

TITLE
DS381 SG Safety of Nuclear Fuel Cycle R&D Facilities - 2014

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 1					
Country/Organization: All		Date: 2014					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
EC01	General	Different font should be used for third and fourth level headings. On p. 22 there is a heading Fire prevention, detection and mitigation that clearly should be a subsection for Fire and explosion. Same with subsections for Extreme weather conditions (pp. 29-30). Further, in the table of contents, after Internal initiating events, all headings before External initiating events should be at 4th level. And similarly for headings after External initiating events (before I&C).	Clarity of the text	Yes			
FR.N01	General		Considering the revision of NS-R-5 (DS478), it would be preferable to delay MS consultation so that future guidance and requirements are made consistent	No		Yes	These particular SSG (DS360 and DS381) are the first of kind and fill significant gaps in the standards.
JP.W01	.039 - 4.126/	...in Ref. [1]. <u>Detailed guidance on predisposal management of radioactive</u>	Consistency between Safety Guides on nuclear fuel cycle	Yes	See also US.N09 and		

	After 1st text p ,	<u>waste is set out in other relevant Safety Guide.[X]</u> [X] DS447	facilities and on predisposal management of radioactive waste from these facilities.		DE.WN38		
EC04	4.108, 1st bullet point	Possible effects on safety of human errors (with account taken of ease of intervention by the operator and tolerance of human error);	"Unauthorized human actions" gives an impression of solely active human errors (errors of commission). Errors of omission should also be covered. Thus the use of a more general expression is suggested.	Yes			
DE.WN68	001 - Ref. []	“... Safety of <u>Nuclear Fuel Cycle Facilities: Safety Requirements, Safety Standards Series No. NS-R-5 (Rev. 1), IAEA, Vienna (2008) and Appendix V (2014)”</u>	Citation of the correct title of NS-R-5. Revision 1 of NS-R-5 has just been published (May 2014) and contains Appendix V which is specific for R&D facilities.	Yes	3		
KR.RNW 12	001 - Ref. []	INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Fuel Cycle Facilities: Safety Requirements, <u>IAEA Safety Standards Series No. NS-R-5 (Rev. 1), IAEA, Vienna (2008)</u> and Appendix V (2014).	For keeping constancy with format of references in IAEA documents	Yes, as above			
JP.W02	002 - 7.60/	Add following text to after the first text ; General requirements on predisposal management of radioactive waste are provided in Ref [14].	Requirements on radioactive waste generation, characterization and classification, management system and others are provided in GSR Part5.	Yes	And added Ref. [21] also. See DE.WN57		
JP.W03	003 - 7.64/	...according to the proper safety management system [21]. [21] GS-G-3.3	Management system specific to processing, handling and storage of	Yes			

			radioactive waste is provided in GS-G-3.3.				
JP.W04	003 - 8.1/	Either the decommissioning work should fall inside the existing safety case <u>decommissioning plan</u> or be subject to an appropriate modification before the decommissioning begins.	Consistency with DS450 (GSR Part6)	Yes			
FR.N02	Chapter 03	Delete 3.4 to 3.8	Chapter 3 (site evaluation) should be limited to NS-R-3 and associated guides (SSG-9, SSG-18, NS-G-3.1...) and, especially, DS433 gives detailed recommendations on this topic.	Paras 3.4, 3.5, 3.6 and 3.8 deleted	Replaced by a reference to NS-R-3 and relevant SSGs if the R&D is actually a pilot for a facility of a specific type		Para 3.7 retained as reviewed by NSGC. See German comment #17 and US.N07
DE.WN69	Ref. [3]	“... Occupational Radiation Protection: Safety Guide, Safety Standards Series No. RS-G-1.1, IAEA, Vienna (1999)”	Insert year of publication to be coherent with other references.		3		
FR.N03	Chapter 05	Delete 5.2 to 5.7	Chapter 5 (Construction) should be further reduced considering SSG-38			No	SSG-38 is not on the IAEA website yet, so cannot be referenced
DE.WN07	Ref. [6]	“... Decommissioning of Nuclear Fuel Cycle Facilities, Safety Standards Series No. WS-G-2.4, IAEA, Vienna (2001)”	Insert year of publication to be coherent with other references.	Yes	3		
KR.RNW 11	Chapter 08 - Contents Section	8. PREPARATION FOR DECOMMISSIONING <u>8. Decommissioning</u>	The title of Section 8 should be replaced with “Decommissioning” as already used in SSG-5, SSG-6 and SSG-7, since preparation of	No			We have deliberately changed the title of the chapter in order to distinguish it from other IAEA guides produced by NSRW

			decommissioning is just a part of issues to be addressed in Section 8.				and referenced.
EC07	Chapter 08	References to WS-R-5. WS-G-5.2, WS-G-5.1 on decommissioning, safety assessment and site release are proposed to be added	Clarity of the text		Quotation and reference to WS-R-5 added.		“sideways” references to other guidance omitted unless especially relevant.
DE.WN01	01.001 -	1 st sentence: “... supplements the Safety Requirements publication on Safety of <u>Nuclear</u> Fuel Cycle Facilities NS-R-5 ...”	To be in line with the correct title of NS-R-5.	Yes	3		
DE.WN02	01.007 -	1 st sentence: “The safety requirements common to the whole range of <u>nuclear</u> fuel cycle facilities ...”	The term ‘nuclear fuel cycle’ is more precise and more common than ‘fuel cycle’.	Yes	3		
DE.WN04	01.008 -	2 nd sentence: “It specifically deals with the safe design, construction, <u>commissioning</u> , operation and decommissioning of R&D facilities.”	Commissioning is a major stage in the lifetime of a nuclear installation, too. The commissioning of a fuel cycle R&D facility is addressed in Section 6 of this Safety Guide.	Yes	2		
DE.WN03	01.008 -	1 st sentence: “This publication applies to the facilities defined in <u>paragraph</u> 1.2 with the exception of ...” 3 rd sentence: “This guide is limited to the safety of the R&D facility, <u>the protection of</u> its workers and the public around it.”	For completeness. Wording.	Yes Yes	3		
KR.RNW	01.008 -	This guide is limited to the safety of	For clarification of the	No	We do not		

