ~~variables~~ parameters whose variation may affect the safety of processes (such as pressure, temperature and flowrate)……	Clarification	X			
78.	GER28	8.25	The aging management programme should consider the technical as well as the non-technical aspects of ageing (preservation of knowledge, know-how and know-why)	Clarification, for better understanding			X	The scope of non-technical aspects of ageing is actually broader than the suggested addition. We suggest to leave it as it is.
79.	GER29	8.29	The modification control form should also specify which documentation will need to be updated as a result of the modification (e.g. training plans, specifications, safety assessment, notes, drawings, engineering flow diagrams, process instrumentation diagrams and operating procedures). Personnel should be informed and trained accordingly before operation commences.	Please point out the importance of training of personnel before operation commences	X			
80.	IND01	7/3.9	The management of the operating organization should ensure that all aspects of safety, including monitoring the	Editorial	X			

			performance of activities and processes are developed and documented. The management should also ensure that all personnel ~~is~~ are adequately trained to perform assigned roles and should establish a system for keeping records that ensures control of performance and verification of activities that are important to safety. The records keeping system should provide for their identification, approval, review, filing, retrieval, and disposal.					
81.	IND02	9/4.1	The site evaluation process for a uranium fuel fabrication facility will depend on a large number of variables, some of which are more important than others. At the earliest stage of planning a facility, a list of these criteria should be prepared and considered in accordance with their safety significance. Risks posed by possible safety significant external initiating eventshazards (e.g. earthquakes, accidental aircraft crashes, hazards arising from nearby industries and transport routes, fires and extreme weather conditions) will probably dominate in the site evaluation process and need to be incorporated into the design of the facility.	To include all factors of the site which could have an effect on the plant	X			
82.	IND03	9,/Chapter 3 Management and verification of safety	**Suggestion:** The clause on constituting safety committee in line with IAEA SSR 4 requirement 6 may be included. The said requirement is reproduced below: Requirement 6, Para No. 4.29 to 4.31 of SSR–4; The operating organization shall	As per Para No. 4.32 of SSR -4, The management system shall include provisions to ensure that relevant aspects of the facility design, changes to the design, operating procedures, organizational structure and safety assessment are subject to an appropriate level of review by the safety committee.			X	There would be no added information/ guidance in addition to Requirement 6 of SSR-4 therefore we

			establish one or more internal safety committees (or advisory groups) to advise the management of the operating organization on safety issues relating to the commissioning, operation and modification of the facility. The functions, responsibilities, composition and terms of reference of such safety committee shall be documented.	Further as per para 8.4 of DS 517 – The safety committee in a conversion facility or an enrichment facility, as defined in SSR-4 [1], para. 4.29, should be developed from the safety committee established for commissioning. Its function should be specified in the management system, it should be adequately staffed, and it should include diverse expertise and have appropriate independence from the direct line management of the operating organization.				believe that the provision in 8.4 is satisfactory.
83.	IND04	16/5.21	In the design of the ventilation and containment systems for the uranium fuel fabrication facility, account should be taken of criteria such as: (i) the desired pressure difference between different parts of the premises; (ii) the air replacement ratio in the facility; (iii) the types of filters to be used; (iv) the maximum differential pressure across filters; (v) the appropriate flow velocity at the openings in the ventilation and containment systems (e.g. ~~the acceptable range of air speeds at the opening of a hood~~ face velocity at the opening of enclosures); and (vi) the dose rate at the filters.	General terminology used in industry	X			
84.	IND05	22/5.47	**Suggestion:** Additional Point (C) is suggested as follows: (c) By-product such as red oil, which may be produced in solvent extraction process	Red oil is one on the by-product produced during solvent extraction (when nitric acid heated in contact with TBP). Above 130^{o} C, rate of the decomposition of the red oil becomes	X			

				rapid enough to generate voluminous explosive gas. Requirement 40, Para 6.160, SSR - 4				
85.	IND06	37/5.96 A	If necessary, a more realistic case can be considered that includes the use of some safety features and some non- safety-related features beyond their originally intended range of functions to reduce the consequences of accidents (the best estimate plus uncertainties approach). A probability-based approach may be explored to address uncertainties involved in assessment of accident consequences.	Estimation of uncertainties should be based on probability.			X	We agree with the comment technically, however it is too detailed for this safety guide. This is addressed by GSR Part 4 and related Safety Guides.
86.	IND07	43/5/5	Preferably, construction work should be completed prior to commissioning of the facility or its parts. In cases when the construction and commissioning or operational phases overlap, the appropriate precautions should be considered to minimize potential adverse impact of construction activities on safety. Implementation of equipment preservation programme should be ensured throughout the construction stage.	To ensure the equipment preservation		X		Consideration should be also given to the protection of equipment which has been already installed.
87.	JPN01	General	Three Guide publications concerning fuel cycle facilities are going to be revised simultaneously. These three draft standards presented have the same table of contents, that is, each stage of facility lifetime as well as general safety recommendations and management system. This means basic recommendations such as “general safety recommendations” and “management system” should have almost the same description, with due consideration to facility specific characteristics. Section 4 on site evaluation also seems to apply to			X		The three documents were checked and harmonized where applicable.

