U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 70-008/90001(DRSS)

Docket No. 07-008 License No. SNM-7

Licensee: Battelle Columbus Operations
505 King Avenue
Columbus, OH 43201-2693

Inspection At: West Jefferson Site and King Avenue Site

Inspection Conducted: January 16-18, 1990

Inspector: George M. France, III 2/9/90
Date

Approved By: D. J. Sreniawski, Chief 2/9/90
Nuclear Materials Safety
Section 1
Date

Inspection Summary

Inspection on January 16-18, 1990, (Report No. 70-008/90001(DRSS)
Areas Inspected: Routine, unannounced health and safety inspection including: management and organization controls (IP 88005); transportation activities (IP 86740); radiation protection (IP 83822); criticality safety (IP 88015); operations review (IP 88020); environmental protection (IP 88045); maintenance surveillance (IP 88025); radioactive waste management (IP 88035); waste generator requirements (IP 84850); training (IP 88010); and emergency preparedness (IP 88050).
Results: The licensee was found to be in compliance with NRC requirements within the areas examined. The inspector examined the licensee's program for maintaining a state of readiness for emergency conditions. Adequate program elements (offsite agency cooperation) appear to be in place.

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## DETAILS

1. Persons Contacted

S. Brown, Research Scientist
T. Emswiler, Transportation Specialist (Part-time Employee)
*C. Jensen, Radiation Safety Officer
*G. Kirsch, Supervisor, Health Physics
V. Pasupathi, Manager, Nuclear Technical Section
*J. Ray, Vice President, Nuclear Operations
M. Stenhouse, Principal, Research Scientist
*H. Toy, Manager, Nuclear Services (Health, Safety, and Environment)

*Denotes those present at the exit meeting on January 18, 1990.

2. General

This inspection of onsite licensee activities, which began at 1 p.m. on January 16, 1990, was conducted to examine activities at the West Jefferson site and King Avenue site under Materials License No. SNM-7. The inspector also reviewed the licensee's progress in preparing the sites for decontamination and decommissioning (D/D).

3. Management Organization and Controls (IP 88005)

The inspector reviewed the licensee's management organization and controls for radiation protection and operations, including changes in the organizational structure.

The following changes occurred during the third quarter of CY 1989:

The licensee noted that a Research Scientist (M. Failey) who provided insight to 10 CFR 61 waste characterization and classification transferred to a non-nuclear division. A former Radiological Safety Officer (D. McKown), who is retired and generally working part time, is now participating in the D/D program on a full time schedule. A former Health Physicist, E. Roe, has returned to Battelle and is now assigned to radiation protection services associated with the Hot Cell Building D/D program. The inspector determined that there were no other organizational changes that affected radiological safety at Battelle Columbus Operations' West Jefferson and King Avenue facilities. The licensee indicated that these changes strengthened the licensee's capability in providing HP services for hot cell D/D operations.

No violations or deviations were identified.

4. Operations Review (IP 88020)

The inspector determined that a final draft of Battelle's D/D plan is scheduled for review and approval for submission to NRC by the end of February 1990. The following buildings were among the areas that previously housed NRC licensed activities:

Hot Cell Building (JN-1) The most highly contaminated of the 15 buildings is the hot cell. From 1955 through 1987, the licensee examined and evaluated power and research reactor fuels; performed post irradiation examination of fissile, control rod, source and structural materials and components, and irradiation surveillance capsules.

JN-2 Through 1970, the licensee conducted experiments in reactor critical assemblies.

JN-3 From 1956-1974, the licensee operated a research reactor which is now void of fuel and partially dismantled.

Preliminary surveys have indicated the following radiological characterization of buildings JN-1, 2 and 3:

| | Estimated Curie Level | Isotopes | Type Of Containment |
|---|---|---|---|
| JN-1 | 6,000 | Mixed fission products; Uranium, (MFP) thorium, activation products (AP) | Drain lines - sludge; tank water equipment |
| JN-2 | less than 1 curie | Transuranium MFP and AP | Sludge, stored water, drain lines and debris |
| JN-3 | to be determined | | Piping, drain system, holding tank |

The licensee plans to remove the fuel pool water during CY 90. The pool water will be reduced in volume by thermal evaporation, solidified with cement or selected chemical fixer, and packaged for offsite disposal.