01		the R&D facility, <u>itself and the protection of its workers, the public, and the environment</u> around it.	scope of the Safety Guide dealing with both the safety of facility and the protection of workers, the public and the environment from harmful impact of ionizing radiation		usually add “itself” to the safety of anything in our standards, it is usually taken as obvious.		
DE.WN05	01.009 -	<p>“Full recommendations on meeting the requirements for the management system and for the verification of safety <u>established in Ref. [8]</u> are provided in Ref. [9]. The implementation of other s Safety requirements such as those on the legal and governmental framework and regulatory supervision (e.g. requirements for the authorization process, regulatory inspection and regulatory enforcement) are established in Ref. [10], and those on the management system and the verification of safety (e.g. requirements for the management system and for safety culture) are established in Ref. [8].”</p>	<p>The statements on References [8] and [9] can be merged into the first sentence because they deal with the same subject (management system).</p> <p>GSR Part 1 establishes the safety requirements on the governmental, legal and regulatory framework for safety. Their implementation, however, is not part of that document. Regarding Ref. [10], please note that the Safety Requirements GS-R-1 (published in 2000) were superseded by GSR Part 1 (published in 2010). The draft document should refer to the valid IAEA Safety Standards Series publications.</p>	Yes, good suggestion	2		
DE.WN06	01.010 -	<p>“Safety recommendations and requirements related to R&D facility Case 2 can also be found in the IAEA safety guides related to the <u>corresponding similar</u> types of</p>	Safety requirements are not provided in IAEA Safety Guide publications.	Yes	2		

		<u>commercial nuclear</u> fuel cycle facilities, ...”					
DE.WN07	01.012 -	1 st sentence: “This document contains guidance specific to <u>nuclear</u> F fuel C cycle R&D facilities.” Last sentence: “Reference should-be <u>is</u> made to the referenced documents and other IAEA standards for requirements and guidance on generic topics (such as <u>safety assessment</u> , radioactive wastes <u>management, decommissioning</u> or security) that are not specific to Fuel Cycle R&D facilities, ...”	Editorial. Wording.	Yes Yes	3		
JP.N02	01.012 -	This Safety Guide covers all the important stages in the lifecycle of a R&D facility, including site evaluation, design, construction, commissioning, operation, and decommissioning.	Editorial This Guide covers all stages in the life cycle of a R&D facility..	Yes			
DE.WN08	01.013 -	Note: The last sentence “Annex III provides examples of operating limits and conditions (OLCs) for R&D facilities.” refers to an Annex which is not part of the current draft document.	Missing information.	Yes	1, Annex III Added		
KR.RNW 02	01.013 -	<i>(Comments)</i> <i>Annex III addressed in Para. 1.18 cannot be found in DS381. Please provide appropriate Annex on examples of operating limits and conditions (OLCs) for R&D facilities.</i>		Yes	Annex III Added		
DE.WN71	010 - Ref.	“... Legal and Governmental	Please note that the Safety	Yes			

	[]	Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety <u>Governmental, Legal and Regulatory Framework for Safety</u> , IAEA Safety Standards Series No. GS-R-1 <u>GSR Part 1</u> , IAEA, Vienna (2000) (2010)”	Requirements GS-R-1 have been replaced and superseded by the General Safety Requirements Part 1. The draft document should refer to the valid IAEA Safety Standards Series publications.				
DE.WN72	014 - Ref. []	“... Predisposal Management of Radioactive Waste, General Safety Requirements Part 5, Safety Standards Series No. GS-R <u>GSR</u> Part 5, IAEA, Vienna (2009)”	Editorial.				
KR.RNW 13	014 - Ref. []	... Safety Standards Series No. GS-R <u>GSR</u> Part 5 ...	For keeping constancy with format of references in IAEA documents	Yes			
DE.WN09	02.002 -	<p>“In R&D facilities a great variety of materials can be handled and processed, such as fissile, radioactive or toxic materials. The factors affecting the safety of R&D facilities include the following: ...”</p> <p>1st bullet: “The radiological consequences caused by the release of radioactive materials under accident conditions can be <u>significant</u> high. While the radio-toxicity <u>radiotoxicity</u> of uranium is relatively low, this is not the case for plutonium or other radionuclides; and thus the expected radiological consequences following potential accidents can be significant.”</p>	<p>The text proposed to be deleted is very similar to the first sentence in Para 2.1. If considered necessary, Para 2.1 could be modified correspondingly.</p> <p>Streamlining of text in order to avoid unnecessary repetitions. The text proposed to be deleted at the end is very similar to the first sentence in this bullet.</p>	Yes Yes	3		
DE.WN10	02.002 -	2 nd bullet: “Furthermore, fissile materials have the potential to achieve criticality	The present wording suggests that the list of		1		

		<p>under certain conditions. The subcriticality of a system depends on many parameters relating to the fissile material, including its mass, concentration, geometry, volume, enrichment and density. Criticality is also affected by the mass, geometry of the material and the existence of a reflecting/moderating environment presence of other materials, such as moderators, reflectors and absorbers.”</p>	<p>parameters affecting criticality is exhaustive. However, this is not the case (see e.g. Para 6.46 of NS-R-5). The proposed new text is taken from Para 1.3 of the Safety Guide SSG-27 “Criticality Safety in the Handling of Fissile Material”. Depending from the type of the R&D facility, several of the parameters mentioned at the left could be relevant for the achievement of criticality.</p>	Yes				
DE.WN11	02.007 -	<p>1st sentence: “When deactivating or reactivating parts of an existing R&D facility’s nuclear facilities or equipment, the safety assessment of these existing facilities this facility should be reviewed and updated ...”</p>	<p>Streamlining of text without loss of information.</p>	Mostly	3	Used “the facility” in preference to “this facility”.		
DE.WN12	02.008 -	<p>“According to paragraph 3.9 (e) of Ref. [2], an An environmental impact assessment of an existing R&D facility should be prepared according to Ref. [13] using actual, historical monitoring data so far as practicable carried out by the operating organization as part of the licensing documentation for the R&D facility. The prospective assessment for radiological environmental impacts should be commensurate with the magnitude of the possible radiation risks arising from the R&D facility.”</p>	<p>Misleading reference. The methodology of environmental impact assessment (EIA) is not addressed in the Safety Requirements NS-R-3, but in the Draft Safety Guide DS427 “Assessment of Facilities and Activities for Protection of the Public and Protection of the Environment”. The corresponding requirement for an EIA is established in</p>	Mostly	1	Used “licensing process” in preference to “licensing documentation”.		

