

May 8, 2000

Dr. Daniel B. Bullen
Mechanical Engineering Department
Nuclear Engineering Program
Iowa State University
2025 H. M. Black Engineering Building
Ames, IA 50011-2160

SUBJECT: ISSUANCE OF AMENDMENT NO. 14 TO FACILITY LICENSE NO. R-59 FOR
IOWA STATE UNIVERSITY ARGONAUT REACTOR (TAC NO. MA4484)

Dear Dr. Bullen:

The Commission has issued the enclosed Amendment No. 14 to Facility License No. R-59 for the Iowa State University Argonaut Reactor (ISUAR).

The amendment approves the decommissioning plan for the ISUAR in response to letters dated January 4 and 6, 1999, and revises some of the possession only Technical Specifications as requested in Scott Wendt's letter of January 31, 2000. The amendment also authorizes the approved decommissioning plan to be included as a supplement to the ISUAR Safety Analysis report pursuant to 10 CFR 50.82 (b)(5).

Prior to issuance of the amendment, the Commission published an Environmental Assessment and Finding of No Significant Impact in the Federal Register, 65 FR 25964, (copy enclosed).

A copy of the related Safety Evaluation supporting Amendment No. 14 is also enclosed.

Sincerely,

/RA/

Theodore S. Michaels, Senior Project Manager
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-116

Enclosures: 1. Amendment No. 14
2. Technical Specifications
3. Safety Evaluation
4. Environmental Assessment
and Finding of No Significant Impact

cc: w/enclosures:
Please see next page

Iowa State University

Docket No. 50-116

cc:

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Nuclear Engineering Program
Iowa State University
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IOWA STATE UNIVERSITY

DOCKET NO. 50-116

AMENDMENT TO FACILITY LICENSE

Amendment No. 14
License No. R-59

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment to Facility License No. R-59 filed by the Iowa State University (the licensee), dated January 4 and 6, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the regulations of the Commission as set forth in 10 CFR Chapter I;
 - B. The facility will be decommissioned in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance that (i) the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) such activities will be conducted in compliance with the regulations of the Commission;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the regulations of the Commission and all applicable requirements have been satisfied.
 - F. Prior notice of this amendment was not required by 10 CFR 2.105, and publication of notice for this amendment is not required by 10 CFR 2.106.
2. Accordingly, Facility License No. R-59 is hereby amended in its entirety to read as follows:
 - A. This license applies to the Argonaut-type Model UTR-10 (American Standard) research reactor (hereinafter referred to as "the reactor") that is owned by Iowa State University and located on the University's campus at Ames, Iowa, and described in the licensee's application dated January 6, 1999. The Iowa State University is authorized to decommission the facility in accordance with this application.
 - B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses the Iowa State University:
 1. Pursuant to Section 104c of the Act and 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," to possess, but not operate the reactor

in accordance with the procedures and limitations described in the application and this license;

2. Pursuant to the Act and 10 CFR Part 30, "Rules and General Applicability to Domestic Licensing of Byproduct Material," and Part 70, "Domestic Licensing of Special Nuclear Material," to possess, but not to separate, such byproduct and special nuclear materials as may have been produced by operation of the facility.
- C. This license shall be deemed to contain and is subject to the conditions specified in Parts 20, 30, 50, 51, 55, 70, and 73 of 10 CFR, Chapter 1, to all applicable provisions of the Act, and to the rules, regulations, and orders of the Commission now, or hereafter in effect.

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment 14, are hereby incorporated in the license. The licensee shall maintain the reactor in accordance with these Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall expire at midnight October 21, 2003.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Enclosure: Appendix A Technical
Specifications

Date of Issuance:

ENCLOSURE TO LICENSE AMENDMENT NO. 14

FACILITY LICENSE NO. R-59

DOCKET NO. 50-116

Replace the following pages of Appendix A, "Technical Specifications," with the enclosed pages. The revised pages are identified by amendment number and changes are either blocked out or dashed through.

