Resolution of Comments

SSG-7: Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities (DS517)

COMMENTS BY REVIEWER Reviewer: Page.... of.... Country/Organization: Date:					RESOLUTION			
No.	Comment	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	FIN001	General Whole document		Although a lot of improvement has been done, IAEA should still cross compare the two standards SSG-6 and SSG-7 and review them together. A consistency between the two should be ensured. In addition, the wordings of the 'similar' paragraphs would be as far as possible, the same. Otherwise it might cause confusion as for the reason of formulating the paragraph differently. (You would think there is a reason behind the difference, although there isn't really any.) It should also be checked and ensured that no requirements given to one and relevant also to the other are left out. STUK has tried to capture the differences in the following comments, but not necessary all are there, so please do a thorough cross checking between the two	X			
2.	ISR01	General		We understand that the Document Preparation Profile	X			

				(DPP DS 517, April 2019, which was approved by the CSS in its April 2019 meeting and is also included in the September 20, 2020 Note Verbal) serves as the "general planning and working basis" for the various working groups (consultants' meetings and Safety Standards Committees) when making the revisions on these guides. We are aware, of course, that during the actual process of revision, not all the intentions detailed in the DPP can (or have to be…) "literally" followed. However, we do ask ourselves if those working groups are aware of the "not fulfilled" DPP items-when such exist-and do they point out (to themselves) the reasons for such situation. On this matter, we bring examples from DPP DS517 and the relevant draft safety standards DS517, regarding issues from the DPP asked to be revised or specifically addressed, but apparently not done so in the actual revisions. The Scope section of the DPP and the Annex of the DPP include (on page 5 and pages 9-11 of the DPP) listing of revisions that are needed, specifically for the individual Guides:				

				For revision of SSG-6 the DPP specifies: (iv) To include information on analytical laboratories. (Not mentioned in revision of SSG-6. Mentioned in revision of SSG-5). (v) The specific issues to be addressed (page 5 of the DPP) include: …"confirm that fuel fabrication with reprocessed U containing traces of Pu is covered.." The Main Revisions listing for the sections of SSG-6 (on page 10 of the DPP) also specifies for section 1: " *Clarify that fuel fabricated* *with reprocessed U containing traces of Pu is covered…*" (Not found in draft DS517B or the other two revised guides)				
3.	RUS02	General	There are a lot of type Uranium and Plutonium Mixed Fuel nowadays with different name (besides MOX fuel) are under developing, including - REMIX fuel for LWR, U-Pu nitride fuel (MNUP) for fast reactors etc. In the same time the requirements for fuel fabrication should be the same	Clarification		X Oxide fuels with thraces of Pu are included, however nitride fuels not.		

4.	RUS41	General Through all the text	Technological documentation may allow for an operational change in the parameters of the procedure specification. Decision-making on the operational change of parameters should be regulated by technological documentation and should be reflected in technological passports.				X	It is not clear what the comment is trying to suggest, change in the draft.
5.	RUS42	General Through all the text	The norms for the loss of nuclear materials should be established and monitored.		X			We agree, but security of nuclear materials is out of the scope of this Safety Standard.
6.	RUS43	General Through all the text	The handling of scrap and defective products containing nuclear materials should be strictly regulated.		X			This is covered by relevant provisions related to the management of waste.
7.	RUS44	General Title page	"Safety of installations for the production of mixed uranium-plutonium oxide fuel (Revision SSG-7)» **Replace with:** "Safety of installations for the production of mixed oxide, nitride uranium-plutonium fuel (Revision SSG-7)»	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
8.	RUS45	General The "Table Of Contents»	In the names of the items in the "Content" section, add "SNOOP" after "MOX", and add "nitride" after "oxide"»	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

9.	RUS46	1.3	"MOX, SNOOP fuel and waste generated at mixed uranium-plutonium fuel fabrication facilities are processed, processed and stored with specific pathways to dispose of the waste at the facility. The manufacturing processes of MOX, SNOOP fuel are heavily dependent on operator intervention and administrative controls to ensure safety. The main hazards of the MAX and SNOOP fuel installation are the release of actinoids (plutonium, americium, and uranium in order of importance), increased radiotoxicity due to transuranic actinides, ionizing radiation (gamma, neutrons), and nuclear criticality. An additional danger is the use of argon-hydrogen mixture (Ar+7% H2) for the manufacture of MOX fuel and nitrogen-hydrogen mixture (N+7% H2) for the manufacture of SNUP fuel, as well as the pyrophoric content of uranium and plutonium nitride compounds.»	The ability of isotopes of U, Pu and fission products to gamma and n radiation. Explosive-the fire hazard of hydrogen used in fuel manufacturing technology. Pyrophoric content of uranium and plutonium nitride compounds. Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
10.	FIN002	1.4	The toxicity of plutonium is high and therefore it is important that ~~where possible~~ best practice be employed at all stages of the …	Can there be cases or phases function or such where the best practices for that particular case cannot be employed? I find it quite strange that best practices would not be used everywhere.	X			
11.	RUS47	1.4	"The toxicity of plutonium is high, and it is therefore important that, where possible, best practices are applied at all stages of the	Pyrophoric content of uranium and plutonium nitride compounds.			X	Nitride fuels are out of the scope of this Safety Guide. See also

			production of MOX and SNOOP fuel, and that plutonium and all waste in MOX and SNOOP fuel production facilities are moved, recycled, processed, and stored safely. In the manufacture of SNP fuel, the condition for providing an inert environment in the in-box, in-chamber volumes at all stages of handling nitride compounds of uranium and plutonium, including RW containing nitride compounds of uranium and plutonium, must be observed.»	Extension of the document to mixed nitride uranium-plutonium fuel				explanation in comment RUS52.
12.	UK01	1.4	…therefore it is important that where possible best practice be employed at all stages of the fabrication of MOX fuel, and that plutonium be handled, processed, treated and stored safely. It is important that best practice is also considered as part of applying optimization to the generation and management of all radioactive wastes and effluents generated in MOX fuel fabrication facilities.	The current test stresses the importance of applying best practice to the handling, processing, treatment and storage of waste. We would also expect best practice to be applied to the generation for all wastes. Furthermore, we consider that radioactive effluents should also be considered (esp. aerial releases), as this is clearly within scope of SSR-4 and this SSG. The suggested rewording should cover these aspects and help to ensure that the background section is aligned with Safety Principle 5 (: Optimization of protection) and the following SSR-4 Requirements 8 (Radiation protection), 24 (Design Provisions for	X			

				radioactive waste management), 25 (Design for the management of atmospheric and liquid discharges) and 68 (Management of				
13.	RUS48	1.5	"The safety of mixed uranium-plutonium oxide (MOX) and mixed uranium-plutonium nitride (SNUP) fuel production facilities is ensured by their proper placement, design, construction, commissioning and operation, including safety management and preparation for decommissioning.	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
14.	RUS49	1.6	"The purpose of this Safety Manual is to provide operating organizations, regulators, designers, and other relevant organizations with recommendations and guidance on meeting the requirements set out in SSR-4 [1] applicable to the MOX and SNOOP fuel fabrication plant.»	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
15.	GER001	1.7	The safety requirements applicable to fuel cycle facilities (i.e. facilities for uranium refining, conversion, enrichment, reconversion, interim storage and storage of fissile material, fabrication of fuel including MOX fuel, storage and reprocessing of spent fuel, associated conditioning and storage of waste, and facilities for fuel cycle related research and development) are established in SSR-4 Ref. [1].	According to IAEA Safety Glossary 2018 "storage", using of solely "interim" might not be fully appropriate.		X Following the guidance in IAEA Glossary: " Storage as defined above should not be described as interim storage."		

16.	RUS50	1.7	"The safety requirements applicable to fuel cycle facilities (i.e., facilities for processing and refining uranium ore, conversion, enrichment, reconversion, temporary storage of fissile materials, fuel fabrication, including MOX and SNOOP fuel, spent fuel storage and recovery, associated conditioning and waste storage, and research and development facilities) are set out in SSR-4 [1]. This Safety Manual provides guidance on how to meet these requirements for MOX and SNOOP fuel fabrication plants during their placement, design, construction, commissioning, operation, and preparation for decommissioning.»	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
17.	RUS51	1.8	"This Safety Guide applies to the handling, handling, transfer of material and storage of: (1) plutonium oxide powder; (2) depleted, natural or regenerated uranium oxide powder, uranium and plutonium nitride compounds in relation to MOX and SNUP fuel fabrication facilities; (3) pellets, rods, and fuel assemblies made from MOX and SNUP fuels made from powders of plutonium oxide or nitride and uranium oxide or nitride for use in thermal and fast neutron reactors.»	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
18.	UK02	1.8	This Safety Guide deals with the handling, processing, material transfer, and storage of: (1)	It should be made clearer in the scope that SSG-7 also applies to the generation and management		X Modified 'used' as		

			plutonium oxide powder; (2) depleted, natural or reprocessed uranium oxide powder as related to MOX fuel fabrication facilities; (3) MOX fuel pellets, rods and assemblies fabricated from plutonium oxide and uranium oxide powders, for use in thermal reactors and fast reactors, and the generation and management of wastes and effluents arising from the use of these materials.	of wastes and effluents arising from the use of these materials in a MOX fabrication facility, to ensure alignment with SSR-4 Requirements 8, 24, 25 and 68.		'handling and procesing' to avoid misunderstanding with the use of the MOX fuels in reactors and associated waste.		
19.	GER002	1.9	The fuel fabrication processes covered by this Safety Guide are dry processes related to mixing and processing of uranium dioxide and plutonium dioxide powders; wet MOX fabrication process is not addressed; the production of oxide powders is not addressed.	Clarification	X			
20.	ISR02	1.9		These paragraphs (which are part of the scope in the introductory section of the guides) mention that these revised safety guides do not include nuclear security recommendations for the relevant nuclear fuel cycle facilities and they refer to relevant IAEA Nuclear Security Series publications. However, we would like to suggest to consider adding a short remark to that introductory paragraph mentioning that the present revised guides do include detailed addressing of interfaces between safety, nuclear security		X Added to 1.14		

				and the State system of accounting for, and control of, nuclear material (as called for in the DPP and in the explanatory note of the Note Verbal).				
21.	RUS52	1.10	This Safety Guide covers the manufacture of: - MOX fuel from mixtures of uranium and plutonium oxides, obtained either by mixing separate powders of uranium and plutonium oxides, or as a finished mixture; - SNUP of fuel from a mixture of uranium and plutonium nitrides obtained either by carbothermic synthesis, hydrogenation-nitriding, or plasma-chemical method. Many aspects depend on the nuclide composition of uranium and plutonium, including plant design, safety analysis, and plant operation. This Safety Guide covers all possible combinations in terms of oxide composition.	Extension of the document to mixed nitride uranium-plutonium fuel			X	Extending the scope of SSG-7 to include also nitride U-Pu fuels was not envisaged in the DPP and not planned. This was also not raised by any of the experts (including Russian Federation representative). Such a significant change would require more extensive discussions and preparations. At this moment it also seems as country-specific technology.
22.	GER003	1.11	This publication includes specific elements of ensuring criticality safety in a MOX fuel fabrication facility. These recommendations are supplemented by more detailed guidance provided in the IAEA Safety Standards Series No. SSG-27, Criticality Safety in the Handling of Fissile Material [4].	Clarification, order of supplement.			X	SSG-27 is considered as the main leading guideline for criticality safety and SSGs 5,6,7 only supplement SSG-27.

