UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

December 9, 2011

Mr. Ramon Lugo, III, Director
NASA Glenn Research Center at Lewis Field
21000 Brookpark Road M.S. 3-2
Cleveland, OH 44135

SUBJECT: NRC INSPECTION REPORT 05000030/12-001(DNMS) AND 05000185/12-001(DNMS) – NASA PLUM BROOK REACTOR FACILITY

Dear Mr. Lugo:

On November 22, 2011, 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 decommissioning activities were conducted safely and in accordance with NRC requirements. Specifically, during an on-site inspection on October 18 – 20, 2011, and subsequent in-office review through November 22, 2011, the inspectors evaluated decommissioning performance and conducted independent confirmatory radiation surveys and sampling. An evaluation of the samples was performed by the Oak Ridge Institute for Science and Education (ORISE). At the conclusion of the on-site inspection, the inspectors discussed the interim inspection results with members of your staff. A final report from ORISE with the results of the sample analysis was provided to the NRC on November 10, 2011. At the conclusion of the in-office review, a final telephone exit meeting was conducted on November 22, 2011, to discuss the final results with members of your staff.

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, no violations were identified.

In accordance with 10 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.

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

Sincerely,

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

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

Enclosure:
NRC Inspection Report Nos. 05000030/12-001(DNMS)
and 05000185/12-001(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
P. Kolb, NASA, Plum Brook Station

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos.	050-00030 and 050-00185
License Nos.	TR-3 and R-93
Report Nos.	05000030/12-001(DNMS) and 05000185/12-001(DNMS)
Licensee:	National Aeronautics and Space Administration (NASA)
Facility:	Plum Brook Reactor Facility Test Reactor and Mockup Reactor
Location:	Sandusky, Ohio
Dates:	October 18-20, 2011 (on-site) through November 22, 2011 (in-office review)
NRC Inspectors:	Jeremy Tapp, Health Physicist Lionel Rodriguez, Reactor Engineer
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 05000030/12-001(DNMS) and 05000185/12-001(DNMS)

The National Aeronautical and Space Administration (NASA) Plum Brook Reactor Facility has completed performing all major remediation of the facility and is now completing the remainder of the final status surveys. These mainly consist of land areas within and bordering the facility fence line. This routine decommissioning inspection included a review of the licensee's current performance related to decommissioning activities by performing independent confirmatory radiation surveys and sampling. These surveys and the associated sampling were performed in the land areas referred to above.

Inspection of Remedial and Final Surveys at Permanently Shutdown Reactors

- For the areas where confirmatory surveys were performed by the inspectors, all results were consistent with the licensee's and well below the required cleanup levels, or derived concentration guideline levels (DCGLs). The DCGLs calculated for the areas surveyed by the inspectors were appropriate and in accordance with the requirements in the Final Status Survey Plan and followed Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance. The survey units where release records were reviewed were appropriate for release in accordance with the Final Status Survey Plan. (Section 1.0)

Report Details

1.0 Inspection of Remedial and Final Surveys at Permanently Shutdown Reactors (83801)

1.1 Inspection Scope

The inspectors performed confirmatory final status surveys in open land areas within and bordering the site fence line. The inspectors chose land areas to survey where the licensee had already completed final status surveys and soil sampling and where a substantial potential existed for residual contamination. Specifically, the inspectors performed surveys in Survey Unit OL-1-56, OL-1-62, OL-1-68, OL-1-71, OL-1-72, OL-1-73, OL-1-74, OL-1-84, and OL-2-3. Walkover surveys were performed with Sodium Iodide (NaI) scintillation detectors and associated Global Positioning System (GPS) equipment to track and record the survey results. Eight soil samples were obtained in the survey units above by the inspectors at both random and biased locations. The biased sample locations where chosen by the inspectors based on the areas with the highest readings during the walkover surveys. The soil sample locations were also recorded with the GPS. In addition, a water sample was obtained from surface water within the site fence to verify elevated tritium levels were not present. All samples were sent to the Oak Ridge Institute for Science and Education (ORISE) for analysis.