Remove

3-6
3-7
3-8
4-6
6-1
6-2
6-4
6-5

Insert

3-6
3-7
3-8
4-6
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6-5

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 14 TO

FACILITY LICENSE NO. R-59

IOWA STATE UNIVERSITY

DOCKET NO. 50-116

1.0 INTRODUCTION

By letters dated January 4 and 6, 1999, the Iowa State University (ISU), the licensee, submitted a request for approval of its decommissioning plan (DP) for the ISU Research Reactor (UTR-10), dated January 6, 1999 (Ref. 1). Decommissioning, as described in the plan, will consist of transferring licensed radioactive equipment and material from the site, and decontamination of the facility to meet unrestricted release criteria (this is called the DECON option). With the DP, the licensee submitted a radiological characterization report (Refs. 2 and 3). In addition, the DP describes the methods and controls for the final radiological survey, which will be performed by the licensee, to verify that the release of the decommissioned areas and structures for unrestricted use is acceptable.

The ISU UTR-10 is an Argonaut-type reactor. It is a water moderated and cooled, and graphite-reflected, non-power reactor. It was licensed and first operated in 1959. The 10-kW thermal reactor was shut down on May 15, 1998. All fuel has been removed and has been shipped to DOE's Savannah River site. By License Amendment No. 13 issued on March 2, 1999, the NRC discontinued the authority to operate the reactor and authorized possession of the residual radioactive materials.

A "Notice and Solicitation of Comments Pursuant to 10 CFR 20.1405 and 10 CFR 50.82(b)(5) Concerning Proposed Action to Decommission Iowa State University Research Reactor" was published in the FEDERAL REGISTER on February 12, 1999 (64 FR 7214), and in the Ames, Iowa Tribune on February 19, 1999.

2.0 EVALUATION

The NRC staff has reviewed the licensee's proposed actions to decontaminate, dismantle, and dispose of component parts of the UTR-10 and to perform a final radiological survey which will permit release of the decommissioned areas for unrestricted use and termination of Facility License No. R-59. The NRC staff's review includes consideration of (a) management responsibilities and commitments to continue following applicable regulations, regulatory guides, standards and personnel protection plans, including procedures, (b) use of appropriate equipment and instrumentation, radiation survey methods, training, personnel dosimetry, radioactive waste disposal, and (c) the final radiological survey of the facility.

2.1 Site and Facility Description

The UTR-10 is housed in the Nuclear Engineering Laboratory (NEL) building located on the west edge of the main campus of ISU, in Ames Iowa. The facility is a two-story building of brick construction built in 1934 by the U.S. Department of Agriculture.

The NEL building is divided into four levels: the basement (west side only), the ground floor (which includes the central bay), the first floor (west side only) and the second floor, which surrounds the central bay. The central bay is approximately 34 feet high and has a floor area of 37 feet by 56 feet, of which a space approximately 37 feet by 38 feet is allocated to the reactor room. The reactor room houses the reactor, which is enclosed in a concrete biological shield, the process pit, the fuel storage pit, and a five-ton bridge crane.

The UTR-10 is a reactor of the Argonaut type which used uranium enriched to 19.75% in ^{235}U in a graphite reflected, water moderated and cooled core. The reactor was installed in 1959 on the ground floor level, central bay area, of the NEL. In 1991 the reactor fuel was changed from its original high-enrichment uranium to low-enrichment uranium. The reactor was controlled with four window-shade type Boral control rods. Heat from the fission was removed from the primary coolant by a 34,000 BTU/hr shell-and-tube heat exchanger that used city water as a heat sink.

2.2 Radiological Status of the Facility

Routine radiological survey data was collected periodically during the operational life of the facility. Of the more recent data, the measurements conducted by ISU in August 1998 indicated that exposure rates in the central general areas of the NEL (all three elevations) and on the reactor floor (including the process pit) were not greater than background. All smears collected at this time indicated that removable contamination was less than 200 dpm/100 cm² (beta/gamma).