23.	RUS53	1.11	This publication includes the criticality safety elements applicable to MOX or SNOOP fuel manufacturing plants.	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
24.	GER004	1.12	This Safety Guide is limited to the safety of MOX fuel fabrication facilities; it does not deal with any impact that the fabricated fuel assemblies may have on safety for <u>transport to the reactors or</u> the reactors in which they are to be used.	Transport of manufactured fuel assemblies to the facilities should be mentioned in this case as well			X	Transport of MOX fuel out of the facility site is out of the scope of this Safety Guide. SSR-6 and its Safety Guides are applicable.
25.	RUS54	1.12	This Safety Guide is limited to the safety of MOX and SNOOP fuel fabrication facilities; it does not address any impact that manufactured fuel assemblies may have on the safety of the reactors in which they will be used.	Extension of the document to mixed nitride uranium-plutonium fuel.			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
26.	ISR01	1.14		These paragraphs (which are part of the scope in the introductory section of the guides) mention that these revised safety guides do not include nuclear security recommendations for the relevant nuclear fuel cycle facilities and they refer to relevant IAEA Nuclear Security Series publications. However, we would like to suggest to consider adding a short remark to that introductory paragraph mentioning that the present revised guides do include	X			

				detailed addressing of interfaces between safety, nuclear security and the State system of accounting for, and control of, nuclear material (as called for in the DPP and in the explanatory note of the Note Verbal).				
27.	RUS55	2	HAZARDS AT MOX AND SNOOP FUEL MANUFACTURING PLANTS	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
28.	RUS56	2.1	In the MOX and SNOOP fuel production plants, a large amount of fissile and radioactive material is present in a dispersible form. This is especially true in the early stages of the fuel manufacturing process, when the material is in powder form. In addition, the radioactive materials encountered exist in various physical forms. Thus, in the production of MOX and SNUP fuel, the main tasks are to prevent nuclear criticality, prevent depressurization of radioactive materials and mitigate its consequences, as well as protect against radiation exposure (requirement 7 SSR-4 [1]).	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
29.	UK03	2.1	Revert to previous wording	The rewording seems to narrow the scope of what is covered by Paragraph 2.1 from the previous, broader (and more encompassing) design, siting, construction, commissioning,		X We agree and this was moved to Scope section in 1.7		

				safe operation and preparation for decommissioning to focus on Requirement 7 of SSR-4. For example, this would seem to eliminate protection of the environment and the public. Additionally, the previous wording aligns with each of the section headings of SSG-7 (Sections 4 – 9) and the proposed re-wording makes the intent of this paragraph much less clear.				
30.	RUS57	2.2	Both plutonium and uranium oxides (PuO2, UO2) and plutonium and uranium nitrides (PuN, UN) are processed at the MOX and SNUP fuel production facilities. Factors affecting the safety of the MOX and SNOOP fuel production plant should include, in particular, consideration of the following: - Although the radiological toxicity of uranium is low, this does not apply to plutonium, so it can be expected that the consequences for personnel, the public and the environment after the accident will be significant.; - Powder manufacturing processes for making MOX and SNOOP fuels have the potential to disperse radioactive material; The isotopic characteristics of plutonium have an impact on the	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

			safety of nuclear criticality, the effects of radiation and heat generation.					
31.	RUS39	2.2, 2.3, 8.54, 8.55, 8.59, 8.67 and others	Include information that gamma-radiation of U-232 should be considered for MOX fuel fabrication from reprocessed uranium.	Clarification		X Mentioned in 5.145		
32.	RUS01	2.3	External exposure assessment should include neutron emission from 238Pu and 240Pu isotopes and gamma radiation from 241Am, which is formed through the radioactive decay of 241Pu during storage. The decay heat of 238Pu should be included in the calculation of heat generation. *Gamma radiation from 228Th decay products (including 208Tl) should also be considered.*	Hard gamma-radiation has great impact on absorbed dose thus should be described	X			
33.	CAN12	2.4	~~The first two levels of defence in depth (see Section 2 of Ref [1]) are the most important, as risks can be reduced to insignificant levels by means of design and appropriate operating procedures (see Sections 5 and 8). For MOX fuel fabrication facilities the third level of defence in depth (physical barrier between the working area and environment) (e.g. a ventilation system) should be also available and reliable at all times.~~	There is no support for this in Section 2 in SSR 4. All levels of defense are important and no priority should be suggested. If the perceived risk turns out not to be reasonable, the damage could be enormous. Some operations may never be acceptable due to the large consequences of an accident, irrelevant how low the frequency (probability) is. Criticality is an event being postulated to occur and there are many design and operational countermeasures.	X			

				Para. 2.12 level (3): “In the design of the facility, such accidents are postulated to occur.”					
34.	RUS58	2.4	The MOX and SNOOP fuel production plant, which uses only dry technologies, does not store or process significant amounts of hazardous chemicals. Thus, the chemical hazard that can lead to radiological consequences is small. However, this is not the case with MOX fuel production plants where wet processes are used. In accordance with the requirements of SSR-4, it is necessary to conduct a safety analysis, during which potential accidents are analyzed to ensure their adequate prevention, detection and (if they do occur) mitigation of their consequences. This requires the application of the concept of deep-layered protection (requirement 10 SSR-4 [1]). The first two levels of deep-layered protection are the most important, as the risks can be reduced to fairly low levels through design tools and appropriate operational procedures (see sections 5 and 8).	Pyrophoric content of uranium and plutonium nitride compounds. The presence of explosive-fire-hazardous hydrogen in the composition of the nitrogen-hydrogen mixture in the production technology of SNOOP fuel. Danger of hydrogen accumulation in exhaust ventilation manifolds ("bends", turns, etc.). Increased risk of ignition of uranium and plutonium nitrides with increased dispersion. Danger of settling and accumulation of fine fraction of uranium and plutonium nitrides on the surfaces of equipment, filter elements, and exhaust ventilation manifolds.			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

			For MOX and SNOOP fuel production plants, the third level of deep-layered protection (the physical barrier between the work area and the environment) (e.g., the ventilation system) must also be kept ready and operational at all times. Additional safety requirements should be imposed on the plant for the production of SNUP fuel due to the high pyrophoric content of uranium and plutonium nitride compounds. Mixed uranium-plutonium nitride (SNUP) is a combustible substance. The explosive and fire-hazardous properties of the SNOOP largely depend on the dispersion. In the technological process, dispersed materials are used, the particles of which have low hovering speeds and are able to accumulate in the atmosphere of protective boxes and technological equipment. Depending on the diameter of the particles and the velocity of the gas flows in the boxes, dust particles can persist in the atmosphere of the box, settle on the surface of the sealing elements of the enclosing structures and the surface of the ventilation system boxes, accumulate on the fine filters.					

			SNOOP is easily oxidized by air oxygen. If the oxygen concentration increases during depressurization of boxes or equipment, planned plant shutdowns, or maintenance of ventilation systems and filter elements, a layer of such particles can ignite spontaneously. An air suspension with a particle size of up to 100 microns ignites spontaneously in air at room temperature. SNOOP powder with a particle size of 25 microns in the layer is oxidized at a temperature of ~200 °C and the oxygen concentration in the nitrogen mixture is 2% vol. A layer of SNOOP particles of different dispersities is able to propagate a gorenje front (or high-temperature oxidation) at 3% vol. of oxygen in a nitrogen medium. Free gorenje temperature in the air is not less than 680 °C. Due to the pyrophoric content of uranium and plutonium nitrides, the boxes (in addition to the requirement for the organization of a vacuum of at least 20 mm.water) must be provided with an inert atmosphere and controlled by the oxygen and moisture content – no more than 50 ppm. In the event of a breach of the tightness of the box with the SNOOP, air will flow and a local increase in the oxygen					

			concentration will occur. If you place the SNOOP in the immediate vicinity of the leak, they may catch fire. It is possible to increase the average volume temperature of the atmosphere of the boxes, damage the elements to ensure the tightness of the boxes, the release of radioactive aerosols into the room. In the design documentation, the boxes for working with SNOOP fuel should be assigned the safety class 2N according to NP-016, which requires the exclusion of detachable connections from the design of the boxes where possible, and where it is impossible – control of their tightness. Depressurization of the box for working with SNOOP fuel is the initial event for a design accident. To ensure explosion and fire safety and limit the consequences of possible ignition of materials, it is necessary: - to exclude the possibility of heating to a critical temperature or reduced to a safe value, the thermal effect (thermal conductivity and heat radiation) from burning SNOOP on the sealing elements boxes; - constantly monitor the concentration of oxygen and water vapor in the atmosphere of the boxes where SNOOP is drawn;						

			- when the oxygen concentration in the protective boxes increases to the values characteristic of the beginning of oxidation, the SNOOP, which is not in the gas-tight equipment, must be moved to sealed containers, the technological process is safely stopped; - The SNOOP must be handled in strong, airtight containers made of non-flammable, unbreakable materials; - all work with SNOOP should be carried out in an inert atmosphere. - exclude the possibility of the formation of air suspension in the technological process with the release of floating particles into the atmosphere of the box; - eliminate the accumulation of fine particles on the surfaces of the enclosing structures of protective boxes, equipment, boxes of ventilation systems; - exclude the use of combustible filter materials; - to exclude the possibility of combustion of the oxygenated layer of particles on the filter elements (can be done by timely replacement of filter elements to the accumulation of a layer of particles capable to spread burning). - clean the boxes and equipment in an inert atmosphere;					

			- turnovers and waste (cleaning material, sealing elements, etc.) should be collected in a metal sealed container, stored in an inert atmosphere. - provide continuous monitoring of the concentrations of hydrogen and carbon monoxide in the boxes where the release of these gases is possible; - if it is possible to release hydrogen or carbon monoxide into the room, then pre-explosion detectors of 0.4% vol. for hydrogen and 1.25% vol. for carbon monoxide should be placed in the room; - provide in the boxes and collectors of the ventilation system the concentration of hydrogen-no more than 0.4% vol, the concentration of carbon monoxide-no more than 1.25 % vol. - provide for the presence and confirmed operability of light and sound alerts when safe concentrations of hydrogen and carbon monoxide in controlled volumes are exceeded; - the flow characteristics of the ventilation system must ensure constant mixing of the exhaust gases, prevent delamination and enrichment of individual layers with combustible gases; - follow the general rules for the safe handling of					

			hydrogen-containing mixtures; - when the oxygen concentration in the protective boxes increases, the SNOOP, which is not located in the gas-tight equipment, must be moved to sealed containers, and the technological process is safely stopped; - if the vacuum in the air ducts of the ventilation system is reduced to less than 20 mm of water, the technological process must be safely stopped; - when the flow rate or pressure of nitrogen supplied to the boxes to create an inert environment is reduced, less than the established technological documentation, the technological process must be safely stopped; - take measures to limit the interaction of the SNUP with the oxidizing environment and prevent it from leaving the protective boxes and equipment in the event of a fire; - take into account the explosive and fire-hazardous properties of fine materials when servicing the ventilation system; - take measures to limit the spread of oil from oil-filled equipment on the premises and eliminate potential sources of ignition in the strait area; - equip the installation room with an automatic fire alarm system with a signal output to the fire station					

			and primary fire extinguishing equipment; - to ensure the tightness and strength of the equipment at the specified parameters of the technological process; - provide backup power supply for the generation and supply of nitrogen to the boxes. - to ensure sufficient strength of the sealed container of the vortex mixing device, to exclude the possibility of opening the container during the mixing process; - to go with the tablets in the VIDEO, contact with them as pyrophoric fuel material, apply a protective atmosphere; - exclude the use of water and water-based extinguishing agents when lighting the SNOOP. When choosing extinguishing agents, take into account the requirements of nuclear safety; - ensure a high level of technological discipline; - ensure compliance with the requirements of regulatory and legal documents on fire safety that apply to this production. Note: *the concentration of carbon monoxide may not be controlled in the design justification of the explosion safety of the synthesis process based on the process speed (maximum rate of carbon monoxide release) and the flow*						

			rate of nitrogen supply to the protective boxes and ventilation systems.					
35.	HUN04	2.4 , Line4	For MOX fuel fabrication facilities the third level of defence in depth (physical barrier between the working area and environment) **have to** be also available and reliable at all times.	The original uses the term *should be,* which is not strong enough for the requirement. It *have to* be available at all times.		X The text was deleted in line with other comment.		
36.	RUS03	2.5	For the MOX fuel fabrication process to remain in a safe state also when stopped (i.e. there is no movement or transfer of material), the following systems should continue to operate: - Heat removal systems in storage areas to remove decay heat from reactor grade plutonium; - Systems executing confinement functions should continue to operate to prevent release of radioactive material from the facility, taking into account alfa decay during prolonged shut-down of the facility; - Inert gas feed systems of sintering furnaces or gloveboxes; - *Criticality accident alarm system.*		X			
37.	RUS59	2.5	In order for the MOX and SNOOP fuel manufacturing process to remain in a safe state even when it is stopped (i.e. there is no movement or transfer of material), the following systems must continue to function: - Heat removal systems in storage	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

			facilities for the removal of decay heat from reactor plutonium; - Containment systems should continue to operate to prevent the release of radioactive materials from the facility, taking into account alpha decay during a prolonged shutdown of the facility; - Systems for supplying inert gas to sintering furnaces and / or glove chambers; -supply and exhaust ventilation and waste gas treatment systems.					
38.	UK04	2.5	2nd bullet: "Systems supporting confinement functions should continue to operate, to supplement the physical containment barriers, and to provide mitigation and monitoring of radioactive discharges".	Revised wording for improved clarity to reflect that the facility will continue to release radioactivity into the environment, via the engineered ventilation / confinement system. The intent of the second part of the bullet point is not clear. Suggest removing. We also note the typographical error (incorrect spelling of alpha).	X			
39.	CAN01	2.5 2nd bullet	Change alfa to alpha	Editorial	X			
40.	RUS60	3 Section 3	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

