DS 509 Core Management and Fuel Handling for Research Reactors (Revision of NS-G-4.3)

COMMENTS BY REVIEWER Reviewer: Page. Country/Organization: Date: 24 October 2019					RESOLUTION			
Comment No.	Country Comment No.	Para/ Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/ rejection
General								
1.	Korea 1	Contents	Propose to insert the number of relevant paragraph in contents as follows: Background (1.1) Objective (1.2)	Propose the unified format of Contents for the uniformity and consistency with other Safety Guides.	X			
Section 1								
2.	Korea 2	1.3	1.3. The recommendations and guidance provided in this Safety Guide are intended to be applicable to research reactors, critical assemblies and subcritical assemblies ~~having a limited hazard potential for the public~~.	It is appropriate to specify the nuclear facilities to which this safety guide is applicable in section 'SCOPE'. And if the graded approach is included in this Safety Guide obviously, this sentence is not necessary.		X ...to research reactors, critical assemblies and subcritical assemblies, having a limited hazard potential for the public		This comment conflicts with comment from Germany to use hazard potential.
3.	Germany 1	1.3 Line 11	[…] Additional guidance that is beyond the scope of this Safety Guide may be necessary for research	It should be pre-defined which reactors are considered to have "low" or "high" power.	X			

			reactors of **higher ~~power levels~~** hazard potential ….	Research reactors are mainly low-power reactors. If the terminology "higher" or "lower" power reactors is used, it should be defined the boundary power in [W] between the both classes of research reactors. Only under this condition the statement "for research reactors of higher power levels" will have a sense and can be correctly applied. Or – "research reactors of higher hazard potential" should be used				
4.	Germany 2	1.3 To be added	The Guide refers mainly to water (H_2O or D_2O) cooled and water (H_2O or D_2O) moderated research reactors with thermal neutron spectrum. The document does not refer to the handling of medical and industrial radioisotopes produced in the research reactor.	We suggest to add this item to the scope, as this Guide is not dealing with research reactors on fast neutrons (molten salts or liquid metal or any others).		X 1.8...This guide does not cover the handling of medical and industrial radioisotopes produced in the research reactor.		Para 1.3 clarifies that the guide is applicable to research reactors having limited hazard potential for the public.
5.	Korea 3	1.3 1.8	1.3. … ~~The publication~~This Safety Guide describes the safety objectives, the tasks … 1.8. … Nuclear security and emergency preparedness and response are also not included in the scope of this ~~publication~~Safety Guide.	'Publication' and 'Safety Guide' are used simultaneously. It is preferred to use 'Safety Guide' rather than 'publication' when this is used to address the content of recommendation itself.	X			

				Publication may be used to compare other IAEA publication.				
6.	Germany 3	1.6	Guidance on core management covers: performing of core criticality and safety analysis, ~~the core calculations~~, experimental verifications, movements and change in fuel elements, and movements and change of other core components.	Clarification and further specification			X	Performing of "core criticality" is not clear, but core calculations are described in Sec 3, paras 3.4 to 3.14. Para 3.4 addresses safety analysis.
7.	Germany 4	1.6 Line 4	Guidance on fuel handling covers: receipt of fresh fuel assemblies; storage and handling of fresh and spent fuel assemblies and other core components	Handling of both fresh and spent fuel assemblies is important			X	"Spent" implies fuel assemblies that have achieved discharge burnup. The existing text is broader in scope and covers all fuel assemblies, including: fresh, partially irradiated and spent fuel assemblies.
8.	Ukraine1	1.6, 1.7	Guidance on fuel handling covers: receipt of fresh fuel assemblies; storage and handling of fuel assemblies and other core **components; inspection** of fuel assemblies; loading and unloading of fuel assemblies and core components; inspection of irradiated fuel; insertion and removal of other reactor materials, either manually or by means of automated systems; preparation of fuel assemblies for shipment; and loading of a shipping	The sentence is split into §1.6 and §1.7. It would be reasonable to combine these parts.	X			

