



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

JUL 10 1985

Report No.: 70-824/85-04

Licensee: Babcock and Wilcox Company  
Lynchburg Research Center  
Lynchburg, VA 24505

Docket No.: 70-824

License No.: SNM-778

Facility Name: Lynchburg Research Center

Inspection Conducted: June 10-14, 1985

Inspector: William B. Gloersen  
W. B. Gloersen

7/3/85

Date Signed

Approved by: P. G. Stoddart  
P. G. Stoddart, Acting Section Chief  
Emergency Preparedness and Radiological  
Protection Branch  
Division of Radiation Safety and Safeguards

7/3/85

Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 20 inspector-hours in the areas of radioactive waste management, environmental protection, and independent measurements.

Results: No violations or deviations were identified.

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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*A. Wehrmeister, Manager, Systems Development Lab (Acting Director)
- \*A. Olsen, Senior License Administrator
- J. Doran, Manager, Accounting and Administrative Services
- \*G. Hoovler, Manager, Building A, Decommissioning Project
- \*J. Cure, Supervisor, Health and Safety
- T. Hardt, Supervisor, Radioanalytical Chemistry Group
- W. Pennington, Senior Health Physics Engineer
- D. Harris, Senior Health Physics Technician
- J. Morris, Technician

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on June 14, 1985, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the inspection findings listed below. Three inspector followup items were identified in the areas of quality assurance for radiological monitoring programs (Paragraph 5.b), plateau determinations for proportional counters (Paragraph 6.c), and confirmatory measurements (Paragraph 9). Licensee management representatives acknowledged the inspector's comments and expressed no contrary opinions. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

### 3. Records and Reports of Liquid and Gaseous Radioactive Effluents (88035)

10 CFR 20.106 requires the licensee to limit effluent discharges to less than the limits specified in 10 CFR 20, Appendix B, Table II, when averaged over a period of not greater than one year. 10 CFR 20.203 specifies the limits for the discharge of liquid effluents into sanitary sewerage systems.

The inspector noted that the licensee's Annual Health and Safety Report Review of 1984 was not issued at the time of this inspection. This report was issued annually to Lynchburg Research Center management and listed the effluent release totals for the previous year. The inspector selectively examined main stack air sample results covering the period August 1984 through May 1985. Batch release permits and batch analyses of low level radioactive liquid waste transferred to the Naval Fuel Facility were also examined. Records were adequate and in order.

No violations or deviations were identified.

4. Audits (88035, 88045)

License Condition 16 specifies audits of the Lynchburg Research Center (LRC) by the Safety Audit Subcommittee (SAS) shall be made once every four months.

The inspector reviewed SAS Audits for August 29-31, 1984 and December 11-12, 1984. Tracking and corrective actions for audit recommendations were adequate. Additionally, the inspector reviewed the monthly health physics audits for fourth quarter 1984 and first quarter 1985.

No violations or deviations were identified.

5. Procedures (88035, 88045)

- a. License Condition 9 specifies that authorized use is in accordance with Appendix A of the licensee's application. Section A.6.2 of Appendix A requires the licensee to establish, maintain, and implement area operating procedures, general health physics procedures, and nuclear criticality safety procedures. The inspector selectively examined the following procedures:

AOP-B-GP-1, Liquid Waste Solidification, Rev. 3, January 3, 1981.

AOP-B-GP-11, General Procedure for Use of the Soil Preparation Laboratory, Rev. 0, March 13, 1985.

LRC-TP-219, Efficiency Calibration for Gamma Ray Spectrometry System, Rev. 0, February 28, 1984.

LRC-TP-220, Gamma-Ray Spectrometry System - Count Reproducibility Chart, Rev. 0, February 28, 1984.

LRC-TP-221, Gamma-Ray Spectrometry System - Energy Calibration and Periodic Checks, Rev. 0, February 28, 1984.

LRC-TP-222, Gamma-Ray Spectrometry System - Background Checks, Rev. 0, February 28, 1984.

LRC-TP-237, Preparation of Waste Shipments to the U.S. Ecology Site in Washington, Rev. 2, June 26, 1984.

LRC-TP-242, Employee Urine Sampling for Uranium, Plutonium, and Byproduct Materials, Rev. 0, November 13, 1984.

LRC-TP-243, Environmental Vegetation Sample Collection, Rev. 0, August 28, 1984.

LRC-TP-244, Environmental Sediment Sample Collection, Rev. 0, September 7, 1984.

LRC-TP-245, Estimating the Activity of Gamma Emitters by External Radiation Levels, Rev. 0, September 6, 1984.

