Resolutions on Member States Comments on DS396
Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report

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CANADA

Atomic Energy of Canada Limited

Questions and Comments relating to:
Draft - Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report (DS396)

COMMENTS BY REVIEWER Reviewer: Country/Organization: **AECL** Date:				RESOLUTION			
Comment No.	Page No., Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	3, 1.8/4	Suggest changing the last sentence to read as follows: "The guidelines are also applicable to a revised and updated safety assessment for life extension of an existing reactor."	Clarifies the intent and makes it consistent with Paragraph 1.11.	Y			
2	3, 1.10/1	Suggest changing the sentence to read: "… capacity of up to a few hundreds of megawatts."	As written, this guideline would not be applicable to the AECL's NRU reactor at Chalk River laboratories. Based on the public risk potential applying the rules for power reactors would not be appropriate.	Modified	……., additional guidance for the safety analyses, preparation of the safety analyses report and licensing process of high powered or otherwise advanced or complex research reactors is provided in the IAEA safety publications for power reactors1. The use of the safety publication for power reactors requires also that a graded approach (NS-R-4, paras		The Safety Guide focuses mainly on research reactors of capacity of up to a few tens of megawatts. For RR with a higher power level, and normally with a higher associated risk, additional guidance (using graded approach) should be sought for in the NPP guides

[1] Further guidance on the preparation of safety analysis for research reactors with bigger potential hazard can be found Refs **Error! Reference source not found.**3] and **Error! Reference source not found.**[4].

					1.11-1.14) is applied in implementing the recommendations based on the potentioanl hazard of the research reactor.		
3	5, 1.18/2	"deterministic and probabilistic methods"	Probabilistic methods should not be excluded as they can provide significant support to making the safety case and operational insight. This is then consistent with Paragraph 3.28.		A footnote has been incorporated		1.18 gives an overview of the content of the annexes. The footnote clarifies that probabilistic techniques are not excluded as presented also in paras 3.27 and 3.28.
4	13, 2.30	This section should include requirements to test the shutdown capabilities of the reactor.	The safety analysis needs to demonstrate that the reactor can be shutdown under all credible normal, abnormal and design basis accident conditions. This links back to earlier requirements in this document for the operator of the reactor to have control of the reactor at all times.	Y			
5	25, 3.21/2	"…. and auditable as appropriate. Examples of such methods are Hazard and Operability (HAZOP) studies and Failure Modes and Effects Analysis (FMEA)."	Need to provide specific examples of methods as most safety cases simply use the list provided in Table 1 of this document. Without a structured approach, there is a danger of missing some new initiating events, especially for novel reactor designs.	Y			
6	27, 3.29/1	"A typical PIE classification based on initiating frequency,	There is a continuum of events and event sequences	Y			

		preventive mitigating system failure likelihood and potential consequences of resulting event sequences should be developed to determine the following:"	depending on probability/frequency and consequences that must be examined in detail to demonstrate the acceptability of the design and operation of the reactor.				

EGYPT

Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report
DS396

COMMENTS BY REVIEWER Reviewer: **Moustafa Aziz** Page.... of.... Country/Organization: **Atomic Energy Authority - Egypt** Date:				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1		The document discusses safety assessment in research reactors in different areas such as safety assessment in the licensing process, preparation of the safety analysis report , performance of the review and assessment and contents of the safety analysis report, My Question Can the document also discusses the concept of graded approach in safety assessment for which the level of analysis , documentations and actions are commensurate with the potential hazard associated with the facility without affecting safety ?		N			The application of graded approach is discussed in 1.13, with a reference to NS-R-4 paras 1.11-1.14). A new SG on graded approach is under development.
2	A.10.4	Information concerning the management of irradiated fuel should be provided ,i.e. the activity , decay rate, fuel burnup history ,refueling frequency , and storage requirement including that for damaged fuel as appropriate.	information should be corrected to " information " the irradiated fuel needs to define the fuel burnup history so fuel burnup history is required	Y			
3	A.15.1	The commissioning program	Some details of	Y			

		shall therefore be divided into stages which are usually according to the following sequences: Stage A: tests prior to fuel loading Stage B: fuel loading tests , initial criticality tests and low power tests. Stage C: Power ascension tests and power tests	information about the commissioning program should be added to para A.15.1. The detailed programs are given in all Chapters and my opinion is to added some details of commissioning program.(Stage A,B,C)				
4	A.16.6 page 76 Line 8	(i) Reactor kinetics parameters	Reactor Kinetic parameters is required in the analysis	Y	Incorporated		