			container with irradiated fuel assemblies					
9.	Ukraine 2	1.7	**inspection** of fuel assemblies; loading and unloading of fuel assemblies and core components; ~~**inspection of irradiated fuel;**~~ insertion and removal of other reactor materials, either manually or by means of automated systems; preparation of fuel assemblies for shipment; and loading of a shipping container with irradiated fuel assemblies.	It is suggested to delete "inspection of irradiated fuel" because "inspection of fuel assemblies" is already mentioned above.			X	It is useful to clarify inspection of irradiated fuel
10.	Korea 4	1.7	Delete '1.7' and modify subsequent paragraphs numbers	Typo error	X			
11.	USA 1	New para. 1.7		New paragraph begins in the middle of a sentence	X			Numbering was inadvertently changed
12.	Korea 5	1.11	1.11. … (see paras 2.15-2.17 of SSR-3 [1]~~, paragraphs 2.15-2.17~~) …	Unified format of referring the requirements and/or paragraph of SSR-3 is necessary, for example, paras 2.6-2.7 in Requirement 1 of SSR-3, paras 2.6-2.7 of SSR-3, and Requirement 3 of SSR-3.		X see paras 2.15-2.17 and Requirement 12 of SSR-3 [1]		The current approach is consistence with guidance from the standards specialist; however, all reference formats will be standardized at the final stage, as required..
13.	Korea 6	1.11	Propose to delete the footnote 4.	If the graded approach is included in this Safety Guide obviously, this sentence is not necessary.			X	The footnote provides useful additional guidance

14.	Korea 7	1.11	Propose insert below sentence in para. 1.11. ‘Each case in which the application of recommendation is graded shall be identified, with account taken of the nature and possible magnitude of the hazards presented by the given facility and the activities conducted.’	In order to clarify the graded approach concepts, safety guide have to address that background and rationale shall be identified and justified when the graded approach is applied to the facility and activities under consideration. (we can find a good example in the revised para 1.4 of SSG-37)	X			
15.	Korea 8	1.12	1.12. … In accordance with the category system discussed in SSG-24 [6], the level of stringency ~~describes for each of these categories the level of stringency that~~ should be associated with the design and analysis, construction, commissioning, documentation, review and final approval for modifications and changes.	It is appropriate to address the Standard Guide from the view point of its application rather than its description.		X The level of stringency that should be associated with the design and analysis, construction, commissioning, documentation, review and final approval for modifications and changes should be in accordance with the category system discussed in SSG-24 [6].		
16.	USA 2	New para. 1.12	SSG-24 [6] discusses a four category	grammar	X			

		item (a)						
17.	Finland 1	1.13.	This Safety Guide consists of ~~ten~~ <u>nine</u> sections and one annex. Sections 2 and 3 provide recommendations on a management system for core management and fuel handling and on the core management programme respectively. Section 4 identifies the best practices relating to the main aspects of the handling and storage of fresh fuel. Section 5 provides recommendations on refuelling activities. Section 6 provides recommendations on aspects of the handling, storage and inspection of irradiated fuel. Section 7 deals with the handling and storage of core components, in particular, those that have been irradiated. Section 8 provides general recommendations on the preparatory arrangements for the dispatch of fuel assemblies from the site. Section 9 provides recommendations ~~on administrative and organizational arrangements for core management, and Section 10 on~~ general aspects of documentation.	Editorial, section 10 is deleted.	X			
18.	Poland 1	1.13	This Safety Guide consists of ~~ten~~ *nine* sections and one annex.	There are 9 sections in new version	X			
Section 2								
19.	Korea 9	2.1	2.1. … ~~The management system documentation~~<u>The documentation of</u>	Propose easy expression			X	Editorial