The inspectors reviewed Survey Design #51, "Restricted Area Surface Soils," Revision 0, for areas within the fence line, and Survey Design #54, "Restricted Areas Buffer Zone Soils," Revision 0, for areas bordering the fence line, to determine if the licensee calculated appropriate required cleanup levels, or derived concentration guideline levels (DCGLs), for the areas that would be surveyed by the inspectors. The inspectors also verified whether the required DCGLs calculated were in accordance with the approved Final Status Survey Plan and followed Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance. The results of the inspectors' surveys and soil samples were compared to the licensee's calculated DCGLs to verify the results were below the required release criteria. In addition, the inspectors reviewed Survey Unit Release Record OL-2-3, Revision 0; OL-1-62, Revision 0; OL-1-71, Revision 0; and OL-1-72, Revision 0, to ensure the results from the inspectors' confirmatory surveys were consistent with those of the licensee and the survey units were appropriate for release.

1.2 Observations and Findings

The licensee continues to make progress towards completion of decommissioning activities. Now that building decontamination and survey activities are complete, final status surveys in outdoor land areas of the site have been the main activities occurring. The inspectors found that the calculations in Survey Design #51 and #54 that determined the DCGLs to be used for the survey units that the inspectors performed confirmatory final status surveys in were performed appropriately and in accordance with the approved Final Status Survey Plan and followed MARSSIM guidance.

The NaI detector walkover surveys that the inspectors performed in the survey units, listed in the scope section above, resulted in all readings being at or near background levels. No area with significantly elevated readings was found. All soil samples

analyzed by ORISE were well below the required DCGLs. In addition, the inspectors noted all walkover survey and soil sample results were below the lower investigation level limits set in the applicable survey design, which ensure that areas with higher levels of potential contamination are bounded and fully characterized to adequately disposition. The results of the sample analysis were documented in a letter from ORISE to the NRC on November 10, 2011, with the subject, "Letter Report for Analytical Results for Eight Soil Samples and One Water Sample from NASA Plum Brook, Sandusky, Ohio" (ML113210536). The inspectors also noted that the surface water sample analysis by ORISE resulted in no detectable tritium. For the areas where survey unit release records were reviewed, all walkover survey data and soil sample results were consistent with the licensee's. In addition, the inspectors found that for the release records reviewed, all survey unit walkover scans and soil sampling results were below the DCGLs and therefore, appropriate for release in accordance with the Final Status Survey Plan.

The results of the surveys performed by the inspectors are documented in Attachments 2 through 7 of this report as survey maps, which were developed using the GPS equipment data obtained during the walkover surveys. The readings are color coded and a legend relates the color to gross counts per minute (cpm), which includes the background radiation component. Background readings at the NASA Plum Brook facility ranged from approximately 4,000 to 12,000 cpm, depending on the area surveyed. In addition, soil sample locations are depicted on the survey maps with orange diamonds. The soil sample results are included in a table on the survey maps as well. For comparison sake, the most limiting DCGL release criterion for the areas surveyed was 11.4 pCi/g for Cs-137.

No findings of significance were identified.

1.3 Conclusions

For the areas where confirmatory surveys were performed by the inspectors, all results were consistent with the licensee's surveys and well below the required DCGLs. The DCGLs calculated for the areas surveyed by the inspectors were appropriate and determined in accordance with the requirements in the Final Status Survey Plan and followed MARSSIM guidance. The survey units where release records were reviewed were appropriate for release in accordance with the Final Status Survey Plan.

2.0 Exit Meeting Summary

The inspectors presented the interim inspection results to licensee management at the conclusion of the onsite inspection on October 20, 2011. After in-office review was completed on November 22, 2011, a final exit teleconference was held on

November 22, 2011. The licensee acknowledged the results presented and did not identify any of the documents reviewed by the inspectors as proprietary.

ATTACHMENT 1: SUPPLEMENTAL INFORMATION
ATTACHMENT 2: SURVEY UNIT OL-2-3 WALKOVER RADIATION SURVEY
ATTACHMENT 3: SURVEY UNIT OL-1-56 WALKOVER RADIATION SURVEY
ATTACHMENT 4: SURVEY UNIT OL-1-71 WALKOVER RADIATION SURVEY
ATTACHMENT 5: SURVEY UNIT OL-1-84 WALKOVER RADIATION SURVEY
ATTACHMENT 6: SURVEY UNITS OL-1-68 AND OL-1-62 WALKOVER RADIATION SURVEY
ATTACHMENT 7: SURVEY UNITS OL-1-74 AND OL-1-75 WALKOVER RADIATION SURVEY

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

[2]P. Kolb, Acting Program Manager
[2]W. Stoner, Radiation Safety Officer
[1,2]R. Case, Assistant Program Manager
[1,2]J. Thomas, Project QA & Licensing Manager

[1]Indicates presence at the interim exit meeting held on October 20, 2011.
[2]Indicates presence on the final exit teleconference held on November 22, 2011.