			GSR Part 3. Note that an EIA is to be conducted prior to authorization of the facility.				
DE.WN13	02.024 -	“ The safety of existing R&D facilities should be <u>assessed and the facilities, if necessary, be</u> modified to meet current (or updated) safety standards as far as reasonably achievable. <u>As an alternative, or provide</u> equivalent compensatory measures <u>should be provided.</u> ”	Not all existing R&D facilities may have a need for such modification.	Yes	2		
DE.WN14	02.025 -	“In a R&D facility, <u>the use of</u> remote handling <u>operations should be considered</u> normally be used to reduce occupational exposures from radioactive materials and to ensure safe operations, especially in experiments using highly toxic or radioactive materials.”	The need to use remote handling depends on the activities to be performed. The proposed wording is consistent with Paras 4.21 and 4.133 (a).	Yes	2		
DE.WN15	03.001 -	1 st sentence: “Ref. [13] establishes generic requirements for the safety evaluation of sites ...”	Editorial.	Yes	3		
DE.WN16	03.003 -	Missing paragraph in the document.	Editorial.	Yes	3		
DE.WN17	03.007 -	“The siting of the R&D facility should allow the implementation of physical security measures in accordance with <u>the guidance provided in the IAEA Nuclear Security Series publications, Guidance</u> Ref. [17].”	To improve wording.	Yes	3, see FR.N02		
KR.RNW 03	04.001 -	... that provide defense_in_depth ...	For keeping consistency in expression	Yes			
DE.WN18	04.006 -	1 st sentence: “In the context of <u>nuclear</u> fuel cycle facilities, a design basis accident (DBA) or a design basis event	See our related comment on Para 1.7.	Yes	3		

		(DBE) presents a challenge ...”					
KR.RNW 04	04.007 -	<i>(Comments)</i> <i>Please check whether Para. 4.1 outlines any radiological hazards as addressed in Para 4.7 saying “...In addition with the radiological hazards outlined in paragraph 4.1 above...”.</i>		Yes	Now refers to Para. 4.6 instead		
DE.WN19	04.008 -	“Some of the events listed in paragraph 4.4 4.7 may occur as a consequence of a postulated initiating event (PIE) ...”	Wrong para is cited.	Yes	2, Same as KR.RNW05		
KR.RNW 05	04.008 -	<i>(Comments)</i> <i>Please check whether Para. 4.4 lists any events as addressed in Para 4.8 saying “...Some of the events listed in paragraph 4.4 may occur...”.</i>		Yes	Same as DE.WN19		
DE.WN20	04.010 -	2 nd sentence: “In addition, R&D facilities corresponding to a type of <u>commercial nuclear</u> fuel cycle facility should fulfil the requirements specific to this facility type ...”	Wording adjusted to Paras 1.10 and 7.67 (see our related comment on these Paras).	Yes	3 Inserted “nuclear”. Word “commercial” will not apply if the facility is not run for profit.		
DE.WN21	04.012 -	1 st sentence: “The criticality <u>safety</u> analysis should demonstrate that the design of equipment is such that the values of control parameters are always maintained in the subcritical range.” 2 nd sentence:	To be consistent with the terminology used in the Safety Guide SSG-27 “Criticality Safety in the Handling of Fissile Material”. Editorial.	Yes Yes	3		

		“This is should be achieved ...”					
DE.WN22	04.013 -	1 st sentence: “A number of methods can be used to perform criticality <u>safety</u> analysis, e.g. the use of experimental data, reference books or recognized standards, ...”	To be consistent with the terminology used in the Safety Guide SSG-27 “Criticality Safety in the Handling of Fissile Material”.	Yes	3		
JP.N01	04.039 - 2.15 4.29	Dynamic <u>containment</u> confinement system The design of static <u>containment</u> confinement ... The dynamic <u>containment</u> confinement system should ...	Editorial Paragraph V.7 in Appendix V of NS-R-5 states “Containment shall be provided by two complementary containment systems — static (e.g. physical barriers) and dynamic (e.g. ventilation).”	Yes to all 3			
DE.WN24	04.043 -	Last sentence: “... the ventilation components that scrub s or filter gases before discharge through a stack ...”	Grammar.	Yes	3		
DE.WN23	04.044 - 4.43	Note: The subsection “ <i>Environmental protection</i> ” (Paras 4.43 to 4.44) should be moved after the current Para 4.47.	The subsections “ <i>Protection of the workers from contamination and internal exposure</i> ” (Paras 4.38 to 4.42) and “ <i>Protection against external radiation exposure</i> ” (Paras 4.45 to 4.47) are closely related to each other because they both deal with radiological effects within the boundaries of the facility and should therefore be dealt with consecutively.	Yes	3		