			management system should describe the system that controls …					
20.	Korea 10	2.3	(e), (f), (g), (h), (i) → (a), (b), (c), (d), (e) respectively	Typo error	X			
21.	Poland2	2.4A.	"A defence in depth approach should be generally applied to safety related activities in research reactor operations, including core management and fuel handling." Defence in depth is not an approach, it is a concept,	Please reformulate or delete this sentence. In its current form the meaning is rather confusing.		X ...defence in depth concept		Revised to defence in depth concept.
22.	Finland 2	2.5	MANAGEMENT RESPONSIBILITY The operating organization is responsible for the overall safety of the research reactor facility while the reactor manager has direct responsibility for its safe operation [1, 7]. While in most research reactor organizations the reactor manager has direct responsibility for both core management and fuel handling, in some cases an analysis group may perform certain aspects of core management (e.g. design, safety analysis or predictions of performance). In all cases, the operational aspects of core management and the fuel handling activities at the research reactor site are the direct responsibility of the reactor manager. The reactor manager should participate in the core management and fuel handling activities by means of:	see below	X			Operating Organization. See below
23.	Finland 3	2.6	The operating organization is responsible for establishing clear lines of authority and communication among personnel involved in core management and fuel handling		X			Operating Organization. See below

			activities, for preparing and controlling implementation procedures, for the training and retraining of personnel as necessary, and for developing and nurturing a strong culture for safety.					
24.	Finland 4	2.7	The operating organization should ensure that approved procedures are put in place to control the various safety related aspects of core and fuel management, including: (a) Receipt, storage, handling, inspection and disposition of fuel assemblies and core components; (b) Recording of the locations, associated dose rates, physical condition and disposition of fuel assemblies and core components; (c) Core surveillance to meet the requirements for core management; (d) Tests to obtain values for core parameters such as those described in para. 3.20 of this Safety Guide (where appropriate); (e) Actions to be taken by reactor operators whenever core parameters are outside the specified limits and conditions for normal operation and corrective actions to be taken to prevent OLCs from being exceeded; (f) Independent review of the performance of the core and of proposals for significant modifications to components and procedures (see Ref. [6]); (g) Reporting and investigation of unusual occurrences, including root cause analysis;	The operating organization or senior management?	X			For consistency with other guides, the operating organization is retained as it includes senior management

			(h) Managing interfaces with nuclear security.					
25.	USA 3	New para. 2.8.1	Paragraph number should be 2.9 and all subsequent paragraphs should be renumbered	Incorrect numbering	X			
26.	France	2.10	If tasks are to be contracted out, the operating organization, including the reactor manager, should have sufficient knowledge of the work done to judge its technical validity and should know where to seek advice and assistance if necessary.	Core handling and fuel management should not be performed by subcontractors.			X	In some research reactor facilities, e.g. those with lifetime cores, the operating organization may need to contract out tasks such as beryllium shim adjustments.
27.	Ukraine 3	2.11	Personnel whose roles **are** ~~**not**~~ **dedicated** to the research reactor facility and personnel of external suppliers who perform core management or fuel handling activities should be appropriately trained and qualified for the work they are expected to perform.	There is no reason to train and qualify personnel not involved in core management or fuel handling activities. Therefore, it is suggested to replace "are not dedicated" with "are dedicated".			X	This is intended for support organizations who may not be dedicated to the RR facility but nonetheless support it in fuel related activities.
28.	Germany 5	2.11	Personnel whose roles are not dedicated to the research reactor facility and personnel of external suppliers who perform core management or fuel handling activities should be appropriately trained and qualified for the work they are expected to perform. Experienced and qualified personnel	We think that personnel should be instructed about possible scenarios during the handling procedures, which may lead to undesired events or accidents, as well	X			

			may be allowed to bypass training after obtaining an appropriate proof of their proficiency. However, they should in any case be instructed on the work to be done at the research reactor and they should be aware of the structure of the reactor core and of all possible scenarios during the handling procedures that can lead to undesired events or accidents.					
29.	USA 4	Para 2.13	However, it may become necessary to change the reactor core and core components during the operational lifetime of the research reactor ~~because of~~ for a variety of reasons, such as the need to change fuel assemblies or ~~because of changing experimental requirements~~ support different utilization activities (see the annex).	It's better to give examples because there are more reasons than the two given in the text for modifying a research reactor core.	X			
30.	Germany 6	2.15	Inspection, testing, verification and validation activities should be completed before the implementation or operational use of a new core design or experiment design or a new handling technique. The SAR should be updated accordingly	Clarification in order to underline importance of SAR			X	It is important to update the SAR but 2.15 is not the most suitable place for such guidance. Review and updating is addressed in 2.7, 2.9 and 3.35.
Section 3								

