

**ADDENDUM TO NS-R-5  
APPENDIX IV – REPROCESSING FACILITIES  
APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

**RESOLUTION OF MEMBER STATES COMMENTS**

**on**

**DS439 Version 3**

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**GERMANY**

		COMMENTS BY REVIEWER			RESOLUTION			
		Reviewer: <b>Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)</b> (with comments of GRS) Country/Organization: <b>Germany</b>			Page 1 of 2 Date: 16.04.2012			
Rel eva nce	Commen t No.	Para/Lin e No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/reje ction
2	1	IV.11	“As part of the overall safety assessment of the facility, a criticality safety assessment shall be performed prior to the commencement of any activity involving fissionable material. The wide range of forms of fissionable material and their associated process conditions shall be taken into account in the assessment. Safety criteria and safety margins shall be developed to ensure sub-criticality based on controlled parameters, such as geometry, mass, <u>concentration, density, enrichment</u> or moderation.”	Processes involving solutions (dissolution of spent fuel, chemical separation of uranium and plutonium) are of special importance for reprocessing facilities. Compare with NS-R-5, Section “Design of the Facility”, Para 6.46: “The most important factors in preventing criticality are mass, geometry, moderation, reflection, interaction, neutron absorption and concentration. These factors shall be considered both alone and in combination for a proper design.”	Y			
3	2	IV.28	“The risk of fire, explosion or of excess internal pressure resulting from: ... §shall be considered and appropriate safety measures implemented.”	Editorial.	Y			

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Page 1 of 2 Date: 16.04.2012								
Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
3	3	IV.43	“Where prompt and reliable action is necessary <u>in response to a postulated initiating event</u> , provision shall be made in the design for automatic safety control or action.”	Completeness and consistency with wording in the IAEA Safety Standard SSR-2/1 “Safety of Nuclear Power Plants: Design”, Para 5.11: “Where prompt and reliable action is necessary in response to a postulated initiating event, provision shall be made in the design for automatic safety actions for the necessary actuation of safety systems, to prevent progression to more severe plant conditions.”	Y			
3	4	IV.47	“The following activities shall, as a minimum, be performed <u>during inactive commissioning</u> <sup>3</sup> : 1. <u>During inactive commissioning</u> <sup>3</sup> ...”	Editorial (no enumeration, since active commissioning is not treated in Para IV.47).	Y			
1	5	IV.61	“The operator shall document the following: ... • all <u>abnormal occurrences/incidents/accidents/events and, including associated radionuclide releases and</u>	- 1 <sup>st</sup> bullet point: Systematization of reportable events according to the International Nuclear and Radiological Event Scale (INES). The documentation			Y	This para was deleted by Japan comment no 41. However, this requirement is

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Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			<u>corrective actions;</u> <ul style="list-style-type: none"> <li>• all environmental monitoring data as required by regulations or license conditions;</li> <li>• <u>the</u> radioactive waste inventory including those disposed or stored on-site;</li> <li>• all inspection records and corrective actions;</li> <li>• <u>the outcomes of periodic safety reviews and the resulting corrective actions and/or safety improvements (depending on national regulations).</u></li> </ul>	of associated corrective actions is essential. Note: The release of radionuclides could be one possible consequence of such an event, but others are possible as well (e.g. radiation exposure of workers above regulatory dose limits). - 5 <sup>th</sup> bullet point: The results of periodic safety reviews (PSR) are also an important part of operating documentation. Regarding PSR, compare with the paras 4.26, 9.18 and 9.68-9.69 of NS-R-5.				covered by NS-R-5 para 9.18.
1	6	IV.76	“Waste generation, <del>treatment</del> <u>processing</u> and storage shall be organised according to pre-established criteria and shall take into consideration both on-site storage capacity and <u>the established acceptance criteria for disposal (or, alternatively, the criteria that are anticipated for the</u>	Clarification and consistency with the IAEA Safety Standard No. GSR Part 5 “Predisposal Management of Radioactive Waste” (Requirements 6, 10 and 12) as well as with the IAEA Safety Glossary (2007 Edition). The term “process-			Y	Cannot use the term processing as waste conditioning is out of scope of the document, See DPP for DS439 and the IAEA Safety

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Relevance	Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			<u>most probable disposal option).</u> "	ing" includes pretreatment, treatment and conditioning of the waste.				Glossary.  Requirements for addressing disposal are covered in WS-R-2 (which is Reference 2 of NS-R-5).  Reference to Ref.2 added.

Relevance:  1 – Essentials  2 – Clarification  3 – Wording/Editorial

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Reviewer: <b>Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)</b> (with comments of BfS) Country/Organization: <b>Germany</b>				Page 1 of 1 Date: 14.05 2011			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Page 3 No. IV.10	Criticality accidents shall be prevented and controlled by means of design, <del>as far as is reasonably practicable.</del>	Criticality safety has to be ensured at all times and not as far as reasonably practicable.		Text re-written to improve clarity and consistency with App I-III, by replacing existing para with two new para above.  With respect to the “at all times” part of the reason, AFARP does not imply time limited safety, it applies all of the time.		
2	Page 10 No. IV.63	Relevant facility personnel <u>and relevant employers</u> shall be trained in the general principles of criticality control, including the requirements of the emergency response plan.	To ensure that external personal has the necessary qualification		Wording modified to include all relevant personnel.		

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**INDONESIA**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer : Djoko Hari Nugroho Country/Organization : Indonesia/BATAN 4/05/2012			Page Date :				
Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/ rejection
1	1/addit ional oint	IV.3. Reprocessing facilities shall be designed to : <ul style="list-style-type: none"> <li>• Prevent ...</li> <li>• Prevent ...</li> <li>• Keep ...</li> <li>• <b>Heat removal ;</b></li> </ul>	heat removal of radioactive material decay and chemical reaction is important			Y	The second bullet, by inference, includes the function of heat removal. (The function of heat removal is one of the measures to prevent an uncontrolled release.)
1	1/1-2	IV.10. Criticality accidents shall be prevented and controlled by means of design, <del>as far as is reasonably practicable.</del>	preventing criticality accident in the plant is a must (mandatory)		See response to Germany BfS comment no 1.		
2	10/add itional point	IV.19. In the criticality safety assessment, account shall be taken of the potential for accumulation of the fissionable material because of mechanical jamming	mechanical failure in the installation can effect to the fission material accumulation and			Y	The potential for accumulation is important, but this is

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Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/r ejection
			increasing of critical mass				considered to be too specific and detailed as a requirement. Guidance will be provided DS-360.
1	1/1-2	as reasonably practicable. However, such measures shall be reviewed with safeguards and maintenance staff before being finalized and installed.	the space arrangement			Y	Please note that reference to safeguards is not within the scope of this requirements document and has therefore been deleted from IV.20. The requirement to review is applicable to all occupationally exposed personnel,

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Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/r ejection
							including maintenance staff. The requirement to review is implicit and does not need to be stated.
1	1/1-2	... equipment containing concentrated acid solutions and frequently mechanical bending, especially when at high ...	the frequent mechanical bending can cause the tool channel ease to brittle and leak		Covered by vibration and oscillation. This text has been added to this para.		
1	2/6	... pre-planned and exercised to ensure adequate and timely deployment. Preventive and periodic in-service inspection is needed to assure the availability of the main and emergency power supply	preventive and periodic in-service inspection is very urgently required for the systems			Y	NS-R-5 paras 6.18, 9.28 and 9.31 address this comment.
2	7/addit ional point	External Flooding IV.42. Flooding shall be taken into account in the design of items important to safety, radioactive material storage or high level radioactive waste	external flooding is important to be taken into account			Y	The specific points in the comment are addressed in NS-R-5 para

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Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/r ejection
							5.5(f)
3	8/addit ional point	External attack IV.43. External attack should be taken into account in the design of items important to safety or probability of material drop (i.e. crane) to hit the processing equipment	external attack is important to be taken into account			Y	External hazards are an important issue and are dealt with in the general section of NS-R-5
1	1/addit ional point	• automatic control system can be implemented to transfer of radioactive material safely	automatic transport system tends to increase the safety			Y	IV.43 covers the intent of this comment.
2	2/2	IV.43. Where prompt and reliable action is necessary or minimizing human error, provision shall be made in the ...	automatic safety control affects to minimize human error			Y	“Prompt and reliable action” includes minimizing human error.
1	3/3	... safety case. Modification document should be approved by Regulatory body before commissioning.	refer to the IAEA construction document			Y	It is not specific to reprocessing plant.  NS-R-5 para 2.9 addresses the comment.

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Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/r ejection
1	1/aditi onal point	<ul style="list-style-type: none"> <li>based on the complexity of system and competence in the reprocessing plant, nuclear knowledge management can be implemented of maintain the worker competence and safety culture</li> </ul>	NKM is very advantageous to gain the competence and safety culture			Y	NKM is covered in the references within NS-R-5, specifically Ref [13], GS-R-3 and Ref [14] GS-G-3.1.
1	1/2	<ul style="list-style-type: none"> <li>all inspection ...</li> <li>the amount of radioactive materials in the storage</li> </ul>				Y	This para was deleted by Japan comment number 41. However, this issue is covered by NS-R-5 para 9.18.
1	2/2	V.3. The design shall equipped with automated safety control system includes interlock	automatic safety control affects to minimize human error		Para V.3 deleted as criticality requirements are adequately covered in the		

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Com - ment No.	Para/ Line No.	Proposed New Text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/r ejection
					general sections of NS-R-5, specifically para 6.43		
1	2/4	... shall be organized by the operating organization. <b>Periodic safety culture training is recommended.</b>	safety culture affects to minimize human error			Y	Good comment, however, safety culture is covered in the general sections of NS-R-5, specifically para 4.17.

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Sjafruddin Page 1 of 1 Country/Organization: Indonesia/BATAN Date: 05/05/2012							
Comments No.	Para/ Line No.	Proposed new text	Reason	Accepted	Accepted, but...	Rejected	Reason for ...
1	Criticality Prevention	Criticality Prevention by Design	There are two titles of Criticality Prevention			Y	No change needed

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Comments No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but...	Rejected	Reason for ...
							as each title is located within the design and operation chapters
2	Criticality Prevention	Criticality accident detection and alarm system shall be installed at potential areas	To protect the worker against high exposure radiation caused by criticality accident			Y	Requirements covering criticality detection and alarm systems are provided in the general sections of NS-R-5, specifically para 6.50

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Comments No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but...	Rejected	Reason for ...
3	Criticality Prevention	Criticality Prevention by administration Control	There are two titles of Criticality Prevention				See response to comment no 1
4	Fires and Explosion	In case of fire, no neutron moderator (water) is used for firefighting (hydrant).	Water is neutron moderator.		Agreed. For consistency the text in App IV, para IV.6 was used.		



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Classification of comments (No.1 – 49)

Comments No.1 to 49 came from various viewpoints. The comments were classified into groups according to viewpoints as shown in the table 1 for convenience of an IAEA secretariat. Please note that a comment with several viewpoints appears in several columns.

Table 1 Classification of comments (No.1 – 49)

Viewpoint	Comment No.
Improve structure of contents	1 with attachment 1
Move to the place according to the proposed new structure above	7
Clarification of scope of document	2
Clarification	25, 35, 36, 37, 49
Subject which <u>must be handled by other appropriate documents/Subject out of scope</u>	3, 4, 16, 39, 40, 46
Content is <u>not specific to reprocessing plants</u>	4, 6, 12, 16, 19, 21, 41, 43, 45
<u>Duplication of description or content</u> with NS-R-5 or other requirement	12, 13, 19, 23, 38, 41, 43
Appropriate as guide	13, 21, 23, 45
<u>Technically wrong or inconsistency</u> description	8, 11, 18, 24, 32, 42, 46, 49
Emphasize or brush up essential point	8, 14, 15, 20, 26, 27, 29, 30, 31, 32, 44, 48
Inadequate description because of <u>introducing it from reactor document directly</u>	9, 17
More adequate and accurate description as requirement	10

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Make no sense	22
Avoid misunderstanding (editorial comment)	5, 34

**JAPAN**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 20					
Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
1	Structure of contents in DESIGN section	Change the structure of contents as shown in the <b><u>Attachment 1.</u></b>	See <b><u>Attachment 1.</u></b>			Y	We are sympathetic to this proposal, however we wish to maintain compliance with the DPP for DS439 and to maintain consistency with the structure in App I-III.
2	Introductio n	Delete 3rd paragraph “Although out of scope of this ..... if located within the reprocessing facility.” Then, put following sentences.  According to DPP360 <sup>1</sup> , this	-The purpose of the present paragraph (in version 3) is understandable. However, the present one has no indication about what and how to do for such facilities, which are out of scope, in a concrete manner.		Agreed, the following text was added: “ <i>This appendix does not cover the out of core reprocessing processes, such as</i>		

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Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
		<p>appendix dose not cover the installation out of the core reprocessing process, like cask unloading facilities, spent fuel storage facilities and radioactive wasteconditioning facilities e.g. facilities for vitrification of high active liquid waste or for bituminisation of radioactive sludge.</p> <p>Safety requirements for radioactive wasteconditioning facilities are provided by SSR WS-R-2<sup>2</sup>. Those for cask unloading facilities and spent fuel storage facilities are provided by *****.</p> <p><sup>1</sup>DOCUMENT PREPARATION PROFILE of Safety of Reprocessing Facilities  <sup>2</sup>PREDISPOSAL MANAGEMENT OF RADIOACTIVE WASTE, INCLUDING DECOMMISSIONING Safety Requirement, 2000</p>	<p>Two kinds of information shown below must be provided because they are very important for readers of this document.</p> <p>1) Facilities which are out of scope  2) The documents showing requirements for such facilities (out of scope)</p> <p>Then, readers of this document can find requirements for such facilities which are not covered in this document in a reasonable and systematic manner.</p> <p>Proposed sentences are based on above background.</p> <p>-Please provide the name of document showing requirements of cask unloading and spent fuel storage facilities, which is shown as ***** in the left column, by IAEA secretariat.</p>		<p><i>cask unloading facilities, spent fuel storage and radioactive waste conditioning facilities e.g. facilities for vitrification of high level waste or for bituminisation of radioactive sludge. Safety requirements for radioactive waste conditioning facilities are provided by Ref [2]."</i></p>		

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Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
3	IV.1 and IV.2	Put a note as below.  IV.1. In siting <sup>3</sup> new reprocessing facilities on complex and large site areas, which may contain a number of facilities, account shall be taken of potential interactions with existing facilities regardless of their status, i.e. under construction, commissioning, operation, shutdown or being decommissioned.  <sup>3</sup> Safety Aspect in Siting for Nuclear Installations DS433	The DS433 “Safety Aspects in Siting for Nuclear Installations” discussed on siting including the contents of IV.2 in detail. Therefore, requirements for siting must be confirmed according to DS433 in principle. This must be a basic rule for drafting this document. From this viewpoint the most important information is an introduction of DS433. Therefore, the note must be put as shown in the left column in order to call readers’ attention.		Included reference to siting requirements document NS-R-3, i.e. Ref [17].		
4	IV.1 and IV.2	Delete IV.2.	-The contents of IV.2 are not specific to reprocessing plants. -In addition to that, requirements for siting must be confirmed by DS433 according to the basic rule for drafting this document, which are shown in the comment No.3. -Once DS433 is introduced, readers of this document can find siting’s requirements including the contents of IV.2 in detail. Therefore, specific safety issues in IV.2 are covered surely without IV.2, that is, the aim of	Y			

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			IV.2 is achieved without IV.2.				
5	IV.3	·Prevent the uncontrolled release of hazardous <del>(including radioactive)</del> -materials;	This document focuses on first nuclear safety and second other hazards, e.g. that due to associated chemical. The proposed description, i.e. “including radioactive” in <u>a bracket</u> , gives a wrong impression such that general hazards are main subjects to be handled in this document.	Y			
6	IV.3	Delete following part.  Keep radiation exposure during normal operation and accident conditions as low as reasonably achievable.	-This is not specific to reprocessing facilities. Original comment for IV.3 in version 3 from France also mentioned the same thing. Therefore, it is appropriate that this sentence goes to the main part of NS-R-5 according to the basic principle of this document.			Y	Agree with the comment. However, it is retained to maintain consistency with App I – III.
7	IV.4, IV.5, IV.6	Move to the place according to the proposed new structure as shown in <b>Attachment 1</b> . IV.4 goes to the place under the new title “Operating experience feedback”. IV.5 and 6 go to the place under	See comment No.1 and <b>Attachment 1</b> .			Y	See response to comment no 1.