KR.RNW 06	04.049 -	<i>Fire and explosion</i>	Guidance on explosion is given separately in Paras. 4.56-4.58.				
KR.RNW 07	04.050 -	<u>Fire hazard analysis</u> 4.50. The fire hazard analysis... <i>Fire prevention, detection and mitigation</i> 4.53. Analysis of fire hazards should also include a review of the provisions made for preventing, detecting and fighting fires. <u>Fire prevention, detection and mitigation</u> 4.54. Prevention is the most important ...	Adding appropriate title for Paras. 4.50-4.53 on fire hazard analysis to keep consistency with similar documents such as SSG-7; Para 4.53 is not a guidance for “Fire prevention, detection and mitigation” but for “Fire hazard analysis”.	Yes Yes, subtitle moved			
DE.WN25	04.061 -	“In R&D facilities where there are vessels and/or pipes with moderating fluids such as water, or where fissile materials are stored, the criticality <u>safety</u> analyses should consider ...”	To be consistent with the terminology used in the Safety Guide SSG-27 “Criticality Safety in the Handling of Fissile Material”.	Yes	3		
DE.WN26	04.067 -	Regarding the 2 nd sentence “In the event of loss of normal power (see Section 2) and depending on the status of the R&D facility, ...” there is no interface with Section 2, neither in DS381 nor in NS-R-5 which is cited in the preceding sentence.	Misleading linkage ?	Yes, we agree this is misleading and have removed the link	3, this was probably a reference to the existing infrastructure and the need to plan for contingencies, in section 2		
KR.RNW 08	04.072 -	<i>(Comments)</i> <i>Para. 4.72 recommends design and provision of ventilation system as a cooling system to remove decay heat. However the ventilation</i>		Noted and the wording changed to	Other potential functions of the ventilation systems should be considered,		

		<i>system is not usually used for cooling but for occupational radiation protection and dynamic confinement of radioactive material. Please check the correct function of ventilation system at R&D facilities.</i>		provide better explanation. See right.	such as the maintenance of cooling to prevent operator heat stress or the control of humidity in materials handling. These can have an indirect effect on the safety of operations.		
DE.WN27	04.072 - 4.71	Note: To make this subsection more descriptive, the initiating events that may lead to a loss of decay heat removal should be elaborated in more detail, as done in other subsections dealing with postulated initiating events.	The subsection “ <i>Loss of decay heat removal</i> ” (Paras 4.71 to 4.72) does not really address postulated initiating events but describes general safety aspects and corresponding design provisions with regard to heat sources.	Yes	1, these two paragraphs have been re-written.		
DE.WN28	04.074 -	2 nd sentence: “Dropped loads are also listed as possible postulated initiating events in Annex I of Ref. [1] and their possible consequences should be minimized.”	Wording.	Yes	3 Dropped loads are included as postulated initiating events in Annex I...		
DE.WN29	04.099 -	1 st sentence: “Instrumentation should be provided to monitor facility parameters and systems over their respective ranges for: ... (3) design basis accidents; and	Consistency with the terminology used in Footnote No. 2 to Para 4.125 (see also our related	Yes	2		

		(4) extended design <u>extension</u> conditions, ...”	comment on this Footnote).				
DE.WN30	04.104 -	Bullet (c): “ <u>Paragraph 9.60 of</u> Ref. [1] contains requirements for fire safety controls in a R&D facility, see paragraph 9.60. ...” Bullets (b), (d), (e) and (f): Please replace „Monitor” by „Monitoring” in each headline.	To avoid possible misunderstanding that Para 9.60 of DS381 instead of NS-R-5 is referred to. Wording.	Yes	3		
DE.WN31	04.104 -	Bullet (f): “The liquid discharges of R&D facilities <u>should be appropriately monitored and controlled. This can be done</u> are usually monitored and controlled by sampling and analysis; and measuring the volume of discharge.”	This bullet should rather provide recommendations and guidance than only describe the common operational practice.	Yes	2		
DE.WN32	04.109 -	1 st sentence: “The design of a R&D facility (both at plant and experimental equipment level) to take into account human factors is a specialist area.”	The insertion in brackets is superfluous.	Yes, bracketed text moved	3	“This guidance applies to the experiments as well as the facility that houses them, in accordance with the graded approach.” Added to para 1.2	
DE.WN33	04.110 - a	“... including internal radiation exposure through cuts in the gloves and/or wounds on the operator’s skin and/or possible the possible failure of confinement;”	Editorial.	Yes	3	The other “possible” deleted	

DE.WN34	04.118 -	2 nd sentence: “R&D facility specific, realistic and robust (i.e. conservative) estimations should be made of material toxicity to R&D facility personnel <u>should be made</u> .”	Wording.	Yes	3		
DE.WN35	04.122 - b	“Identification of workers and members of the public (i.e. ‘critical-group(s)’ of people <u>representative persons</u> living in the vicinity of the R&D facility) who could possibly be affected by accidents, ...”	According to the definitions in the IAEA Safety Requirements GSR Part 3, the term ‘representative person’ has replaced the term ‘critical group’. As indicated in the ICRP Publication 101, the dose to the representative person is the equivalent of the mean dose in the critical group.	Yes	2		
DE.WN36	04.125 -	1 st sentence: “The operating organization of a R&D facility should develop an emergency plan that takes into account the potential hazards at the facility <u>using a graded approach</u> (plant and experimental), see paragraph 9.62 of Ref. [1].” 3 rd sentence: “The emergency plan and the necessary equipment and provisions should be determined on the basis of selected scenarios for design extension <u>conditions</u> accidents (or the equivalent).”	Clarification. The insertion in brackets is superfluous. A graded approach should be applied for both types of R&D facilities addressed in Para 1.2. Consistency with the terminology used in footnote No. 2 as well as in the IAEA Safety Requirements SSR-2/1. According to the definitions in SSR-2/1, the term ‘design extension conditions’ has superseded the term ‘beyond design basis accidents’.	Yes Yes	2		
KR.RNW	04.125 -	<i>(Inserting a new para.)</i>	For keeping consistency				