31.	Korea 11	3.6 (d)	Local and global power, fuel temperature, moderator temperature and void coefficients of reactivity ~~coefficients of temperature, power, pressure and void~~ over the normal operating range, for anticipated operational occurrences and design basis accidents~~transient conditions~~;	Reactivity is affected by fuel temperature, moderator temperature, and void coefficients, and their summation is power coefficient of reactivity. Pressure coefficient of reactivity does not exist. For consistency with other paragraphs, where the plant conditions are classified by normal operation, AOO and DBA. (Note that AOOs are a subset of transients)			X	The text is coherent with NPP guide DS497D, revision of NS-G-2.5, para 2.4. Transient conditions retained for consistency with first sentence of 3.6.
32.	Poland 3	3.8	and that it would remain shut down following all *failures or deviations from* normal operational ~~processes~~	Consistency with SSR-3			X	The text is consistent with SSR-3 para 6.143: …remain shut down in all operating states and accident conditions.
33.	Poland 4	3.12	(ideally, using ~~diverse~~ *disparate* people, tools and methods)			X ideally, by separate analysts using diverse ~~people,~~ tools and methods		For consistence with USA comment resolution on 3.12
34.	Poland 5	3.35	Prior to operating a core with *nuclear* fuels	Consistency within text	X			

35.	Korea 12	3.13	… in accordance with standard methods and procedures for the maintenance~~management and control~~ of software, which could include approval by a competent body before implementation.	'Maintenance' is generally used to represent the software development, change and update, implementation, and documentation during software life cycle.	X			
36.	Finland 5	3.29 A	3.29A. The fuel integrity programme should be developed so as to reduce radiation to levels as low as reasonably achievable.	fuel integrity programme or FEM in line with …..		X The fuel integrity monitoring programme...		FEM not clear.
37.	Germany 7	3.3 a)	[…] a) Validated <u>or certified</u> methods and codes should be used to determine appropriate positions in the core for locating the nuclear fuel, reflector …	There are countries where only certified codes are used for this purposes (e.g. Russia)	X			
38.	Germany 8	3.6 b)	[…] b) Location and reactivity worth of control rods for all core configurations, <u>burnup and Xe concentration</u>, including verification that the shutdown margin is in accordance with the OLCs;	Reactivity worth of the control rods depends on the level of the core burnup. By the determination of the shutdown reactivity margin must be considered the reactivity contribution of the Xe dynamics at the moment.	X			
39.	Germany 9	3.6 d)	[…] d) ~~Local and global r~~ <u>R</u>eactivity coefficients of <u>coolant, moderator and fuel</u> temperature, power, pressure and void over the normal operating range, and for anticipated operational occurrences and transient conditions;	Clarification and further specification		X Local and global reactivity coefficients of temperature <u>(for fuel, moderator and coolant)</u>, power, pressure and void		This guidance is useful for RRs with large cores that need to consider local as well as global reactivity coefficients. Clarification of reactivity coefficients in accordance with