			this as well. However, some descriptions are different from each other, for example, para 2.1 of DS517A(rev. SSG-5) and DS517B(rev. SSG-6) focus on hazards, while DS517C(rev. SSG-7) on safety objectives. Another example is found in section 3, that is, DS517C have paragraphs on "verification of safety", while other two drafts do not have it. These cases show that the three drafts are not coordinated with each other in preparing the draft. Especially, DS517B and DS517C will be combined in future in accordance with the Long-term Structure of the IAEA Safety Standards, and the revision of these two document are required to have equivalent descriptions as long as possible. So, it is suggested that those recommendations other than ones depending on specific characteristics of each facility should have identical text and format. We have some comments on each draft regarding to this aspect.				Some differences arise because of the existing text which was not subject to revision or due to the application of graded approach to different facility types.
88.	JPN02	General	There are many cases that appropriate messages do not appear for guide level document. Some are simply referred to the requirements established in SSR-4 and do not present useful message as recommended practices. Furthermore, there are many information text without any recommendations. One example on DS517A is shown below. These paras just show relation of another publication and does not add any value as recommendations. Specific engineering design guidance 5.4. The requirements on maintaining subcriticality are established in Requirement 38 and paras 6.138 – 6.156 of SSR-4 [1]. Further guidance on the design of conversion facilities and uranium enrichment facilities to ensure subcriticality is provided in Section 3 of SSG-27 [2]; 5.5. The requirements on confinement for the prevention of releases that might lead to internal exposure and chemical hazards are established in Requirements 34 and 35 and the following paras. of SSR-4 [1]; 5.6. The requirements on protection against external exposure are established in Requirement 36 and following paras. of SSR-4 [1]. Shielding should be considered for processes or areas that could involve sources of high levels of external gamma radiation, such as reprocessed uranium or newly emptied cylinders (e.g. exposure to daughter products of 232U and 238U). Another example on DS517C is shown below. These paras just show relation of another publication that is only information		X		Yes, this is true, however not necessarily wrong. Safety Guides are built to provide useful guidance including references to relevant requirements and other existing guidance documents. We try to avoid

			5.2. The requirements on maintaining subcriticality are established in requirement 38 and para. 6.138 – 6.156 of SSR-4 [1] 5.3. The requirements on confinement and cooling of radioactive materials are established in requirements 35, 39 and in para. 6.123 – 6.128 and 6.157 – 6.159 of SSR-4 [1]. Further guidance on the design of a MOX fuel fabrication facility to ensure subcriticality is provided in Section 3 of SSG-27 [4]. 5.4. The requirements on protection against radiation exposure are established in requirement 36 and para. 6.129 – 6.134 of SSR-4 [1]. Owing to the radiation fields associated with plutonium (neutron emissions and gamma radiation), an appropriate combination of requirements on source limitation, distance, time and shielding is necessary for the protection of personnel in respect of whole body exposures and exposures of the hands. For neutron emissions, a general design principle is to place the shielding as close as possible to the source. In some cases, remote operation should be considered if necessary. There should be individual monitoring of neutron doses for personnel in addition to individual monitoring of gamma. So, it is suggested that those paragraphs should add useful recommendations to be performed by users with using "should" statement, instead of just referring to requirements or relevant paras of another safety standard. We have the same comments on each draft regarding to this aspect.					duplication by copying or paraphrasing existing provisions from already existing publications.
89.	JPN03	1.5.	The safety requirements applicable to fuel cycle facilities (i.e. facilities for uranium ore processing and refining, conversion, enrichment, deconversion, reconversion, fabrication of fuel including uranium and plutonium mixed oxide fuel, storage and reprocessing of spent fuel, associated conditioning and storage of waste, and facilities for the fuel cycle related research and development) are established in SSR-4	Completeness. The same comment is on DS517A and DS517C respectively. This description is commonly appeared in three draft documents (para.1.5 of DS517A, para.1.5 of DS517B and para.1.7 of DS517C), and it would be preferable to add "deconversion", even though "deconversion" is not addressed in this draft document to keep consistency among three draft documents. This addition of "deconversion" is also proposed in other two draft documents (DS517A and DS517C).	X			

90.	JPN04	1.5. /L6	This Safety Guide provides recommendations on meeting these requirements for uranium fuel fabrication facilities during their siting, design, commissioning, operation and preparation for decommissioning.	Since the MOX fuel fabrication facilities are specified separately, it is clearly stated that this is for the uranium fuel fabrication facilities.	X			
91.	JPN05	3.12./L2	The operating organization should ensure, through audits, that suppliers have management systems that are adequate for ensuring safety of ~~conversion facilities and~~ uranium ~~enrichment~~ fuel fabrication facilities.	Correction. This guide is for uranium fuel fabrication facilities.	X			
92.	JPN06	3.17. /L1	Audits performed by the operating organization as well as proper control of modifications to facilities and activities are particularly important for ensuring safety of ~~conversion facilities and~~ uranium ~~enrichment~~ fuel fabrication facilities (para. 4.23 of SSR-4 [1]). …	Correction. This guide is for uranium fuel fabrication facilities.	X			
93.	JPN07	4.1. /L10	Requirements for site evaluation for uranium fuel fabrication facilities are provided in IAEA Safety Standards Series No. SSR-1, Site Evaluation for Nuclear Installations [10] and further guidance is provided in SSG-35, Site Survey and Site Selection for Nuclear Installations [11].	It is clearly stated that this is for the uranium fuel fabrication facilities.	X			
94.	JPN08	4.3.	The density and distribution of population in the vicinity of the uranium fuel fabrication facility and the direction of the prevailing wind at the site should be considered in the site evaluation process to minimize any possible health consequences for people in the event of a release of radioactive material and hazardous chemicals.	Completeness. In the site evaluation, in addition to the hazardous chemicals, the release of radioactive substances is also included.				

95.	JPN09	5.6.	The specification of a design basis accident (or equivalent) will depend on the facility design and on ~~national criteria~~ regulatory requirements. However, particular consideration should be given to the following hazards in the specification of design basis accidents at uranium fuel fabrication facilities:	Better wording.	X			
96.	JPN10	5.6. (a), (e)	(a) ~~A n~~Nuclear criticality accident (e) ~~A large f~~Fire	Correction to keep consistency with the relevant correction of para 5.6 of DS517C (Revision of SSG-7).	X			
97.	JPN11	5.8.	The events listed in para. ~~4.4~~5.6 may occur as a consequence of a postulated initiating event (PIE). …	Correction.	X			
98.	JPN12	5.10.	The following paragraphs highlight some of the main elements that are specific for uranium fuel fabrication facilities. There are other topics related to criticality safety that are relevant for ~~enrichment~~ uranium fuel fabrication facilities and are not adequately covered by this Safety Guide. The principal guidance is obtained in SSG-27 [2]	Correction. This guide is for uranium fuel fabrication facilities.	X			
99.	JPN13	5.17. /4th bullet	— *Moderation.* The analysis should cover the presence of moderators that are commonly present in uranium fuel fabrication facilities, such as water, oil and other hydrogenous substances (e.g. additives for UO_2 powder), or that may be present in accident conditions (e.g. water from firefighting). Special consideration should be given to cases of inhomogeneous moderation, in particular when transfers of fissile material take place.	Clarification. In order to make clear “other hydrogenous substances” in this paragraph, a concrete example should be added.	X			

