
Safety Evaluation Report

related to the renewal of the operating license
for the research reactor at the
Armed Forces Radiobiology Research Institute

Docket No. 50-170

**U.S. Nuclear Regulatory
Commission**

Office of Nuclear Reactor Regulation

May 1983



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ABSTRACT

Supplement 1 to the Safety Evaluation Report related to the renewal of the operating license for the research reactor at the Armed Forces Radiobiology Research Institute has been prepared by the Office of Nuclear Reactor Regulation of the U. S. Nuclear Regulatory Commission. The reactor facility is located in Montgomery County, Maryland. This supplement reports on the status of the licensee's emergency plan that had not been reviewed at the time the Safety Evaluation Report (NUREG-0882) was published.

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1 INTRODUCTION

The Nuclear Regulatory Commission (NRC) staff issued its Safety Evaluation Report (SER, NUREG-0882) in January 1982 regarding the application by the Armed Forces Radiobiology Research Institute (AFRRI) for renewal of the operating license for its TRIGA-type research reactor. At that time, the staff identified one outstanding item that was not yet complete, emergency planning (Section 13.3, NUREG-0882). The purpose of Supplement 1 to the SER is to provide the staff evaluation and conclusions regarding this outstanding item.

Each of the following sections is numbered the same as the corresponding SER section that is being updated. Appendix A lists the staff members contributing to this supplement. Appendix B contains errata to the SER (NUREG-0882).

Copies of this supplement are available for inspection at the NRC Public Document Room at 1717 H Street, N.W., Washington, D.C. Copies also are available for purchase from the sources indicated on the inside front cover.

The NRC Project Manager for licensing actions on the AFRRI reactor facility is R. E. Carter, Standardization and Special Projects Branch, Division of Licensing, Office of Nuclear Reactor Regulation.

1.1 Summary and Conclusions of Principal Safety Considerations

1.1.1 Outstanding Item

The SER (Section 1.1.1) stated that "one matter, emergency planning, is incomplete at the time of publication of this safety evaluation. This item is discussed further in Section 13.3."

13 CONDUCT OF OPERATIONS

13.3 Emergency Planning

10 CFR 50.54(q) requires that a licensee authorized to possess and/or operate a research reactor follow and maintain in effect an emergency plan that meets the requirements of Appendix E to 10 CFR 50. At the time the licensee submitted the application for license renewal, the guidance used by the staff for reviewing a research reactor emergency plan was contained in American Nuclear Society (ANS) 15.16 (1978 Draft) and Regulatory Guide (RG) 2.6 (1979, For Comment Issue). At the time the SER was issued, January 1982, both of these guides were being revised, so the staff's review of the licensee's emergency plan was incomplete. In the meantime, ANS 15.16 (November 1981 Draft) was approved for use, and RG 2.6 (March 1982, For Comment) was issued. RG 2.6 endorsed ANS 15.16 for interim use.

On May 6, 1982, an amendment to 10 CFR 50.54 was published in the Federal Register (47 FR 19512) recommending these guides to licensees and containing the following in the Statement of Considerations:

Credible accidents for research and test reactors have been evaluated by the Commission and are discussed in the proposed amendment which was published in the Federal Register (46 FR 63315), on December 31, 1981. The Commission concluded that the power level threshold of 2 megawatts thermal more accurately reflects the power level at which the potential for any significant offsite consequences exist.

The amendment also established new submittal dates for emergency plans from all research reactor licensees. The established deadline for submittal from a licensee in the AFRRRI reactor class (less than 2 Mwt) was November 3, 1982. Accordingly, AFRRRI transmitted by letter dated November 2, 1982, an updated emergency plan, dated October 1982, thereby complying with the existing applicable regulations, and the staff evaluated that plan against the regulations and recommended guidance.

Furthermore, the NRC staff developed and issued an interim report, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors" (NUREG-0849, May 1982), which was based on the referenced guidance. This standard review plan explicitly listed 10 planning standards against which the staff would review and evaluate the emergency plans submitted by nonpower reactor facilities.

Specifically, the AFRRRI emergency plan was reviewed against the requirements of 10 CFR 50, Appendix E, and the guidance criteria set forth in the proposed Revision 1 to RG 2.6, which endorses American National Standards Institute (ANSI)/ANS-15.16-1982 and NUREG-0849. The staff performed an item-by-item review of the plan as summarized below.

13.3.1 Introduction

AFRRI is a triservice military organization, subordinate to the Defense Nuclear Agency, and is responsible for conducting scientific research in the field of radiobiology and related matters essential to the support of the Department of Defense. The AFRRI reactor is a TRIGA-fueled, pool-type research reactor capable of both pulsed and steady-state operation. The reactor is licensed pursuant to 10 CFR 50 under Facility Operating License No. R-84 to operate at steady-state power levels up to a maximum of 1 MWt and to pulse with step reactivity insertions up to a maximum of 2.8% $\Delta k/k$ (4.00\$ pulse). The reactor provides a source of mixed neutrons and gamma radiations for radiobiology research and of neutrons for radioisotope production in support of medical research within the Department of Defense. The reactor averages approximately 1,000 power operations (steady state and pulsing) per year with an annual average energy output of approximately 30 MW hours. The reactor is housed within the AFRRI complex and is located in the southeast quadrant of the National Naval Medical Center (NNMC), now known as the Naval Medical Command, National Capital Region in Bethesda, Maryland. A more detailed description of the AFRRI facility is given in the SER.