LIST OF PROCEDURES USED

IP 83801	Inspection of Remedial and Final Surveys at Permanently Shutdown Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

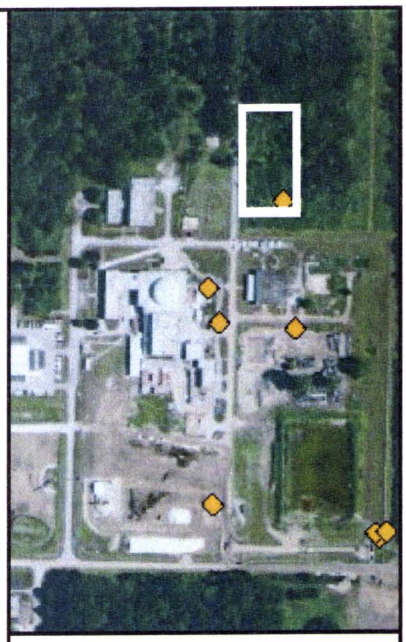
Opened	None
Closed	None
Discussed	None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
cpm	counts per minute
DCGL	Derived Concentration Guideline Level
DNMS	Division of Nuclear Material Safety
GPS	Global Positioning System
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NaI	Sodium Iodide
NASA	National Aeronautical and Space Administration
NRC	U. S. Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education

