



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

DISMANTLING OF FACILITY AND DISPOSITION OF COMPONENT PARTS

WESTINGHOUSE ELECTRIC CORPORATION

NUCLEAR TRAINING REACTOR FACILITY

FACILITY LICENSE NO. R-119

DOCKET NO. 50-87

1.0 INTRODUCTION

By application dated July 8, 1987, as supplemented, Westinghouse Electric Corporation (Westinghouse) submitted a plan that requested authorization to dismantle the 10 kilowatt (thermal) Westinghouse Nuclear Training Reactor (WNTR) located at Zion, Illinois to dispose of its component parts and radioactive material and decontaminate the facility. The objective of this plan is to terminate the license of the WNTR facility, and to return the facility to unrestricted use. The WNTR was shut down in February 1987, and has not been operated since then. Subsequently, the reactor fuel elements, including control rod followers were removed from the core tank and placed in storage. The fuel, control rod followers and neutron sources were shipped to a Department of Energy Facility prior to receipt of a possession only license (Amendment No. 10), which was issued on October 5, 1987. Shipment was made in accordance with DOE, NRC, and DOT requirements.

2.0 FACILITY DESCRIPTION

The WNTR Facility is located in Zion, Illinois within the Westinghouse Nuclear Training Center (WNTC). The WNTR Facility is located in the southwest corner of the WNTC building. As part of Westinghouse Training and Operational Services, the WNTR Facility was used as a training facility for commercial power plant operators. The reactor was licensed to operate at a maximum power level of 10 kilowatts. The inherent design features of the reactor and the low power at which it was operated precluded the buildup of significant amounts of fission products. The fission product inventory is considered to be negligible. The power levels at which the WNTR operated were insufficient to heat the fuel or its coolant. Total burnup of the WNTR fuel, after 25 years of service, has been calculated to be less than 0.1 gram.

3.0 DISCUSSION

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The Westinghouse Nuclear Training Reactor was in operation from January 28, 1972 to January 1987. Since 1972, the WNTR has been used to train reactor operators and engineers in the fundamental theoretical principles of reactor operation. The reactor had a lifetime core and, at the final shipment, the total activity of the fuel was estimated to be 1.8 curies.

During the fifteen years of operation the only operational occurrences that necessitated reporting to the NRC were those involving dropped fuel elements. One of these incidents occurred on March 1, 1979 and one on November 23, 1981. Neither incident resulted in any damage to the fuel element involved and no leakage or facility contamination occurred. No fuel will be onsite during the dismantling operation and, there will be no probability of a fuel handling accident. There will be no requirement for Safe Storage since all radioactivity will be removed from the WNTR facility and the facility will be returned to unrestricted use condition. The licensee has agreed that the radiation levels for unrestricted use will not exceed 5 micro R/hr at one meter from the surface (see Section 4.4). The collective dose equivalent to the licensee's staff and public for the decommissioning operation is estimated to be less than 2 person-rems.

4.0 EVALUATION

The licensee proposes to dismantle the facility in accordance with their dismantling plan. They intend to decontaminate the facility below the radiation and contamination levels of Regulatory Guide 1.86 and the staff positions, as addressed in Section 4.4 of this safety evaluation, for unrestricted access and use. In completing the approved process to place this reactor in its current possession-only status, the reactor, all reactor components, and all equipment which was in contact with radioactive materials were surveyed for contamination and met minimum detectable activity levels. All fixed radiation monitors and alarms will remain in operation until the reactor and component parts have been removed from the facility.

The staff has reviewed the Westinghouse plan to dismantle the WNTR facility, dispose of its component parts and radioactive material and decontaminate the facility. The review considered the management responsibilities and commitments; the relevant regulatory guides, the health physics program including procedures, equipment, instrumentation, survey techniques, training, and personnel dosimetry; the waste disposal; and the final survey. These functions and activities, except for the final survey, were ongoing during operation of the reactor and will be maintained in appropriate scope during its dismantlement. They are described in the following sections.

4.1 Radiation Sources

The reactor fuel elements, including control rod followers, have been removed from the facility and shipped to a DOE facility. The WNTR facility will maintain only exempt instrumentation check and calibration sources. These exempt sources will be transferred with the appropriate survey instruments. The inherent design features of this reactor and the low power at which it was operated precluded the buildup of significant amounts of fission products, and the fission product inventory is considered to be negligible. Smear surveys were conducted by the licensee to detect the presence of activation products and none were detected.

The reactor tank and the dump tank water were sampled for radioactivity and drained according to specified limits of 10 CFR Part 20. The reactor vessel interior, including the thermal column tank, stainless steel collar pieces, the graphite reflector material and the control rod assemblies, were surveyed for residual radioactivity and loose surface contamination; they were then placed in steel drums for shipment to a burial site. The reactor controls have been de-energized, removed from the core, and stored in the facility.

The staff finds the licensee's plans and recent actions for disposition of sources of radioactivity associated with this operation to be acceptable.