FINLAND

Finnish comments on DS396

COMMENTS BY REVIEWER Reviewer: Page 1 of 1 Country/Organization: Finland Date: 17.12.2009				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection

General remark: The draft is a very comprehensive compilation of recommendations which have to be taken into account when evaluating the safety and preparing a SAR for a research reactor. In Finland we have at the moment only one pool type unpressurized research reactor, but considering the commonly used principles of graded approach and engineering judgment also we consider this document as an excellent reference for our developing purposes.
Therefore, we support in finalizing this draft according to the IAEA procedures.

FRANCE

There are no comments from France on DS396 related to Safety Assessment of Research Reactors

GERMANY

Draft DS 396 "Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report" Aug. 2009

COMMENTS BY REVIEWER Reviewer: **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), GRS, VdTÜV** Page 1 of 5 Country/Organization: Germany Date: 18.12.2009				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	General	Many paragraphs actually refer to reactors instead of research reactors (especially APPENDIX and ANNEXes). Specification of the reactor type is necessary in order to avoid misunderstandings.		Y			
2	General	In the following paragraphs comma is missing: 2.7/4; 2.27/1; 3.2/11; A.3.14/1; A.4.1/3; A.5.12/1; A.5.14/6; A.5.16/1; A.5.23/1; A.8.13/1; A.10.1/5; A.10.1/10; A.11.3/4; A.11.5/1; A.12.12/1&3; A.12.23/6; A.17.6/4; A.20.1/1; I-1.2/2; I-1.6/2; I-1.13/11;		Y			
3	General	The Safety Guide DS396 refers often to a "graded approach" (e.g. 1.1., 1.3., 1.10. or 1.12.). This should be harmonized with the Safety Guide DS351 "The Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors".			Consistency has been checked but a reference to DS 351 cannot be made yet, since this Safety Guide will be published earlier than DS 351		

4	General	The Safety Guide DS396 refers throughout the document to the requirements stipulated in NS-R-4 "Safety of Research Reactors". As a designated Safety Guide, DS396 expresses only "should" recommendations. It should be stated clearly that it is international consensus that it is necessary to follow the recommendations and guidance of DS396 to be able to comply with the safety requirements.		Y			In every Safety Standard information regarding the Safety Standards, the development process, their application and interpretation of the text is added. This will be done after approval by NUSSC for publication.
5	1.2/3	Where applicable references (…)"	Typing mistake	Y			
6	2.1/2	"(...), the highest safety standards, (...)"	It should be specified, that the safety assessment should address the highest standards of safety.	Y			
7	2.10/4	"(...), be agreed upon between, (...)" should be "(...),	Isn't both "upon and between" not too much?	M	Modified also based on another comment "A schedule for the review and assessment by the regulatory body might be agreed upon between the operating organization and the regulatory body"		

8	2.11/2	"The operating organisation should revise all documentation associated with any modification or activity, affect the safety of a research reactor ~~or activity~~, (...)" should be "(...),	Modifications and activities may affect the safety not vice versa. This sentence should be rewritten, either by shifting the "activity" direct after modification, or by deleting the word activity from its place at the sentence.	Y			
9	2.17 (c)	Insert another acceptance criteria: - Limits to damage of safety relevant systems by core-near experimental facilities	In-core or core-near experimental facilities may have potential to damage safety related systems, e.g. "cold neutron source" filled with liquid D2 or "hot neutron source" with γ-heated graphite (up to 2600 K)	Y			
10	2.29/4&5	The information referred to these paras of commissioning should be updated and its submission to the regulatory body will form the basis (…)	The sentence should be rewritten; otherwise is not clearly to understand.	Y			Text moved to new para 2.35 and clarified.
11	2.37/1	~~"From time to time~~, Regularly or periodically a review of the safety measurements (…)	The phrase "from time to time" for the review of safety measures is not precise enough. The review of safety measures should be performed regularly i.e. in a periodical manner.	Y			