DOCUMENTS REVIEWED

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



Legend

Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

0 2.5 5 10 15 20 25 Meters

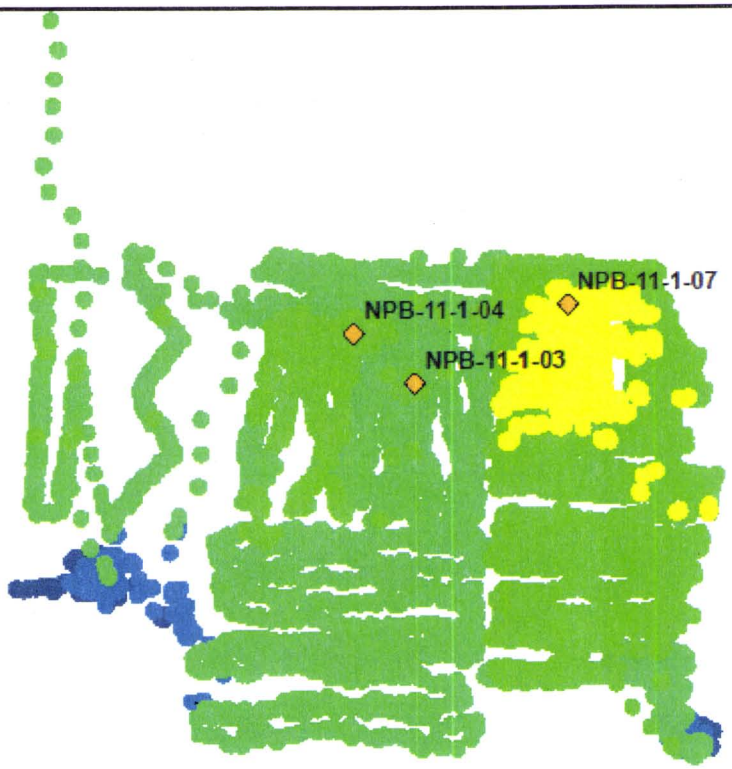
U.S.NRC

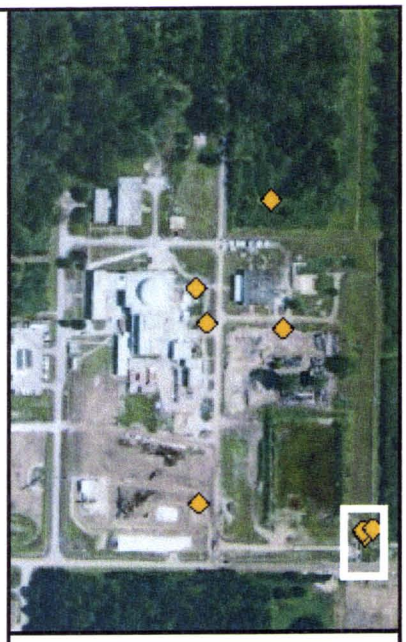
Protecting People and the Environment

SURVEY UNIT OL-2-3
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
NPB-11-1-01	10/18/2011	10:35 EST	8,022	0.22
NPB-11-1-02	10/18/2011	10:55 EST	10,242	< MDC
NPB-11-1-03	10/18/2011	12:35 EST	10,100	< MDC
NPB-11-1-04	10/18/2011	12:45 EST	10,800	1.75
NPB-11-1-05	10/18/2011	16:05 EST	12,300	0.32
NPB-11-1-06	10/19/2011	10:20 EST	12,500	0.13
NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13





Legend

Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

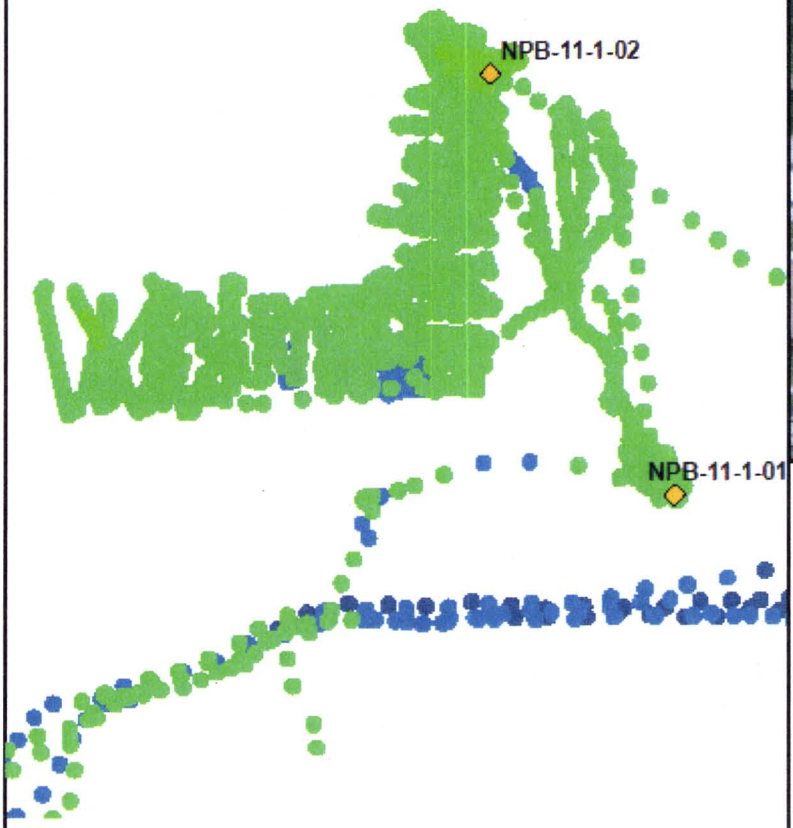
0 5 10 20 Meters

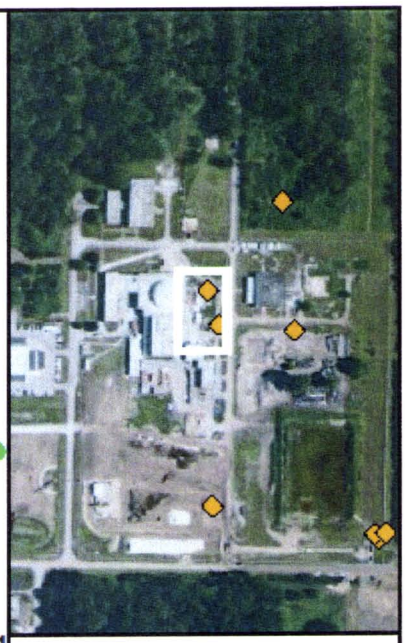
U.S.NRC

SURVEY UNIT OL-1-56
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
NPB-11-1-01	10/18/2011	10:35 EST	8,022	0.22
NPB-11-1-02	10/18/2011	10:55 EST	10,242	< MDC
NPB-11-1-03	10/18/2011	12:35 EST	10,100	< MDC
NPB-11-1-04	10/18/2011	12:45 EST	10,800	1.75
NPB-11-1-05	10/18/2011	16:05 EST	12,300	0.32
NPB-11-1-06	10/19/2011	10:20 EST	12,500	0.13
NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13





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Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