41.	GER005	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 Text harmonized between SSGs 5,6,7		
42.	FR01	3.10	There should be clear, written assignment of responsibilities for key safety functions, as for example criticality safety officer and people within the radiation competence center	In French regulation, the radiation protection officer has been replaced by a radiation competence center.		X IAEA Safety Standards cannot use any specific country terminology. The text does not contradict French terminology.		
43.	GER006	3.12	In meeting requirement 58 of SSR-4 [1] the operating organization should ensure that operating personnel receive training and refresher training at suitable intervals, appropriate to their level of responsibility. In particular, operating personnel involved in activities with fissile material (both uranium and plutonium), with radioactive waste with their corresponding waste and waste forms, and with chemicals should understand the nature of the hazard	Clarification		X "activities with fissile material (both uranium and plutonium), radioactive materials including waste and with chemicals…" Harmonized among SSGs 5,6,7		

			posed by these materials and how the risks are controlled with the established safety measures, the operational limits and conditions and operating procedures.					
44.	FR02	3.18	Audits of the management system performed by the operating organization as well as proper control of modifications are particularly important for ensuring the safety of a MOX fuel fabrication facility (para. 4.23 of SSR-4 [1]). In addition, independent audits should be also implemented (such as …). Audits should be carried out regularly and should cover also measures for emergency preparedness and response.	In order to precise "independent audits", please give examples.		X Para replaced with clearer provisions.		
45.	FIN003	3.18/3	In addition, independent audits should be also implemented. These audits should be carried out regularly and the results should be evaluated by the operating organization and corrective actions should be taken to implement recommendations and suggestions for safety improvements. The audits should also cover measures for emergency preparedness and response.	Is there no need for evaluation of the audit results and corrective actions in a MOX fabrication facility like in the uranium fuel facility (SSG-6 3.18 last sentence)?		X Harmonized among SSGs 5,6,7		
46.	RUS04	3.19	*Para could be moved to a chapter "MANAGEMENT RESPONSIBILITY".*			X The text was modified to better capture the heading		

47.	GER007	3.21	(3) Fire safety programme — Testing of fire detection systems ~~detectors,~~ ventilation dampers, spark arrestors, maintenance of fire barriers; — Mitigation based on fire extinghuishing agent~~s extinguishants~~ compatible with criticality safety and — control of pressure differentials ensured by ventilation systems;	Clarification	X				
48.	RUS06	3.21	*Equipment geometry control should be mentioned.*			X The whole para was changed to be harmonized with other SSGs			
49.	RUS05	3.21 (1)	Radiation protection programme — Continuous monitoring and alarm of aerial contamination inside the facility and in surrounding area; — Contamination of surfaces; — Glovebox containment and shielding*, airlocks and hermetically sealed devices for transport containers;* — Radiation protection zone controls for personnel and equipment; — Surveillance programme for equipment and systems; — Confinement controls for radiological protection and heat removal; — Ventilation control and maintenance of pressure differentials;	The process of loading the basic material (uranium dioxide and plutonium dioxide powders) into the MOX fuel production facility and offloading the waste is possible through loading chambers (devices) equipped with hermetically sealed closing hatches. Harmonization with NP-098 (section.17).	X				

			— HEPA filtration; — Glovebox integrity					
50.	RUS07	3.21 (3)	Fire safety programme - *Maintenance and performance monitoring of technical means of fire protection (installations and systems of automatic fire alarm and fire extinguishing, control of evacuation of people in case of fire, ventilation fire valves, fillings in openings in fire barriers;* - *The use of fire extinguishing agents compatible with the safety of criticality and control of the operation of ventilation systems in case of fire to exclude pressure drops.*			X Combined with the existing text and simplified.		
51.	CAN02	3.21 (6) 2nd bullet	Put the 2nd bullet under (1) Radiation protection programme. Also shorten bullet to “Means for decontamination and screening of personnel.”	Decontamination and screening – is that not part of a radiation protection programme? The last part of the sentence is hard to understand. What does this mean: “as well as protective active substances related to specific hazards of the installation”	X			
52.	RUS08	4 SITE EVALUATION	Proposed to complement with provisions for safety and security interfaces during site evaluation and selection process	Clarification	X			
53.	RUS61	4 Section 4	In the text of the section, after" MOX", add "SNOOP".				X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

54.	CAN03	4.1	Remove "explosions in nearby public traffic". If keeping, suggest either saying "explosions" or "nearby explosions not related to facility operations"	This example needs to be more general like the other examples.		X Harmonized with other SSGs 5,6,7 and comments.		
55.	GER008	4.1 Line 4	… Risks posed by possible significant external hazards (e.g. earthquakes, accidental aircraft crashes, fires, explosions in nearby <u>industrial facilities and</u> public traffic, floods and extreme weather conditions) will probably dominate in the site evaluation process and need to be incorporated into the design of the facility	Clarification Perhaps applicable to DS517A and DS517B as well		X Harmonized with other SSGs 5,6,7 and comments.		
56.	RUS09	4.3.	For a MOX fuel fabrication facility where dry process is used to manufacture fuel appropriate design and operation can ensure that aerial releases are negligible under normal operating conditions. The major hazard in accident conditions is the potential release of plutonium (as plutonium oxide or MOX) as particles to the atmosphere *or to the air of working zone.*	Main hazard in emergency situation is a potential release of plutonium (as plutonium oxide or MOX) as particles to the atmosphere or to the air of working zone	X			
57.	GER009	4.4	…. *Transport links*. Minimize the distance by which fissile material needs to be transported (as for example by siting a MOX fuel fabrication facility on the same site as plutonium production). <u>Combined hazards, and hazard</u>	We suggest to add this statement as important	X			

			interactions should be understood and regarded for.					
58.	ISR02	4.4		Regarding the example of siting a MOX fuel fabrication facility on the same site as plutonium production, for minimizing the extent distance by which fissile material has to be transported: We suggest to add there a remark related to the potential for natural and human induced external hazards to affect multiple nuclear installations on the same site as well as on adjacent sites and the potential for hazards originating from one nuclear installation to affect other nuclear installations located on the same or on adjacent sites. (That potential is mentioned in paragraphs 5.80 and 5.81 in relation to external hazards).	X			
59.	FIN004	4.6, 4.7		Why is here wording different from SSG-6 4.4-4.6 ? Harmonising needed throughout the two to three paragraphs! This is confusing when the wording is different.	X			
60.	RUS62	5 Section 5	In the text of the section, after" MOX", add "SNOOP".				X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

61.	HUN06	5.3 last line	There should be individual monitoring of neutron doses for personnel in addition to individual monitoring of gamma radiation.	Added the word radiation, after *gamma*.	X			
62.	HUN05	5.3 Line 2	Concerning the radiation fields associated with plutonium…	Wording: *Concerning* instead of *owing to*. Just a proposal.	X			
63.	FIN005	5.4	The definition of a design basis accident in the context of fuel cycle facilities can be found in Definitions of SSR-4 [1]. The safety requirements…	Why was the first sentence removed from SSG-7 but not from SSG-6 5.4? Are the definitions not found for MOX facility?	X			
64.	FR03	5.5	Change items 5.5 (b) to 5.5 (e) in order to list the “final” hazards rather than the initiating events. For example: ***a) Nuclear criticality accident,*** ***b) Release of plutonium inside and/or outside of the facility,*** etc.	Consistency with SSR-4 and para. 5.7: events 5.5(b) to 5.5(e) are indeed postulated initiating events (PIE) as listed in Appendix of SSR-4 (reminded in para. 5.7). If needed to emphasize on these particular PIE, it might be mentioned in 5.7 instead (e.g “Among these PIE, particular consideration should be given to: […]”)		X The whole para was changed		
65.	GER010	5.5	… e) Internal and external events, including: (i) Internal ~~and external explosions~~ (in particular hydrogen ~~explosions~~) and external explosions;	Clarification		X The whole para was changed		
66.	HUN07	5.5 b)	Fire (especially in gloveboxes);	Wording: instead of *in particular*	X			
67.	JPN01	5.5.e) (v)	The specification of a design basis (or equivalent) will depend on the facility design, its siting and regulatory requirements. However, particular consideration should be	Completness for using the wording in this draft as “accidental aircraft crashes”.	X			

			given to the following hazards in the specification of design basis safety analysis for MOX fuel fabrication facilities: ……… e) Internal and external events, including: (i) Internal and external explosions (in particular hydrogen explosions); (ii) Internal and external fire; (iii) Dropped loads and associated handling events; (iv) Natural phenomena (including earthquakes, flooding and tornadoes); (v) Accidental aircraft crashes. ………					
68.	JPN02	5.6.	All the events may have both on-site and off-site consequences. The e~~E~~vents associated with criticality accident or hydrogen explosions might result primarily in radiological consequences for personnel. ~~The other events might have both on-site and off-site consequences.~~	To keep a consistency with the description between DS517B and DS517C. There are no differences between uranium and MOX facilities in terms of criticality accident or hydrogen explosions.		X Text harmonized with SSG-6		
69.	FIN006	5.8		Needs harmonising with SSG-6, 5.8.	X			
70.	RUS10	5.9-5.18 Prevention of nuclear criticality	It is necessary to establish a threshold mass of nuclear material, below which any work with nuclear material can be carried out without restrictions.			X We agree that ‘a safe mass’ of fissile materials is frequently defined in national		

						regulations. But this concept is not applicable to process lines of a MOX fuel fab.facility. The quantities are much larger there.		
71.	CAN13	5.10	~~The~~**One** aim of the criticality safety analysis	Criticality safety analysis involves more than calculation of k_{eff}. The title of the subsection is “Prevention of criticality”. The design and operation also require criticality safety analysis to cover what could happen if criticality occurs. An event may become real and thus credible even if not perceived to be so in the prevention analysis. It is not possible at this time to change or clarify every reference to “criticality safety” (it is not done in SSR-4 and SSG-27) but here it is easy.	X			
72.	FIN007	5.10		Check which reference is right and also harmonise wording and location of this paragraph as far as possible with SSG-6, 5.13.	X			
73.	HUN01	5.10	“subcriticality” instead of “sub-criticality”	it should be one word like in the rest of the guide	X			
74.	CAN04	5.11	Complete the list with: **d) MOX pellets: Mass, geometry and moderation, in accordance with the isotopic specifications,**	The current list only tackles powders (no consideration given to pellets, rods and assemblies).	X			

			the PuO_2 content and the size of the pellets, **e) Fuel rods: Geometry and moderation, in accordance with the isotopic specifications, the PuO_2 content and the design of the rods (size and cladding).** **f) Fuel assemblies: Geometry and moderation, in accordance with the isotopic specifications, the PuO_2 content distribution in the different rods and the design of the assembly.**					
75.	FR04	5.11	c) MOX powder (receipt or preparation) : Mass, geometry and moderation in accordance with the isotopic specifications and the PuO_2 content at each stage of the process.	Rewording to match with the structure of the list.	X			
76.	FR05	5.11	Complete the list with: d) MOX pellets: Mass, geometry and moderation, in accordance with the isotopic specifications, the PuO_2 content and the size of the pellets, e) Fuel assemblies: Geometry and moderation, in accordance with the isotopic specifications, the PuO_2 content distribution in the different rods and the design of the assembly.	The current list only tackles powders (no consideration given to pellets and assemblies).	X			
77.	JPN03	5.11.	For the prevention of criticality by means of design, the double contingency principle shall be the preferred approach" (SSR-4 [1], para. 6. 142). For ensuring criticality safety in a MOX fuel fabrication facility one or more of the following parameters of the	***1) Editorials to keep the consistency.*** ***2) Neutron absorbers should be considered for MOX powder.***	X			

			system should be kept within subcritical limits: a) PuO_2 (receipt) (i) Mass and geometry (limitation of the dimensions or shape) in accordance with the safety specification of PuO_2 isotopic composition and moderation. (ii) Presence of appropriate neutron absorbers. b) UO_2 (receipt) (i) Mass and geometry in accordance with the safety specification of UO_2 isotopic composition and moderation. c) MOX powder (receipt or preparation) MOX powder is formed in the fuel fabrication process, and the associated criticality hazard should be assessed in accordance with the isotopic specification and the PuO_2 content at each stage of the process. (i) Mass, geometry and moderation should be considered. (ii) Presence of appropriate neutron absorbers.					
78.	CAN05	5.12	Complete the list with: **d) MOX pellets (in addition to previous controls):** – *Diameter range of the pellets* **e) Fuel rods (in addition to previous controls):** – *Cladding thickness range of the rods* **f) Fuel assemblies (in addition to previous controls):**	The current list only tackles powders (no consideration given to pellets and assemblies).	X			