LRC-TP-248 Calculating the Activity Concentration of Water Samples, Rev. 0, December 12, 1984.

LRC-TP-260, Shipment of Pu Contaminated Glove Boxes to U.S. Ecology, Rev. 3, January 22, 1985.

LRC-TP-271, Standardization of Beckman Wide Beta Counting System, Rev. 0, April 1985.

The inspector noted that the procedures had been reviewed, updated and approved as required.

No violations or deviations were identified.

- b. The inspector noted in LRC-TP-219 that the efficiency calibration frequency for the gamma-ray spectrometry systems was not specified. The licensee informed the inspector that the efficiency calibrations were determined whenever the need was indicated, such as when a significant change in the measurement system was detected by routine measurements with a check source. The inspector commented that efficiency calibrations are normally checked periodically (typically yearly) with standard sources. The inspector discussed with the licensee the guidance contained in Regulatory Guide 4.15 - Quality Assurance for Radiological Monitoring Programs - Effluent Streams and the Environment as related to the gamma-ray spectrometry-systems. Additionally, the inspector noted that the "gas vial" efficiency determination involved the use of a liquid mixed gamma-ray solution. The inspector noted that this efficiency would not be valid unless an attenuation correction was made. The licensee agreed to evaluate the areas mentioned above. Similarly, the inspector noted in LRC-TP-222 that the frequency of "background checks" for the gamma-ray-spectrometry-systems was not specified. The inspector noted that background determinations had been made approximately twice per year. The inspector discussed with the licensee the need to determine the background counting rate on a scheduled basis for gamma-ray-spectrometry systems in routine use. Regulatory Guide 4.15 indicates that background measurements should be made frequently, typically daily or before each use, to ensure that levels are within the expected range. The results should be recorded in a log and plotted on a control chart or compared to an acceptance criterion. Licensee representatives acknowledged the inspector's comments and agreed to evaluate this area. The needs for improvement in the efficiency calibration program and evaluating the attenuation correction for the gas vial efficiency determination noted above and the need to determine background counting rates more frequently will be reviewed during future inspections (70-824/85-04-01).

No violations or deviations were identified.

6. Records (88035)

a. The inspector reviewed selected portions of the following records

- (1) Main stack air sample results for the period August 1984 to May 1985.
- (2) NNFD (Naval Nuclear Fuel Division) Liquid waste pumping records (from liquid waste treatment facility holding tanks) - Batch releases for the period January 1985 to May 1985.

(3) Environmental Sample Analyses:

Continuous background air samples, August 1984 - May 1985.

Liquid Samples, August 1984 - May 1985.

- Upstream/downstream James River
- LRC pond
- NNFD pond
- Dirt Coffin basin
- Rainwater

Annual grab samples of James River silt and vegetation, September 1984 and December 1984.

- (4) EPA Cross Check results for gross alpha and beta in water.
- (5) Weekly QC background and source checks for the Beckman Wide Beta II and the Sharp Low Beta proportional counters, January - May 1985.
- (6) Daily count reproducibility and energy calibration for the Ortec gamma-ray system, April - June 4, 1985.
- (7) Efficiency calibrations of the Ortec gamma-ray-spectrometry-system for the following geometries, June 1983, January - April 1985:

poly bottles: 125ml, 250 ml, and 1 liter

particulate filter

charcoal filter

gas vial



- (8) Absolute filter annual DOP testing for nuclear air cleaning system, August 1984, May 1985.

Hot cell filter bank

Labs 15, 16, 17, 19, 20 in Building "C"

Hot machine shop

CX-10

Nuclear Chemistry Lab

- (9) Weekly delta-P checklists for nuclear air cleaning systems, January 1985 - May 1985.

- b. The inspector noted that the Health and Safety Counting Lab had participated in the EPA cross-check for gross alpha and beta in water. The inspector also noted that the radiochemistry counting laboratory had participated in the EPA cross check program but on a limited, irregular basis. The radiochemistry personnel agreed that more active participation in the EPA Crosscheck program would enhance the laboratory's quality assurance program.
- c. The inspector noted that voltage response curves (or "plateaus") had never been determined for the Beckman Wide Beta II or the Sharp Low Beta proportional counters used for effluent measurements in the Health and Safety counting lab. The inspector discussed with licensee representatives the need to determine the plateaus for the alpha/beta proportional counters. Licensee representatives informed the inspector that plateau determinations had been attempted when the equipment was purchased, however the licensee experienced problems with detector voltage stability after that initial attempt. Licensee representatives agreed to evaluate the need for plateau determinations and the inspector informed licensee representatives that this evaluation will be reviewed during future inspections (70-824/85-04-02).
- d. The inspector noted that weekly backgrounds and source checks (using NBS traceable calibrated sources) were performed on the Beckman Wide Beta II and the Sharp Low Beta proportional counters and recorded in logbooks, however the results were not plotted on control charts so that measurement values could be tracked to ensure they remain inside the predetermined control values. Additionally, the inspector discussed with licensee representatives the need for improving the quality assurance for radiological measurements to meet the applicable guidance contained in Regulatory Guide 4.15 or an equivalent program.