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Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
		the title "Cooling".					
8	IV.5	<p>Modify IV.5 as follows.</p> <p>Cooling systems, including any support features, shall have adequate capacity, availability and reliability to remove heat from radioactive decay and for removing heat due to chemical reactions, e.g. during the dissolution of spent fuel in nitric acid.</p>	<p>-It is sure that the dissolution of spent fuel gives heat due to its chemical reaction. However, a dissolution process has a heating system because a spent fuel is resolved in HNO<sub>3</sub> under high temperature. Therefore, generally a dissolution process dose not needs a cooling system for <u>removing heat due to chemical reactions during the dissolution.</u></p> <p>-Some of dissolution processes might have some kind of system, which can be used to reduce the temperature of solution, when necessary. However, such a system is not specific for removing heat due to chemical reaction during the dissolution.</p> <p>-As described above the dissolution of spent fuel is not an appropriate example of chemical reaction for the context of this sentence.</p> <p>-On the contrary, a cooling system to remove decay heat is always necessary as long as a facility has</p>		<p>Agree with the comment and have split the para into two paras to separate the cooling requirements for radioactive decay and chemical processes. The following text was used:</p> <p><i>"Cooling systems, including any support features, for removing heat due to chemical reactions shall have adequate capacity, availability and reliability to remove heat and prevent an uncontrolled increase in</i></p>		

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Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
			<p>such materials. It must work regardless of facility's operational phase. From this view point a cooling system to remove decay heat is indispensable and special to a reprocessing facility.</p> <p>-Therefore, first its requirement must be stated in a single sentence to pinpoint its importance to avoid confusion shown before. -Second, other than the dissolution, if we have a cooling system in the same sense of that for decay heat, i.e. which is always necessary to remove heat due to chemical reaction, such requirement will be mentioned in a different sentence with clear, appropriate and reasonable example/s.</p>		<p><i>temperature, i.e. a fire during the dissolution of metal spent fuel in nitric acid</i>".</p> <p>The driver for the example given was the Magnox reprocessing plant in the UK that processes metal fuel.</p>		
9	IV.7, 8	<p>Replace IV.7 &amp; 8 by following sentence.</p> <p>Appropriate means shall be provided for measuring the variables that are relevant to the safety of the reprocessing facility, both:</p> <ul style="list-style-type: none"> <li>· in normal operation to ensure that the process is being</li> </ul>	<p>-IV.7 and 8 are introduced from the document(s) for nuclear reactors. Therefore, some of detailed expressions do not match a reprocessing facility well, e.g. post-accident systems, time lag. Those expressions give confusion to readers of this document because it seems to be difficult to have common understandings for what</p>	Y			

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		operated within the safety limits and to monitor its environmental impact; · for detecting and managing accident conditions, such as criticality.	such expressions mean. -In addition to that, the sentence includes items with regards to the safeguards. Items on the safeguards must be handled by its specific document. Such items must not be handled by this document in half measures. This must be the basic rule for drafting this document as stated in the comment No.3 and 4. -After all, the essence of importance for sampling and analysis is to provide appropriate means to have necessary information in normal and accident conditions. The proposed descriptions provide the essence and they include the contents in IV.7 and IV.8.				
10	IV.9	Replace IV.9 by following sentence.  Sampling and analysis systems shall be provided for monitoring, prior to or during discharges from the plant to the environment, radioactive effluents and effluents with possible contamination.	Not only equipment but also systems (for sampling and analysis) can work for monitoring. Sampling and analysis systems include equipment. Therefore, the proposed sentence is more general and appropriate than IV.9 because “sampling and analysis systems” include “equipment”.			Y	The original sentence was replaced by Japan comment No.9, which covers the requirement to monitor discharges to the



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11	IV.11	As part of the overall safety assessment of the facility, a criticality safety assessment shall be performed prior to the commencement of any activity involving fissionable material. The wide range of forms of fissionable material and their associated process conditions shall be taken into account in the assessment. Safety criteria and safety margins shall be developed to ensure sub-criticality based on <u>either the neutron multiplication factor, Keff, or</u> on controlled parameters, such as geometry, mass, enrichment or moderation.	-Safety criteria and safety margins can be developed based on controlled parameters, such as geometry, mass, enrichment or moderation <u>for a simple system</u> . However, <u>for a complex system</u> safety criteria and safety margins may not be developed without using Keff in many cases. -The DS407 (Criticality Safety for Facilities and Activities Handling Fissionable Material) also states that Keff can be used to develop safety criteria and safety margins (see 2.12 in DS407). -Therefore, the part “either the neutron multiplication factor, Keff, or” must not be deleted.	Y			
12	IV.12	Replace 2nd paragraph by following sentence. <u>Such a reference shall be used in engineering studies</u>	-The reasons to delete the parts in the left column are as follows. -The first part “Such a ..... process step” is too commonsense, i.e. a matter of course, as a requirement	Y			

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		<del>performed prior to the initial start-up of any process step. These studies It shall be designed to assured through the assessment that processes, in-process measurements, and analytical measurements are operated perform</del> within established limits.	because such a reference is developed on order to use in engineering studies for design. In addition to that, it is not specific to reprocessing plants. -The second part “in process .... measurements” indicates secondary matter, i.e. measures to assure that processes perform within established limits. In this sentence “assure that processes perform within established limits” is essential. In addition to that, a requirement on such measures is provided in IV.42.				
13	IV.13	Delete following part.  Stringent controls shall be considered for any processing steps performed before an analytical value is determined for the materials in process.	-In the first place safety shall be maintained by design for the case shown in the left column. This is the principle. (IV.12 includes this matter, i.e. the requirement for conservative bounding case.) -The case in the left column is specific, i.e. out of the basic principle above. Therefore, it is appropriate that this part goes to a guide document if we have it.	Y			
14	IV.15	Add following sentence after the present IV.15  For the leaks of fissionable	The contents of IV.15 include a prevention of leaks. IV.17 states about prevention of leaks. Therefore, it is appropriate that IV.17 moves		Deleted reference to leaks, covered in IV.17		

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		material, account shall be taken of the effects of corrosion, erosion and vibration cracking in systems exposed to oscillations.	here with its modification. The modification, i.e. adding “For the leaks of fissionable material” instead of “In the criticality safety assessment” is to show the purpose of the sentence more clearly.				
15	IV.17	IV.17. In the criticality safety assessment, account shall be taken of the effects of geometrical change due to corrosion, erosion and so on.	Corrosion and erosion could give an effect to critical safety through not only leaks but also geometrical change. This aspect (geometrical change) must be stated clearly because it shall be considered in the criticality safety assessment. The proposed sentence provides such requirements.		Reference to changes in geometry added to IV.17.		
16	IV.20	Delete following part.  However, such measures shall be reviewed with safeguards staff before being finalized and installed.	-The sentence describes about an item of safeguards. An item on the safeguards must be handled by its specific document. Such items must not be handled by this document in half measures. This must be basic principle for drafting this document as mentioned in several comments before. -This is not specific to reprocessing plants. -The content of the sentence is just one measure to keep the requirement in the first sentence of	Y			

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			<p>IV.20. It is appropriate that this part goes to a guide document.</p> <p>-The content of the sentence is too commonsense, i.e. a matter of course, as a requirement because reviewing measures by a specialist before their finalizing and installing them is common not only for the safeguards but also other aspects of design. There is no reason to mention about safeguards particularly.</p> <p>-Safeguards staff may not be selected in the design stage of a facility.</p>				
17	IV.21	<p>Replace IV.21 by following sentence.</p> <p>Containment shall be the primary method for confinement against the spreading of contamination. Confinement shall be provided by two complementary containment systems — static and dynamic.</p>	<p>-The IV.21 describes about only the ventilation of <u>buildings</u>. A reprocessing facility has the ventilation of <u>vessels and equipment</u>.</p> <p>-The descriptions under the bullets are too detailed as a requirement.</p> <p>-The IV.21 was introduced from the document for a reactor. Therefore, some of detailed expressions do not match a reprocessing facility well, e.g. 4th bullet (inert gases, noxious gases). Those give confusion to readers of this document because it seems to be difficult to have</p>	Y			

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			common understandings for what such expressions mean. -Considering above reasons, the proposed sentence is appropriate if we mention about a ventilation system. This sentence is introduced from Appendix II.9.				
18	IV.22	Replace IV.22 by following sentence.  In the design of a process, account shall be taken of the performance criteria for ventilation and containment systems according to the degree of potential contamination risk which each process has, e.g. materials and their chemical and/or physical form handled in it. The performance criteria include the pressure difference between zones, the types of filter to be used, the differential pressure across filters and the appropriate flow velocity for operational states.	-The performance criteria for ventilation and containment system must be decided for each facility according to the degree of potential contamination risk. This is the common and basic principle for a reprocessing plant, and it is stated clearly. The proposed sentence mentions such principle in a clear manner. -Examples are shown below. *Some processes, e.g. storage of uranium products, storage of low level solid waste, do not have complete dynamic containment system. In these processes, only handling of packages (steel drum or special can etc.) is allowed. In other word, the open of such packages is prohibited inside the facilities. This limit makes the potential risk of leakage from the packages		Location of para IV.21 moved to beginning of section, and modified to ensure that it is generic. Text now reads:  <i>“Containment shall be the primary method for confinement against the spreading of contamination. Confinement shall be provided by two complementary containment systems — static and dynamic.</i> • to prevent		

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			<p>extremely small. Generally speaking, such processes are those handling just uranium in a sealed condition and low level waste.</p> <p>*In contrary, facilities handling Pu, HLW and a large amount of unsealed uranium have a dynamic containment system with high performance criteria.</p>		<p><i>unacceptable dispersion of airborne radioactive substances within the facility;</i></p> <ul style="list-style-type: none"> <li>• <i>to keep the levels of airborne radioactive substances in the facility below authorized limits and as low as reasonably achievable;”</i></li> </ul> <p>Modified para IV.22 to read:</p> <p><i>“In the design of the ventilation system, account shall be taken of the performance criteria for the pressure difference between zones, the types of filter to be used, the</i></p>		

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					<i>differential pressure across filters and the appropriate flow velocity for operational states.”</i>		
19	IV.24	Delete IV.24.	-The control of discharge as described in IV.26 is the essential requirement for public and environmental protection. The IV.26 with a minor modification, as proposed in the comment No. 26, can include the content of IV.24. -Providing systems as shown in the IV.24 to achieve the requirement in IV.26 is a matter of course. In addition to that, the IV.24 is not specific to reprocessing plants.	Y			
20	IV.26	In the design of the reprocessing facility it shall be ensured that liquid and aerial radioactive discharges from the reprocessing facility site are evaluated and confirmed to be within authorized limits prior to discharge to the environment and that aerial discharges from the reprocessing plant are monitored and confirmed to be	This requirement must be applied not only liquids but also gas.  The proposed sentence can be replaced by following one. “In the design of the reprocessing facility it shall be ensured that liquid and aerial radioactive discharges from the reprocessing facility site are evaluated and confirmed to be within	Y			

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		within authorized limits.	authorized limits.”				
21	IV.26	Delete following part.  Analytical results from such discharges shall be reported to material control and accounting personnel at the facility.	-This part is not a matter of nuclear safety. -This part is not specific to reprocessing plants. -This part is not a matter of design. -This part is too detail as a requirement. (This part is appropriate as a guide).	Y			
22	IV.27	Delete IV.27.	-The IV.27 is meaningless as a requirement. -Appendix I, II and III do not have this kind of sentence just after the title “POSTULATED INITIATING EVENTS”. Therefore, there is no reason to have this sentence only for Appendix IV.	Y			
23	IV.29	Delete IV.29.	- It is appropriate that the IV.29 goes to a guide document because the content of the IV.29 is one of measures to achieve the requirement shown in the IV.28 (the 3rd bullet). - In the sense above the content of IV.29 is included in the IV.28.	Y			



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24	IV.36	IV.36. During the design of a reprocessing facility, the loss of <b>a utility which supports a safety function</b> <del>safety related items and safety systems (including their supporting features)</del> shall be considered and their impact on safety shall be assessed.	<b>-Attachment 2</b> shows definitions of “safety related items”, “safety systems” and “their supporting features” in the “IAEA Safety Glossary”. According to the <b>Attachment 2</b> , the “safety system” is defined just for a reactor. Therefore, the definition of “safety system” cannot be applied to a reprocessing facility directly. It is not appropriate to use this definition in this requirement. - The “IAEA Safety Glossary” indicates that “items important to safety” consist of “Safety related items” and “Safety systems”, that is, the loss of both “safety related items” and “Safety systems” means the loss of all of “items important to safety”. However, the original sentence here dose not intent to provide a requirement for such conditions because it is under the title “ <b>Loss of support systems</b> ”. As the title says, this sentence originally intends to provide a requirement for a loss of electric power, cooling water, and so on, i.e. a system supporting a safety		Section now reads: <i>“During the design of a reprocessing facility, the loss of services such as cooling and energy supply which support a safety function safety related items and safety systems (including their supporting features) shall be considered and their impact on safety shall be assessed.”</i>		

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			function. -The proposed sentence is to provide a requirement according to the original intention shown above.				
25	IV.38	Question on “provision” and concrete examples of pressurized equipment and vacuum equipment	-It is difficult to imagine what “pressurized equipment and vacuum equipment in <u>high active areas</u> ” mean. (A reprocessing facility has pressurized equipment and vacuum one in some areas. However, it is hardly to find them <u>in high active areas</u> , e.g. in a cell.) -First, please provide us examples of “pressurized equipment and vacuum one in high active areas” and “provisions” for them as a response to this comment. We might give further comments after reviewing the response.		The question and reason is accepted, and this resulted in the deletion of the para IV.38.		
26	IV.38	Modify the 2nd paragraph as follows.  Safety <u>assessment</u> to minimize the consequences of potential failure or leak in high active area shall be conducted.	-Provisions do not come first directly. They come after safety assessment based on it for a postulated initiating event focused on. -Namely, safety assessment for initiating events is essential here because the IV.38 is under the title “POSTULATED INITIATING EVENTS”. Therefore, a requirement for safety assessment is appropriate			Y	The comment is no longer relevant as IV.38 was deleted, see Japan comment no 25.