			Distribution of the fuel rods within the assembly					
79.	CAN14	5.12	The isotopic composition of the plutonium (ratios of the amount of a particular isotope of plutonium to the total amount of plutonium: **e.g.** ^{239}Pu/Pu)~~, 240Pu/Pu, 241Pu/Pu, 242Pu/Pu). 238Pu should not be taken into account as 238Pu is a neutron absorbent;238Pu should not be taken into account as 238Pu is a neutron absorbent~~;	To get an adequate description, all known Pu isotope fractions should be specified and the sum should be unity. ^{238}Pu, ^{240}Pu and ^{242}Pu. All Pu isotopes are fissionable and can support a fission chain reaction. In a fast system, they may reduce the critical mass. A MOX plant may even handle Pu metals as feed materials.			X	In principle we agree however this is an existing SSG-7 text, it provides better understanding of the main contributing isotops and technically is not incorrect. We suggest to keep the list of isotopes.
80.	FR06	5.12	Complete the list with: d) MOX pellets (in addition to previous controls): – ***Diameter range of the pellets*** e) Fuel assemblies (in addition to previous controls): Distribution of the fuel rods within the assembly	The current list only tackles powders (no consideration given to pellets and assemblies).	X			
81.	RUS63	5.12	Complement: SNOOP powder (preparation or preparation): Carbothermic reduction method: $(UO_2, PuO_2) + (1 – y)N_2 + (2 + z)C \rightarrow (U, Pu)N_{1-y}C_y + (z – y)C + 2CO_2$; $(U, Pu)N_{1-y}C_y + (z – y)C + y/2N_2 + 2zH_2 \rightarrow (U, Pu)N + zCH_4$. Method for the synthesis of metals: $2Me + 3H_2 = 2MeH_3$; $2MeH_3 + ½ (1+X) N_2 = MeN_{(1+X)} + 1,5H_2$.	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

			- The ratio of the amount of PuN to the total amount of nitrides (PuN/(UN + PuN)); - the number of additives (degree of deceleration), to assess the criticality hazard at each stage of the process; - Upper bound of density (Pu, U)N (СНУП); - The presence of inhomogeneous moderator distributions, if this is considered necessary.					
82.	GER011	5.12 (a) Bullet 1	….. 238Pu should not be taken into account ~~as 238Pu is a neutron absorbent~~ as its isotopic content and neutron properties are not as well qualified as for the other Pu isotopes;	240Pu is an even more potent and redundant neutron absorber, and is in fact taken into account.	X			
83.	CAN06	5.12 b	First bullet: "When this ratio is less than 1 %, and given that there is no **significant presence of deuterium**~~heavy water (D2O)~~, beryllium, or graphite ~~or other moderators more effective than light water present~~ in the facility, no criticality hazard is to be considered for powders"	1) No necessary to emphasize on heavy water, beryllium and graphite (which are not the most common effective moderators which can be found in a MOX facility). 2) Exception valid only for homogeneous materials (like powders) but strictly not for heterogeneous materials (pellets or rods).	X			
84.	FIN008	5.13		Avoid repeating requirements. Rewrite if needed or remove!	X			
85.	FIN009	5.14 before 5.14		What about SSG-6 5.14? Is it not relevant here?	X			
86.	RUS11	5.14	In order to perform criticality analysis of a MOX fuel fabrication	Without knowledge of Pu and U isotopic composition it is	X			

			plant, the following input data should be specified: i. the PuO_2 content of the final MOX powder mix ($PuO_2/(UO_2+PuO_2)$) value; ii. the maximum density of the final MOX powder mix; iii. and the final moderator material content in the mix (powder “moisture” and hydrogen / carbon content (composition) of the additives); *iv. Pu and U isotopic composition.*	impossible to make safety considerations.				
87.	RUS12	5.14	The input data that specified in this para are obviously not sufficient for performing criticality analysis of a MOX fuel fabrication plant and are needed to be corrected.	Completeness and consistency with SSR		X We fully agree this is not the complete list but it is also not what the provision is saying. Please, see also the next para. Which refers to SSG-27 and on many other places of the document as well.		
88.	RUS64	5.14	Complement: Content PuN in the finished mixture of SNOOP powders (PuN/(UN + PuN)); Maximum density of the finished mixture of SNOOP powders;	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.

			The content of the moderator (additives).					
89.	GER012	5.15 Line 10	— The use of appropriate verified and validated computer codes that are validated together with the appropriate data libraries of nuclear reaction cross-sections, for the normal and credible abnormal conditions being analysed, while taking into account any bias and its uncertainties	Specification	X			
90.	FIN010	5.17		Consider harmonising the wording between SSG-6 5.16 and SSG-7 5.17! All the dashed items as far as possible tallowing of course for the differences between the two facilities	X			
91.	FR08	5.17	Third bullet: Geometry. The analysis should cover possible changes in dimensions due to operation (e.g. bulging of ~~slab tanks or~~ slab hoppers)	There are no “tanks” containing large amount of fissile materials in solution in MOX fuel fabrication facilities. And this parenthesis is only an example.	X			
92.	FR09	5.17	Add a last sentence to the seventh (last) bullet: “**Absorber parameters include thickness, density and nuclide composition of both the absorber material and the hydrogenated material used to increase its absorption efficiency (if applicable)**”	Consistency with SSG-5.	X			
93.	HUN03	5.17	„The neutron absorbers that may be used in MOX fuel fabrication facilities include cadmium, boron and the safety analysis should	The last dash in paragraph number 5.17 contradicts the statement in the first dash in which is advised that the neutron	X			

			incorporate their effect as neutron absorbers; however, ignoring their effects would yield conservative results. The use of mobile neutron absorbers should be avoided.” instead of „The neutron absorbers that may be used in MOX fuel fabrication facilities include cadmium, gadolinium and boron and the safety analysis should incorporate their effect as neutron absorbers; however, ignoring their effects would yield conservative results. The use of mobile neutron absorbers should be avoided.”	absorption characteristics of elements/isotopes present such as gadolinium, 236U or 238Pu should be avoided unless the validity of the data used can be demonstrated with high level of confidence.				
94.	GER013	5.17 footnote 1	effective enrichment takes credit for neutron absorption characteristics of elements/isotopes present such as gadolinium, 236U or 238Pu or 240Pu	Specification; 240Pu is the main neutron absorbing isotope in typical MOX fuels	X			
95.	JPN04	5.17. 5th bullet	The following are recommendations for conducting a criticality analysis for a MOX fuel fabrication facility to meet the safety requirements established in para. 6.144 of SSR-4 [1],: …… — Moderation. Water, oil and other hydrogenous substances such as additives are common moderators that are present in MOX fuel fabrication facilities or that may be present in accident conditions (e.g. water from firefighting). Special consideration should be given to	To keep a consistency with other paragraphs in this DS517C. The term “non-homogeneous” is used in the last sentence of paragraph 5.12 and the first bullet of paragraph 5.15.	X			

			cases of inhomogeneous non-homogeneous moderation.					
96.	RUS13	5.19	In a MOX fuel fabrication facility, three static barriers (or more, as required by the safety analysis) should be provided, in accordance with a graded approach. The first static barrier normally consists of gloveboxes, fuel claddings, material containers *or technological equipment containing radioactive material*. The second static barrier normally consists of rooms around the gloveboxes. The third static barrier is the building itself. The design of the static containment system should consider openings between different confinement zones (e.g. doors, penetrations). Such openings should be designed to ensure that confinement is maintained in all operational states, especially during maintenance (e.g. by the provision of permanent or temporary additional barriers) and, as far as practicable, in accident conditions.		X			
97.	FR10	5.20	The associated systems system should be designed to prevent the movement or diffusion of radioactive …	Typing error	X			
98.	GER014	5.20 Line 3	… The associated systems system should be designed to …	Wording; surplus “system”	X			

99.	GER015	5.20 (a)	Operational states, anticipated operational occurrences and accident conditions;	Specification			X	Operational states include Normal Operation and AOO (see SSR-4)
100.	RUS15	5.20 (c)	Where more than one ventilation system is used, protection in the event of a failure of a lower pressure (higher contamination) system, causing pressure differentials and airflows to be reversed; *It is necessary to provide for a constructive ability to control the exposure dose rate on the air filter blocks at all stages of cleaning*;	Further clarification.		X 5.20 is on confinement function. For radiation protection aspect of the ventilation system see 8.65.		
101.	HUN08	5.20 Line 4	The associated systems should be designed to prevent the movement or diffusion of…	The word *system* is repeated twice.	X			
102.	HUN09	5.20 Line 7	The design of the associated systems should address, as far as applicable:	Wording: applicable instead of *practicable*.	X			
103.	FR11	5.22	Surface contamination can be detected by smear checks on surface or by portable devices for which equipment should be provided.	Using the same vocabulary as in the renewed SSG-5	X			
104.	RUS16	5.25	Procedure and instrumental means to control the potential buildup of plutonium powder or MOX powder particulates in the ventilation ducts *and the HEPA filters* should be established.	Further clarification.	X			
105.	UK05	5.25	**The ventilation system should be designed and operated to minimise the opportunity for**	Making it clear that the starting point is that the design of the	X			

			buildup of particulate. Procedure and instrumental means to control the potential buildup of plutonium powder or MOX powder particulates in the ventilation ducts should be established.	ventilation system should minimise buildup of particulate.				
106.	GER016	5.29	Last stage filters are used to protect the public and the environment and are normally located close to the location at which discharges to the environment occur. Last stage filters are discussed in para. ~~5.35 – 5.36.~~5.38-5.39	Wrong reference	X			
107.	UK16	5.29	Last stage filters are used to protect the public and the environment and are normally located close to the location at which discharges to the environment occur. Last stage filters are discussed in para. **5.38 – 5.39**.	Incorrect reference to subsequent paragraphs for last stage filters.	X			
108.	GER017	5.30	To prevent the propagation of a fire through the ventilation ducts and to maintain the integrity of firewalls, ventilation systems should be equipped with fire and hot smoke dampers, ~~unless the likelihood of a fire spreading is considered to be acceptably low.~~	We suggest "fire and HOT SMOKE" dampers, as this is where fire dampers are typically at least qualified to protect against (triggered by temperature). It could also be "fire and smoke" if it is wanted to protect against spread of cold smoke by fire dampers triggered by smoke detectors. Part of the text is deleted, as this can not be agreed on, because a ventilation duct through a fire wall MUST be equipped with a	X			

				fire damper, otherwise it is no fire wall anymore. Exeptions can be allowed e.g. when the ventilation duct itself is protecterd against fire.				
109.	HUN10	5.33	Requirements on the design of MOX fuel fabrications facilities to ensure radiation protection are established in Requirement 8 of SSR-4 [1].	Typo: established instead of stablished	X			
110.	RUS14	*5.33 Protection of personnel*	*Protection of workers*	In the case of the radiological or other harmful impact, the term **workers** should be used instead of **personnel** in compliance with SSR-4 (e.g Requirement 34).	X			
111.	JPN05	5.33.	Requirements on the design of MOX fuel fabrications facilities to ensure radiation protection are established in Requirement 8 of SSR-4 [1].	Typo.	X			
112.	GER018	5.36	Gloveboxes, fume hoods, or filtered ventilation systems ~~The dynamic containment system, along with the usage of personal protective equipment, is~~ should be used to minimize the radiation exposure of personnel and their exposure to hazardous material that could become airborne and so could be inhaled. In addition, personal protective equipment should be used to avoid contamination and incorporation of radioactive materials and other hazardous material of workers, if protection	From occupational health and safety point of view, personal protective equipment is less effective and introduces additional burdens to the workers. Therefore, priority to technical solutions should be expressed in this paragraph. The use of personal protective equipment should be balanced with the hazard potential, possible technical solutions and burdens for the workers caused by wearing personal protective equipment.	X			

			cannot be achieved by technical solutions only.					
113.	FR12	5.37	The use of protective respiratory equipment for normal operation should be reserved only for a complementary mean of protection in addition to existing barriers	Avoiding the repetition of "use" : "the use of .. should used as …'	X			
114.	FIN011	5.38 before 5.38	5.xx. The design should provide for the minimization of releases to environment during normal operation by application of best available technology.	Is SSG-6 5.29 not relevant here?	X			
115.	UK06	5.38	The uncontrolled dispersion of radioactive substances to the environment as a result of an accident can occur if multiple containment barriers are impaired. Barriers that may provide environmental protection comprise the room and the building itself. The provision of multiple redundant filters in parallel should be considered for the final stage of filtration before discharge through a stack. Filtration, including final stage filtration, also provides means of minimising the release of radioactive particulates to the environment under normal operational conditions, typically reducing aerial discharges to very low levels.	The text should be retained to reflect that aerial discharges under normal operation through last stage filters reduces discharges to very low levels.	X			
116.	UK07	5.39	The design of a MOX fuel fabrication facility should include measures for assuring the performance of filtration claimed in	Wording broadened to include other aspects of their performance, whilst still	X			

			the facility safety analysis, particularly the last stage filters. Provisions to assure the performance of filtration may include testing the particulate removal efficiency (such as aerosol challenge testing), differential pressure measurement and alpha-in-ductwork monitoring. The design should make provision to monitor the environment around the facility, and to identify breaches of the containment barriers.	specifically referring to removal efficiency.				
117.	FIN012	5.44	MOX fuel fabrication facilities, like all industrial facilities, have to be designed to control fire hazards to protect workers, the public and the environment. Fire in MOX …	The first sentence was not removed from SSG-6 5.36. It is proposed to remove it from there or put it back here in SSG-7, the relevance is the same for both facilities.	X			
118.	GER019	5.44	Fire in MOX fuel fabrication facilities may lead to the dispersion of radioactive material by breaching the containment barriers or may cause a criticality accident by affecting the system or the parameters used for the control of criticality (e.g. the moderation control system or the dimensions of processing equipment). Special consideration shall be given to the fire-fighting media deployed, and its potential moderation effect.	Specification.		X “shall” replaced with “should”		
119.	FIN013	5.46		Apparently, incineration areas do not exist in MOX facilities, since this was not removed from SSG-6, 5.38 (f))	X			