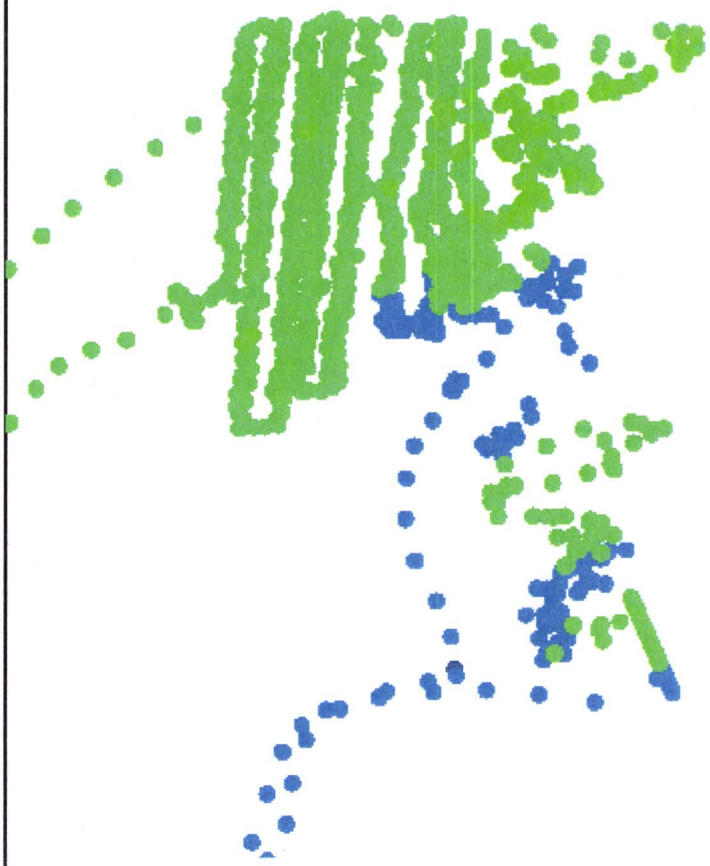
0 5 10 20 Meters

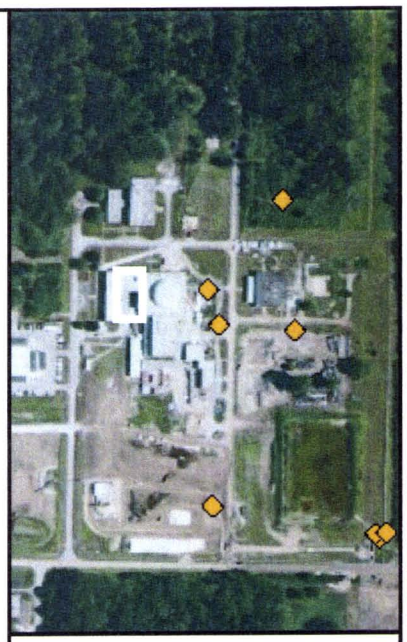
U.S.NRC

SURVEY UNIT OL-1-71
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
NPB-11-1-01	10/18/2011	10:35 EST	8,022	0.22
NPB-11-1-02	10/18/2011	10:55 EST	10,242	< MDC
NPB-11-1-03	10/18/2011	12:35 EST	10,100	< MDC
NPB-11-1-04	10/18/2011	12:45 EST	10,800	1.75
NPB-11-1-05	10/18/2011	16:05 EST	12,300	0.32
NPB-11-1-06	10/19/2011	10:20 EST	12,500	0.13
NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13





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Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

0 2.5 5 10 Meters

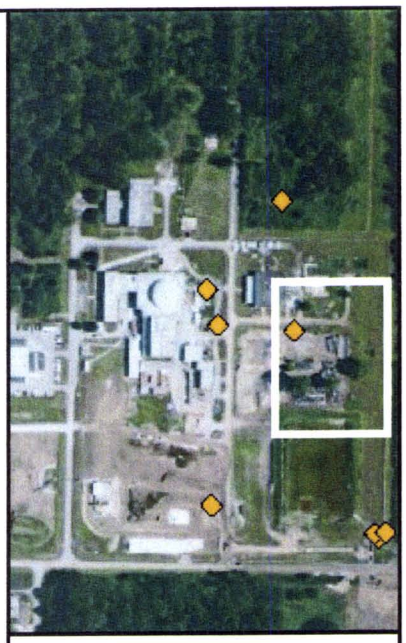
U.S.NRC

Protecting People and the Environment

SURVEY UNIT OL-1-84
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
NPB-11-1-01	10/18/2011	10:35 EST	8,022	0.22
NPB-11-1-02	10/18/2011	10:55 EST	10,242	< MDC
NPB-11-1-03	10/18/2011	12:35 EST	10,100	< MDC
NPB-11-1-04	10/18/2011	12:45 EST	10,800	1.75
NPB-11-1-05	10/18/2011	16:05 EST	12,300	0.32
NPB-11-1-06	10/19/2011	10:20 EST	12,500	0.13
NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13