09		<u>4.125. The identification of workers and members of the public (the critical group of maximally exposed off-site individuals) who may potentially be affected by an accident should involve a review of descriptions of the facility and demographic information.</u>	with similar documents such as SSG-5, SSG-6 and SSG-7	Yes			
DE.WN37	04.125 - Footnote No. 2 to	<p>“Design extension conditions are used to identify additional accident scenarios to be addressed in the design and to plan practicable provisions for the prevention of such accidents or their mitigation.”</p> <p>Note: In the latest version of DS462 (revision of SSR-2/1) dated March 2014, the following definition of design extension conditions is used for nuclear power plants: “Postulated accident conditions that are not considered for design basis accidents, but that are considered in the design process of the facility in accordance with best estimate methodology, and for which releases of radioactive material are kept within acceptable limits.” In our opinion, this definition is very concise, so why not use it in DS381, too ?</p>	In our opinion, the definition of the term ‘design extension conditions’ provided in DS462 for nuclear power plants can also be assigned to fuel cycle R&D facilities.	Yes, used this definition	2	Yes	No, used second definition below
AR.W01	04.126 -	Add “ <i>At the generation step those</i>		Yes			

	a	<i>waste should be properly characterized in activity concentration of relevant radionuclides and other hazards</i>	To stress not only the relevance of record keeping and also the relevance of characterization at early management steps				
AR.W02	04.126 - c	“For the assessment and the management of radioactive waste; provision should be made for a central waste management area. In this central area, waste should be monitored for <i>activity characterized in activity concentration</i> (and fissile content) and may be treated and placed in containers for interim storage; ...”	To improve understanding.	Yes	Minor wording change		
AR.W03	04.126 - d	“The interim storage of radioactive waste should be performed taking into account the activities concentrations and other hazards of the waste. Measures to guarantee the integrity of the facility and the containers considering low probability events should be taken”	The text proposed should be placed under the “Interim Storage” title It is proposed to remove the former text and place it under e) Treatment	Yes	Minor wording change. See DE.WN40		
DE.WN38	04.126 -	2 nd sentence: “For both economic and environmental reasons, it is preferable <u>required</u> to <u>reduce and/or minimize</u> the quantity of waste generated in R&D facilities. <u>With regard to this issue, further technical guidance is provided in Ref. [4], [5].</u> ”	Clarification. As stated in Para 9.54 of NS-R-5, the facility shall be operated so as to minimize, as far as reasonably practicable, the generation of radioactive waste of all kinds. Technical details are found in TECDOC Series publications No. 1115 and 1130.	Yes	2 Cannot use TecDocs to justify requirements. Additional reference to relevant paras in NS-R-5 provided instead.		See note on TecDocs and requirements and comment US.N09
DE.WN39	04.126 - a	Last sentence: “In fume-hoods, glove boxes and hot	Wording.	No	3	Yes	Changed to “introduced” to

		cells it is possible to reduce waste by reducing the materials imported <u>stored</u> into these installations;”					describe un-needed wastes such as packaging
DE.WN40	04.126 - c	<p>“Collection <u>Processing</u>:</p> <p>... For the assessment and the management of radioactive waste, provision should be made for a central waste management area. In this central area, waste should be monitored for activity (and fissile content) and may be treated and placed in containers for interim storage. <u>Subsequent processing of the radioactive waste outside R&D facilities can include conditioning, immobilization and decontamination before longer term storage. For the processing of waste, preferably such techniques and procedures should be applied that provide waste forms and/or waste packages being in line with the waste acceptance requirements for storage and future disposal (if available);”</u></p>	<p>According to the IAEA Safety Glossary (2007 Edition), the term ‘processing’ includes ‘pre-treatment’, ‘treatment’ and ‘conditioning’.</p> <p>The sentence assigned to bullet d) rather deals with waste processing than with interim storage. Therefore, it should be moved to bullet c) and the heading of c) should be modified correspondingly.</p> <p>In order to avoid, as far as possible, re-conditioning and/or re-packaging measures, it is useful and appropriate to consider requirements related to subsequent storage and disposal during waste processing.</p>	Yes	1 Wording “For the processing of waste, techniques and procedures are preferred that provide waste forms and/or waste packages in line with the available waste acceptance requirements for storage and future disposal” added to the new bullet € Treatment, see AR.W03.		
DE.WN41	04.126 - d	<p>“Interim sStorage:</p> <p>Subsequent treatment outside R&D facilities can include conditioning, immobilization and decontamination before longer term storage.</p> <p><u>Requirement 11 of Ref. [14] states that adequate storage conditions should be foreseen and maintained</u></p>	<p>Bullet d) should address the storage of radioactive waste. Our proposal is provided at the left.</p>	Yes	1. This bullet has been rewritten to combine the suggested concepts with the existing text.		

		<u>with regard to its subsequent management. This includes the provision of suitable measures for inspection, monitoring and retrieval of the waste at the end of the anticipated storage period.”</u>					
DE.WN42	04.128 -	<p>“Monitoring equipment such as:</p> <p>(1) Differential pressure gauges to identify the requirement for filter changes; and</p> <p>(2) Activity or gas concentration measurement devices and discharge flow measuring devices with continuous sampling; <u>and</u></p> <p>(3) Injection and sampling equipment to test filter performance should be installed and used.”</p>	Move the phrase “should be installed and used” at the end of item (3) into a new line since it concludes the introductory statement.	Yes	3, see KR.RNW10		
KR.RNW 10	04.128 -	<p>4.149 Monitoring equipment such as <u>the following should be installed and used:</u></p> <ul style="list-style-type: none"> ● Differential pressure gauges to identify the requirement for filter changes; and ● Activity or gas concentration measurement devices and discharge flow measuring devices with continuous sampling; <u>and</u> ● Injection and sampling equipment to test filter performance, should be installed and used. 	For easy understanding	Yes	See DE.WN42		
DE.WN43	04.133 - a	“Consideration of whether maintenance can be carried <u>out</u> remotely if possible or carried out	Missing word.	Yes	3		