120.	GER020	5.48	The estimation of the likelihood of fires can be used as a basis for making decisions or for identifying 19 weaknesses that might otherwise go undetected. Even if the estimated likelihood of fire may seem low, a fire might have significant consequences for safety, and thus certain protective measures should be undertaken, such as delineating small ***fire areas*** <u>by qualified fire barriers</u>, to prevent fires or prevent the fire from spreading.	Using of term should be discussed. In this document "fire area" and "fire zone" are being used. SSG-64 uses "fire compartment" and "fire cell". Which term is correct?	X The terminology was harmonized			
121.	GER021	5.49 After 5.49	Fire prevention, detection and mitigation (subtitle)	As it is mentioined in para. 5.50 fire prevention is most important. Therefore this para. should be put before the para. on fire hazards. Inbetween there should be a new para. that requires a fire protection concept.			X	We believe the chronology is correct, it starts with Hazard description, then analysis and in the end the measures are addressed.
122.	RUS17	5.49	The analysis of fire hazards should also involve a review of the provisions made at the design stage for preventing, detecting, fighting and mitigating fires.			X We agree but this whole section is about facility design against fire hazards		
123.	CAN15	5.51	minimize the ~~risk~~**probability** of a large fire	The text discusses fire as a trigger, not the total risk.	X			
124.	CAN16	5.52	with account taken of the ~~risk of~~**potential for** criticality	The risk (including consequences) is not covered. Note the difference to 5.53: “with the risks **from** internal fires and explosions”	X			

125.	FIN014	5.52	Fire extinguishing devices, automatically or …	In addition, add a reference to SSR-4 like in SSG-6, 5.44, if relevant.	X			
126.	FR13	5.52	*Last sentence:* Extinguishing gas ~~other than CO_2~~ may be used in the event of a fire breaking out in a glovebox. **The possible use of CO_2 should be considered in the criticality safety assessment.**	Rewording to be consistent with 8.74 which don't exclude the use of CO_2 but ask to consider the impact on the criticality risk.	X			
127.	GER022	5.52	Extinguishing devices, automatically or manually operated, with the use of an adequate extinguishing material should be installed in areas where a fire is possible and where the consequences of a fire could lead to the dispersion of plutonium contamination outside the first static barrier. <u>Fire-fighting media should be considered also based on their neutron moderation properties.</u> The installation of automatic devices with water sprays should be avoided for areas where uranium, plutonium and/or mixed oxide may be present, with account taken of the risk of criticality.	Specification		X Covered by 5.47		
128.	FIN015	5.54	… Fire dampers should be mounted in the ventilation system ~~unless the likelihood of widespread fires is acceptably low. The fire dampers should close automatically on receipt of a signal from the fire detection system or by means of temperature sensitive fusible links.~~ Spark arrestors should …	This was removed from SSG-7, 5.54, but not from SSG-6 5.45. Should it be kept in or removed from both? Or is this specific for uranium plants but not for MOX plants?	X			

129.	GER023	5.56	In MOX fuel fabrication facilities, the use of hydrogen in the sintering furnaces is a potential cause of an explosion. Hydrogen should be diluted with an inert gas (e.g. argon) before it enters the sintering furnace to reduce the likelihood of a hydrogen explosion. The supply of the premixed gas should be automatically stopped when the concentration of hydrogen in the quality controlled premixed gas exceeds a limit. The composition of the premixed gas should be permanently monitored during operation.	Permanent monitoring of the composition of the premixed gas is an important issue	X			
130.	FR14	5.58	The concentration of oxygen within gloveboxes presenting a risk of explosion should be monitored.	Being more precise regarding the kind of gloveboxes. This recommendation is not necessary for wastes gloveboxes	X			
131.	JPN06	5.58.	The concentration of oxygen within gloveboxes filled with inert gas should be monitored.	Clarification. If the inside of the glovebox has an air atomosphere, there is no need to monitor the oxygen concentration in it. Conditions for monitoring oxygen concentration should be specified.	X			
132.	FIN016	5.59	in the conditions for neutron moderation.		X			
133.	FR15	5.59	Flooding in a MOX fuel fabrication facility may lead to the dispersion of radioactive material and to changes in the conditions for moderation **and/or reflection.**	Flooding may affect both moderation and reflection conditions (+ Consistency with SSG-5.)	X			

134.	FIN017	5.61		Harmonise with SSG-6, 5.51	X			
135.	FIN018	5.63		Just evaluated, no measures or actions to minimise or prevent? Or ensuring its acceptability? The result of the evaluation could be that the risk for the steam explosion is high or damage large!	X			
136.	GER024	5.63	The amount of liquid present in a MOX fuel fabrication facility is limited. Water is used for cooling sintering furnaces and during pellet grinding. Possible steam explosions resulting from water entry due to a potential leak in the cooling system should be evaluated.	Additional process step requiring amound of liquid.	X			
137.	JPN07	5.65 after 5.65	5.65A. The surfaces of floors and walls should be chosen to facilitate their cleaning. This will also facilitate the minimization of waste from decommissioning.	To keep a consistency with para 5.56 in DS517B.	X			
138.	FIN019	5.66 before 5.66/subtitl e		The title in SSG-6 is "Loss of services" while SSG-7 uses "Loss of support systems". Choose one and use it consistently, or are the two facilities so different that the different subtitles are justified?	X			
139.	FIN020	5.66		Number these as in SSG-6, 5.57. Also use same order and wording in the two standards as far as possible!	X			
140.	GER025	5.66	To fulfil the requirement established in requirements 49 and 50, and para. 6.89 of SSR-4 [1],	There are cases when power supply must be uninter-ruptible		X The title "emergency"		

			electric power supplies and other support systems in a MOX fuel fabrication facilities should be of high integrity. In the event of loss of normal power and depending on the status of the facility, an emergency power supply, uninterruptible where necessary, should be provided to certain structures, systems and components important to safety, including the following:			means it needs to be continuous without interruptions		
141.	RUS65	5.66	Add: - systems for ensuring the supply of inert gas to the in-chamber (in-box) volume.	Pyrophoric content of nitride compounds of uranium and plutonium, the ability to self-ignite with loss of inertia of the medium.			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
142.	FIN024	5.68 after 5.68	The flow and pressure of process gases should be controlled continuously. In the event of deviations in the flow or pressure, shutdown and/or lock up sequences should start automatically.	SSG-6 has paragraph 5.60. Is this not relevant in a MOX facility?		X It is already addressed in 5.76 d)		
143.	FIN021	5.68 (a)	Criticality due to loss of safe geometry or loss of moderation control	Criticality due to loss of safe geometry or loss of moderation control should also be considered (see SSG-6, 5.59 c)	X			
144.	FIN022	5.68 (b)		Wording in SSG-6 5.59 (d) is clearer if this is what is meant!	X			
145.	FIN023	5.68 (c)		Wording in SSG-6 5.59 (e) is clearer!			X	Different provision
146.	CAN17	5.74	avoid the ~~risk~~**hazard** of breaking a rod	Risk is not appropriate. Hazard may be?	X			

147.	FIN025	5.74		Cross compare between SSG-6 5.62 and SSG-7 5.74 and see where/how they could be harmonised?	X			
148.	FIN026	5.74 after 5.74	Failure due to fatigue or chemical corrosion or lack of mechanical strength should be considered in the design of containment systems for hazardous and/or radioactive material.	SSG-6 has paragraph 5.63. Is this not relevant in a MOX facility?	X			
149.	CAN18	5.75	The ~~risk of~~**potential for** radiolysis	"risk of" is not appropriate. "potential for" should be.	X			
150.	RUS18	5.76 and REFERENCES	The first sentence is proposed to complete by referencing the Safety Guides associated with SSR-1 and include these references into REFERENCES.	Completeness		X Cross reference added, Safety guides mentioned in Section 4		
151.	FR16	5.77	(e) The effect on criticality safety ~~functions~~ **controls,** such as geometry, moderation, **poisoning** and/or interaction**,** of the following : - Deformation […] - Displacement […] - Loss of material […] **- Ingress of moderating material** (moderation control)	1. "controls" is the dedicated term and used elsewhere in the document 2. "poisoning" was cited in 2 of 3 examples but nut mentioned in the introductory text 3. "moderation" was mentioned in the introductory text, but didn't appear in any of the examples	X			
152.	FIN027	5.77 (e)		number the dashed items i), ii) and iii) as in SSG-6, but keep them on separate lines for clarity			**X**	This is done by technical editors to be consistent with other safety standards.

153.	JPN08	5.77. (c)	To ensure that the design provides the required degree of robustness, a detailed seismic assessment (see SSR-1 [12] and IAEA Safety Standards Series No. SSG-9, Seismic Hazards in Site Evaluation for Nuclear Installations [14]) should be made of the MOX fuel fabrication facility design, including the following seismically induced events: a) Loss of cooling; b) Loss of support services, including utilities; c) Loss of ~~containment~~ confinement functions (static and dynamic);	To keep a consistency with para 5.65 in DS517B as “confinement”.	X			
154.	GER026	5.78	Design basis earthquakes should not impair the function of control rooms. Supplementary control rooms or emergency control panels should be accessible and operable by staff after ~~a~~ an earthquake exceeding the design basis ~~earthquake~~. [...]“	Clarification Perhaps applicable to DS517A and DS517B as well	X			
155.	JPN09	5.78.	~~Supplementary control rooms or emergency control panels should be accessible and operable by staff after a design basis earthquake.~~ Equipment required to maintain the MOX fuel fabrication facility in a safe and stable state and to monitor the facility and environment should be tested (as far as practicable) and qualified using appropriate conservative methodologies,	Supplementary control rooms or emergency control panel are not stated in SSR-4 and those are actually not exist in MOX fuel facility as well as uranium fuel facility.			X	We agree there is no explicit requirement and therefore it is as a recommendation here. The basis for the recommendation may be found in para 6.184 of SSR-4.

			including the use of an earthquake simulation platform.					
156.	GER027	5.83 Line 2	… The design of buildings and ventilation systems should be in compliance with specific national regulations relating to hazards from tornadoes. If pertinent national regulations do not exist, the design should adhere to international good practices.“	Clarification Perhaps applicable to DS517A and DS517B as well	X			
157.	RUS19	5.83 Extreme weather conditions	Extreme meteorological conditions	In compliance with SSR-4		X 'Meteorological phenomena' as in SSR-4		
158.	GER028	5.87 Line 2	.. Snow and ice are generally taken into account as an additional load on the roofs of buildings. The neutron reflecting effect, or the interspersed moderation effect of the snow should be considered if relevant. In addition to increasing roof loads, snow and ice might also impaire the ventillation system and electrical equipment outside buildings.	Clarification Perhaps applicable to DS517A and DS517B as well	X			
159.	CAN19	5.88	structures, systems and components important to safety ~~at risk of~~ **when vulnerable to** damage	Vulnerable seems to be the intended term, not risk.	X			
160.	FIN028	5.88		extreme rainfall is twice	X			
161.	GER029	5.88	For any flood events such as extreme rainfall in the catchment basin of a river (for inland site), storm surge (coastal site), extreme	Clarification Perhaps applicable to DS517A and DS517B as well		X Modified in line with comment FIN028		

			local rainfall, attention should be focused on …					
162.	ISR03	5.88	"*extreme rainfall*"...is mentioned twice	Just typos…:	X			
163.	RUS20	5.93	Instrumentation should be provided for measuring all the main parameters whose variation may affect the safety of processes (such as pressure, temperature and flowrate). In addition, instrumentation should be provided, for monitoring general conditions at the facility (such as criticality safety related parameters, parameters of radiation monitoring, *individual dosimetric monitoring of external and internal exposure of workers*, releases of effluents and ventilation conditions), and for obtaining any other information about the facility necessary for its reliable and safe operation (such as presence of personnel and environmental conditions).		X			
164.	FIN029	5.96	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~~. The need for and location of control rooms and panels in different areas should be evaluated taking into account occupational exposure,	SSG-6 states (5.82) "… The need for and location of control rooms and panels in different areas should be evaluated taking into account occupational exposure, safety of personnel and emergency response. … " The emergency response would be important also for MOX facility, so why different wording and content?	X			