12	3.3	Insert safety relevant experimental facilities: - The evolution of the design, operation, utilization, modification **and safety relevant experimental facilities** / upgrade of the …		Y			
13	3.3/4	The evolution of the design, operation and utilization and modification/upgrade of the research reactor ~~over its lifetime~~.	Delete repeating wording "over its lifetime", because it is included in the first sentence.	Y			
14	3.3/5	The consequences of events that may have occurred during ~~the lifetime of the research reactor~~ <u>that time</u> and which (…)	Replace repeating wording "during the lifetime of the research reactor" by "during that time" since it is included in the first sentence	N			Original text more clear
15	4.3/1&2	~~The programme for the review and assessment should be established jointly by the regulatory body and the operating organization.~~ The regulatory body should develop a programme to review and assess information provided by the operating organization to demonstrate the safety of the facility or collected during its own inspections.	The review and assessment lies in the responsibility of the regulatory body (see NSG-1.2; GS-G-1.2) therefore, it should not be established jointly by regulator and operator.	Y	Sentence adapted		The Operating Organization should discuss the programme for the review and assessment with the regulatory body. This programme, which should be established by the regulatory body, should take ….
16	Table I., 5.	Insert: - Drop of heavy loads - Loss of integrity of pressurized vessels	Complete the list of PIE	Y			

17	A.1.2.	Insert: Safety relevant experimental facilities should be described.	In-core or core-near experimental facilities are safety relevant, e.g. “cold neutron source” filled with liquid D2 or “hot neutron source” with γ-heated graphite (up to 2600 K)	Y	Utilization and experimental facilities are added in the text.		
18	A.3.4.	Insert under (c) and (d): Military facilities Airports and air routes	Create consistency with A.3.15	Y			
19	A.3.17/1	This section should describe ~~ecological~~ radiological aspects (…)	To the section radiological impacts belong radiological or environmental aspects not ecological ones.	Y			
20	A.3.17/2	Most of ~~this detail~~ these details (…)	Typing mistake	Y			
21	A.3.24/4	(…), to the ~~extent necessary~~ necessary extent, (…)	Reversed order	N			Original txt is preferred
22	A.12.26/1	(…) for area radiation radiation area (…)	Reversed order	Y			
23	A.12.34/1	(…) combined ~~effect~~ effects (…)	It should be plural	Y			
24	A.12.39/5	(…), ~~radwaste~~ radioactive waste handling, (…)	Typing mistake	Y			
25	A.13.10/15	(…), (see A13.12 and A 13.2); (…)	Right parenthesis missing	Y			
26	A.16.1/1	The safety analysis (…) ~~form~~ forms (…)	Typing mistake	Y			

GHANA

REVIEW OF DS 396 – SAFETY ASSESSMENT FOR RESEARCH REACTORS AND PREPARATIONS OF THE SAFETY ANALYSIS REPORT

COMMENTS BY REVIEWER Reviewer: Country/Organization: Ghana Atomic Energy Commission Date:				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	1.1 Line 4	Guidance is also given "on" which analysis, verification and evaluation should be performed to prove that the safety objectives will be met to fulfill safety requirements for the OO…		Y			
2.	1.2, Line 3	"Were" should be read "Where"		Y			
3.	1.12 Line 4	and "his" utilization could read and "its" (his) utilization		Y			
4.	Footnote 9 (Page 9)	"IRCP" on 2nd line could read "ICRP"		Y			
5.	2.42 Line 5	"to" could be inserted between process and demonstrate resulting in 'the operating organization should describe decommissioning process "to" demonstrate that …		Y			
6.	3.2 Line 5	Replace "," with "and"		Y			
7.	3.14 Line 1	"an" could be replaced with "a"		Y			
8.	Page 21 Line 1	TABLE I "SELECTED" instead of "S ELECTED"		Y			
9.	Line 11	"D2O" should read "D_2O" and "H2O" should read "H_2O"		Y			