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			here.				
27	IV.39	<p>Replace IV.39 by following sentence.</p> <p>During the design of a reprocessing facility, the possible of load drops shall be considered and their impact on safety shall be assessed.</p>	<p>-Considering the possible of load drops in a design and assessing their impact are important here as same as the proposed sentence for IV.36 (see the comment No. 24) because the IV.39 is under the title “POSTULATED INITIATING EVENTS”.</p> <p>-A design of handling systems does not come first directly. It comes after considering the possible of load drops in a design and assessing their impact, i.e. a postulated initiating event focused on here.</p> <p>-The proposed sentence comes according to the reasons above. (It is as same type as the proposed sentence for IV.36.)</p>	Y			
28	IV.41	<p><u>Based on geographical, hydrological and meteorological conditions, and historical natural hazards, etc.,</u> extreme weather conditions <u>(tsunami, external flooding, etc.)</u> shall be taken into account in the design of items</p>	<p>-Worth wording (adding basis of consideration)</p> <p>-To focus on tsunami and flooding</p>			Y	The specific points in the comment are considered in NS-R-5 para 5.5(f).

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		important to safety, in particular cooling systems associated with the storage of heat generating high level waste.					
29	title	Replace “INSTRUMENTATION AND CONTROL SYSTEMS” by “MEASUREMENT AND CONTROL SYSTEMS”.	The proposed replacement comes from the comments No. 31 and 30. (See those comments.)			Y	To maintain consistency with App I-III
30	New sentence	Add following sentence after title “MEASUREMENT AND CONTROL SYSTEMS”.  Adequate measurements and control systems shall be considered to ensure the safety functions and operations.	IV.42 shows a requirement for measurement. IV.43 shows a requirement for control systems. Both are important factors to ensure the safety functions and operations. Therefore, such factors are shown first under the title as a basic requirement.			Y	This comment is not specific to reprocessing and to maintain consistency with App I - III.
31	title	Replace “Instrumentation” by “Measurement”.	The descriptions of IV.42 show a method to measure the variables which are relevant to safety. (Providing adequate instrumentation is for measuring such variables.) Therefore, “Measurement” is more appropriate than “Instrumentation” as the title here.			Y	To maintain consistency with App I-III
32	IV.42	IV.42. Adequate <b>means instrumentation</b> shall be provided for measuring the	“instrumentation” must be means because instrumentation is not just one way for measuring.	Y			

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		variables that are relevant to the safety of the reprocessing facility, both: <ul style="list-style-type: none"> <li>· in normal operation to ensure that the process is being operated within the safety limits and to monitor its environmental impact;</li> <li>· for detecting and managing accident conditions, such as criticality or <b>effect due to an earthquake detection</b>.</li> </ul>	-The last “detection” must be deleted to avoid duplication. (Editorial comment)  -Operation of a reactor is stopped immediately under a big earthquake in an automatic manner. A countermeasure of a reprocessing facility for a big earthquake is not simple as that for a reactor because the facility has features of chemical processes. A reprocessing facility consists of many chemical processes with different characteristics. Each process needs different measure/s which depends on a type and a degree of effect due to an earthquake, e.g. fire, leaks. It is important to apply an appropriate measure to each process according to its situation (a type and degree of effect). From the viewpoint above, detecting an <u>effect due to an earthquake</u> is essential to manage accident conditions.				
33	IV.47	Move IV.47 with title “Inactive commissioning” before “Active commissioning”.	IV.47 shows a requirement during inactive commissioning. Therefore, it is appropriate that IV.47 goes to the	Y			

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			place before “Active commissioning” with the title “Inactive commissioning”.				
34	IV.47	<p>Modify IV.47 as follows according to the comment No. 31.</p> <p>The following activities shall, as a minimum, be performed<sup>3</sup>:</p> <p>1. <del>During inactive commissioning:</del><sup>3</sup></p> <ul style="list-style-type: none"> <li>· Confirmation of the performance of shielding and confinement systems, including confirmation of the weld quality of static containment;</li> <li>· Confirmation of the performance of criticality control measures;</li> <li>· Demonstration of the availability of criticality detection and alarm systems;</li> <li>· Demonstration of the performance of emergency shutdown systems;</li> <li>· Demonstration of the availability of emergency power supply.</li> </ul>	<p>-The part “1. During inactive commissioning” is not necessary because IV.47 will have the title “Inactive commissioning” according to the comment No. 33.</p> <p>-The note No.3 must be kept in some place in IV.47.</p>	Y			

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35	IV.48	<p>Replace IV.48 by following sentence.</p> <p>The operators' ability and equipment's capability to inspect and maintain the reprocessing facility for operational phase shall be addressed in the commissioning programme, especially for hot cells and remote equipment.</p>	Clarification		<p>Agreed, the following text was used: <i>"The ability to test and maintain the reprocessing facility's structures, systems and components and its systems after operation commences, once commercial operation has started, shall be addressed in the commissioning programme, especially for hot cells and remote equipment."</i></p>		
36	IV.53	<p>Modify the description of the note 4 as follows.</p> <p>The feed programme is the planned sequence of fuel feeding to the head end facility and dissolver in a given operational period.</p>	<p>A definition of "campaign" may be different among member states. It is not necessary to define "campaign" very strictly in this note because it is not essential matter in IV.53. Therefore, "a given operational period" is appropriate here.</p>		Reference to campaign deleted.		

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37	IV.54	What is the purpose of the first bullet, e.g. for emergency case, for all operation phase? Modify the description of first bullet to show “for what” clearly.	A purpose of the first bullet is not clear, e.g. for emergency case, for all operation phase. Contents of interfaces and communication channels to be established and maintained become different for purposes. Therefore, the purpose of the first bullet (for what) must be clearly mentioned in order to work this requirement practically.		Bullet covers communication during operation.  Operation is defined in the IAEA Safety Glossary  Communications related to emergency preparedness and response are covered by the emergency preparedness and response requirements in GS-R-2, i.e. NS-R-5 Ref [3].		
38	IV.54	Delete the last sentence, i.e. “In addition to ----- shut-down state.”	Contents of the sentence are as same as that of the paragraph 9.14 in the NS-R-5. Therefore, it is appropriate to delete the sentence.	Y			
39	IV.55	Delete following part.  The timescale of sample analysis and assessment shall be commensurate with any	-This is not the matter of nuclear safety. (This is the matter to operate a facility smoothly.)	Y			



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		processing lag in the system.					
40	IV.58	Delete IV.58.	-This is not the matter of nuclear safety.	Y			
41	IV.61	Delete IV.61.	-The contents of IV.61 are as same as those in 9.18 of NS-R-5. -They are not specific for reprocessing plants.	Y			
42	IV.64	Modify IV.64 as follows.  Procedures for the transfer or movement of fissionable material during operational states (including maintenance) shall be defined and submitted for <b>review approval</b> from critically <b>safety</b> staff that are, to the extent necessary, independent of the operations management.	-Clarification  -The 9.53. in NS-R-5 says that “The nuclear criticality staff --- shall provide technical guidance and expertise for the development of operating procedures; --- (see Ref. [20]).”. According to above, an essential responsibility of critically staff is reviewing a technical adequacy of procedures. In this sense, “review” is better than “approval” because “approval” gives us misunderstanding such as “approval by management level”.  - NS-R-5 says “criticality staff”.	Y			
43	IV.66	Delete IV.66.	-The content of IV.66 is shown in 9.35 of NS-R-5.			Y	Agree that the general

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**APPENDIX IV – REPROCESSING FACILITIES**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 20					
Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
			-This is not specific to reprocessing plants.				control of modifications is covered in NS-R-5 para 9.35. IV.66 is highlighting a number of issues relating to modifications to criticality control.
44	IV.70	Replace IV.70 by following sentence.  According to possibility of fissionable material accumulation a surveillance programme shall be developed and implemented to assure that uncontrolled accumulation of fissionable material is detected and further accumulation is prevented.	-Clarification -Detecting and preventing uncontrolled accumulation are an essential requirement behind of IV.70. The proposed sentence is more appropriate than IV.70 according to the viewpoint above.		Agreed, the following text was added: <i>“Depending on the risk arising from fissionable material accumulation a surveillance programme shall be developed and implemented to ensure that uncontrolled accumulation of fissionable material is detected and further</i>		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 20					
Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
					<i>accumulation is prevented.</i>		
45	IV.75	Delete IV.75.	-This is not specific to reprocessing plants. -This is too detail as a requirement. (This is appropriate as a guide.)	Y			
46	IV.78	Delete IV.78.	-WS-R-2 (Predisposal Management of Radioactive Waste, Including Decommissioning), which handles requirements of waste conditioning, does not require that liquid waste shall be transferred into a solid and neutralized. (Refer e.g. 1.11, 4.2, 5.2, 5.11, 5.12 and 5.22 of WS-R-2.) Therefore, IV. 78 is not right requirement because its content is inconsistent WS-R-2. -Items on waste conditioning must be handled by its specific document, i.e. WS-R-2. Such items must not be handled by this document in half measures. This must be the basic rule for drafting this document as stated in the comments before.	Y			
47	title	Add a title "Discharge" after IV.78.	The proposal comes from the comments No. 49. (See the comments No.49.)			Y	We understand the intent behind the comment;

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 20					
Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
							however, we consider that this requirement is covered in the general section of NS-R-5. (paras 9.54 and 9.57)
48	After above proposed title	Add following sentences.  Aerial and liquid discharges shall be adequately monitored to keep operational limits and conditions.	-Monitoring of discharge is very important because it concerns an effect to the environment directly. -In the DESIGN section IV.26 shows the requirement about discharge to the environment. The proposed sentence is necessary in order to correspond with IV.24 here, i.e. in the OPERATION section. -The OPERATION section must have this requirement even if a same kind of requirement is in the COMMISSIONING section because this is the OPERATION section.			Y	We understand the intent behind the comment; however, we consider that this requirement is covered in the general section of NS-R-5. (paras 9.54 and 9.57)
49	IV.79	-It is necessary to clarify the <u>dismantling equipment</u> .	Just in case, it is necessary to clarify that <u>dismantling equipment</u> " means the equipment to be dismantled or the equipment which performs		Reworded first sentence to improve clarity. The following text		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:		Page 1 of 20					
Country/Organization: Japan/		Date:					
Com ment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
		-Add following sentence.  Criticality safety shall be ensured for the temporary storage of waste contaminated with fissionable materials generated by the dismantling.	dismantling. If the latter case is correct IV.79 is meaningless.  -When we mention about the management of criticality safety during a dismantling period, the management for the temporary storage is also important as shown in the proposed sentence.		was used: <i>“When decommissioning equipment which was used to process fissionable material (e.g. vessels, gloveboxes) procedures shall be implemented to ensure that criticality control is maintained.”</i>		

Editorial comment

Comme nt No.	Para/Li ne No.	Proposed new text	Reason	Accept ed	Accepted, but modified as follows	Rejected	Reason for modify./rejec tion
1	IV.12	IV.12. A reference fissionable material composition or medium shall be defined. The criticality safety assessment performed using this reference shall be a	-Clarification -“mass” and “volume” in examples (after e.g.) are not fissionable material composition but medium.	Y			

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejection
		conservative bounding case of the actual fissionable material composition <b>or medium</b> being handled or processed, e.g. mass, volume, isotope vector.					
2	IV.14	IV.14. If the design of the reprocessing facility <u>takes into account</u> burn-up credit, its use shall be appropriately justified.	Editorial comment	Y			
3	IV.28	IV.28. The risk of fire, explosion or of excess internal pressure resulting from: · the use of explosive gases, flammable liquids and chemical substances such hydrogen or hydrogen peroxide, nitric acid, tributyl phosphate (TBP) and diluents, hydrazine nitrate; · the generation of hydrogen by radiolysis in aqueous or organic solutions and solids; · the forming of explosive <b>or flammable</b> products due to chemical reaction, e.g. nitrated organic substances (red oils), <del>or thermal runaway reaction</del> ; · pyrophoric materials (zircaloy fines); <b>s</b> Shall be considered and appropriate safety measures implemented.	-Clarification  -“thermal runaway reaction” in examples (after e.g.) is not a product. It is not appropriate as an example in this sentence.	Y			

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejection
4	IV.19, 20		<p>-Clarification of “exposure”</p> <p>Dose “exposure” means just radiation exposure? or exposure including other ones, e.g. chemical exposure?</p> <p>If “exposure” in IV.19 and 20 means not only radiation exposure but also other exposure, e.g. chemical one, it should be described clearly. If “exposure” in IV.19 and 20 means just radiation exposure, it is better to show it in a clear manner just in case because readers of the document can avoid misunderstanding.</p>			Y	Section deals with exposure to radioactive material and therefore further clarification is not needed.

Other comment

Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejection
1	title	CONFINEMENT OF RADIOACTIVE MATERIAL	When this title is accepted, the same sort of titles in Appendix I, II and III should be “CONFINEMENT OF RADIOACTIVE MATERIAL” in the next chance of reviewing of NS-R-5.	Y			

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Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modify./rejection
2	IV.30, IV.31	Make clear the difference between “industrial safety regulations” and “national requirements”.	-IV.30 has an expression “industrial safety regulations”. IV.31 has an expression “national requirements”. The difference between them is not clear. --First, please show the difference as a response to this comment. We might give further comments after receiving the answer. If both expressions have same meaning, please use the same wordings to avoid confusion to readers of this document.		Changed to “national requirements”		

**Attachment 1**

**Proposed structure of contents in the DESIGN section**

**DESIGN**

**SAFETY FUNCTIONS**

**ENGINEERING DESIGN**

**Cooling**

**Sampling and analysis**

**CRITICALITY PREVENTION**

**CONFINEMENT OF RADIOACTIVE MATERIAL**

**Occupational protection**

**Public and environmental protection**

Overall structure

“SAFETY FUNCTIONS” must come first.