4.2 Health and Safety Management

The Radiation Protection Program for the Dismantling and Decommissioning Program is an extension of the existing Radiation Protection Program. A Reactor Safeguard Committee has been established with the responsibility for monitoring and assuring safe operations. Members of the Committee will be assigned to inform the full Committee of the overall planning and dismantling activities, progress, and adherence to health and safety standards and procedures. The licensee stated that it is their policy that all operations be planned and executed to conform with NRC regulations and appropriate Regulatory Guides and to maintain exposures at as low as is reasonably achievable (ALARA) levels.

Health physics functions will be provided by the WNTR staff. The staff may utilize the services of Westinghouse License Administration and the expertise of extensive Westinghouse resources experienced in health physics procedures and policies, licensing issues, decontamination procedures, radiological engineering, radioactive waste handling, and shipment. The qualifications and training of the personnel staff have been indicated, and are acceptable to the staff.

The reactor facility and its environs will be monitored during the decommissioning operation in the same manner as that in effect during the normal operating period. Additional monitoring will be performed and documented during the dismantling phase to ensure obtaining a complete radiation record of the facility. Health physics personnel will be responsible for maintenance of radioactive exposure records, implementation of the environmental survey program, ensuring compliance with work procedures, training, and specific work tasks. Additionally, the Radiation Safety Engineer and the WNTM Coordinator, continue to be responsible for area and airborne radioactivity surveys; administering the respiratory protection program; assisting in decontamination of personnel, equipment and facilities; conducting radiation protection training; personnel dosimetry; and assuring that all personnel working in radiation areas properly utilize protective clothing. The staff finds the above to be acceptable.

4.3 Dose Commitment

The licensee has estimated that the collective dose equivalent expected for the entire decontamination/dismantling operation will be less than 2 person-rems. This estimation is based on the expected levels of radioactivity from all sources, the manner in which experienced and well-trained workers will be performing their tasks in the expected radiation fields, review of dismantling plan procedures by the Reactor Safeguard Committee and the Westinghouse's Organization, with the aim of maintaining personnel exposure to a minimum, and use of enclosures, controlled atmospheres and filtration systems to control movement of radioactive particulates. These measures for assuring that the collective exposure will be ALARA are acceptable to the staff.

4.4 "Unrestricted Use" Release Criteria

The staff surface contamination criteria used in past decommissionings of non-power reactors for release of areas for unrestricted use or unrestricted access are found in Regulatory Guide 1.86, Table 1. In addition, external exposure rates must be less than 5 micro R/hr above natural background at 1 meter from the measured surfaces. Alternately, for external exposure levels, if it can be shown that the maximum radiation exposure to an individual would be less than the staff's recommended annual exposure limit of 10 mR/yr, because of potential occupancy in the vicinity of the radiation source, then levels greater than 5 micro R/hr would be acceptable. The licensee has committed to these criteria and the staff finds this commitment acceptable for this specific site.

4.5 Health Physics Instrumentation

Continuing evaluation of the radiological status of the facility will be carried out by health physics personnel during dismantling and clean-up procedures. Levels of radiation will, therefore, be known at all times in areas where personnel are working. During dismantlement, each component of the reactor will be surveyed for fixed and removable contamination using portable radiation monitoring instruments available at the WNTR Facility (i.e., Eberline E-530, E-120, PAC-15A, Jordan Radector III and Technical Associates MicroR Meter), NMC Proportional Counter Converter, which is connected to a NMC Decoder Scaler (beta and gamma measurements) and; for alpha measurements an Eberline PAC-4. After dismantlement a total building survey will be performed using the previously noted instruments. Readings will be made at floor and 1 meter from floor levels throughout the building, and outside the building adjacent to the reactor room at the wall and at 1 meter from the wall. This building survey will be repeated after the reactor is removed by the staff.

Staff review indicates that the instruments to be used by the licensee during the dismantling and decontamination operation, and the plan for sample analysis, are acceptable for use in a final termination survey to characterize the status of the reactor facility with respect to unrestricted use of its equipment and facilities. The staff, therefore, finds this acceptable.

4.6 Radioactive Materials and Waste Management

The reactor fuel and neutron sources have been shipped offsite for recovery; only minimal radioactive material in the form of activated metallic components and calibrations sources remain. During the defueling process, all areas of the reactor vessel were surveyed for contamination. No detectable contamination was found by the licensee. The licensee expects no release of solid, liquid or airborne contamination. All radioactive components have been removed. The reactor shield tank water was tested for contamination and drained. All swipes, gloves, filter papers, wiping papers, and rags were stored in a disposal barrel. All packaging and shipping of any low-level radioactive waste for transport and burial will adhere to 10 CFR 71, 10 CFR 20, and 49 CFR, and the standards set forth by the Westinghouse "Radioactive Shipment Checklist." The packaging and shipping of these wastes will be coordinated with the Westinghouse Office of the Director of Nuclear Energy System, Licensing, Safeguards and Safety.

The staff finds the above licensee practice for handling solid radioactive waste to be acceptable.

5.0 CONCLUSION

Based on the foregoing considerations, the staff concludes that the dismantling and decontamination operations can be conducted without undue risk to the health and safety of the public or workers, and without any significant impact on the public or the environment.

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Dated: January 29, 1988