10.	Line 14	Insufficient shutdown reactivity is not clear. Does it refer to the inability of the reactor control rods or blades to provide sufficient negative reactivity to shut down the reactor?		Y	Changed in: Insufficient shutdown margin.		
11.	Line 20	Reduction in flow “on” primary coolant … could read Reduction in flow “of” primary coolant		Y			

MEXICO

There are no comments from Mexico on DS396 related to Safety Assessment of Research Reactors

MOROCCO

Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report (DS396)

COMMENTS BY REVIEWER Reviewer: Abdeljalil JRAUT Page 1 of 2 Country/Organization: Morocco/CNESTEN Date: 12, 25th 2009				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	Contents	"Chapter 10 : Electric Power ……..56"	The chapter 10 should be included in the Content of a Safety Analysis Report	Y			
2	2.17. (page 10, line 17)	(b) Fuel performance criteria: - Maximum cladding temperature below blistering temperature **or maximum fuel temperature below limit that could lead to cladding damage**.	For some reactors (such as TRIGA), the acceptance criteria, regarding the fuel, is the maximum fuel temperature below limit that could lead to cladding damage	N			The blister temperature is lower than the proposed criterion. If another temperature criterion to avoid fuel damage is being used it should be proved that that the same required level of safety is met.
3	4.9. (page 30, line 23)	a) The records of the results of previous commissioning step, **including non-conformances and, when appropriate, their corrective actions**.	Non-conformances encountered during commissioning and their corrective actions constitute an important part of commissioning results.	Y			

4	4. (last line, page 31)	**4.13. Before authorizing decommissioning and release from regulatory control, the regulatory body should complete the review and assessment of the operating organization's application, which takes into account:** **- The records and results of operational experience.** **- The decommissioning program.**	In addition to construction, commissioning, operation, experiments and modifications (from 4.7. to 4.12), a statement concerning decommissioning should be included.	Y			
5	A.3.4. (line 11, page 40)	(d) Nearby highways, roadways, waterways, rail lines **and airports.**	The nearby airports should be considered in General site description.	Y			
6	A.4.3 (line 23 page 45)	The specific efficiencies of the air filters and iodine traps **and the ventilation change rates** should be given.	The ventilation change rates are important characteristics of ventilation system.	Y			
7	A.15.5 (line 3, page 74)	(c) A summary of the accepted non-conformances**, and when appropriate, their corrective actions**; and,	Corrective actions constitute an important part of commissioning results.	Y			
8	A.16.36 (line 26, page 83)	Information on the modelling of radiological consequences should include the following: - A description of the mathematical… - **A description of the meteorological data used to perform the calculation;**	The metrological data are important to model radiological consequences.	Y			
9	A.16.36 (line 28, page 83)	Information on the validation of the calculational methods **and on restrictions and limitations of their utilization;** and,	Restrictions and limi-tations of methods used have to be considered in performing calculations.	Y			

INDIA

"Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report (03396)"

A. General Comments:

1. Definition of Research Reactors should be given.

Resolution: Definitions are included in IAEA's Safety Glosarry

2. Differences in Safety Analysis of Research Reactors and Power Reactors should be explicitly slated.

Resolution: This safety guide describes the recommendations for research reactors. Para 1.11 gives the scope of the guide. The recommendations for NPP's are given in SSG-2

3. Additional section on safety analysis rules to be used for demonstrating the compliance with the 'acceptance criteria' (for example, exposure pathway and credit of counter measures in dose assessment), also need to be included.

Resolution: The development of the Safety Analysis is discussed in paras 3.17 – 3.30. Additional information on the techniques to be used is normally published in TECDOCs or Safety Serie reports. A footnote to SR 55 in which examples of deriving acceptance criteria are given, is incorporated at the paras regarding acceptance criteria.

4. An overview of quality assurance in design, manufacture, construction, commissioning, operation and decommissioning may be included here.

Resolution: This safety guide describes the recommendations for research reactors. Detailed guidance is presented in GS-R-3 "The Management System for Facilities and Activities" and in GS-G 1-3 "Application of the Management System for Facilities and Activities" references to these Safety guuides are incorporated.

