# Resolution to NUSSC Comments on DS396

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**FINLAND**

**DS440DPP Design Auxiliary Systems in Nuclear Power Plants**

| COMMENTS BY REVIEWER<br>Reviewer:<br>Country/Organization ….Finland | | | Page.... of....<br>Date: 7th June 2010 | RESOLUTION | | | |
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| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/rejection |
| 1. | after 3.15 | add<br>The accidents during the operating modes and shutdown are assessed. | add the modes of the operation | | | X | The development of the safety analyses are described in para 3.17 – 3.30. The proposed addition could be confusing. |
| 2. | 3.16 | Special internal events<br>- Internal fires or explosions, including internally generated missiles;<br>- Internal flooding;<br>- Loss of support systems;<br>- Drop of heavy loads<br>- Loss of integrity of pressurized vessels<br>- Malfunction in reactor experiment;<br>- Improper access by persons to restricted areas;<br>- Fluid jets and pipe whip;<br>- Exothermic chemical reactions;<br>- Security related incidents (see A.13.12 and A.13.13<br>internal flood<br>high temperature<br>fire | A lot of internal events are missing they can of cause be causes of the events listed earlier. | | EMC is added. The other events are covered. | | |

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| | | EMC<br>etc.. | | | | | |
| 3. | 3.16 | External events<br>- Earthquakes (including seismically induced faulting and landslides);<br>- Flooding (including failure of an upstream dam and blockage of a river);<br>- Tornadoes and tornado missiles;<br>extreme weather conditions, climate change<br>- Sandstorms;<br>- Hurricanes, storms and lightning;<br>- Tropical cyclones;<br>- Explosions;<br>- Aircraft crashes;<br>- Fires;<br>- Toxic spills;<br>- Accidents on transport routes;<br>- Effects from adjacent facilities (e.g. nuclear facilities, chemical facilities and waste management facilities);<br>- Biological hazards such as microbial corrosion, structural damage or damage to equipment by rodents or insects;<br>- Extreme meteorological phenomena;<br>- Lightning strikes; | add extreme weather conditions, climate change | | "The climate change should be taken into account for the determination of the external events" has been added in A2.6 and as a footnote at 3.16. | | Results of climate change which are known or can be predicted are covered by flooding and the PIEs for extreme weather conditions. The results of a climate change should also be covered during a periodic safety review, but this is beyond the scope of the document<br>Extreme weather conditions are covered by "Tornadoes and tornado missiles;<br>Sandstorms;<br>Hurricanes, storms and lightning;<br>Tropical cyclones. |

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| | | - Power or voltage surges on the external supply line;<br>- Security related external events (see A.13.12 and A.13.13. | | | | | |
| 4. | 3.19 | The consideration of fault conditions determines the design of the research reactor and limits for the safety systems<br>and for most SSCs needed for the operation of the research reactor. It will strongly influence the operational instructions and procedures that operating personnel should follow. In addition the potential radiological consequences for workers, the public and the environment of fault<br>conditions may be more severe than those in routine operation. For this reason, an important part<br>of the review and assessment effort should be directed to the safety analysis of fault conditions. It should be performed in accordance with the potential magnitude and nature of the risks<br>associated with the particular research reactor. Safety analysis can be considered to consist of the following major steps: | add<br><br>of the research reactor<br><br>The general design of the research reactor should be known. | Yes | | | |

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| | | - Identification and selection of the postulated initiating events (PIEs);<br>- Categorization of the PIEs<br>- Determination of enveloping PIEs;<br>- Evaluation of the development of the PIEs in relation to the system responses and their consequences;<br>- Comparison against acceptance criteria. | | | | | |
| 5. | 3.26 | The safety analysis should identify the design basis accident (DBAs). In addition,<br>accidents with more severe consequences than the design basis may be analysed for purposes of emergency planning and the measures to be designed and taken to mitigate the consequences of an accident. | change beyond design basis<br><br>add design aspect | Yes | | | |
| 6. | 4.7 | Before authorizing the construction:<br>(a) The competence and capability of the operating organization to meet the licence requirements;<br>(b) The site characteristics, to confirm the acceptability of the site and the related data used in the design of the proposed research reactor; | The guide should present requirements to the license applicant not to the regulatory body. | Yes | | | |