“CRITICALITY PREVENTION” and “CONFINEMENT OF RADIOACTIVE MATERIAL”, which are two important functions shown in the first paragraph of IV.3, must come second. “ENGINEERING DESIGN” must come next. Then, “POSTULATED INITIATING EVENTS” must come finally.

The overall structure above is reasonable and



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**ENGINEERING DESIGN**

**Cooling**

**Sampling and analysis**

**Measurement and control systems**

**Measurement**

**Automated safety control systems**

**Radioactive waste and effluent management**

**Operating experience feedback**

**POSTULATED INITIATING EVENTS**

**Internal initiating events**

*Fire and Explosion*

*Equipment Failure*

*Leaks*

*Flooding*

*Loss of support systems*

*Use of pressurised and vacuum equipment*

*Load drops*

**External Initiating Events**

*Earthquake*

*Extreme weather conditions*

**INSTRUMENTATION AND CONTROL SYSTEMS**

*Instrumentation*

*Automated safety control systems*

**RADIOACTIVE WASTE AND EFFLUENT MANAGEMENT**

Structure in the “ENGINEERING DESIGN”

Not only “cooling, sampling and analysis” but also other items such as “measurements and control systems” and “radioactive waste and effluent management” must be together under the “ENGINEERING DESIGN” because they are engineering aspects. “Operating experience feedback” is also one of engineering aspects in design.

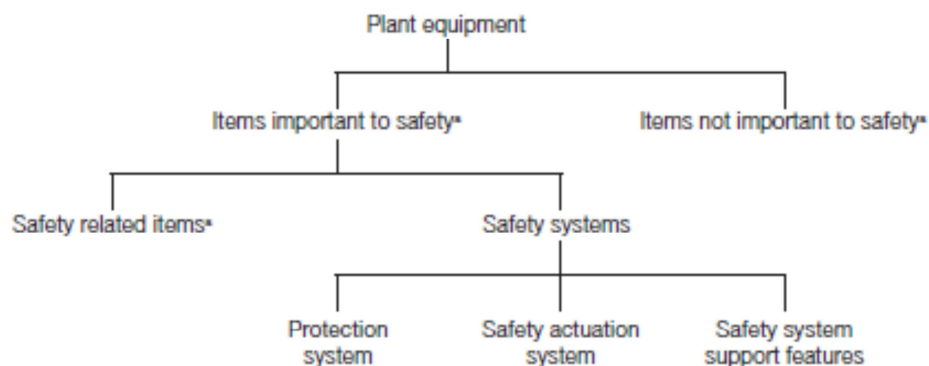
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**Attachment 2**

**Definitions of items important safety etc.**

Definitions in the IAEA/STI/PUB/1290 (2007), "IAEA Safety Glossary, Terminology Used in Nuclear Safety and Radiation Protection" are shown below.

**plant equipment**



\* In this context, an 'item' is a *structure, system or component*.

**item important to safety.** An item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public.

① Items important to safety include:

- Those structures, systems and components whose malfunction or failure could lead to undue radiation exposure of site personnel or members of the public;
- Those structures, systems and components that prevent anticipated operational occurrences from leading to accident conditions;
- Those features that are provided to mitigate the consequences of malfunction or failure of structures, systems and components.

**protection system.** System that monitors the operation of a reactor and which, on sensing an abnormal condition, automatically initiates actions to prevent an unsafe or potentially unsafe condition.

! This use of the term protection refers to protection of the plant (protection (2)).

① The system in this case encompasses all electrical and mechanical devices and circuitry, from sensors to actuation device input terminals.

**safety actuation system.** The collection of equipment required to accomplish the necessary safety actions when initiated by the protection system.

**safety related item.** An item important to safety that is not part of a safety system.

**safety related system.** A system important to safety that is not part of a safety system.

① A safety related instrumentation and control system, for example, is an instrumentation and control system that is important to safety but which is

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not part of a safety system.

**safety system.** A system important to safety, provided to ensure the safe shutdown of the reactor or the residual heat removal from the core, or to limit the consequences of anticipated operational occurrences and design basis accidents.

① Safety systems consist of the protection system, the safety actuation systems and the safety system support features. Components of safety systems may be provided solely to perform safety functions, or may perform safety functions in some plant operational states and non-safety functions in other operational states.

**safety system support features.** The collection of equipment that provides services such as cooling, lubrication and energy supply required by the protection system and the safety actuation systems.

! After a postulated initiating event, some required safety system support features may be initiated by the protection system and others may be initiated by the safety actuation systems they serve; other required safety system support features may not need to be initiated if they are in operation at the time of the postulated initiating event.

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**RUSSIAN FEDERATION**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	IV.1, IV.2	It is reasonable to transpose paragraphs IV.1 and IV.2	IV.2 has no more general meaning and thus should go first			Y	Not necessary to transpose both paragraphs as para IV.2 was deleted, see Japan comment no 4.
2.	IV.2	To exclude the words “or aggressions”	There is not agreed definition of the term “aggression”		Note, para IV.2 deleted, see Japan comment no 4.		
3.	IV.6	Cooling systems shall be designed for preventing coolant from leaking into areas with criticality hazard	In this working the requirement has more general sense.	Y			
4.	IV.10	Criticality accidents shall be prevented and controlled by design technical means	It should not rely only on managerial procedures			Y	The original text in IV.10 does not imply that safety will depend only on managerial procedures.
5.	IV.12	... The criticality safety... volume, nuclide composition	Editorial comment	Y			
6.	IV.16	In the criticality safety assessment,... shall be verified	Editorial comment			Y	In DS439, “address” is used in paras IV.16,

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
							IV.48, IV.77 and IV.11, “verify” is used in IV.46. Comparing their usage suggests that “address” is appropriate for IV.16.
7.		It is recommended not separate the section into <b>Occupation protection and Public Environmental Protection</b>	Separation in case seems not necessary here and could bring confusion because <i>Occupational protection</i> part contain not only occupational protection measures and the same for <i>Public and Environmental protection</i>		Retained the current structure and moved paras IV.22 & 23 under the title to imply general requirements.		
8.	IV.19-IV.26	It would be reasonable to add requirements for containment of <b>radioactive liquids.</b>	Only requirements for ventilation (containment of radioactive gas) are established in this section.		New para added to cover the exposure to leakage		
9.	IV.20	The last sentence should be	The last sentence does	Y			

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		deleted.	not have relation to the issue under consideration.				
10.	new para after IV.23	It would be reasonable to add here a requirement that <i>structural materials shall have strength properties sufficient for the technological process, provide for low sorption of radionuclides, shall be corrosion resistant to aggressive agents under radiation.</i>	These properties of the structural materials are important from safety point of view.			Y	Covered by NS-R-5 para 6.17.
11.	new para IV.23	It is reasonable to set a requirement that <i>shielding shall be designed taking corrosion into consideration/</i>	Corrosion is very important process that could gradually affect to safety features of the shielding.		Agree, following text added: <i>“The design and layout of shielding shall take into account of potential degradation, e.g. alkalization of concrete.”</i>		
12.	new para IV.23	It would be reasonable to add a new statements related to confinement of radioactive liquids (e.g., by tray, pallet, underpan).	The confinement of radioactive liquids (in addition to confine gas, i.e. ventilation) is the same important issues.			Y	IV.34 includes this comment. Therefore no detailed proposal required.

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostekhnadzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
13		In the design of the reprocessing facility it shall be ensured that radioactive liquids discharged from the reprocessing facility site are collected, treated and confirmed to be within authorized limits prior to discharge to the environment. The last sentence should be deleted because it does have no relation to the localization of radioactive substances.	The last sentence does have no direct relation to the safety aspects of discharge of radioactive substances.	Y			
14.	new para after IV.32	It would be reasonable to add the following requirements after IV.32: - to the extent possible, design shall provide for use of noncombustible or fire/resistant materials for structural elements of safety related systems; - measures shall be provided to exclude uncontrolled increase of temperature, ignition sources, leaks of inflammable liquids, and formation of explosive mixtures; - designed so that to be able to operate in the even design basis fire or explosion;	These requirements are important for fire and exposure safety of reprocessing facilities.			Y	We agree with these comments. However, for the following reasons it is not proposed to modify the text.  First sentence - It is not specific to reprocessing facilities. The requirements covering fire protection are included in the

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostekhnadzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<ul style="list-style-type: none"> <li>- technical means shall be provided for to prevent inflammation of vapors/gas mixtures;</li> <li>- confinement safety systems shall be with air and to prevent uncontrolled decomposition of mixture of organic substances with oxidants;</li> <li>- inter gases or air shall be used to prevent formation of potentially fire and explosion hazardous gaseous mixtures in the equipment;</li> <li>- uncontrolled mixing of processed materials shall be excluded;</li> <li>- one shall prevent sorption equipment from fracturing in the case of intensive gas emission;</li> <li>- fire-resistant cables shall be used.</li> </ul>					<p>general sections of NS-R-5.</p> <p>Second sentence - IV.28 includes its content. The detail should go to the Safety Guide DS360.</p> <p>Third sentence - It is not specific to reprocessing facilities. - It is an issue as a matter of course based on the definition of “design basis”.</p> <p>Fourth sentence - - IV.28 includes its content. - It is not specific to reprocessing facilities.</p>



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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
							Fifth sentence - IV.28 includes its content. The detail should go to the Safety Guide DS360.  Sixth, Seventh, Eighth and Ninth sentences - IV.28 includes its content. The suggested text is one measure to satisfy IV.28 The detail should go to the Safety Guide DS360.
15.	IV.31	A detection, alarm and/or suppression system shall be installed that is commensurate with the risks of fires and is in compliance with national requirements.	It would be reasonable to add a requirement that fire-alarm systems shall be provided.	Y			
16.	External Initiating	Flooding as a result of external event should be addressed here.	The list of events is not complete.			Y	Agree, but this is not intended to be

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechнадзор, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Events						a complete list of natural external events to be considered. These are covered in the general section of NS-R-5, para 5.5.
17.	Instrumentation and Control	It would be reasonable to add radiation control systems (radiation monitoring, control of contaminants, control of discharges and emissions, etc.)	Radiation control is an important part of safety control.			Y	The items in the comment are included App IV as shown below. - IV.8, 9, 72 include issues on monitoring. - IV.8, 9 include issues on contaminants. - IV. 9, 24, 25, 26 include issues on discharges and emissions.
18.	IV.47	The following activities shall, as a minimum, be performed: 1. During inactive commissioning: - Confirmation of the performance of shielding and confinement	During inactive commissioning it is difficult to confirm the performance of criticality control			Y	There are some ways to confirm the performance of criticality control measures

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>systems, including confirmation on the weld quality of static containment;</p> <ul style="list-style-type: none"> <li>- <del>Confirmation of the performance of criticality control measures;</del> criticality detection and alarm systems;</li> <li>- Demonstration of the availability of criticality detection and alarm systems;</li> <li>- Demonstration of the performance of emergency shutdown systems;</li> <li>- Demonstration of the availability of emergency power supply.</li> </ul>	measure in full.				during a cold commissioning, e.g. using simulated signal for control system, verifying characteristics of material and geometrical size for components. Even during a hot commissioning, we do not confirm the performance under the occurrence of criticality.
19.	IV.49	During commissioning, the safety committee shall include members with expertise in the design and construction of reprocessing facilities <b>and other specialists in appropriate safety issues.</b>	The safety committee should include specialists in different safety fields.			Y	Para IV.49 deleted as the requirements for the safety committee during operation, including commissioning is already covered in para 9.15.

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechnadzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
20.	IV.50	By the beginning of active commissioning...	All safety measures shall be ready before starting of active commissioning			Y	It is not always possible to confirm the full functionality of systems before the addition of activity.  The comment is inconsistent with NS-R-5 paras 8.9 and 8.16, which require conducting commissioning step by step.
21.	IV.59	Operating procedures shall include the action to be taken in the event when operational limits and conditions are exceeding.	Editorial comment			Y	The phrase 'in the event that' covers the term 'when'.
22.	IV.69	The inadvertent addition of water or neutralizing chemicals (often used for decontamination) to fissionable solutions, which can cause precipitation with a criticality risk, shall be prevented.	During operation should not be possible to unintentionally dilute solutions containing nuclear materials, or adding to them reagents, precipitating			Y	"Inadvertent addition" includes human errors, the original sentences is appropriate because it is hard

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			nuclear materials.				to prevent human errors 100%.
23.	IV.78	It would be reasonable to formulate as follows “- high level liquid waste shall be transferred into a solid and neutralized to enhance safety.	First, a liquid waste usually should be neutralized, and then be transferred to a solid condition, and not the reverse. Secondly, they not always should be neutralized before transfer to a solid condition. Thirdly, there is no need always to transfer a liquid waste to a solid condition for safety increase. As for high level liquid waste, solidification is quite right the statement about			Y	Para IV.78 deleted, see Japan comment no 46
24.	Section V.2	Section V.2. should be moved to follow after V.16. This section DESIGN should follow after IV.41.,	It is more logical structure of text. The Paragraphs IV.10-IV.41 deal with requirements that are			Y	Requirements in App V cannot be moved to App IV

**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			related to safety functions.				
25.	V.1-V.7	This section should be added with a requirement that <i>technical means for elimination of accidents consequences (removal of radioactive contamination of equipment, etc.) shall be provided by design.</i>	The elimination of accidents is an important part of safety systems and should be foreseen by design.		Agreed, following text was added: <i>“Consideration shall be given in the design for the clean-up or recovery of radioactive materials following incidents and potential accidents.”</i>		
26.	V.4	Containment shall be the primary method for ensuring confinement against the spreading of contamination. Containment can be provided by <del>two</del> complementary containment systems – static (e.g. physical barriers) and/ <del>or</del> dynamic (e.g. ventilation).	not always enough for ensuring confinement against the spreading of contamination, using only additional dynamic (for example ventilation) system of localization of failure.			Y	To maintain consistency with text in App II.
27.	V.8-V.14	This section should be added with a requirement that technical means and operational procedures shall be	These requirements seem to be added due to their importance for			Y	Acceptance of radioactive material received

**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		provided for: - acceptance and storage of SNF assemblies until processing; - control of delivered SNF assemblies to comply with data in the accompanying documents (specification or passport); - SNF handling operations.	safety operation of the facility.				at the facility and the safety of handling operations are covered by V.8 and V.5 respectively.
28.	Add after V.16	Waste collection must be carried out in specially designated areas in the manner provided in the facility design.	Radwaste collection as a part of radwaste management should be addressed.			Y	The requirements for the collection and segregation of waste are covered in NS-R-5 Ref [2].
29.	Appendix V, Section "Operation", Item "Criticality Prevention"	It would be reasonable to add the following text refers to the analytical laboratories: V.10. Mass of a fissile material should not exceed a threshold amount at workplaces (separate rooms). V.11. Vessels for sampling should have a volume that is scores of times less then critical volume. V.12. Acid and alkaline solutions after analysis should be accumulated in separate vessels.			Mass is an important criticality control parameter, but is not the only one. The requirement should not be restrictive.  Control of sampling vessels added		