No violations or deviations were identified.

7. Environmental Monitoring Program (88045)

- a. The inspector reviewed the licensee's environmental monitoring program with respect to the requirements of the facility license and the license conditions. Appendix A, License Conditions, Section A.9.3.5, of the licensee's application required the licensee to collect and analyze one continuous on-site background air sample, a monthly grab sample of river water downstream of the plant discharge, a continuous sample of rain water, and an annual grab sample of river silt and vegetation. Records examined by the inspector indicated that the licensee performed the required sample collection and analysis and that the program was adequate to meet the license conditions.

No violations or deviations were identified.

- b. License Condition 24 requires sampling and analysis of retention basin water at least annually. The inspector reviewed sample analysis records for the period August 1984 through May 1985 and noted that the licensee had satisfied the requirements of the License Condition.

No violations or deviations were identified.

8. Liquid and Airborne Effluent Sampling and Analysis (88035)

The inspector reviewed facilities, sampling gear, and analytical methods for the determination of radioactivity in liquid and airborne effluents. Potentially contaminated air from hoods, hot cells, and glove boxes was discharged via a 50 meter stack. The inspector examined the stack air sampling system. The stack air sample was drawn from a sampling head located in the stack approximately 25 feet from the stack base. The air sample passed through a fixed filter paper, the chamber of the gas detector, a vacuum pump and returned to the stack. The licensee had the capability to monitor potential stack releases of radioactive iodine, however the licensee was not performing work which required iodine monitoring. The fixed filter paper was analyzed for alpha and beta activity by a gas flow proportional counter in the Health and Safety Lab. The radioactive gas monitor utilized a halogen-quenched GM tube and was provided with alarm setpoints which were determined by the health physics staff. The alarms were connected to a remote alarm panel located in Building B. The inspector reviewed the alarm set point calculations and counter efficiency determinations. The licensee performed weekly checks of the radioactive gas monitor using a depleted uranium source. Semiannual calibrations which involved the use of certified traceable National Bureau of Standards (NBS) Pu and Sr-Y sources and an electronic pulser were also performed.

Additionally, the inspector reviewed the liquid effluent sampling and analysis program. An underground tank farm collected liquid wastes from all radioactive material handling areas. Wastes from each area drained into specific tanks, enabling separation of wastes at their source. The licensee pumped the liquid waste to the James River via the NNFD waste disposal system. The liquid waste was pumped to NNFD in batches after the waste tank

contents were analyzed to determine if concentrations were within the prescribed limits for unrestricted areas required by 10 CFR 20. In the event the activity level of a waste tank would not permit release, the licensee had the capability to either dilute or treat the waste to reduce the activity to acceptable levels. The inspector examined liquid waste batch release permits as noted in Paragraph 3.

No violations or deviations were identified.

9. Confirmatory Measurements (88045, 84844)

The inspector collected two liquid waste tank samples and two recent stack sampler particulate filters which the licensee had analyzed in order to evaluate the licensee's capability for measuring radioactivity in those media. The liquid waste tank samples and stack samples were identified as follows:

<u>Collection Date</u>	<u>Sample Type</u>	<u>Sample Identification</u>
1/8/85	Liquid waste tank	LWDP Tank 5K-1 HP #2834
5/23/85	Liquid waste tank	LWDP Tank 5K-1 HP #2913
5/15/85	Air particulate filter	CHA
5/15/85	Air particulate filter	CH-2

The four samples indicated above were sent to the NRC contract laboratory for analysis. A comparison of the results of the licensee's analyses and the NRC contractor analyses will be made at the next inspection (70-824/85-04-03).

10. Inspector Followup Items (92701)

(Closed) 70-824/84-03-01: Comparison of licensee water sample analysis results to NRC contractor analysis results. During an inspection on August 9-10, 1984 (70-824/84-03), liquid samples were collected for analysis by both the NRC contract laboratory and the licensee's laboratory. Due to handling errors in the preparation of the liquid samples, the results of the two laboratory analyses could not be evaluated adequately. Therefore, for record purposes, this item is considered closed.