The following exposure rate data was collected at the reactor housing area:

- 0.5 mR/hr 1 meter above the core surface
- 2.0 mR/hr on average 4" above top of the graphite
- 3.0 mR/hr maximum (between two of the control rod housings)
- 8.0 mR/hr 3 feet into the core tanks (below top of the graphite)
- 6.0 mR/hr at the surface of the bottom of the shutdown closures.

A licensee review of audits conducted by the Nuclear Regulatory Commission (and its predecessor, the Atomic Energy Commission) indicates that there were no instances of unusual events which caused any area to become contaminated. A licensee review of the ISU records indicated there were no known instances of contaminating events, no instances of an area ever posted as a "Contaminated Area," and no instances of airborne contamination, with the exception of short-lived noble gases.

In preparation for decommissioning, a radiological survey of the ISU reactor facility was recently conducted by the licensee to assess the current radiological conditions at the site. A characterization/sampling plan was prepared and characterization activities were indicated at

the fuel storage pit in July 1998. The remaining characterization survey activities for the facility were concluded in September 1998.

The results of this survey indicate that the remaining residual radioactivity is limited to the activated materials in the reactor room structure. A small area of slightly elevated and fixed activity (~200 cm²) was also detected on the concrete floor of the process pit near a water sample tap.

2.2.1 Area Exposure Rates

The average area exposure rates range from 27 to 54 $\mu\text{R/hr}$ in areas immediately adjacent to Rooms 101 and 201. However, these are not related to reactor operation because the areas in question serve as storage areas for radioactive sources and radioactive materials for the ISU Environmental Health & Safety Department (EH&S). Exposure rates up to 23 $\mu\text{R/hr}$ were detected in the southwest stairwell and in an area above the east side of the reactor room. The remainder of the facility produced exposure rates consistent with the outdoor levels near the facility, which ranged from 12 to 28 $\mu\text{R/hr}$.

2.2.2 Surface Contamination

Surface contamination was limited to a small area on the process pit floor and averaged 9000 dpm/cm². No removable surface contamination was detected on the surface of the reactor core. Elevated measurements that were observed in the reactor core are due to activation.

2.2.3 Reactor Core Activation

Contact exposure rate readings collected on the east Beam Port Plug and the Central Thermal Column Stringer indicate that the area of activation extends radially to approximately 40" x 34" from the core centerline. A calculation performed using the 10 CFR Part 61 analysis results from four materials collected from the core (concrete, graphite, aluminum, and steel) indicate an estimated total volume of radioactive waste of 1200 ft².

2.2.4 Conclusion

The NRC staff has reviewed all the dose rates and contamination levels identified and concludes that the report is complete. The NRC staff concurs with the conclusion that no significant events that would inhibit the acceptable decommissioning of the reactor as proposed occurred in the operating history of the facility. Further, the NRC staff considers the licensee's estimates of the radiological conditions and radiation measurements to be acceptable.

2.3 Radiological Release Criteria

The NRC Final Rule on License Termination, 10 CFR 20.1402, provides radiological criteria for release of a site for unrestricted use. Release criteria for unrestricted use is a maximum Total Effective Dose Equivalent (TEDE) of 25 mrem per year from residual radioactivity above background. Application of As Low As Reasonably Achievable (ALARA) is also a requirement.

The results of the final survey will be used to demonstrate that the predicted dose to a member of the public from any residual activity does not exceed the 25 mrem per year dose limit. The final survey will be conducted in accordance with the guidelines in NUREG-1575, (Ref. 4).

These methods include subdividing the ISU NEL facility into Class 1, Class 2 and Class 3 Areas in accordance with NUREG-1575. Class 1 Areas are areas that had, prior to remediation, known contamination based on the recent radiological survey (also known as the Characterization Report) in excess of the derived concentration guideline level (DCGL). Class 2 Areas are areas that had, prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL. Class 3 Areas are areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL.

Since the Characterization Report has shown that only Class 1 Areas had contamination that could be confirmed, these areas will receive the highest degree of survey efforts during the final survey. The area classification of the ISU NEL facility for the final survey has been identified in Table 4.1 of the licensee's decommissioning plan.