**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: A. Gruskov, SEC NRS; S. Mikheenko, FSUE PA Mayak Page x of x Country/Organization: Russian Federation/Rostechndzor, ROSATOM Date: 30.05.2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		V.13. Decisions not to install criticality detection and alarm systems should be made only after risk assessment.			to para V.12.  New para added addressing the unintentional mixing of chemicals.  The requirements for criticality detection and alarm systems are covered in the general requirements in NS-R-5, specifically para 6.50		



**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

**SWEDEN**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Swedish Radiation Safety Authority Country/Organization: SWEDEN Date: 2012-05-25							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	IV.24 – IV.26  IV.59	--	Are these paragraphs really specific for reprocessing facilities? Seems general in nature??			Y	The comment is technically correct. However, Appendixes I, II and III have the same type of descriptions. If we delete IV.26, Appendix IV loses its balance for other appendixes. From this viewpoint it is better to keep IV.26.
2	IV.27	The following initiating events <i>and related requirements</i> shall be considered in the design of the reprocessing facilities	The proceeding paragraphs do not only contain initiating events but also requirements on measures to be taken (e.g. IV.30 and IV.32)			Y	Para IV.27 deleted, refer to Japan comment no. 22.
3	IV.38	Change <i>high active area</i> to <i>high radiation area</i>	We think the term specifies an area where the radiation level is high?			Y	The comment is no longer relevant as IV.38 was deleted, see Japan comment no 25.
4	IV.28	Change <i>zircaloy fines</i> to <i>small particles of zircaloy</i>	Clarity (the word fine is not generally known)	Y			
5	IV.70		The sentence is not really		Replaced		

**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Swedish Radiation Safety Authority Country/Organization: SWEDEN Date: 2012-05-25							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			clear – perhaps it could be split in two parts? We do not offer solution since we are not sure we understand the exact meaning		existing para with the following text: <i>“Depending on the risk arising from fissionable material accumulation a surveillance programme shall be developed and implemented to ensure that uncontrolled accumulation of fissionable material is detected and further accumulation is prevented.”</i>		
6	IV.78	Change <i>neutralized</i> to <i>chemically neutralized</i>	Clarity			Y	Para IV.78 deleted, see Japan comment no 46
7	V.5	Change <i>minimize doses to workers to keep the radiation doses as low as reasonably</i>	This is a more familiar way to express this in the radiation protection area. (The	Y			

**ADDENDUM TO NS-R-5**  
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**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Swedish Radiation Safety Authority Country/Organization: SWEDEN Date: 2012-05-25							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<i>achievable</i>	comment could be valid in other places of the document e.g. IV.20 although we believe in para. IV.19 minimise is perhaps the correct word?)				

**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

**SWITZERLAND**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: Pierre Multone		Page 1 of 1					
Country/Organization: Switzerland/Bundesamt für Energie		Date: 04/24/2012					
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	Appendix V, Para V.8, page 14	Procedures shall be developed to check the delivery information and the adequacy of the installation for handling, storage, and disposal of the material.	Wir sind der Ansicht, dass derartige Prozeduren im Prinzip nicht möglich sind. Zum Zeitpunkt der Entgegennahme des Materials liegen lediglich Informationen des Absenders vor. Eine physikalische Kontrolle ist erst anschliessend, nach der Übernahme, möglich.  We are of the opinion that these kinds of procedures are in principle not possible. At the time of receiving the material solely information about the sender is available. A physical control is only possible afterwards, after receipt.			Y	The term “Procedures” is a general term and characterization by the sender may be acceptable depending on the regulatory requirements.

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**UKRAINE**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: SE NNEGC “ENERGOATOM”		Page 1 of 1					
Country/Organization: Ukraine/Ministry of Energy and Coal Industry		Date:					
04/25/2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Paras IV.2, page 1, bullit 1	Safety aspects of storage and transportation (both from and to the site) of materials as well as of solid and liquid waste treatment	Waste treatment is missing			Y	Waste treatment is covered within the scope of the reprocessing facility, see introduction of Appendix IV, and would therefore be covered by the general siting requirements in both NS-R-5 and NS-R-3.
2	Paras IV.3, page 2, add new bullit	keep total risk during normal operation and accident conditions as low as reasonably achievable taking into account chemical hazardous materials	To take into consideration possible chemical hazards as well			Y	Agree with the comment, however, control of total risk, including purely industrial hazards, is outside the scope of the document, see NS-R-5 para 2.2.
3	Page 4, add new	In the design of a reprocessing facility appropriate zoning shall be	To ensure adequate measures against			Y	Agree, however already covered

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: SE NNEGC “ENERGOATOM”		Page 1 of 1					
Country/Organization: Ukraine/Ministry of Energy and Coal Industry		Date:					
04/25/2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	para following para IV.21	provided taking into consideration sources of ionizing radiation and radioactive contamination in different zones	spreading of radioactive materials and risk of radiation exposure				in general section in NS-R-5 para 6.39.
4	Page 7, para IV.47, add new bullet	Confirmation of the performance of dynamic barriers	Ventilation is missing			Y	The comment is technically correct. However, it could be said that the first bullet “confinement system” includes a ventilation system.
6.	IV.3, bullet 3	<b>Limit</b> radiation exposure during normal operation and accident conditions as low as reasonably achievable	Clarification of requirement			Y	In the text of NS-R-5, a term “keep” is used in the same sentences e.g. I.1, II.1 and III.1. Therefore, the term “keep” is appropriate.
7.	IV.33	During the design of a reprocessing facility, plant equipment used in a radiological environment shall be	Introducing of limits regarding to the occurrence of failures			Y	It is considered that the intent of the comment is

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: SE NNEGC “ENERGOATOM”		Page 1 of 1					
Country/Organization: Ukraine/Ministry of Energy and Coal Industry		Date:					
04/25/2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		suitably assessed for its actions or failure. Design failures should not result in decrease of safety level. Measures required for ensuring industrial safety of non-nuclear equipment, e.g. guards, fuses, seals, insulation, installed in glove boxes or hot cells shall be adapted to their radiological environment					covered by the first sentence in para IV.33. In addition, it is not clear what is meant by ‘Design failure’ in the Ukraine comment.
8.	IV.42, bullet 1	in normal operation to ensure that the process is being operated within the safety limits and to monitor <b>its impact on personnel and environment</b>	Requirement on personnel control is added			Y	Para 9.57 in NS-R-5 covers the requirement to monitor to protect the environment, and Para 9.46 from NS-R-5 covers the personnel specifically.
9.	IV.61, bullet 1	all incident/accidents/events and associated radionuclide releases and discharges	Discharges are added as one of the possible results of incidents/accidents/events			Y	This para was deleted by Japan comment no 41. However, this is covered by NS-R-5 para 9.18.
10.	IV.77	Heat generating high level waste shall be stored in facilities that address the need to maintain	Extension of requirement		‘Cooling’ replaced by ‘heat removal’.		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer: SE NNEGC “ENERGOATOM”		Page 1 of 1					
Country/Organization: Ukraine/Ministry of Energy and Coal Industry		Date:					
04/25/2012							
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		suitably reliable cooling or heat removal					



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**UNITED KINGDOM**

COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
1	General	The level of detail changes throughout the document. The criticality bits are more detailed than the radiological-perhaps that reflects the authors? No numerical criteria given for dose, discharge etc- possibly because it varies across the world. Would expect a new plant to be designed to minimise dose from seismic event eg Thorp was designed ~25 years ago for this.				Y	Only requirements which are not already covered in IAEA safety standards, including the general requirements in NS-R-5, are included in the Appendices.

**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
2	General	<p>I am unsure if, in it's entirety, these Appendices are comprehensive. I have highlighted in specific comments what it is lacking for the criticality area, but it looks to me there may be missing materials associated with radiological protection - you will hopefully be getting help/comments on that too.</p> <p>There should be cross reference to standards where applicable. Convention for this would be pointing to ISO standards where available, as their purpose is to provide detailed guidance and it would be fitting to do so in these Appendices. Specific ISO standards for criticality I would have expected to see were ISO-1709 (General principles of criticality safety), ISO-14943 (Administrative criteria), ISO-11320 (Emergency Planning) and, ISO-7753 (CID systems). If these are left out, then there is a</p> <p>danger of thinking this is all there is and there is in actuality a ton of definitive guidance missing. This is</p>				Y	<p>Only requirements which are not already covered in IAEA safety standards, including the general requirements in NS-R-5, are included in the Appendices.</p> <p>ISO 1709 and ISO 14943 are referenced in the general requirements in NS-R-5.</p>

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
3	General comment	<p>Relevance, usefulness and scope: the documents provide some useful, very high level prompts regarding important safety considerations for reprocessing facilities. A consequence of the high level approach is that several significant areas, particularly 'soft'/managerial issues receive only fleeting address. As a result of the approach taken the document would be more useful as an aid to senior management in the discharge of their oversight responsibilities rather than for 'front line' operational managers for whom the document lacks breadth and detail.</p> <p>Recognising the approach taken, i.e. to provide very brief high level prompts, there are opportunities to improve the completeness/clarity of the advice given without significantly extending the document and suggestions have been made in the attached Table.</p>			<p>Noted.</p> <p>Only requirements which are not already covered in IAEA safety standards, including the general requirements in NS-R-5, are included in the Appendices.</p> <p>Recommendations and guidance to be prepared for the Safety Guide DS360 may be more useful to the "front line" operational managers.</p>		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
4	Intro L2	i. Definition of “industrial scale” ii. include thorium	i. Need to know up front if it applies ii. thorium reactors also used.			Y	It is very difficult to define “industrial scale” strictly or quantity, e.g. using reprocessing capacity. Such definition might limit a facility for which the document applied. The document should not include reprocessing processes for a thorium cycle in its scope because of followings. <ul style="list-style-type: none"> <li>- Requirements have been discussed based on a PUREX process, not on thorium reprocessing processes.</li> <li>- We do not have enough technical information and knowledge on thorium reprocessing processes.</li> </ul>

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
5	Appendix IV – Design Section	more needs to be included on ALL operational states, Start-up, shutdown, wash-out, maintenance modes etc. <ul style="list-style-type: none"> <li>- more made of the fault tolerance, independency, engineering hierarchy, redundancy, diversity, resilience etc. Are these covered elsewhere?</li> <li>- Nothing on chemical reaction hazards e.g accumulation of material which may then react at once</li> <li>- The Engineering Design section is not comprehensive, cooling + sampling &amp; analysis only?</li> </ul>				Y	Only requirements which are not already covered in IAEA safety standards, including the general requirements in NS-R-5, are included in the Appendices.
6	IV.3 3 <sup>rd</sup> bullet	add text as follows "....during normal operation <b>and maintenance</b> as low as reasonably achievable."				Y	The definition of normal operation, see IAEA Safety Glossary – “Plant States”, includes maintenance.

**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
7	IV.3	Consistency in the use of terms".. as low as reasonably achievable..."	Define ALARA (ALARP used in UK)			Y	For consistency we use the term ALARA as defined in the IAEA Safety Glossary.
8	IV.6	...designed to <i>minimise the risk from</i> coolant leaking ...	Promotes consideration of a broader range of unwanted events and prevention/mitigation measures.	Y			
9	IV.6	...designated for criticality safety... <i>and areas in which dilution of acid may pose a criticality hazard via precipitation.</i>	Colloid formation another criticality hazard which could be caused by coolant leakage.		Agreed, the following text added to address the general intent of the comment: " <i>Cooling systems shall be designed to minimise the risk from coolant leaking into areas with a criticality hazard.</i> "		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
10	New Para IV.7	Cooling systems shall be designed to ensure thermal shock does not occur to components, either during heating or cooling.	Thermal shock can cause cracking in vessels, fittings and pipework.			Y	The integrity of cooling systems is covered by the requirements covering capacity, availability and reliability in existing para IV.5 and new para added below. The detailed consideration of thermal shock will be included in the reprocessing Safety Guide, DS360.

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
11	IV.10	<p>Above existing IV.10,: New mini-section suggested to be included as follows:  <b>"Criticality Safety</b>            IV.10 The design will, where practicable, integrate passive criticality safety design such as geometrically favourable vessels. Such design is in preference to the reliance on active safety equipment such as trips and automatic controls. The reliance on active controls that require human response and/or intervention should be minimised. It is noted that excessively complex engineering in favour of simple operational controls can be ultimately detrimental to the principle of ALARP, particularly when taking into account the needs of effective and minimised plant maintenance.</p> <p>IV.11 Where practical, the design should incorporate a safe means of intervention to terminate a criticality accident if it is considered a such an accident could continue or recur.</p>	Important to reemphasise hierarchy of protection.			Y	<p>The proposed sentences are too detail for requirements. It is appropriate that they go to the Safety Guide DS360 on safety of reprocessing facilities.</p> <p>NS-R-5 pars 6.6 and 6.49 contain descriptions on passive safety and hierarchy of design measures.</p>



**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
12	IV.12	..would also expect a reference flowsheet for all safety assessments  Suggested new para:  IV.13 A reference flowsheet shall be defined. This shall specify active and reagent feed compositions and flowrates. Faults of getting reagent flows or compositions incorrect with the potential to impact on criticality safety shall be assessed.	Important at the desing stage to ensure the flowsheet is defined and that any faults are understood so that protections can be designed in where necessary.	Y	Agreed, the following text was added: <i>“A reference flow sheet shall be defined. This shall specify active and reagent feed compositions and flow rates. Faults relating to incorrect reagent flows or compositions with the potential to impact criticality safety shall be assessed.”</i>		
13	IV.13	The terms “system interfaces” and “fissile material state” are vague.	Make meaning clearer		Footnotes added to provide clarification.		
14	IV.13	...unsafe geometry. .... It may be appropriate to design those vessels which do not contain high fissile concentration liquor under normal conditions but which may do under fault conditions to be geometrically safe, depending upon the identified faults and their likelihood.	Important to emphasise that vessels which designers might not expect to contain unsafe liquors can do under fault conditions (e.g. OML systems, Sellafield)			Y	Detail to be included in the safety guide DS360.

**ADDENDUM TO NS-R-5**  
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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
15	IV.16	New sentences after existing text..... This shall consider the potential for enhanced neutron reflection, moderation and/or dilution (and possible precipitation). Criticality considerations should not be the sole driver of the decision as to choice of extinguishant (e.g. the potential for offsite release of radiation following a fire should also be considered). Firefighters who may be expected to respond to fires in areas of criticality risk should be adequately trained.	Clarifies what potential effects of firefighting system need to be considered, not all may be relevant in different areas. Overall risk should be the ultimate driver, not one element of safety (criticality)			Y	Detail to be included in the safety guide DS360.
16	IV.17	...the effects, <i>singly and in combination</i> , of corrosion ...	Self explanatory: consideration should be given to synergistic inactions.			Y	It is not necessary to describe such combination one by one. Considering plural effects in a design is a matter of course if they affect the design.

