U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.: 50-47/93-01

Docket No.: 50-47

License No.: R-65

Licensee: U.S. Army Material Technology Laboratory
405 Arsenal Street
Watertown, Massachusetts

Facility Name: Army Materials Research Reactor

Inspection At: Watertown, Massachusetts

Inspection Conducted: January 6-8,1993

Inspectors: _____ 2/2/93
Thomas Dragoun, Project Scientist, Effluents — date
Radiation Protection Section (ERPS), Facilities
Radiological Safety and Safeguards Branch (FRSSE)

Approved By: for _____ 2-2-93
Marie Miller, Acting Chief, ERPS, FRSSB, — date
Division of Radiation Safety and Safeguards

Areas Reviewed: Status of decommissioning, revised release criteria, shipment of radwaste, environmental soil analysis, and preparations for the termination survey.

Results: Within the scope of this review, no safety concerns or violations were observed. The final phase of decommissioning was proceeding smoothly.

DETAILS

1.0 Persons Contacted

D. Anderson, Analytical Services Manager (SEG)
* P. Biack, MTL Assistant Radiation Safety Officer
* R. Chase, MTL Project Manager
* P. Cornetta, MTL Radiation Safety Officer
T. Eastman, Shipping Supervisor (CNS)
* A. Feldman, Rad. Control and Safety Officer (SEG)
J. Hensch, Radwaste Supervisor (SEG)
G. McDonald, Chem/HP Technician (SEG)
* J. Naughton, Cdr. Watertown Site
G. Policastro, Instrumentation Supervisor (SEG)
D. Shult, Radiological Engineering (SEG)

* Attended the exit interview on 1/8/93. Other licensee and contractor personnel were contacted or interviewed during the course of the inspection.

2.0 Status of Previously Identified Items

2.1 (Closed) Followup Item (92-02-01)

Licensee to establish a date for the completion of the final radiological survey report. The licensee stated that the report will be provided to the NRC on April 1, 1993. This matter is closed.

2.2 (Closed) Followup Item (92-02-02)

Licensee to document the basis for the release of concrete from the site. Technical Basis Document AMTL-ADM-D-203 was sent to the NRC on October 15, 1992. This matter is closed.

3.0 Status of Decommissioning

The inspector toured the licensee's facilities and noted the following. The reactor pool concrete walls have been removed down to a level flush with the building support pad in the basement. Much of the concrete flooring that was adjacent to the pool walls was also removed. The imbedded piping in the basement floor has been chipped out. Thermal insulation was being stripped from the containment steel dome. A section of ventilation ductwork connected to the containment isolation valve was still in place but scheduled for removal. The containment was essentially a hollow shell. The postings and radiological controls were deactivated during the inspection and the containment opened to unrestricted access.

The inspector performed a slow, walk-around survey with a sensitive micro-R survey meter of all accessible areas in containment. No radioactive material or contamination was detected. All radiation readings were at background (10 to 15 micro-R/hr). The inspector similarly surveyed the outside area trenches, dirt piles, and cistern excavation. A few boxes and barrels of low level radwaste remained in storage inside the fenced area awaiting shipment. No other radioactive material was detected. The interior and exterior surfaces were being spray painted with the cross hatch pattern to be used during the detailed termination radiation survey. Within the scope of this review, decontamination of the facility appeared to be proceeding smoothly.

4.0 Revised Release Criteria

In a licensee letter dated October 15, 1992, the criteria for unconditional release of concrete and other porous material were described. The volumetric radioactivity limit was set at background radiation level plus or minus three standard deviations. To determine background, the licensee performed a detailed survey on a clean block of concrete. The data was documented in Technical Basis Document AMTL-ADM-D-205. This resulted in release criteria that were more conservative than limits at other decommissioning facilities. However, surveys of the concrete removed from reactor structures showed levels below those obtained from the clean block. Licensee management decided to lower the value of background to that obtained from the structural concrete. Since this provided additional conservatism, the inspector accepted the licensee's revised criteria. Approximately 70 concrete blocks were surveyed and released using the revised criteria.