		using personal protective equipment.”					
EC05	041 - p	Decontamination and dismantling (title)	Decommissioning covers both decontamination and dismantling	Yes			
DE.WN66	066 - Annex II p.	Process area “Performing experiments / Equipment” in the table: “Independent double check by SQEP <u>suitably qualified and experienced persons</u> , especially for mass and concentration of fissile materials”	The abbreviation SQEP should be explained here because it is not introduced elsewhere in the document.	Yes	2		
DE.WN67	068 - Annex II p.	Last para: “Definition of exotic materials: – Non-standard fuel-fabrication MO _x or UO ₂ <u>fuel</u> , or new fuel matrix, e.g. carbides, nitrides; – Isotopes with particular constraints for disposal acceptance criteria, e.g. long <u>lived</u> Hfe transuranics, ... – Chemical elements not allowed in <u>radioactive</u> wastes, e.g. graphite”	1 st bullet: The list aims to define exotic nuclear materials (in this case: fuel types), and not processes like non-standard fuel fabrication. 2 nd and 3 rd bullet: Editorial/Wording.	Yes Yes	3		
DE.WN44	07.003 -	1 st sentence: “There are requirements in Paragraphs 4.7 to 4.9 of Ref. [1] and <u>Req. 23</u> of Ref. [11] concerning management responsibilities ...”	Editorial.	Yes	3		
DE.WN45	07.004 -	2 nd sentence: “Subsequent paragraphs in Ref. [1] detail responsibilities for operations, maintenance and change control <u>of modifications</u> .”	Clarification. The term ‘change control’ gives rise to confusion as it could also mean the control of organizational changes which is addressed in Section 9 of NS-R-5 as well. In the	Yes	3		

			context of this Para, however, the term refers to the control of modifications.				
DE.WN46	07.006 -	“The activities performed in a R&D facility can be grouped into two categories: experiments for fundamental research (Case 1) and pilot processing (Case 2). The process routes of these two categories are illustrated in Annex I, Case 1 and Case 2 ”	Clarification.	Yes	2		
DE.WN47	07.014 -	2 nd sentence: “Annex H III gives examples of parameters for both <u>categories: experiments for fundamental research</u> (Case 1) and pilot processing (Case 2), which <u>These examples</u> can be used for defining operating limits and conditions in the various R&D facility areas.”	We assume that this statement refers to Annex III which is mentioned in Para 1.13 but not included in the current draft document (see our related comment on this Para). Wording has been adjusted to be in line with Paras 1.2 and 7.6.		2		
DE.WN48	07.021 -	“An inspection programme for the facility should be established ... to periodically confirm that the R&D facility (plant or experimental) is operating in accordance with prescribed operating limits and conditions.”	The insertion in brackets is superfluous.	Yes	3, generic statement added in Chapter 1.		
DE.WN49	07.023 -	“The safety requirements related to maintenance, calibration, periodic testing and inspection of <u>nuclear</u> fuel cycle facilities are defined in Ref. [1], paras 9.28 to 9.34.”	See our related comment on Para 1.7.	Yes	3		
DE.WN50	07.029 -	1 st sentence: “ <u>As part of the management system,</u> a A standard process for any modification should be applied in a	Clarification. Reference to the corresponding requirement in	Yes	2		

		R&D facility, in accordance with Para 9.35 of Ref. [1] .”	NS-R-5 is recommended.				
DE.WN51	07.032 -	2 nd sentence: “... to ensure that documents <u>are</u> changed and distributed within a reasonable time, ...”	Missing word.	Yes	3		
DE.WN52	07.035 -	1 st bullet: “... e.g., unplanned accumulation of fissile material (e.g. in glove boxes or ventilation ducts) or hydrogenated materials);”	Editorial.	Yes	3		
DE.WN53	07.038 -	“Paras 9.36 and 9.37 of Ref. [1] states “... For all operational states the radiation protection measures should be such as: (a) To ensure ...; (b) To optimize radiation protection.” In a R&D facility, the radiological hazards to both R&D facility personnel workers and members of the public include intakes ... and external exposure.””	The citation of paras 9.36 and 9.37 taken from Ref. [1] ends after the word “protection” in bullet (b). The last sentence is not part of citation.	Yes	2		
DE.WN54	07.039 -	2 nd sentence: “For a R&D facility, account should be taken of its complexity and size, as well as the diversity of inventories and the complexity and size of the R&D facility. ”	Streamlining of text without loss of information.	Yes	3		
DE.WN55	07.051 -	“On the basis of effluent monitoring data, regular estimates of exposure to the “critical group” of population representative person living in the vicinity of the facility should be made.”	See our related comment on Para 4.122 b).	Yes	2, both terms retained		
DE.WN56	07.052 -	“There are dedicated areas in a R&D facility (e.g., pilot processing) where	The insertion in brackets should be deleted because the	Yes	3		

		specific arrangements are required to control external radiation exposure. Typically these will be areas in pilot processing facilities where bulk quantities of radioactive materials and source materials are stored and handled.”	introductory statement may also be valid for R&D facilities in which experiments and fundamental studies are carried out. The following example, however, fits much better to pilot processing facilities.				
DE.WN57	07.060 -	“The requirements related to the management of radioactive waste and effluents during operation are defined in the paragraphs 9.54 to 9.57 of Ref. [1]. In addition, general safety requirements for the predisposal management of radioactive waste are established in Ref. [14]. ”	1 st sentence: Wording/Editorial. 2 nd sentence: In the context of this subsection, GSR Part 5 is an indispensable overarching publication since it establishes requirements on the characterization, classification, processing and storage of radioactive waste. Most of these requirements apply to R&D facilities as well. Therefore, reference to GSR Part 5 is strongly recommended.	Yes Yes	2 See comments to WASSC from Japan #2		
DE.WN58	07.062 -	1 st sentence: “One easy way to <u>reduce and/or minimize the</u> generation of solid radioactive wastes is to minimize packaging before transfer to contamination areas.” 3 rd and 4 th sentence: “According to the national regulations and as far as	Clarification. For completeness. In accordance with IAEA-TECDOC-1130, recycling means reutilization of	Yes Yes	2		

