SAFETY AND MISSION ASSURANCE DIRECTORATE

Plum Brook Reactor Facility

SUPPLEMENTAL CHARACTERIZATION REPORT FOR THE PLUM BROOK REACTOR FACILITY

Revision 0
December 16, 2004

Form
AD-01/ 7
Rev 2

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1.0 SITE CHARACTERIZATION

1.1 Overview

This Supplemental Characterization Report presents additional information used for the classification of survey areas in accordance with applicable guidance contained in NUREG 1575. The information has been collected through ongoing facility radiological characterization efforts and contains characterization data that was not part of the original Decommissioning Plan submittal. Additional supplemental reports will be submitted as the characterization efforts continue throughout the decommissioning process.

This characterization data was collected and evaluated in accordance with site procedures that implement the PBRF Characterization Plan. The scope and objectives of the characterization program and the staff organization that manages the program are described in the PBRF Characterization Plan (MW-PL-02-004).

1.2 Previous Investigations

Section 2.2 of the Decommissioning Plan describes the radiological status of the Plum Brook Reactor Facility at the start of the decommissioning project. It presents a historical site assessment of past facility operations, assesses the radiological impact of those operations, and presents the results of two radiological characterization studies performed at the facility and the conclusions that these studies produced. These studies included a radiological survey performed in 1985 by Teledyne Isotopes and a 1998 confirmatory study performed to verify the results of the 1985 study. These studies provided the basis for determining the radiological classification of survey areas that was presented in the Decommissioning Plan. These studies and initial area classifications also provided the basis for establishing the methodology that would be used in designing the Final Status Surveys for the facility and for developing a Plan for continued radiological characterization.

In approving the Decommissioning Plan, the U. S. Nuclear Regulatory Commission approved the methodology proposed for developing a Final Status Survey Plan and the methodology to be used in performing a dose pathway analysis used in establishing the DCGLs for evaluating residual radioactivity against the radiological release criteria presented in 10 CFR 20 subpart E.

The Decommissioning Plan presented preliminary site specific radionuclide DCGLs that were based on the earlier characterization data and preliminary hydro-geologic characteristics.

Continuing radiological characterization and a more recent site specific hydro-geologic study have resulted in changes to the classification of some of the survey areas identified in the Decommissioning Plan, classification of some areas that were not specifically classified in the Decommissioning Plan, and changes in the radionuclide DCGLs calculated for the site.

The characterization data collected since submittal of the Decommissioning Plan is included in the attachments to this report. The sections of this report that follow discuss the design of the characterization surveys, the instrumentation used in performing the surveys, and the results of those surveys. Included is a discussion of the survey results, and the impact of the results on the prior survey area classifications. This report is used to support the data and technical discussions contained in the recently submitted Final Status Survey Plan.

2.0 CHARACTERIZATION ORGANIZATION, TRAINING, AND PROCEDURES

The Decommissioning Plan and the PBRF Decommissioning Project Operations Plan provide descriptions of the PBRF decommissioning team organization including position descriptions and responsibilities. The Operations Plan functions as a "roadmap" for project execution. Its purpose is to define operating procedures for the Federal Sector Team and the contractors to execute the decommissioning of the PBRF. Refer to the Decommissioning Plan and the Operations Plan for further information regarding the PBRF D&D project organization, responsibilities, and position descriptions.

MWH is providing the necessary personnel, materials, and subcontractors to perform all contracted phases of the decommissioning, including performance of the characterization survey described in the Characterization Plan. MWH performed and is continuing to perform the characterization survey in accordance with the protocols and process presented in the plan, using written survey instructions and approved procedures.

2.1 Training

Specific training on the contents and requirements contained in the Characterization Plan was provided to personnel that performed surveys, collected samples, and/or handled radioactive materials in radiological areas in accordance with MW-PL-02-006, "FSS/Characterization Supervisor and Technician Training Plan". The training was provided to ensure that personnel had sufficient knowledge to perform work activities in accordance with the requirements of the Characterization Plan and the Decommissioning Plan.

2.2 Procedures

Characterization survey activities were conducted in accordance with written approved procedures to ensure quality and employee and public safety. These procedures are controlled and implemented in accordance with site programs. Procedures used to perform site characterization included the following;

- PBRF-CS-001 - Characterization Sample Identification and Chain-of-Custody
- PBRF-CS-002 - Data Quality Management Guidelines for Off-Site Laboratories
- PBRF-CS-007 - Issue, Control and Accountability of Characterization/FSS Portable Radiological Instrumentation
- PBRF-CS-011 - Operation of the Ludlum Model 2350 Data Logger Survey Instrument

- PBRF-CS-015 - Characterization Survey Design, Package Generation and Survey Implementation
- PBRF-CS-016 - Material Background Determination

2.3 Characterization Survey Packages

A Characterization Survey Package was developed for each survey unit or area. These survey package instructions were developed according to the guidance provided in MARSSIM regarding field sampling plans for radiological surveys. The survey package instructions described the number, type, and location of direct measurements and samples with the analyses to be performed. Specific survey package instructions are developed to sufficiently address characterization survey objectives for each area to be surveyed in accordance with the characterization plan for structure surfaces, systems and environmental areas.

The survey packages are the primary method of controlling and tracking the hard copy records of survey results. Characterization survey packages were developed in accordance with PBRF-CS-015 "Characterization Survey Design, Package Generation and Survey Implementation". During the performance of the survey, the survey package(s) were updated with the results of direct measurements as well as the results of any special surveys or sample analyses performed.

Survey package development involved the performance of walk-downs and worksheet preparation. During the walk-down, details regarding the physical survey area are compiled, such as type of area (structure, system or environ), surfaces in the area (wall, floor, ceiling, surface soil, etc.,) and metric dimensions in meters. Data from previous surveys are also reviewed and utilized as appropriate. A Characterization Survey Package contains the following:

1) A detailed description of the survey areas and/or survey units, as applicable,
2) Photographs, drawing or drawings of the survey area and/or survey units, as applicable,
3) The operational history of the survey area including summary data from previous surveys,
4) Characterization survey instructions,
5) The location codes developed uniquely for the area,
6) The types and number of survey measurements and/or samples prescribed for the survey,
7) Any survey support requirements,
8) Any health and safety requirements,

9) Any RWP requirements,

10) Any specific survey instructions for abnormal conditions that may be encountered within the survey area, and

11) The survey instrument data downloads and sample analysis report hard copies.

A combination of photographs and drawings is developed for each survey package depicting each survey unit. The survey area/unit drawings are annotated with the location of the characterization survey measurements. Implementation, completion and review signature blocks in the survey packages are used to initiate and track the progress of the characterization surveys. Prior to implementing the survey package instructions, the FSS/Characterization Manager as well as the USACE Health Physicist review and approve each survey package. Following completion of the survey implementation, data analysis, and evaluation, the survey packages were reviewed to ensure that the data satisfied the survey objectives.

2.4 Survey Data Management System (SDMS)

A Survey Data Management System was developed to assist in managing the data generated during site characterization survey, post remediation survey, and final status survey operations. The SDMS has a modular structure that incorporates a database (DB) storage repository to include folders, file structure, and DB tables for each function of the process. Survey data collected during the project was downloaded from survey instruments into database tables specific to each measurement type for storage, analysis, and reporting.

2.5 Survey Measurement Location Codes

To facilitate database queries and reporting utilizing the SDMS, each characterization survey measurement and sample collected was assigned a unique survey measurement Location Code (LC). The LC system also provided for measurement traceability back to a specific location on a survey area drawing and a marking at the location where the survey measurement or sample was taken. A combination of the first two location codes is the designation for the survey unit and the location of the measurement. The four remaining 5 character sections designate the area classification, the material to be surveyed, the type of surface, the type of measurement, the detector used, and the location of the measurement.

3.0 CHARACTERIZATION APPROACH

Survey categories for site characterization are designated as surfaces and structures, systems, and environs (surface and sub-surface soils, sediments and groundwater) for both "impacted" and "non-impacted" locations based on the likelihood of the area being contaminated.

Radiological characterization surveys were performed prior to decontamination/ remediation activities within individual survey units to the extent practicable. The characterization data obtained will allow finalization of both planned remediation activities and waste management planning, the development of the FSS Plan and design of post-remediation and final surveys for each area. The site characterization survey includes both scans, direct measurements, and media samples of structural surfaces, scan surveys of surface soils, and collection and analysis of both surface and subsurface soils. Measurements and samples were collected to define the lateral and vertical extent of the contamination based on the results of initial surveys. The characterization surveys are designed, performed, evaluated, and documented in accordance with guidance provided in MARSSIM.

3.1 Site Preparation

In support of performing characterization surveys, facility surfaces and land areas were cleared of all loose equipment and materials to the maximum extent possible using RP work instructions and existing approved procedures. Materials showing detectable radioactivity were placed into appropriate radioactive waste containers for either disposal at a low level radioactive waste disposal site or to be sent to a licensed waste processor for further processing in accordance with the Waste Management Plan and procedures. In environmental survey areas, the area was cleared of debris and/or vegetation to eliminate physical obstructions. Characterization survey package instructions included measurements and samples for any remaining loose equipment or materials in an area.

3.2 Initial Area Classifications

Based upon the operational history of the PBRF buildings and the surrounding area, most of the facility was considered to be impacted with a few areas initially classified as non-impacted. All areas that were known to require decontamination (or remediation) were classified as Class 1 areas. Some of the surrounding support areas were classified as either Class 2 or 3. Non-impacted areas are adjacent to the Class 2 or Class 3 areas.

Surveys performed in 1985 and 1998 identified Class 1 impacted areas containing radioactive contamination at levels that will require decontamination prior to subsequent final status survey. The primary purpose of performing additional characterization surveys in areas of known radiological contamination is to bound the nature and extent of the contamination. Characterization survey locations selected in these areas were biased based upon the previous 1985 and 1998 survey results. Survey designs developed for areas classified as either non-impacted or impacted Class 2 or Class 3 included a combination of systematic and biased direct survey measurements and area scans to supplement what was already known about the radiological condition of the areas.

To facilitate site characterization, the PBRF buildings and site were divided into characterization survey areas based on each major structure or land area. These survey areas were then subdivided into survey units in a manner to minimize logistical concerns and optimize work flow. Minimal consideration was given to maintaining the total surface area (quantity of surface requiring evaluation) within survey unit size guidelines provided in MARSSIM. Instead the survey unit designation, when practicable, focused on the operational history within the survey area to assign units within each survey area. The survey areas and preliminary characterization survey units for the PBRF site are listed in Table A-1. The initial classification associated with each survey area was based upon the Decommissioning Plan. Each survey area and unit was assigned a unique number (Survey Package ID) to facilitate handling of information and data via the SDMS database.

3.3 Characterization Survey Action Levels

In accordance with the Decommissioning Plan, DCGLs were used to determine the Action Levels for non-radionuclide specific direct measurements of radioactive contamination. The Action Levels are necessary to facilitate the appropriate acquisition of meaningful direct measurements in the field. These action levels were used to guide characterization efforts with regard to bounding the vertical and lateral extent of detected radioactive contamination. The interim site-specific DCGLs presented in the Decommissioning Plan for volumetric material samples (surface soils & sediments) were used as action levels for bulk media samples. These action levels are presented in Table 3-1.

Generally, the Action Levels for scan surveys were established at 50% of the interim site-specific DCGLs. However, technicians were instructed to identify any sustained count rates above background for follow-up surveys and/or sampling.

When conducting characterization activities for the Pentolite Ditch environs the action level for gamma scans of surface soils was further refined to 3,000 cpm above background. This count rate corresponded to a scan MDC of approximately 7 pCi/g for Cs-137, which corresponds to slightly less than 50% of the interim site specific DCGL from the Decommissioning Plan. Any areas that were identified as being above this action level were identified for follow-up surveys and sampling.

Table 3-1, Characterization Survey Action Levels

Direct Measurements on Structural Surfaces		
	Interim Site Specific DCGL from Decommissioning Plan	
^{60}Co	16,000	dpm/100cm^2
^{241}Am	617	dpm/100cm^2
Volumetric Material Samples		
	Interim Site Specific DCGL from Decommissioning Plan	
^{137}Cs	18	pCi/g
^{60}Co	4.6	pCi/g
^{90}Sr	32	pCi/g

3.4 Characterization Survey Design

Characterization survey results will be used to determine the estimated standard deviation (used to calculate the relative shift) for FSS in accordance with MARSSIM section 5.5.2.2. MARSSIM recommends a survey population of 5 to 20 as sufficient to successfully establish this parameter. For performance of characterization surveys at the PBRF, a minimum survey population of eight sample locations was chosen. The method chosen to determine measurement and sample locations used a systematic approach, with additional biased "bounding" measurements collected, as necessary.

Alpha and beta scans and direct measurements for total surface contamination as well as smear samples for removable alpha and beta surface contamination were acquired for the characterization of building structural, system and equipment surfaces. Areas of elevated count rate identified during the scans received additional direct measurements and samples. The degree of scan surveys performed in Class 1 open land and structural survey areas varied between survey areas. The basis for the scan coverage was the effort sufficient to allow for the adequate bounding of areas of radiological contamination within these areas and to provide sufficient radiological information to develop waste volume estimates and remediation plans. In Class 2 and 3 areas, the function of the scan survey provides for the discovery of radiological contamination versus bounding and as such, required a more extensive scan survey effort. Scan survey coverage

implemented to support the characterization of Class 2 & 3 open land and structural survey areas/units was sufficient to give reasonable assurance that all radioactive materials within these areas had been identified. Judgmental emphasis was given to scanning areas that based upon operational history or inherent processes would have a high probability of exhibiting radiological conditions in excess of the action levels if any areas were to exist.

3.5 Instrumentation and Selection

The criterion for selecting radiological survey instrumentation and detectors was based upon the assurance that an instrument's detection sensitivity was sufficient to detect the radionuclides of concern at or below minimum detection requirements. Data Logger instrumentation was employed with a variety of detectors for direct measurements of alpha and beta surface contamination as well as exposure rate measurements. The Data Logger is a portable micro-processor computer based counting instrument capable of operation with NaI(Tl) gamma scintillation, plastic scintillation, gas-flow proportional, G-M, and ZnS scintillation detectors. The instrumentation used for characterization is presented in Table 3-2.

Detector selection depended upon the type of survey, surface contour and survey area size. Large area (125 cm^2) alpha and beta scintillation detectors were typically used for both direct alpha and direct beta measurements. The 15.5 cm^2 G-M detector was used for direct beta measurements in smaller areas where the large area beta detector did not fit and in areas of high background where a shielded detector was required. Exposure rate measurements and gamma scans were performed using 2"x 2" NaI (Tl) gamma scintillation detectors.

The majority of smear sample counting and analysis for removable alpha and beta contamination was performed using a low background automatic gross alpha/beta counter. Tritium smear sample counting and analysis was performed using a quench corrected liquid scintillation counter. The liquid scintillation counter could also be setup, calibrated, and utilized for counting other hard-to-detect radionuclides suspected or known to be present at the PBRF. Samples for gamma isotopic analysis were counted and analyzed using a high purity germanium (HPGe) gamma spectroscopy system. Samples that were analyzed by gamma spectroscopy included soil, sediment, water, filters or smears, and various other bulk materials such as concrete and asphalt.

All data loggers, associated detectors and all other portable instrumentation used for characterization were calibrated in accordance with applicable, approved procedures using National Institute of Standards and Technology (NIST) traceable sources and calibration equipment. Calibration labels showing the

instrument identification number, calibration date and calibration due date are attached to all portable field instruments.

3.6 Minimum Detectable Concentration (MDC)

The MDCs for the detectors used during the characterization survey were adjusted to approximately equal to or less than 50% of the applicable action level. Two different types of MDCs were utilized, one for direct surface contamination measurements, MDC_{Static}, and one for field scanning of surfaces, MDC_{Scan}. These are calculated differently and each was incorporated into the survey instructions as appropriate. The equation used for calculating the MDC_{Static} for direct measurements using field instrumentation is as follows:

$$MDC_{static} = \frac{\frac{2.71}{t_s} + 3.29\sqrt{\frac{R_b}{t_s} + \frac{R_b}{t_b}}}{E\left(\frac{A}{100}\right)}$$

Where: MDC_{Static} = Minimum Detectable Concentration (dpm/100 cm^2)

R_b = Background Count Rate (cpm)

t_b = Background Count Time (min)

t_s = Sample Count Time (min)

A = Detector Area (cm^2)

E = Detector Efficiency (c/d)

The equation used to calculate the MDC_{Scan} for surfaces is as follows:

$$MDC_{scan} = \frac{d' * \sqrt{b_i} * \frac{60}{i}}{E_i * E_s * \sqrt{p} * \frac{A}{100}}$$

Where: MDC_{Scan} = Minimum Detectable Concentration (dpm/100 cm^2)

d' = Decision error taken from Table 6-5 of MARSSIM

i = Observation counting interval (scan speed divided by the detector width)

b_i = Background count per observation interval

E_i = Detector Efficiency (c/d), (2Π efficiency per ISO-7503)

E_s	=	Surface Efficiency (typically around 50% for beta contamination on concrete)
p	=	Surveyor Efficiency (typically 50%)
A	=	Detector Area (cm^2)

NOTE: In alpha scanning situations with very low alpha background (around one to three counts-per-minute), the guidance and methods contained in MARSSIM Appendix J are more applicable for determining Alpha MDC_{Scan}. However, no such low-background situations were encountered in areas that required alpha scans during characterization activities.

For scanning soil with a sodium iodide gamma detector, the MDC_{Scan} values presented in Table 6.7 of MARSSIM were used. According to NUREG-1727, the MDC_{Scan} values presented in Table 6.7 of MARSSIM provide an acceptable estimate of MDC_{Scan} for the survey.

The MDC for the gamma spectral analysis of soil was based on sample count times sufficient to detect at 50% or less of the volumetric action level specified in Table 4-1. The gamma spectroscopy system was operated such that for ^{60}Co and ^{137}Cs, a MDC of less than 0.5 pCi/g was maintained. The MDC for the alpha/beta smear counter was based on sample count times sufficient to detect at 5% or less of the structural surface action level specified in Table 4-1. The MDC for the liquid scintillation counter for analysis of tritium contamination was based on sample count times sufficient to detect at 5% or less of the interim site-specific DCGL for tritium specified in the Decommissioning Plan.

Table 3-2, Survey Instrumentation Used for PBRF Characterization

Instrument/ Detector	Detector Type	Radiation Detected	Calibration Source	Use
Ludlum Model 2350-1 with 44-116 detector	Plastic Scintillator (125 cm^2)	Beta	^{99}Tc (β)	Direct beta measurements and beta scan surveys.
Ludlum Model 2350-1 with 43-90 detector	ZnS Scintillator (125 cm^2)	Alpha	^{230}Th (α)	Direct alpha measurement surveys.
Ludlum Model 2350-1 with 43-37 detector	Large area gas-flow proportional (582 cm^2)	Alpha and/or beta	^{99}Tc (β), ^{230}Th (α)	Floor Monitor detector for beta scan survey.
Ludlum Model 2350 with. 44-40 detector or equal	Shielded GM (15.5 cm^2)	Beta	^{99}Tc (β)	Direct beta surveys; Beta scans.
Ludlum Model 2350 with. 44-10 detector or equal	NaI (Tl) Scintillator	Gamma	^{137}Cs (γ)	Gamma exposure rate and gamma scans.
Thermo Hand-E Count	ZnS Scintillator	Alpha and Beta	^{99}Tc (β), ^{230}Th (α)	Smear counting
Tennelec S5-XLB	Gas Proportional	Alpha and Beta	^{99}Tc (β), ^{230}Th (α)	Smear and air sample counting
Protean Planchet Counter	Shielded Gas-flow proportional	Alpha and Beta	^{99}Tc (β), ^{230}Th (α)	Smear counting
Packard Liquid Scintillation Counter or Equal	Photo-multiplier tube (PMT) and Liquid Scintillator	Low Energy Beta, including Tritium and C-14	^{3}H (β), ^{14}C (β), ^{63}Ni*	Tritium Smear counting
ORTEC HPGe detector based Gamma Spectrometer	HPGe	Gamma energy and intensity	Mixed gamma	Nuclide identification and quantification of media samples.

* After January 1, 2005, the Packard liquid scintillation counter will be setup for ^{63}Ni.

3.7 Survey Protocols/Requirements

The characterization survey of building surfaces consisted of surface scans (beta and gamma); direct alpha and direct beta measurements, and smears for removable gross alpha, removable gross beta and, in some cases, tritium analysis. The characterization survey of the asphalt-paved areas consisted of surface scans (beta and gamma) and direct alpha and direct beta measurements. The survey of the facility grounds consisted of gamma scans and soil sampling for gamma spectroscopy analysis. Surveys were performed as follows:

3.7.1 Alpha Surface Scans

Alpha scans were only performed in areas where there was previous knowledge of alpha contamination. That knowledge was gained either through previous characterization activities or ongoing operational health physics surveys. Alpha scans were generally performed on 100% of concrete and tile floor surfaces. However, in at least one characterization package, the lower walls (walls to two meters) were also scanned. The scans were performed using a Ludlum 2350 Data Logger with either a Ludlum 43-90 probe (125 cm^2 zinc sulfide scintillator covered with 0.8 mg/cm^2 aluminized mylar) or a Ludlum 43-37 probe (582 cm^2 gas flow proportional detector covered with 0.8 mg/cm^2 aluminized mylar). Technicians listened to the data logger's audible output while simultaneously observing the digital readout for any indications of elevated counts. Scans were performed holding the detector ¼" from the surface and moving at the rate of one detector width every two seconds. All areas of elevated contamination were identified for further evaluation.

3.7.2 Beta Surface Scans

Beta scans were performed as instructed in each survey package over accessible floor, wall, and ceiling interior surfaces; exterior walls and roofs; and asphalt and concrete paved areas typically using a large area (125 cm^2) plastic scintillator. In some case, a large-area (582 cm^2) gas proportional detector was used for large floor and roof areas. Generally, in Class 1 areas 100% of accessible surfaces were scanned. In Class 2 areas at least 50% of accessible surfaces were scanned. The amount of surface area scanned in Class 3 areas varied. In all cases, biased scans were performed to provide sufficient assurance that areas of potential residual radioactivity were identified. Technicians listened to the data logger's audible output while observing the instrument readout for any indication of elevated counts. Beta scans of surfaces were typically performed holding the detector approximately ¼ inch to ½ inch from the surface and moving the detector at a rate of one detector width per second over the

area. All areas of elevated contamination were identified for further investigation and potential decontamination.

3.7.3 Gamma Surface Scans

Gamma scans were performed as instructed in each survey package. Scans were performed in some inside areas and in all outdoor soil areas of the PBRF, above the surfaces of soils, floors, building roofs, as well as outside buildings around asphalt and concrete paved areas and immediately around the buildings. Typically, a 2"x 2" NaI (Tl) gamma scintillation detector was used with a data logger to help identify any areas of residual contamination in the soil or the building interior. When scanning, the detector was moved in a serpentine manner in close proximity with the surface while listening to the audible output of the instrument. The digital display readout was also observed for any elevated counts detected. Any areas where a noticeable increase in the count rate was detected were flagged for further investigation and/or sampling.

3.7.4 Exposure Rate Measurements

Exposure rate measurements were performed as instructed in each survey package inside the facility structures above the floor, and outside the building around the asphalt and concrete paved areas and around the buildings. A 2"x 2" NaI (Tl) gamma scintillation detector was used with the data logger to help identify any areas of residual contamination in the soil or the building interior. The exposure rate measurements were performed at survey measurement locations on building floors and the outside grounds with the detector 1 meter above the surface and no closer to 1 meter proximity with any other surface. The exposure rate measurement count time was integrated for 15 to 60 seconds as required by survey package instructions.

3.7.5 Direct Surface Contamination Measurements/Sampling

Direct surface contamination measurements, for total alpha contamination and total beta contamination, were taken on the structural surfaces of the buildings and on concrete or asphalt paved areas within each survey area/unit as instructed in each survey package. The direct alpha and direct beta measurements were typically performed using large area (125 cm^2) scintillation detectors in combination with a data logger instrument. Direct alpha measurements were generally performed at 10% of the beta survey locations if the direct beta survey results indicated greater than 1,000 dpm/100cm^2.