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
17	New Para IV.19	In the criticality safety assessment, the potential use of poisons and their dilutions prior to addition to vessels, such as gadolinium or barium, shall be addressed.	It is important to ensure that the dilution of such materials remains above a calculated minimum value.		Agreed. Suggested text modified as shown to improve clarity in use of poisons. <i>“In the criticality safety assessment, the potential use of neutron poisons, such as gadolinium or barium, either during normal operations (e.g. to increase the safe mass of fissile material in a dissolver), or during deviations from normal operation, (e.g. dilutions), or during accident conditions, shall be addressed.”</i>		
18	New Para Iv.20  (or somewhere in document)	The design shall account for the potential for the plant control system to initiate faults and ensure that any safety equipment is independent of the control system.	If control system is not independent cannot be sure it will perform required safety function. Note this does not apply just to criticality faults!			Y	This is covered by the general requirements in NS-R-5. Note that independence is only one way of achieving reliability.

**ADDENDUM TO NS-R-5**  
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Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
19	New Para IV.21	In the criticality safety assessment, the dilution of poisons due to the use of ejectors or similar equipment, (including long-term condensation) shall be addressed.	It is important to ensure that the dilution of such materials remains above a calculated value, and is not further diluted during transfer processes, etc.			Y	See response to UK comment no 17, which covers dilution faults. This detail can be included in the DS360.
20	New Para IV.22	The shielding within the facility shall, where practical, be designed to reduce the dose to workforce from credible criticality accidents to below significant levels.	Magnox reprocessing plant at Sellafield designed this way, aligns with defence in depth principle and ALARP/ALARA.		Agreed, the following para was added: <i>“Within the design of the facility, consideration shall be given to further increase shielding, designed to address external exposure, to reduce the consequences of a criticality accident where practical.”</i>		

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COMMENTS BY REVIEWER				RESOLUTION			
Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
21	New Para IV.22	The ventilation system shall be designed to ensure that radiolysis of materials does not lead to an explosive environment. The system should also be capable of ensuring that aerosols, such as tritium vapour remain within environmental release criteria.	Radiolysis can lead to a build-up of hydrogen or other gases in tanks, etc, and can lead to an explosion.			Y	First sentence IV.21, 28 and 29 include this comment. Hydrogen accumulation is prevented not only by ventilation system but also a sweeping air (compressed air) system.  Second sentence IV.24 and 25 include this comment.

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22	Para IV.23	"..resistance to chemicals, <b>high humidity</b> , high temperatures..."	HEPA filters can be seriously damaged (suffer collapse) by water or water vapour ingress.		Agreed and reference to humidity added. Additional text suggested by Japan consultant as follows: <i>"The efficiency of filters and factors potentially damaging them e.g. their resistance to high humidity, chemicals, high temperatures and high pressure of the exhaust gases and fire conditions shall be taken into consideration."</i>		
23	IV.25	..their amounts ( <i>quantity and concentration</i> ) below ...	Self explanatory: 'amounts' does not make explicit what should be considered.			Y	Concentration is not always used as a limit. Details of how limits are set depend on case by case basis.

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24	IV.28	The use of <i>flammable</i> gases, liquids ...	There are very few gases that can accurately be described as explosive. This term should not be used to describe gases, e.g. fuel gases, which form explosive mixtures with air/oxygen.			Y	The term “explosive gases” is commonly used.
25	IV32	Extinguishing devices, automatically or manually operated, shall be installed in areas where a fire is possible. A detection and/or suppression system shall be installed that is commensurate with the risks of fires and is in compliance with national requirements.	IV 32 should have a similar final sentence as IV31			Y	Para IV.32 deleted as it is considered IV.31 covers suppression system.
26	Para IV.34	Delete “..given to equipment containing <b>concentrated</b> acid....”	Consideration should be given to the corrosion resistance of equipment against the envisaged concentration of acid in that equipment, and the effects due to extended residence times.	Y			

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27	Para IV.34	Add “This is to include leakage from liquid heating jackets to the nuclear material, and vice-versa.”	Leakage from heater jackets could dilute any poisons in the liquor, or vice-versa, nuclear material in cooling/heating jackets.			Y	IV.34 includes the content of the comment.
28	IV.34	..from corrosion, vibration, <i>erosion, and synergistic interactions thereof</i> , shall be implemented.	Self explanatory			Y	It is not necessary to describe such combination one by one. Considering plural effects in a design is a matter of course if they affect the design. If we would adopt this comment, we would have to apply this comment for all similar sentences, e.g. A, B, C --.
29	Para IV.35	“...event of internal flooding, <b>either from pipework or vessel failure, processing errors, or nature-induced events</b> ”	This specifies that all routes for liquors entering the plant are anticipated.			Y	These initiators are not specific to reprocessing, and would be considered as detailed guidance in the DS-360.



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30	IV.35	“as fully as practicable”	Need to say exactly what is required.			Y	Rejected as this phrase is not used in IV.35.
31	IV.37	..their adequate availability, <i>sustainability</i> and reliability ...	Fukushima learning	Y			
32	Para IV.37	Add “In the event of multiple facilities being simultaneously affected by a power outage, the safety case for each facility is to demonstrate that emergency electrical supplies are capable and available to run several facilities simultaneously. Also, if each safety case includes reliance on a single source (eg mobile generator), that source should not be claimed elsewhere for another facility.”	Self-explanatory, especially after the Fukushima incident.			Y	This requirement, whilst being very important, is not specific to reprocessing facilities. It should be captured, but located in the general section of NS-R-5. This can and should be done when NS-R-5 comes up for review.

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33	IV.40	..post-earthquake .. design to survive or withstand 0.25g ie design basis seismic event	Clarify			Y	This numerical figure is too specific and will depend on conditions at the particular site of the reprocessing facility. The existing para IV.40 specifies 'post earthquake', this implies that the instruments have survived.
34	IV.41	..the design <i>and siting</i> of items ...	Fukushima learning		Accept the comment, text now modified to read:  <i>'Extreme weather conditions shall be taken into account in the design (including the location) of items important to safety, in particular cooling systems associated with the storage of heat generating high level waste.'</i>		

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35	IV.41	Delete "...high level waste..." and replace with "radioactive material eg high level waste, intact irradiated fuel assemblies.	Make clearer			Y	The definition of 'high level waste' in the IAEA glossary covers spent fuel assemblies.
36	IV.42	Replace "variables" with "process parameters"	Clearer	Y			
37	IV.42	..within the safety limits, to <i>provide early indication of significant process deviations</i> and to ...	Self explanatory: the capability to identify the early signs of process parameters deviating from the normal range can make a significant contribution to nuclear safety.	Y	Following a comment from Japan, the following text was added: <i>"..within the safety limits, to provide indication of significant process deviations and to ..."</i>		

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38	IV.44	Safety interlock systems ... these should <u>not</u> be part of the plant control kit	Clarify DCS at Thorp not used in this way			Y	<p>It is not unusual that some interlock systems use sensors (e.g. pressure, temperature) which are common for normal operation. A requirement of 100% independence between a safety interlock system and a process control system is not realistic. Essential factor is not just "independence" but keeping necessary function".</p> <p>Independence is important and this is acknowledged in Annex II of NS-R-5.</p> <p>There does not appear to be an international consensus on the requirement to provide independence between control and safety systems.</p>

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39	Para IV.46 Footnote 1	Bring into main text ,Phased =staged	This is important and should be in the main text. Are footnotes part of the requirements?		Footnote moved into main text. "Stage" retained to be consistent with main text in NS-R-5.		
40	IV47.1 bullet 2	As is	Comment: This may be difficult for eg alpha and neutron monitors		Reference to where practical added to the requirement.		
41	IV.47.1 Footnote 3	Move to main text	Too important to be a footnote	Y			
42	Para IV.47	Add to final bullet: "...power supply, <b>and where necessary compressed gases bottle back-up.</b> "	Some reprocessing plants use various gases during the reprocessing operations. There may be other services which are required on a back-up basis to maintain plant safety during emergency situations, other than power.		New bullet added as follows:  <i>"Demonstration of the availability of any other support features e.g. compressed air supply, cooling."</i>		

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43	IV.48	At which stage in commissioning?	Make clearer			Y	The requirement is linked to the commissioning programme, it is not necessary to prescribe which stage. It would be for the operator to determine which stage is most appropriate.
44	IV. 48	New para:  Iv.49 Consideration needs to be given within the document for “Turn-Key” projects, and the intelligent customer aspects of such facilities, especially where the commissioning is carried out by a third party, rather than the operator of the plant. The eventual owner/operator should ensure they have confidence in the rigour of the commissioning process.	In some instances, the licence holder/operator may not undertake all the commissioning tests/operations.			Y	This proposal is not unique to reprocessing facilities and should therefore be incorporated into the general sections of NS-R-5 when it becomes available for review.

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45	IV.49	...and people with operations and safety background	Omission?			Y	Para IV.49 deleted as the requirements for the safety committee during operation, including commissioning is already covered in para 9.15.

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Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
46	New Para IV.51	In the event of phased commissioning, where the fuel is converted to liquid form (ie dissolved in acid) prior to chemical reprocessing, the safety case is to consider the possibility of delays in chemical reprocessing (due to commissioning delays to chemical plant, etc), and the effects such delays could impose on the stored liquors. Potential routes for processing these liquors at other facilities should also be considered. The inventory of liquors in such circumstances should not exceed the volumes considered in the safety case for each storage vessel, or the cumulative total for a facility. Storage vessels are to be designed such that a critical mass cannot form within the vessel due to settling of contents over an extended period, especially if no means of agitation exists within that vessel. Abnormal residence times in vessels should also be considered within the safety case.	In some instances, it can be up to a year before the dissolved fuel can be chemically reprocessed.			Y	To detailed for a requirements and should be added to the safety guide DS360



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47	IV.51	Shall confirm performance etc as in para IV.47 and identify...etc	Consistency and what done in practice			Y	The overall requirements for the commissioning report are covered in NS-R-5 para 8.17 and address the comment made.
48	IV.51		vague			Y	No proposed text offered.
49	IV.52	new paragraph after existing IV.52 as follows: "IV.53 A criticality accident alarm system shall be considered and should be installed if it provides an overall risk benefit"				Y	NS-R-5 para 6.50 covers the comment with the requirement to consider the provision of criticality detection and alarm systems.  Guidance is also provided on this matter, specifically the overall risk benefit, in safety guide DS407 on Criticality safety.

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50	IV.52	..and post commissioning	Clearer			Y	Requirements to consider emergency preparedness and response post commissioning, i.e. operation are covered in the general sections of NS-R-5.
51	IV.53	Fuel acceptance..	Vague		Acceptance criteria added.		
52	IV.54 second bullet	a) Para 9.14 b) add in operations/shutting down /shut down	a) clarify this reference b)Clarify			Y	IV.54 deleted. See Japan comment no 38.
53	IV.54	..shut down..	Need to define			Y	IV.54 deleted. See Japan comment no 38.
54	IV.55	Page 9, new paragraph to be inserted after "Facility Operation" title: "IV.56 Operations Management shall be responsible for the safety of operations"				Y	It is not specific to reprocessing plants. NS-R-5 paras 4.24, 8.6 and 9.5 etc include the comment.

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55	IV 56 onwards ....  (Appendix IV – Operation Section)	Nothing on training, competence, emergency staffing levels, maintenance, modifications etc. - Nothing on chemical reaction hazards e.g accumulation of material which may then react at once - Waste Management - would like to see the accumulation of mobile high level waste minimized (IV 77)				Y	The main text of NS-R-5 handles requirements on training, competence, emergency staffing levels, maintenance, and modifications etc.
56	IV.58	Is this nuclear materials safeguards and accountancy?			Yes. This para has been deleted, see Japan comment no 40.		

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57	Para IV.59	Add "...conditions are exceeded, or are likely to be exceeded in the current situation."	This enables corrective action prior to reaching the undesirable state.		Agreed with intent of the comment, text modified as follows:  <i>"Operating instructions and procedures shall include the action(s) to be taken in the event that operational limits and conditions are exceeded to ensure corrective action is taken to prevent exceeding of a safety limit."</i>		
58	New bullet Para IV.61	Any exports of nuclear material removed from the site.	Waste may be exported to a specialized repository off the site.			Y	This para was deleted by Japan comment nor 41. However, this is covered by NS-R-5 para 9.18.
59	IV.62		What about non-active eg solvent, reagents			Y	The wording in IV.62 does not exclude non-active reagents.