5. The word "operating organization" may be replaced by "responsible organization" in the document.

Resolution: Operating Organization is generally used in the safety standards. Definition is included in IAEA's Safety Glosarry

6. The safety analysis should include PSA also. It should describe the requirements of PSA for different levels (i.e. Level-1, Level-2 and Level-2 PSA), internal events and external events as PSA is a complementary approach to deterministic approach.

Resolution: In Para 3.27 is is stated that ".....deterministic methods which are normally used for safety evaluations of research reactors. Deterministic techniques are characterized by conservatism and are based on defined sets of rules for event selection, analytical methods, and parameter specification and acceptance criteria. ....." Para 3.28 states" ..... Probabilistic techniques could be used to supplement the above mentioned evaluations. Probabilistic methodologies assume that all accidents are possible and that any number of simultaneous failures may

occur, although the probabilities may be very low. ....." References to TECDOCs636 and 930 regarding information on applications of PSA to research reactors are incorporated.

7. Re-licensing aspects of research reactors may be brought out in some clause since Research Reactor may continue to operate beyond design life.

Resolution: Although this Safety Guide focuses mainly on newly designed and constructed research reactors, its content is applicable to any re-licensing process or reassessment for the research reactor requested by the regulatory body or decided on by the operating organization, see 1.11

B. Pagewise Comments:

COMMENTS BY REVIEWER Reviewer: **AERB** Country/Organization: **AERB** Date: **December 16, 2009**				RESOLUTION			
Comment No.	Page No./ Para/Line	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	1/1st para/ 5th line	**Add:** "acceptance guidelines/criteria".	The guidance on the acceptance criteria has been provided on page 9, in section 2.14.	Y			
2.	13/2.30	**Add:** Safety related test procedures should be approved by regulatory body	For better clarity	Y	New para 2.32 added		
3.	17/3.2/4th bullet	Instead of operating personnel – Write O&M personnel	inclusion of PSA in safety analysis would require training far maintenance personnel also	N	Maintenance personnel are part of operating personnel. See IAEA's Safety Glossary		
4.	21/2/9th bullet	**Add:** "including handling of isotope production assembly"	It contributes considerable amount of reactivity changes in reactor.	Y	Footnote added on 2 places		
5.	22/6/7th bullet	**Add:** "and internally generated missiles"	This is not covered.	Y			

6.	31/4.9(i)	**Add:** "and contingency plan"	This is also required	N	The provisions to be available to mitigate the consequences of accidents are part of the emergency plan. There is no need for an additional contingency plan.		
7.	31/4.9(l)	**Add bullet:** • The industrial and fire safety aspects	This is not covered.				
8.	37/A 2.4 (17) (f)	**Add one more bullet:** • Layout and zonal classification	This is an important aspect.	Y			
9.	50/A5.23/ 17 point	**Add:** Including the aspects related to build up of induced activity.	Requirement of material selection with low activation property	Y			
10.	41/A3.9/1st bullet	**Add:** includinq the static and dynamic stability of all soil or rock slopes, both natural and man-made, the failure of which could adversely affect the safety of the nuclear power plant may be included.	For completeness	Y			
11.	47/ A5.4	**Add one more bullet:** • Fuel clad interaction and mode of fuel failure	This is an important aspect	M			In A5 the general characteristics are described. Accident scenario development is described in A 16. The proposal is added in A16.19
12.	54/A8.1	**Add as new bullet:** • Requirements of C&I components during severe	For completeness	N			This requirement is already present in NS-R-4; 6.136 and

		accidents					6.144. A 8.1 refers already to these paras of NS-R-4

C. Editorial Comments::

Comment No.	Page No./ Para/Line	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	8/2.12/last line	Documentation word may be **replaced** with document	Editorial	N	More documents and drawings are meant.		
2.	13/clause 2.29/3rd line	**Delete:** for the operating organization	Editorial	Y			
3.	22/3. last but one bullet	**Delete:** one deviation word	Editorial	Y			

ROMANIA

There are no comments from Romania on DS396 related to Safety Assessment of Research Reactors

UNITED KINGDOM

DS 396 Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report (Draft 6)
FOR OFFICIAL MEMBER STATES COMMENTS

COMMENTS BY REVIEWER Reviewer: Country/Organisation: UK Member States comments Date: 16 December 2009				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	General		The UK supports the progress of the current version of DS 396 (Draft 6). We have no detailed comments to make on this document.				

