



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

JUL 29 1988

Report No.: 50-538/88-01

Licensee: Memphis State University
 Memphis, TN 38152

Docket No.: 50-538

License No.: R-127

Facility Name: Memphis State University AGN-210 Training Reactor

Inspection Conducted: June 23-24, 1988

Inspector: G. B. Kuzo 26 Jul 1988
Date Signed

Approved by: C. M. Hosey 7/27/88
Date Signed
 C. M. Hosey, Section Chief
 Division of Radiation Safety and Safeguards

SUMMARY

Scope: This special announced closeout inspection involved the review of licensee radiation protection activities associated with decommissioning of the Memphis State University (MSU) AGN-201 Training and Research Reactor facility, and also the performance of confirmatory radiological surveys for the reactor equipment and facilities.

Results: The licensee's actions concerning personnel radiation protection, fuel disposition, and equipment and facilities external radiation exposure and loose contamination levels for equipment and facilities met established regulatory criteria. Supplemental survey results for fixed surface radioactive contamination levels for equipment and facilities conducted subsequent to the onsite inspection and reviewed by the NRC, met the established release criteria for unrestricted use of the facilities.

No violations or deviations were identified in the areas inspected.

REPORT DETAILS

1. Persons Contacted

- R. Collier, Director, Public Service
- *V. Oliphant, Vice President, Planning and Public Service
- *R. Riley, Radiation Safety Officer, Safety Services

*Attended exit interview

2. Closeout Inspection and Survey (83829)

a. Request for Confirmatory Radiological Surveys

The Memphis State University (MSU) AGN-207 Nuclear Research and Training Reactor was operated at the University from December 10, 1976 through March 31, 1985.

In an application to the Office of Nuclear Reactor Regulation (NRR) dated March 15, 1985, the licensee requested conversion of its license to a possession only status while plans were being developed for decommissioning and license termination. Amendment No. 5, to the MSU Facility Operating License No. R-127 was issued on June 17, 1985, authorizing possession only status of the reactor at MSU. Initial plans for accomplishing the dismantlement, disposal and decontamination of the MSU AGN-201 Reactor and its associated facilities were forwarded by the licensee to NRR by letter dated November 10, 1986. Additional information regarding the plans was detailed to NRR in letters dated June 10, 1987, and August 21, 1987. Plans included discussion of decontamination methods, radiological monitoring and surveys to be performed, and residual radiological contamination and exposure limits to be established for release and/or unrestricted use of the equipment and MSU facilities associated with the reactor.

The NRC issued an Order on January 26, 1988, authorizing the dismantling of the facility and disposition of the component parts.

By letter dated March 24, 1988, the licensee forwarded to NRR, a request for verification of their radiological surveys, and for the issuance of an order to terminate License No. R-127. NRR requested the NRC Region II office to provide a final radiological survey of the facility to verify that residual radiation and contamination levels met the requirements of Regulatory Guide 1.86, Table 1, the maximum dose rate was 5 microRoentgens per hour (uR/hr) above background at a one meter distance from all materials and all fuel was removed from the MSU facilities.

b. Disposition of Special Nuclear Materials

The MSU AGN-201 Training and Research Reactor facility operated from approximately December 1987, through March 1988. The reactor operated at a maximum power level of 0.1 watt thermal.

Status of all fuel utilized for operation of the facility and a Radium-Beryllium (Ra-Be) startup source authorized by license No. R-127 were reviewed by the inspector. All fuel originally received onsite was shipped to the Department of Energy (DOE) facilities, Oak Ridge, TN, during February 1988. The inspector reviewed DOE/NRC Form 741, Nuclear Material Transaction Reports, dated February 18, 1988, and corrections thereto, dated March 31, 1988, verifying shipment of fuel to the DOE facility. In addition, tours of the reactor facilities confirmed that the reactor components were dismantled and all fuel materials were shipped.

The 10 millicurie (mCi) Ra-Be startup source originally authorized by NRC License R-127 was retained and was stored at the facility. Authorization for possession of the Ra-Be source material was transferred to the State of Tennessee License No. R-79177-C-89. The inspector reviewed and discussed the State license with cognizant personnel to verify that the startup source could be retained under the State license.