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| | | (c) The basic design of the proposed research reactor, to confirm that it will meet the safety requirements, including occupational and fire safety aspects;<br>(d) The management systems of the operating organization and its vendors;<br>(e) The design features related to physical protection which are important to safety;<br>(f) Information necessary for design verification<br>should be approved by the regulatory body. | | | | | |
| 7. | 4.8 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 8. | 4.9 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 9. | 4.10 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 10. | 4.11 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 11. | 4.12 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 12. | 4.13 | change the wording so that this is not requirement to a regulatory body | see above | Yes | | | |
| 13. | A.2.3 | (f) The extent to which redundancy, separation and diversity are applied in the research reactor design of | clarity<br><br>redundancy, separation | Yes | Separation is included | | |

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| | | engineered safety features; | and diversity are means to achieve independence | | | | |
| 14. | Appendis | External events<br>Design for internal fire protection<br><br>There is list of external events in the SAR but only internal fires from the list of internal events. | The different treatment of the internal and external events should be justified or they should be treated similarly. | | | | The design requirements for the SSCs of the research reactor, which will be used in the analyses of the internal events, are specified in A2.4 item (1) – (17). Since internal fire protection system is an auxiliary system the requirements are discussed separately. |
| 15. | A.8.3 | Information on provisions for testing the I&C system should also be included. It should be demonstrated that ageing effects and obsolesce of components have been considered in the design, especially for those components which cannot be replaced easily. | For electronics and especially for the digital I&C also obsolescence should be considered. | Yes | | | |
| 16. | new after A.8.15 | The operation of the emergency procedures may be proven by the test made at the research reactor | For big research reactors there may be need to build a simulator. | | The use of a simulator for training and | | |

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| | | simulator. | | | qualification is introduced in A13.6. | | |
| 17. | A.10.1. | This chapter should provide information concerning the auxiliary systems included in the research reactor. The description of the research reactor and each system, the design bases for the research reactor the system and for critical components, a safety evaluation demonstrating how the system satisfies the requirements of the design basis, the testing and inspection to be performed to verify system capability and dependability, and the required instrumentation and control should be provided. In cases where auxiliary systems are not related to the protection of the public against exposure to radiation, enough information should be provided to allow understanding of the design and function of the auxiliary system; emphasis should be placed on those aspects that might affect the reactor and its safety features or contribute to the | upper level design should be included | | | | The reactor is described in A5 |

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| | | control of radioactivity inside the research reactor. For those systems also foreseeable ageing effects, which could affect safety should be discussed. | | | | | |
| 18. | A.10.9 | In this section, the design bases, system descriptions and safety analysis should be provided also for the other auxiliary systems, such as general communication system, sanitary provisions, sewage systems, and gas service systems. | | | | | Also suggests that other analyses should be provided here too, but they have been described in other paras |
| 19. | A.15.2 add after new | RESULTS OF THE COMMISSIONING PROGRAMME<br>Overview of the test and the obtained results<br>Summary of the operation of the plant and major findings (safety signigicance)<br>Summary of the operation of the planned organization, procedures and major findings (safety signigicance)<br>Summary of the major changes during the commissioning (technical, organizational, procedures, .etc.) (safety signigicance)<br>Action plan for the later changes needed (systems, structures, components, safety analysis/safety analysis report, procedures etc.) (safety signigicance) | | | One section has been added | X | |

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| 20. | A.115.3 | add aspects from the DS446 content | relevant to research reactors too | | | X | Only the draft Document Preparation File is available for DS 446 and consequently cannot taken as basis for this Safety Guide |
| 21. | A.16.1 | The safety analysis presented in this chapter forms the focal point of the safety analysis report. In previous chapters, the research reactor design, structures, systems and components important to safety should be evaluated for their susceptibility to malfunctions and failure. In this chapter, the effects of anticipated process disturbances and postulated component failures and human errors (postulated initiating events) should be described, including their consequences, to evaluate the capability of the research reactor to control or accommodate such situations and failures. | add<br><br>research reactor design | Yes | | | |
| 22. | A.16.2 | To ensure completeness of presentation and to facilitate the | add | | | X | The general description of the |

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| | | review and assessment by the regulatory body, this chapter of the safety analysis report should contain the following information:<br>(1) Introduction: The general approach and methods used in the safety analysis (paras A.16.3.–A.16.4.);<br>(2) Research reactor Characteristics: The reactor parameters and initial conditions used in the safety analysis (paras A.16.5.–A.16.9.);<br>(3) description of the research reactor and it systems and structures<br>(4) Selection of Initiating Events: The spectrum of events initiating accidents considered in the safety analysis (paras A.16.10.–A.16.12.);<br>(5) Evaluation of Individual Events Sequences: The results of the safety analysis (paras A.16.13.–A.16.45.);<br>DS396 NSNI-SC-Review 77<br>(6) Summary: A summary of significant results and conclusions regarding acceptability | description of the research reactor and its systems and structures | | | | reactor is already covered in A.1.2 and in detail in A.5 |