100.	JPN14	5.17. /5th bullet	— *Reflection.* The most conservative margin should be retained of those resulting from different assumptions such as: (i) a hypothetical thickness of water around the processing unit; and (ii) consideration of the neutron reflection effect due to the presence of human ~~being~~ bodies, organic materials, wood, concrete, steel of the container, etc., around the processing unit.	Appropriate expression.	X			
101.	JPN15	5.36. (h)	As an important aspect of fire hazard analysis for a uranium fuel fabrication facility, areas of the facility that require consideration should be identified (see Requirement 22 of SSR-4 [1]). Fire hazard analyses should at least be carried out for: ……. (h) Control rooms (e.g. electric cable fires in a control panel);	If electric cables are assumed as a fire source in a control room, it should be described as a concrete example.			X	This recommendation is meant as general, i.e. fire in control rooms as such, regardless the originator.
102.	JPN16	5.62.	A uranium fuel fabrication facility should be designed in accordance with the nature and severity of the external hazards, either natural or human induced, identified and evaluated in accordance with the provisions of SSR-1 [10] and its associated Safety Guides. The list of specific external hazards for a ~~conversion facility or enrichment~~ uranium fuel fabrication facility should include those identified in the following paragraphs under appropriate headings.	Correction. This guide is for a uranium fuel fabrication facility.	X			
103.	JPN17	5.63. (d)	(d) The effect on criticality safety functions such as geometry and/or moderation of the following: i) deformation (geometry control); ii) displacement (geometry control,	It should be explained that "poisons" are neutron absorbers.	X			

			fixed neutron poisons); iii) loss of material (geometry control, soluble neutron poisons).					
104.	JPN18	5.89.	5.89. The ~~risk~~ safety assessment of the conversion facilities and enrichment facilities should include the safety analysis of the variety of hazards for the whole facility and all activities. The safety analysis for the facility will provide the information required for the risk assessment. The IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), Safety Assessment for Facilities and Activities [13] requires that all credible postulated initiating events shall be assessed.	To keep a consistency with the Safety Glosssary. Paras. 5.103. to 5.118. are under the subject of SAFETY ANALYSIS. In accordance with the Safety Glossary (2018) p.20, "Safety Analysis" is part of the safety assessment. There are deterministic and probabilistic methods in "Safety Analysis", and the latter is related to risk assessment. In p.25 of the Glossary (2018), safety assessment normally includes risk assessment.		X		"safety assessment" corrected, the second addition is not necessary
105.	JPN19	5.106.	The magnitude and severity of conditions considered in DEC (Design Extension Conditions) as well as the acceptance criteria used for acceptability of consequences of DECs should be accepted by the national regulatory body.	Add definition of the abbreviation for DEC.	X			
106.	JPN20	6.1.	Requirements for construction of ~~conversion facilities and enrichment~~ uranium fuel fabrication facilities are listed in Requirement 53 and para. 7.1–7.7 of SSR-4 [1]. …	Correction. This guide is for uranium fuel fabrication facilities.	X			
107.	JPN21	7.4.	During commissioning and later during operation of the facility, the estimated doses to personnel that were calculated should be compared with the actual doses or dose rates. If, in operation, the actual doses are higher than the calculated doses, corrective actions should be taken, including making any necessary changes to the licensing documentation (i.e. the safety ~~case~~ analysis	Safety analysis report is generally used.	X			

			report) or adding or changing safety features or work practices.					
108.	JPN22	8.4.	The safety committee in a ~~conversion facility or an enrichment~~ uranium fuel fabrication facility, as defined in SSR-4 [1], para. 4.29, should be developed from the safety committee established for commissioning. …	Correction. This guide is for a uranium fuel fabrication facility.	X			
109.	JPN23	8.20. /L3	When maintenance is performed on installation that may contain enriched uranium or near a storage location of enriched ~~material~~ uranium, criticality safety personnel should be consulted before the work commences.	Make clearer.	X			
110.	JPN24	8.22.	Compliance of the operational performance of the ventilation system with the fire protection requirements (see para ~~4.36~~5.41) should be verified on a regular basis.	Correction is necessary. In this version of the draft, para 4.36 does not exist. The current para 5.41 (the former 4.36) quote may be correct. Please confirm the para number.	X			
111.	JPN25	8.23.	Programme for calibration and periodic inspections of the facility should be established., whose Its purpose is to verify that the facility and SSCs (structures, systems and components) are operating in accordance with the operational limits and conditions. Suitably qualified and experienced consideration should be given to fatigue affecting equipment and to the ageing of SSCs.	Add definition of the abbreviation for SSCs.	X			
112.	JPN26	8.26. (c), (d)	The periodic tests and inspections should be completed by regular checks performed by operating personnel, such as: (a) Monitoring of deterioration;	These two items ((c) and (d)) seems to be too specific. There is a possibility that the inspection method is limited. And (c) and (d) are part of the (a).		X		See the modified text

			(b) Regular visual inspections of Uranium powder pipes; ~~(c) Taking heat images of electrical cabinets;~~ ~~(d) Check of temperatures of ventilator bearings.~~					
113.	JPN27	8.67.	The requirements for emergency preparedness and response are established in ~~paras~~ Requirement 72 and paras. 9.120-9.132 of SSR-4 [1], …	Typo.	X			
114.	RUS01	1.2	Uranium and the waste generated in uranium fuel fabrication facilities are handled, processed, treated and stored ~~with defined pathways for waste disposal~~ at the facility.	Disposal of the waste is out of the scope this Guide.	X			
115.	RUS02	1.5	First sentence should be aligned with para 1.3 SSR-4 or excluded.	Compliance with SSR-4	X			
116.	RUS03	1.7	This publication includes specific **recommendations** ~~elements of~~ for ensuring criticality safety in uranium fuel fabrication facilities. **These recommendations supplement** more detailed guidance provided in the IAEA Safety Standards Series No. SSG-27, Criticality Safety in the Handling of Fissile Material [2].	Editorial remark	X			
117.	RUS04	2.2	The chemical **toxic** hazards of uranium in a soluble form such as UF6 is more significant than its radiotoxic hazards.	Editorial remark	X			
118.	RUS05	Title of Chapter 3	MANAGEMENT **FOR** ~~AND VERIFICATION OF~~ SAFETY	This Chapter doesn't address any recommendations for verification of safety.	X			
119.	RUS06	3.4	Potential conflicts between the transparency of information related to safety matters ~~(to~~	Editorial remark.		X		See the modified text