No violations or deviations were identified.

4. Personnel Exposure

The inspector reviewed exposure records for personnel involved with fuel movement and handling, and dismantlement and surveys of the MSU reactor equipment and associated facilities. For fuel movement and handling activities, both whole body and extremity (finger ring) dosimeters were utilized. All results were reported as less than 10 millirem (mrem), the vendor's minimum measurable quantity dose equivalent. During radiation surveys, only whole body dose monitoring was performed. All results were reported as not exceeding the minimum dose equivalent.

The cognizant licensee representative stated that the records required by 10 CFR 20.401(c) would be maintained indefinitely by the MSU radiation safety office which will continue to monitor campus radiation safety activities not associated with the NRC license.

5. Termination Radiation Contamination Surveys

The NRR Safety Evaluation Report (SER) for decommissioning of the MSU AGN-201 facilities located in Building 113 of the MSU south campus was sent as an enclosure to a letter from NRR to MSU dated January 26, 1988, which also transmitted the Order authorizing dismantling of the reactor and disposition of component parts. Section 4.5 of the SER requires that for unrestricted use of the facility or materials, the facility and/or materials must meet or be less than the surface contamination levels

detailed in Regulatory Guide 1.86, Table 1, and must not exceed an exposure rate limit of 5 microroentgens per hour (uR/hr) above natural background at 1 meter from the measured surface.

The inspector reviewed the licensee's final contamination survey results which were provided as an enclosure to a letter from the licensee to the NRC Region II office dated March 24, 1988. Background exposure levels measured approximately 18 uR/hr. Excluding Room 147, exposure results measured at one meter above selected surface areas in Building 113 ranged from 6 to 22 uR/hr throughout the reactor facility and associated rooms within the building. The elevated exposure reading noted for Room 147 resulted from the storage of the Ra-Be startup source and other radioactive source material maintained under the State of Tennessee license. This area was being maintained as a controlled area by the campus radiation safety office.

The inspector noted that the licensee reported smearable (removable) surface contamination results for equipment at the facility as counts per minute (cpm) for both beta/gamma and alpha analyses. Furthermore, the licensee's report did not indicate the efficiency of the survey instrument utilized to conduct the measurements nor listed the area of the surveys. Regulatory Guide 1.86 established acceptable fixed and removable surface contamination levels in units of disintegrations per minute per 100 square centimeters (dpm/100 cm²). The inspector noted that the licensee needed to report their smearable contamination results in the appropriate units and also needed to conduct additional surveys of fixed and smearable contamination levels on selected equipment and building surfaces within the facilities. Licensee representatives stated that the appropriate surveys would be conducted to meet the established criteria for unrestricted release or use of the facilities. They agreed to conduct the appropriate surveys and provide the information to the NRC as an addendum to their initial termination survey report.

The inspector performed radiation exposure surveys throughout the reactor room, control room and adjacent rooms in the Building 113. NRC values were slightly lower than licensee values, background measurements indicating 7 uR/hr and survey measurements ranging from 3 to 7 uR/hr for all areas, excluding Room 147 where the sources were maintained. In addition, the inspector took approximately 28 swipes of selected facility and equipment surface areas to verify that the limits for removable (smearable) contamination were not exceeded. All NRC results were less than the limits specified in Regulatory Guide 1.86. During the inspection, the inspector did not conduct surveys of fixed alpha or beta/gamma contamination levels.

6. Exit Interview

The inspection scope and findings were summarized on June 24, 1988, with those persons indicated in Paragraph 1. The inspector discussed the areas inspected and noted that supplemental surveys for fixed alpha and beta surface contamination levels associated with the equipment and selected facility areas were needed to meet the release and/or unrestricted use

criteria specified in the decommissioning plans submitted by the licensee. NRC review and verification of these supplemental radiation contamination surveys, were considered necessary subsequent to a decision being made regarding termination of the license. In letters dated July 14, 1988, and July 26, 1988, from MSU to NRR, the licensee provided supplemental information regarding their final survey report. All results for the fixed and removable alpha and beta/gamma surveys conducted were below the limits specified in Regulatory Guide 1.86. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection. Dissenting comments were not received from the licensee.