3.7.6 Removable Contamination Measurements

Smears were taken for removable alpha and beta analysis at each direct beta contamination measurement location as instructed in each survey package. Smears were taken by applying moderate pressure to the smear and wiping the smear over an area of approximately 100 cm^2. Smears were taken for removable tritium analysis at direct beta contamination measurement locations as instructed in each survey package. Tritium smears were first moistened with deionized water and then, with light pressure, wiped over an area of approximately 100 cm^2. The smear was then placed into a 20 ml scintillation vial for subsequent preparation and analysis according to approved procedures.

3.7.7 Material Sampling

Material samples including concrete cores, roofing materials, soil, sediment, and sludge were collected as instructed in each survey package. Approximately one to two liters of material were collected, dried, homogenized, and sieved. The on-site gamma spectroscopy system was used for analyses of samples.

3.8 Determination of Radionuclide Distribution

Core bore and removable structural surface contamination sampling was performed to determine the depth of fixed contamination and establish the attendant radionuclide profiles for use in dose assessments, DCGL development, and Final Status Survey planning.

3.8.1 Core Bore Sampling

Core bore sampling for concrete covered surfaces involved the use of a core drill with a 3-inch diameter diamond bit. The cutting of the concrete was performed with water applied to the cutting bit so as not to overheat and preserve the cutting surface.

3.8.2 Removable Surface Contamination Sampling

Smear samples were taken for removable alpha, beta, and tritium analysis. Smear samples were collected in accordance with the methods described in section 4.7.6, above.

Samples were subsequently analyzed using either the onsite gamma spectroscopy system or sent to an off-site laboratory for full isotopic analysis. Analyses results and illustrations depicting the locations of all core bores and smear samples are provided in Attachment A to the Final Status Survey Plan.

3.9 Quality Assurance

This PBRF Characterization Plan was developed according to the essential elements of the quality assurance and quality control (QA/QC) program for the PBRF decommissioning and is subject to the PBRF Quality Assurance Plan, QA-01. The QA/QC program elements for the PBRF D&D are as follows:

1) Establishment/implementation of plans, procedures, and protocols for the field operations,
2) Actions to assure that the procedures are understood and followed by the implementing staff, and
3) Documentation of the data collected.

The specific QA/QC program components applied for the characterization are as follows:

1) Selection of personnel,
2) Establishment of project plans and procedures,
3) Documentation of survey data and sample analyses,
4) Personnel training,
5) Selection of appropriate instruments to perform the surveys,
6) Proper instrument calibration and daily functional checks, and
7) Management oversight of characterization activities relative to the adherence to procedures, protocols, and documentation requirements.

Details of these elements are set forth in the implementing procedures used during characterization. The day-to-day characterization operations and the associated data acquisition and recording were guided and conducted in compliance with these QA/QC requirements.

4.0 CHARACTERIZATION SURVEY RESULTS

4.1 Impacted Structures

4.1.1 Class 1 Structures

Class 1 areas are defined as areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous contamination surveys) above the DCGL. Examples of Class 1 areas include:

1) site areas previously subjected to remedial actions,
2) locations where leaks or spills are known to have occurred,
3) former burial or disposal sites,
4) waste storage pits, and
5) areas with contaminants in discrete solid pieces of material and high specific activity.

The following structures are considered to be Class 1. Illustrations depicting facility area designators and survey area classifications can be found in Attachment D of the Final Status Survey Plan for the Plum Brook Reactor Facility.

- Containment Vessel: Areas 2 and 17, Quads A-D, Canal E, Sub-Pile Room, Elevator Pit, and Stairwells
- Reactor Building: Areas 1, 20, 21, 22, and 33, and Canals F, G, and H
- Hot Laboratory Building Cells 1 - 7, the mezzanine above all seven cells, Cold Work Area & Air Lock, Manipulator Repair Shop, Lavatory Areas, Hot Work Area, Hot Handling Area, Canal J, Canal K, Hot Dry Storage, Decontamination Areas, Room 27 Mezzanine, and Hot Pipe Tunnel
- Services Equipment Building Cold Pipe Tunnel, part of Room 19A (Chemical Storage), and part of Area 1.
- Primary Pump House Rooms 1-8
- ROLB Utility Tunnel, New Fuel Vault, and 2nd Floor Lab
- Fan House interior
- Waste Handling Building interior
- Hot Retention Area

Summaries of available characterization data for these areas are provided in Attachment, Table A-1. Reactor Building Areas 1, 20, 21, and 22; Hot Laboratory Cold Work Area and Hot & Cold Lavatory; PPH Rooms 1-8; and ROLB New Fuel Vault and 2nd Floor Offices/Lab were initially Class 2. The ROLB Utility Tunnel was unclassified previously.

4.1.2 Class 2 Structures

Class 2 areas are defined as areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL. To justify changing the classification from Class 1 to Class 2, there should be measurement data that provide a high degree of confidence that no individual measurement would exceed the $DCGL_W$. Other justifications for reclassifying an area as Class 2 may be appropriate based on site-specific considerations. Examples of areas which may be classified as Class 2 areas include:

1) locations where radioactive materials were present in an unsealed form,
2) potentially contaminated transport routes,
3) areas downwind form stack release points,
4) upper walls and ceilings of buildings or rooms subjected to airborne radioactivity,
5) areas handling low concentrations of radioactive materials, and
6) areas on the perimeter of former contamination control areas.

The following structures are considered to be Class 2:

- Reactor Building Mezzanine Offices and Roof
- Hot Laboratory Roof, Vestibule and First Floor Office
- ROLB Northeast, Southeast and Middle Stairwells, Elevator Areas, Areas 11, 14, 15, and 16, Instrument Areas, parts of Rooms 109-111, parts of Rooms 121-126, first- and second-floor Restrooms, first-floor Lavatory and Janitor's Closet, Pipe Chase, Rooms 112-116, parts of Rooms 117-120, first-floor East-West Hallways, and Roof
- Fan House Building Roof and Exterior Walls
- Waste Handling Building Roof and Exterior Walls
- WEMS
- SEB Roof, Mezzanine (Area 14 and Room 19) and 1st Floor (except shop and equipment room)

Summaries of available characterization data for these areas are provided in Attachment, Table A-1. The Primary Pump House Exterior Walls & Roof was previously Class 3. All other areas were previously classified as impacted, Class 2.

4.1.3 Class 3 Structures

Class 3 areas are defined as any impacted areas that are not expected to contain residual activity, or are expected to contain levels of radioactivity at a small fraction of the $DCGL_W$, based on site operating history and previous radiological surveys. Examples of areas which may be classified as Class 3 include:

1) buffer zones around Class 1 or Class 2 areas, and
2) areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

The following areas are considered to be Class 3:

- Reactor Building Count Room, Area 4, and Exterior Walls
- Hot Laboratory External Walls
- 1st Floor Offices, Conference Room, 2nd Floor Offices, Crawl Space, and Exterior Walls
- SEB Mezzanine, Pit Area and Shop & Storage, Basement Auxiliary Equipment Room, Water Treatment Pump Room, Clear Well Area, Pit Area and Electrical Room.
- Reactor Security Building

Summaries of available characterization data for these areas are provided in Attachment, Table A-1. The Reactor Building Count Room and Area 4 and ROLB 2nd Floor Offices, and Crawl Space were originally Class 2. The Reactor Security Building was unclassified previously.

The Reactor Precipitator (1157) was initially classified as a Class 3 structure. This structure has been demolished, leaving only the concrete base.

4.2 Non-Impacted Structures

The Reactor Service Equipment Building (1131), Reactor Gas Services Building (1135), Reactor Water Tower (1151), Reactor Substation (1161), Reactor Security Building (1191), Reactor Compressor Building (1136), Reactor Cryogenic and Gas Supply Farm and Building (1195 & 9837), and Reactor Gas Storage Structure (1196) were initially classified as non-impacted structures. With the exception of

the Reactor Substation (1161), Reactor Service Equipment Building (1131) and Reactor Security Building (1191), these structures have been demolished and disposed of, leaving only the base concrete foundations.

All equipment, i.e., transformers, panels, etc., have been removed from the Reactor Substation (1161). The underground structure beneath the Reactor Substation has not yet been characterized.

Based on characterization results, all areas of the Reactor Service Equipment Building (1131) have been reclassified as Class 1, 2, or 3. The Reactor Security Building (1191) has been reclassified as Class 3. Consequently, there are no remaining PBRF structures that are considered non-impacted.

4.3 Environs Inside the PBRF Fence

Survey Area 2400 (A2400) encompasses all open land areas inside the Plum Brook Reactor Facility (PBRF) fence line. This survey area includes open land areas and paved surfaces such as roads and lay down areas. The fenced area is approximately 27 acres. A portion of the Storm Drain System traverses many of the survey units approximately four feet below grade.

A2400 was divided into ten (10) survey units of similar size. Within each survey unit, 100% of the accessible land areas were scanned for gamma radiation. Contact and one-meter gamma measurements and surface soil samples were conducted in each identified location. Subsurface soil sampling was also conducted within each survey unit.

Subsurface soil sample locations were selected in the following manner:

- A sample was collected at biased locations that were identified as a former spill location.
- A sample was collected at biased locations that were identified during surface soil sampling.
- Samples were collected randomly in FSS Class 3 areas in accordance with MARSSIM guidelines.
- Samples were collected using a random start location and triangular grid pattern in FSS Class 1 and Class 2 areas in accordance with MARSSIM guidelines.
- Duplicate samples were collected within each survey unit at a frequency of 1 duplicate sample for every 20 samples collected.

Generally, surface and subsurface soil samples were collected at each location to groundwater or refusal.

Each four (4) foot tube of soil was identified as an individual sample and typically the first one (1) foot below the top 6 inches (15 cm) and the last one (1) foot of soil above groundwater or refusal, was analyzed onsite by gamma spectroscopy.

Samples near a subsurface system or structure were also identified for analysis.

Once the samples were analyzed, and activity above the action level was identified (50% of the Unity Test), then adjacent vertical samples from the same location were selected for gamma spectroscopic analysis to determine the vertical extent of the elevated activity.

The estimated total number of sample locations, estimated total number of samples to be analyzed and the estimated total number of samples collected for each area are provided in the table below:

Table 4-1, Subsurface Soil Samples

Area	Estimated Number of Locations	Estimated Number of Samples to be Analyzed	Estimated Total Number of Samples Collected
Survey Unit 1	14	28	112
Survey Unit 2	27	54	216
Survey Unit 3	47	94	376
Survey Unit 4	12	24	896
Survey Unit 5	43	86	344
Survey Unit 6	114	228	912
Survey Unit 7	42	84	336
Survey Unit 8	67	134	536
Survey Unit 9	45	90	360
Survey Unit 10	14	28	112
O/S PBRF Fence	20	40	160
ERB	30	60	240
Pentolite Ditch	24	48	192
Total	**499**	**998**	**3,992**

An illustration depicting site environs survey units and sample locations is provided in Figure 4-1, below.

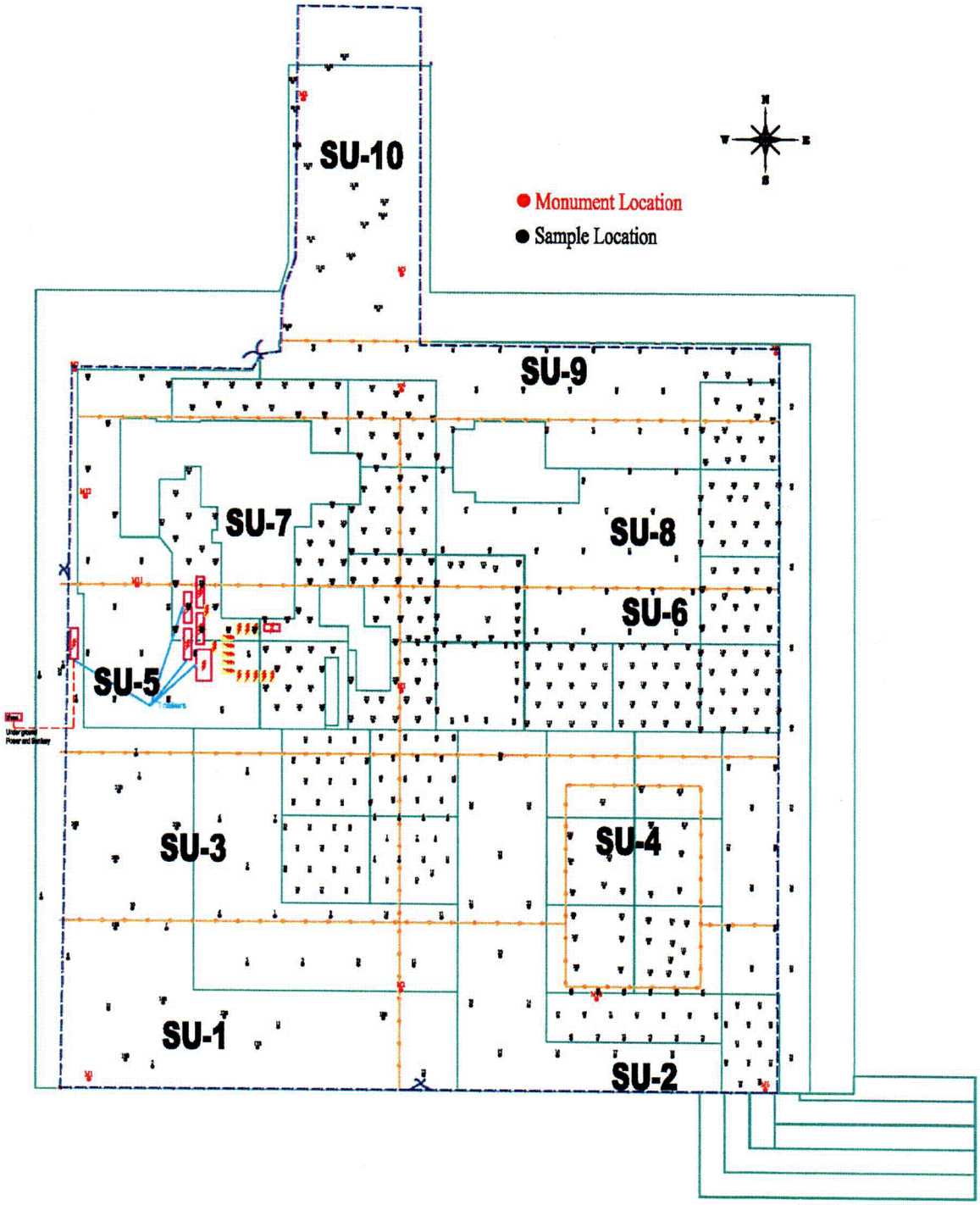
The Emergency Retention Basin (ERB) (A2100) was initially classified as Class 1 and surveys indicate that the classification is justified.

The following surveys and sampling have been performed or are currently being performed for the PBRF Environs (A2400) and the ERB (A2100):

- The entire accessible land surface areas of A2100 and A2400 have been scanned for gamma radiation.
- 415 surface soil samples have been collected and measured in the onsite laboratory by gamma spectroscopic analysis.
- Approximately 480 out of 499 subsurface soil sample locations have been collected and to date 234 samples have been analyzed onsite.

The specific survey unit characterization summary information is provided in the following sections.

Figure 4-1, Site Environs Survey Units & Sample Locations



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4.3.1 Survey Unit #1 (A2400 301Cx)

Survey Unit #1 consists of the far southwest portion of the fenced in area of PBRF.

Forty-eight (48) surface soil samples were collected. To date, 19 subsurface soil samples have been analyzed from Survey Unit #1. Sample analysis results are provided in Attachment A, Table A-2.

4.3.2 Survey Unit #2 (A2400 302Cx)

Survey Unit #2 consists of the far southeast portion of the fenced in area of PBRF.

Fifty-one (51) surface soil samples were collected. To date, 32 subsurface soil samples have been analyzed from Survey Unit #2. Sample analysis results are provided in Attachment A, Table A-2.

4.3.3 Survey Unit #3 (A2400 303Cx)

Survey Unit #3 encompasses the open land areas in the middle southwest portion of the fenced in site.

A radioactive materials area is located in the northeast section of the survey unit. The radioactive materials area is used as a staging area for waste containers awaiting shipment.

Contact and one-meter gamma measurements and surface soil samples were conducted in each identified location. The maximum contact gamma measurement was 230.4 micro-Roentgen/hour (μR/hr) taken at location #3 on the south side of the WHB pad. The maximum one-meter gamma measurement was 351.4 μR/hr, also taken at location #3. Additionally, forty-seven (47) surface soil samples were collected and analyzed by gamma spectroscopy.

To date, 64 subsurface soil samples have been analyzed from Survey Unit #3. Sample analysis results are provided in Attachment A, Table A-2.

4.3.4 Survey Unit #4 (A2400 304Cx)

Survey Unit #4 encompasses the open land in the middle southeast portion of the fenced area. The northern two-thirds of the ERB are located within the survey unit boundary along the south side. The basin is not included as part of this survey unit. However, the dike surrounding the northern ERB is included in this survey unit.

Eight (8) elevated areas were identified during gamma scan and thirty-two (32) additional locations were identified for follow-up surveys and sampling. The maximum contact gamma measurement was 13.90 μR/hr. The maximum one-meter gamma measurement was 14.57 μR/hr. Additionally, forty (40) surface soil samples were collected and analyzed by gamma spectroscopy.

To date, 23 subsurface soil samples have been analyzed from Survey Unit #4. Sample analysis results are provided in Attachment A, Table A-2.

4.3.5 Survey Unit #5 (A2400 305Cx)

Survey Unit #5 encompasses the open land in the mid-west portion of the fenced area. The survey unit borders Line 2 road to the west. The Hot Retention Area (HRA), the Reactor Fan House (FH), the WHB, the Reactor Security Building (RSB) and a portion of the Reactor Hot Laboratory Building (HLB) cover a large portion of the area of this survey unit.

As a result of the scan, no areas of elevated gamma radiation were identified during the survey. However, field notes indicate that gamma scans were not conducted in all areas due to elevated background radiation levels that were present in the north and east portions of the survey unit. The elevated background radiation levels are due to the proximity of the WHB and its associated operations. The maximum contact and 1-meter gamma measurements were 98.97 and 199.11 μR/hr respectively. Forty-five (45) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

To date, no subsurface soil samples have been analyzed from Survey Unit #5.

4.3.6 Survey Unit #6 (A2400 306Cx)

Survey Unit #6 encompasses the open land in the mid-east portion of the fenced area. The Reactor Cold Retention Basins (CRB) resides in the northwest corner of this survey unit. The location of the former Reactor Substation also resides along the north survey unit border.

As a result of the scan, one area of elevated gamma radiation was identified west of the CRB. The maximum contact and 1-meter gamma measurements were 32.51 and 18.35 μR/hr respectively. Forty-four (44) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

To date, no subsurface soil samples have been analyzed from Survey Unit #6.

4.3.7 Survey Unit #7 (A2400 307Cx)

Survey Unit #7 encompasses the open land areas in the middle northwest portion of the fenced-in site. The ROLB, RB, PPH, GSB and part of the HLB reside within this survey unit.

The maximum contact and 1-meter gamma measurements were 65.48 and 84.54 μR/hr respectively. Twenty (20) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

Subsurface soil samples are currently being collected. To date, no subsurface soil samples have been analyzed from Survey Unit #7.

4.3.8 Survey Unit #8 (A2400 308Cx)

Survey Unit #8 encompasses the open land in the middle northeast portion of the fenced area. Several large structures are included in this survey unit, including the SEB, the Cooling Tower foundation, a portion of the Reactor Precipitator, a portion of the Reactor Sludge Settling Basins (SSB) and a portion of the CRB.

As a result of the gamma scan, five (5) areas of elevated gamma radiation were identified. The maximum contact and 1-meter gamma measurements were 77.60 and 19.17 μR/hr respectively. Forty-five (45) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

To date, no subsurface soil samples have been analyzed from Survey Unit #8.

4.3.9 Survey Unit #9 (A2400 309Cx)

Survey Unit #9 encompasses open land areas in the northern portion of the fenced site area. Several paved areas and small structural foundations are located within the unit. The survey unit borders the north fence line of the site between the east and west boundaries. A portion of the Reactor Precipitator and the SSB reside in this survey unit.

As a result of the gamma scan, no area of elevated gamma radiation was identified. The maximum contact and 1-meter gamma measurements were 49.45 and 51.52 μR/hr respectively. Forty-two (42) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

To date, no subsurface soil samples have been analyzed from Survey Unit #9.

4.3.10 Survey Unit #10 (A2400 310Cx)

Survey Unit #10 encompasses the open land on the extreme northern portion of the fenced site. The foundation of the Reactor Air Compressor Building and the Reactor Cryogenic Farm and Building reside in this survey unit. Several paved surfaces traverse the area mostly around the two structures. Several small trees are located within the unit as well as typical native grasses.

As a result of the scan, no area of elevated gamma radiation was identified. The maximum contact and 1-meter gamma measurements were 27.75 and 29.01 μR/hr respectively. Thirty-six (36) surface soil sampling locations were identified throughout the survey unit. Sample analysis results are provided in Attachment A, Table A-2.

To date, no subsurface soil samples have been analyzed from Survey Unit #10.

4.3.11 Emergency Retention Basin (A2100 101Cx)

The Emergency Retention Basin (ERB) is a component of the Water Effluent Monitoring System (WEMS). A series of in-stream monitors in the WEMS would reposition the sluice gates in the discharge canal to divert the flow to the ERB when radioactivity levels in the effluent path exceeded a preset limit. The effluent liquid was held in the ERB until it met effluent discharge level requirements. The area of the ERB is approximately 51,487 ft^2. The survey unit is flat, generally deforested and populated with native field grasses. The survey unit is surrounded on all sides by an earthen berm that is approximately fifteen (15) feet in height.

Twenty-four (24) elevated areas were identified during gamma scan for follow-up surveys and sampling. The maximum contact gamma measurement was 60.05 μR/hr. The maximum one-meter gamma measurement was 39.35 μR/hr. Additionally, twenty-four (24) surface soil samples were collected. Sample analysis results are provided in Attachment A, Table A-2.

To date, forty-nine (49) subsurface soil samples have been analyzed within the ERB. Sample analysis results are provided in Attachment A, Table A-2.

4.4 Environs Outside the PBRF Fence

4.4.1 Areas Immediately Adjacent to PBRF Fence

This area encompasses land surface area that immediately surrounds the Plum Brook Reactor Facility (PBRF) perimeter fence boundary to an outermost distance of up to 50 feet. The area immediately surrounding the PBRF fence boundary was not previously classified.

The area was scanned for gamma radiation to identify additional survey and sampling locations. Surveys required under this package included gamma scans and static measurements, and gamma spectroscopic analysis of surface and subsurface soil samples.

Gamma scans were conducted over 100% of the open land areas around the perimeter of the PBRF fence line. Thirty-seven (37) sample locations were identified. Contact and 1-meter gamma dose rates were conducted at each location. The maximum contact dose rate was 15.77 μR/hr east of the WEMS sump. The maximum 1-meter gamma exposure rate was 14.78 μR/hr at the northern end of the PBRF site. This 1-meter exposure rate was due to elevated background radiation from a High Integrity Container (HIC) stored nearby.

Thirty-nine (39) surface soil samples were collected, including 2 Quality Assurance/Quality Control samples (QA/QC). Sample analysis results are provided in Attachment A, Table A-2. Eleven (11) surface soil sample locations displayed significant activity levels. All of the elevated surface soil sample locations were identified in an area east of the WEMS sump.

To date, no subsurface soil samples have been analyzed from within this survey unit.

The results of the characterization indicate that the initial classification of a majority of the area adjacent to the PBRF fence as a Class 3 area is correct. A Class 1 area (approximately 250 ft^2) outside the PBRF fence immediately adjacent to the WEMS sump has been identified. However, further analysis of subsurface soil samples is necessary to accurately characterize this area.

4.4.2 Pentolite Ditch (A2300 101Cx)

The Pentolite Ditch received all water from the Water Effluent Monitoring Station and was the primary effluent release pathway for the Plum Brook Reactor Facility. Pentolite Ditch drains from west to east with the termination of the ditch at the interface with Plum Brook. An unnamed stream enters Pentolite Ditch approximately 1,450 feet east of the WEMS Canal Outfall.

This survey area initially encompassed a 33 foot grid imposed over the approximate 3,500 ft length of the Pentolite Ditch (including small parts of Plum Brook and the unnamed stream). The total surface area of this survey unit is 115,500 ft^2.

During the performance of gamma scan surveys conducted within the immediate Pentolite Ditch area, elevated activity was discovered. As part of the effort to bound elevated activity areas, surveys were performed north and south of original survey area identified along Pentolite Ditch. Elevated activity areas were bounded and surface soil samples were collected. During the FSS/Characterization weekly meeting, held on 09/02/04, it was determined that the elevated activity that was identified predominantly on the flat areas south of the Pentolite Ditch may have derived from past dredging operations of the ditch. This determination resulted from information provided by former site employees who had been involved in the dredging operations.