			~~facilitate improvements in safety and to reassure the public)~~ **and protection of the information required by security reason** ~~information on site vulnerabilities and safety analysis~~ should be addressed.	Proposal to delete unclear information and specify the provision.				
120.	RUS07	4.2	The scope of the site evaluation for a uranium fuel fabrication facility **is established by** ~~should in line with~~ requirements 3 of SSR-1 [10] and requirement 11 of SSR-4 [1] **and should** reflect the specific hazards listed in Section 2 of this Safety Guide.	The requirements SSR-4 **shall be met** not **should**		X		Yes, SSR-4 requirements shall be met. The statement refers to the recommendations in this SG.
121.	RUS08	4.4	To move the provision "Site selection should include assessment of safety risks related to external natural and human induced events" to separate para.	This is a specific provision that differ from the following provisions of this para.	X			
122.	RUS09	4.5	~~To prevent potential conflicts~~ safety and security interface should be considered systematically in the site evaluation and site selection process (requirement 75 of SSR-4 [1]). Site evaluation and selection should be facilitated by experts from both safety and security disciplines. ~~Sites which are vulnerable to civil unrest should be excluded from consideration in the uranium fuel fabrication facility siting process.~~ It is recommended to add **"The selection of a site should take into account both safety and security aspects**".	The interface is important not only for the purpose to prevent the conflict. The sentence is proposed to be deleted or modified due to its ambiguity.		X		The second part of the proposal was accepted. We agree with the first proposal, but other aspects are out of the scope of this SG.
123.	RUS10	4.7	The adequacy of the site evaluation should be reviewed **periodically during the lifetime of the facility including** in case of	Compliance with SSR-1 and SSR-4.	X			

			an increase of a production capacity beyond the original envelope (para 5.14 of SSR-4 [1])					
124.	RUS11	5.10 and 5.11	These paras related to criticality safety should be moved to the section *Prevention of criticality*	To keep the logic	X			
125.	RUS12	5.14	The aim of the criticality safety analysis is to demonstrate that **the safety measures are** ~~design of equipment is~~ such that the values of controlled parameters are always maintained in the subcritical range.	The term *safety measures* are more general.		X		"…design of equipment together with the related safety measures…"
126.	RUS13	5.30	The design should also provide for the monitoring of the source of releases (**gaseous** ~~air emissions~~ and liquid effluents) as well as monitoring of the receiving environment around the facility and the identification of breaches to confirm there is no the breach of containment barriers and the impact to the environment and the public **complies with authorized limits.**	In compliance with para 6.101 and requirement 25 of SSR-4.	X			
127.	RUS14	5.31	Uncontrolled releases of hazardous materials should be prevented by design. The liquid toxic effluents should be collected, stored and monitored and released and/or handled as radioactive waste.	1. Propose to introduce a new para – for toxics releases What does it means "*as radioactive waste"*?		X		The provision was decided to be deleted.
128.	RUS15	5.36	Fire hazard analyses **of the facility should give particular consideration** ~~should at least be carried out~~ for the **areas**:…	Fire hazard analysis is performed for the whole facility	X			
129.	RUS16	5.62	~~The list of specific external hazards for a uranium fuel fabrication facility should include those identified in the following paragraphs under appropriate headings.~~	This list is neither complete nor necessary		X		Examples of specific external hazards for a fuel

								fabrication facility should include those identified in the following paragraphs under appropriate headings.
130.	RUS17	5.80	~~Provision should be made for the automatic measurement and recording of values of parameters that are important to safety and where applicable, manual periodic testing should be used to complement automated continuous testing of conditions.~~	Propose to delete because the similar provision is provided by Requirement 43 and relevant paras of SSR-4	X			
131.	RUS18	5.82	Safety related I&C systems for normal operation of a uranium fuel fabrication facility should include systems for the following: (1) Criticality control To add "including criticality detection and alarm system"	In accordance with para 6.149 SSR-4	X			
132.	RUS19	5.83-5.86	~~5.83. Instrumentation should be provided to monitor the process variables and the facility systems over their respective ranges for:~~ ~~(1) Normal operation;~~ ~~(2) Anticipated operational occurrences;~~ ~~(3) Design basis accidents;~~ ~~(4) Design extension conditions, as far as practicable.~~ ~~5.84. The aim should be to ensure that adequate information can be obtained on the status of the facility and correct~~	Repetition of the provisions provided in Requirements 43 and 44 and relevant paras of SSR-4 (there is no specific information relevant to the specified facilities) Propose to delete the paras or adapted to the to the specified facilities	X			

			~~responses can be planned and taken in accordance with procedures for all facility states.~~ ~~5.85. Adequate and reliable controls and appropriate instrumentation should be provided for monitoring and controlling all the main variables that can affect the safety of the process and the general conditions at the facility. These variables include radiation levels, airborne contamination conditions, effluent releases, criticality conditions, fire conditions and ventilation conditions. Instrumentation should also be provided for obtaining any other information about the facility necessary for its reliable and safe operation.~~ ~~5.86. According to the requirements of the safety analysis and any defence in depth consideration, instrumentation and control systems should incorporate redundancy and diversity to ensure an appropriate level of reliability and availability. This should include the requirement for a reliable and uninterruptable power supply to the instruments, as necessary.~~					
133.	RUS20	Section SAFETY ANALYSIS	The Section should be revised to bring into compliance with relevant requirements of SSR-4.	Compliance with SSR-4	X			
134.	RUS21	4.86	~~The risk assessment of the uranium fuel fabrication facilities should include the safety analysis of the variety of hazards for the whole facility and all activities:~~	Term *risk assessment* is not used in SSR-4. The provision is repetition of appropriate requirements of SSR-4 and		X		Changed to "safety assessment"