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| | | (paras A.16.46.–A.16.47.). | | | | | |
| 23. | new | requirements for de description of the research reactor and the systems and structures should be added | | | | X | Guidance on the description of the and systems and structures is already covered in A.5 |
| 24. | A.18.3 | The operating organization is responsible for the preparation and implementation of an integrated management system that will ensure conformance to every aspect of safety. The principles and scope of the management system should be established in accordance with the general requirements of Safety Requirements GS-R-3], and with other national standards. | GS-R-3] should be reference to the quality management | | The reference is already available in 2.7 and in A.18.1 | | |
| 25. | Chapter 18 | The whole chapter18 should be checked against GS-R-3 and related safety guides. | The guide should be consistent with generic safety requirements and guides. | | The section has been checked again and no inconsistencies has been found. | | |

**JAPAN**

**Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report**
**DRAFT SAFETY GUIDE DS396**

| COMMENTS BY REVIEWER<br>Reviewer: MEXT Page.... of....<br>Country/Organization: Japan Date: 27 May 2010 | | | | RESOLUTION | | | |
|---|---|---|---|---|---|---|---|
| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/ rejection |
| 1 | General | Acronyms, such as SAR (Para. 2.24) , SSCs (Para. 2.25) and PIEs (Para. 3.16) must be defined at their first appearance. | Some acronyms are used without definition. | | The acronyms will be replaced by the full text during the technical editing process. | | |
| 2 | Para. 2.30 p.13 - 14 | The correction added to Para. 2.30 on "Tests to prove the shutdown capabilities" needs to be added also to Paras. 2.34 and 2.35. | Paras. 2.34 and 2.35 are inconsistent with the correction added to 2.30. For example, it must be clearly stated whether it is to be applied to Stage B and/or Stage C. | | Added in 2.30 and 2.34 | | |
| 3 | Para. 2.30 11th line P14 Para. 2.35 1st line P15 | Change “power tests” to “<u>full</u> power tests” | To be consistent with the definition of power tests in Stage C. | Yes | | | |

## PAKISTAN

### DS 396 – Safety Assessment of Research Reactors and Preparation of Safety Analysis Report

| COMMENTS BY REVIEWER<br>Reviewer: Anwar Habib Page.... of....1/1<br>Country/Organization: Pakistan/PNRA Date: 08-06-101 | | | | RESOLUTION | | | |
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| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/ rejection |
| 1 | General | The following may be added to Para A 5.3.<br>List of computer codes, their validation etc used for analysis should be included. | Computer codes are used for analysis in SAR, therefore are essential part, a summary should also include tabulation of Computer codes used as RG 1.70 requires for NPPs. | | The guidance for the computational models are included in A16.20 – A16.24 | | |
| 2 | General | The following may be added to Para A 5.23.<br>All correlations used to determine DNBR, thermal hydraulic loads and void fractions etc. should be clearly described along with experimental verification and applicable range. Experimental analysis should validate these correlation showing conservatism and safety margin for all operational states. | To review and assessment and verification of results produced by licensee, a complete description of correlations should be included in SAR for the purpose outlined in GS-G-1.2 2.2 (i) and 3.40. | | All correlations used to determine the thermal hydraulic load and void fractions should be clearly described along with the justification for there applicability. | | |
| 3 | General | The computational models used in analysis techniques should be described in respective sections along with range of applicability and uncertainties etc. including;<br>• General description of model<br>• A brief description of input data for each model<br>• A summary of results. | To review and assessment and verification of results produced by licensee, a complete description of correlations should be included in SAR for the purpose outlined in GS-G-1.2 2.2 (i) and 3.40. | | See A16.20 – A16.24. | | |

**USA**

**Comments on IAEA Draft Safety Guide**
**DS396 "Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report" (Draft 7)**

| COMMENTS BY REVIEWER<br><br>Reviewer: USA<br><br>Country/Organization: USA Date: June 2010 | | | | RESOLUTION | | | |
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| 1 | 1.10 | Add and highlight security guidance in the Nuclear Security Series. The Scope section of the document notes when security or physical protection aspects should be considered in the Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report. | The scope section does not provide context to how security issues are covered in the document. Text in the document does not adequately address interface issues or change management issues associated with security. | 1.14 has been added | | | |