The expanded survey area boundary currently encompasses the Pentolite Ditch and the bounded areas (approximately 15,000 ft^2) north and south of the ditch. The total surface area of this survey unit is approximately 130,500 ft^2.

Gamma scans were conducted over 100% of the accessible areas of the ditch bank and bounded land areas around the ditch to determine elevated locations for follow-up surveys and sampling. Contact and 1-meter gamma dose rates were conducted at each location. The maximum contact dose rate was 200.5 μR/hr south of the ditch. The maximum 1-meter gamma exposure rate was 70.3 μR/hr, also south of the ditch.

Fifty-eight (58) surface soil samples were collected and the results indicated that thirty-nine (39) samples contained significant activity. The sample containing the highest activity was collected south of the Pentolite Ditch. Sample analysis results are provided in Attachment A, Table A-2.

Sixty-four (64) sediment samples were collected throughout the length of Pentolite ditch and the results indicated that twenty-five (25) samples contained significant activity with the maximum activity being south of the WEMS outfall. Sample analysis results are provided in Attachment A, Table A-2.

Collection of subsurface soil samples is ongoing. Subsurface sediment samples will be collected during the remediation phase of Pentolite ditch.

The results of the characterization indicate that the initial classification of Pentolite Ditch as Class 1 is correct. Additionally, based on surveys and sampling of areas adjacent to the ditch and historical evidence, parts of those areas were incorrectly classified as non-impacted, but have been reclassified as impacted, Class 1 in accordance with MARSSIM guidance. Characterization activities remain ongoing in this area to ensure that the lateral and vertical extent of impact is properly bounded.

4.5 Previously Unclassified Areas

All or parts of the following PBRF areas were not previously classified for Final Status Survey. The current classifications of these areas, provided in tables A-1 and A-2, were assigned based either on the results of characterization surveys or on known history and radiological status of the area. Detailed reports of available characterization data for these areas are included in Attachment B, Survey Data Management System Reports.

- Reactor Building Roof & Exterior Walls – Class 2 & 3 respectively
- Hot Laboratory Building Hot Cells – Class 1
- Hot Laboratory Building Lavatory Areas – Class 1
- Hot Laboratory Building Hot Work Area – Class 1
- Hot Laboratory Building Hot Handling Area – Class 1
- Hot Laboratory Building Hot Dry Storage – Class 1
- Hot Laboratory Building Room 19, Removable Slabs, & Area Above HDS – Class 1
- Hot Laboratory Building Roof & Exterior Walls – Class 2 & Class 3 respectively
- Reactor Services Equipment Building Roof & Exterior Walls - Class 2 & Class 3 respectively
- Reactor Fan House Building Roof & Exterior Walls – Class 2
- Waste Handling Building Operating Areas – Class 1
- Waste Handling Building Roof & Exterior Walls – Class 2
- Reactor Primary Pump House Building Roof & Exterior Walls – Class 1

- Reactor Office & Laboratory Building Utility Tunnel – Class 1
- Reactor Office & Laboratory Building Roof & Exterior Walls - Class 2 & Class 3 respectively
- Open Land Areas Outside the PBRF Fence – Class 1/3

4.6 Downgraded Classifications

As a result of characterization surveys, all or parts of the following PBRF areas were downgraded from the initial classifications presented in Table 4-2 of the PBRF Decommissioning Plan. Detailed reports of characterization data for these areas are included in Attachment B, Survey Data Management System Reports.

- Reactor Building Shop Area (Area 4) – Class 2 to Class 3
- Reactor Building Count Rooms – Class 2 to Class 3
- Reactor Office & Laboratory Building Crawl Space (Area 7) – Class 2 to Class 3
- Reactor Office & Laboratory Building First Floor Offices – Class 2 to Class 3
- Reactor Office & Laboratory Building Second Floor Offices – Class 2 to Class 3

4.7 Systems

The only plant systems that are expected to be surveyed to FSS protocols are buried and embedded piping. Minimal characterization has been conducted on these systems and characterization is ongoing. However, radiological survey data collected during fixed equipment removal activities indicate that many of these systems contain contamination levels that exceed the interim site-specific DCGLs for structural surfaces.

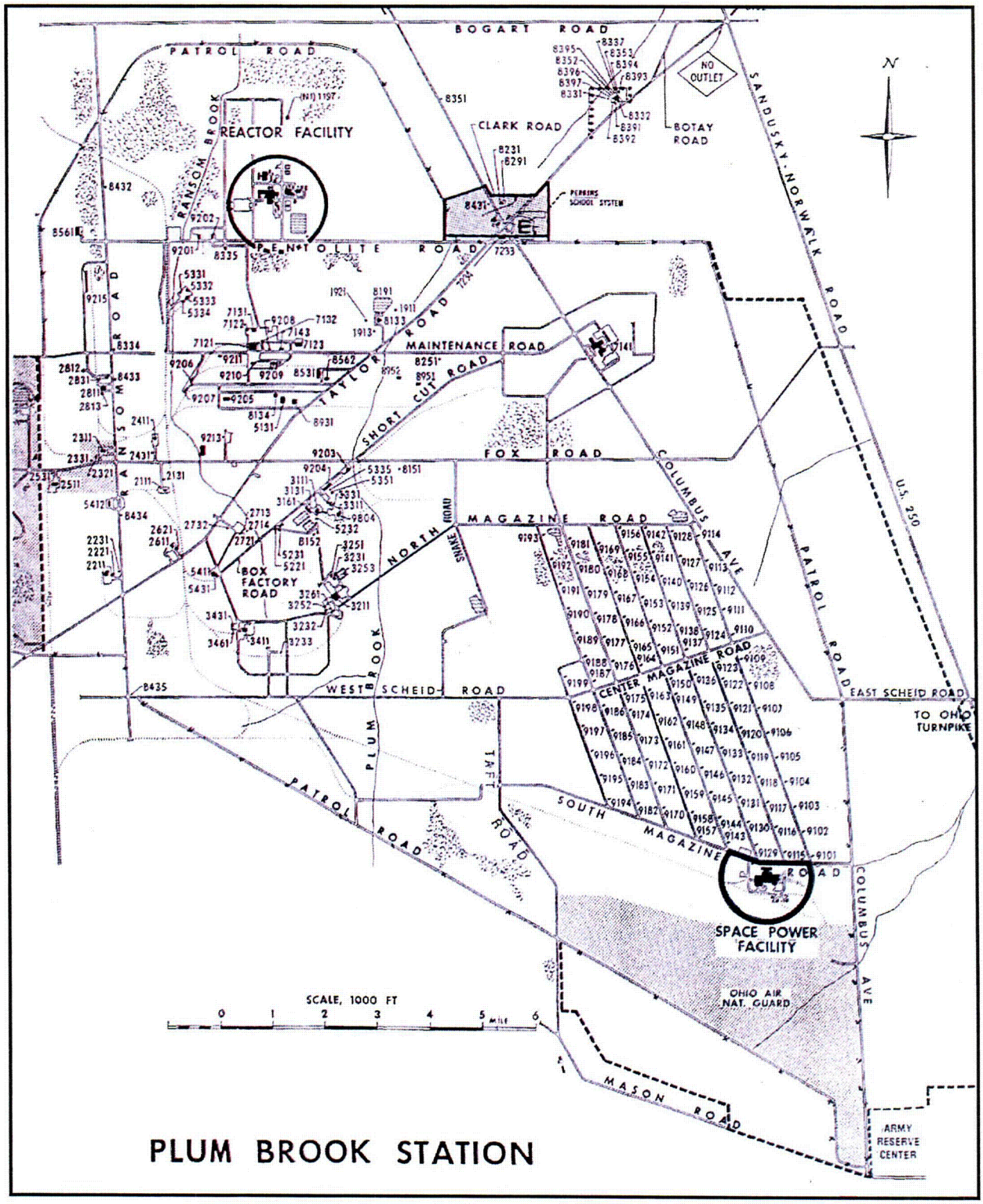
4.8 Background

The PBRF project developed a procedure, PBRF-CS-016, intended to provide the basis for material background determination using the guidance and methods described in NUREG-1575, MARSSIM. This procedure details the methods used to determine the natural background radioactivity associated with materials that will be surveyed to demonstrate compliance with the established release criteria.

Background measurements were made on several types of construction material from PBS facilities that were reasonably believed to not have been impacted by operations at the PBRF. Soil samples from remote, onsite locations were also taken and analyzed to be used as background data for soils.

Figure 4-2, below, illustrates the location of the PBRF in relation to the areas of the Plum Brook Station site where background studies were conducted.

Figure 4-2, Plum Brook Station



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4.8.1 Material Background

The natural levels of radioactivity in plant construction materials affects direct measurements for total activity. To quantify this effect, a background study was performed at the Space Power Facility and the Engineering Building (Building 7141) on the PBS. The study included direct measurements for total beta activity on painted, unpainted and epoxy-coated concrete, concrete block, ceramic tile, porcelain fixtures, brick, asphalt, and other miscellaneous materials. Other materials encountered during the characterization survey such as glass, carpeting, and steel were not included in the background study since their natural radioactivity is not expected to contribute significantly to direct measurements for total beta activity. Survey personnel used the same instruments for the structural background survey as were used for the characterization survey and are anticipated for use during final status survey. Survey techniques complied with approved procedures and supporting documentation. Project personnel did not use these results to correct data gathered from similar surfaces during the characterization survey. However, it is anticipated that background results will be subtracted from similar surfaces during the final status survey.

4.8.2 Environs Background

The purpose of the environmental background study was to measure and document the direct gamma radiation levels present in the environment from surface soil, rock and sediment. Survey personnel used the same instruments for the environmental background survey as were used for the characterization survey and are anticipated for use during final status survey. Survey sampling and measurement techniques complied with approved procedures and supporting documentation. Each soil and sediment sample was analyzed in the on-site laboratory by gamma spectroscopy. Duplicate samples were sent to a USACE validated off-site laboratory for a confirmatory gamma spectral analysis. Survey measurement and sample locations were from an undisturbed open land area and road cut ditch on the PBS along Fox Road in close proximity to the North Columbus Avenue intersection. Figure 4-2, above, illustrates the location of the PBRF in relation to the areas of the Plum Brook Station site where background studies were conducted.

4.8.3 Background Results

The analysis of data collected during the background reference area study is currently on-going and will be fully reported in a future revision to this report.

Attachment A

Characterization Survey Data Summaries

Table A-1 - Impacted Structures Characterization Data Summary

Facility or Survey Area	Floor Area (ft^2)[a]	Floor Area (m^2)	Estimated Total Surface Area (m^2)	FSS Classification[b]	Initial Classification[c]	Sigma[d] ($dpm/100cm^2$)	Mean Net Total Beta ($dpm/100cm^2$)	Maximum Net Total Beta ($dpm/100cm^2$)
Reactor Building (Building 1111):								
Inside Containment Vessel								
• Area 2 - Work Space Inside CV @ 0' (C1110 106Cx)	4,019	374	2,244	Class 1	Class 1	Char Pending	Char Pending	Char Pending
• Area 17 - Test Area Inside CV at -25' (C1110 105Cx)	1,350	126	756	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 18 - Canal E (C1110 111Cx)	1,281	120	720	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 23 - Quad A (C1110 107Cx)	803	75	450	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 24 - Quad B (C1110 108Cx)	813	76	456	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 25 - Quad C (C1110 109Cx)	803	75	450	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 26 - Quad D (C1110 110Cx)	637	60	360	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Area 29 - Sub-Pile Room (C1110 101Cx)	157	15	90	Class 1	Class 1	Post Decon	38,108	78,775
• Area 30 - Elevator Pit and Stair Well (C1110 102Cx/103Cx/104Cx)	210	20	120	Class 1	Class 1	Char Pending	Char Pending	Char Pending
	10,073	**941**	**5,646**					
Reactor Building (Building 1111):								
Outside Containment Vessel								
• Area 1 - General Floor Area @ grade (C1111 207Cx)	9,449	878	5,268	Class 1/2	Class 2	Char Pending	Char Pending	Char Pending
• Area 3 - Canals								
◦ Canal F (C1111 104Cx)	382	36	216	Class 1	Class 1	Post Decon	Post Decon	Post Decon
◦ Canal G (C1111 105Cx)	580	54	324	Class 1	Class 1	Post Decon	687,144	6,107,314
◦ Canal H (C1111 103Cx)	455	43	258	Class 1	Class 1	Post Decon	13,212	54,926
• *Area 4 - Shop Area* (C1111 203Cx)								
◦ Rooms 102 &103, Exp Ctrl Annex	806	75	450	Class 3[e]	Class 2	220	144	551
◦ Room 104, Office	400	38	228	Class 3[e]	Class 2			
◦ Room 105, Office	441	41	246	Class 3[e]	Class 2			
• *Count Rooms* (C1111 204Cx)								
◦ Room 5, Experiment Control Room	1,156	108	648	Class 3[e]	Class 2	608	335	1952
◦ Room 6, Counting	80	8	48	Class 3[e]	Class 2			
◦ Room 7, Janitor Closet	124	12	72	Class 3[e]	Class 2			
◦ Room 8, Restroom	498	47	282	Class 3[e]	Class 2			
◦ Room 9, Locker	197	19	114	Class 3[e]	Class 2			
◦ Room 10, Personnel Decontamination[g]	120	12	72	Class 3[e]	Class 2			
• *Area 11 - Office Area Mezzanine* (C1111 208Cx)								
◦ Room 15, Reactor Control Room	872	82	492	Class 2	Class 2	6,254	2,957	17,749
◦ Room 16, Restroom, +12 Elevation	80	8	48	Class 2	Class 2			
◦ Room 28, Storage	87	9	54	Class 2	Class 2			
◦ Rooms 202/203, Elec Equip & Parts Storage	806	75	450	Class 2	Class 2			
◦ Room 204, Office	400	38	228	Class 2	Class 2			
◦ Room 205, Office	441	41	246	Class 2	Class 2			

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◦ Room 206, Office	171	16	96	Class 2	Class 2			
◦ Room 207, Office	171	16	96	Class 2	Class 2			
◦ Room 208, Office	171	16	96	Class 2	Class 2			
◦ Room 209, Office	171	16	96	Class 2	Class 2			
◦ Pipe Chase	46	5	30	Class 2	Class 2			
• Area 20 - Work Area @ -15' (C1111 202Cx)[h]	7,790	724	4,344	Class 1	Class 2	Char Pending	Char Pending	Char Pending
• Reactor Bldg Sub-basement (C1111 201Cx)								
◦ Area 21 - Work Area @ -25'	3,013	280	1,680	Class 1	Class 2	7,720	6,280	25,058
◦ Area 22 - Pump Room Area + Roof	1,366	127	762	Class 1/2	Class 2			
• Penthouse Areas (C1111 209Cx)								
◦ Room 31, East Penthouse	N/A	N/A	N/A	N/A[f]	Class 2	N/A	N/A	N/A
◦ Room 32, West Penthouse	N/A	N/A	N/A	N/A[f]	Class 2			
• Area 33 - Air Lock 1 & 2 (C1111 206Cx)	121	12	72	Class 1	Class 1	Char Pending	Char Pending	Char Pending
	30,840	**2,878**	**17,268**					
• Building Exterior (C1111 301Cx)								
◦ Building Roof	28,084	2,609	2,609	Class 2[e]	N/A	1,155	658	5,188
◦ Building Exterior Walls	13,110	1,218	1,218	Class 3[e]	N/A			
	82,107	**7,646**	**26,741**					
Hot Laboratory (Building 1112):								
• *Hot Cells* (C1112 107Cx)								
◦ Room 1, Hot Cell #1	342	32	192	Class 1[e]	N/A	Post Decon	1,547,828	11,664,262
◦ Room 2, Hot Cell #2	138	13	78	Class 1[e]	N/A			
◦ Room 3, Hot Cell #3	96	9	54	Class 1[e]	N/A			
◦ Room 4, Hot Cell #4	64	6	36	Class 1[e]	N/A			
◦ Room 5, Hot Cell #5	64	6	36	Class 1[e]	N/A			
◦ Room 6, Hot Cell #6	64	6	36	Class 1[e]	N/A			
◦ Room 7, Hot Cell #7	64	6	36	Class 1[e]	N/A			
• Mezzanine above Hot Cells 1-2 (C1112 109Cx)	1,000	93	558	Class 1	Class 1/2	Post Decon	151,979	597,660
• Mezzanine above Hot Cells 3-7 (C1112 110Cx)	1,005	94	564	Class 1	Class 1/2	Post Decon	989,411	4,462,502
• Cold Work Areas (C1112 203Cx)								
◦ Room 8, Cold Work Area + Air Lock	2,219	207	1,242	Class 1	Class 2	Post Decon	11,398	288,801
◦ Room 8A, Vestibule	44	5	30	Class 2	Class 2			
◦ Room 9, Manipulator Repair Shop	409	38	228	Class 1	Class 2			
◦ Room 10, Office	117	11	66	Class 2	Class 2			
• Lavatory Areas (C1112 205Cx)								
◦ Room 11, Locker Area	217	21	126	Class 1[e]	N/A	Post Decon	11,834	78,234
◦ Room 12, Cold Lavatory	142	14	84	Class 1[e]	N/A			
◦ Area 13 - Pipe Space	61	6	36	Class 1[e]	N/A			
◦ Room 14, Change Room	183	18	108	Class 1[e]	N/A			

Table A-1 - Impacted Structures Characterization Data Summary

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◦ Room 15, Hot Lavatory	279	26	156	Class 1[e]	N/A			
◦ Room 15A, Closet	24	3	18	Class 1[e]	N/A			
• Room 16, Hot Work Area (C1112 202Cx)	2,155	201	1,206	Class 1[e]	N/A	Post Decon	628,257	1,667,274
• Hot Handling Area (C1112 106Cx)								
◦ Room 17, Hot Handling Room	692	65	390	Class 1	Class 1/2	Post Decon	Post Decon	Post Decon
◦ Area 26 - Valve Pit	184	18	108	Class 1[e]	N/A			
• Area 18 - Canal J (C1112 105Cx)	435	41	246	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Hot Dry Storage (C1112 103Cx)								
◦ Room 19, Hot Dry Storage	900	84	504	Class 1[e]	N/A	Post Decon	Post Decon	Post Decon
◦ Room 19A, Off-Gas Clean-up	174	17	102	Class 1[e]	N/A			
• Room 19, Removable Slabs & area above HDS (C1112 111Cx)	793	74	444	Class 1[e]	N/A	Post Decon	Post Decon	Post Decon
• Area 20 - Canal K (C1112 104Cx)	799	75	450	Class 1	Class 1	Post Decon	Post Decon	Post Decon
• Decontamination Areas (C1112 204Cx)								
◦ Room 21, Storage + Roof	246	23	138	Class 1	Class 1/2	Post Decon	396,111	1,602,360
◦ Room 22, Repair Shop	646	61	366	Class 1	Class 1/2			
◦ Room 23, Decontamination Room	387	36	216	Class 1[g]	Class 1/2			
◦ Room 24, Storage	591	55	330	Class 1	Class 1/2			
• Hot Pipe Tunnel (C1112 108Cx)								
◦ Area 25A - Hot Pipe Tunnel	1,413	132	792	Class 1	Class 1	Post Decon	Post Decon	Post Decon
◦ Area 25B - Hot Pipe Tunnel	1,474	137	822	Class 1	Class 1			
◦ Area 25C - Hot Pipe Tunnel	1,112	104	624	Class 1	Class 1			
• Room 27, Mezzanine (C1112 112Cx)	1,412	132	792	Class 1	Class 1/2	Char Pending	Char Pending	Char Pending
• Building Exterior (C1112 301Cx)								
◦ Building Roof	14,134	1,313	1,313	Class 2[e]	N/A	265	360	917
◦ Building Exterior	14,047	1,305	1,305	Class 3[e]	N/A			
	48,126	**4,487**	**13,832**					

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Reactor Service Equipment Building (1131)								
• SEB First Floor Areas (D1131 403Cx)								
◦ Area 1 - Shop & Equipment	2,218	207	1,242	Class 1/3	Non-Impacted	321	545	1,134
◦ Room 1, Chem. Lab & Record	394	37	222	Class 2/3	Non-Impacted			
◦ Room 2, Counting	143	14	84	Class 2/3	Non-Impacted			
◦ Room 3, Office	173	17	102	Class 2/3	Non-Impacted			
◦ Room 4, Corridor	104	10	60	Class 2/3	Non-Impacted			
◦ Room 5, Office	87	9	54	Class 2/3	Non-Impacted			
◦ Room 6, Locker	162	16	96	Class 2/3	Non-Impacted			
◦ Room 7, Janitor's Closet	28	3	18	Class 2/3	Non-Impacted			
◦ Room 8, Restroom Vestibule	16	2	12	Class 2/3	Non-Impacted			
◦ Room 9, Vestibule	52	5	30	Class 2/3	Non-Impacted			
◦ Room 10, Corridor	195	19	114	Class 2/3	Non-Impacted			
◦ Room 11, Control Room	1,083	101	606	Class 2/3	Non-Impacted			
◦ Room 12, Chlorine	105	10	60	Class 2/3	Non-Impacted			
◦ Room 13, Water Treatment	3,752	349	2,094	Class 2/3	Non-Impacted			
◦ Room 15, Boiler	1,667	155	930	Class 2/3	Non-Impacted			
◦ Room 16, Parts and Storage	290	27	162	Class 2/3	Non-Impacted			
◦ Room 17, Vertical Lift	149	14	84	Class 2/3	Non-Impacted			
◦ Room 18, Engine Room	5,372	500	3,000	Class 2/3	Non-Impacted			
• SEB Mezzanine Areas (D1131 404Cx)								
◦ Room 1A, Instrument Repair	221	21	126	Class 3	Non-Impacted	1,819	1,564	4,859
◦ Room 2A, Instrument Repair	270	26	156	Class 3	Non-Impacted			
◦ Room 3A, Instrument Repair	320	30	180	Class 3	Non-Impacted			
◦ Area 14 - Mezzanine	358	34	204	Class 2/3	Non-Impacted			
◦ Room 19, Chemical Storage	1,526	142	852	Class 2/3	Non-Impacted			
◦ Room 19A, Chemical Storage	393	37	222	Class 1/3	Non-Impacted	Post Decon	12,791	91,375
• Cold Pipe Tunnel (D1131 406Cx)								
◦ Area 23 - CPT (under SEB)	1,890	176	1,056	Class 1	Class 3	Post Decon	21,824	92,897
◦ Area 23 - CPT (from 1131 to 1152)	1,098	103	618	Class 1	Class 3			
◦ Area 23 - CPT (under 1152)	570	53	318	Class 1	Class 3			
◦ Area 23 - CPT (from 1151 to 1152)	366	35	210	Class 1	Class 3			
◦ Area 23 - CPT (under 1151)	111	11	66	Class 1	Class 3			
◦ Area 23 - CPT (from 1111 to 1131)	2,347	219	1,314	Class 1	Class 3			
• SEB Basement Areas (D1131 402Cx)								
◦ Room 20, Auxiliary Equipment	1,020	95	570	Class 3	Non-Impacted	319	501	1,021
◦ Room 21, Water Treatment Pump	1,543	144	864	Class 3	Non-Impacted			
◦ Area 22 - Clear Well	423	40	240	Class 3	Non-Impacted			
◦ Area 24 - Generator/Compressor Pit	460	43	258	Class 3	Non-Impacted			
◦ Room 25, Electrical & Batteries	914	85	510	Class 2/3	Non-Impacted			
◦ Area 26 - Pit	88	9	54	Class 3	Non-Impacted			
◦ Closet, Basement	40	4	24	Class 3	Non-Impacted			