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60	IV.64	As is	Need to clarify what is meant by “independent” eg at Sellafield it is Safety and Reliability Section			Y	The text in IV.64 on independence is consistent with the main text of NS-R-5, see para 9.52.
61	IV.66	Why just inaccessible cells? Suggest rewording	Unclear at present.		Reference to inaccessible cells deleted.		
62	IV.67	Add: .... And to detect any such accumulations in locations judged to be credible.	Detection of Pu laden solvent (e.g. neutron monitoring) also important		Agreed, text modified as follows: “...and to detect accumulations in locations where necessary.”		
63	IV.69	The inadvertent addition of water, <i>weak acid</i> , or neutralizing chemicals	Low acidity solutions may also be of concern from precipitation perspective.	Y			
64	IV.69	..which can cause precipitation.. or a change in the process chemistry (e.g. failure to extract)....	Not just precipitation which is of concern.		Agreed, text modified as follows: “..or a change in the flow sheet conditions (e.g. failure to extract)”		

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65	IV.70	Suggest rewording: Tanks or vessels which are not safe by geometry and which are liable to the build-up of high fissionable concentration solids shall be periodically checked for build-up of fissionable material, after appropriate rinsing and draining (if this is carried out).	Wording unclear as present.		Agreed, the following text was added: <i>“Depending on the risk arising from fissionable material accumulation a surveillance programme shall be developed and implemented to ensure that uncontrolled accumulation of fissionable material is detected and further accumulation is prevented.”</i>		

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Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
66	New Para IV.72	A suitable means of detecting leaks from fissionable solutions which are above the safe infinite sea concentration shall be installed. This should take into account the potential for liquors to evaporate quickly if they leak onto hot surfaces.	Acute leaks from safe by geometry tanks a real concern. B205 evaporator leak did not reach the cell sump due to got surface causing evaporation.		Agree with the comment. It was decided at the consultation that this consideration fits best in the design stage. Text added to para IV.15 as follows:  <i>“Consideration shall be given to the potential for leaks to evaporate and increase in concentration, particularly if there is the potential to leak onto a hot surface.”</i>		

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67	New Para IV.73	An appropriate monitoring regime shall be set up for those areas where fissionable solutions which are normally safe by concentration could credibly leak and evaporate - potentially before reaching the cell sump.	Such 'chronic leaks' are assessed as a credible fault at Sellafield.		Agree with the comment. It was decided at the consultation that this consideration fits best in the design stage. Text added to para IV.15 as follows:  <i>“Consideration shall be given to the potential for leaks to evaporate and increase in concentration, particularly if there is the potential to leak onto a hot surface.”</i>		



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68	New Para IV.74	Non-fissionable reagents which are important to process chemistry should be assessed. If they could pose a criticality hazard if either the wrong composition or quantity is added their composition and quantity should be monitored as appropriate.	Important set of initiators for reprocessing plant is getting reagents wrong – changes process chemistry		Agree, with comment, new para added as follows:  <i>“Non-fissionable chemical reagents which are important to process chemistry shall be assessed. If addition of either the wrong composition or quantity could pose a criticality hazard then this shall be monitored and controlled as appropriate.”</i>		
69	IV.73	Delete interventions insert operations Administrative?	Not required Clarify		Interventions replaced by operations as suggested.  Administrative covers all non-physical measures to reduce dose exposure (e.g. minimising time and maximising distance).		
70	IV.74	Delete “carefully”	Vague-needs to be a bit more explicit	Y			

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71	IV.76	Add in hierarchy of waste generation	So that can keep it to a minimum			Y	The intent of the comment is covered in NS-R-5 para 9.54 "minimization of waste generation".
72	IV.78		The intended meaning of the sentence is not clear – is this referring to vitrification? Is this the only end state of relevance?		We agree, however this para has been deleted, see Japan comment no 46.		
73	IV.78	A new Emergency Preparedness sub-heading for the Operation section, after existing IV.78: Add new paragraphs as follows: <b>"Emergency Preparedness</b> "IV.79 The emergency plan shall be re-confirmed as adequate by means of periodic exercises and drills. Learning shall be gathered and used to improve the plan."				Y	Requirement to conduct exercises is covered in NS-R-5 para 9.66.

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74	Appendix V	This in my opinion needs a fundamental rethink - a present its very general - considering most criticality events have historically occurred during R&D. More needs to be made of the competence and training of personnel and an appropriate management structure to assess and authorize experiments. Lots of the information in Appendix IV would also be relevant			Noted.  Only requirements which are not already covered in IAEA safety standards, including the general requirements in NS-R-5, are included in the Appendices.		
75	V.1	ALARA?				Y	Consistency with App I-III
76	V.2	i Title "Containment ..." ii static/dynamic	I consistent use of terms "Confinement"?			Y	No reference to containment in V.2
77	V.3	i.doses –dose uptake ii title radiation (singular)				Y	No reference to dose in V.3
78	V.6	"containers with a favourable geometry and shall be stored in dedicated criticality safe areas"	As for entry against V.5.			Y	No reference to favourable geometry in V.6
79	V.6	Add "A fire detection <b>and suppression</b> system..."	Need to be able to deal with fire.	Y			

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80	V.8	Who decides if it is appropriately characterized and acceptable?	The terms are vague. If it means that the materials meet the Conditions of Acceptance (CfA) defined by the building then it is OK.		Responsibility defined and text added as follows: <i>“The operating organisation shall develop procedures to ensure that radioactive material received at the facility is appropriately characterized and acceptable before it is allowed to be stored or used within the facility.”</i>		
81	V.10	“only approved containers” - Should this be “only containers which are assessed and approved via a peer checked criticality safety assessment”.	Terms are unclear and who defines what are approved- the building/site in question? Does this apply to Pu Labs that are limited on inventory to much less than critical masses eg Phase 1 labs in NNL limited to 100g. Confirm Appendix V is aimed at pilot plant facilities?			Y	Requirement covered by NS-R-5 para 9.53.

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Reviewer:UK Organisations Country/Organisation: UK Date: May 2012							
Comment No	Para/Line No	Proposed new text	Reason	Accepted	Accepted but modified as follows	Rejected	Reason for modification/rejection
82	V.10	Add “only approved containers <b>(designed to be geometrically safe)</b> shall be used.”	Need to ensure containers are correct size or shape.			Y	The use of the term “approved” covers the requirement where appropriate to use geometrically safe containers. Note, that not all operations with liquids require safe geometry containers, e.g. low concentration solutions.
83	V.11	Add “..e.g. water, <b>inert gas</b> or powder..”	The use of inert gases should be a consideration	Y			
84	V.13	Add “ <b>Loss of services, including electrical and coolants</b> ”.	The emergency responses should also cover loss of services/amenities.	Y			

**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

**UNITED STATES OF AMERICA**

COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
<b>Appendix IV Comments</b>							
1	Page 1, Para IV.2, 2 <sup>nd</sup> Bullet	Modify bullet: The site shall be evaluated with respect to: <ul style="list-style-type: none"> <li>“the possibility for the environment to receive liquid or aerial radioactive and chemical discharges”</li> </ul> To: <ul style="list-style-type: none"> <li><b>Potential environmental impacts from liquid or aerial radioactive and chemical discharges.</b></li> </ul>	Accuracy and correctness of the expression and language. The term “possibility of the environment to receive” may not adequately express the intended requirement to assess potential environmental impacts.			Y	The whole of IV.2 was deleted, see Japan comment No. 4  Safety requirements for storage and transport are covered by NS-R-5 Ref [17], i.e. NS-R-3 para 2.9 and safety requirements for discharges are covered by NS-R-5 para 5.1.
2	IV.8/2	monitoring of radioactivity in fluid systems	Clarification, as the term activity could mean radioactivity or flow through fluid systems			Y	The original sentence is replaced by Japanese comment No.9.
3	IV.10/1	Criticality safety shall be ensured by means of preventive measures and, as far as reasonably practicable, criticality hazards shall be controlled by means of design	In NS-R-5 (para 6.43-6.51), and Appendix I of NS-R-5 (para 1.3 and 1.4), the terminology is focused on control of criticality hazards or		Para IV10 replaced to ensure consistency with paras NS-R-5 App		

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			prevention of criticality, rather than criticality accident prevention		I.3, II.3, III.3 and I.4, II.4 and III.4, which addresses the intent of the comment.		
4	Page 3, Para IV.10	Modify IV.10 IV.10. Criticality accidents shall be prevented and controlled by means of design, as far as is reasonably practicable.” To: <b>IV.10. Criticality accidents shall be prevented and controlled by means of design and <u>best available technology as is reasonably practicable.</u></b>	Design and <b>best available technology</b> should be concomitantly used to prevent criticality accidents. Certain designs may be realized after construction and operation to be inadequate to highly optimize prevention of criticality accidents; therefore best available technology may be needed to supplement old design features.			Y	The reference to “best available technology” in the comment relates to upgrading the design. This aspect is covered in the general safety requirements in NS-R-5, specifically paras 4.26 and 9.68.  Consideration of best available technology is part of the reasonably practicable demonstration.  Applying the best available technology

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				Date: 5/22/12				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection				
							is recommended, but not always an absolute requirement.				
5	Page 3, Para IV.19	Modify IV.19 IV.19. During normal operation, internal exposure shall be minimized by design as far as reasonably practicable. To read: <b>IV.19. During normal operation, internal exposure shall be monitored and minimized by design to be as low as reasonably achievable.</b>	Monitoring of internal exposure at reprocessing facilities is necessary to control internal exposure. Use of the concept "as low as is reasonably achievable" is more appropriate than "as far as reasonable practicable."		Monitoring is not considered to be part of design and is addressed during operation.						
6	IV.20	...with <del>safeguards</del> physical protection and material control and accounting staff ...	The term "safeguards" is not defined in the safety glossary (located at <a href="http://www-ns.iaea.org/standards/safety-glossary.htm">http://www-ns.iaea.org/standards/safety-glossary.htm</a> ). The design and layout of plant equipment will affect how physical protection may be applied to it (e.g., analysis of adversary attack scenarios,		Agree, sentence deleted – see comment Japan no 16.						



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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			establishment of material access areas, planning of detection and assessment systems, placement of fighting positions) and therefore the design stage of facility development is an optimum time for physical protection analyses to be afforded. In addition, the design and layout of plant equipment will have impacts on material control and accounting operations, with respect to the establishment a material balance area's physical perimeter within the facility.				
7	Page 4, Para IV.24	Modify IV.24 IV.24. Systems shall be provided for treating solid radioactive waste and liquid radioactive waste at the reprocessing facility.. To read: <b>IV.24. Systems shall be provided to minimize contamination.</b>	Minimization of contamination and radioactive waste generation in reprocessing facilities operation should be included under this requirement. This will			Y	Para deleted by Japan comment no 19. However, intent of suggested modification covered by NS-R-5 para 9.54.

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<b>generation of radioactive waste, and for treating solid radioactive waste and liquid radioactive waste at the reprocessing facility.</b>	establish consistency with NRC regulations under 10CFR 20.1406.				
8	IV.24	(Insert at end of section IV.24)  All discharges of waste, effluents and products from the facility shall be analyzed and those analytical results reported to material control and accounting personnel at the facility.	IV.26 presents the discussion for material control and accounting personnel at the a facility to be notified with respect to the liquid discharge analytical results from the facility. To be comprehensive in application of material control and accounting, all discharges (i.e, wastes, effluents and products) from the facility should be analyzed and those analyses sent to the material control and accounting personnel at the a facility.			Y	Para deleted by Japan comment no 19. However, NS-R-5 does not handle issues on accounting
9	IV.26	<del>Analytical results from such discharges shall be reported to material control and accounting personnel at the facility.</del>	This sentence is not necessary if comment 8 is accepted.	Y			
10	Page 4,	Modify IV.27	Completeness			Y	Para IV.27 deleted,

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Para IV.27	IV.27. The following initiating events shall also be considered in the design of the reprocessing facility: To read: <b>IV.27. The following initiating events shall also be considered in the design of the reprocessing facility to eliminate occurrence of such events as practicable:</b>					refer to Japan comment No. 22
11	Page 5, Para IV.33	Modify IV.33 IV.33. During the design of a reprocessing facility, plant equipment used in a radiological environment shall be suitably assessed for its actions or failure. To read: <b>IV.33. During the design of a reprocessing facility, plant equipment used in a radiological environment shall be suitably assessed for its adequate performance actions or potential failure.</b>		Y			
12	IV.38/1-2	Provision for in-service inspection and testing of equipment installed in high radiation areas shall be	The term active can mean motion. I believe the intent is to ensure			Y	The comment is no longer relevant as IV.38 is deleted, see

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		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		defined according to the national requirements on pressurized and/or vacuum equipment.	safety in highly radioactive areas or high radiation areas.				Japan comment 25.
13	IV.38/3-4	Safety measures to minimize the consequences of potential failures or leaks in high radiation areas shall be implemented	The term active can mean motion. I believe the intent is to ensure safety in highly radioactive areas or high radiation areas.			Y	The comment is no longer relevant as IV.38 is deleted, see Japan comment 25.
14	Page 6, Para IV.41	Modify IV.41 IV.41. Extreme weather conditions shall be taken into account in the design of items important to safety, in particular cooling systems associated with the storage of heat generating high level waste. To read: <b>IV.41. Extreme weather conditions, such as tsunami, flooding, tornadoes, hurricanes, etc; shall be taken into account in the design of items important to safety, in particular cooling systems associated with the storage of heat-generating high level waste.</b>	Examples would provide completeness and emphasis to address extreme weather conditions such as tsunami, flooding, and hurricanes.			Y	The specifics of the extreme weather conditions to be considered are covered in NS-R-5 para 5.5.
15	Page 7,	Modify IV.45	Minimization of			Y	The comment is not

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Para IV.45	<p>IV.45. The design of the reprocessing facility shall enable safe management of radioactive waste and effluents arising from operational states, maintenance and periodic wash-out of the facility. Due consideration shall be paid to the various nature, composition and activity level of the waste generated in the facility.</p> <p>To read:            IV.45. The design of the reprocessing facility shall enable <b>minimization of contamination and waste generation</b>, as well as safe management of radioactive waste and effluents arising from operational states, maintenance and periodic wash-out of the facility. Due consideration shall be paid to the various nature, composition and activity level of the waste generated in the facility. <b>Consideration shall also be paid to facilitate waste classification as well as storage or ultimate disposal.</b></p>	contamination and waste generation need to be considered under this requirement. Waste classification to facilitate storage and ultimate disposal is also an important aspect under this item if requirement.				<p>specific to reprocessing plants.</p> <p>First part 9.47 in NS-R-5 includes “minimization of contamination” 9.45 in NS-R-5 includes “minimization of waste generation” The descriptions of 9.47 and 9.45 have “as far as reasonably practicable”.</p> <p>Second part 6.35 in NS-R-5 includes “consideration of ultimate disposal ”</p>
16	IV.48/2	once operation	The term commercial is not used anywhere else	Y			

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			in NS-R-5				
17	Page 8, Para IV.52	We suggest modification of the title “Emergency Planning” to <b>“Emergency and Security Planning.”</b> We also suggest modification of Para IV.52 “The emergency plan shall be prepared, tested, and reviewed (Commissioned) prior to the introduction of radioactive material to reprocessing facility.” To read: “The emergency <b>and security plans</b> shall be prepared, tested, and reviewed (Commissioned) prior to the introduction of radioactive material to reprocessing facility.”	Synergy between safety and security needs to be addressed (see also general comment #1, p. 16)			Y	The synergy between security and safety is acknowledged in NS-R-5 in the background discussion to the IAEA Safety Standards which also includes a cross reference to the IAEA Nuclear Security Series. The provision of security plans is covered by this series.
18	Page 9, Para IV.54	Modify the bullets Under IV.54: <ul style="list-style-type: none"> <li>• Establish and maintain the quality of the interfaces &amp; communication channels between different worker groups within the reprocessing facility and between the reprocessing facility and other facilities both on-site and off-site;</li> <li>• In addition to meeting the</li> </ul>	Interface and communication with regulatory authorities during operation is important. Usually, resident inspector is designated by the regulatory authority, who needs to be involved and interfaced with during			Y	Requirements covering the communication between operator and regulatory body covered by NS-R-5 Para 9.20.