				GSR Part 4 but with the statement *should*.				
135.	RUS22	5.92	A best estimate approach ~~plus~~ **with** uncertainty **analysis** may also be used.	Editorial remark		X		"'best estimate plus uncertainty' approach " is the common name of the method used for example in SSG-2, however this para was changed following other comments.
136.	RUS23	5.96	Term *Design Basis Analysis approach* is not used in SSR-4 with regard to safety analysis and need to be clarified or replaced The whole para needs to be properly checked against the requirements established by SSR-4 and GSR Part 3 taking into account the approaches adopted for the safety analysis of the specified facilities.		X			The term "DBA approach" was removed. In addition, the description of the two different approaches was simplified to provide clarity.
137.	RUS24	5.97	Accidents that have more severe consequences as well as progression of events that could potentially lead to a criticality event, radiological or chemical	We agree with this statement. However we propose to discuss applicability DEC to criticality event or chemical releases.		X		The comment is unclear. Our understandin

			releases should also be analysed to support emergency preparedness and response and assist in the development of emergency plans to mitigate the consequences of an accident.					g is that there are no objections to the proposed text.
138.	RUS25	MANAGEMENT OF RADIOACTIVE WASTE ~~AND EFFLUENTS~~	Propose to delete	There are no recommendations related to effluent management in this section.			X	See for example "An appropriate balance should thus be achieved between the loss of uranium through unrecovered waste and the generation of liquid effluents in the recovery process."
139.	RUS26	5.109	The general requirements for ~~optimization of protection and safety for~~ predisposal waste management ~~and effluent management and the formulation of a waste strategy~~ are established in the IAEA Safety Standards Series No. GSR Part 5, Predisposal Management of Radioactive Waste [15] ~~and No. SSR-5, Disposal of Radioactive Waste [16~~] with additional guidance provided in the IAEA Safety Standards Series No. GSG-3, The Safety Case and Safety Assessment for the	GSR Part 5 establishes requirements for the predisposal management of radioactive waste not for effluent management. Disposal of the waste is out the scope of SSR-4.	X			

			Predisposal Management of Radioactive Waste [17]…					
140.	RUS27	5.113	~~Effluent releases to the environment without proper monitoring should be avoided (see para 6.102 of SSR-4 [1]).~~	Effluent releases to the environment without proper monitoring **shall** be avoided according to para 9.104 of SSR-4	X			
141.	RUS28	5.126	The design should allow all systems, structures and components important to safety to be easily inspected in order to detect their ageing (static containment deterioration, corrosion) ~~and obsolescence~~ and **maintained or** replaced if needed.	Obsolescence is a mode of ageing. Some equipment can be maintained rather than replaced	X			
142.	RUS29	5.127	An ageing management programme should be implemented at the design stage to allow **timely maintenance or** anticipating equipment replacements.	Ageing management programme should consider not only replacement of the equipment but also maintenance.	X			
143.	RUS30	7.1	The requirements for commissioning are **established** ~~listed~~ in Requirement 54 of SSR-4 [1] and subsequent paragraphs. The operating organization should make the best use of the commissioning stage to become completely familiar with the facility.	Editorial remark.	X			
144.	RUS31	7.1	It should also be an opportunity to further enhance safety culture, including positive behaviours and attitudes, throughout the entire organization.	This is unclear statement and need to be clarified (how to "further enhance safety culture, including positive behaviours and attitudes…" during commissioning phase).		X		"…to promote and further enhance…" Commissioning is an important milestone when operating personnel gains its

								values and attitudes of the organization for the whole operation.
145.	RUS32	8.10	Examples of **operational limits** and ~~limiting~~ conditions for safe operation (SSR-4 [1], para. 9.31) for a uranium fuel fabrication facility such limits are:…	The list include examples both operational limits and conditions		X		Limits on operating parameters
146.	RUS33	8.13	~~For anticipated operational occurrences, design basis accidents and design extension conditions without significant facility damage the operating procedures should provide instructions for the return to a safe state.~~	Propose to delete this provision because of its incorrectness.	X			
147.	RUS34	8.27	Propose to move the provision "The operating organization should prepare procedural guidelines and provide training to ensure that the responsible personnel have the necessary training and authority to ensure that modification projects are carefully considered" to a new para because it is specific recommendation .	To keep the logic.	X			
148.	RUS35	8.31	Modifications performed on ~~structures, systems and components~~ **design, layout or procedures of the facility** might negatively affect security **arrangements** ~~equipment~~ and vice versa. For example, malfunction of safety equipment may damage nearby security equipment.	Propose to make the provisions more general.	X			
149.	RUS36	8.31	Therefore, **before approval and implementation**, **any proposed changes** to the facility or **management arrangements**	To make the provision more general and clear.	X			

			~~its documentation~~ should be reviewed, assessed and endorsed from the safety **objective view** and its interface with security **should be evaluated to verify that they do not compromise each other.**					
150.	RUS37	8.55	For any wet cleaning process, a safe uranium holdup **limit** should be defined.	Editorial remark	X			
151.	SWE01	5.23	Where possible, the need for the use of protective respiratory equipment should be avoided through careful design of the containment and ventilation systems (fixed and portable). ~~The use of protective respiratory equipment during operation could be used as complementary mean of protection in addition to existing barriers.~~	The chapter is on design. The proposed additional text could be interpreted as an indication that use of protective equipment could be included in the design process to limit restrictions on containment and ventilation. Respiratory equipment should rather be discussed as part of the operational guidelines in connection with optimisation of radiation protection.	X			
152.	SWE02	-	It would have been valuable with paragraphs with guidance on accumulation of uranium powder in the ventilation systems.	Comment based on oversight experience.	X			Additional provisions were added – recommendation to identify possible places with accumulation and regularly inspect these.
153.	SWE03	8.34	The requirements for radiation protection in operation are established in SSR-4 [1], para. 9.90-9.101 and in the IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards [24];	The last part of the suggested paragraph could be interpreted as not in line with the ICRP recommendations in terms of keeping doses as low as reasonably achievable. The current formulation of	X			