		reasonably practicable, waste material <u>resulting from processing</u> should be recycled or reused, or <u>cleared from regulatory control</u> where possible. Facility cleaning methods should be adopted which <u>reduce and/or</u> minimize waste generation, for instance reuse of washings from clean areas for more contaminated areas.”	materials for the original purpose in their original form or after being treated. Reuse means utilization of valuable materials, tools and equipment for other than original purposes, also with or without treatment.				
DE.WN59	07.063 -	“ <u>As part of the management system, measures for Quality assurance and control regimes</u> should be <u>implemented applied</u> to the <u>processing treatment and disposal</u> of all waste streams to ensure, as far as achievable, compliance with <u>the waste acceptance requirements for the selected or anticipated disposal authorizations</u> option.”	According to the IAEA Safety Glossary (2007 Edition), the term ‘processing’ is more comprehensive and includes ‘pretreatment’, ‘treatment’ and ‘conditioning’. Furthermore, waste disposal is outside the scope of this Safety Guide. Interdependences exist among all steps in the management of radioactive waste, from the generation up to disposal. These interdependences need to be appropriately taken into account. This is also emphasized in Requirement 6 of GSR Part 5. Given that disposal is the final step in the management of radioactive waste that cannot be otherwise recycled, reused, cleared or discharged, the	Yes	1		

			selected or anticipated disposal option also needs to be taken into account when any other upstream radioactive waste management step is being considered.				
DE.WN60	07.063 - after	Please add a new paragraph after 7.63: <u>“Mixing waste streams should be limited to those streams that are radiologically and chemically compatible. If the mixing of chemically different waste streams is considered, the chemical reactions that could occur should be evaluated in order to avoid uncontrolled or unexpected reactions.”</u>	Safety considerations that should be taken into account when mixing different waste streams are worth mentioning in the context of this subsection.	Yes	1		
DE.WN61	07.065 -	“When legacy materials exist without chemical and radiological analyses, reports on the research and development programmes that produced these wastes should be collected or prepared (from historical information, if necessary) and stored, to be used in subsequent safety assessments. <u>Furthermore, any efforts should be made to obtain information and references on legacy materials via the evaluation of previous annual reports and publications or by interviewing former employees.”</u>	Completeness regarding the recommended actions when legacy material is identified.	Yes, with slightly modified wording, and change to preceding paragraph.	2, “Where necessary to fill gaps in historical information, former employees should be interviewed and published scientific and annual reports on legacy materials should be evaluated.”		
DE.WN62	07.067 -	“For R&D facilities belonging to Case 2, an expanded list of hazards is defined in the corresponding	Wording adjusted to Paras 1.10 and 4.10 (see our related	Yes	2, references quoted in		

		chapters of the related FCF IAEA s Safety Guides SSG-5, SSG-6 and SSG-7 related to the corresponding type of commercial nuclear fuel cycle facilities.”	comment on these Paras). For completeness, please insert references to the three Safety Guides mentioned at the left.		standard style.		
DE.WN63	07.070 -	“ Additional guidance on EPP can be found <u>General safety requirements for emergency preparedness and response are established</u> in Ref. [7].”	IAEA Safety Requirements publications do not provide guidance.	Yes	2		
DE.WN64	08.001 -	“ <u>General safety requirements for the decommissioning of facilities are established in GSR Part 6.</u> Decommissioning guidance for <u>nuclear</u> fuel cycle facilities is provided in Ref. [6]. ...”	1 st sentence: In the context of Section 8, GSR Part 6 is an indispensable overarching publication. All requirements therein also apply to R&D facilities. Thus, reference to GSR Part 6 is strongly recommended. 2 nd sentence: See our related comment on Para 1.7.	No	2		GSR Part 6 is not on the IAEA website. A complete set of the references which have been published are now included. See US.N04
EC08	08.002 -	Characterization is proposed to be added as a key step in the preparation for decommissioning. Also the proposals on decommissioning made on DS360 are relevant to this draft.	Completeness and consistency of standards				
DE.WN65	08.004 -	1 st bullet: “... In particular, the amounts of liquids (such as water and chemicals) used for decontamination should be minimized <u>in order</u> to reduce the generation of <u>secondary radioactive waste</u> .”	Wording. For completeness.		3		

		3 rd bullet: “The safe <u>processing and storage</u> of contaminated waste material that cannot be disposed of immediately.”	According to the IAEA Safety Glossary (2007 Edition), the term ‘processing’ includes ‘pre-treatment’, ‘treatment’ and ‘conditioning’.				
EC02	General	Safety analysis is suggested to be replaced with safety assessment (e.g. p 36 and p 37)	In line with GSR Part 4 (rev)				
EC03	General	Similar to DS360, it is proposed to present all guidance on radioactive waste management (e.g. 4.126 and 7.60 -7.65) in one section	Avoid duplication, e.g. para 4.126 and para 7.60; unify level of detail; clarity of the text				See US.N09
US.N01	General 1	A stated objective of the document in 1.5 is to ‘ensure safety at all stages in the lifetime of the facility.’ To that end, some suggested topical considerations that should be addressed are 1) CHEMICAL SAFETY, and 2) PHYSICAL SECURITY – You can’t really begin to have much a discussion of using radioactive material with discussion of security.		No	Inserted “The national and international standards that apply to non-nuclear chemical laboratories also apply to nuclear chemical laboratories. Guidelines should be developed for scientific staff, covering the types of chemical hazards to be expected and their prevention. Much of the guidance may overlap with standard practice for radiological protection and there will be areas where there should be guidance specific to chemical hazards. These may cover topics such as; eye protection, reaction hazards and toxicity and may refer to documentation provided by chemical and equipment suppliers or contained		There is clearly synergy and overlap between nuclear and non-nuclear safety but the current view of IAEA is that it should to stick to nuclear safety. Nevertheless, because of the special nature of chemical laboratories a paragraph has been added to Chapter 7. It is IAEA policy to provide guidance for physical security in different ways, though the Nuclear Security series of guides. This SSG was reviewed by NSGC and there was no comment.