Region III will continue to monitor the licensee's progress in performing D/D activities during future inspections.

No violations or deviations were identified.

5. Radiation Protection (IP 83822)

The inspector reviewed the licensee's internal and external exposure control programs including the required records, reports, and notifications.

a. Internal Exposure Control

Whole body count results performed on November 7 and 8, 1989, for 23 hot cell workers were less than the maximum permissible body burden for mixed fission products and isotopes of cesium, cobalt, plutonium, and uranium. Bioassay records for the fourth quarter 1989 disclosed that the 40 MPC-hour intake limit for uranium and plutonium had not been exceeded. The data also indicated that the sample results did not exceed the minimum detection level.

b. External Exposure

Because of limited work in the hot cell laboratory, the highest exposure level to any one employee was less than 1.0 rem for 1989 operations. The records disclosed that the total man-rem calculated for 27 individuals assigned to the hot cell laboratory through the third quarter 1989 operating period and/or service group at the West Jefferson site was 1.96 man-rem.

Individual exposures at elevated levels (300-500 mrem/hour) can occur to workers performing HEPA filter changes and/or workers preparing fuel assembly hardware for radiological characterization and packaging for offsite disposal. Fuel assembly hardware is handled remotely to minimize exposure to individuals engaged in hot cell operations. The highest reported exposure (470 mrem) to an individual occurred during the third quarter 1989.

It is apparent that the practices and procedures used by the licensee limited the total occupational dose to any individual to less than the quarterly standard (1.25 rem) specified in 10 CFR 20.101.

No violations or deviations were identified.

6. Criticality Safety (IP 88015)

The inspector determined that the licensee has positive management controls as well as calibrated instrumentation to ensure that D/D operations are conducted within nuclear criticality safety limits. The quantitative levels of plutonium and enriched uranium located in plant materials are considered residues. It is highly unlikely that fissile quantities of plutonium and enriched uranium residues are contained in any of the contaminated materials. However, maintaining criticality alarm and detection capability is necessary to offset the possibility of fissile material being collected into a critical configuration.

No violations or deviations were identified.

7. Training IP 88010

In accordance with Materials License No. SNM-7, License Condition No. 20, the licensee has documented that training sessions were conducted in topics that are appropriate to employee work assignments.

On December 14 and 20, 1989, twenty (20) workers assigned to the D/D staff attended a refresher training session on the hands-on use of air purifying respirators and self-contained breathing apparatus (SCBA). On November 6, 1989, twenty-six (26) members of the D/D staff received reading material concerning radiological safety retraining. The training session, written examination, and critique were given on November 7, 1989. Test scores ranged from 82-98% among the 26 workers. The questions seemed appropriate for cross-training/retraining of D/D workers who may be called upon to provide selected radiation protection services.

No violations or deviations were identified.

8. Radioactive Waste Management (IP 88035), Transportation Activities (IP 86740) and Waste Generator Requirements (IP 84850) of 10 CFR 20 and 10 CFR 61

The inspector reviewed the licensee's transportation activities to determine whether the licensee is maintaining an adequate program to assure radiological safety in the receipt, packaging, and delivery of licensed radioactive materials. No discrepancies were found in the licensee's shipping records. A review of the records disclosed that two waste shipments were completed during the last half of 1989 (9/27 and 12/19).

The September shipment was comprised of waste generated from RG and E (client) fuel assembly hardware, associated structural materials, and non-fuel activated hardware. Inspection Report No. 70-008/88002 describes the regulatory problems that this licensee encountered by shipping fuel assembly components to a low-level waste burial site. To date, existing NRC requirements concerning certain waste classification has not been fully clarified. In order to eliminate discrepancies in interpreting 10 CFR 61.55 Waste Classification and 61.56 Waste Characteristics for Class "C" concentrations, the licensee discussed shipping and packaging requirements with representatives of the disposal site (from Chem Nuclear and the South Carolina Department of Health and Environmental Control). The fuel assembly hardware was packaged in a liner supplied by Chem Nuclear. Six radionuclides produced a total of 187 curies with cobalt-60 and iron-55 providing the highest contribution. The total curie content for each package was based on high resolution gamma ray spectroscopy for gamma emitting species and gross radiation field measurements at defined distances. Dose rate curves were also established for each detected isotope.