			recommendations are provided in the IAEA Safety Standards Series No. GSG-7, Occupational Radiation Protection [25]. The operating organization should have a policy to optimize protection and safety and is required to ensure doses are below national dose limits and within any dose constraints set by the operating organization (SSR-4 [1], para. 9.91). ~~The policy should address the minimization of exposure to radiation by all available physical means and by administrative arrangements, including the use of time and distance during operations and maintenance activities.~~	the last sentence could signal a policy shift towards prioritizing radiation protection above other safety concerns in an unfortunate way. Consider a revised formulation of the sentence.				
154.	SWE04	5.30	The design should ~~also~~ provide for **adequate** monitoring of the source of releases (air emissions and liquid effluents) as well as monitoring of the receiving environment of the facility and detection of breaches to confirm there is no breach of containment in the barriers and the impact to the environment and the public.	No need for "also" Result from oversight experience: The design of a facility can make it very difficult to obtain an adequate monitoring of releases.	X			
155.	SWE05	5.x	The design should provide for the minimization of releases to air and water during normal operation by application of best available technology.	Normal releases and the need to reduce such are often not mentioned explicitly.	X			
156.	SWE06	General	Consider if the guide can be made more balanced.	The guide is very specific in most parts. Though section three is very general.		X		We believe Management System is a general topic. Any

			See comments on examples of Section 3 which are on a very general level, in contrast to other parts of the guide.					particular suggestions how to add more detailed guidance are welcomed.
157.	SWE07	Para 1.5	The now given listing of steps in the nuclear fuel cycle is not complete without "disposal".	Possible need of clarification, even though waste disposal facilities are outside the scope of SSR-4.		X		Yes and we believe this is correct since "disposal" is out of the scope.
158.	SWE08	Section 3	A proposal of a text which is specific to the management system at a fuel cycle facility. The text in section 3 is very general, even though its sometimes mentions criticality and its importance. Section 3.1-3.6: These statements are very general, and it is difficult to find new, more specific guidance in relation to the requirements in GSR part 2 or SSR-4. E.g. section 3.5 states that "In determining how the requirements of the management system for safety of uranium fuel fabrication facilities are to be applied, a graded approach based on the relative importance to safety of each item or process should be used." In what way is this text providing more guidance on how to fulfil the requirements than, for e.g. requirement 4.17 in SSR-4?	Guidance of how to comply with requirements related to management system is of great importance and it is positive that this is highlighted also within this guide. However, GSR part 2 and SSR-4 provides the organizations with a lot of the same information as in section 3 of the edited version of SSG-6. Would it be more convenient to have a shorter text on management system that refers to GSR part 2 and SSR-4?		X		We agree, see the response to comm. SWE06.

159.	SWE09	Para 3.9, last sentence	Rather alludes to “materials” rather than the “activities” in the preceding sentence.	Possible need of clarification.			X	The comment is unclear what is suggested. Generally we always talk about “facilities and activities”.
160.	SWE10	5.23	Where possible, the need for the use of protective respiratory equipment should be avoided through careful design of the containment and ventilation systems (fixed and portable). ~~The use of protective respiratory equipment during operation could be used as complementary mean of protection in addition to existing barriers.~~	The chapter is on design. The proposed additional text could be interpreted as an indication that use of protective equipment could be included in the design process to limit restrictions on containment and ventilation. Respiratory equipment should rather be discussed as part of the operational guidelines in connection with optimisation of radiation protection.	X			The same comment as SWE01.
161.	SWE11	5.30	The design should ~~also~~ provide for **adequate** monitoring of the source of releases (air emissions and liquid effluents) as well as monitoring of the receiving environment of the facility and detection of breaches to confirm there is no breach of containment in the barriers and the impact to the environment and the public.	No need for “also” Result from oversight experience: The design of a facility can make it very difficult to obtain an adequate monitoring of releases.	X			The same comment as SWE04.
162.	SWE12	5.x	The design should provide for the minimization of releases to air and water during normal operation by application of best available technology.	Normal releases and the need to reduce such are often not mentioned explicitly.				The same comment as SWE05.

163.	SWE13	8.34	The requirements for radiation protection in operation are established in SSR-4 [1], para. 9.90-9.101 and in the IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards [24]; recommendations are provided in the IAEA Safety Standards Series No. GSG-7, Occupational Radiation Protection [25]. The operating organization should have a policy to optimize protection and safety and is required to ensure doses are below national dose limits and within any dose constraints set by the operating organization (SSR-4 [1], para. 9.91). ~~The policy should address the minimization of exposure to radiation by all available physical means and by administrative arrangements, including the use of time and distance during operations and maintenance activities.~~	The last part of the suggested paragraph could be interpreted as not in line with the ICRP recommendations in terms of keeping doses as low as reasonably achievable. The current formulation of the last sentence could signal a policy shift towards prioritizing radiation protection above other safety concerns in an unfortunate way. Consider a revised formulation of the sentence.	X			The same comment as SWE03.
164.	SWE14	-	It would have been valuable with paragraphs with guidance on proper management of spill of pellets in the pellet workshop.	Comment based on oversight experience.		X		We agree, however this was not proposed by the experts during the preparation of the draft. Any particular suggestions are welcomed.