The licensee has identified the instruments that will be used to conduct the final survey and has discussed the approach that will be taken to determine background radiation levels at the facility.

The NRC staff considers the licensee's proposed methods to satisfy the release requirements to be acceptable.

The NRC will review and evaluate the licensee's results.

2.4 Decommissioning Alternative

As previously stated, the DP notes that decontamination down to the levels required by the NRC for termination of the license (the DECON alternative) was proposed by the licensee because of the desire for unrestricted use of the property and remaining facilities. The DP presents task analysis, schedule for completion, and radiation dose estimates for specific tasks. The DP discusses segmenting and removing radioactive components and materials, contamination control, respiratory protection, local shielding and radioactive waste disposition. Decommissioning, as defined in the DP, will include:

- (a) area and equipment decontamination;
- (b) removal of the beam tubes and gates, safety rods and drives, and shield plugs and plates;
- (c) removal of the reactor vessel;
- (d) removal of the retention tanks;
- (e) removal of the biological shield; and
- (f) packaging, shipping and disposal of the irradiated and contaminated material, equipment, and rubble at a licensed repository.

Decontamination activities will continue until the remaining UTR-10 facility, including the support building, is suitable for unrestricted use.

The NRC staff has concluded that the choice of DECON and associated proposed plans are consistent with the provisions of 10 CFR 50.82(b)(4)(i) for decommissioning without significant delay and are, therefore, acceptable.

2.5 Management, Organization, and Associated Controls During Decommissioning

The DP outlines the organizational structure by which dismantling and decontaminating will be managed and implemented. The DP describes the detailed duties and responsibilities of each position.

ISU, as the owner of the facility, has the overall responsibility for the work conducted during decommissioning of the UTR-10 reactor. The University retained Duke Engineering and Services (DE&S) as the decommissioning contractor (DC). The DE&S Project Manager reports to the ISU Project Manager and is responsible for preparing the site for decommissioning, and implementing decommissioning and dismantlement activities.

DE&S has extensive experience with decommissioning Nuclear Power Plants.

2.5.1 Project Management Structure

The project management structure for the decommissioning of the ISU reactor is consistent with the guidance provided in Appendix 17.1 of NUREG-1537 (Ref. 5). ISU will continue to be responsible for the overall supervision, compliance with regulations, and the health and safety of the public.

2.5.2 ISU Project Manager

The ISU Project Manager for the decommissioning project is also the Reactor Manager. The Reactor Manager is responsible for the facility management and the reactor operation. He has been in charge of the operations of the reactor for several years. He is familiar with every aspect of the reactor, associated facilities, and the University policies and controls related to radiation protection.

The ISU Project Manager (Reactor Manager) interacts with the University's Reactor Use Committee and the Radiation Safety Officer on matters related to radiation safety, ALARA reviews, and regulatory affairs. The ISU Project Manager also interacts with the Director of EH&S on health and safety issues.

2.5.3 ISU Radiation Safety Officer

The Radiation Safety Officer (RSO) at ISU reports directly to the EH&S Director and is responsible for health physics activities. He is a member of the Radiation Safety Committee. During decommissioning activities, the RSO will review and approve all DE&S Radiation Work Permits (RWPs). He will also ensure that the contractor's health physics staff follows the radiation protection regulations and policies, including the implementation of the ALARA. The

RSO has the authority to interrupt or suspend any activity if the method used is deemed unsafe or contrary to appropriate regulations.

2.5.4 ISU Reactor Use Committee

During operation of the UTR-10 facility, the Reactor Use Committee was responsible for reviewing and approving all experiments before they were conducted. Since the Committee reviews and approves all safety-related projects, it is responsible for the review and approval of the Decommissioning Plan prior to its submittal to the NRC. In addition, the Committee is responsible for the review and approval of any changes to the DP under the provisions of 10 CFR 50.59. The Reactor Use Committee members are appointed by the ISU Radiation Safety Committee. The Radiation Safety Committee members are representatives from various colleges at ISU and are appointed by the University Provost.