The December waste shipment was comprised of glass vacuum tubes filled with gaseous krypton-85. This material (krypton-85) collected from fuel rod studies and/or examinations amounted to several curies packaged in 30 gallon drums. No problems were identified.

The inspector examined the quality assurance records and determined that the shipping records (transportation activities) were traceable to sign-offs (checklists) performed by persons assigned to the quality assurance department. In keeping with 10 CFR 71.137 audits, the licensee audited the transportation activities with personnel not having direct responsibilities in the areas being audited. The inspector noted that the "paper trail" should be expanded to clearly indicate that checklists/sign-offs are based on independent observations and/or audits of transportation activities that are made in the field. A research scientist assigned to the quality assurance program indicated that this matter would be reviewed.

No violations or deviations were identified.

9. Environmental Protection (IP 88045)

In accordance with DOE requirements and similar NRC requirements under 10 CFR 20.302, the licensee has collected and analyzed soil samples to provide information as to the nature of the environment or site characteristic. Radiological results of soil indicate that very low concentrations of cesium-137 and americium-241 were detected near the storm sewer outfall. The estimated annual exposure based on soil measurements of only the highest values was calculated as 71 mrem per year. However, calculations for the average values when complied with remediation of the first 12 inches of soil indicate an annual dose equivalent of less than 25 mrem to the whole body to any member of the public located in the general environment.

No violations or deviations were identified.

10. Maintenance Surveillance IP (88025)

During the last half of the 1989 operating year, there were no apparent non-routine conditions which produced radioactivity concentrations in the storage pool water in excess of the surveillance limits of 5E-03 uCi/ml beta-gamma and 5E-03 uCi/ml alpha.

Other ongoing surveillance requirements include changeout of the pool water filter (bank of 12 filters) and monitoring the collection system for possible pool water leaks. No problems were reported. The inspector determined that the surveillance requirements are being maintained during D/D operations.

No violations or deviations were identified.

11. Emergency Preparedness

The inspector interviewed the Supervisor, Health Physics, concerning emergency drills and selected training for workers assigned to fire brigades.

On July 1, 1989, the Health Physics Supervisor and a representative of the onsite protective services (Security) performed a communication drill to determine response time of offsite agencies and Battelle Fire Control members. The communication drill was purposely scheduled during a holiday weekend to measure availability and response time of emergency service personnel for a "worst case" situation. During a 30 minute period, 26 calls were attempted to offsite agencies and Battelle Fire Control members. A single call-relay alerted the offsite agencies, while 35% of the licensee's staff responded (available) during the 30 minute period. The offsite agencies estimated a seven minute arrival time during the holiday traffic should an ambulance be summoned.

Based on lessons learned during the communication exercise, the licensee plans to implement the following program improvements:

- Issue wallet cards with names and telephone numbers of emergency call list personnel.

- Conduct quarterly audits to update telephone numbers and names of emergency call list.

The licensee also indicated that ongoing emergency preparedness training involves cross-training of members of the fire control group and emergency radiological survey units.

Based on discussions with the RSO, the licensee agreed to audit hospital facilities to determine the level of services available (to include emergency procedures providing medical services and calibrated instruments) for contaminated patients.

The inspector determined that in spite of the presence of only residual quantities of SNM materials, the licensee has maintained essential program elements and training of personnel for handling emergencies.

No violations or deviations were identified.

12. Exit Meeting

The scope and findings of the inspection were discussed with licensee representatives (Section 1) at the close of the onsite inspection on January 18, 1990. The inspector stated that licensee programs in the areas of exposure control, criticality safety, surveillance, waste generation and classification, and transportation met regulatory requirements.

The licensee agreed to determine the level of service available at local hospitals to handle contaminated patients.

During the course of the inspection and the exit meeting, the licensee did not identify any documents or inspector statements and references to specific processes as proprietary.