					in relevant international and national standards.”		
US.N02	General 2	There are other gaps in the document. Other topics that the Agency would address for any type of facility would be: 1) ORGANIZATION AND MANAGEMENT , 2) OVERSIGHT (consistent with GSR Part 1), and 3) ENVIRONMENTAL PROTECTION.			No		We would welcome discussion and US input to a future draft on this topic
US.N03	General 3	<p>The document needs edits and further revision for the language and use of terms and expressions. For example, on Page 1 the two bullets need to be edited as given below:</p> <p>Case 1: Experiments and fundamental research studies conducted on chemical, physical, mechanical, and radiological properties of specific nuclear materials in prototype nuclear fuels (before and after reactor irradiation); or experiments on nuclear material/waste arising from R&D experimental processes.</p> <p>Case 2: Research and development on processes and equipment for envisaged use on industrial scale (e.g. pilot facilities for waste treatment).</p> <p>The document used the term “recommendation” as synonym for “guidance.” We recommend using the term “guidance” as the document</p>	Editorial, correctness, and use of terminology.	Yes	Case 1: Experiments and fundamental research studies conducted on chemical, physical, mechanical and radiological properties of specific nuclear materials like prototype nuclear fuels (before and after reactor irradiation) or experiments on nuclear material or/wastes arising from new processes. This guidance applies to the experiments as well as the facility that houses them, in accordance with the graded approach. Case 2 : Research and development on processes and equipment envisaged for use on an industrial scale (e.g. pilot facilities for waste treatment).		
				Yes, replaced			

		<p>is intend to provide guidance on how to implement recommendations in NS-R-5 Appendix V.</p> <p>We suggest modification of paragraph 1.5 to read:</p> <p>The objective of this publication is to provide guidance based on experience gained from member States and considering present state of technology to ensure safety at all stages of the lifecycle of R&D facilities. These guidance specific actions, conditions, or procedures to meet the requirements established in Ref [1].</p>		Yes	Typo at start of sentence 2 corrected		
US.N04	04.134 - General & and Page 41, Para	<p>The Section on Decommissioning was presented in one paragraph (4.134). This Section needs to be expanded to refer to GSR Part 6 (Decommissioning of Facilities) and address facility release criteria as well as release of equipment for clearance. In this regard we propose adding the following paragraphs:</p> <p>4.135. IAEA GSR Part 6 [Decommissioning of Facilities) presents safety requirements for decommissioning.</p> <p>4.136. The level of decontamination to release building or facility should be in accordance with the required criteria by the regulatory authority [See IAEA GSR Part 6 on Decommissioning of Facilities, Ref.]</p>	<p>The Section on “Decontamination and Decommissioning” is incomplete.</p> <p>The document did not reference or refer to IAEA GSR Part 6 which includes safety requirements for decommissioning of facilities; and GSR Part 3 which includes exemption and clearance levels.</p>	No		Yes	<p>GSR Part 6 is not listed on the IAEA website. All the listed decommissioning standards are now referenced.</p> <p>See DE.WN64</p>
				Yes			

		4.137. Before release of equipment for recycling or clearance for reuse, it should be decontaminated to the level required by the regulatory authority [See IAEA GSR Part 3, BSS and IAEA RSG1.7]		Yes	Only the BSS is referenced		
US.N05	02.012 - Page 6, Para	Modify Para to read: 2.12 The licensing documentation should also take into account the aspects arising from the decommissioning and radioactive waste management at the facility.	Completeness	Yes			
US.N07	03.004 - Page 9, Para	Add a 3 rd bullet: <ul style="list-style-type: none"> Severe climate conditions such as high speed winds, tornadoes, hurricanes, etc. 					See FR.N02 and DE.WN17
US.N08	04.027 Page 17, Para - line 7	Modify last sentence to read: Wastes and other potentially contaminated containers should be appropriately characterized and labeled at the time and place of origin to avoid unexpected contaminant releases.	Completeness to ensure proper characterization of waste.	Yes	Recommendation to label with the time and place of characterization retained		
US.N09	04.126 - Page 39, Para	Change 1 st sentence to read: 4.126. Requirements for managing radioactive wastes from R&D facilities are established in paragraphs 9.54 to 9.57 in Ref. [1]. For both economic and environmental reasons, it is required under NS-R-5 (9.54) to minimize the quantity of waste generated in R&D facilities; see also technical guidance documents in Ref. [4], [5]. The following aspects should be	Correctness: Using the term preferable is incorrect. In fact, NS-R-5 requires waste minimization.	Yes	See JP.W01 and DE.WN38 and other comments		

		considered in design: Line 11: use the term "transported" instead of "imported."					
US.N10	04.016 - Page 40, Para	Modify last sentence to read: Subsequent treatment outside R&D facilities can include conditioning, volume reduction, encapsulation, immobilization, and decontamination before longer term storage	Completeness to include other significant waste treatment processes	Yes	This comment refers to 4.126 which was modified, and not 4.16.		
US.N11	Page 40, Para 4.129, Line 1	Modify 1 st sentence to read: Liquid effluents to be discharged to the environment should be treated to reduce the discharge of radioactive materials and hazardous chemicals to levels required by regulatory authorities.	Completeness	Yes			
US.N12	04.133 - Page 41, Para	Add: g) The design should include segregation and handling of mixed and hazardous waste.	Completeness	Yes			
US.N13	04.134 - Page 41, Para	Modify last sentence to read: Structures, floor, wall and ceiling surfaces should be chosen, particularly in wet chemical areas, to facilitate decontamination and future decommissioning. Surfaces in areas where contamination may exist should be made nonporous and easy to clean as practical by applying coverings or coatings to such surfaces such as paint, resins, or stainless steel liners.	Language	Yes	Appropriate methods include the application of coverings or coatings to such surfaces, for instance by using paint, resins or stainless steel liners.		
US.N14	07.050 -	Revise "critical group" to "representative individual"	The Term "critical group" has been replaced with the term representative individual.	Yes	Term "representative person" has been added		

US.N15	8.001 (3)	Add footnote	A footnote may be appropriate here to indicate that efforts should be made to minimize the potential airborne contamination, rather than simply relying on personal protective equipment.	Yes	Added to 8.048		
US.N16	Page 69 Ref. [1]	[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Fuel Cycle Facilities: Safety Requirements NS-R-5 (Revision 1) and Appendix V (2014)	Update of reference since NS-R-5 Revision 1 is dated 2014 and contains Appendix V	Yes	Similar comment elsewhere		