The DP identifies the overall organizational structure by which the licensee will manage the facility decontamination and dismantlement leading to decommissioning. A decommissioning contractor is an integral part of the organization. An organizational chart identifies the roles of personnel and identifies key positions for both implementation and oversight of the project. The interface between the contractor and the ISU is described in the DP.

The NRC staff judges that the DP provides acceptable organizational structure and control to decontaminate and dismantle the ISU UTR-10 facility while maintaining due regard to protecting the public, environment and workers from significant radiological risk.

2.6 Radiation Protection Program

The DP designates the responsibilities and oversight functions of key positions and committees in the decommissioning organization including the DC, and also commits to the use of written RWPs that will include ALARA objectives for all relevant tasks.

The DP discusses the use of self-contained ventilation systems, including filters to prevent the release of airborne radioactive particles either to the rest of the containment building or to the environment. In this regard, the licensee recognizes that the location of the decommissioning project in the center of a population area requires an environmental monitoring program to ensure that no releases exceeding regulatory limits will occur during the decommissioning.

The estimated collective doses in person-rem for individual decommissioning tasks are presented in the DP. No releases of airborne radioactivity to the unrestricted environment are expected. Therefore, it is not expected that the public will receive more than minimal radiation exposure related to the reactor decommissioning. The DP indicates that 10 CFR Part 20 requirements for radiological exposures and protection will be met.

Based on the above, the NRC staff concludes that the licensee's plan on radiation protection is acceptable.

2.7 Radioactive Materials and Waste Management

The DP addresses the potential sources of solid, liquid and gaseous radioactive waste and disposal. In addition, the plan addresses the sources and disposal of mixed wastes (i.e., radioactive and hazardous waste).

Solid waste will consist primarily of reactor components such as tanks, demolished concrete and graphite. Solid waste will be packaged and shipped to a licensed low level radioactive waste disposal facility in accordance with regulatory requirements.

Liquid waste may result from washing contaminated surfaces, de-watering activities, or dust suppression activities. All liquid waste disposal will be either in accordance with 10 CFR 20.2003 or by solidification and treatment as low level radioactive solid waste.

Gaseous waste will probably consist of airborne particles generated during the demolition process. These particles will be contained and trapped in HEPA filters that will be disposed of as solid waste in accordance with applicable requirements.

Mixed waste will be packaged and disposed of at an appropriately licensed facility.

The staff considers these aspects of the DP acceptable.

2.8 Training

The DP discusses the training of the staff to perform the decontamination and dismantlement, and outlines the training areas and the performance of training. Training will be conducted to implement the ALARA principle and will be conducted by the DC using personnel qualified in the program content. The training program for all personnel working on the decommissioning and in the vicinity of the containment building will consist of instructions in radiation safety prior to the commencement of their work activities.

The training will ensure that decommissioning project personnel have sufficient knowledge to perform work activities in accordance with the requirements of the radiation protection program and to accomplish ALARA goals and objectives. The principal objective of the training program is to ensure that personnel understand the responsibilities and the required techniques for safe handling of radioactive materials and for minimizing exposure to radiation.

The training topics will include:

- (a) General employee training in compliance with 10 CFR 19.12 for all personnel involved with radioactive materials or those in the vicinity of radioactive materials;
- (b) Radiation worker training in compliance with 10 CFR Part 20 including personnel monitoring, radiation surveillance and monitoring, controlled areas, ventilation, access control, health physics and administrative controls;
- (c) Respiratory protection in accordance with 10 CFR 20.701 through 20.1704, NRC Regulatory Guide 8.15, Revision 1, NUREG-1400, and 29 CFR 1910.134;
- (d) Training consistent with the requirements of 29 CFR 1910.120, which concerns hazardous waste operations and emergency response; and

- (e) Hazards communication training to meet the requirements of 29 CFR 1910.120.

Records of each individual training session will be maintained on the job site.

The staff considers the DP's discussion of personnel training controls to be acceptable.