			safety of personnel and emergency response. 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. …					
165.	CAN07	5.97	change the title of (1) as follows: I&C relating to criticality control and criticality detection and alarm:	The first bullet of (1) has nothing to deal with criticality detection and alarm (the current title of (1)).	X			
166.	GER030	5.97	….. (6) Control of liquid discharges. — MOX fuel fabrication facilities with dry fabrication process have low volumes of liquid discharges that can usually be monitored for control purposes by sampling and analysis and by measuring the volumes of discharges. …..	Clarification	X			
167.	UK08	5.97	(6) Control of liquid discharges. — MOX fuel fabrication facilities have low volumes of liquid discharges that can usually be monitored for control purposes by sampling and analysis and by measuring the volume of discharged effluent. Special arrangements should be made for effluents from laboratories, which can differ from site to site.	The statement "Liquid discharges should be measured continuously", should be removed, as it will depend on the operation of the facility. Most nuclear facilities discharge liquid effluent on a batch basis, for which representative sampling and analysis tends to be the optimized approach. Suggested removal of reference to the continual measurement of liquid discharges and keeping the original wording for this section. Detection and alarm systems are not usually provided on liquid releases in the UK to identify	X			

				abnormal releases. This tends to be performed by the assessment of batch discharges.				
168.	FR17	5.97 (1)	Remove the first bullet of (1) : - ~~Depending on the method of criticality control, the control parameters relating to para. II.24 of Appendix II of Ref. [1] should usually include mass, density, moisture content, isotopic content~~composition~~, fissile content, moderation and reflection of additives, and spacing between items~~	This bullet has nothing to deal with Criticality detection and alarm I&C		X The text modified in line with other comments.		
169.	FIN030	5.97 (1) , first dashed item		Has this some relation to I&C, i.e. is there a requirement or something, why is this here?	X The text modified in line with other comments.			
170.	FIN032	5.97 (2)		SSG-6,5.83 (3) has a few more bullets e.g. "Indicating temperatures, pressures, flow rates, concentrations of chemicals and/or radioactive material, tank levels, cylinder weights. " Is this not relevant for MOx facility?	X			
171.	RUS21	5.97 (5)	Control of occupational radiation exposure. - External exposure. *Direct-reading* dosimeters with real-time displays and/or alarms should be used to monitor occupational radiation doses, in particular in areas in		X			

			which inspection equipment such as X ray equipment and radioactive sources are located. Portable equipment and installed equipment should be used to monitor whole body exposures and exposures of the hands to gamma radiation and neutron emissions. - Internal exposure. Owing to the specific hazards of airborne plutonium, the following provisions should be considered: • Continuous air monitors to detect plutonium should be installed as close as possible to the working areas to ensure the early detection of any dispersion of plutonium. • Continuous air sampling devices should be installed in the breathing zone of personnel for the retrospective assessment of doses due to internal exposure. • Devices for detecting alpha surface contamination should be installed close to the working areas and also close at least to the exits of rooms in which working areas are located. • Devices for detecting and assessment of eye lens doses should be installed where appropriate *(assessment of eye lens doses can also be performed by calculation methods)*.					
172.	FR18	5.97 (9)	"Fire detection and suppression ~~extinguishing~~ systems …"	Replace extinguishing with suppression : this is the term used until now in the document.	X			

173.	FIN033	5.97 (9), (10) and (11)		Position and wording like in SSG-6, 5.83 would be clearer!	X			
174.	FIN031	5.97 before (2)		Is there no need for fire detection I&C in a MOX facility? (s**ee SSG-6 5.83 (2)**.) Seems to be , but they should be located here as in SSG-6, not in different order!	X			
175.	FR19	5.100 (f)	“The criticality mass limit, ~~and~~ the actual mass of fissile material **and the monitoring thresholds** in a glovebox should be visible to the operator.”	The monitoring thresholds are also concerned.	X			
176.	FIN034	5.100 a)		layout of the dashed items. Clearer if they are on separate lines	X			
177.	CAN20	5.101	minimize ~~risks of~~ **the potential for** glove damage;	Risk is not an appropriate term.	X			
178.	FR20	5.101	In the design and operation of gloveboxes, the following specific considerations should be taken into account: a) In the design of equipment ~~inside gloveboxes~~, account should be taken of the potential for conventional industrial hazards that may **result in injuries** to personnel~~workers~~, including internal radiation exposure through cuts in the gloves and/or wounds on the operator’s skin, and/or the possible failure of confinement; b) Ease of physical access to gloveboxes and adequate space and good visibility in the areas in which gloveboxes are located;	Suppression of b) and reattaching “that may result in” with the rest of the sentence “injuries ..”	X			

179.	GER031	5.101	In the design and operation gloveboxes, the following specific considerations should be taken into account: a) In the design of equipment, account should be taken of the potential for conventional industrial hazards that may result in injuries~~-~~ ~~b) juries~~ to personnel, including internal radiation exposure through cuts in the gloves and/or wounds on the operator's skin, and/or the possible failure of confinement;	Merging of a) and b) because of wording	X			
180.	FIN035	5.101 a) and b)		something is broken here!	X			
181.	JPN10	5.101.b)	b) injuries to personnel including internal radiation exposure through cuts in the gloves and/or wounds on the operator's skin, and/or the possible failure of confinement;	Typo.	X			
182.	RUS22	5.102.	The second sentence should be redefined because there is no requirement established in GSR Part 4 which requires that "all credible postulated initiating events shall be assessed".	Consistency with GSR Part 4	X			
183.	FIN036	5.105		Why different numbering between SSG-6, 5.89 and SSG-7, 5.105, and why so different wording? Please harmonise	X			
184.	UK09	5.109	Guidance on prospective radiological assessment for public doses is given in GSG-10.	Reference to GSG-10 added and the consideration to be given to		X		

			Calculations of estimated public doses should be made on the basis of maximum estimated releases of radioactive material to the air and to water, maximum depositions to the ground and direct exposure. Conservative models and parameters should be used to calculate the estimated doses to the public in the initial stages of design, with consideration given to further refinement as appropriate.	the need to refine the assessment.		GSG-10 ref not provided as this is a bullet list.		
185.	FIN037	5.113 after 5.113		Are paragraphs like or similar to SSG-6 5.93 and 5.94 not relevant for MOX facilities?		X MOX plants are more complex and the range of methods is wider than for simpler facilities as in SSG-6. More general provision is therefore provided.		
186.	RUS23	5.113.	Propose to specify the "supporting Safety Guides".	Clarification and completeness			X	We believe this is not needed, supporting safety guides for GSR Part 4 could be easily identified. This is a general introductory provision providing

								reference to the framework safety standard.
187.	HUN02	5.118	“subcriticality” instead of “sub-criticality”	it should be one word like in the rest of the guide	X			
188.	RUS24	5.119	It is proposed to move the para to the beginning of the section “Safety analysis” as general information related to safety analysis as a whole.	Logic and coherence of the document		X The whole section was re-arranged		
189.	RUS25	5.125	Ref. [18] doesn’t contain recommendations how to evaluate the toxic exposure. Proposed to specify references on evaluation toxic exposure explicitly.	Clarification and completeness	X The reference was corrected			
190.	FIN038	5.126 and 5.127		SSG-7 has here a few paragraphs that SSG-6 doesn’t (5.126 & 5.127) concerning emergency preparedness and response. Wrong place in SSG-7 or not relevant for SSG-6?	X			
191.	ISR05	5.127	We would like to suggest to modify the original phrasing (taken from paragraph 4.111 of SSG-7): "… *selected scenarios for* **beyond design basis accidents** *(or the equivalent)*…" so as **not** to use the combination: **beyond** <u>design basis accidents</u> for situations far <u>more severe than design basis accidents</u>. "Beyond design basis accident", referring to an accident condition plant state term has not to be used, since it was replaced by **design extension conditions** (as appearing in the 2018 edition of Safety	<u>Remark</u>: Indeed, so it is appropriately done in the parallel sections of DS517A (paragraphs 5.104, 5.105) and DS517B (paragraphs 5.94, 5.95) where the word <u>*beyond*</u> is not used in conjunction with design basis and instead <u>*more severe*</u> is used.		X The text among SSGs was harmonized, EPR is to cover both design extension and beyond design basis accidents.		

			Glossary, and for example in SSR-4).					
192.	GER032	5.127 Line 4	… The conditions under which an off-site emergency is required to be declared for a facility should include criticality accidents (if a dose assessment for members of the public in case of a postulated criticality shows this is necessary), widespread fires and earthquakes.	Clarification. Dose assessment for members of public; off-site emergency not mandatory in case of criticality accidents dependent on consequence analysis (dose criteria)			X Criticality accident are never postulate. These are analysed but cannot be postulate. See also SSG-27.	
193.	UK17	5.128	Predisposal Management of Radioactive Waste [**18**] with additional guidance provided in the IAEA Safety Standards Series No. GSG-3, The Safety Case and Safety Assessment for the Predisposal Management of Radioactive Waste [**19**], IAEA Safety Standards Series No. GSG-1, Classification of Radioactive Waste [**20**], IAEA Safety Standards Series No. SSG-41, Predisposal Management of Radioactive Waste from Nuclear Fuel Cycle Facilities [**21**] and IAEA Safety Standards Series No. GS-G-3.3, The Management System for the Processing, Handling and Storage of Radioactive 42 Waste [**22**].	The reference numbers do not align with those in the Reference list	X			

194.	FIN039	5.128 /1		Why different wording between SSG-6 5.17 and SSG-7 5.128 when referring to other IEAE standards and guides?	X			
195.	RUS66	5.129	Supplement in relation to SNOOP: - exclude the use of combustible filter materials; eliminate gorenje gorenje layer of oxidized particles on the filter elements (can be done by timely replacement of the filter elements before the accumulation of a layer of particles that can spread the combustion); - clean the boxes and equipment in an inert atmosphere; - turnovers and waste (cleaning material, sealing elements, etc.) should be collected in a metal sealed container, stored in an inert atmosphere.	The risk of settling and accumulation of fine fraction of uranium and plutonium nitrides on the filter elements. The ability to self-ignite nitride compounds of uranium and plutonium in the air atmosphere.			X	
196.	UK10	5.129	(a) Generation of waste. — The waste generated in a MOX fuel fabrication facility is mainly solid waste. A record keeping system should be implemented to ensure the proper identification, traceability and documentation of the radioactive waste generated. Estimates of quantities and types of waste arisings should be made. — It is possible to reduce waste from gloveboxes by reducing the number of items that need to be imported into gloveboxes and the design should consider this.	The quantification of waste arisings is key to understanding the capability needed to manage wastes. It is key for the generation of waste to include reference to reducing waste by reducing the introduction of items into gloveboxes. The original wording should be retained, with the word 'material' revised to 'items', to limit any confusion with 'nuclear material' and to clarify that items introduced	X			

			- Optimized disposal routes should be identified and any design features that are required to enable these to be used should be included, particularly design features that allow for waste acceptance criteria to be met. — It is possible that segregation of wastes with different properties (including different levels of radioactivity) may be possible at some stages of the process and should be considered to facilitate disposal by optimized routes. For example, removal of uncontaminated outer packaging for disposal separate to plutonium contaminated inner packaging.	become waste when they are no longer needed. Specific aspects of relevance to solid waste added.				
197.	UK11	5.129	(c) Collection of waste […] — For the assessment and management of waste contaminated with plutonium, provision should be made for a central waste management area. In this central area, waste should be monitored for its plutonium content and may be treated and placed in containers for interim storage. Consideration should be given to ensuring that there is sufficient capacity within the waste management area to handle expected arisings.	Adding learning from existing facilities on ensuring adequate capacity in the waste management area. Suggest adding that the purpose of such an area is to enable optimized management of waste and so it should be informed by a detailed understanding of the waste process (see comment against Para. 5.131 below).	X			