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• Building Exterior (D1131 405Cx)								
◦ Building Roof	16,985	1,578	1,578	Class 2[e]	N/A	199	467	699
◦ Building Exterior Walls	4,123	383	383	Class 3[e]	N/A			
	51,056	**4,763**	**18,773**					
Fan House Building (1132):								
• First Floor Operating Area (C1132 201Cx)								
◦ Room 1, Operating Area	2,772	258	1,548	Class 1	Class 1/2	Char Pending	Char Pending	Char Pending
◦ Room 2, Restroom	94	9	54	Class 1	Class 1/2			
◦ Room 3, Janitor's Closet	55	6	36	Class 1	Class 1/2			
◦ Room 4, Deionizer	155	15	90	Class 1	Class 1/2			
◦ Room 5, Office	64	6	36	Class 1	Class 1/2			
• Basement Areas (C1132 102Cx)								
◦ Room 6, Air Monitor	174	17	102	Class 1	Class 1	Post Decon	Post Decon	Post Decon
◦ Room 7, Sump Room	217	21	126	Class 1	Class 1			
◦ Room 8, Equipment Room	2,906	270	1,620	Class 1	Class 1			
◦ Area 9, Tunnel to Rx Bldg 1111	420	40	240	Class 1	Class 1			
◦ Area 10, Stairwell	96	9	54	Class 1	Class 1			
◦ Resin Pit	136	13	78	Class 1	Class 1			
◦ Pipe Trench	183	18	108	Class 1	Class 1			
• Building Exterior (C1132 301Cx)								
◦ Building Roof	3,897	362	362	Class 2[e]	N/A	186	99	580
◦ Building Exterior Walls	4,445	413	413	Class 2[e]	N/A			
	15,614	**1,457**	**4,867**					
Waste Handling Building (1133):								
• Operating Areas (C1133 104Cx)								
◦ Room 1, Operating Area	1,951	182	1,092	Class 1	Class 1/2	Post Decon	Post Decon	Post Decon
◦ Room 2, Decontamination	414	39	234	Class 1	Class 1/2			
◦ Area 16 - Stair Housing	97	10	60	Class 1[e]	N/A			
• Laundry Area (C1133 201Cx)								
◦ Room 3, Laundry	222	21	126	Class 1	Class 1/2	Char Pending	Char Pending	Char Pending
◦ Room 4, Clean Clothing	171	16	96	Class 1	Class 1/2			
◦ Room 5, Storage	85	8	48	Class 1	Class 1/2			
◦ Room 6, Laboratory	155	15	90	Class 1	Class 1/2			
◦ Room 7, Office	150	14	84	Class 1	Class 1/2			
◦ Room 8, Corridor	121	12	72	Class 1	Class 1/2			
◦ Room 9, Janitor's Closet	19	2	12	Class 1	Class 1/2			
◦ Room 10, Closet	15	2	12	Class 1	Class 1/2			
◦ Room 11, Contaminated Change	122	12	72	Class 1	Class 1/2			
◦ Room 12, Clean Restroom	120	12	72	Class 1	Class 1/2			
◦ Room 13, Corridor	127	12	72	Class 1	Class 1/2			
◦ Pipe Chase	21	2	12	Class 1	Class 1/2			
• Room 14, Boiler Room (1133 202Cx)	411	39	234	Class 1	Class 1/2	Char Pending	Char Pending	Char Pending

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• Basement Work Areas (C1133 102Cx)								
◦ Room 15, Access & Work Area	1,563	146	876	Class 1	Class 1	Post Decon	Post Decon	Post Decon
◦ Room 19, Access Tunnel	347	33	198	Class 1	Class 1			
• Evaporator Work Areas (C1133 103Cx)								
◦ Room 17, Preparation	406	38	228	Class 1	Class 1	Post Decon	Post Decon	Post Decon
◦ Room 18, Evaporator	406	38	228	Class 1	Class 1			
• Mezzanine (C1133 105Cx)	1,350	126	756	Class 1[e]	N/A	Char Pending	Char Pending	Char Pending
• Building Exterior (C1133 301Cx)								
◦ Building Roof	4,726	439	439	Class 2[e]	N/A	164	16	349
◦ Building Exterior Walls	3,821	355	355	Class 2[e]	N/A			
	14,869	**1,391**	**4,376**					
Primary Pump House (1134)								
• Interior Rooms (C1134 201Cx)								
◦ Room 1, Pump	171	16	96	Class 1	Class 2	Post Decon	1,052,432 1,046,611	5,288,932 4,986,792
◦ Room 2, Pump	171	16	96	Class 1	Class 2			
◦ Room 3, Pump	171	16	96	Class 1	Class 2			
◦ Room 4, Heat Exchanger	1,073	100	600	Class 1	Class 2			
◦ Room 5	149	14	84	Class 1	Class 2			
◦ Room 6, Bypass Deionizer	257	24	144	Class 1	Class 2			
• Exterior Rooms (C1134 202Cx)								
◦ Room 7	636	60	360	Class 1	Class 2	Post Decon	6,998	275,028
◦ Room 8	990	92	552	Class 1	Class 2			
◦ Mezzanine	544	51	306	Class 1	Class 2			
• Resin Pit (C1134 203Cx)	136	13	78	Class 1	Class 2	Post Decon	Post Decon	Post Decon
• Building Exterior (C1134 301Cx)								
◦ Building Roof[j]	5,220	485	485	Class 1[e]	N/A	1,010	846	3,311
◦ Building Exterior Walls	4,316	406	406	Class 1[e]	N/A			
	13,834	**1,293**	**3,303**					

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Reactor Office and Laboratory Building (1141)								
• Area 1, Northeast Stair Hall (C1141 203Cx)	291	28	168	Class 2	Class 2	631	818	1,575
• Elevator Areas (C1141 202Cx)								
◦ Area 2, Elevator & Shaft	60	6	36	Class 2	Class 2	380	249	941
◦ Area 3, Elevator Machinery	143	14	84	Class 2	Class 2			
• Vault Areas (C1141 206Cx)								
◦ Area 4, Cold Test Area	2,491	232	1,392	Class 1	Class 2	8,234 400	3,204 586	38,865 2,155
◦ Area 5, Airway	700	66	396	Class 1	Class 2			
◦ Area 8, Vestibule	99	10	60	Class 1	Class 2			
◦ Area 9, Restroom	82	8	48	Class 1	Class 2			
◦ Area 10, Janitor's Closet	38	4	24	Class 1	Class 2			
◦ Area 11, Building Service Equipment	1,767	165	990	Class 2	Class 2			
◦ Area 14, Tool Crib	265	25	150	Class 2	Class 2			
◦ Area 15, General Shop Area	813	76	456	Class 2	Class 2			
◦ Area 16, Telephone Exchange	303	29	174	Class 2	Class 2			
◦ Area 17, Vault	188	18	108	Class 1	Class 2			
• Area 6, Sump (C1141 208Cx)	530	50	300	Class 1	Class 2	321	209	781
• Area 7, Crawl Space (C1141 210Cx)	3,782	352	2,112	Class 3[e]	Class 2	121	450	608
• Instrument Areas (C1141 207Cx)								
◦ Area 12, Counting Rooms	357	34	204	Class 2	Class 2	880	715	2,589
◦ Area 13, Electronic Shop	317	30	180	Class 2	Class 2			
◦ Area 13A, Calibration Room	177	17	102	Class 2	Class 2			
• Utility Tunnel (C1141 209Cx)	2,064	192	192	Class 1[e]	N/A	Post Decon	Post Decon	Post Decon
• First Floor Offices (C1141 211Cx)								
◦ Lobby	505	47	282	Class 3[e]	Class 2	565	263	1,664
◦ Room 100, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 101, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 102, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 103, Office	209	20	120	Class 3[e]	Class 2			
◦ Room 104, Office	176	17	102	Class 3[e]	Class 2			
◦ Room 105, Office	191	18	108	Class 3[e]	Class 2			
◦ Room 106, Office	176	17	102	Class 3[e]	Class 2			
◦ Room 107, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 108, Office	197	19	114	Class 3[e]	Class 2			
◦ Room 109/110/111, Classroom	653	61	366	Class 2/3[e]	Class 2			
◦ Room 121, Conference	484	45	270	Class 2/3[e]	Class 2			
◦ Room 122, Office	300	28	168	Class 2/3[e]	Class 2			
◦ Room 123, Office	197	19	114	Class 2/3[e]	Class 2			
◦ Room 124, Office	200	19	114	Class 2/3[e]	Class 2			

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◦ Room 125, Office	200	19	114	Class 2/3[e]	Class 2			
◦ Room 126, Office	212	20	120	Class 2/3[e]	Class 2			
◦ Restroom, Men's, +0 Elevation	177	17	102	Class 2	Class 2			
◦ Restroom, Women's +0 Elevation	158	15	2	Class 2	Class 2			
◦ Lavatory, +0 Elevation	32	3	18	Class 2	Class 2			
◦ Janitor's Closet, +0 Elevation	30	3	18	Class 2	Class 2			
◦ Pipe Chase, +0 Elevation	39	4	24	Class 2	Class 2			
◦ Hallways, +0 Elevation North/South	307	29	174	Class 3[e]	Class 2			
• First Floor Work Areas (C1141 212Cx)								
◦ Room 112, First Aid	303	29	174	Class 2	Class 2			
◦ Room 113, Office	100	10	60	Class 2	Class 2			
◦ Room 114, Health & Safety Operations	406	38	228	Class 2	Class 2			
◦ Room 115, Office	341	32	192	Class 2	Class 2	1,028	528	3,026
◦ Room 116, Receiving	209	20	120	Class 2	Class 2			
◦ Room 117/118, Electronic Laboratory	768	72	432	Class 1/2	Class 2			
◦ Room 119/120, Electronic Laboratory	642	60	360	Class 1/2	Class 2			
◦ Hallways, +0 Elevation East/West	1,725	161	966	Class 2	Class 2			
• Middle Stairwell (C1141 204 Cx)	196	19	114	Class 2	Class 2	436	497	1,527
• Southeast Stairwell (C1141 205Cx)	196	19	114	Class 2	Class 2	2,080	1,490	6,438
• Second Floor Offices (C1141 213Cx)								
◦ Room 200, Office	202	19	114	Class 3[e]	Class 2			
◦ Room 201, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 202, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 203, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 216, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 217, Library	480	45	270	Class 3[e]	Class 2			
◦ Room 218, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 219, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 220, Office	214	20	120	Class 3[e]	Class 2	742	305	3,564
◦ Room 221, Office	214	20	120	Class 3[e]	Class 2			
◦ Room 222, Office	523	49	294	Class 3[e]	Class 2			
◦ Room 223, Office	214	20	120	Class 3[e]	Class 2			
◦ Restroom, Men's, +12 Elevation	134	13	78	Class 2	Class 2			
◦ Restroom, Women's +12 Elevation	45	5	30	Class 2	Class 2			
◦ Janitor's Closet 1, +12 Elevation	28	3	18	Class 3[e]	Class 2			
◦ Hallways, +12 Elevation North/South	727	68	408	Class 3[e]	Class 2			

Table A-1 - Impacted Structures Characterization Data Summary

Facility or Survey Area	Floor Area (ft^2)[a]	Floor Area (m^2)	Estimated Total Surface Area (m^2)	FSS Classification[b]	Initial Classification[c]	Sigma[d] ($dpm/100cm^2$)	Mean Net Total Beta ($dpm/100cm^2$)	Maximum Net Total Beta ($dpm/100cm^2$)
• Second Floor Work Areas (C1141 214Cx)								
◦ Room 204, Materials Laboratory	345	33	198	Class 1	Class 2			
◦ Room 205, Materials Laboratory	301	28	168	Class 1	Class 2			
◦ Room 206, Materials Laboratory	345	33	198	Class 1	Class 2			
◦ Room 207, Chem. Lab Storage	352	33	198	Class 1	Class 2			
◦ Room 207A, Counting	160	15	90	Class 1	Class 2			
◦ Room 208, Office	164	16	96	Class 1	Class 2			
◦ Room 208A, Darkroom	133	13	78	Class 1	Class 2			
◦ Room 208B, Darkroom	133	13	78	Class 1	Class 2			
◦ Room 209, Chem. Laboratory	312	29	174	Class 1	Class 2	65,994	39,099	293,254
◦ Room 210, Chem. Laboratory	312	29	174	Class 1	Class 2			
◦ Room 211/212, Chem. Laboratory	695	65	390	Class 1	Class 2			
◦ Room 213, Chem. Laboratory	349	33	198	Class 1	Class 2			
◦ Room 213A, Chem. Laboratory	362	34	204	Class 1	Class 2			
◦ Room 214/215, Chem. Laboratory	417	39	234	Class 1	Class 2			
◦ Janitor's Closet 2, +12 Elevation	23	3	18	Class 1	Class 2			
◦ Pipe Chase, +12 Elevation	33	4	24	Class 1	Class 2			
◦ Hallways, +12 Elevation East-West	855	80	480	Class 1	Class 2			
• Building Exterior (C1141 215Cx)								
◦ Building Roof	11,540	1,072	1,072	Class 2[e]	N/A	650	783	2,340
◦ Building Exterior Walls	18,675	1,735	1,735	Class 3[e]	N/A			
Hot Retention Area (1155)								
• All Areas (C1155 102Cx)	4,050	377	2,262	Class 1	Class 1	Char Pending	Char Pending	Char Pending
Reactor Security Building (1191)								
• All Areas (D1191 401Cx)								
• Room 100, Visitor Control	470	44	264	Class 3	Non-Impacted			
• Room 101, Utility	28	3	18	Class 3	Non-Impacted	222	177	523
• Room 102, Furnace	52	5	30	Class 3	Non-Impacted			
• Lavatory	34	4	24	Class 3	Non-Impacted			
• Building Exterior (C1191 402Cx)	1,701	158	158	Class 3	Non-Impacted	91	-12	138
	2,285	**214**	**494**					

[a] Area estimated from facility drawings.
[b] Characterization Survey Units are not reflective of the anticipated FSS areas.
[c] Initial classifications taken from Table 4-2 of the Decommissioning Plan.
[d] Large Sigma values for areas specified in this table shall be recalculated using post remediation survey information.
[e] Supporting documentation for new area classifications and area classification downgrades is provided in Attachment B, Survey Data Management System Reports
[f] Reactor Building Penthouse structures have been removed.
[g] The structure of the Hot Lab Decontamination Room has been removed. The floor area where the structure once stood will be classified and surveyed as indicated.
NOTE: The term "Post Decon", as used in the above table, indicates areas where characterization data could not be collected due to high levels of residual radioactivity remaining on structural surfaces. Additional data will be collected in these areas after decontamination occurs.

Table A-2 – Environs Characterization Data Summary

PBRF Survey Area	Survey Area (ft^2)[a]	Survey Area (m^2)	FSS Classification[b]	Initial Classification[c]	Package ID	Isotope [d]	Sigma[d] (pCi/g)	Mean Measurement (pCi/g)	Maximum Measurement (pCi/g)
Emergency Retention Basin									
• All Areas (A2100 101Cx)	60,000	5,575	Class 1	Class 1	C1	^{60}Co	0.6009	0.56406	2.1436
						^{137}Cs	9.7326	13.079	37.653
					C3	^{60}Co	1.727	2.149	7.610
						^{137}Cs	18.690	37.72	81.940
					C4	^{60}Co	0.1143	0.1381	0.7049
						^{137}Cs	1.128	1.224	4.459
Effluent Pathways									
• Drainage Systems (Storm Sewers) (A2200 101Cx)	N/A	N/A	Class 1	Class 1	C1	^{60}Co ^{137}Cs	Char Pending	Char Pending	Char Pending
• Pentolite Ditch & Environs (A2300 101Cx)	574,000	53,327	Class 1	Class 1/Non-impacted	C1	^{60}Co	1.737	1.120	16.65
						^{137}Cs	109.3	37.51	1,019
Environmental Areas									
• South Southwest Unit (A2400 301Cx)	125,000	11,613	Class 2/3	Class 3	C1	^{60}Co	0.01326	0.05172	0.08278
						^{137}Cs	0.10468	0.29297	0.48578
					C2	^{60}Co	0.16979	0.11662	0.87453
						^{137}Cs	0.09363	0.21873	0.44134
					C3	^{60}Co	0.02906	0.06827	0.08004
						^{137}Cs	0.07320	0.09891	0.2587
• South Southeast Corner (A2400 302Cx) Note: Contains the WEMS Spill area, the south ERB berm and portions of the east and west ERB berm.	122,891	11,417	Class 1/2	Class 1/3	C1	^{60}Co	0.01164	0.04291	0.06650
						^{137}Cs	0.07518	0.23082	0.36748
					C2	^{60}Co	6.0365	1.8708	37.151
						^{137}Cs	39.250	15.327	217.90
					C3	^{60}Co	0.03374	0.07008	0.1639
						^{137}Cs	0.7132	0.2687	5.293

Table A-2 – Environs Characterization Data Summary

PBRF Survey Area	Survey Area (ft^2)[a]	Survey Area (m^2)	FSS Classification[b]	Initial Classification[c]	Package ID	Isotope [d]	Sigma[d] (pCi/g)	Mean Measurement (pCi/g)	Maximum Measurement (pCi/g)
• Southwest Unit (A2400 303Cx) Note: Contains portions of the WHB Spill Area and the Waste Storage Pad.	125,000	11,613	Class 1/2/3	Class 1/3	C1	^{60}Co	0.00181	0.04259	0.04662
						^{137}Cs	48.003	19.657	150.58
					C2	^{60}Co	0.09183	0.09689	0.22770
						^{137}Cs	95.371	110.51	207.50
					C3	^{60}Co	0.03692	0.07894	0.1263
						^{137}Cs	26.73	0.08724	153.2
					C4	^{60}Co	0.02039	0.05180	0.09207
						^{137}Cs	2.566	0.6389	22.52
• Southeast Unit (A2400 304Cx) Note: Contains the north ERB berm and portions of the east and west ERB berm.	105,895	9,838	Class 1/2	Class 3	C1	^{60}Co	0.00741	0.04558	0.06258
						^{137}Cs	0.08350	0.26198	0.42556
					C2	^{60}Co	0.01652	0.07273	0.08990
						^{137}Cs	0.1658	0.2793	1.060
					C3	^{60}Co	0.02478	0.05683	0.08088
						^{137}Cs	0.4235	0.2109	2.606
• Northwest Unit (A2400 305Cx) Note: Contains the HRA, WHB, FH, portions of the Hot Lab, and portions of the WHB spill area.	108,608	10,091	Class 1/2	Class 1/3	C1	^{60}Co	0.02666	0.05054	0.10171
						^{137}Cs	0.47620	0.51620	1.5203
					C2	^{60}Co	0.02459	0.07325	0.1377
						^{137}Cs	0.2784	0.3151	1.449
• Northeast Unit (A2400 306Cx) Note: Contains the CRA's and ERB Spill Areas	117,542	10,921	Class 1/2	Class 3	C1	^{60}Co	0.01475	0.04701	0.07637
						^{137}Cs	0.09803	0.23683	0.38934
					C2	^{60}Co	0.06809	0.1199	0.3239
						^{137}Cs	1.261	0.5769	8.185
• North Northwest Unit (A2400 307Cx) Note: Contains the Rx Bldg, ROLB, PPH, portions of the Hot Lab, and PPH resin spill area.	74,626	6,933	Class 1/2	Class 1/3	C1	^{60}Co	0.00421	0.03420	0.03973
						^{137}Cs	0.12943	0.26071	0.49599
					C2	^{60}Co	0.00735	0.03369	0.05632
						^{137}Cs	0.02758	0.05655	0.12184
					C3	^{60}Co	132.0	86.46	604.8
						^{137}Cs	0.1697	0.365	0.7686

Table A-2 – Environs Characterization Data Summary

PBRF Survey Area	Survey Area (ft^2)[a]	Survey Area (m^2)	FSS Classification[b]	Initial Classification[c]	Package ID	Isotope[d]	Sigma[d] (pCi/g)	Mean Measurement (pCi/g)	Maximum Measurement (pCi/g)
• North Northeast Unit (A2400 308Cx) Note: Contains the SEB, and portions of the Sludge Basins and Precipitator.	121,072	11,248	Class 1/2	Class 3	C1	^{60}Co	0.00401	0.04431	0.05089
						^{137}Cs	0.11521	0.26315	0.43784
					C2	^{60}Co	0.7439	1.216	4.914
						^{137}Cs	24.50	4.595	162.3
					C3	^{60}Co	0.01902	0.05014	0.06873
						^{137}Cs	0.05269	0.08165	0.3466
• Northern Unit (A2400 309Cx) Note: Contains portions of the Precipitator and portions of the Sludge Basins.	110,287	10,246	Class 1/2/3	Class 3	C1	^{60}Co	0.01073	0.04560	0.07090
						^{137}Cs	0.09318	0.23966	0.39998
					C2	^{60}Co	0.01325	0.04299	0.05908
						^{137}Cs	0.1390	0.2868	0.7121
• Far Northern Unit (A2400 310Cx) Note: Contains the Compressor Bldg, Gas Storage Structure and Cryogenic and Gas Supply Farm.	89,817	8,345	Class 3	Class 3	C1	^{60}Co	0.00925	0.04903	0.06385
						^{137}Cs	0.16384	0.30677	0.61130
					C2	^{60}Co	0.02835	0.06782	0.1038
						^{137}Cs	0.1667	0.3156	0.7604
					C3	^{60}Co	0.01718	0.04392	0.05579
						^{137}Cs	0.06154	0.09394	0.2161
• Open land areas outside the PBRF Fence (A2500 301I1) Note: Areas to serve as buffer zones to impacted areas inside the fence (estimated)	1,524,748	141,649	Class 1/3[e]	N/A	C1	^{60}Co	0.7930	0.6555	4.567
						^{137}Cs	4.036	2.106	19.080
	3,259,486	**302,816**							

[a] Area estimated from facility drawings.
[b] Characterization Survey Units are not reflective of the anticipated FSS areas.
[c] Initial classifications taken from Table 4-2 of the Decommissioning Plan.
[d] Large Sigma values for areas specified in this table shall be recalculated using post remediation survey information.

Attachment B

Survey Data Management System Reports

NOTE

The "Prescribed Number of Measurements" and "Action Level" input values were intentionally omitted when these reports were generated from the SDMS. Omission of these inputs has no effect on the reported measurement results. The actual values for these data points can be found in the original reports contained within each respective survey package archive.