UNITED STATES OF AMERICA

U.S. Member State Comments on IAEA Draft Safety Guide
"Safety Assessment for Research Reactors and Preparation of Safety Analysis Report"
(DS396) Draft 06

COMMENTS BY REVIEWER Country/Organization: United States				RESOLUTION			
Comment No.	Para / Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1	2.3 / 3-4	"…should be commensurate with the potential magnitude of the hazard associated with the design and purposes of utilization of the research reactor and consistent with the particular stage of the licensing process." of the research reactor"	This change clarifies that both the design and the purposes of utilization affect the potential hazard of a research reactor.	Y			
2	2.23 / 5	"…its interaction with the site and the surrounding environment should be provided. In addition, a preliminary statement on the…"	Line 5, 6, and 7 of Section 2.23 state that the radiological impact of the reactor on the surrounding environment should be considered in siting the reactor. The change clarifies that non-radiological impacts of reactor construction and operation on the environment surrounding the reactor site should also be considered in the siting phase of licensing.	Y			

3	2.24 / 7-8	"…given in Ref. ([2], chapter 5). Additional guidance for siting and site evaluation is given in [25] and [26]. A comprehensive discussion of necessary siting factors is provided in the Appendix in this Standard, For example, Chapter 2 of Appendix in Section 2 A2.6 describes external events that are to be addressed for each site; entire Chapter A3 "Site Characteristics," Sections A3.1 to A3.26 address the following: General site description, External events, Geology and seismology, Meteorology, Hydrology and oceanography, Nearby industrial, transport and military facilities, Radiological impact, Population distribution, Natural environment, land and water usage, Baseline radiological levels, Atmospheric dispersion of radioactive materials, Dispersion of radioactive materials through surface waters and groundwater, Site adequacy for emergency measures, The above siting factors should be considered when an initial evaluation and selection of a site is to be conducted."	It is important to be fully cognizant of all the siting factors that influence the selection or adaptation of a site for reactors, given that the use of a graded approach has already been emphasized in this standard in relation to the reactor power level.	M	The proposed text "Additional guidance for siting and site evaluation is given in [25] and [26]" is incorporated and a reference to A3, which also refers to A2.6, is incorporated.		
4	A.1.2 / 6	"…safety analysis, these should be outlined. The reactor site and the structure or facility housing the research reactor should be briefly described."	This information provides additional context to better understand the reactor facility.	Y			
5	A.2.6 / (5) & (6)	"(5) Security related events, including terrorist attacks and theft of radioactive material or	Structures must be designed to withstand potential loads from	Y			

		sabotage; ~~and~~ (6) Fire and explosions~~.~~; and (7) Reactor building roof loadings from accumulated rain, snow, ice, dust, or other natural materials."	naturally deposited materials that could collect on the roof of a building and lead to structure damage or collapse which could impact reactor safety.				
6	A.2.9 / 4	"…combination thereof, may be applied, and an explanation of the results and their applicability should be given."	This change emphasizes the need to explain why the results of experience, tests or analysis are applicable to the particular item important to safety that is being analyzed.	Y			
7	A.3.4 / (d)	"(d) Nearby highways, roadways, waterways, airports and rail lines;"	The vicinity and patterns of air traffic surrounding the reactor site should be considered to determine if air traffic could pose a threat to safe operation of the reactor.	Y			
8	A.3.9 / 4-6	"- Defining the conditions and engineering properties of soil and/or rock supporting the reactor foundations; ~~and~~ - Assessing the potential for volcanic activity~~.~~; and - Assessing the liquefaction potential. The applicant should list all historically reported earthquakes that could reasonably affect the region surrounding the site. The list should include all earthquakes of modified Mercalli intensity greater than IV or magnitude greater than 3.0 that have been reported in	Potential for liquefaction is a critical safety issue. Historical seismicity should be presented to assess seismic hazard of the area.	Y	Principle of the proposal is accepted. Some textual changes and a reference for additional guidance on siting is added in para A3.8 and A3.9.		