2.9 Industrial Safety and Hygiene Program

The DP discusses various specific plans to control and limit potential non-radiological risks and hazards. An onsite emergency plan that is site specific as well as project specific will be prepared to account for the responsibilities of all individuals involved in the project during an emergency. Potential accidents, such as spillage or minor contamination spread, may be possible. Such minor accidents are typical of decontamination and decommissioning projects and do not pose a significant radiological concern. The emergency plan will be implemented if such accidents occur to ensure coordination of radiological and industrial safety concerns.

The staff considers these steps acceptable.

2.10 Accident Analysis

Because of the training of all involved personnel, the quantity of radioactive material on the site and the radiation protection program, the staff expects the probability and consequences of accidents to be very low.

2.11 Proposed Final Radiation Survey Plan

Section 4 of the DP includes a proposed final radiation survey plan to ensure that the facility meets unrestricted release criteria. The final radiation survey plan includes provisions to develop specific procedures, use appropriate instrumentations and methodologies, and provide documentation.

ISU will submit documentation of the satisfactory completion of its Final Radioactive Survey to the NRC. The NRC will review and evaluate this documentation.

The staff finds this aspect of the plan acceptable.

2.12 Cost Estimate and Funding

The DP presents a detailed cost estimate to complete the tasks and a commitment by ISU to provide the necessary funds. The staff finds the cost estimate and funding commitment acceptable.

2.13 Technical Specifications

In addition to the DP requirements, the Technical Specifications approved in Amendment No 13, which modified the license to possess but not operate the reactor, and as modified by this amendment, are applicable during the decommissioning of the reactor.

2.13.1 Technical Specification Changes

By letter dated January 31, 2000, the ISU submitted changes to their Possession-Only License TS to eliminate or revise sections that are no longer applicable because all reactor fuel has been removed from the facility. The following sections have been amended or deleted.

Section 3.6 Emergency Power

The emergency power was provided to assure that power was available during fuel transfer operations. This power is no longer required because all fuel has been removed. This section has been deleted.

Section 3.7 Radiation Monitoring System and Effluents

An air particulate monitor was placed in service whenever fuel transfer operations were being performed. It is no longer needed and has been eliminated. Radiation monitors were placed in the wall adjacent to the fuel storage pit. Since there is no fuel, they are no longer needed and have been eliminated. Radiation protection of the health and safety of radiation workers and the public during decommissioning will be in accordance with the measures described in the ISU decommissioning plan (Section 3.0).

Section 4.6 Emergency Power

This section deals with test and surveillance requirements of the emergency power required in section 3.6. Since this emergency power is no longer needed, the surveillance requirements have been eliminated.

Section 6.1.3 Staffing

Sections 6.1.3(1), 6.1.3(2), and 6.1.3(3) a. have been deleted since they all deal with staffing requirements during fuel transfer operations.

Section 6.1.4 Selection and Training of Personnel

This section deals with the requalification requirements for personnel that would be operating the reactor. Since the reactor is being decommissioned, it is no longer needed and has been deleted.

Section 6.2.4 Audit Function

Section 6.2.4(2) required that the audit review the retraining and requalification of the operating staff. Since the reactor is not operating, this is no longer needed.

Section 6.2.4(4) required that the Emergency and Physical Security plans be audited. These plans are no longer needed because there is no fuel on site. The Emergency and Physical Security Plans provisions during decommissioning will be as described in the ISU decommissioning plan, Section 6.0 and 7.0.

Section 6.3 Procedures

The procedures dealing with fuel element manipulation, conduct of experiments and the implementation of the Emergency and Physical Security Plans are no longer needed for the same reasons as previously stated.

The staff finds all these TS changes acceptable.

2.14 Quality Assurance Provisions

The licensee has committed to the use of existing ISU QA programs. The DC (DE&S) has extensive QA experience and is fully capable of developing specific QA programs for the ISU Decommissioning project.

2.15 Safeguards and Physical Security

The fuel has been shipped off the site prior to start of decommissioning; therefore, safeguards provisions are no longer necessary. Since the fuel was shipped off the site, the physical security task has been reduced to ensuring access control of the facility. The DP describes acceptable access control to prevent inadvertent exposure to workers and members of the public.