								DS497D Rev of NS-G-2.5, para 2.4.
40.	Germany 10	3.8 Line 4	[…] This should be done to confirm that there is sufficient reactivity control at all times to ensure that …	Clarification	X			
41.	Germany 11	3.10 Line 7	[…] A conservative approach based on measurements of key core parameters (e.g. core multiplicity (K_{eff}) ~~critical mass~~, control rod worth, excess reactivity, shutdown margin) should be …	Clarification		X (e.g. core effective multiplication factor (K_{eff}), critical mass...		Clarity
42.	Germany 12	3.12 Line 4	[…] Independent cross check verification of the computational results (ideally, using diverse people, tools and methods)	Clarification		X Independent verification of the computational results		Independent cross check verification is redundant
43.	Germany 13	Page 19 3.17 c)	[…] c) Safety system settings to avoid damage to the n u c l e a r fuel or the core, with account taken of changes in core conditions due to fuel burn-up, Xe concentration or refuelling;	Xe dynamics must be taken always into account. Xe concentration can be minimum (Xe free state) or Xe- maximum or in between – Xe equilibrium. Usually all experiments are done by Xe-equilibrium concentration	X			
44.	Germany 14	3.19 Line 3	[…] If core conditions do not conform, ~~appropriate action should be taken to maintain the research reactor in a safe condition.~~ the reactor should be brought into a	Depending on the deviation from OLCs the reactor should be brought into controlled or safe state.		X […] If core conditions do not conform, appropriate action should be		Text retained for coherence with DS497D Rev NS-G-2.5 for NPP, para 2.17.

			controlled state/safe state. In case of reactor trip the situation should be analysed in detail. Only after finding the reason(s) of the deviations of the safety reactor operation conditions, can follow the re-start-up activities.			taken to maintain the research reactor in a safe condition In case the predicted conditions cannot be met, corrective actions should be taken in accordance with the limiting conditions for safe operations.		Controlled state/safe state are defined in the glossary as plant states following AOOs. Instructions for actions to be taken on a reactor trip are given elsewhere. (see NS-G-4.4 para 3.21)
45.	Germany 15	3.19 f)	[…] f) Coolant and m~~M~~oderator temperature and mass flow;	There are research reactors with separated primary loops – one or more for the coolant and another one or more for the moderator.			X	Redundant (e) covers coolant temperature and mass flow
46.	Germany 16	3.20 b)	[…] b) Coolant and moderator flow rates are within specified limits;	Clarification (see Comment to 3.19 f))	X			
47.	Germany 17	Page 21 3.20 d)	[…] d) Temperatures of coolant, moderator and core components are as expected.	Clarification (see Comment to 3.19 f))	X			
48.	Germany 18	3.22	Parameters such as coolant and moderator temperatures, coolant and moderator flow rates, neutron flux and, when appropriate, coolant and moderator pressures should be measured and displayed appropriately to the operator.	Clarification (see Comment to 3.19 f))	X			

49.	Germany 19	3.24	Methods and acceptance criteria should be established for assessing measured core parameters and correlating them with other parameters important to safety that cannot be measured directly, such as maximal ~~internal temperatures of~~ fuel and maximal cladding temperatures, and …	The wording ‘internal temperature of fuel” is not correct in this context.			X	The text is consistent with accepted text in DS497D Rev NS-G-2.5 for NPP, para 2.22
50.	Germany 20	3.28 Line 15	[…] ~~Subcritical assemblies may not require cooling for heat removal, but such provisions should be applied to the fluids contained within subcritical assemblies to preserve the fuel elements and avoid radioactive releases.~~	Not necessary to add specific guidance for sub-critical assemblies here. This sentence creates more confusion rather than providing guidance			X	It is important to include guidance for a range of subcritical assemblies as they are now covered by SSR-3 and this guide.
51.	Germany 21	3.38	To assess the behaviour of a new or modified design of fuel assembly under the conditions to be expected in subsequent refuelling, a programme using a lead test assembly ~~(LTA),~~ in which …	Clarification and further specification			X	Lead test assembly is not defined in the glossary and the term is not used in all MSs.
52.	Germany 22	3.44 a)	[…] a) Fuel burn-up, including power ~~fission~~ density limits and consequential structural and metallurgical limitations;	Clarification			X	Fission density limits is more commonly used in research reactors, while power density is used in NPPs.
53.	Ukraine 4	3.46 (d)	Demonstration that if the control rod with the highest reactivity worth is in the fully withdrawn position and	In §3.46(c), the term “experiments” is replaced with “experimental devices”.	X			