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>requirement of para 9.14, covering the minimum staffing for operation, define the minimum staffing level to ensure safety of the reprocessing facility in its shut-down state.</p> <p>To:</p> <ul style="list-style-type: none"> <li>Establish and maintain the quality of the interfaces &amp; communication channels between different worker groups within the reprocessing facility and between the reprocessing facility, <b>the regulatory authorities</b>, and other facilities both on-site and off-site;</li> <li>In addition to meeting the requirement of <b>NS-R-5</b> para 9.14, covering the minimum staffing for operation, define the minimum staffing level to ensure safety of the reprocessing facility in its shut-down state.</li> </ul>	<p>operation.</p> <p>The 2<sup>nd</sup> bullet should refer to NS-R-5 Para 9.14 for completeness.</p>				
19	Page 9, Para IV.55	Modify IV.55 IV.55. Procedures shall be	Receiving manifest of material in advance is			Y	For 1st bullet The proposed part is

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p>developed to ensure that radioactive material received at each facility is appropriately characterized and acceptable before it is allowed to be stored or used within the facility. The timescale of sample analysis and assessment shall be commensurate with any processing lag in the system.</p> <p>To:            IV.55. Procedures shall be developed to ensure that <b>radioactive material manifest is provided in advance</b> and material received at each facility is appropriately characterized and acceptable, <b>based on authorized limits and characteristics</b>, before it is allowed to be stored or used within the facility. The timescale of sample analysis and assessment shall be commensurate with any processing lag in the system.</p>	<p>necessary to avoid return of shipment and to designate a responsible party.</p> <p>Material is usually acceptable based on authorized limits and/or specific characteristics provided in the license.</p>				<p>one of procedures. It is better that such detailed procedure goes to the safety guide DS360.</p> <p>For 2nd bullet            The proposed part is a matter of course.</p>
20	IV.55	(Insert after first sentence.) If the radioactive material received	An important aspect of the acceptability of a			Y	The comment is on matters relating



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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		contains fissile material in a reportable quantity, any shipper receiver differences of the fissile material shall be appropriately resolved by the material control and accounting personnel at the facility, before acceptance of that material by the facility.	shipment of radioactive material is recognizing that all fissile material that is in the received shipment aligns with the shipper's declared values. This establishes the foundational numbers of the fissile material quantity at the facility.				accounting. (It is not a safety issue.)
21	Page 9, Para IV.58	Modify IV58. The operating organisation shall ensure control of, and be able to account for all nuclear material <b>on</b> the facility at all times. To: The operating organisation shall ensure control of, and be able to <b>document and</b> account for all nuclear material <b>at</b> the facility at all times.	Language			Y	Para deleted, see Japan comment no 40.
22	Page 9/10, Para IV.61	IV.61 Bullet #1 Modify <input type="checkbox"/> <input type="checkbox"/> all incident/accidents/events and associated radionuclide releases; To: <input type="checkbox"/> <input type="checkbox"/> all incident/accidents/events and <b>spills</b> associated with	Spills of radionuclides and chemical hazards are important aspects that need to be included under this requirement.  Waste classification			Y	This para was deleted by Japan comment no 41. However, this is covered by NS-R-5 para 9.18.

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				Date: 5/22/12 RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		<p><b>radionuclides and hazardous chemical</b> releases;            IV.61 Bullet #3            Modify</p> <ul style="list-style-type: none"> <li>radioactive waste inventory including those disposed or stored onsite;</li> </ul> <p>To:            radioactive waste inventory and <b>classification</b> including those disposed or stored onsite            IV.61 Bullet #4            Modify</p> <ul style="list-style-type: none"> <li>all inspection records and corrective actions.</li> </ul> <p>To:</p> <ul style="list-style-type: none"> <li>all inspection records, <b>audits,</b> and corrective actions.</li> </ul>	<p>before disposal and storage is necessary to be required before storage or disposal.</p> <p>Audit records and documentation is an important aspect which needs to be included.</p>				
23	IV.70/1-3	Periodic review of tanks, for which subcriticality is not guaranteed only by the geometry, shall be performed by appropriate means after draining and rinsing to ensure the lack of accumulation of fissionable material.	Writing to confirm a negative finding of contamination is not direct		Replaced existing para with the following text was added: <i>“Depending on the risk</i>		

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
					<i>arising from fissionable material accumulation a surveillance programme shall be developed and implemented to ensure that uncontrolled accumulation of fissionable material is detected and further accumulation is prevented."</i>		
24	Page 11, Para IV.76	<b>Waste Management</b> Modify Para IV.76 IV.76. Waste generation, treatment and storage shall be organised according to preestablished criteria and shall take into consideration both on-site storage capacity and disposal. To:	Waste minimization, segregation, and classification are important aspects of waste management for reprocessing facilities		Reference to waste generation now deleted as minimization is covered in the general section of NS-		

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		IV.76. Waste generation <b>minimization</b> , treatment, <b>segregation</b> , and storage shall be organised according to preestablished criteria and <b>waste classification scheme</b> and shall take into consideration both on-site storage capacity and disposal.			R-5.  Segregation not added as it is included in the definition of 'pre-treatment' – see IAEA Safety Glossary.  Reference to waste classification scheme added.		
25	Page 11, Para IV.78	Modify IV.78 IV.78. Liquid waste shall be transferred into a solid and neutralized to enhance safety. To: IV.78. Liquid waste shall be <del>transferred</del> <b>converted</b> into a solid and neutralized form to enhance <b>containment</b> and safety.	The intent of this Para is to convert (or transform) liquid waste into a stable form, rather than to transfer. In addition, containment of liquid waste is the key issue for safety.			Y	Para IV.78 deleted, see Japan comment no 46.
26	Page 11,	<b>Decommissioning:</b>	Completeness.		The activity in		

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
	Para IV.79	Modify IV.79 IV.79. Special procedures shall be implemented to ensure that criticality control is maintained in dismantling equipment whose criticality is controlled by geometry. To: IV.79. Special procedures shall be implemented to ensure that criticality control is maintained in dismantling <b>and decontamination of components and</b> equipment, particularly those whose criticality is controlled by geometry.	Decontamination is an important aspect of decommissioning that needs to be included to ensure safety.		Para IV.79 has been broadened to cover decommissioning and this activity includes decontamination, see IAEA Safety Glossary.		
27	Page 11 Last line	<b>Add a new Para IV.80 All equipment and facilities used in reprocessing shall be decontaminated and decommissioned in accordance with acceptable safety protocols and release criteria approved by the concerned regulatory authorities.</b>	This requirement is necessary to ensure cleanup and decontamination is carried out in accordance with criteria acceptable to the regulatory authority.			Y	Regulatory requirements covered by NS-R-5 paras 2.9, 3.7, 10.6 and 10.7 include the comment.
		<b>Appendix V Comments</b>					
1	V.2.	(Insert after the first sentence.) <b>If a</b>	The design and layout of			Y	Accounting and

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Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		reportable quantity of fissile material is anticipated to be present during facility operations, the design and layout of plant equipment shall be reviewed with physical protection and material control and accounting staff before being finalized and installed.	plant equipment will affect how physical protection may be applied to it (e.g., analysis of adversary attack scenarios, establishment of material access areas, planning of detection and assessment systems, placement of fighting positions) and therefore the design stage of facility development is an optimum time for physical protection analyses to be afforded. In addition, the design and layout of plant equipment will have impacts on material control and accounting operations, with respect to the establishment a material balance area's physical perimeter within the facility. The beginning of the sentence is changed from the				safeguards are out of scope of the NS-R-5.

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COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
			sentence as applied to reprocessing facilities due to the possibility of only a small amount of fissile material being utilized.				
2	V.8	(Insert after first sentence.) If the radioactive material received contains fissile material in a reportable quantity, any shipper receiver differences of the fissile material shall be appropriately resolved by the material control and accounting personnel at the facility, before acceptance of that material by the facility.	An important aspect of the acceptability of a shipment of radioactive material is recognizing that all fissile material that is in the received shipment aligns with the shipper's declared values. This establishes the foundational numbers of the fissile material quantity at the facility.			Y	Accounting is out of scope of the NS-R-5.
3	Insert after V.8. new section titled "Public and Environmental Protection"	All discharges of waste, effluents and products from the facility shall be analyzed and those analytical results reported to environmental protection and material control and accounting personnel at the facility (if a reportable quantity of fissile material is being utilized at the facility).	To be consistent with Appendix IV, this sentence discusses the action to consider discharges from the facility in respect to environmental protection concerns and material control and accounting (if appropriate).			Y	The requirement concerning environmental protection is covered by NS-R-5 para. 9.57.  Accounting is out of scope of the NS-R-5.

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		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
4	Page 14, Para V9	<p>Modify V.9</p> <p>V.9. An inappropriate response to a fire or explosion at the facility could increase the consequences of the event (e.g. radiological hazards including criticality, chemical hazards). Specific training and drills for personnel and external fire and rescue staff shall be organized by the operating organization.</p> <p>To:</p> <p>V.9. <b>Staff working on Fuel Cycle R&amp;D projects shall be qualified and well trained to handle radioactive materials and conduct tests/experiments based on pre-prepared safety procedures or protocols. In addition</b>, specific training and drills for personnel and specific training for external fire and rescue staff shall be organized and implemented by the operating organization. <b>The organization and staff</b> shall recognize that an inappropriate response to a fire or explosion at the facility could <b>substantially</b> increase the</p>	<p>In addition to training on fire hazards and rescues; the Para needs to emphasize training and qualification of staff to handle radioactive materials and experimental work using established safety protocols and procedures.</p>		<p>Following text was added:</p> <p><i>“Operators shall be qualified and trained to handle radioactive materials and conduct tests/experiments. In addition, specific training and drills for personnel and external fire and rescue staff shall be organized by the operating organization. The operating organization and operators shall</i></p>		



**ADDENDUM TO NS-R-5**  
**APPENDIX IV – REPROCESSING FACILITIES**  
**APPENDIX V – FUEL CYCLE RESEARCH & DEVELOPMENT FACILITIES**

COMMENTS BY REVIEWER Reviewer: United States of America Country/Organization: U.S. Nuclear Regulatory Commission				RESOLUTION			
		Date: 5/22/12					
Comment No. / Reviewer	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
		consequences of the event (e.g. radiological hazards including criticality, chemical hazards).			<i>recognize that an inappropriate response to a fire or explosion at the facility could increase the consequences of the event (e.g. radiological hazards including criticality, chemical hazards)."</i>		
5	Page 14 Para V.12	Modify V.12. Any wastes and residues arising from experiments or pilot processes, decontamination, or maintenance activities that contain fissile material shall be collected in containers with a favourable geometry and shall be <b>recorded and</b> stored in dedicated criticality safe areas.	Maintaining a record of fissile materials is an important aspect which needs to be mentioned under this requirement.	Y			

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6	V/25 (page 12)	facility and research and development personnel.	Undefined acronymn	Y			
7	Page 15, last line	<b>Add a new Para V.17. All equipment and facilities, including buildings, used in the Fuel Cycle R&amp;D operations shall be decontaminated and decommissioned in accordance with acceptable safety protocols and release criteria approved by the concerned regulatory authorities.</b>	This requirement is necessary to ensure cleanup and decontamination is carried out in accordance with acceptable criteria by the regulatory authority.			Y	The requirements concerning decontamination and decommissioning are covered by NS-R-5 paras. 10.1 to 10.15.
		<b>General Comments</b>					
1	General	The security aspect is missing from the document. Since the document is an addendum to NS-R-5 dealing with reprocessing facilities; it would be appropriate to address overlapping safety/security aspects presented under NS-R-5 of particular importance to reprocessing. In this context we suggest incorporation of safety/security aspects under the Section "EMERGENCY PLANNING." After incorporation of security aspects, this Section can	Security is of paramount importance for reprocessing facilities. The synergy between safety and security should be recognized and addressed as provided under generic NS-R-5 requirements. For example, NS-R-5 stated: " <u>Safety measures and security measures must be designed and</u>			Y	The synergy between security and safety is acknowledged in NS-R-5 in the background discussion to the IAEA Safety Standards which also includes a cross reference to the IAEA Nuclear Security Series. The provision of security plans is covered by this

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		be re-titled “EMERGENCY AND SECURITY PLANNING.” <i>(This comment also applies to Appendix V document).</i>	<u>implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security.</u> ” In addition, NS-R-5 II.39. stated “For MOX fuel fabrication facilities, specific attention shall be paid to the qualification and training of personnel for dealing with the radiological hazards (e.g. criticality, external exposure, contamination) and specific conventional hazards (e.g. fire), <u>security and emergency drills.</u>				series.				
		<b>Editorial Comments</b>									
1	IV.7/4	and in accident conditions,	Clarifying that sampling is necessary as required by material and accounting. As written it is not clear that there are two purposes for			Y	See Japan comment no 9.				

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			sampling.				
2	IV.12/7	<b>remain</b> within	The term “perform” could refer to performance of the studies described in this paragraph. The purpose of the studies is to ensure that the processes, once in operation, will remain within established limits.	Y	Agree. Text was modified as “ <i>are operated within</i> ”.		
3	IV.15/2 and 3	leaks of fissionable material (e.g. mis-transfer due to human error) or potential carry over (e.g. from evaporators).	Unclear as written and the use of e.g. set off by commas is inconsistent with the rest of NS-R-5.	Y			
4	IV.16/2	extinguishing media (e.g. water or powder) shall be	The use of e.g. set off by commas is inconsistent with the rest of NS-R-5 where examples are presented in parentheses.	Y			
5	IV.23/2	of the exhaust gases, and fire conditions	Clarity that filter efficiency and resistance needs to consider chemical, high temperatures, and fires	Y			
6	IV.28/1	fire, explosion, <b>and</b> excess internal pressure	There are three hazards that need to be considered: fire,	Y			

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			explosion, and excess internal pressure				
7	IV.28/4	and diluents, <b>and</b> hydrazine nitrate	Clarity	Y			
8	IV.33/4	Measures required for ensuring industrial safety of non-nuclear equipment (e.g. guards, fuses, seals, insulation installed in glove boxes or hot cells) shall be adapted to their radiological environment.	Unclear and inconsistent with the rest of NS-R-5 where examples are presented in parentheses	Y			
9	IV.40/1	Provisions ( e.g. instrumentation, support systems and procedures) for	Unclear and inconsistent with the rest of NS-R-5 where examples are presented in parentheses	Y			
10	IV.44/1	Automated safety control systems ( e.g. safety interlock systems) shall be	Unclear and inconsistent with the rest of NS-R-5 where examples are presented in parentheses			Y	The para was deleted by Germany BMU comment no 3.
11	IV.53/5	and wastes, <b>and</b> discharges generated.	Use of / is unclear	Y			
12	IV.54/4	of the interfaces <b>and</b> communication	Use and instead of &	Y			
13	IV.66/1-2	the location of neutron reflectors or connections of process equipment installed in inaccessible cells, the criticality	Unclear with first comma and use of “or” when it should have been “of”		Agreed. Text added as follows:  <i>“Prior to modifying the location of</i>		

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					<i>process equipment, or connections or neutron reflectors, the criticality assessment shall be updated to determine whether such change is acceptable."</i>		
14	IV.71/3	provision of equipment, and shall	Unclear without comma	Y			
15	IV.76/1	Waste generation, treatment, and storage	Unclear without comma if organization is two-fold or three-fold.	Y			