

September 14, 2010

Dr. Woodrow Whitlow, Jr., Director  
NASA Glenn Research Center at Lewis Field  
21000 Brookpark Road M.S. 3-2  
Cleveland, OH 44135

SUBJECT: NRC INSPECTION REPORTS 050-00030/10-01(DNMS) AND  
050-00185/10-01(DNMS) – NASA PLUM BROOK REACTOR FACILITY

Dear Dr. Whitlow:

On August 16, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed inspection activities at the National Aeronautical and Space Administration (NASA) Plum Brook Reactor Facility, Sandusky, Ohio. The purpose of the inspection was to determine whether the decommissioning activities were conducted safely and in accordance with the NRC requirements. Specifically, during an on-site inspection on July 12-14, 2010, and subsequent in-office review through August 16, 2010, the inspector evaluated decommissioning performance and conducted independent confirmatory radiation surveys and soil and sediment sampling activities. At the conclusion of the on-site inspection, the inspector discussed the interim inspection results with members of your staff. At the conclusion of the in-office review, a final telephone exit meeting was conducted on August 16, 2010, to discuss the final results with members of your staff. The results of analysis of soil and sediment samples are included in the enclosed report.

This inspection consisted of an examination of decommissioning activities at the NASA Plum Brook Reactor Facility as they relate to safety and compliance with the Commission's rules and regulations. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, and interviews with personnel.

Based on the results of this inspection, the NRC did not identify any violations.

In accordance with Title 10 Code of Federal Regulations (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html>.

W. Whitlow, Jr.

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We will gladly discuss any questions you may have regarding this inspection.

Sincerely,

*/RA/*

Christine A. Lipa, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch

Docket Nos. 050-00030 and 050-00185  
License Nos. TR-3 and R-93

Enclosure:  
NRC Inspection Report Nos. 050-00030/10-01(DNMS)  
and 050-00185/10-01(DNMS)

cc w/encl: Radiation Health Program Director, Ohio Department of Health (ODH)  
S. Helmer, ODH  
M. Rubadue, ODH  
Division of Planning, Ohio Environmental Protection Agency,  
K. Peacock, NASA, Plum Brook Station

W. Whitlow, Jr.

-2-

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Enclosure:  
NRC Inspection Report Nos. 050-00030/10-01(DNMS)  
and 050-00185/10-01(DNMS)

cc w/encl: Radiation Health Program Director, Ohio Department of Health (ODH)  
S. Helmer, ODH  
M. Rubadue, ODH  
Division of Planning, Ohio Environmental Protection Agency,  
K. Peacock, NASA, Plum Brook Station

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

Docket Nos. 050-00030 and 050-00185

License Nos. TR-3 and R-93

Report Nos. 050-00030/10-01(DNMS) and  
050-00185/10-01(DNMS)

Licensee: National Aeronautics and Space  
Administration (NASA)

Facility: Plum Brook Reactor Facility  
Test Reactor and Mockup Reactor

Location: Sandusky, Ohio

Date: July 12-14, 2010  
August 5 – 16, 2010 (In-office review)

NRC Inspectors: Jeremy Tapp, Health Physicist

NRC Observers: Paul Michalak, Branch Chief,  
Materials Decommissioning, FSME  
Varughese Kurian, Health Physicist, FSME  
Nicholas Hansing, Student Engineer, RIII

Approved by: Christine A. Lipa, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure

**EXECUTIVE SUMMARY**  
**NASA Plum Brook Reactor Facility**  
**Inspection Reports 050-00030/10-01(DNMS) and 050-00185/10-01(DNMS)**

This routine decommissioning inspection included a review of the licensee's current performance related to decommissioning activities, including radiation surveys and soil sampling. Primary activities observed involved surveys, soil sampling, and remediation of the Plum Brook. Areas reviewed included corrective actions, transportation activities, and environmental air sampling.

**Research and Test Reactor Decommissioning**

Inspector observations of the facility determined that work areas were adequately established to ensure worker safety and that the control of radioactive material areas and wastes were roped off and labeled appropriately.

The licensee was adequately performing characterization and remediation activities in accordance with the applicable requirements and sound health physics principles and techniques. The inspectors' independent confirmatory surveys and soil and sediment sampling results were consistent with the licensee's. The inspector concluded that the licensee has an effective survey and sampling process to identify areas of elevated activity in the Plum Brook and remediate as necessary to meet the appropriate derived concentration guideline level (DCGL).