3.0 ENVIRONMENTAL CONSIDERATION

The Commission has prepared an Environmental Assessment and Finding of No Significant Impact (EA), which was published in the Federal Register on May 4, 2000, 65 FR 25964.

On the basis of the EA and this safety evaluation, the Commission has determined that no environmental impact statement is required and that issuance of this amendment approving decommissioning will have no significant adverse effect on the quality of the human environment.

4.0 CONCLUSION

Based on the staff's review of the licensee's DP, it is concluded that the licensee is adequately cognizant of its continuing responsibilities to protect the health and safety of both workers and the public from undue radiological risk. The DP provides reasonable evidence that the licensee is prepared to dismantle the reactor, and dispose of all significant reactor-related radioactive materials in accordance with applicable regulations and applicable NRC guidance. The staff, therefore, finds the licensee's plans to be acceptable.

The staff has concluded, based on the considerations above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed activities; (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

5.0 REFERENCES

1. DE&S' Document No. 00752.F03.A01, Decommissioning Plan for the Iowa State University UTR-10 Reactor, January 6, 1999.
2. DE&S' Document No. 00752.F02.A01, Characterization Report for the Iowa State University UTR-10 Reactor, January 6, 1999.
3. DE&S' Document No. 00752.F02.A01, Appendices to Characterization Report for the Iowa State University UTR-10 Reactor, January 6, 1999.
4. USNRC, NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), December 1997.
5. USNRC, NUREG-1537, Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors, Appendix 17.1, February 1996.

Principal Contributor(s): James Miller, INEEL
Daniel Hughes, INEEL
Theodore Michaels

Date:

UNITED STATES NUCLEAR REGULATORY COMMISSIONIOWA STATE UNIVERSITYDOCKET NO. 50-116UTR-10 RESEARCH REACTORENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering the issuance of a license amendment to Facility License No. R-59, issued to Iowa State University (ISU or the licensee), that would allow decommissioning of the UTR-10 Research Reactor located on the west edge of the main campus of the ISU, in Ames, Iowa.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action

By application dated January 6, 1999, the licensee submitted a decommissioning plan in accordance with 10 CFR 50.82(b), in order to dismantle the 10-kilowatt (thermal) ISU UTR-10 Argonaut Research Reactor, to dispose of its component parts and radioactive material, and to decontaminate the facility in accordance with the proposed dismantling plan to meet the Commission's unrestricted release criteria. After the Commission verifies that the release criteria have been met, Facility License No. R-59 would be terminated. The licensee submitted an Environmental Report, dated January 4, 1999, that addresses the estimated environmental impacts resulting from decommissioning the UTR-10 reactor.

ISU ceased operating the reactor in May 1998. All the reactor fuel has been removed from the facility.

A "Notice of Application for Decommissioning Amendment, Iowa State University UTR-10 Research Reactor" was published in the FEDERAL REGISTER on January 25, 1999, 64 FR 3725. A "Notice and Solicitation of Comments Pursuant to 10 CFR 20.1405 and 10 CFR 50.82(b)(5) Concerning Proposed Action to Decommission Iowa State University UTR-10 Research Reactor" was published in the FEDERAL REGISTER on February 12, 1999, 64 FR 7214, and in the Ames, Iowa daily newspaper, *The Tribune*, on February 19, 1999. There were no comments.

Need for the Proposed Action

The proposed action is necessary because of ISU's decision to cease operations permanently. As specified in 10 CFR 50.82, any licensee may apply to the Nuclear Regulatory Commission for authority to surrender a license voluntarily and to decommission the affected facility. Further, 10 CFR 51.53(d) stipulates that each applicant for a license amendment to authorize decommissioning of a production or utilization facility shall submit with its application an environmental report that reflects any new information or significant environmental change associated with the proposed decommissioning activities. ISU is planning to use the area that would be released for other academic purposes.

