

January 25, 2002

MEMORANDUM TO: Jodi B. Lieberman  
Office of International Programs

FROM: Patrick Madden, Chief **/RA by Marvin Mendonca Acting for/**  
Research and Test Reactors Section  
Operating Reactor Improvements Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

SUBJECT: OFFICE OF NUCLEAR REACTOR REGULATION COMMENTS ON  
IAEA DRAFT SAFETY REQUIREMENTS GUIDE ON SAFETY  
REQUIREMENTS OF RESEARCH REACTORS

Attached are comments on the IAEA Draft Safety Requirements Guide DS 272 on "Safety Requirements of Research Reactors." This document is primarily the combination of Safety Series No. 35-S1, "Code on the Safety of Nuclear Research Reactors: Design," and Safety Series No. 35-S2, "Code on the Safety of Nuclear Research Reactors: Operation," into a single updated document.

Attachment: As stated

cc w/attachment: J. Murphy, RES

CONTACT: Alexander Adams, Jr., 301-415-1127  
NRR/DRIP/RORP

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United States Nuclear Regulatory Commission  
Office of Nuclear Reactor Regulation

Comments on IAEA DS272

Safety Requirements of Research Reactors

The explanatory note for the draft standard stated that editing the standard for grammar still needs to be accomplished. We concur with the explanatory note that from our review that the entire text needs careful editing. As such, only major grammar problems that could affect the meaning of the text are commented upon.

1. Para 1.8. The paragraph states that reactors operated for research but also for other purposes such as desalination or district heating may be included in the definition of research reactors. Is this situation so unique that it should be removed from the document? Also, reactors at a high enough power level to supply heat or water may be outside the scope of this document (see comment 2). It should be made clear that if the primary purpose of the facility is desalination or heating (i.e., if the focus of the design, the operating schedule or the mode of operation is determined by the need to provide heat or water) the facility may not be considered a research reactor. If the production of heat or water is a use of the facility waste heat, when available (as an alternative to sending all of the waste heat to a cooling tower or other heat sink), the facility may be a research reactor depending on its other uses in accordance with the standard definition of research reactors. For example, if the facility is to be used so that more than 50 percent of the annual cost of owning and operating the facility is devoted to the production of materials, products, or energy for sale or commercial distribution, or to the sale of services, other than research and development or education or training, such reactors may not be a research reactor. Research and development could mean (1) theoretical analysis, exploration, or experimentation; or (2) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes.
2. Para. 1.10. The issue of document scope was well expressed in Safety Series 35-S1 and 35-S2 and that approach should be considered here (see para.109 of 35-S1). There should be a caution in this paragraph that as power levels exceed several tens of megawatts, guidance in addition to that given in the document may need to be considered. Areas that may be affected are siting, engineered safety features and impact on the staff, public and environment from operations or potential accidents.
3. Para. 1.18. Reference is made to paragraphs 1.10 to 1.12. Should the reference be to paragraphs 1.8 to 1.11?
4. Para. 2.7, line 4. Change “residual probability that an accident may happen” to “very low probability that an accident may happen” to improve grammar.
5. Para. 2.10. The concept of severe accidents is discussed in this section (severe accidents and accident management are also discussed in the definitions). This is a concept that was not used in 35-S1 and 35-S2 because it is a concept that came from

power reactors and has specific special meaning and requires a specific approach within that reactor type (see the definition of accident conditions in 35-S1 or 35-S2). The power levels and fission product inventories of reactors within the scope of this document are such that a severe accident approach to accident analysis or defense in depth is not needed. Replace “severe accidents” with “accidents beyond the design basis” for existing facilities that need to consider accidents beyond those for which the facility was designed. New research reactor facility designs should consider all credible accidents as within the design basis. The term, “severe accidents,” is also used in other sections of the document, e.g., 5.37. Suggest changing the phrase wherever it occurs in the document to the term “accidents beyond the design basis.”

6. Para. 2.18, line 5. Change “to the effect necessary” to “to the level necessary” to improve grammar.
7. Para. 2.22, line 15. Reference is made to paragraphs 1.8 to 1.12. Should the reference be to paragraphs 1.8 to 1.11?
8. Para. 2.25, line 2. Change “verification of the safety in design that the main safety issues have been resolved” to “verification that the main safety issues of the design have been resolved” to improve grammar.
9. Para. 3.9, line 7. This paragraph states that the requirements for the safety analysis for critical assemblies or low power reactors may be less stringent than higher powered research reactors. The SAR requirements should be the same for all reactors. However, the scope of the safety analysis for low power research reactors may be significantly less than high-powered research reactors because certain accident scenarios may not apply or need limited analysis. For example, the treatment of loss of coolant accidents may differ significantly depending on reactor power and design. Change “the requirements for the safety analysis may be less stringent” to “the scope of the safety analysis may be limited.”
10. Para. 4.6, line 7. Combine the last two sentences to read “The extent of the detailed QA programme that is required for a particular research reactor or experiment shall depend on the hazard potential of the reactor or the experiment and the requirements of the regulatory body” (see 35-S2 para. 1801). This wording allows flexibility for national requirements to be applied in the area of QA.
11. Para. 5.32. Remove “produce any type of missiles.” The hazard from these materials is more than missiles. For example, the failure of a storage tank could produce a toxic cloud that could be drawn into the reactor containment by the facility ventilation system and create a safety hazard for the facility staff. If the concept of potential missiles is needed, suggest changing the sentence by removing the phrase, “produce any type of missiles,” and adding at the end of the sentence the phrase, “including any type of potential missiles.”
12. Para. 5.37. The last sentence does not appear to be related to the subject of the paragraph. Consider saying that the population distribution should be used in evaluation of the site for the impact of radioactive releases on members of the public.

13. Para. 5.38. It is not clear what the investigation discussed in this paragraph refers to. Investigation of the site to determine acceptability for a research reactor or the affect of the research reactor on the uses of land and water in the region? Suggest clarifying this point.
14. Para. 6.78. Change “assembling” to “assemblies” to improve grammar.
15. Para. 7.27, line 4. Change “Training and retraining shall provide in a regular basis for the progressive improvement of personnel” to “Regular training and retraining shall be provided to continually enhance the knowledge and abilities of personnel” to improve grammar.
16. Para. 7.99, section k. This section insinuates a requirement for medical surveillance for persons occupationally exposed to radiation. This should be a “should” or “may” statement and not a “shall” requirement because it is not a requirement in all member states. The purpose of establishing occupational exposure limits is to set a level of radiation exposure that results in minimum additional risk. If exposures are maintained within the legal limits, there should be no need for regular medical surveillance solely because a person is exposed occupationally to radiation. Further, if a person is overexposed to radiation, the need for medical surveillance would also depend on the circumstances.
17. Para. 7.111, line 3. Change “When these reviews are exclusively focused to examine generally using non-destructive techniques the reactor structure, systems and components are called *in-service inspections*” to “Reviews of reactor structures, systems and components carried out using non-destructive techniques are called *in-service inspections*” to improve grammar.
18. Definitions. It should be verified that all terms in the definitions are used in the document. Defined terms not used in the document should be removed.
19. Definitions. The definition of accident conditions includes severe accidents. The concept of severe accidents should be removed. See this definition as used in 35-S1 and 35-S2 and comment 5 above. Also the definition of “Accident Management” is a power reactor concept and should not be used for research reactors. Emergency plans and procedures should allow for response to all accidents.
20. Definitions. 35-S1 contained a definition of fuel. It should appear in this document. Not all fuel used in research reactors is in the form of elements or assemblies (e.g., solid and liquid fueled homogeneous reactors).