The inspector determined that the licensee was adequately capturing issues in its corrective action program and the scope and timeliness of corrective actions were commensurate with their safety significance. The licensee's air effluent concentrations were well below the required regulatory limits. The licensee was also adequately classifying waste shipments to off-site disposal facilities.

The inspector's independent confirmatory soil sampling results for Phase 1 of the Storm Sewer Draining system excavations and land area south of the Pentolite Ditch were consistent with the licensee's Final Status Survey (FSS) results and well below the required DCGLs. The inspectors concluded that these results confirm that FSS surveys were performed appropriately and in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance.

## Report Details

### **1.0 Research and Test Reactor Decommissioning (69013)**

#### **1.1 Inspection Scope**

The inspector interviewed site personnel, performed facility and site tours, and observed decommissioning activities being performed. The inspector evaluated the licensee's remediation and characterization survey and soil sampling activities being performed along the Plum Brook. Confirmatory surveys and soil sampling were performed by the inspector in Transect 10 of Section 2 of the Plum Brook. The soil samples collected were sent to the Oak Ridge Institute for Science and Education (ORISE) for analysis. The inspector reviewed the results provided by ORISE in a letter to the U.S. Nuclear Regulatory Commission (NRC) titled, Letter Report for Analytical Results for Five Soil Samples from NASA Plum Brook, Sandusky, Ohio, dated July 29, 2010 (ML102150186). In addition, a review of Survey Request (SR)-259, Perform Characterization Surveys and Sampling of Plum Brook Stream Section 2, dated 6/28/2010, and SR-262, Perform Final Post Remediation Surveys of Plum Brook-Section 1, dated 7/13/2010, was performed, which describe the requirements for the characterization and remediation activities respectively.

The inspector also performed a review of corrective actions since September 2009 to evaluate whether the corrective actions were appropriate for the problem reported. The inspector reviewed Problem Number (PN) 379, I & C postings were violated at the Service Equipment Building (SEB) during excavation work the week of August 24, 2009, dated 9/1/2009; PN 381, Survey Deficiencies – Documentation, dated 10/1/2009; PN 387, Uncalibrated balance used to measure and report weights, dated 11/19/2009; PN 388, Post-use response checks were not performed on Lm-2221, dated 12/16/2009; PN 391, Failure to properly implement LO/TO program, dated 3/3/2010; PN 396, Radiological postings knocked down, dated 6/21/2010; and PN 398, Contaminated Scissor Lift in FSS I & C area, dated 7/1/2010.

The NASA PBRF Decommissioning Project Environmental Media Sampling and Analysis 2009 Annual Report, dated May 2010, was reviewed to evaluate the environmental air sampling results for 2009. In addition, the inspector reviewed documentation related to a mixed waste shipment with the manifest number 9073-03-0002, to verify it was shipped in accordance with the applicable NRC and Department of Transportation (DOT) requirements.

The inspector reviewed the results of the radiological analysis of soil samples collected during inspection activities on December 2, 2009. The soil sample analysis results were analyzed by ORISE and provided to the NRC by letter from ORISE titled, Letter Report for Analytical Results for Five Soil Samples from NASA Plum Brook, Sandusky, Ohio, dated January 12, 2010 (ML102300278).

## 1.2 Observations and Findings

The licensee continues to make progress towards completion of decontamination and decommissioning activities. The inspector toured the facility to review the licensee's progress, specifically, the reactor building, hot lab, and outdoor areas. The inspector noted the required radiological postings were readily visible and areas were generally clean and free of personnel hazards.

The licensee is currently performing characterization and remediation of the Plum Brook from the site property to Sandusky Bay. The inspector performed independent confirmatory surveys and collected split samples of the soil and sediment in the Plum Brook where characterization activities were being performed. These surveys included surface scans with a 2x2 NaI detector with all results similar to the licensee's. Four soil samples were split with the licensee, two from each bank of the brook at different elevations. Also, one sediment sample was split with the licensee from the middle of the brook. The samples were sent to ORISE for analysis and all results were similar to the licensee's and significantly below the derived concentration guideline level (DCGL) required for the Plum Brook survey area. In addition, the inspectors verified the characterization activities were being performed in accordance with SR-259 requirements.

The inspectors observed the licensee performing remediation activities in the Plum Brook in accordance with SR-262 requirements. The personnel performing the work appropriately controlled the spread of contaminated material as it was being removed. Health Physics Technicians performed detailed scans of the area being remediated in order to ensure all contaminated material was removed above the required cleanup level.