198.	RUS26	5.129 (b)	Removal of waste. - Waste should be first bagged in the glovebox and then removed from the glovebox using bagging ports in which a bag is attached to the glovebox and the waste is inserted and then removed after sealing to maintain confinement. The size of the port should be such as to accommodate the expected waste, which may include equipment that has been replaced. - Filters from the gloveboxes and the ventilation system should have engineered features (e.g. containers). - *Spent first stage aerosol filters should be recycled to return nuclear materials to production.*	Decrease volume of RW, nonproliferation of NM.	X			
199.	CAN21	5.129(c)	reduce the ~~risk of~~**potential for** dropping bags of waste.	Risk is not an appropriate term.	X			
200.	UK12	5.131	During the design phase, arrangements covering how wastes will arise, be managed and disposed of over entire lifecycle of the facility should be established. These arrangements should detail how the impact of such waste is optimised such that it is reduced to as low as reasonably achievable (ALARA).	To emphasise that the waste process should be a key part of the design phase and should result in a detailed plan as to how unavoidable wastes will be managed including by sorting, segregation and characterisation to enable reuse, recycling or disposal in a timely and optimized (ALARA) manner.		X This is already covered by Requirement 24 of SSR-4 and following paras		
201.	GER033	5.132	MOX fuel fabrication facilities, which use dry processes, ~~and~~ generate dust, and the effluent discharges from MOX fuel	Clarification	X			

			fabrication facilities should be reduced by filtration, which normally consists of a number of high efficiency particulate air (HEPA) filters in series.					
202.	RUS29	5.132	MOX fuel fabrication facilities use dry processes *and liquid phase processes*. The effluent discharges from MOX fuel fabrication facilities should be reduced by filtration, which normally consists of a number of high efficiency particulate air (*e.g.* HEPA) filters in series. *Discharges from MOX fuel fabrication plants should be reduced by solution purification (sorption, extraction and other methods).*	Clarification		X The wording modified in line with GER033 comment		
203.	GER034	5.133	Customer specifications on fuel characteristics that have implications for safety in the design and operation of MOX fuel fabrication facilities (e.g. criticality, shielding, thermal effects) should be taken into account at an early stage in the design of the facility and equipment, especially the specifications for the plutonium content <u>and anticipated or conservatively bounding isotopic vector</u> as input and the specifications for MOX fuel assemblies as output.	Specification	X			
204.	GER035	5.134	Radiation protection <u>and</u> shielding	Clarification	X			

		Headline before 5.135							
205.	GER036	5.135 Line 3	… UO2 from reprocessing may also contain residual fission products and 232U with its decay products that give rise to beta and gamma radiation.	Specification; 232U itself poses no increased radiation protection challenges.	X				
206.	GER037	5.145	For cases where misidentification of containers could impose hazard, provisions for easy identification of the content should be used~~, if possible~~ (for example unique colors, shapes, valves).	Provisions for easy identification should be possible in any case	X				
207.	FR21	5.146	Technical provisions for inspection and maintenance of containers classified as items important to safety should be available.	Some containers are not items important to safety.	X				
208.	FIN040	5.149		Different wording in SSG-6 5.122 and SSG-7 5.149 for the same thing, except SSG-7 misses the reference to SSR-4.	X				
209.	FIN041	5.151 after 5.151	5.xxx Effectiveness of the ageing management programme should be reviewed and assessed periodically.	Is this not needed for periodic assessment in MOX facility (see SSG-6: 5.125.)	X				
210.	RUS67	6 Section 6	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.	
211.	FIN042	6.2, 6.3 and 6.4		Can paragraphs 6.2-6.4 in SSG-6 and paragraphs 6.2-6.4 in SSG-7 somehow be harmonised? Are there requirements that are in one but are missing from the		X We believe the two are harmonized as far as			

				other though relevant for or applicable to it?		applicable. The differences are caused by the different levels of hazards associated with the two types of the facilities.		
212.	RUS68	7 Section 7	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
213.	ISR04	7.2		The first phase (inactive–cold processing) of the main three phases of commissioning, points out the need for availability of sufficient operating personnel for qualification of this phase and training of the personnel in the operation procedures (including maintenance, safety requirements and emergency procedures). Although it is obvious, we suggest to refer shortly to these points of personnel qualification and training, also regarding the next two phases of the commissioning (Uranium commissioning and Plutonium-hot processing commissioning), or in common for all three phases of the commissioning. Remark: In the parallel paragraphs 7.2 of the	X			

				commissioning sections in DS517A and DS517B the commissioning is divided into ("only") two main phases (inactive-cold and active-hot), and there is no mentioning of personnel qualification and training in any of these phases of the commissioning.				
214.	FIN043	7.2 (2)	This should include: (i) check~~sing~~ for airborne radioactive material; (ii) smear checks on surfaces; and (iii) check~~sing~~ for aerial and liquid discharges~~. U~~ and (iv) checks for the unexpected accumulations of material ~~should also be checked for~~. At the …	why not have these as items in SSG-6 7.2 (2) SSG-6 uses gaseous discharges and releases of liquids;	X			
215.	JPN11	7.2.	For a MOX fuel fabrication facility, the commissioning should be divided into three main phases: inactive or ‘cold processing’ commissioning, ~~active~~ uranium ~~or ‘hot uranium’~~ commissioning, and ~~active~~ plutonium or ‘hot processing’ commissioning: ***(1) Inactive or ‘cold processing’ commissioning*** ***(2) Uranium commissioning*** Plutonium or ‘hot processing’ commissioning	To keep a consistency with the titles in followed sub-bullets (1), (2) and (3).		X Harmonized with SSR-4		
216.	FIN044	7.4		This would be better right after 7.2, since it refers to "this third phase". Also, the order of current 7.3 and 7.5 are different from their order in SSG-6.	X			

				Moreover, is there no need for minimising contamination and testing processes for removal of material, like in 7.3 in SSG-6?				
217.	GER038	7.6	Where possible, lessons learnt from the commissioning and operation of similar MOX fuel fabrication facilities should be sought out and applied.	Clarification in order to put in accordance with text in general	X			
218.	UK13	7.7 New Para. 7.7	During commissioning, features claimed in the safety analysis for the safe management of radioactive waste and effluents should be commissioned using appropriate procedures.	Making the need to commission features claimed in the safety analysis explicit.		X "All processes and equipment associated with the operation of a MOX fuel fabrication facility (as for example waste management processes) should be commissioned using appropriate procedures during the facility commissioning. The purpose is to demonstrate that these processes operate as		

						demonstrated in the safety analysis.”		
219.	RUS40	8 Chapter 8	Indicate that the procedure specification should be documented and performed strictly in accordance with Quality Management System (QMS). Measurement procedure and checking operation methods should be metrologically certified.	Clarification				
220.	RUS69	8 Section 8	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
221.	GER039	8.2	~~Much of the processing performed in a MOX fuel fabrication facility is done automatically, which helps to reduce occupational exposures due to plutonium and MOX. However, some processes relating to glovebox operations involve manual intervention.~~	We propose to delete 8.2 as it includes no safety-related benefit		X Harmonized with SSG-6		
222.	FR22	8.6	Personnel should be provided periodically with basic training or safety instructions in criticality and radiation safety and emphasis should be made on protection from radiation exposure, criticality control and	Being informed of safety instructions is also a means of keeping or spreading skills		X We fully agree and in our opinion safety instructions is one form of the training so this is included in		

			emergency preparedness and response.			the existing text.		
223.	CAN22	8.7	The safety risks ~~and hazards~~ for operators,	The term risk includes the concept of hazards,	X			
224.	HUN11	8.8	The training of all levels of management should be considered	Wording: „The need for training all levels of management should be considered.” The „need for” is unnecessary.	X			
225.	GER040	8.10	For manual activities, training should include, but not be limited to, the following: … d) Procedures for ~~breaching~~ passing barriers, self-monitoring and the use of personal protective equipment;	If for example the entering into hot zones is meant, then passing would be more adequate.	X			
226.	FIN045	8.12 after 8.12	~~FACILITY OPERATION~~ OPERATIONAL DOCUMENTATION	SSG-6 uses the title Operational documentation while SSG-7 uses Facility operation. Choose one and use the same in both documents!	X			
227.	JPN12	8.13 Before 8.13. (sub-title)	~~FACILITY OPERATION~~ OPERATIONAL DOCUMENTATION	Better to use the same subtitle used in DS517C as DS517B.	X			
228.	GER041	8.17	Examples of limits on operating parameters for safe operation (SSR-4 [1], para. 9.31) for a MOX fuel fabrication facility are: a) The allowed ranges of the isotopic composition of PuO_2 and the content of 241 Am especially at, but not limited to, the plutonium receipt stage;	Please add for clarification	X			

229.	RUS31	8.17.	Examples of limits on operating parameters for safe operation (SSR-4 [1], para. 9.31) for a MOX fuel fabrication facility are: a) The allowed ranges of the isotopic composition of PuO2 and the content of 241Am especially at the plutonium receipt stage; b) The maximum PuO2 content allowed for the different steps in the process; c) The maximum specific heat loads; d) The maximum allowed throughputs and inventories for the facility; e) The maximum quantities of additives allowed at different steps in the process; f) The maximum quantities of liquid moderator allowed at different steps in the process; g) The maximum concentration of hydrogen allowed in the atmosphere of sintering furnaces; h) The maximum concentrations of oxygen and moisture in gloveboxes. *(i) Maximum allowed loss rates of nuclear materials.*	Determining the loss rates of nuclear materials is one of the parameters for safe operation.	X			
230.	JPN13	8.18.	Examples of administrative controls for safe operation (SSR-4 [1], para. 9.36) for a MOX fuel fabrication facility are: — Minimum staffing on shift; — Availability of specific expertise (criticality expert, radiation	Move to an appropriate place. .	X			

			<u>protection expert, etc.) </u>at all times when the facility is in production<s> (criticality expert, radiation protection expert, etc.)</s>; — Minimum and maximum number of persons working in a glovebox.					
231.	GER042	8.20	In a MOX fuel fabrication facility, the safe operational state of the process attained after any anticipated operational occurrence is often the shutdown state. However, some systems, such as the criticality <s>accident</s> <u>detection and</u> alarm system, radiation detection and alarm system, the ventilation system used for confinement, should continue to operate.	Clarification	X			
232.	RUS32	8.23	Procedures should be developed for planned outages of production needed for activities such as inventory checking, maintenance, *cleaning equipment from fissile materials* and other operational needs. These procedures should specify systems for ensuring fissile materials are returned to their safe locations. The duration of scheduled activities and relevant compensatory measures should be specified in the procedures.		X			
233.	FR23	8.25	Maintenance activities in a MOX fuel fabrication facility should be pre-authorised on the basis of the safety report or a safety assessment	Introducing the fact that some maintenance activities are described and analysed in the	X			

				safety report during the design stage.				
234.	FIN046	8.25/1	All maintenance activities in a MOX fuel	(See SSG-6 8.14)	X			
235.	FIN047	8.27		add reference to SSG-27 as in SSG-6 8.15, if relevant to MOX plant.	X			
236.	GER043	8.28	…. d) Safety precautions for work, e.g. specification of safety precautions, ensuring the availability of fully functional personal protective equipment and ensuring its use, and emergency response procedures;	Specification; not only availability but also the proper condition of protective equipment is crucial.	X			
237.	FIN048	8.30	8.xx Compliance of the operational performance of the ventilation system with the fire protection requirements (see para. 5.xx) should be verified on a regular basis.	This was not removed from SSG-6 (8.22). Is this only relevant for uranium plants and not for MOX-plants?	X			
238.	FIN049	8.32	… qualified and experienced persons should carry out inspections. Particular consideration should be given to fatigue affecting equipment and to the ageing of structures.	The last sentence was not removed from SSG-6 (8.23). Is this only relevant for uranium plants and not for MOX-plants?		X Removed also from SSG-6		
239.	GER044	8.32	A programme of periodic inspections of the facility should be established, whose purpose is to verify that the facility is operating in accordance with the operational limits and conditions. Suitably qualified and experienced persons should carry out these inspections.	Clarification	X			

240.	FR24	8.33	Places in the process line, identified by the operating organization as those with potential for accumulation of ~~uranium~~ **plutonium** compounds, should be periodically inspected.	Plutonium would be a bigger concern than uranium	X			
241.	RUS33	8.33	Places in the process line, identified by the operating organization as those with potential for accumulation of *fissile material* compounds, should be periodically inspected.			X Uranium and plutonium		
242.	JPN14	8.33.	Places in the process line, identified by the operating organization as those with potential for accumulation of <u>plutonium and/or</u> uranium compounds, should be periodically inspected.	Completeness. Plutonium should be treated here.	X			
243.	FIN050	8.35	The aging management programme should consider the technical as well as the non-technical aspects of ageing and its effectiveness should be regularly assessed and reviewed (see also para. 5.124).	Is there no need for assessing its effectiveness like in SSG-6 8.26?	X			
244.	GER045	8.37	The management system for a MOX fuel fabrication facility should include a standard process for all modifications (see para. 3.~~15~~<u>16</u>).	3.16 seems to be the right paragraph.	X			
245.	ISR03	8.37	Referring in DS517B and DS517C should be to paragraph 3.16 (not 3.15)		X			
246.	ISR04	8.37	Referring in DS517B and DS517C should be to paragraph 3.16 (not 3.15)		X			