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 203C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Area 4

Statistical Summary	dpm/100 cm²
Mean:	144
Median:	153
Standard Deviation:	220
Range:	796
Minimum:	-245
Maximum:	551
Number of Measurements	
Prescribed:	0
Collected:	8
Reported:	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	425
Minimum MDC:	364
Maximum MDC:	472
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	7

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041008-003	FL1C2	B02FS	102/3	00004	1.00	452	1,718	109	-109
DL041008-003	FL1D2	B02FS	00104	00006	1.00	414	1,543	202	-202
DL041008-003	FL1G1	B02FS	00105	00008	1.00	413	1,527	196	-196
DL041008-003	FL1M1	B02FS	00005	00002	1.00	469	1,930	196	-196
DL041008-003	WL1D2	B02FS	00104	00005	1.00	472	2,307	551	-551
DL041008-003	WL1M1	B02FS	00005	00001	1.00	364	1,096	71	-71
DL041008-003	WL1M1	B02FS	00105	00007	1.00	405	1,352	71	-71
DL041008-003	WL1M1	B02FS	102/3	00003	1.00	408	1,052	-245	245

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041008-003	FL1C2	B02GS	102/3	00004	1.00	295	295	1,609
DL041008-003	FL1D2	B02GS	00104	00006	1.00	246	246	1,342
DL041008-003	FL1G1	B02GS	00105	00008	1.00	244	244	1,331
DL041008-003	FL1M1	B02GS	00005	00002	1.00	318	318	1,734
DL041008-003	WL1D2	B02GS	00104	00005	1.00	322	322	1,756
DL041008-003	WL1M1	B02GS	00005	00001	1.00	188	188	1,025
DL041008-003	WL1M1	B02GS	00105	00007	1.00	235	235	1,282
DL041008-003	WL1M1	B02GS	102/3	00003	1.00	238	238	1,298

Characterization Survey Summary Report
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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 203C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Area 4

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041008-005	CL1G1	B02QS	00005	00009	1.00	383	1,776	269	-269

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041008-005	CL1G1	B02PS	00005	00009	1.00	359	359	1,508

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041008-003	180715	44-116	PR188384	125	0.1467	PAM7843
DL041008-005	180716	44-116	PR188386	125	0.1905	DRM0271

Characterization Survey Summary Report
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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1111 203C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Area 4

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.35	7.70
Median:	-0.43	8.06
Standard Deviation:	1.54	7.39
Range:	3.50	26.13
Minimum:	-0.43	-1.74
Maximum:	3.07	24.39

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	13.54	16.72
Minimum LLD:	13.54	16.72
Maximum LLD:	13.54	16.72
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	9

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	2	8

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041011-029	FL1	L01	4	FL 1-2	3.07	13.54	-1.74	16.72
CS041011-029	FL1	L01	4	FL 1-9 QA	-0.43	13.54	4.79	16.72
CS041011-029	FL1	L01	4	FL 3-4	-0.43	13.54	1.52	16.72
CS041011-029	FL1	L01	4	FL 4-6	-0.43	13.54	8.06	16.72
CS041011-029	FL1	L01	4	FL 5-8	-0.43	13.54	11.33	16.72
CS041011-028	WL1	L01	4	WL 1-1	-0.43	13.54	8.06	16.72
CS041011-028	WL1	L01	4	WL 3-3	-0.43	13.54	8.06	16.72
CS041011-028	WL1	L01	4	WL 4-5	-0.43	13.54	4.79	16.72
CS041011-028	WL1	L01	4	WL 5-7	3.07	13.54	24.39	16.72

Characterization Survey Summary Report
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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 204C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Count Room

Statistical Summary	dpm/100 cm²
Mean:	335
Median:	155
Standard Deviation:	608
Range:	2,094
Minimum:	-142
Maximum:	1,952
Number of Measurements	
Prescribed:	0
Collected:	10
Reported:	10

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	446
Minimum MDC:	388
Maximum MDC:	513
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	7

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (Act.Level-Result) (dpm/100 cm²)
DL041008-004	FL1C1	B02FS	00006	00010	1.00	513	2,465	376	-376
DL041008-004	FL1C2	B02FS	00007	00007	1.00	469	1,969	234	-234
DL041008-004	FL1C2	B02FS	00009	00003	1.00	488	1,740	-142	142
DL041008-004	FL1C2	B02FS	00008	00005	1.00	442	2,127	594	-594
DL041008-004	FL1G1	B02FS	00010	00001	1.00	448	1,761	185	-185
DL041008-004	WL1M1	B02FS	00007	00008	1.00	414	1,287	-49	49
DL041008-004	WL1M1	B02FS	00008	00006	1.00	404	1,243	-27	27
DL041008-004	WL1M1	B02FS	00009	00004	1.00	389	1,276	98	-98
DL041008-004	WL1M1	B02FS	00010	00002	1.00	388	1,292	125	-125
DL041008-004	WL1Y1	B02FS	00006	00011	1.00	509	4,008	1,952	-1,952

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkgd Beta (dpm/100 cm²)
DL041008-004	FL1C1	B02GS	00006	00010	1.00	383	383	2,089
DL041008-004	FL1C2	B02GS	00007	00007	1.00	318	318	1,734
DL041008-004	FL1C2	B02GS	00008	00005	1.00	281	281	1,532
DL041008-004	FL1C2	B02GS	00009	00003	1.00	345	345	1,881
DL041008-004	FL1G1	B02GS	00010	00001	1.00	289	289	1,576
DL041008-004	WL1M1	B02GS	00007	00008	1.00	245	245	1,336
DL041008-004	WL1M1	B02GS	00008	00006	1.00	233	233	1,271
DL041008-004	WL1M1	B02GS	00009	00004	1.00	216	216	1,178

Characterization Survey Summary Report
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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 204C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Count Room

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041008-004	WL1M1	B02GS	00010	00002	1.00	214	214	1,167
DL041008-004	WL1Y1	B02GS	00006	00011	1.00	377	377	2,056

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041008-006	FL1C2	B02QS	00010	00009	1.00	394	1,667	63	-63

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041008-006	FL1C2	B02PS	00010	00009	1.00	382	382	1,604

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041008-004	180715	44-116	PR188384	125	0.1467	PAM7843
DL041008-006	180716	44-116	PR188386	125	0.1905	DRM0271

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1111 204C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Count Room

Statistical Summary	dpm/100 cm²
Mean:	39
Median:	39
Standard Deviation:	
Range:	0
Minimum:	39
Maximum:	39
Number of Measurements	
Prescribed	0
Collected	1
Reported	1

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	75
Minimum MDC:	75
Maximum MDC:	75
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	1

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041026-004	WL1Y1	A03FS	00006	00011	1.00	75	49	39	-39

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041026-004	WL1Y1	A03GS	00006	00011	1.00	1	1	10

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041105-014	WL1Y1	A03QS	00006	00011	1.00	22	126	126	-126

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041105-014	WL1Y1	A03PS	00006	00011	1.00	0	0	0

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1111 204C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Count Room

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041026-004	201186	43-90	PR203396	125	0.082	PAM7843
DL041105-014	203469	43-90	PR188387	125	0.10825	TEM5562

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1111 204C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Count Room

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	-0.11	11.92
Median:	-0.43	14.59
Standard Deviation:	1.06	9.89
Range:	3.50	29.40
Minimum:	-0.43	-1.74
Maximum:	3.07	27.66

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	13.54	16.72
Minimum LLD:	13.54	16.72
Maximum LLD:	13.54	16.72
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	11

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	No	Yes
No. Measurement > Action Level	1	9

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041011-030	FL1	L01	N/A	FL 10-1	-0.43	13.54	27.66	16.72
CS041011-030	FL1	L01	N/A	FL 10-9 QA	-0.43	13.54	1.52	16.72
CS041011-030	FL1	L01	N/A	FL 6-10	-0.43	13.54	8.06	16.72
CS041011-030	FL1	L01	N/A	FL 7-7	-0.43	13.54	-1.74	16.72
CS041011-030	FL1	L01	N/A	FL 8-5	-0.43	13.54	21.13	16.72
CS041011-030	FL1	L01	N/A	FL 9-3	-0.43	13.54	-1.74	16.72
CS041011-031	WL1	L01	N/A	WL 10-2	-0.43	13.54	21.13	16.72
CS041011-031	WL1	L01	N/A	WL 8-11	-0.43	13.54	8.06	16.72
CS041011-031	WL1	L01	N/A	WL 7-8	-0.43	13.54	17.86	16.72
CS041011-031	WL1	L01	N/A	WL 8-6	3.07	13.54	14.59	16.72
CS041011-031	WL1	L01	N/A	WL 9-4	-0.43	13.54	14.59	16.72

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Statistical Summary	dpm/100 cm²
Mean:	658
Median:	298
Standard Deviation:	1,155
Range:	5,349
Minimum:	-160
Maximum:	5,188
Number of Measurements	
Prescribed:	0
Collected:	28
Reported:	28

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	404
Minimum MDC:	298
Maximum MDC:	633
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	25

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041105-010	BE1M1	B02FS	00006	00001	1.00	415	1,772	-8	8
DL041105-010	BE1M1	B02FS	00007	00001	1.00	476	2,515	155	-155
DL041105-010	BE1M1	B02FS	00008	00001	1.00	528	3,099	181	-181
DL041105-010	BE1M1	B02FS	00009	00001	1.00	340	1,235	55	-55
DL040928-007	RF1G1	B02FS	00005	00001	1.00	413	4,564	3,234	-3,234
DL040928-007	RF1G1	B02FS	00005	00002	1.00	404	2,918	1,647	-1,647
DL040928-007	RF1G1	B02FS	00005	00003	1.00	371	1,527	464	-464
DL040928-007	RF1G1	B02FS	00005	00004	1.00	424	1,761	354	-354
DL040928-007	RF1G1	B02FS	00005	00005	1.00	395	1,756	540	-540
DL040928-007	RF1G1	B02FS	00005	00006	1.00	441	1,952	425	-425
DL040928-007	RF1G1	B02FS	00005	00007	1.00	400	3,588	2,339	-2,339
DL040928-007	RF1G1	B02FS	00005	00008	1.00	409	2,040	731	-731
DL041007-002	RF1G1	B02FS	00005	00001	1.00	342	1,293	173	-173
DL041007-002	RF1G1	B02FS	00005	00003	1.00	325	1,013	4	-4
DL041013-001	RF1G1	B02FS	00005	00003	1.00	579	8,692	5,188	-5,188
DL041020-002	RF1G1	B02FS	00005	00007	1.00	466	2,167	120	-120
DL041123-001	RF1G1	B02FS	00002	00026	1.00	298	1,044	200	-200
DL041123-001	RF1G1	B02FS	00005	00021	1.00	323	1,507	511	-511
DL041123-001	RF1G1	B02FS	00005	00022	1.00	329	1,489	453	-453
DL041123-001	RF1G1	B02FS	00005	00023	1.00	452	2,400	404	-404
DL041123-001	RF1G1	B02FS	00005	00024	1.00	347	1,484	329	-329
DL041123-001	RF1G1	B02FS	00005	00025	1.00	313	1,338	404	-404
DL041123-001	RF1G1	B02FS	00005	00027	1.00	374	1,618	267	-267

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041123-001	RF1G1	B02FS	00005	00028	1.00	338	1,307	213	-213
DL041007-002	RF1M1	B02FS	00005	00002	1.00	352	1,160	-36	36
DL041007-002	RF1M1	B02FS	00005	00004	1.00	318	1,164	200	-200
DL041013-001	RF1M1	B02FS	00005	00004	1.00	633	4,057	-160	160
DL041020-002	RF1M1	B02FS	00005	00008	1.00	522	2,614	23	-23

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041105-010	BE1M1	B02GS	00006	00001	1.00	424	424	1,781
DL041105-010	BE1M1	B02GS	00007	00001	1.00	562	562	2,360
DL041105-010	BE1M1	B02GS	00008	00001	1.00	695	695	2,919
DL041105-010	BE1M1	B02GS	00009	00001	1.00	281	281	1,180
DL040928-007	RF1G1	B02GS	00005	00001	1.00	244	244	1,331
DL040928-007	RF1G1	B02GS	00005	00002	1.00	233	233	1,271
DL040928-007	RF1G1	B02GS	00005	00003	1.00	195	195	1,063
DL040928-007	RF1G1	B02GS	00005	00004	1.00	258	258	1,407
DL040928-007	RF1G1	B02GS	00005	00005	1.00	223	223	1,216
DL040928-007	RF1G1	B02GS	00005	00006	1.00	280	280	1,527
DL040928-007	RF1G1	B02GS	00005	00007	1.00	229	229	1,249
DL040928-007	RF1G1	B02GS	00005	00008	1.00	240	240	1,309
DL041007-002	RF1G1	B02GS	00005	00001	1.00	252	252	1,120
DL041007-002	RF1G1	B02GS	00005	00003	1.00	227	227	1,009
DL041013-001	RF1G1	B02GS	00005	00003	1.00	830	830	3,504
DL041020-002	RF1G1	B02GS	00005	00007	1.00	444	444	2,047
DL041123-001	RF1G1	B02GS	00002	00026	1.00	190	190	844
DL041123-001	RF1G1	B02GS	00005	00021	1.00	224	224	996
DL041123-001	RF1G1	B02GS	00005	00022	1.00	233	233	1,036
DL041123-001	RF1G1	B02GS	00005	00023	1.00	449	449	1,996
DL041123-001	RF1G1	B02GS	00005	00024	1.00	260	260	1,156
DL041123-001	RF1G1	B02GS	00005	00025	1.00	210	210	933
DL041123-001	RF1G1	B02GS	00005	00027	1.00	304	304	1,351
DL041123-001	RF1G1	B02GS	00005	00028	1.00	246	246	1,093
DL041007-002	RF1M1	B02GS	00005	00002	1.00	269	269	1,196
DL041007-002	RF1M1	B02GS	00005	00004	1.00	217	217	964

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041013-001	RF1M1	B02GS	00005	00004	1.00	999	999	4,217
DL041020-002	RF1M1	B02GS	00005	00008	1.00	562	562	2,591

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041105-011	BE1M1	B02QS	00006	00001	1.00	378	1,579	118	-118
DL040928-005	RF1G1	B02QS	00005	00004	1.00	371	1,906	581	-581

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041105-011	BE1M1	B02PS	00006	00001	1.00	346	346	1,461
DL040928-005	RF1G1	B02PS	00005	00004	1.00	296	296	1,324

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL040928-005	180739	44-116	PR188383	125	0.17885	SLM2556
DL040928-007	180715	44-116	PR188384	125	0.1467	SLM2556
DL041007-002	189088	44-116	PR197315	125	0.18	PAM7843
DL041013-001	192608	44-116	PR197314	125	0.1895	TDG7534
DL041020-002	193707	44-116	PR203147	125	0.1735	TDG7534
DL041105-010	180716	44-116	PR188386	125	0.1905	SLM2556
DL041105-011	192608	44-116	PR197314	125	0.1895	tem
DL041123-001	189088	44-116	PR197315	125	0.18	TDG7534

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Statistical Summary	dpm/100 cm²
Mean:	79
Median:	50
Standard Deviation:	88
Range:	199
Minimum:	8
Maximum:	207
Number of Measurements	
Prescribed	0
Collected	4
Reported	4

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	48
Minimum MDC:	25
Maximum MDC:	79
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	4

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL040928-008	RF1G1	A03FS	00005	00001	1.00	25	41	41	-41
DL040928-008	RF1G1	A03FS	00005	00002	1.00	25	8	8	-8
DL040928-008	RF1G1	A03FS	00005	00003	1.00	79	75	58	-58
DL040928-008	RF1G1	A03FS	00005	00004	1.00	63	216	207	-207

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL040928-008	RF1G1	A03GS	00005	00001	1.00	0	0	0
DL040928-008	RF1G1	A03GS	00005	00002	1.00	0	0	0
DL040928-008	RF1G1	A03GS	00005	00003	1.00	2	2	17
DL040928-008	RF1G1	A03GS	00005	00004	1.00	1	1	8

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL040928-008	180718	43-90	PR188388	125	0.0965	DRM0271

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	7.24	Mean:	7.43
Median:	7.24	Median:	7.43
Standard Deviation:		Standard Deviation:	
Range:	0.00	Range:	0.00
Minimum:	7.24	Minimum:	7.43
Maximum:	7.24	Maximum:	7.43

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041119-004	RF1G1	G01FN	00005	00003	7,578	7.2

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041119-004	RF1G1	G02FN	00005	00003	7,775	7.4

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL041119-004	189094	44-10	PR196943	6.28E+10	PAM7843

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)	Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean:	0.39	8.81	Mean LLD:	12.82	17.03
Median:	-0.42	5.88	Minimum LLD:	11.91	16.72
Standard Deviation:	2.01	9.44	Maximum LLD:	13.54	17.36
Range:	6.98	28.36	Action Level:	0.00	0.00
Minimum:	-0.43	-1.74			
Maximum:	6.55	26.62			

Number of Measurements	
Prescribed:	0
Collected:	14

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	2	11

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041115-001	BE1	L01	6	BE1-1-1	-0.23	12.06	26.62	17.25
CS041115-001	BE1	L01	6	BE1-1-2	3.16	12.06	10.65	17.25
CS041115-001	BE1	L01	6	BE1-1-3	6.55	12.06	7.45	17.25
CS041115-001	BE1	L01	6	BE1-1-4	-0.23	12.06	4.26	17.25
CS041011-027	RF1	L01	5	RF1-5-1	-0.43	13.54	21.13	16.72
CS041011-027	RF1	L01	5	RF1-5-2	-0.43	13.54	1.52	16.72
CS041011-027	RF1	L01	5	RF1-5-3	-0.43	13.54	-1.74	16.72
CS041011-027	RF1	L01	5	RF1-5-4	-0.43	13.54	1.52	16.72
CS041011-027	RF1	L01	5	RF1-5-5	-0.43	13.54	-1.74	16.72
CS041011-027	RF1	L01	5	RF1-5-6	-0.43	13.54	-1.74	16.72
CS041104-001	RF1	L01	5	RF1-5-5	-0.20	11.91	16.99	17.36
CS041104-001	RF1	L01	5	RF1-5-6	-0.20	11.91	16.99	17.36
CS041202-089	RF1	L01	5	5-7	-0.42	13.10	4.30	17.17

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

CS041202-089	RF1	L01	5	5-8	-0.42	13.10	17.08	17.17

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	N/A	4.669E-01	0.03
Median:	N/A	4.669E-01	0.03
Standard Deviation:	N/A	2.335E-01	0.01
Range:	N/A	4.669E-01	0.02
Minimum:	N/A	4.669E-01	0.02
Maximum:	N/A	4.669E-01	0.04

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:	8.199E-02	8.035E-02
Minimum MDC:	5.570E-02	5.528E-02
Maximum MDC:	9.848E-02	1.384E-01
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	4	4
Positve Results:	0	1

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	N/A	No	No
No. Measurement > Action Level	0	0	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041011-010	RF1	L11	5	1	146		8.958E-02		5.840E-02	0.03
CS041011-012	RF1	L11	5	2	155.3		8.421E-02		6.929E-02	0.03
CS041027-003	RF1	L11	5	3	132.8		9.848E-02		1.384E-01	0.04
CS041027-004	RF1	L11	5	4	234.8		5.570E-02	4.669E-01	5.528E-02	0.03

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1111 301C1 **Package Type:** Structure

Survey Area Name: Reactor Building (1111)

Survey Unit Name: Reactor Building Roof & Exterior Walls

QC Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041011-011	RF1	Q11	5	2	99.5		1.314E-01	1.861E-01	8.570E-02	0.05

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = 0-1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL

$$Unity\ Test = \frac{C_{^{60}Co}}{Act\ Level_{^{60}Co}} + \frac{C_{^{137}Cs}}{Act\ Level_{^{137}Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041011-010 MDC =>									
CS041011-012 MDC =>									
CS041027-003 MDC =>									
CS041027-004 MDC =>									

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Statistical Summary	dpm/100 cm²
Mean:	1,547,828
Median:	205,724
Standard Deviation:	3,417,053
Range:	11,661,065
Minimum:	3,196
Maximum:	11,664,262
Number of Measurements	
Prescribed:	0
Collected:	24
Reported:	24

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	1,711
Minimum MDC:	559
Maximum MDC:	6,469
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	24

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL031004-001	FL1M1	B02FS	00007	00001	0.50	2,377	522,047	494,785	-494,785
DL031004-001	FL1M1	B02FS	00007	00002	0.50	1,875	466,084	449,224	-449,224
DL031104-003	FL1M1	B02FS	00005	00001	0.50	6,469	9,694,766	9,489,710	-9,489,710
DL031104-003	FL1M1	B02FS	00005	00002	0.50	1,050	164,925	159,766	-159,766
DL031204-005	FL1M1	B02FS	00003	00001	0.50	3,075	11,710,159	11,664,262	11,664,262
DL031204-005	FL1M1	B02FS	00003	00002	0.50	6,145	9,878,551	9,693,607	-9,693,607
DL031204-005	FL1M1	B02FS	00004	00001	0.50	1,053	2,066,037	2,060,841	-2,060,841
DL031204-005	FL1M1	B02FS	00004	00002	0.50	1,149	160,421	154,206	-154,206
DL031004-001	WL1C2	B02FS	00007	00002	0.50	1,179	63,355	58,804	-58,804
DL031004-001	WL1M1	B02FS	00007	00001	0.50	1,145	74,411	68,243	-68,243
DL031104-003	WL1M1	B02FS	00005	00001	0.50	836	108,271	105,047	-105,047
DL031104-003	WL1M1	B02FS	00005	00002	0.50	1,081	230,430	224,953	-224,953
DL031204-005	WL1M1	B02FS	00003	00001	0.50	2,201	93,589	70,243	-70,243
DL031204-005	WL1M1	B02FS	00003	00002	0.50	2,123	886,682	864,981	-864,981
DL031204-005	WL1M1	B02FS	00004	00001	0.50	736	49,327	46,850	-46,850
DL031204-005	WL1M1	B02FS	00004	00002	0.50	1,110	274,794	269,009	-269,009
DL031004-001	WU1C2	B02FS	00007	00001	0.50	926	70,757	66,776	-66,776
DL031104-003	WU1C2	B02FS	00005	00002	0.50	750	5,776	3,196	-3,196
DL031204-005	WU1C2	B02FS	00003	00001	0.50	1,017	239,131	234,299	-234,299
DL031204-005	WU1C2	B02FS	00003	00002	0.50	1,176	257,832	251,318	-251,318
DL031204-005	WU1C2	B02FS	00004	00001	0.50	810	114,121	111,103	-111,103
DL031204-005	WU1C2	B02FS	00004	00002	0.50	749	189,065	186,495	-186,495
DL031004-001	WU1M1	B02FS	00007	00002	0.50	1,474	418,430	408,103	-408,103

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measurement MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL031104-003	WU1M1	B02FS	00005	00001	0.50	559	15,439	14,047	-14,047

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkgd Beta (dpm/100 cm²)
DL031004-001	FL1M1	B02GS	00007	00001	0.50	2,917	5,834	27,262
DL031004-001	FL1M1	B02GS	00007	00002	0.50	1,804	3,608	16,860
DL031104-003	FL1M1	B02GS	00005	00001	0.50	21,941	43,882	205,056
DL031104-003	FL1M1	B02GS	00005	00002	0.50	552	1,104	5,159
DL031204-005	FL1M1	B02GS	00003	00001	0.50	4,911	9,822	45,897
DL031204-005	FL1M1	B02GS	00003	00002	0.50	19,789	39,578	184,944
DL031204-005	FL1M1	B02GS	00004	00001	0.50	556	1,112	5,196
DL031204-005	FL1M1	B02GS	00004	00002	0.50	665	1,330	6,215
DL031004-001	WL1C2	B02GS	00007	00002	0.50	701	1,402	6,551
DL031004-001	WL1M1	B02GS	00007	00001	0.50	660	1,320	6,168
DL031104-003	WL1M1	B02GS	00005	00001	0.50	345	690	3,224
DL031104-003	WL1M1	B02GS	00005	00002	0.50	586	1,172	5,477
DL031204-005	WL1M1	B02GS	00003	00001	0.50	2,498	4,996	23,346
DL031204-005	WL1M1	B02GS	00003	00002	0.50	2,322	4,644	21,701
DL031204-005	WL1M1	B02GS	00004	00001	0.50	265	530	2,477
DL031204-005	WL1M1	B02GS	00004	00002	0.50	619	1,238	5,785
DL031004-001	WU1C2	B02GS	00007	00001	0.50	426	852	3,981
DL031104-003	WU1C2	B02GS	00005	00002	0.50	276	552	2,579
DL031204-005	WU1C2	B02GS	00003	00001	0.50	517	1,034	4,832
DL031204-005	WU1C2	B02GS	00003	00002	0.50	697	1,394	6,514
DL031204-005	WU1C2	B02GS	00004	00001	0.50	323	646	3,019
DL031204-005	WU1C2	B02GS	00004	00002	0.50	275	550	2,570
DL031004-001	WU1M1	B02GS	00007	00002	0.50	1,105	2,210	10,327
DL031104-003	WU1M1	B02GS	00005	00001	0.50	149	298	1,393

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL031004-001	180718	44-116	PR187571	125	0.1712	BAD8661
DL031104-003	180718	44-116	PR187571	125	0.1712	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL031204-005	180718	44-116	PR187571	125	0.1712	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Statistical Summary	dpm/100 cm²
Mean:	133
Median:	42
Standard Deviation:	205
Range:	899
Minimum:	-18
Maximum:	882
Number of Measurements	
Prescribed	0
Collected	24
Reported	24

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	51
Minimum MDC:	18
Maximum MDC:	80
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	21

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL030904-003	FL1M1	A03FS	00007	00001	1.00	18	42	42	-42
DL030904-003	FL1M1	A03FS	00007	00002	1.00	18	6	6	-6
DL031104-001	FL1M1	A03FS	00005	00001	1.00	57	232	220	-220
DL031104-001	FL1M1	A03FS	00005	00002	1.00	66	36	18	-18
DL031204-003	FL1M1	A03FS	00003	00001	1.00	46	18	12	-12
DL031204-003	FL1M1	A03FS	00003	00002	1.00	46	888	882	-882
DL031204-003	FL1M1	A03FS	00004	00001	1.00	46	304	298	-298
DL031204-003	FL1M1	A03FS	00004	00002	1.00	18	77	77	-77
DL030904-003	WL1C2	A03FS	00007	00002	1.00	73	24	0	0
DL030904-003	WL1M1	A03FS	00007	00001	1.00	46	30	24	-24
DL031104-001	WL1M1	A03FS	00005	00001	1.00	73	54	30	-30
DL031104-001	WL1M1	A03FS	00005	00002	1.00	73	18	-6	6
DL031204-003	WL1M1	A03FS	00003	00001	1.00	46	30	24	-24
DL031204-003	WL1M1	A03FS	00003	00002	1.00	57	113	101	-101
DL031204-003	WL1M1	A03FS	00004	00001	1.00	46	30	24	-24
DL031204-003	WL1M1	A03FS	00004	00002	1.00	18	42	42	-42
DL030904-003	WU1C2	A03FS	00007	00001	1.00	46	42	36	-36
DL031104-001	WU1C2	A03FS	00005	00002	1.00	66	0	-18	18
DL031204-003	WU1C2	A03FS	00003	00001	1.00	66	179	161	-161
DL031204-003	WU1C2	A03FS	00003	00002	1.00	73	477	453	-453
DL031204-003	WU1C2	A03FS	00004	00001	1.00	46	101	95	-95
DL031204-003	WU1C2	A03FS	00004	00002	1.00	80	393	363	-363
DL030904-003	WU1M1	A03FS	00007	00002	1.00	46	298	292	-292