165.	SWE15	-	It would have been valuable with paragraphs with guidance on accumulation of uranium powder in the ventilation systems.	Comment based on oversight experience.	X			See comm. SWE02
166.	UK01	5.11	Suggest it is made clear that whilst criticality does not need to considered for a plant processing natural or DU, the Operator needs to consider potential maloperations leading to the feeding of off-specification (i.e. enriched) U to the facility before any case can be made that further criticality safety analysis is not required on the basis that only DU or natural U can be processed.	Criticality safety clearly does become a concern if U enriched above natural or DU levels could be fed to the plant in error and controls must be in place to prevent this.	X			
167.	UK02	5.12	Quantities of liquid moderator in dry processing stations also needs to be controlled to within certain limits demonstrated to be safe by the criticality safety assessment.	Excess liquid moderator in the presence of finely divided fissile material poses a threat to criticality safety.		X		Excess moderation is listed in PIE list in SSR-4 Annex so this is covered.
168.	UK03	5.26	The location of air monitoring instruments should be demonstrated to be optimized at the inactive commissioning stage (e.g. by smoke testing to demonstrate that the airflows in the facility are as anticipated and that the instruments will therefore promptly detect any release of radioactive material from containment).	Non-optimal siting of activity in air detectors could fail to provide early warning to operators and lead to internal exposures in advance of evacuation.	X			Guidance added to the Commissioning section.
169.	UK04	5.91 (2)	Estimates of occupational doses should also include doses due to maintenance activities, which are likely to be a significant component of the overall annual estimated dose burden of a facility. Consideration	The annual dose estimates should be as comprehensive as possible in order to highlight areas of potential high dose accrual on the plant and to consider designing these out or to mitigating the	X			

			should also be given to dose accrual by managers, supervisors and Health Physics surveyors.	doses by a change in job design, addition of shielding etc.				
170.	UK05	7.2 (2)	See comment (3) above.	See comment (3) above.	X			
171.	UK06	Design (Section 5)	Suggest text is added in the 'Design' section advising that at all potential accumulation sites for fissile material should be identified and steps taken to design these out or to ensure these are flagged and an appropriate inspection regime is put in place to inspect and recover material periodically from all such locations.	Hidden adventitious accumulations of fissile material have a potential to challenge criticality safety.	X			
172.	UK07	8.19	Suggest text is added to reflect that completion of periods of maintenance provides an opportunity for the conduct of a Review Learn and Improve (RLI) exercise to provide improvements in the delivery of future maintenance activities.	Plant operation should be in a climate of continuous improvement.			X	RLI is not the terminology which IAEA Safety Standards use. However we believe the essence is reflected in the text (in Leadership and management)
173.	UK08	8.19	The recording of quality information on plant condition encountered during maintenance is of importance – i.e. what was found and how specifically was it fixed. In addition maintenance instructions, where numerical values of parameters have	Experience over inspections of a number of UK Operators has indicated that this is an area that could benefit from considerable improvement and additional guidance – often the information fed back by maintainers is		X		A new para was added.

			to be measured and recorded, should be quite clear as to the pass/fail criteria.	of poor quality and is too brief or in the worst cases is missing or unintelligible.				
174.	UKR01	Contents, pages 3 and 4	Ageing management considerations (5.125-***5.127***) Management of radioactive waste and effluents (8.62-8.6***6***) Emergency preparedness and response (8.6***7***-8.7***2***) Feedback of operating experience (8.7***3***) The decommissioning plan (9.5-***9.6***)	Paragraphs referenced incorrectly.	X			
175.	UKR02	§1.5	The safety requirements applicable to fuel cycle facilities (i.e. facilities for uranium ore ~~***processing and***~~ refining, conversion, enrichment, reconversion, fabrication of fuel including uranium and plutonium mixed oxide fuel, storage and reprocessing of spent fuel, associated conditioning and storage of waste, and facilities for the fuel cycle related research and development) are established in SSR-4	The proposal is to exclude processing of uranium ore. §1.3 SSR-4: "Requirements for nuclear power plants, research reactors and critical assemblies, facilities for the mining and ***processing of natural ore*** and waste disposal facilities are established in other IAEA safety standards and therefore ***are not addressed in this publication***." §1.8 SSR-4: "Facilities for the mining and ***processing of natural ore***, nuclear power plants, research reactors, critical assemblies and waste disposal facilities ***are outside the scope of this publication.***"	X			
176.	UKR03	§4.2.	The scope of the site evaluation for a conversion facility or an enrichment facility should in line with requirements 3 of SSR-1 [10] and ***§§5.1-5.14*** of SSR-4 [1] reflect the specific hazards listed in Section 2 of this Safety Guide.	Requirement 11 of SSR-4 is addressed to the use of a graded approach. Site evaluation requirements are presented in §§5.1-5.14.	X			
177.	UKR04	§5.8.	The events listed in para. 4.4 may occur as a consequence of a postulated initiating	SSR-4 has only one appendix without number, so the appendix number in §5.8. should be removed.	X			

			event (PIE). Selected PIEs are listed in Appendix ~~I~~ of SSR-4 [1].					
178.	UKR05	§5.54.	Where it is possible for uranium powder to spill in quantities that could be significant from the standpoint of criticality safety, consideration should be given to installing design features to prevent water or moderator intrusion. ***In addition, it is recommended to provide an installation of drainage and water detectors in such compartments.***	It is recommended to install water drainage and water detectors to inform the personnel in a case of failure of design features. It is better to prevent the criticality, than to mitigate its consequences.	X			
179.	UKR06	§5.63 (d)	The effect on criticality safety functions such as geometry and/or moderation ***and reflection*** of the following: i) deformation (geometry control); ii) displacement (geometry control, fixed poisons, ***neutron interaction***); iii) loss of material (geometry control, soluble poisons ***or neutron absorbers***).	An addition to the effect of earthquakes on criticality safety functions.		X		The text modified in combination with other comments.
180.	UKR07	§5.90	***5.90.*** The risk assessment of uranium fuel fabrication facilities should include the safety analysis of the variety of hazards for the whole facility and all activities. The IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), Safety Assessment for Facilities and Activities [13] requires that all credible postulated initiating events shall be assessed.	The text of paragraph 5.90 is removed, however the number is still in use. Besides, the text above §5.90 does not have paragraph number (as it is usually done in the document). It seems to be correct to place it within §5.90.	X			
181.	UKR08	§8.27	The management system for a uranium fuel fabrication facility should include a standard process for all modifications (see para. 3.1***5***). The operating organization should prepare procedural guidelines and provide training to ensure that the responsible personnel have the necessary	Wrong reference to the paragraph.	X			