13.3.1.1 Evaluation

The emergency plan describes the licensee's approach to coping with emergencies and mitigating the consequences of accidents occurring at the reactor facility.

The plan is an integral part of the AFRRI emergency evacuation and fire plan and specifies the objectives and implementing procedures to be followed for emergency situations occurring at the reactor facility. The plan establishes guidelines and describes the responsibilities of the AFRRI staff for emergency event response. The plan includes drawings that provide definitive information on facility location, access routes, facility layout, and bounded areas where the Emergency Director of AFRRI has ensured jurisdiction and control of activities.

The plan describes the AFRRI emergency organization and the responsibilities and authority of the key members of the emergency organization. Several organizations, which are off-site to the AFRRI complex but are an integral part of the NNMC, that will augment the AFRRI emergency organization are described. The assistance and support services provided by these organizations include fire fighting, ambulance and emergency medical services, hospital facilities, and police protection. These support services are provided to AFRRI under an interservice support agreement between the Defense Nuclear Agency and the NNMC. The responsibilities and authority with a line of succession are specified for the key elements of the emergency organization. The plan includes a block diagram that shows the interface between the elements of the emergency organization and specifies the lines of communication for notification and emergency response. The AFRRI internal emergency organization with augmentation from the NNMC organization form the total AFRRI emergency response organization. The emergency organization described in the plan provides reasonable assurance that emergency management will exist to meet any foreseeable emergency at the reactor facility.

The plan describes three classes of emergencies that cover a broad spectrum of accidents that involve the alerting or activating of the emergency organization.

These classes are based on credible accidents associated with reactor operations and other emergency situations generally peripheral to reactor operations.

The emergency classes are "Notification of Unusual Events," "Alert," and "Events Less Severe than Unusual Events." This latter class was established to provide emergency preparedness planning to cope with the more likely but less severe emergency situations that might arise. Each emergency class is associated with emergency action levels (EALs) for activating the emergency organization and initiating emergency response measures. The area within the defined operations boundary for the reactor facility is established as the emergency planning zone (EPZ), which is totally within the AFRRRI complex site. Predetermined protective actions including evacuation, assembly areas, and access control have been established for the EPZ.

The plan describes emergency response measures for each emergency class and covers emergency team activation, assessment actions, protective actions, and corrective actions. These response measures are related to the emergency class and EALs that specify what measures are to be implemented. The plan describes the criteria for the termination of a state of emergency, for authorization for reentry, and for exposures to radiation in excess of normal occupational limits for emergency team members for life-saving and corrective actions that mitigate the consequences of an accident.

The emergency facilities and equipment available for emergency response includes a designated emergency support center (ESC) with a backup facility, radiological monitoring systems, instruments and laboratory facilities for continually assessing the course of an accident, first aid and medical facilities, and communication equipment. The provisions for maintaining emergency preparedness includes programs for training, retraining, drill, drill critiques, plan and procedures review, and updates and equipment inventory and calibrations.

13.3.1.2 Conclusion

On the basis of its review and evaluation, the staff concludes that the emergency plan for the AFRRRI reactor facility, dated October 1982, is acceptable because it

- (1) is in full compliance with the applicable regulations in 10 CFR 50.54
- (2) is consistent with the guidance provided by the staff in RG 2.6, Revision 1 (1982)
- (3) addresses acceptably all 10 of the planning standards itemized in NUREG-0849
- (4) provides reasonable assurance that the licensee has the capabilities to assess and respond to emergency events
- (5) provides reasonable assurance that necessary emergency equipment will be available
- (6) describes a plan of action to protect the health and safety of workers and the public in the event of a reactor-related radiological emergency

19 REFERENCES

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, D.C.

Federal Register 47 FR 19512, "Emergency Planning and Preparedness for Research and Test Reactors: Extension of Submittal Dates," S. J. Chilk, NRC, May 6, 1982.

U.S. Nuclear Regulatory Commission, NUREG-0849, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors," May 1982.

---, NUREG-0882, "Safety Evaluation Report Related to the Renewal of the Operating License for the Research Reactor at the Armed Forces Radiobiology Research Institute," June 1982.

---, Regulatory Guide 2.6, "Emergency Planning for Research Reactors," For Comment Issue, 1979, Rev. 1, Mar. 1982.

Industry Codes and Standards

American National Standards Institute/American Nuclear Society (ANSI/ANS) 15 series.

---, 15.16, "Standard for Emergency Planning for Research Reactors," (ANS) Draft, 1978, (ANS) Draft, Nov. 1981, 1982.

APPENDIX A

LIST OF CONTRIBUTORS

This supplement to the Safety Evaluation Report is a product of the NRC staff and its consultants, who are listed below:

<u>NRC Staff</u>	<u>Title</u>	<u>Branch</u>
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APPENDIX B

ERRATA FOR NUREG-0882

"Safety Evaluation Report related to the renewal of the Operating License for the research reactor at the Armed Forces Radiobiology Research Institute"
Docket No. 50-170.

<u>Section</u>	<u>Page</u>	<u>Change</u>
1	page 1-1	In paragraph 5, line 6 after "to" insert "and including 1 MW, and pulsed operation with step reactivity insertions up to".
14.2.7	page 14-9	Delete the last six lines on page: typographical error.

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