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL031104-001	WU1M1	A03FS	00005	00001	1.00	57	36	24	-24

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL030904-003	FL1M1	A03GS	00007	00001	1.00	0	0	0
DL030904-003	FL1M1	A03GS	00007	00002	1.00	0	0	0
DL031104-001	FL1M1	A03GS	00005	00001	1.00	2	2	12
DL031104-001	FL1M1	A03GS	00005	00002	1.00	3	3	18
DL031204-003	FL1M1	A03GS	00003	00001	1.00	1	1	6
DL031204-003	FL1M1	A03GS	00003	00002	1.00	1	1	6
DL031204-003	FL1M1	A03GS	00004	00001	1.00	1	1	6
DL031204-003	FL1M1	A03GS	00004	00002	1.00	0	0	0
DL030904-003	WL1C2	A03GS	00007	00002	1.00	4	4	24
DL030904-003	WL1M1	A03GS	00007	00001	1.00	1	1	6
DL031104-001	WL1M1	A03GS	00005	00001	1.00	4	4	24
DL031104-001	WL1M1	A03GS	00005	00002	1.00	4	4	24
DL031204-003	WL1M1	A03GS	00003	00001	1.00	1	1	6
DL031204-003	WL1M1	A03GS	00003	00002	1.00	2	2	12
DL031204-003	WL1M1	A03GS	00004	00001	1.00	1	1	6
DL031204-003	WL1M1	A03GS	00004	00002	1.00	0	0	0
DL030904-003	WU1C2	A03GS	00007	00001	1.00	1	1	6
DL031104-001	WU1C2	A03GS	00005	00002	1.00	3	3	18
DL031204-003	WU1C2	A03GS	00003	00001	1.00	3	3	18
DL031204-003	WU1C2	A03GS	00003	00002	1.00	4	4	24
DL031204-003	WU1C2	A03GS	00004	00001	1.00	1	1	6
DL031204-003	WU1C2	A03GS	00004	00002	1.00	5	5	30
DL030904-003	WU1M1	A03GS	00007	00002	1.00	1	1	6
DL031104-001	WU1M1	A03GS	00005	00001	1.00	2	2	12

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL030904-003	180716	43-90	PR188387	125	0.1343	BAD8661
DL031104-001	180716	43-90	PR188387	125	0.1343	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL031204-003	180716	43-90	PR188387	125	0.1343	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	181.87	Mean:	77.67
Median:	84.00	Median:	48.05
Standard Deviation:	236.98	Standard Deviation:	83.65
Range:	844.44	Range:	374.88
Minimum:	16.44	Minimum:	16.55
Maximum:	860.88	Maximum:	391.42

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL030904-004	FL1M1	G01FN	00007	00001	337,144	414.6
DL030904-004	FL1M1	G01FN	00007	00002	120,076	147.6
DL031104-002	FL1M1	G01FN	00005	00001	542,444	667.0
DL031104-002	FL1M1	G01FN	00005	00002	40,304	49.6
DL031204-004	FL1M1	G01FN	00003	00001	559,588	688.1
DL031204-004	FL1M1	G01FN	00003	00002	700,112	860.9
DL031204-004	FL1M1	G01FN	00004	00001	67,192	82.6
DL031204-004	FL1M1	G01FN	00004	00002	41,628	51.2
DL030904-004	WL1C2	G01FN	00007	00002	109,432	134.6
DL030904-004	WL1M1	G01FN	00007	00001	84,768	104.2
DL031104-002	WL1M1	G01FN	00005	00001	17,220	21.2
DL031104-002	WL1M1	G01FN	00005	00002	39,168	48.2
DL031204-004	WL1M1	G01FN	00003	00001	248,288	305.3
DL031204-004	WL1M1	G01FN	00003	00002	170,932	210.2
DL031204-004	WL1M1	G01FN	00004	00001	17,664	21.7
DL031204-004	WL1M1	G01FN	00004	00002	95,960	118.0
DL030904-004	WU1C2	G01FN	00007	00001	45,840	56.4
DL031104-002	WU1C2	G01FN	00005	00002	26,616	32.7
DL031204-004	WU1C2	G01FN	00003	00001	56,836	69.9
DL031204-004	WU1C2	G01FN	00003	00002	69,436	85.4
DL031204-004	WU1C2	G01FN	00004	00001	13,372	16.4
DL031204-004	WU1C2	G01FN	00004	00002	17,324	21.3
DL030904-004	WU1M1	G01FN	00007	00002	113,508	139.6
DL031104-002	WU1M1	G01FN	00005	00001	14,848	18.3

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

DL030904-004	FL1M1	G02FN	00007	00001	97,860	120.3
DL030904-004	FL1M1	G02FN	00007	00002	46,816	56.3
DL031104-002	FL1M1	G02FN	00005	00001	24,912	30.6
DL031104-002	FL1M1	G02FN	00005	00002	28,160	34.8
DL031204-004	FL1M1	G02FN	00003	00001	98,400	121.0
DL031204-004	FL1M1	G02FN	00003	00002	163,012	200.4
DL031204-004	FL1M1	G02FN	00004	00001	18,676	23.0 *
DL031204-004	FL1M1	G02FN	00004	00002	19,004	23.4
DL030904-004	WL1C2	G02FN	00007	00002	55,496	68.2
DL030904-004	WL1M1	G02FN	00007	00001	62,320	76.6
DL031104-002	WL1M1	G02FN	00005	00001	14,096	17.3
DL031104-002	WL1M1	G02FN	00005	00002	29,056	35.7
DL031204-004	WL1M1	G02FN	00003	00001	318,324	391.4
DL031204-004	WL1M1	G02FN	00003	00002	133,712	164.4
DL031204-004	WL1M1	G02FN	00004	00001	16,284	20.0
DL031204-004	WL1M1	G02FN	00004	00002	34,140	42.0
DL030904-004	WU1C2	G02FN	00007	00001	44,016	54.1
DL031104-002	WU1C2	G02FN	00005	00002	19,168	23.6
DL031204-004	WU1C2	G02FN	00003	00001	76,980	94.7
DL031204-004	WU1C2	G02FN	00003	00002	91,372	112.4
DL031204-004	WU1C2	G02FN	00004	00001	15,788	19.4
DL031204-004	WU1C2	G02FN	00004	00002	13,456	16.5
DL030904-004	WU1M1	G02FN	00007	00002	78,576	96.6
DL031104-002	WU1M1	G02FN	00005	00001	17,352	21.3

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL031204-004	189094	44-10	PR196943	4.88E+10	BAD8661
DL031104-002	189094	44-10	PR196943	4.88E+10	BAD8661
DL030904-004	189094	44-10	PR196943	4.88E+10	BAD8661

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)	Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean:	1.81	3,617.91	Mean LLD:	13.95	22.29
Median:	2.98	3,371.26	Minimum LLD:	13.95	22.29
Standard Deviation:	1.81	1,847.92	Maximum LLD:	13.95	22.29
Range:	3.51	5,720.36	Action Level:	0.00	0.00
Minimum:	-0.53	1,242.87			
Maximum:	2.98	6,963.23			

Number of Measurements	
Prescribed:	0
Collected:	6

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	4	6

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC8)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS031004-008	FL1	L02	N/A	WL1-4-1	2.98	13.95	3,346.76	22.29
CS031004-008	FL1	L02	N/A	WL1-4-2	2.98	13.95	3,431.70	22.29
CS031004-009	WL1	L02	N/A	WU1-4-1	2.98	13.95	3,395.76	22.29
CS031004-009	WL1	L02	N/A	WU1-4-2	-0.53	13.95	6,963.23	22.29
CS031004-007	WU1	L01	N/A	FL1-4-1	-0.53	13.95	1,242.87	22.29
CS031004-007	WU1	L01	N/A	FL1-4-2	2.98	13.95	3,327.16	22.29

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	7.232E+03	9.696E+04	
Median:	3.232E+02	4.759E+03	273.51
Standard Deviation:			
Range:			
Minimum:	1.030E+02	2.173E+02	
Maximum:			

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:		
Minimum MDC:		
Maximum MDC:		
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	0	0
Positve Results:	0	0

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	Yes	Yes	No
No. Measurement > Action Level	11	15	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS031004-002	WU1	L07	N/A	N/A	1	1.030E+02	2.139E+01	1.789E+04	7.613E+01	0.00
CS031004-017	WU1	L07	N/A	N/A	1		2.139E+01	2.173E+02	1.393E+01	0.00
CS031204-022	WU1	L07	N/A	N/A	1	4.434E+02	2.139E+01	1.556E+03	4.035E+01	0.00
CS031204-025	WU1	L07	N/A	N/A	1	2.575E+02	2.139E+01	3.399E+03	3.807E+01	0.00
CS031004-016	WL1	L07	N/A	N/A	1		2.139E+01	4.759E+03	3.807E+01	0.00

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS031104-002	WL1	L07	N/A	N/A	1	6.307E+03	4.843E+01	7.634E+03	1.002E+02	0.00
CS031204-021	WL1	L07	N/A	N/A	1	3.232E+02	2.139E+01	8.676E+02	2.669E+01	0.00
CS031204-024	WL1	L07	N/A	N/A	1	1.886E+02	2.139E+01	1.608E+03	3.055E+01	0.00
CS031704-011	WL1	L07	1	N/A	1	1.309E+04	8.974E+01	2.277E+05	2.864E+02	0.00
CS031004-001	FL1	L07	N/A	N/A	1	1.447E+02	2.139E+01	5.706E+03	3.563E+01	0.00
CS031004-015	FL1	L07	N/A	N/A	1		2.139E+01	2.819E+05	2.314E+02	0.00
CS031104-001	FL1	L07	N/A	N/A	1	2.223E+04	7.856E+01	9.353E+04	2.011E+02	0.00
CS031204-020	FL1	L07	N/A	N/A	1		2.139E+01	1.709E+03	3.003E+01	0.00
CS031204-023	FL1	L07	N/A	N/A	1	1.040E+02	2.139E+01	3.410E+03	2.380E+01	0.00
CS031704-010	FL1	L07	1	N/A	1	3.637E+04	1.140E+02	8.025E+05	4.955E+02	0.00

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = <0.1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL

$$Unity\ Test = \frac{C_{60Co}}{Act\ Level_{60Co}} + \frac{C_{137Cs}}{Act\ Level_{137Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS031004-002 MDC =>									
CS031004-017 MDC =>									
CS031204-022 MDC =>									
CS031204-025 MDC =>									
CS031004-016 MDC =>									

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
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GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 107C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Cells 1-7 Structural Surfaces

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS031104-002									
MDC =>									
CS031204-021									
MDC =>									
CS031204-024									
MDC =>									
CS031704-011	4.584E+02						7.143E+02		
MDC =>	*1.630E+02*						*3.895E+02*		
CS031004-001									
MDC =>									
CS031004-015									
MDC =>									
CS031104-001									
MDC =>									
CS031204-020									
MDC =>									
CS031204-023									
MDC =>									
CS031704-010	1.340E+03			2.636E+03			1.735E+03		
MDC =>	*2.925E+02*			*9.420E+02*			*7.299E+02*		

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Statistical Summary	dpm/100 cm²
Mean:	11,834
Median:	1,556
Standard Deviation:	19,804
Range:	78,347
Minimum:	-113
Maximum:	78,234
Number of Measurements	
Prescribed:	0
Collected:	37
Reported:	37

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	492
Minimum MDC:	358
Maximum MDC:	706
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	35

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL020404-001	CL1G1	B02FS	00001	00001	1.00	395	12,200	10,469	-10,469
DL020504-003	CL1G1	B02FS	00002	00001	1.00	469	1,820	-113	113
DL020404-001	FL1C3	B02FS	00001	00001	1.00	387	2,230	573	-573
DL020404-001	FL1C3	B02FS	00001	00002	1.00	409	3,364	1,507	-1,507
DL020404-001	FL1C3	B02FS	00001	00003	1.00	395	2,053	322	-322
DL020504-003	FL1C3	B02FS	00002	00001	1.00	442	2,234	517	-517
DL020904-001	FL1C3	B02FS	00003	00001	1.00	471	3,617	1,556	-1,556
DL021704-001	FL1C3	B02FS	00004	00001	1.00	555	34,303	31,022	-31,022
DL021704-001	FL1C3	B02FS	00004	00002	1.00	428	23,843	21,920	-21,920
DL021804-002	FL1C3	B02FS	00005	00001	1.00	557	40,023	37,107	-37,107
DL021804-002	FL1C3	B02FS	00005	00002	1.00	528	10,276	7,664	-7,664
DL021804-002	FL1C3	B02FS	00005	00003	1.00	530	11,720	9,084	-9,084
DL021804-002	FL1C3	B02FS	00005	00004	1.00	523	6,551	3,995	-3,995
DL021804-002	FL1C3	B02FS	00005	00005	1.00	506	7,322	4,930	-4,930
DL021804-002	FL1C3	B02FS	00005	00006	1.00	550	45,397	42,556	-42,556
DL021804-002	FL1C3	B02FS	00005	00007	1.00	507	30,416	28,014	-28,014
DL021804-002	FL1C3	B02FS	00005	00008	1.00	544	69,411	66,636	-66,636
DL021804-002	FL1C3	B02FS	00006	00001	1.00	534	80,911	78,234	-78,234
DL021804-002	FL1C3	B02FS	00006	00002	1.00	497	55,238	52,935	-52,935
DL020504-003	WL1G1	B02FS	00002	00001	1.00	432	12,777	11,144	-11,144
DL020504-003	WL1G1	B02FS	00002	00002	1.00	463	10,189	8,300	-8,300
DL021704-001	WL1Y1	B02FS	00004	00001	1.00	540	4,806	1,707	-1,707
DL021804-002	WL1Y1	B02FS	00005	00001	1.00	706	8,037	3,299	-3,299

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measurement MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (Act-Level-Result) (dpm/100 cm²)
DL020404-001	WU1G1	B02FS	00001	00002	1.00	356	1,507	110	-110
DL020504-003	WU1G1	B02FS	00002	00002	1.00	429	1,574	-39	39
DL020404-001	WU1Y1	B02FS	00001	00001	1.00	439	3,403	1,252	-1,252
DL020504-003	WU1Y1	B02FS	00002	00001	1.00	482	3,218	1,166	-1,166
DL020904-001	WU1Y1	B02FS	00003	00001	1.00	472	3,963	1,888	-1,888
DL021704-001	WU1Y1	B02FS	00004	00001	1.00	499	3,849	1,206	-1,206
DL021704-001	WU1Y1	B02FS	00004	00002	1.00	487	3,521	1,015	-1,015
DL021704-001	WU1Y1	B02FS	00004	00003	1.00	475	3,273	891	-891
DL021804-002	WU1Y1	B02FS	00006	00001	1.00	620	4,752	1,117	-1,117
DL021904-004	WU1Y1	B02FS	00005	00001	1.00	498	3,327	1,014	-1,014
DL021904-004	WU1Y1	B02FS	00005	00002	1.00	573	4,061	977	-977
DL021904-004	WU1Y1	B02FS	00005	00003	1.00	516	3,864	1,369	-1,369
DL021904-004	WU1Y1	B02FS	00005	00004	1.00	480	3,411	1,266	-1,266
DL021904-004	WU1Y1	B02FS	00005	00005	1.00	498	3,556	1,238	-1,238

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL020404-001	CL1G1	B02GS	00001	00001	1.00	441	441	1,731
DL020504-003	CL1G1	B02GS	00002	00001	1.00	393	393	1,934
DL020404-001	FL1C3	B02GS	00001	00001	1.00	422	422	1,657
DL020404-001	FL1C3	B02GS	00001	00002	1.00	473	473	1,857
DL020404-001	FL1C3	B02GS	00001	00003	1.00	441	441	1,731
DL020504-003	FL1C3	B02GS	00002	00001	1.00	349	349	1,717
DL020904-001	FL1C3	B02GS	00003	00001	1.00	441	441	2,061
DL021704-001	FL1C3	B02GS	00004	00001	1.00	792	792	3,281
DL021704-001	FL1C3	B02GS	00004	00002	1.00	464	464	1,922
DL021804-002	FL1C3	B02GS	00005	00001	1.00	624	624	2,916
DL021804-002	FL1C3	B02GS	00005	00002	1.00	559	559	2,612
DL021804-002	FL1C3	B02GS	00005	00003	1.00	564	564	2,636
DL021804-002	FL1C3	B02GS	00005	00004	1.00	547	547	2,556
DL021804-002	FL1C3	B02GS	00005	00005	1.00	512	512	2,393
DL021804-002	FL1C3	B02GS	00005	00006	1.00	608	608	2,841
DL021804-002	FL1C3	B02GS	00005	00007	1.00	514	514	2,402
DL021804-002	FL1C3	B02GS	00005	00008	1.00	594	594	2,776

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL021804-002	FL1C3	B02GS	00006	00001	1.00	573	573	2,678
DL021804-002	FL1C3	B02GS	00006	00002	1.00	493	493	2,304
DL020504-003	WL1G1	B02GS	00002	00001	1.00	332	332	1,633
DL020504-003	WL1G1	B02GS	00002	00002	1.00	384	384	1,889
DL021704-001	WL1Y1	B02GS	00004	00001	1.00	748	748	3,099
DL021804-002	WL1Y1	B02GS	00005	00001	1.00	1,014	1,014	4,738
DL020404-001	WU1G1	B02GS	00001	00002	1.00	356	356	1,397
DL020504-003	WU1G1	B02GS	00002	00002	1.00	328	328	1,614
DL020404-001	WU1Y1	B02GS	00001	00001	1.00	548	548	2,151
DL020504-003	WU1Y1	B02GS	00002	00001	1.00	417	417	2,052
DL020904-001	WU1Y1	B02GS	00003	00001	1.00	444	444	2,075
DL021704-001	WU1Y1	B02GS	00004	00001	1.00	638	638	2,643
DL021704-001	WU1Y1	B02GS	00004	00002	1.00	605	605	2,506
DL021704-001	WU1Y1	B02GS	00004	00003	1.00	575	575	2,382
DL021804-002	WU1Y1	B02GS	00006	00001	1.00	778	778	3,636
DL021904-004	WU1Y1	B02GS	00005	00001	1.00	495	495	2,313
DL021904-004	WU1Y1	B02GS	00005	00002	1.00	660	660	3,084
DL021904-004	WU1Y1	B02GS	00005	00003	1.00	534	534	2,495
DL021904-004	WU1Y1	B02GS	00005	00004	1.00	459	459	2,145
DL021904-004	WU1Y1	B02GS	00005	00005	1.00	496	496	2,318

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL020404-001	180716	44-116	PR188386	125	0.2038	JPH5419
DL020504-003	193707	44-116	PR203147	125	0.1626	JPW4121
DL020904-001	180718	44-116	PR187571	125	0.1712	JPH5419
DL021704-001	180739	44-116	PR188383	125	0.1931	BAD8661
DL021804-002	180718	44-116	PR187571	125	0.1712	BAD8661
DL021904-004	180718	44-116	PR187571	125	0.1712	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Statistical Summary	dpm/100 cm²
Mean:	41
Median:	37
Standard Deviation:	33
Range:	151
Minimum:	0
Maximum:	151
Number of Measurements	
Prescribed	0
Collected	30
Reported	30

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	41
Minimum MDC:	19
Maximum MDC:	76
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	28

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL020604-001	CL1G1	A03FS	00001	00001	1.00	76	25	0	0
DL020604-001	FL1C3	A03FS	00001	00002	1.00	19	12	12	-12
DL021604-002	FL1C3	A03FS	00004	00001	2.00	41	28	12	-12
DL021604-002	FL1C3	A03FS	00004	00002	2.00	29	25	18	-18
DL021704-005	FL1C3	A03FS	00003	00001	2.00	34	28	19	-19
DL021904-003	FL1C3	A03FS	00005	00001	2.00	44	74	55	-55
DL021904-003	FL1C3	A03FS	00005	00002	2.00	47	22	0	0
DL021904-003	FL1C3	A03FS	00005	00003	2.00	44	55	37	-37
DL021904-003	FL1C3	A03FS	00005	00004	2.00	41	22	6	-6
DL021904-003	FL1C3	A03FS	00005	00005	2.00	50	132	108	-108
DL021904-003	FL1C3	A03FS	00005	00006	2.00	52	74	46	-46
DL021904-003	FL1C3	A03FS	00005	00007	2.00	34	15	6	-6
DL021904-003	FL1C3	A03FS	00005	00008	2.00	38	163	151	-151
DL021904-003	FL1C3	A03FS	00006	00001	2.00	38	34	22	-22
DL021904-003	FL1C3	A03FS	00006	00002	2.00	29	37	31	-31
DL020604-001	WL1G1	A03FS	00002	00001	1.00	47	56	50	-50
DL020604-001	WL1G1	A03FS	00002	00002	1.00	47	25	19	-19
DL021704-005	WL1Y1	A03FS	00004	00001	2.00	30	40	34	-34
DL021904-003	WL1Y1	A03FS	00005	00001	2.00	47	74	52	-52
DL020604-001	WU1Y1	A03FS	00001	00001	1.00	69	43	25	-25
DL020604-001	WU1Y1	A03FS	00002	00001	1.00	19	62	62	-62
DL021704-005	WU1Y1	A03FS	00003	00001	2.00	34	37	28	-28
DL021704-005	WU1Y1	A03FS	00004	00001	2.00	30	84	78	-78

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL021704-005	WU1Y1	A03FS	00004	00002	2.00	24	53	50	-50
DL021904-003	WU1Y1	A03FS	00005	00001	2.00	50	49	25	-25
DL021904-003	WU1Y1	A03FS	00005	00002	2.00	50	95	71	-71
DL021904-003	WU1Y1	A03FS	00005	00003	2.00	44	55	37	-37
DL021904-003	WU1Y1	A03FS	00005	00004	2.00	44	59	40	-40
DL021904-003	WU1Y1	A03FS	00005	00005	2.00	29	74	68	-68
DL021904-003	WU1Y1	A03FS	00006	00001	2.00	34	71	62	-62

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL020604-001	CL1G1	A03GS	00001	00001	1.00	4	4	25
DL020604-001	FL1C3	A03GS	00001	00002	1.00	0	0	0
DL021604-002	FL1C3	A03GS	00004	00001	2.00	5	3	15
DL021604-002	FL1C3	A03GS	00004	00002	2.00	2	1	6
DL021704-005	FL1C3	A03GS	00003	00001	2.00	3	2	9
DL021904-003	FL1C3	A03GS	00005	00001	2.00	6	3	18
DL021904-003	FL1C3	A03GS	00005	00002	2.00	7	4	22
DL021904-003	FL1C3	A03GS	00005	00003	2.00	6	3	18
DL021904-003	FL1C3	A03GS	00005	00004	2.00	5	3	15
DL021904-003	FL1C3	A03GS	00005	00005	2.00	8	4	25
DL021904-003	FL1C3	A03GS	00005	00006	2.00	9	5	28
DL021904-003	FL1C3	A03GS	00005	00007	2.00	3	2	9
DL021904-003	FL1C3	A03GS	00005	00008	2.00	4	2	12
DL021904-003	FL1C3	A03GS	00006	00001	2.00	4	2	12
DL021904-003	FL1C3	A03GS	00006	00002	2.00	2	1	6
DL020604-001	WL1G1	A03GS	00002	00001	1.00	1	1	6
DL020604-001	WL1G1	A03GS	00002	00002	1.00	1	1	6
DL021704-005	WL1Y1	A03GS	00004	00001	2.00	2	1	6
DL021904-003	WL1Y1	A03GS	00005	00001	2.00	7	4	22
DL020604-001	WU1Y1	A03GS	00001	00001	1.00	3	3	19
DL020604-001	WU1Y1	A03GS	00002	00001	1.00	0	0	0
DL021704-005	WU1Y1	A03GS	00003	00001	2.00	3	2	9
DL021704-005	WU1Y1	A03GS	00004	00001	2.00	2	1	6
DL021704-005	WU1Y1	A03GS	00004	00002	2.00	1	1	3