5.0 Radwaste Processing

The prime health physics contractor, Scientific Ecology Group (SEG), developed six different sets of dose to curie conversion factors for waste packages to account for the different waste streams, such as concrete, cistern sludge, and reactor components. The analysis of waste stream samples was done off-site by an accredited laboratory. The inspector reviewed the isotope mix and concentrations used in the conversion factors and found them to be reasonable.

Records indicate that all waste was categorized as Dry Active Waste with Low Specific Activity except for the reactor beam tubes which were Class A waste. No liquids or resin wastes were generated. Most of the waste (about 19,000 cu.ft.) was packaged in "B25" boxes, with lesser amounts in a "C-Van" (about 7,600 cu.ft.) or in 55 gallon drums (about 400 cu.ft.). Only a small amount of packaged waste remained on site awaiting shipment.

Packaged, characterized waste was administratively transferred to the shipping broker, Chem-Nuclear Systems (CNS), for removal from the site. Records indicate that all shipments off-site were by exclusive use vehicles. Notifications to the Commonwealth

of Massachusetts were completed in a timely manner. There were no direct burial shipments, instead all waste was sent to the "Waste Consolidation Facility" operated by CNS for the Army. On-site records of the shipments were incomplete in that there were no records of receipt or final disposition of the waste. The licensee indicated that the Waste Consolidation Facility was also the repository for all waste records. The inspector requested that the licensee conduct an independent audit to verify that records regarding MTL waste were complete and satisfactory. The licensee stated that Army-AMCOM will complete an audit by March 12, 1993, and forward a copy of the report for NRC review (50-47/93-01-01).

Within the scope of this review, the inspector determined that processing of waste was done well and in accordance with the regulatory requirements.

6.0 Environmental Soil Analysis

SEG continues to take a large number of soil samples on-site and off-site. The on-site samples are taken at termination survey grid locations and include shallow and deep (3 feet) core bores. Off-site samples were taken from 36 locations in the surrounding community to determine background concentrations.

Samples are dried, sifted, and prepared using generally accepted technique. Samples are analyzed in the on-site SEG laboratory with 10% split with the Army for independent analysis. On-site analysis consists of a gamma scan for isotope identification and gross alpha-beta measurement. Counting techniques were good and achieved an acceptable minimum detectable activity. SEG also sends selected samples to an independent laboratory for confirmatory analysis and participates in a quality control program using spiked samples.

The inspector reviewed selected sample results and found them to be within the range of typical environmental samples. There was a backlog of off-site samples due to the long count times (5,000 seconds). The inspector noted that there was no criteria for comparison of results between the various laboratories. The licensee stated that criteria would be developed.

Within the scope of this review, the soil sampling and analysis programs were determined to be good.

7.0 Termination Survey Preparations

The inspector reviewed the 36 sampling points in the surrounding community that will be used as baseline radiological conditions for the area. The locations met the requirements specified in the Decommissioning Plan. The licensee maintains photographs, maps, and identification numbers to uniquely identify each location. The value for background is not yet determined because all samples have not been analyzed.

The licensee plans to use the Ludlum Model 2350 portable meter with a sodium iodide detector for direct radiation measurements during the termination survey. This is a state-of-the-art, computer controlled meter with capability to digitally store radiation readings for downloading and analysis. The licensee is aware that the NRC's contractor will use a different instrument, a pressurized ion chamber (PIC), to verify the survey data. The licensee conducted comparison tests and determined that the Ludlum meters over-respond by factors of 1.6 to 1.8 relative to the PIC. The licensee stated that this issue will be resolved prior to the final survey report.

Within the scope of this review, the inspector determined that preparations for the termination survey were good.

8.0 Exit Interview

On January 8, 1993, the inspector met with the personnel denoted in Section 1.0 and summarized the scope and findings of this inspection.