		within 200 km of the site. The applicant should assess the ground motion at the site from the maximum potential earthquakes associated with each tectonic province or geologic structure and should consider site-amplification effects. Using the results, the applicant should establish the vibratory ground motion design spectrum."	More specific statement about assessing seismic hazard and design ground motion at the site.				
9	A.3.11 / 4	"…including darns, diversion channels and any flood control measures. Foreseeable changes in land use that may influence hydrology should b described, for example changes in runoff characteristics resulting from urbanization, or realignment of drainage channels."	Surface and underground hydrological characteristics of a site can change, sometimes to a large degree, as the result of changes in land use. For example, urban development typically causes more rapid runoff with higher peak flows, together with enhanced erosion, deepening, and lateral migration of watercourses. To the extent practicable, such future hydrologic changes caused by land use changes should be anticipated in order to guard against safety problems that may not exist at the time of licensing, but that can be foreseen to develop in the future.	Y			
10	A.3.25 / 11-16	"- The capability of the appropriate	In the event of a major accident, it would be	Y			

		authorities to implement emergency measures if required; ~~and~~ - The feasibility of emergency plans (if are required), taking into account the population distribution, national and international boundaries, special groups (e.g. hospitals), special geographical features (e.g. islands), and communication and transport facilities~~.~~; and - Availability of evacuation routes and refuges for evacuees.“	necessary to evacuate the population of the severely affected area. Evacuation routes and refuge locations for the evacuees are necessary to carry out a successful evacuation. Therefore, their availability is an important consideration in assessing the adequacy of the site in terms of the effectiveness of emergency measures.				
11	A.5.18 / (b)	“The power distribution, including power peaking factors, in all core components which may contain fissile materials, as…”	Power peaking factors are design requirements specified in Section A.2.4 and should be considered in the thermal hydraulic design of the reactor.	Y			
12	A.5.23 / 2-3	“…for the construction of safety relevant components and structures can withstand the nuclear, thermal, and chemical environment to which they are subjected, without unacceptable worsening of the…”	Thermal cycling and maximum and minimum material temperature can affect the short term and long term performance of materials used in safety relevant components and structures.	Y			
13	A.8.10 / 9	“- Seismic monitoring system; - Monitoring system for external meteorological and hydrological conditions.”	To enable awareness of external conditions that may not be otherwise observable from the control room.	Y			
14	A.10.4 / 2	“…activity, decay rate, refuelling frequency, and inspection and storage requirements including that	Periodic inspection of irradiated fuel in storage may be necessary to	Y			

		for damaged…"	confirm or monitor the information listed in this section and to verify that there has been no significant degradation of the fuel in storage.				
15	A.12.26 / 9-10	"- Requirements for calibration, testing and maintenance; ~~and~~ - Automatic actions initiated or taken~~.~~; and - Operability requirements for radiation monitoring systems depending on the state of the reactor (e.g., shutdown, operation, fuel handling, etc.)."	Different states of the reactor necessitate different radiation monitoring capabilities to adequately monitor radiological conditions at or near the reactor to protect personnel and the public.	Y	Is part of the OLCs and therefore added in 17.6		
16	A.14.2	"(f) Alternative locations where the proposed reactor might have a smaller environmental impact."	It is possible that the reactor might have a smaller environmental impact if it were placed in a different location. Although this consideration is implicit in point (c), "Alternatives to the licensing action", alternative sites should be identified and discussed explicitly in order to fully assess the balancing of environmental impacts with other siting considerations as discussed under point (e).	N	This is normally part of an Environmental Impact Study, which is beyond the scope of this safety guide		
17	A.16.40 / 10	"- Contamination of aquifers and reservoirs on and off the site."	Contamination of reservoirs should also be	Y			