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL021904-003	WU1Y1	A03GS	00005	00001	2.00	8	4	25
DL021904-003	WU1Y1	A03GS	00005	00002	2.00	8	4	25
DL021904-003	WU1Y1	A03GS	00005	00003	2.00	6	3	18
DL021904-003	WU1Y1	A03GS	00005	00004	2.00	6	3	18
DL021904-003	WU1Y1	A03GS	00005	00005	2.00	2	1	6
DL021904-003	WU1Y1	A03GS	00006	00001	2.00	3	2	9

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL020604-001	189094	43-90	PR203395	125	0.1289	JWT5700
DL021604-002	180715	43-90	PR188389	125	0.1299	BAD8661
DL021704-005	189094	43-90	PR203395	125	0.1289	BAD8661
DL021904-003	180715	43-90	PR188389	125	0.1299	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	16.22	Mean:	18.67
Median:	16.11	Median:	20.94
Standard Deviation:	4.12	Standard Deviation:	6.41
Range:	12.69	Range:	22.56
Minimum:	9.90	Minimum:	8.81
Maximum:	22.59	Maximum:	31.37

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL022404-001	CL1G1	G01FN	00001	00001	12,484	11.8
DL022404-001	FL1C3	G01FN	00004	00001	22,564	21.4
DL022404-001	FL1C3	G01FN	00004	00002	14,020	13.3
DL022404-001	FL1C3	G01FN	00005	00001	23,844	22.6
DL022404-001	FL1C3	G01FN	00005	00002	17,492	16.6
DL022404-001	FL1C3	G01FN	00005	00003	15,544	14.7
DL022404-001	FL1C3	G01FN	00005	00006	20,852	19.8
DL022404-001	FL1C3	G01FN	00005	00007	17,004	16.1
DL022404-001	FL1C3	G01FN	00005	00008	19,796	18.8
DL022404-001	FL1C3	G01FN	00006	00001	20,852	19.8
DL022404-001	FL1C3	G01FN	00006	00002	16,760	15.9
DL022404-001	WL1G1	G01FN	00002	00001	10,916	10.3
DL022404-001	WL1G1	G01FN	00002	00002	10,448	9.9

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL022404-001	CL1G1	G02FN	00001	00001	9,300	8.8
DL022404-001	FL1C3	G02FN	00004	00001	22,736	21.5
DL022404-001	FL1C3	G02FN	00004	00002	15,656	14.8
DL022404-001	FL1C3	G02FN	00005	00001	23,376	22.1
DL022404-001	FL1C3	G02FN	00005	00002	23,176	22.0
DL022404-001	FL1C3	G02FN	00005	00003	22,552	21.4
DL022404-001	FL1C3	G02FN	00005	00006	22,108	20.9
DL022404-001	FL1C3	G02FN	00005	00007	18,424	17.5
DL022404-001	FL1C3	G02FN	00005	00008	16,492	15.6
DL022404-001	FL1C3	G02FN	00006	00001	33,116	31.4

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

DL022404-001	FL1C3	G02FN	00006	00002	26,498	25.1
DL022404-001	WL1G1	G02FN	00002	00001	11,324	10.7
DL022404-001	WL1G1	G02FN	00002	00002	11,408	10.8

Download File, Instrument Summary and Survey Technician

Download ID	M2360 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL022404-001	180716	44-10	PR188337	6.33E+10	BAD8661

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.38	149.01
Median:	-0.46	13.85
Standard Deviation:	1.53	434.99
Range:	3.60	2,499.18
Minimum:	-0.51	-5.75
Maximum:	3.09	2,493.43

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	13.73	22.59
Minimum LLD:	13.43	21.55
Maximum LLD:	13.90	23.14
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	37

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	9	31

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS020604-004	CL1	L01	N/A	11	-0.41	13.43	-1.38	21.70
CS020604-004	CL1	L01	N/A	4	-0.41	13.43	47.62	21.70
CS020604-003	FL1	L01	N/A	1	-0.41	13.43	5.15	21.70
CS020604-003	FL1	L01	N/A	2	3.09	13.43	537.66	21.70
CS020604-003	FL1	L01	N/A	3	-0.41	13.43	24.75	21.70
CS020604-003	FL1	L01	N/A	7	-0.41	13.43	1.88	21.70
CS021704-002	FL1	L01	N/A	1	-0.46	13.64	18.33	21.55
CS022404-003	FL1	L01	N/A	1	-0.51	13.90	20.39	23.14
CS022404-003	FL1	L01	N/A	10	-0.51	13.90	79.19	23.14
CS022404-003	FL1	L01	N/A	11	2.99	13.90	30.19	23.14
CS022404-003	FL1	L01	N/A	12	-0.51	13.90	39.99	23.14
CS022404-003	FL1	L01	N/A	13	2.99	13.90	415.68	23.14
CS022404-003	FL1	L01	N/A	14	-0.51	13.90	298.07	23.14

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

CS022404-003	FL1	L01	N/A	2	-0.51	13.90	10.58	23.14
CS022404-003	FL1	L01	N/A	21	-0.51	13.90	102.06	23.14
CS022404-003	FL1	L01	N/A	22	2.99	13.90	219.87	23.14
CS022404-003	FL1	L01	N/A	7	-0.51	13.90	2,493.43	23.14
CS022404-003	FL1	L01	N/A	8	-0.51	13.90	869.78	23.14
CS022404-003	FL1	L01	N/A	9	-0.51	13.90	180.46	23.14
CS020604-006	WL1	L01	N/A	8	-0.41	13.43	1.88	21.70
CS020604-006	WL1	L01	N/A	9	-0.41	13.43	1.88	21.70
CS022404-004	WL1	L01	N/A	15	2.99	13.90	-2.48	23.14
CS022404-004	WL1	L01	N/A	3	-0.51	13.90	-5.75	23.14
CS020604-005	WU1	L01	N/A	10	3.09	13.43	14.95	21.70
CS020604-005	WU1	L01	N/A	12	3.09	13.43	1.88	21.70
CS020604-005	WU1	L01	N/A	5	-0.41	13.43	1.88	21.70
CS020604-005	WU1	L01	N/A	6	-0.41	13.43	5.15	21.70
CS021704-003	WU1	L01	3	1	3.05	13.64	-1.27	21.55
CS022404-005	WU1	L01	N/A	16	-0.51	13.90	13.85	23.14
CS022404-005	WU1	L01	N/A	17	-0.51	13.90	10.58	23.14
CS022404-005	WU1	L01	N/A	18	-0.51	13.90	4.05	23.14
CS022404-005	WU1	L01	N/A	19	-0.51	13.90	0.78	23.14
CS022404-005	WU1	L01	N/A	20	-0.51	13.90	-5.75	23.14
CS022404-005	WU1	L01	N/A	23	2.99	13.90	0.78	23.14
CS022404-005	WU1	L01	N/A	4	-0.51	13.90	13.85	23.14
CS022404-005	WU1	L01	N/A	5	-0.51	13.90	-2.48	23.14
CS022404-005	WU1	L01	N/A	6	-0.51	13.90	66.12	23.14

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	N/A	2.962E+01	
Median:	N/A	2.962E+01	6.32
Standard Deviation:	N/A		
Range:	N/A		
Minimum:	N/A	2.962E+01	
Maximum:	N/A		

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:		
Minimum MDC:		
Maximum MDC:		
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	0	0
Positve Results:	0	0

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	N/A	Yes	No
No. Measurement > Action Level	0	1	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS030104-003	FL1	L07	N/A	N/A	1	2.139E+01	2.962E+01	1.857E+01	[illegible]	0.06

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = 0.0X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL [illegible]

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 205C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot and Cold Lavatory

$$Unity\ Test = \frac{C_{60Co}}{Act\ Level_{60Co}} + \frac{C_{137Cs}}{Act\ Level_{137Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS030104-003									
MDC =>									

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

Statistical Summary	dpm/100 cm²
Mean:	360
Median:	376
Standard Deviation:	265
Range:	929
Minimum:	-13
Maximum:	917
Number of Measurements	
Prescribed:	0
Collected:	14
Reported:	14

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	397
Minimum MDC:	323
Maximum MDC:	514
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	13

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measurement MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041025-005	BE1C2	B02FS	00002	00001	1.00	411	1,918	556	-556
DL041025-005	BE1C2	B02FS	00004	00001	1.00	492	2,893	917	-917
DL041025-005	BE1C2	B02FS	00005	00001	1.00	403	1,801	498	-498
DL041025-005	BE1C2	B02FS	00007	00001	1.00	403	2,003	699	-699
DL041025-005	BE1C2	B02FS	00008	00001	1.00	422	1,934	493	-493
DL041025-005	BE1C2	B02FS	00009	00001	1.00	408	1,764	424	-424
DL041025-005	BE1C2	B02FS	00009	00002	1.00	413	1,653	275	-275
DL041025-005	BE1M1	B02FS	00003	00001	1.00	514	2,336	175	-175
DL041026-007	RF1C1	B02FS	00006	00001	1.00	337	1,558	405	-405
DL041026-007	RF1C1	B02FS	00006	00002	1.00	352	1,608	350	-350
DL041026-007	RF1G1	B02FS	00006	00003	1.00	369	1,486	97	-97
DL041026-007	RF1G1	B02FS	00006	00004	1.00	375	1,490	51	-51
DL041026-007	RF1G1	B02FS	00006	00005	1.00	323	1,165	114	-114
DL041026-007	RF1G1	B02FS	00006	00006	1.00	331	1,098	-13	13

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041025-005	BE1C2	B02GS	00002	00001	1.00	257	257	1,362
DL041025-005	BE1C2	B02GS	00004	00001	1.00	373	373	1,976
DL041025-005	BE1C2	B02GS	00005	00001	1.00	246	246	1,303
DL041025-005	BE1C2	B02GS	00007	00001	1.00	246	246	1,303

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041025-005	BE1C2	B02GS	00008	00001	1.00	272	272	1,441
DL041025-005	BE1C2	B02GS	00009	00001	1.00	253	253	1,340
DL041025-005	BE1C2	B02GS	00009	00002	1.00	260	260	1,377
DL041025-005	BE1M1	B02GS	00003	00001	1.00	408	408	2,162
DL041026-007	RF1C1	B02GS	00006	00001	1.00	273	273	1,153
DL041026-007	RF1C1	B02GS	00006	00002	1.00	298	298	1,258
DL041026-007	RF1G1	B02GS	00006	00003	1.00	329	329	1,389
DL041026-007	RF1G1	B02GS	00006	00004	1.00	341	341	1,440
DL041026-007	RF1G1	B02GS	00006	00005	1.00	249	249	1,051
DL041026-007	RF1G1	B02GS	00006	00006	1.00	263	263	1,110

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041025-006	BE1C2	B02QS	00007	00001	1.00	318	1,554	536	-536
DL041026-005	RF1G1	B02QS	00006	00005	1.00	342	1,281	102	-102
DL041026-005	RF1G1	B02QS	00006	00006	1.00	361	1,472	157	-157

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041025-006	BE1C2	B02PS	00007	00001	1.00	241	241	1,017
DL041026-005	RF1G1	B02PS	00006	00005	1.00	277	277	1,179
DL041026-005	RF1G1	B02PS	00006	00006	1.00	309	309	1,315

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041025-005	180718	44-116	PR187571	125	0.151	PAM7843
DL041025-006	192608	44-116	PR197314	125	0.1895	RDF6510
DL041026-005	189094	44-116	PR197312	125	0.188	JGS8492
DL041026-007	192608	44-116	PR197314	125	0.1895	PAM7843

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.19	12.85
Median:	-0.21	11.16
Standard Deviation:	1.12	9.11
Range:	3.38	35.14
Minimum:	-0.21	1.58
Maximum:	3.17	36.72

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	11.99	16.15
Minimum LLD:	11.99	16.15
Maximum LLD:	11.99	16.15
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	17

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	2	17

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC8)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041027-002	BE1	L01	N/A	BE1-2-1	-0.21	11.99	11.16	16.15
CS041027-002	BE1	L01	N/A	BE1-3-1	3.17	11.99	7.97	16.15
CS041027-002	BE1	L01	N/A	BE1-4-1	-0.21	11.99	4.77	16.15
CS041027-002	BE1	L01	N/A	BE1-5-1	-0.21	11.99	4.77	16.15
CS041027-002	BE1	L01	N/A	BE1-7-1	-0.21	11.99	1.58	16.15
CS041027-002	BE1	L01	N/A	BE1-7-1 QC	-0.21	11.99	7.97	16.15
CS041027-002	BE1	L01	N/A	BE1-8-1	-0.21	11.99	14.36	16.15
CS041027-002	BE1	L01	N/A	BE1-9-1	-0.21	11.99	36.72	16.15
CS041027-002	BE1	L01	N/A	BE1-9-2	-0.21	11.99	23.94	16.15
CS041027-009	RF1	L01	6	RF1-6-1	-0.21	11.99	20.75	16.15
CS041027-009	RF1	L01	6	RF1-6-2	-0.21	11.99	11.16	16.15
CS041027-009	RF1	L01	6	RF1-6-3	-0.21	11.99	7.97	16.15
CS041027-009	RF1	L01	6	RF1-6-4	3.17	11.99	7.97	16.15

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

CS041027-009	RF1	L01	6	RF1-6-5	-0.21	11.99	11.16	16.15
CS041027-009	RF1	L01	6	RF1-6-6	-0.21	11.99	17.55	16.15
CS041027-009	RF1	L01	6	RF1-6-6 QC	-0.21	11.99	23.94	16.15
CS041027-009	RF1	L01	6	RF6-5-5 QC	-0.21	11.99	4.77	16.15

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	N/A	2.705E-01	0.13
Median:	N/A	2.705E-01	0.07
Standard Deviation:	N/A	1.572E-01	0.14
Range:	N/A	2.927E-01	0.29
Minimum:	N/A	2.483E-01	0.05
Maximum:	N/A	2.927E-01	0.33

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:	4.831E-01	3.985E-01
Minimum MDC:	1.397E-01	1.534E-01
Maximum MDC:	1.295E+00	9.269E-01
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	4	4
Positve Results:	0	2

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	N/A	No	No
No. Measurement > Action Level	0	0	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041027-005	RF1	L11	6	1	10.1		1.295E+00		9.269E-01	0.42
CS041027-006	RF1	L11	6	2	61.4		2.130E-01	2.483E-01	1.700E-01	0.06
CS041027-007	RF1	L11	6	3	45.9		2.849E-01		3.438E-01	0.10
CS041027-008	RF1	L11	6	4	93.6		1.397E-01	2.927E-01	1.534E-01	0.08

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
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GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1112 301C1 **Package Type:** Structure

Survey Area Name: Hot Laboratory (1112)

Survey Unit Name: Hot Lab Roof & Exterior Walls

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = 0.1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL Red = 10X AL

$$Unity\ Test = \frac{C_{^{60}Co}}{Act\ Level_{^{60}Co}} + \frac{C_{^{137}Cs}}{Act\ Level_{^{137}Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041027-005									
MDC =>									
CS041027-006									
MDC =>									
CS041027-007									
MDC =>									
CS041027-008									
MDC =>									

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
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DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: D1131 405C1 **Package Type:** Structure

Survey Area Name: Reactor Service Equipment Building (1131)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	dpm/100 cm²
Mean:	467
Median:	499
Standard Deviation:	199
Range:	615
Minimum:	84
Maximum:	699
Number of Measurements	
Prescribed:	0
Collected:	8
Reported:	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	450
Minimum MDC:	404
Maximum MDC:	493
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	8

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL051304-002	BE1C2	B02FS	00003	00001	1.00	443	2,376	654	-654
DL051304-002	BE1C2	B02FS	00004	00001	1.00	493	2,681	531	-531
DL051304-002	RF1G1	B02FS	00006	00001	1.00	404	2,121	699	-699
DL051304-002	RF1G1	B02FS	00006	00002	1.00	460	1,948	84	-84
DL051304-002	RF1G1	B02FS	00006	00003	1.00	448	2,062	300	-300
DL051304-002	RF1G1	B02FS	00006	00004	1.00	455	2,258	438	-438
DL051304-002	RF1G1	B02FS	00006	00005	1.00	462	2,435	561	-561
DL051304-002	RF1G1	B02FS	00006	00006	1.00	438	2,150	467	-467

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL051304-002	BE1C2	B02GS	00003	00001	1.00	350	350	1,722
DL051304-002	BE1C2	B02GS	00004	00001	1.00	437	437	2,150
DL051304-002	RF1G1	B02GS	00006	00001	1.00	289	289	1,422
DL051304-002	RF1G1	B02GS	00006	00002	1.00	379	379	1,865
DL051304-002	RF1G1	B02GS	00006	00003	1.00	358	358	1,761
DL051304-002	RF1G1	B02GS	00006	00004	1.00	370	370	1,820
DL051304-002	RF1G1	B02GS	00006	00005	1.00	381	381	1,875
DL051304-002	RF1G1	B02GS	00006	00006	1.00	342	342	1,683

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: D1131 405C1 **Package Type:** Structure

Survey Area Name: Reactor Service Equipment Building (1131)

Survey Unit Name: Exterior Walls and Roof

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL051304-002	193707	44-116	PR203147	125	0.1626	SLM2556

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: D1131 405C1 **Package Type:** Structure

Survey Area Name: Reactor Service Equipment Building (1131)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	dpm/100 cm²
Mean:	160
Median:	169
Standard Deviation:	91
Range:	279
Minimum:	40
Maximum:	320
Number of Measurements	
Prescribed	0
Collected	8
Reported	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	35
Minimum MDC:	9
Maximum MDC:	50
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	8

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL051304-001	BE1C2	A03FS	00003	00001	2.00	38	53	40	-40
DL051304-001	BE1C2	A03FS	00004	00001	2.00	30	186	180	-180
DL051304-001	RF1G1	A03FS	00006	00001	2.00	50	242	217	-217
DL051304-001	RF1G1	A03FS	00006	00002	2.00	30	56	50	-50
DL051304-001	RF1G1	A03FS	00006	00003	2.00	48	180	158	-158
DL051304-001	RF1G1	A03FS	00006	00004	2.00	38	133	121	-121
DL051304-001	RF1G1	A03FS	00006	00005	2.00	34	329	320	-320
DL051304-001	RF1G1	A03FS	00006	00006	2.00	9	196	196	-196

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL051304-001	BE1C2	A03GS	00003	00001	2.00	4	2	12
DL051304-001	BE1C2	A03GS	00004	00001	2.00	2	1	6
DL051304-001	RF1G1	A03GS	00006	00001	2.00	8	4	25
DL051304-001	RF1G1	A03GS	00006	00002	2.00	2	1	6
DL051304-001	RF1G1	A03GS	00006	00003	2.00	7	4	22
DL051304-001	RF1G1	A03GS	00006	00004	2.00	4	2	12
DL051304-001	RF1G1	A03GS	00006	00005	2.00	3	2	9
DL051304-001	RF1G1	A03GS	00006	00006	2.00	0	0	0

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: D1131 405C1 **Package Type:** Structure

Survey Area Name: Reactor Service Equipment Building (1131)

Survey Unit Name: Exterior Walls and Roof

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL051304-001	189094	43-90	PR203395	125	0.1289	BLS7891

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: D1131 405C1 **Package Type:** Structure

Survey Area Name: Reactor Service Equipment Building (1131)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	2.71	14.89
Median:	3.15	9.79
Standard Deviation:	2.92	11.32
Range:	7.00	29.40
Minimum:	-0.35	1.62
Maximum:	6.65	31.02

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	13.13	16.49
Minimum LLD:	13.13	16.49
Maximum LLD:	13.13	16.49
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	8

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	5	8

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS051304-001	BE1	L01	N/A	1	3.15	13.13	4.89	16.49
CS051304-001	BE1	L01	N/A	2	-0.35	13.13	1.62	16.49
CS051304-002	RF1	L01	N/A	1	3.15	13.13	24.49	16.49
CS051304-002	RF1	L01	N/A	2	-0.35	13.13	8.16	16.49
CS051304-002	RF1	L01	N/A	3	6.65	13.13	8.16	16.49
CS051304-002	RF1	L01	N/A	4	3.15	13.13	11.42	16.49
CS051304-002	RF1	L01	N/A	5	-0.35	13.13	27.76	16.49
CS051304-002	RF1	L01	N/A	6	6.65	13.13	31.02	16.49

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	dpm/100 cm²
Mean:	99
Median:	74
Standard Deviation:	186
Range:	709
Minimum:	-129
Maximum:	580
Number of Measurements	
Prescribed:	0
Collected:	20
Reported:	20

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	413
Minimum MDC:	355
Maximum MDC:	468
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	14

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041103-013	BE1C2	B02FS	00001	00001	1.00	390	1,911	340	-340
DL041103-013	BE1C2	B02FS	00001	00005	1.00	374	2,016	580	-580
DL041103-013	BE1M1	B02FS	00001	00002	1.00	373	1,598	168	-168
DL041103-013	BE1M1	B02FS	00001	00003	1.00	428	1,823	-76	76
DL041103-013	BE1M1	B02FS	00001	00004	1.00	460	2,087	-118	118
DL041103-013	BE1M1	B02FS	00001	00006	1.00	374	1,474	38	-38
DL041103-013	BE1M1	B02FS	00001	00007	1.00	355	1,365	76	-76
DL041103-013	BE1M1	B02FS	00001	00008	1.00	360	1,226	-105	105
DL041103-013	RF1G1	B02FS	00002	00001	1.00	432	2,175	244	-244
DL041103-013	RF1G1	B02FS	00002	00002	1.00	401	1,571	-88	88
DL041103-013	RF1G1	B02FS	00002	00003	1.00	386	1,697	164	-164
DL041103-013	RF1G1	B02FS	00002	00004	1.00	411	1,797	55	-55
DL041105-018	RF1G1	B02FS	00002	00001	1.00	416	1,697	74	-74
DL041105-018	RF1G1	B02FS	00002	00002	1.00	434	1,840	74	-74
DL041105-018	RF1G1	B02FS	00002	00003	1.00	412	1,992	401	-401
DL041105-018	RF1G1	B02FS	00002	00004	1.00	458	2,075	101	-101
DL041105-018	RF1M1	B02FS	00002	00001	1.00	468	2,116	51	-51
DL041105-018	RF1M1	B02FS	00002	00002	1.00	448	1,761	-129	129
DL041105-018	RF1M1	B02FS	00002	00003	1.00	421	1,849	189	-189
DL041105-018	RF1M1	B02FS	00002	00004	1.00	468	2,010	-55	55

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041103-013	BE1C2	B02GS	00001	00001	1.00	374	374	1,571
DL041103-013	BE1C2	B02GS	00001	00005	1.00	342	342	1,436
DL041103-013	BE1M1	B02GS	00001	00002	1.00	340	340	1,428
DL041103-013	BE1M1	B02GS	00001	00003	1.00	452	452	1,898
DL041103-013	BE1M1	B02GS	00001	00004	1.00	525	525	2,205
DL041103-013	BE1M1	B02GS	00001	00006	1.00	342	342	1,436
DL041103-013	BE1M1	B02GS	00001	00007	1.00	307	307	1,289
DL041103-013	BE1M1	B02GS	00001	00008	1.00	317	317	1,331
DL041103-013	RF1G1	B02GS	00002	00001	1.00	460	460	1,932
DL041103-013	RF1G1	B02GS	00002	00002	1.00	395	395	1,659
DL041103-013	RF1G1	B02GS	00002	00003	1.00	365	365	1,533
DL041103-013	RF1G1	B02GS	00002	00004	1.00	415	415	1,743
DL041105-018	RF1G1	B02GS	00002	00001	1.00	352	352	1,623
DL041105-018	RF1G1	B02GS	00002	00002	1.00	383	383	1,766
DL041105-018	RF1G1	B02GS	00002	00003	1.00	345	345	1,591
DL041105-018	RF1G1	B02GS	00002	00004	1.00	428	428	1,973
DL041105-018	RF1M1	B02GS	00002	00001	1.00	448	448	2,066
DL041105-018	RF1M1	B02GS	00002	00002	1.00	410	410	1,890
DL041105-018	RF1M1	B02GS	00002	00003	1.00	360	360	1,660
DL041105-018	RF1M1	B02GS	00002	00004	1.00	448	448	2,066

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041103-011	BE1C2	B02QS	00001	00001	1.00	325	1,773	764	-764
DL041103-011	RF1G1	B02QS	00002	00001	1.00	408	1,938	316	-316

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041103-011	BE1C2	B02PS	00001	00001	1.00	227	227	1,009
DL041103-011	RF1G1	B02PS	00002	00001	1.00	365	365	1,622