247.	RUS30	8.41 Subsection "CONTROL OF MODIFICATION"	The subsection should be supplemented by referencing to relevant requirements of SSR-4.	Completeness and compliance with SSR-4	X			
248.	FR25	8.41 & 8.42	8.41. 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). 8.42. Procedures for the control of documentation and training should be put in place to ensure documents are changed within a reasonable time period following the modification and that, where necessary and as specified in the modification control form: — Training has been given and assessed. — Documentation has been changed before the modification is commissioned. — All changes in the remaining documentation and training requirements are completed within a reasonable extended period following the modification	Redundancy between 8.41 and 8.42	X			
249.	FIN051	8.44	… Therefore, changes to the facility or its documentation should be reviewed, assessed and endorsed	The beginning of this sentence is simpler and clearer here in SSG-7. However, having the security aspect in a separate sentence like	X			

			from the safety perspective before approval and implementation. In addition, the interface with security should be evaluated to verify that they do not compromise each other.	in SSG-6 would make it even more clear.				
250.	RUS37	8.48 (a)	Prevention of unexpected changes in conditions that could increase the risk of a criticality accident; for example, unplanned accumulation of uranium compounds (e.g. in ventilation ducting), inadvertent precipitation of material containing uranium in storage vessels or loss of neutron absorbers;	«Anticipation» is not enough for safety.	X			
251.	GER046	8.48 new issue	Operational aspects of the control of criticality hazards in MOX fuel fabrication facilities should include: The double contingency principle (single failure criterion) should be applied where appropriate and possible.	The double contingency principle should be applied			X	We agree the double contingency principle needs to be applied. It is already a requirement so cannot be repeated as a 'should' statement. And it is related more to the Design rather than Operation.
252.	CAN23	8.48(a)	conditions that could increase the ~~risk~~ probability of a criticality accident	Risk does not appear to be the intention here. Loss of reflection/shielding may increase the risk of a accident but reduces the probability.	X			
253.	FR26	8.50	*Last sentence:* Special care including the effect of **interspersed** moderation ~~by the human body~~ should be taken to ensure the proper spacing of vessels	Unnecessary focus on "human body". Any kind of hydrogenated material is of importance. Preferred use of		X (including by a human body)		

			or installation parts that may contain enriched material.	"interspersed moderation" as elsewhere in SSGs. Human body could be used as an example, among others, of hydrogenated "materials" (it's the way it's done in other SSGs).				
254.	JPN15	8.50.	Criticality hazards may be encountered when carrying out maintenance work. Waste and residues arising from decontamination and maintenance activities should be collected in containers with a favourable geometry approved for the work and should be stored in dedicated criticality safe areas. Maintenance instructions and procedures for equipment that possibly contain fissile material should be reviewed and approved by criticality safety staff before the work starts. Special care including the effect of moderation by the human body should be taken to ensure the proper spacing of vessels or installation parts that may contain ~~enriched~~ fissile material.	Use an appropriate wording.	X			
255.	CAN08	8.51	Change [27] to [24]	GSG-7 reference is [24]	X			
256.	FIN052	8.51		Why the different wording between SSG-6 8.40 and SSG-7 8.51 when referring to other standards	X			
257.	RUS34	8.52	Proposed to insert before para 8.56 as being relevant to monitoring aspects	Logic	X			

258.	FIN053	8.54		"members of " was removed in SSG-7 8.54 but not in SSG-6 8.41. Consistency both within this document and the two is needed.	X			
259.	GER047	8.54	In a MOX fuel fabrication facility, the main radiological hazard for both the personnel and the public is from the inhalation <u>and incorporation</u> of airborne PuO_2 or MOX powder.	Incorporation is also an important issue.			X	Incorporation is not a main radiological hazards in this context. UO_2 and U_3O_8 are practical insoluble in water and in most of the common chemicals. This is the reason why the biological half-live is very long. The powdery solid Uranyl fluoride (UO_2F_2) is very well soluble in water and has a short biological half-live.
260.	RUS35	8.55	For MOX fuel fabrication facilities, in normal operation, the main characteristic that needs to be taken into account in the development of measures for radiation protection is that the dose rate from beta and gamma radiation and neutron emission in the operational state is relatively low. It is required to put in place emergency arrangements for criticality incidents, which are		X			

			the only events in which a high dose rate would be encountered.					
261.	UK14	8.57	The risks of exposure of members of the public should be minimized by ensuring that, as far as reasonably practicable, radioactive material is kept away and/or removed from ventilation exhaust gases to prevent its entrainment in the effluent waste stream and subsequent discharge to the atmosphere.	Clarification added to wording to make clear the intent of keeping materials away from ventilation exhaust gases.	X			
262.	FIN054	8.58	The monitoring results from the radiation protection programme should be compared with the operational limits and conditions, and corrective actions shall be taken if necessary.	Is there really no need for corrective measures if needed? (see SSG-6 8.44)	X			
263.	GER048	8.59	The doses caused by plutonium ~~are dependent on the proportion of ^{238}Pu and ^{241}Pu (^{238}Pu-238 has a short half-life and ^{241}Pu-241 decays to ^{241}Am). This~~ should be controlled by integrity of the first containment barrier, which should be monitored close to the workplace of the operator, by means of continuous air-sampling and routine monitoring for surface contamination.	We propose to delete this explanatory statement as it is trivial	X			
264.	RUS36	8.59	Proposed to insert after para 8.55 as being relevant to doses	Logic	X			
265.	CAN24	8.60(k)	increases the ~~risk of~~**potential for** causing contamination	”potential for” appears to be better.	X			

266.	RUS28		It is proposed to consider the internal exposure of personnel not only as a result of inhalation intake, but also as a wound intake of radioactive substances through damaged skin.		X See 8.64 n)			
267.	FR27	8.68	Although most of the processes in a MOX fuel fabrication facility are automated, there are some actions that require manual work in gloveboxes. Owing to the proximity of the hands of operators to PuO2 when work in gloveboxes is being carried out, the hands are more susceptible to exposure than other parts of the body., The dose to the hands should therefore be monitored (by extremity dosimetry) together, when necessary, with doses to eye lens.	According to the work place, estimation of eyes doses may prove what monitoring eye lens is not necessary	X			
268.	FIN055	8.71		Fire is twice: (c) and (f)? Is there a reason for this?	X			
269.	CAN09	8.72	Update reference [18]	It seems that Reference [18] is not the correct reference.	X			
270.	RUS38	8.72	Does Ref. [18] contain the acceptable levels of occupational exposure for various chemical hazards?		X			
271.	JPN16	8.72.	The occupational exposure to chemical hazards should be assessed similarly to the assessing of radiation doses and should be based upon the collection of data from air sampling in the workplace, in combination with personnel occupancy data. This method	Reference 18, GSR Part 5 “Predisposal Management of Radioactive Waste”, is not appropriate.	X			

			should be assessed and reviewed as appropriate by the regulatory body. The acceptable levels of occupational exposure for various chemical hazards in a fuel fabrication facility can be found in Ref. ~~[18~~XX~~]~~.					
272.	CAN25	8.74	except where it may cause a criticality ~~risk~~**hazard**	"Hazard" appears to be better,	X			
273.	GER049	8.84	Gaseous radioactive discharges should be treated, where appropriate, by means of HEPA filters or equivalent (see para. ~~5.125~~ 5.132).	Wrong reference	X			
274.	UK18	8.84	Gaseous radioactive discharges should be treated, where appropriate, by means of HEPA filters or equivalent (see para. 5.125). Performance standards should be set that specify performance levels at which filters or scrubber media are to be changed, including filter age. After filter changes, tests should be carried out to ensure that new filters are correctly seated and yield a removal efficiency as used in the safety analyses. A suitable storage and quality control regime should be maintained for new filters.	There is an incorrect paragraph reference here. Importance of filter age is now recognised. Analyses clarified to 'safety analyses' for consistency with earlier section. Quality control of new filters is recognised as important.	X			
275.	FIN056	8.85 after 8.85	8.xx Quality control regimes should be applied to the treatment and disposal of waste from all streams to ensure compliance with authorizations for disposal.	Is there no need for quality control regimes as in SSG-6 8.67?	X			

276.	GER050	8.85	~~One easy way to minimize the generation of solid radioactive waste is to remove as much outer packing as possible before material is transferred to controlled areas. Processes such as incineration, metal melting and compaction may also be used to reduce the volume of waste, but such processes are beyond the scope of this publication.~~ As far as reasonably practicable, and in accordance with national regulations, waste material should be treated to allow its further use. Cleaning methods should be adopted at the facility that minimize the generation of waste.	We propose to delete this statement as it depends on the waste management strategy chosen, and is beyond the scope of this SSG.			X	The wording was changed and represents guidance only. This principle is applicable to any waste strategy.
277.	CAN10	8.86	Change [19] to [26]. Double check all references as it seems some are incorrect.	GSR part 7 is reference [26]	X			
278.	UK15	8.86 New Para. @ 8.86	Throughout operations, the facility should maintain awareness of waste disposal route developments and periodically assess whether new optimised disposal routes have become available. The facility should use robust arrangements and assurance processes to ensure adequate waste characterisation and to ensure that the waste acceptance criteria of receiving disposal sites are met.	To ensure that waste disposal routes are optimised.		X Optimisation of disposal is out of the scope of this Safety Guide, acceptance criteria were incorporated in line with other comments.		
279.	FIN057	8.86/3		different wording than in SSG-6 8.68	X			

280.	GER051	8.92.	The programme for the feedback of operational experience at ~~uranium~~ MOX 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 worldwide and other relevant non-nuclear accidents. It should also include the evaluation of trends in operational disturbances, trends in malfunctions, near misses and other incidents that have occurred at the ~~research reactor~~ uranium fuel fabrication facilities and, as far as applicable, at other nuclear installations.	The Safety Guide is about MOX fuel fabrication facilities. Mistake in using “research reactors” here	X			
281.	RUS70	9 Section 9	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
282.	CAN11	9.3	Add: “is controlled by geometry **or moderation or poisoning. Care should also be taken for possible changes in the fissile material form.**”	Decommissioning activities have an impact not only on geometry. Removal of an absorber, addition of a moderator, etc. may also arise and lead to a criticality risk.	X			
283.	CAN26	9.3	when handling equipment containing nuclear material **for** which **subcriticality** ~~criticality safety~~ is controlled by geometry	Subcriticality is appropriate; criticality safety is not.	X			
284.	HUN12	9.3 whole para	Special measures should be implemented during the preparatory works for decommissioning to	Cleaner wording.		X		

			ensure that criticality control is maintained by geometry when handling equipment containing nuclear material, , wherever it is a criteria.			Modified in line with other comments.		
285.	FIN058	9.4		Is there really no need for site characterisation like in SSG-6 9.4 (b) or risk assessment 9.4 (c)? Harmonise this paragraph with SSG-6 9.4 as far as possible.	X			
286.	JPN17	9.4	9.4. In addition to the general preparations for decommissioning described in the IAEA Safety Standards Series No. SSG-47, Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities [31] the following preparatory steps specific to Uranium and Plutonium Mixed Oxide fuel fabrication facilities should be performed: a) During the transition period between the shutdown and decommissioning, post-operational cleanout to remove all bulk amounts of PuO2 and MOX powder in gloveboxes in order to reduce the residual inventory of plutonium should be performed. The plutonium inventory should be determined on the basis of accounting data for nuclear material.	To match the expressions of similar items described in para 9.3 in SSG-5 and in para 9.4 in SSG-6.	X			

287.	JPN18	9.4	b) Any grounds (surface and subsurface), groundwater, parts of buildings and equipment contaminated with radioactive material or chemical material and their levels of contamination should be identified by means of comprehensive site characterization.	To add items that are described in 9.3(c) in SSG-5 and in 9.4(b) in SSG-6 and should also be described in SSG-7.	X			
288.	GER052	9.6 (c)	The radioactive waste anticipated remains compatible with available (or planned) interim storage or storage capacities and disposal considering its transport and treatment.	According to IAEA Safety Glossary 2018 “storage”, using of solely “interim” might not be fully appropriate.	X			
289.	RUS71	10 Section 10	In the text of the section, after" MOX", add "SNOOP".	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also explanation in comment RUS52.
290.	JPN19	Annex II, P.72	Degradation of neutron absorber (due to heating of ~~reprocessed~~ plutonium)	Editorial.	X			
291.	RUS27	Annex III Process Area – Ventilation System	*Additional control parameter for operational limits and conditions should be included: “The amount of accumulation of radioactive and fissile materials on the first stage filters”. Safety functions – (1), (3).*	Prevention of criticality, protection from external radiation.	X			
292.	RUS72	Appendix 1	Supplement Annex I with schemes for SNOOP fuel	Extension of the document to mixed nitride uranium-plutonium fuel			X	Nitride fuels are out of the scope of this Safety Guide. See also

								explanation in comment RUS52.