			movable **experimental devices** and irradiations are in their most reactive conditions, the core meets the OLCs for shutdown margin;	Here the term "experiments" is used to refer to experimental devices. Therefore, it is suggested to replace "experiments" with "experimental devices" as well.				
54.	USA	Para. 3.3, item (d)	The integrity of the fuel cladding ~~of the fuel assembly assemblies~~ should	Simplify text and recognize that some research reactors do not use fuel "assemblies".	X			
55.	USA	Para. 3.4	considered in the current safety analysis, ~~a more comprehensive~~ the analysis should be ~~performed~~ updated to include the changes and new conditions to ensure that the research reactor continues to be operated within the OLCs with adequate margin	Clarify that the analysis needs to reflect the changes and new conditions.		X considered in the current safety analysis, a more comprehensive analysis should be performed considering the changes and new conditions to ensure that the research reactor continues to be operated within the OLCs with adequate margin		Clarify.
56.	USA	Para. 3.6,	occurrences and ~~transient~~ accident conditions arising from postulated initiating events	These parameters should be understood for all credible			X	"transient conditions" text is consistent with similar guidance in

		item (d)		conditions, including accidents.				NPP guide DS497 Rev NS-G-2.5, para 2.4
57.	USA	Para. 3.8	Replace “and” in the last line.	grammar	X			
58.	USA	Para. 3.12	ideally, by separate analysts using diverse ~~people,~~ tools and methods	Clarity. The phrase “diverse people” does not necessarily convey the message of independence.	X			
59.	USA	Para. 3.13	include approval by the safety committee, regulatory body or another ~~a~~ competent body before implementation	Provide examples of competent bodies.	X			
60.	USA	Para. 3.16, item (o)	Reactivity, chemical and physical effects of failures in experimental devices	Chemical and physical effects of experiment failures are also important for ensuring safe operation.	X			
61.	USA	Para. 3.18	within OLCs and that facility personnel will be alerted in a timely manner to the need for any corrective action ~~can be taken when necessary~~	Focus on equipment requirements and not human performance.			X	Retained for consistent with para 2.16A of DS497D.
62.	USA	Para. 3.23	neutron flux, ~~and~~ temperatures ~~of core materials~~, pressures and flow rates	It’s better to leave temperatures general in this case because the list is measured parameters and the temperature of core materials, such as fuel cladding, are not necessarily measurable.	X			

63.	USA	Para. 3.25 A	and ~~efficiency~~ operation of the means of shutdown of the reactor.	Clarity.			X	Consistent with DS497D revision of NS-G-2.5.
64.	USA	Para. 3.28	Subcritical assemblies may not require cooling for heat removal but ~~such~~ provisions such as those describe in item (b), above, should be applied to the fluids contained within subcritical assemblies to preserve the fuel elements and avoid radioactive releases	Be more specific about the relevant provisions	X			
65.	USA	Para. 3.29 A	The fuel integrity programme should be developed so as to reduce radiation to levels as low as reasonably achievable	It is unclear what is meant by "fuel integrity programme".		X The fuel integrity monitoring programme		Consistency with DS497D revision of NS-G-2.5, para 2.28
66.	USA	Para. 3.30	This background level is caused by ~~'tramp'~~ fissionable material ~~(i.e. fissionable material~~ remaining on the outside surface of the cladding from the manufacturing process~~)~~ and results in a ~~necessarily~~ small, often even undetectable activity	Clarity. Remove unnecessary jargon.	X			
Section 4								
67.	Germany, 23	4.6 b)	[…] b) Safety system settings and measurements of control rod drop times <u>or injection of borated water;</u>	There are research reactors with special channels for a fast injection of borated water.		X 3.46 (b)		
68.	Germany, 24	4.18	Inspections should <u>apply non-destructive testing methods (e.g. neutron or gamma spectrometry or</u>	Further specification		X Inspections should not damage the fuel		For clarity