During the review of corrective actions, the inspectors identified a concern regarding PN 379. Several required postings were violated and removed on the north side of the SEB that indicated the area had been remediated and surveyed and was ready for Final Status Survey (FSS). In this case, the SEB had already been surveyed for free release when the signs were removed. The signs were originally ten feet from the SEB but had been moved next to the building in order to facilitate movement of heavy equipment to a nearby work area. The corrective actions discussed in PN 379 involved worker training and posting perception. The inspector identified there was no discussion in the corrective action document regarding the impact of the sign movement to the FSS status. This was communicated to the licensee and PN 400, inadequate assessment of impact on FSS Status was performed for issue # 0379, dated July 14, 2010, was written to document the concern. The inspector reviewed PN 400 and determined the licensee concluded that the FSS status was assessed at the time of the original corrective action but was not documented. The licensee performed a quarterly routine contamination survey on September 11, 2009, after the removal and replacement of the signs to their required positions, and no fixed or removable contamination was found. The licensee also performed surveys on the entire above grade internal and external steel surfaces of the SEB for free release between June 24, 2010, and July 6, 2010, in preparation for building demolition. No detectable fixed or removable contamination above background was found on any surface. No additional concerns were identified.

The licensee's air sample results for 2009 for the six air sampling stations located around the site showed that gross alpha and gross beta concentrations were both under

the required limits. The licensee also maintained the air samplers in appropriate locations to detect allowed air effluent releases off-site. The mixed waste shipment reviewed by the inspector was classified and shipped in accordance with DOT and NRC requirements.

As stated in Inspection Reports Nos. 050-00030/09-001 and 050-00185/09-001 (ML093650247), the inspector compared the results of the soil samples taken on December 2, 2009, to the licensee's results. Specifically, two soil samples were taken in Phase 1 of the Storm Sewer Drainage System excavations and three in the land area south of the Pentolite Ditch. All results were well below the DCGLs for Cesium-137 and Cobalt-60 and similar to the licensee's results.

### 1.3 Conclusions

Inspector observations of the facility determined that work areas were adequately established to ensure worker safety and that the control of radioactive material areas and wastes were roped off and labeled appropriately.

The licensee was adequately performing characterization and remediation activities in accordance with the applicable requirements and sound health physics principles and techniques. The inspectors' independent confirmatory surveys and soil and sediment sampling results were consistent with the licensee's. The inspector concluded that the licensee has an effective survey and sampling process to identify areas of elevated activity in the Plum Brook and remediate as necessary to meet the appropriate DCGL.

The inspector determined that the licensee was adequately capturing issues in its corrective action program and the scope and timeliness of corrective actions were commensurate with their safety significance. The licensee's air effluent concentrations were well below the required regulatory limits. The licensee was also adequately classifying waste shipments to offsite disposal facilities.

The inspector's independent confirmatory soil sampling results for Phase 1 of the Storm Sewer Draining System excavations and land area south of the Pentolite Ditch were consistent with the licensee's FSS results and well below the required DCGLs. The inspectors concluded that these results confirm that FSS surveys were performed appropriately and in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance.

### 2.0 **Exit Meeting Summary**

The inspectors presented the interim inspection results to licensee management at the conclusion of the onsite inspection on July 14, 2010. After in-office review was completed on August 13, 2010, a final exit teleconference was held on August 16, 2010. The licensee acknowledged the results presented.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### PARTIAL LIST OF PERSONS CONTACTED

#### Licensee

<sup>1,2</sup>K. Peecook, Program Manager  
<sup>1,2</sup>W. Stoner, Radiation Safety Officer  
<sup>1,2</sup>J. Thomas, Project QA & Licensing Manager

<sup>1</sup>Indicates presence at the interim exit meeting held on July 14, 2010.

<sup>2</sup>Indicates presence on the final exit teleconference held on August 16, 2010.

### LIST OF PROCEDURES USED

IP 69013      Research and Test Reactor Decommissioning

### LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
DCGL	Derived Concentration Guideline Level
DNMS	Division of Nuclear Material Safety
DOT	Department of Transportation
FSS	Final Status Survey
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NASA	National Aeronautical and Space Administration
NRC	U. S. Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
PN	Problem Number
pCi/g	Picocuries per gram
SEB	Service Equipment Building
SR	Survey Request

### DOCUMENTS REVIEWED

Licensee documents used during the inspection were specifically identified in the Report Details above.

### ITEMS OPENED, CLOSED, AND DISCUSSED

Opened	None
Closed	None
Discussed	None