Environmental Impact of the Proposed Action

All decontamination will be performed by trained personnel in accordance with previously reviewed procedures, and will be overseen by experienced health physics staff. Solid and liquid waste will be removed from the facility and managed in accordance with NRC requirements. The operations are calculated to result in a total occupational radiation exposure of 2.4 person-rem. Radiation exposure to the general public during decommissioning is expected to be zero. This will be accomplished by keeping the public at a safe distance and by eliminating effluent releases during decommissioning.

Occupational and public exposure may result from offsite disposal of the low-level residual radioactive material from the ISU. The handling, storage, and shipment of this radioactive material are to meet the requirements of 10 CFR 20.2006, and "Transfer for Disposal and Manifest," 49 CFR Parts 100-177, "Transportation of Hazardous Materials." The proposed low-level radioactive waste facility (LLRW) has the licenses and permits to accept and dispose LLRW from reactor decommissioning projects. The materials that are classified LLRW will be packaged and shipped from ISU directly to this facility for disposal.

The NRC Final Rule on License Termination, 10 CFR 20.1402, provides radiological criteria for release of a site for unrestricted use. Release criteria for unrestricted use is a maximum Total Effective Dose Equivalent (TEDE) of 25 mrem per year from residual radioactivity above background. Application of As Low As Reasonably Achievable (ALARA) is also a requirement. The results of the final survey will be used to demonstrate that the predicted dose to a member of the public from any residual activity does not exceed the 25 mrem per year dose limit.

All liquid waste that is generated during the decommissioning activities will be collected in barrels and disposed of in accordance with state and Federal guidelines. All decommissioning activities will be carried out within the Nuclear Engineering Laboratory's confinement boundary. Additional containment measures will be taken as necessary to minimize the spread of contamination within the confinement boundary. These measures will include wood framing covered with plastic and low volume water misting. Airborne releases of radioactive materials are not expected. Dust production will be minimized by low volume water mist at points where dust is produced.

Based on the review of the specific proposed activities associated with the dismantling and decontamination of the ISU facility, the staff has determined that the proposed action will

not increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential non-radiological impacts, the proposed action does not involve any historic sites. It does not affect non-radiological plant effluents and has no other environmental impact. Therefore, there are no significant non-radiological environmental impacts associated with the proposed action.

Accordingly, the Commission concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action

The four alternatives for disposition of the UTR-10 reactor are: DECON, SAFSTOR, ENTOMB, and no action. These alternatives are defined as follows:

DECON is the alternative in which the equipment, structures, and portions of the facility containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use after cessation of operations.

SAFSTOR is the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use.

ENTOMB is the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained; and continued surveillance is carried out until the radioactivity decays to a level permitting release of the property for unrestricted use. The no-action

alternative would leave the facility in its present configuration. However, the regulations in 10 CFR 50.82(b) only allow a limited time for this condition to exist.

The radiological impacts of SAFSTOR would be less because of radioactive decay prior to DECON. The ENTOMB option would result in lower radiological exposure but continued use of resources. ISU has determined that the proposed action (DECON) is the most efficient use of the existing facility, since it proposes to use the space that will become available for other academic purposes. The SAFSTOR, ENTOMB, and no-action alternatives would entail continued surveillance and physical security measures to be in place and continued monitoring by licensee personnel.

Alternative Use of Resources

This action does not involve the use of any resources not previously considered in the Environmental Report submitted on January 4, 1999, and the Decommissioning Report submitted on January 6, 1999, for the UTR-10 reactor.

Agencies and Persons Contacted

In accordance with its stated policy, on March 7, 2000, the staff consulted with the Iowa State official, Donald A. Flater, Chief, Bureau of Radiological Health, Iowa Department of Public Health, regarding the environmental impact of the proposed action. The state official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letters dated January 4, and 6, 1999, which are available for public inspection at the NRC's Public Document Room, the Gelman Building, 2120 L Street, NW, Washington, DC 20555. Publically available records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, <http://www.nrc.gov> (the Electronic Reading Room).

Dated at Rockville, Maryland, this 26th day of April 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

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