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Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

0 5 10 20 30 40 50 Meters

U.S.NRC

SURVEY UNIT OL-1-68 and OL-1-62
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
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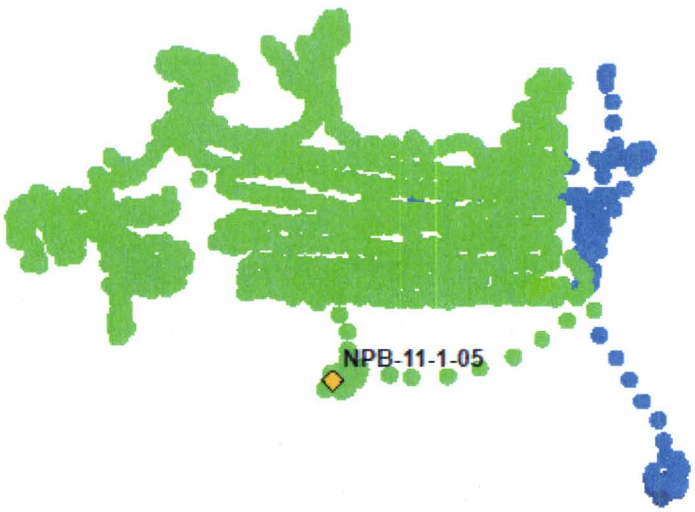
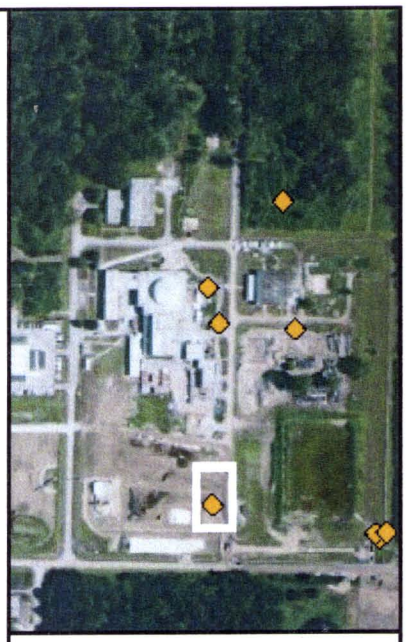
NPB-11-1-05	10/18/2011	16:05 EST	12,300	0.32
NPB-11-1-06	10/19/2011	10:20 EST	12,500	0.13
NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13





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Sample Locations

Gamma Walkover

Gross cpm

- 4143 - 6000
- 6001 - 8000
- 8001 - 10000
- 10001 - 12000
- 12001 - 14000

0 2.5 5 10 15 Meters

U.S.NRC

SURVEY UNIT OL-1-74 and OL-1-75
WALKOVER RADIOLOGICAL SURVEY
NASA PLUM BROOK REACTOR SITE
SANDUSKY, OHIO

Dates	10/18/2011 - 10/20/2011
Instrumentation	Kits #: 5N and 6N Meters: 2241-3 Detectors: 44-10

NRC ID#	Collection Date	Collection Time	Count Rate (cpm)	Cs-137 Concentration (pCi/g)
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NPB-11-1-07	10/19/2011	12:15 EST	12,600	2.76
NPB-11-1-08	10/20/2011	11:35 EST	8,100	0.13

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

Sincerely,

/RA/

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

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

Enclosure:
NRC Inspection Report Nos. 05000030/12-001(DNMS)
and 05000185/12-001(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
P. Kolb, NASA, Plum Brook Station

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Letter to Mr. Ramon Lugo, III from Christine A. Lipa, dated December 9, 2011.

SUBJECT: NRC INSPECTION REPORT 05000030/12-001(DNMS) AND 05000185/12-001(DNMS) – NASA PLUM BROOK REACTOR FACILITY

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