			training and authority to ensure that modification projects are carefully considered.					
182.	UKR09	Annex I		Blocks on the diagram do not fully display their contents.	X			
183.	NSGC1	Security aspects	Add NSS-8 - Preventive and Protective Measures against Insider Threats and NSS-25 - Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities	Guidance mentioned should be considered			X	As mentioned in Section 1, nuclear security is out of the scope therefore it is not practical to provide an exhaustive list of guidance documents. The two key standards are referenced.
184.	NSGC2	1.8	-	1.8. This Safety Guide does not include **nuclear** security recommendations	X			
185.	NSGC3	3.4	Coordination of **nuclear** safety and security interface in the establishment of the integrated management system should be ensured. Potential conflicts between the transparency of information related to safety matters (to facilitate improvements in safety and to reassure the public) and information on site vulnerabilities and safety analysis should be addressed. The management system should take into account the specific ~~**aspects**~~ **concerns of**	Rules for transparency, sharing and protection of information apply to any information, no matter its nature (nuclear safety, nuclear security, others…). What are different are the concerns: for nuclear safety, there is a special concern to sharing as much information as possible (for different reasons), for nuclear security, there is a special concern to protect **any** information that could be used by malicious actors.	X			

			each discipline regarding ~~related to~~ the management of information **~~in each discipline~~**.					
186.	NSGC4	8.7	8.7. Complementary training of safety and security personnel and their mutual participation in exercises of both types should be part of the training programme to effectively manage the interface between safety and security. In particular, personnel with responsibilities and expertise in safety analysis and safety assessment should be provided with a working knowledge of the security requirements of the facility and security experts should be provided with a working knowledge of the safety considerations of the facility, so that **potential conflicts ~~contradictory requirements~~** between safety and security can be resolved most effectively.	Requirements are not contradictory by themselves but they are complementary. The same problems exist within safety: you want closed doors to avoid fire spread while you want quick access through these doors in case of evacuation caused by the same fire. They are more easily managed because the same experts manage both concerns. What can be a problem is bad implementation, with no effective interface management and, sometimes, difficulty to find a practical solution that can meet all requirements.	X			
187.	NSGC5	8.72	For establishing access control procedures during emergencies, when there is a necessity for rapid access and egress of personnel, safety and security specialists should cooperate closely. Both safety and security objectives should be **~~met~~ sought for** during emergencies **as much as possible,** in accordance with regulatory requirements. **When it is not possible, the best solution taking into account both objectives should be pursued.**	The specificity of an emergency situation is that safety/security objectives may not be met, because of the situation. In particularly difficult situations, pre-planned procedures may need to be adapted to the situation.	X			
188.	WNA01		-	In ‘Requirement 11 Use of a graded approach’ of IAEA SSR-4, ‘Safety of Nuclear Fuel Cycle Facilities’, the concept of a graded approach		X		Even if not referring always to Graded

				commensurate with the potential risk is described. The proposed revision of SSG-6 only refers to this important concept on one occasion (§3.5), and does not state what would be the different recommendations for its application in the different types of fuel fabrication facility. Given the importance of a graded approach in the application of safety requirements, it would be highly desirable for SSG-6 to provide specific examples of its application.				Approach concept, we believe the SG contains several places where this was considered: "Where applicable, it may be useful to have dedicated control rooms to allow for the remote monitoring of operations, thereby reducing exposures and risks to personnel." The graded approach in SSR-4 is primarily intended to grade the requirements on different types of fuel

								cycle facilities and this is indeed done by having different SSGs for different facility types.
189.	WNA02	3.12	The Guide under review states: "3.12. The management system should include procurement activities and should be extended to include vendors and sub-contractors. The operating organization should ensure, through audits, that suppliers have management systems that are adequate for ensuring safety of conversion facilities and uranium enrichment facilities." Propose to amend the last sentence to: The operating organization should ensure, through audits, that suppliers of items important to safety have management systems that are adequate for ensuring safety of conversion facilities and uranium enrichment facilities.	This requirement is not present in SSR-4. In Requirement 4 Management system', SSR-4 establishes: "Suppliers, manufacturers and designers of items important to safety have an effective management system in place" (§4.16). SSG-6 should establish, like SSR-4, that this requirement applies only to "suppliers, manufacturers and designers of items important to safety". It is very important for the industry not to generate additional costs in the qualification of suppliers. Many items do not require the chosen provider to have an auditable management system.	X			
190.	WNA03	-	-	SSR-4 'Requirement 6 Safety committee' states (§4.29): "The committee shall be independent of the regulatory body and its membership shall, to the extent practicable, be independent of the operations management." In §4.30, a list of items that the safety committee is required to review should be establised.		X		The comment does not have any particular suggestion. We believe the guidance is satisfactory.

				The proposed revision of SSG-6 does not have any recommendation regarding the composition of this committee according to the size and radiological and nuclear hazards of the facility. The safety committee is only mentioned once in SSG-6 Rev 1 (§8.4), whereas in SSR-4 the committee is responsible for the management of many requirements (it is referred to 22 times).				Any particular proposal would be welcomed.
191.	WNA04	1.6	This Safety Guide deals specifically with the handling, processing, material transfer and storage of natural uranium, and of low enriched uranium (LEU) that has a 235U concentration of no more than 6%, derived from natural, high enriched or reprocessed uranium	The proposed amendment makes it clear that facilities working only with natural uranium are included.	X			
192.	WNA05	5.80	5.80 Control rooms and panels should be provided to centralize the main data displays, controls and alarms for general conditions at the facility. The need for control rooms in the different areas should be evaluated in each facility, taking into account whether they are necessary to reduce risks of exposure and undesired consequences in emergency situations.	The proposed change is consistent with SSR-4 'Requirement 46: Design of control rooms and panels', which states: *"Where control rooms and/or panels are needed for safety, including for emergency response, their accessibility and habitability shall be ensured by design to satisfy the requirements resulting from the safety assessment."*		X		The proposal was taken and combined with other comments.
193.	WNA06	ANNEX II		In ANNEX II, safety function (3) "Protection against external exposure" has not been considered in many of the "Structures, systems and components important to safety". Examples include: Intermediate storage of uranium oxide powder/powder containers; Pellet storage; Fuel assembly storage.	X			The safety function added to a number of SSCs. The whole table provides examples only and is

								not intended to be exhaustive.