			considered since reservoirs could be a significant source of public exposure to liquid borne radioactive materials.				
18	A.16.45 / 6	"- Mode of release (single ~~burst~~ puff, intermittent, continuous);"	This change makes the terminology consistent with Section A.16.31, item 6.	Y			
19	A.16.45 / 7	"- Location of release and characteristics, including stack height and diameter and the exit velocity and temperature of the effluent;"	This change includes other release characteristics that are important for determining the dispersion of the effluent. This information could also be included in Section A.16.45, lines 3-5.	Y			
20	A.16.45 / 9-10	"- Meteorology data, characteristic of the timescale of the release duration, including wind speed and direction, and data on inversions and other atmospheric stability;"	This change clarifies that in selecting meteorological data to use in the dispersion calculations, consideration must be given to expected duration of the release (e.g., annually-averaged wind speed data may not be appropriate for a release that lasts only a few hours).	Y			
21	A.17.6 / 10-11	"- Core configuration and design limitations (minimum and maximum number and geometric arrangement of fuel elements, reactivity coefficients, burn-up limits, inspection, etc.)"	This change emphasizes that the number and arrangement of fuel elements in the core should be specified as a limiting condition for operation because these	Y			

			details are essential to the safety analysis. For example, fission product inventory of a single fuel element is dependent on the number of elements in the core for a given core operating power. Also, the coolant channel dimensions can depend on the geometry of the arrangement of the fuel elements.				
22	III-1.1 / 4	"(b) Type of reactor (~~swimming~~ pool, tank, etc.):"	The term "swimming pool" is misleading since reactor pools can be a variety of shapes, depths, and volumes.	Y			
23	IV-1.1	"– Neutron start-up sources~~.~~; – Sources for test and calibration of radiation monitoring equipment."	Research reactor radiation protection programs often require the use of radioactive sources of known strength for testing and calibrating radiation monitoring equipment.	Y			

UKRAINE

DS396 Safety' Assessment for Research Reactors and Preparation of the Safety Analysis Report

COMMENTS BY REVIEWER Reviewer: O. Dybach Page.... of... Country/Organization: Ukraine/State Nuclear Regulatory Committee of Ukraine Date: 28/12/09				RESOLUTION			
Comment No.	Para/Line No.	Proposed new text	Reason	Accepted	Accepted, but modified as follows	Rejected	Reason for modification/rejection
1.	Appendix Chapter III	It is proposed to add to the Chapter III SAR "Site Characteristics" information dealing with monitoring of site related parameters. As an example to add a following specific item: "Monitoring of site related parameters A.3.27 This section should describe the provisions to monitor site related parameters affected by seismic, atmospheric, water and groundwater related, demographic, industrial and transport. The strategy for monitoring and the use of the results in preventing, mitigating and forecasting the effects of site related hazards should be provided.»	This may be used to provide necessary information for emergency operator actions in response to external events, to support the periodic safety review at the site, to develop dispersion modeling for radioactive material and as confirmation of the completeness of the set of site specific hazards taken into account.	Y			
2.	Appendix Chapter VI-X	It is proposed to include in the SAR for each system the following sections: 1. System description 2. Engineering evaluation	The structure of the information to be reported for each system is useful to be harmonized.	Y			The requirements which information should be presented in Chapter VI of the SAR is presented in

		3. Safety assessment					A.6.1
3.	Appendix Chapter II	It is proposed to extend the scope of information dealing with human factors engineering. As an example to add a following specific item: "Human factors engineering. This section should demonstrate that human factors engineering and human-machine interface issues have been adequately taken into consideration in the development of the design"	Human factors engineering is an important part of design aspects and should be present more detail in the SAR				Is addressed in A2.4-6
4.	Appendix Chapter XII	It is seems that missing a clear statement requiring that in this chapter the Applicant shall give evidence of application of principles of • Justification • Optimization • Limitation	Definition clarification	M			The records which should be kept to prove that exposure to radiation is adequately justified is added. The application of the optimization principle is addressed in A12.4. The legal dose limits are addressed in A12.3 and the operational limits are addressed in A17.8 as a part of the Operational Limits and Conditions