			any other) ~~neither damage the fuel assembly nor~~ and should not introduce any foreign material into it.			assembly (e.g., apply non-destructive testing methods such as. neutron or gamma spectrometry or other techniques) ~~neither damage the fuel assembly nor~~ and should not introduce any foreign material into it.		
69.	USA	Chapter 4	Use the more general term “fuel” instead of “fuel assemblies”.	Not all research reactors use fuel in the form of “assemblies.” Recommend that this be a global change in the document except when the guidance is specifically related to fuel assemblies, such as precautions for removing individual fuel rods or plates from an assembly.		X		The text has been accepted previously with revision by amendment in accordance with DPP. The guide will be harmonized at the final stage, as required.
Section 5								
70.	Turkey 1	5.17	Bullet (p) can be written as "(p) ... handling incidents and accidents."	There might be cases where the situation can be beyond the incident. Therefore the term "accident" should be added to the expression to			X	In the IAEA glossary ‘Incidents’ includes initiating events, accident precursors, near misses, accidents and

				cover the whole range of abnormal situations.				unauthorized acts (including malicious and non-malicious acts).
71.	Poland 6	5.5	Dummy or test fuel assemblies should be clearly distinguishable, even when ~~are~~ *placed* in the core.		X			
72.	Ukraine 5	5.1	The refuelling process described in paras **3.40–3.46** of this Safety Guide will form the basis for a programme which should be implemented by means of approved procedures that specify in detail the sequence of the operations to be carried out.	Wrong reference to §§3.39-3.45. It should be replaced with 3.40–3.46.	X			
73.	Ukraine 6	5.2	Only approved nuclear fuel (see paras **3.26–3.27** of this Safety Guide) should be loaded into the reactor core.	Wrong reference to §§3.25-3.26. It should be replaced with 3.26– 3.27.	X			
74.	Germany, 25	5.15 c)	[…] c) Damage to a fuel assembly due to lack of proper cooling, <u>oxidation or CRUD;</u>	Further specification			X	The intent of para 5.15 is to address issues that could arise from inadequate handling. Oxidation or CRUD are not likely to be caused by improper handling, but result from operating conditions during irradiation.

75.	USA	5.15	inserting ~~defective (damaged)~~ fuel into the reactor core that is damaged or not within the limits specified in the OLCs or supporting analysis in the SAR.	Only fuel that is within the bounds of the safety analysis should be used in the core.	X			
Section 6								
76.	Korea 13	6 (All numbering)	Change numbering '1.1, 1.2, …, 1.20' to '6.1, 6.2, …, 6.20', respectively	Typo error	X			
77.	Korea 14	6.1	(subcritical assemblies are … might not be applied~~apply~~).	To Passive sentence			X	Editorial
78.	Germany 26	1.1	Section 6 Page 39 1.1 Fuel assemblies that have been utilized in the reactor will be highly radioactive and will contain radioactive major and minor actinides, and fission products that are retained in the irradiated fuel assemblies.	Further specification		X … will contain radioactive actinides, and fission products that are retained in the irradiated fuel assemblies.		
79.	Poland 7	Sections 6, 7 and 9	The numeration in sections 6, 7 and 9 should be corrected to 6.1, 7.1 & 9.1 etc.		X			
80.	Ukraine 7	Chapters	6.1, 6.2,… 7.1, 7.2,… 9.1, 9.2,…	Wrong paragraph numbering: 1.xx.	X			

		6, 7, 9						
81.	Ukraine 8	6.9	A surveillance programme should be put in place to ensure the integrity **(or concentration)** of any neutron absorbers used for irradiated fuel storage units.	Term "integrity" is not suitable for dissolved neutron absorbers. It is suggested to add "or concentration" to account for this method of absorber control.	X			
82.	USA	Chapter 6	Fix the paragraph numbering	Numbering is incorrect.	X			
83.	USA	6.25, item (f)	protect operators against radiation exposure	Clarity	X			7.5 (f)
Section 7								
84.	Korea 15	7 (All numbering)	Change numbering '1.21, 1.22, …, 1.28' to '7.1, 7.2, …, 7.8', respectively	Typo error	X			