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041103-011	189088	44-116	PR197315	125	0.18	PAM7843
DL041103-013	180716	44-116	PR188386	125	0.1905	TDG7534
DL041105-018	203468	44-116	PR203147	125	0.1735	TDG7534

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.22	10.60
Median:	-0.20	9.00
Standard Deviation:	1.20	8.71
Range:	3.38	22.37
Minimum:	-0.20	1.01
Maximum:	3.18	23.38

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	11.91	17.36
Minimum LLD:	11.91	17.36
Maximum LLD:	11.91	17.36
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	8

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	1	8

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041108-003	RF1	L01	2	RF1M1-2-1	-0.20	11.91	10.60	17.36
CS041108-003	RF1	L01	2	RF1M1-2-2	-0.20	11.91	1.01	17.36
CS041108-003	RF1	L01	2	RF1M1-2-3	-0.20	11.91	23.38	17.36
CS041108-003	RF1	L01	2	RF1M1-2-4	-0.20	11.91	1.01	17.36
CS041108-004	RF1	L01	2	RF1G1-2-1	-0.20	11.91	20.18	17.36
CS041108-004	RF1	L01	2	RF1G1-2-2	3.18	11.91	16.99	17.36
CS041108-004	RF1	L01	2	RF1G1-2-3	-0.20	11.91	4.21	17.36
CS041108-004	RF1	L01	2	RF1G1-2-4	-0.20	11.91	7.40	17.36

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	N/A	4.464E-01	0.05
Median:	N/A	4.464E-01	0.05
Standard Deviation:	N/A	3.096E-01	0.02
Range:	N/A	6.564E-01	0.03
Minimum:	N/A	2.365E-01	0.03
Maximum:	N/A	6.564E-01	0.06

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:	1.398E-01	1.191E-01
Minimum MDC:	7.635E-02	4.978E-02
Maximum MDC:	2.319E-01	1.908E-01
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	4	4
Positive Results:	0	2

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	N/A	No	No
No. Measurement > Action Level	0	0	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041108-011	RF1	L01	2	1	109.9	1.190E-01		6.564E-01	1.345E-01	0.09
CS041108-012	RF1	L01	2	2	56.4	2.319E-01			1.908E-01	0.06
CS041108-013	RF1	L01	2	3	171.3	7.635E-02		2.365E-01	4.978E-02	0.04
CS041108-014	RF1	L01	2	4	99.6	1.313E-01			1.014E-01	0.04

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
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GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1132 301C1 **Package Type:** Structure

Survey Area Name: Fan House (1132)

Survey Unit Name: Exterior Walls and Roof

QC Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041108-010	RF1	Q02	2	1	42.1		3.106E-01		2.770E-01	0.1

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = 0.1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL [illegible]

$$Unity\ Test = \frac{C_{^{60}Co}}{Act\ Level_{^{60}Co}} + \frac{C_{^{137}Cs}}{Act\ Level_{^{137}Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041108-011					2.145E+00				
MDC =>					*2.706E+00*				
CS041108-012							4.388E-01		2.067E+00
MDC =>							*5.615E-01*		*1.480E+00*
CS041108-013									
MDC =>									
CS041108-014									
MDC =>									

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	dpm/100 cm²
Mean:	16
Median:	-12
Standard Deviation:	164
Range:	528
Minimum:	-180
Maximum:	349
Number of Measurements	
Prescribed:	0
Collected:	20
Reported:	20

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	414
Minimum MDC:	340
Maximum MDC:	582
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	9

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041103-014	BE1M1	B02FS	00001	00001	1.00	376	1,340	-113	113
DL041103-014	BE1M1	B02FS	00001	00002	1.00	358	1,419	105	-105
DL041103-014	BE1M1	B02FS	00001	00003	1.00	340	1,272	92	-92
DL041103-014	BE1M1	B02FS	00001	00004	1.00	365	1,306	-59	59
DL041103-014	BE1M1	B02FS	00001	00005	1.00	399	1,512	-134	134
DL041103-014	BE1M1	B02FS	00001	00006	1.00	386	1,562	29	-29
DL041103-014	BE1M1	B02FS	00001	00007	1.00	411	1,625	-122	122
DL041103-014	BE1M1	B02FS	00001	00008	1.00	488	2,339	-151	151
DL041111-009	BE1M1	B02FS	00001	00020	1.00	582	3,914	349	-349
DL041103-014	RF1G1	B02FS	00002	00001	1.00	424	1,898	34	-34
DL041103-014	RF1G1	B02FS	00002	00003	1.00	388	1,730	176	-176
DL041103-014	RF1G1	B02FS	00002	00004	1.00	374	1,781	340	-340
DL041105-019	RF1G1	B02FS	00002	00001	1.00	420	1,485	-166	166
DL041105-019	RF1G1	B02FS	00002	00002	1.00	391	1,406	-18	18
DL041105-019	RF1G1	B02FS	00002	00003	1.00	415	1,886	277	-277
DL041105-019	RF1G1	B02FS	00002	00004	1.00	441	1,812	-14	14
DL041105-019	RF1M1	B02FS	00002	00001	1.00	420	1,646	-9	9
DL041105-019	RF1M1	B02FS	00002	00002	1.00	402	1,388	-124	124
DL041105-019	RF1M1	B02FS	00002	00003	1.00	443	1,858	14	-14
DL041105-019	RF1M1	B02FS	00002	00004	1.00	453	1,752	-180	180

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DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041103-014	BE1M1	B02GS	00001	00001	1.00	346	346	1,453
DL041103-014	BE1M1	B02GS	00001	00002	1.00	313	313	1,314
DL041103-014	BE1M1	B02GS	00001	00003	1.00	281	281	1,180
DL041103-014	BE1M1	B02GS	00001	00004	1.00	325	325	1,365
DL041103-014	BE1M1	B02GS	00001	00005	1.00	392	392	1,646
DL041103-014	BE1M1	B02GS	00001	00006	1.00	365	365	1,533
DL041103-014	BE1M1	B02GS	00001	00007	1.00	416	416	1,747
DL041103-014	BE1M1	B02GS	00001	00008	1.00	593	593	2,490
DL041111-009	BE1M1	B02GS	00001	00020	1.00	849	849	3,565
DL041103-014	RF1G1	B02GS	00002	00001	1.00	444	444	1,865
DL041103-014	RF1G1	B02GS	00002	00003	1.00	370	370	1,554
DL041103-014	RF1G1	B02GS	00002	00004	1.00	343	343	1,440
DL041105-019	RF1G1	B02GS	00002	00001	1.00	358	358	1,651
DL041105-019	RF1G1	B02GS	00002	00002	1.00	309	309	1,425
DL041105-019	RF1G1	B02GS	00002	00003	1.00	349	349	1,609
DL041105-019	RF1G1	B02GS	00002	00004	1.00	396	396	1,826
DL041105-019	RF1M1	B02GS	00002	00001	1.00	359	359	1,655
DL041105-019	RF1M1	B02GS	00002	00002	1.00	328	328	1,512
DL041105-019	RF1M1	B02GS	00002	00003	1.00	400	400	1,844
DL041105-019	RF1M1	B02GS	00002	00004	1.00	419	419	1,932

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measurement MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041103-012	BE1M1	B02QS	00001	00001	1.00	329	1,107	71	-71
DL041103-012	RF1G1	B02QS	00002	00001	1.00	384	1,782	356	-356

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041103-012	BE1M1	B02PS	00001	00001	1.00	233	233	1,036
DL041103-012	RF1G1	B02PS	00002	00001	1.00	321	321	1,427

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DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm^2)	Efficiency	Survey Technician
DL041103-012	189088	44-116	PR197315	125	0.18	PAM7843
DL041103-014	180716	44-116	PR188386	125	0.1905	JGS8492
DL041105-019	203468	44-116	PR203147	125	0.1735	CHM2299
DL041111-009	180716	44-116	PR188386	125	0.1905	JGS8492

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	46.60	Mean:	20.44
Median:	46.60	Median:	20.44
Standard Deviation:		Standard Deviation:	
Range:	0.00	Range:	0.00
Minimum:	46.60	Minimum:	20.44
Maximum:	46.60	Maximum:	20.44

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041111-007	BE1M1	G01FN	00001	00020	48,275	46.6

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041111-007	BE1M1	G02FN	00001	00020	21,178	20.4

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL041111-007	201186	44-10	PR196942	6.22E+10	TDG7534

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.48	7.08
Median:	-0.20	4.21
Standard Deviation:	1.39	9.09
Range:	3.38	31.95
Minimum:	-0.20	-2.18
Maximum:	3.18	29.77

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	11.91	17.36
Minimum LLD:	11.91	17.36
Maximum LLD:	11.91	17.36
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	20

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	4	17

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041103-006	BE1	L01	1	BE 1-1	3.18	11.91	4.21	17.36
CS041103-006	BE1	L01	1	BE 1-2	3.18	11.91	1.01	17.36
CS041103-006	BE1	L01	1	BE 1-3	-0.20	11.91	4.21	17.36
CS041103-006	BE1	L01	1	BE 1-4	-0.20	11.91	-2.18	17.36
CS041103-006	BE1	L01	1	BE 1-5	3.18	11.91	4.21	17.36
CS041103-006	BE1	L01	1	BE 1-6	-0.20	11.91	4.21	17.36
CS041103-006	BE1	L01	1	BE 1-7	-0.20	11.91	7.40	17.36
CS041103-006	BE1	L01	1	BE 1-8	3.18	11.91	10.60	17.36
CS041103-008	RF1	L01	2	RF 2-1	-0.20	11.91	26.57	17.36
CS041103-008	RF1	L01	2	RF 2-2	-0.20	11.91	-2.18	17.36
CS041103-008	RF1	L01	2	RF 2-3	-0.20	11.91	1.01	17.36
CS041103-008	RF1	L01	2	RF 2-4	-0.20	11.91	13.79	17.36
CS041108-001	RF1	L01	2	RF1G1-2-1	-0.20	11.91	16.99	17.36

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1133 301C1 **Package Type:** Structure

Survey Area Name: Waste Handling Building (1133)

Survey Unit Name: Exterior Walls and Roof

CS041108-001	RF1	L01	2	RF1G1-2-2	-0.20	11.91	29.77	17.36
CS041108-001	RF1	L01	2	RF1G1-2-3	-0.20	11.91	13.79	17.36
CS041108-001	RF1	L01	2	RF1G1-2-4	-0.20	11.91	-2.18	17.36
CS041108-001	RF1	L01	2	RF1M1-2-1	-0.20	11.91	7.40	17.36
CS041108-001	RF1	L01	2	RF1M1-2-2	-0.20	11.91	1.01	17.36
CS041108-001	RF1	L01	2	RF1M1-2-3	-0.20	11.91	1.01	17.36
CS041108-001	RF1	L01	2	RF1M1-2-4	-0.20	11.91	1.01	17.36

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

Statistical Summary	dpm/100 cm²
Mean:	846
Median:	572
Standard Deviation:	1,010
Range:	3,071
Minimum:	240
Maximum:	3,311
Number of Measurements	
Prescribed:	0
Collected:	8
Reported:	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	357
Minimum MDC:	282
Maximum MDC:	538
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	8

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (Act.Level-Result) (dpm/100 cm²)
DL041012-003	BE1C2	B02FS	00001	00001	1.00	335	1,706	566	-566
DL041012-003	BE1C2	B02FS	00001	00002	1.00	282	1,372	578	-578
DL041012-003	BE1C2	B02FS	00002	00001	1.00	332	1,870	751	-751
DL041012-003	BE1C2	B02FS	00002	00002	1.00	296	1,165	287	-287
DL041018-004	BE1C2	B02FS	00003	00001	1.00	357	1,471	240	-240
DL041018-004	BE1C2	B02FS	00003	00002	1.00	337	1,533	444	-444
DL041018-004	BE1C2	B02FS	00003	00003	1.00	379	1,978	591	-591
DL041018-004	BE1C2	B02FS	00003	00004	1.00	538	6,173	3,311	-3,311

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041012-003	BE1C2	B02GS	00001	00001	1.00	270	270	1,140
DL041012-003	BE1C2	B02GS	00001	00002	1.00	188	188	794
DL041012-003	BE1C2	B02GS	00002	00001	1.00	265	265	1,119
DL041012-003	BE1C2	B02GS	00002	00002	1.00	208	208	878
DL041018-004	BE1C2	B02GS	00003	00001	1.00	277	277	1,231
DL041018-004	BE1C2	B02GS	00003	00002	1.00	245	245	1,089
DL041018-004	BE1C2	B02GS	00003	00003	1.00	312	312	1,387
DL041018-004	BE1C2	B02GS	00003	00004	1.00	644	644	2,862

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041012-005	BE1C2	B02QS	00002	00003	1.00	301	1,138	280	-280

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041012-005	BE1C2	B02PS	00002	00003	1.00	193	193	858

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041012-003	192608	44-116	PR197314	125	0.1895	PAM7843
DL041012-005	189088	44-116	PR197315	125	0.18	PAM7843
DL041018-004	189088	44-116	PR197315	125	0.18	PAM7843

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

Statistical Summary	dpm/100 cm²	Measurement Sensitivity	dpm/100 cm²
Mean:	44	Mean MDC:	22
Median:	44	Minimum MDC:	22
Standard Deviation:		Maximum MDC:	22
Range:	0	Action Level:	0
Minimum:	44	**Test Performed**	
Maximum:	44	No. Collected ≥ Prescribed	Yes
Number of Measurements		Max MDC < 50% Action Level	No
Prescribed	0	Measurements > Action Level	Yes
Collected	1	Measurement Mean > Action Level	Yes
Reported	1	No. Measurement > Action Level	1

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041019-004	BE1C2	A03FS	00003	00004	1.00	22	44	44	-44

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041019-004	BE1C2	A03GS	00003	00004	1.00	0	0	0

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041108-001	BE1C2	A03QS	00003	00004	1.00	92	17	-8	8

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041108-001	BE1C2	A03FS	00003	00004	1.00	3	3	25

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041019-004	180716	43-90	PR188387	125	0.10825	RDF6510
DL041108-001	180718	43-90	PR188388	125	0.0965	PAM7843

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	23.14	Mean:	13.32
Median:	22.69	Median:	13.27
Standard Deviation:	1.07	Standard Deviation:	0.17
Range:	2.29	Range:	0.38
Minimum:	22.44	Minimum:	13.18
Maximum:	24.74	Maximum:	13.56

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041019-008	BE1C2	G01FN	00003	00004	24,833	24.7
DL041112-002	BE1C2	G01FN	00003	00004	22,958	22.4
DL041112-002	BE1C2	G01FN	00003	00004	23,275	22.8
DL041112-002	BE1C2	G01FN	00003	00004	23,147	22.6

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041019-008	BE1C2	G02FN	00003	00004	13,380	13.3
DL041112-002	BE1C2	G02FN	00003	00004	13,478	13.2
DL041112-002	BE1C2	G02FN	00003	00004	13,518	13.2
DL041112-002	BE1C2	G02FN	00003	00004	13,867	13.6

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL041112-002	193707	44-10	PR198931	6.14E+10	PAM7843
DL041019-008	180718	44-10	PR188338	6.02E+10	PAM7843

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1134 301C2 **Package Type:** Structure

Survey Area Name: Primary Pump House (1134)

Survey Unit Name: Primary Pump House Exterior Walls (Rev. 0)

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	-0.25	12.75
Median:	-0.25	8.40
Standard Deviation:	0.00	10.20
Range:	0.00	32.67
Minimum:	-0.25	1.86
Maximum:	-0.25	34.53

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	12.54	15.91
Minimum LLD:	12.54	15.91
Maximum LLD:	12.54	15.91
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	9

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	No	Yes
Measurement Mean > Action Level	No	Yes
No. Measurement > Action Level	0	9

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041012-003	BE1	L01	2	1-1	-0.25	12.54	5.13	15.91
CS041012-003	BE1	L01	2	1-2	-0.25	12.54	8.40	15.91
CS041012-003	BE1	L01	2	2-1	-0.25	12.54	14.93	15.91
CS041012-003	BE1	L01	2	2-2	-0.25	12.54	5.13	15.91
CS041012-003	BE1	L01	2	2-3	-0.25	12.54	1.86	15.91
CS041018-001	BE1	L01	3	C2-3-1	-0.25	12.54	21.46	15.91
CS041018-001	BE1	L01	3	C2-3-2	-0.25	12.54	14.93	15.91
CS041018-001	BE1	L01	3	C2-3-3	-0.25	12.54	8.40	15.91
CS041018-001	BE1	L01	3	C2-3-4	-0.25	12.54	34.53	15.91

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 210C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Crawl Space, Area 7

Statistical Summary	dpm/100 cm²
Mean:	450
Median:	490
Standard Deviation:	121
Range:	346
Minimum:	262
Maximum:	608
Number of Measurements	
Prescribed:	0
Collected:	8
Reported:	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	332
Minimum MDC:	303
Maximum MDC:	356
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	8

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041019-015	CL1C1	B02FS	00003	00001	1.00	323	1,537	485	-485
DL041019-015	CL1C1	B02FS	00003	00002	1.00	343	1,494	304	-304
DL041019-015	CL1C1	B02FS	00003	00003	1.00	356	1,554	262	-262
DL041019-015	WL1C1	B02FS	00002	00001	1.00	340	1,554	384	-384
DL041019-015	WL1C1	B02FS	00002	00002	1.00	331	1,663	553	-553
DL041019-015	WL1C1	B02FS	00002	00003	1.00	303	1,431	507	-507
DL041019-015	WL1C1	B02FS	00002	00004	1.00	331	1,718	608	-608
DL041019-015	WL1C1	B02FS	00002	00005	1.00	331	1,604	494	-494

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041019-015	CL1C1	B02GS	00003	00001	1.00	249	249	1,051
DL041019-015	CL1C1	B02GS	00003	00002	1.00	282	282	1,191
DL041019-015	CL1C1	B02GS	00003	00003	1.00	306	306	1,292
DL041019-015	WL1C1	B02GS	00002	00001	1.00	277	277	1,169
DL041019-015	WL1C1	B02GS	00002	00002	1.00	263	263	1,110
DL041019-015	WL1C1	B02GS	00002	00003	1.00	219	219	925
DL041019-015	WL1C1	B02GS	00002	00004	1.00	263	263	1,110
DL041019-015	WL1C1	B02GS	00002	00005	1.00	263	263	1,110

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 210C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Crawl Space, Area 7

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041019-014	CL1C1	B02QS	00003	00001	1.00	455	1,997	46	-46

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041019-014	CL1C1	B02PS	00003	00001	1.00	423	423	1,950

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041019-014	126196	44-116	PR203147	125	0.1735	TEM5562
DL041019-015	126195	44-116	PR197314	125	0.1895	PAM7843

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 210C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Crawl Space, Area 7

Statistical Summary	dpm/100 cm²
Mean:	52
Median:	52
Standard Deviation:	
Range:	0
Minimum:	52
Maximum:	52
Number of Measurements	
Prescribed	0
Collected	1
Reported	1

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	82
Minimum MDC:	82
Maximum MDC:	82
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	1

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041019-013	CL1C1	A03FS	00003	00001	1.00	82	74	52	-52

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041019-013	CL1C1	A03GS	00003	00001	1.00	3	3	22

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041019-013	180716	43-90	PR188387	125	0.10825	JGS8492

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1141 210C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Crawl Space, Area 7

Statistical Summary (contact)	μr/hr	Statistical Summary (1 meter)	μr/hr
Mean:	7.77	Mean:	7.69
Median:	7.88	Median:	7.76
Standard Deviation:	0.59	Standard Deviation:	0.47
Range:	1.82	Range:	1.29
Minimum:	6.51	Minimum:	6.90
Maximum:	8.32	Maximum:	8.19

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041019-012	FL1G1	G01FN	00001	00001	6,508	6.5
DL041019-012	FL1G1	G01FN	00001	00002	8,112	8.1
DL041019-012	FL1G1	G01FN	00001	00003	8,272	8.3
DL041019-012	FL1G1	G01FN	00001	00004	7,460	7.5
DL041019-012	FL1G1	G01FN	00001	00005	7,736	7.7
DL041019-012	FL1G1	G01FN	00001	00006	7,812	7.8
DL041019-012	FL1G1	G01FN	00001	00007	7,944	7.9
DL041019-012	FL1G1	G01FN	00001	00008	8,324	8.3

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041019-012	FL1G1	G02FN	00001	00001	6,900	6.9
DL041019-012	FL1G1	G02FN	00001	00002	8,152	8.2
DL041019-012	FL1G1	G02FN	00001	00003	8,188	8.2
DL041019-012	FL1G1	G02FN	00001	00004	7,404	7.4
DL041019-012	FL1G1	G02FN	00001	00005	7,244	7.2
DL041019-012	FL1G1	G02FN	00001	00006	7,740	7.7
DL041019-012	FL1G1	G02FN	00001	00007	7,780	7.8
DL041019-012	FL1G1	G02FN	00001	00008	8,096	8.1

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor*	Survey Technician
DL041019-012	180715	44-10	PR188344	6.00E+10	TEM5562

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 210C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Crawl Space, Area 7

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	-0.25	10.57
Median:	-0.25	5.13
Standard Deviation:	0.00	13.47
Range:	0.00	42.47
Minimum:	-0.25	1.86
Maximum:	-0.25	44.33

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	12.54	15.91
Minimum LLD:	12.54	15.91
Maximum LLD:	12.54	15.91
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	9

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	No	Yes
Measurement Mean > Action Level	No	Yes
No. Measurement > Action Level	0	9

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041019-001	WL1	L01	N/A	CL1-3-1	-0.25	12.54	5.13	15.91
CS041019-001	WL1	L01	N/A	CL1-3-2	-0.25	12.54	8.40	15.91
CS041019-001	WL1	L01	N/A	CL1-3-3	-0.25	12.54	1.86	15.91
CS041019-001	WL1	L01	N/A	CL1-3-4	-0.25	12.54	44.33	15.91
CS041019-001	WL1	L01	N/A	WL1-2-1	-0.25	12.54	14.93	15.91
CS041019-001	WL1	L01	N/A	WL1-2-2	-0.25	12.54	1.86	15.91
CS041019-001	WL1	L01	N/A	WL1-2-3	-0.25	12.54	11.66	15.91
CS041019-001	WL1	L01	N/A	WL1-2-4	-0.25	12.54	5.13	15.91
CS041019-001	WL1	L01	N/A	WL1-2-5	-0.25	12.54	1.86	15.91

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Statistical Summary	dpm/100 cm²
Mean:	263
Median:	121
Standard Deviation:	565
Range:	1,801
Minimum:	-137
Maximum:	1,664
Number of Measurements	
Prescribed:	0
Collected:	16
Reported:	16

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	471
Minimum MDC:	442
Maximum MDC:	503
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	10

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL040707-004	FL1G1	B02FS	00001	00001	1.00	473	1,708	-44	44
DL040707-004	FL1G1	B02FS	00007	00001	1.00	442	1,812	291	-291
DL040707-004	FL1G1	B02FS	00011	00001	1.00	499	2,141	181	-181
DL040707-004	FL1G1	B02FS	00016	00001	1.00	467	1,806	99	-99
DL040707-004	FL1G1	B02FS	00019	00001	1.00	450	1,724	143	-143
DL040707-004	FL1G1	B02FS	00021	00001	1.00	457	1,493	-137	137
DL040707-004	FL1G1	B02FS	00025	00001	1.00	476	1,680	-93	93
DL040707-005	FL1G1	B02FS	00001	00001	1.00	503	3,651	1,664	-1,664
DL040707-005	FL1G1	B02FS	00007	00001	1.00	442	1,812	291	-291
DL040707-005	FL1G1	B02FS	00011	00001	1.00	499	2,141	181	-181
DL040707-005	FL1G1	B02FS	00016	00001	1.00	467	1,806	99	-99
DL040707-005	FL1G1	B02FS	00017	00001	1.00	473	1,708	-44	44
DL040707-005	FL1G1	B02FS	00019	00001	1.00	450	1,724	143	-143
DL040707-005	FL1G1	B02FS	00021	00001	1.00	457	1,493	-137	137
DL040707-005	FL1G1	B02FS	00025	00001	1.00	476	1,680	-93	93
DL040707-004	FL1Y1	B02FS	00001	00001	1.00	503	3,651	1,664	-1,664

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL040707-004	FL1G1	B02GS	00001	00001	1.00	319	319	1,752
DL040707-004	FL1G1	B02GS	00007	00001	1.00	277	277	1,521

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL040707-004	FL1G1	B02GS	00011	00001	1.00	357	357	1,960
DL040707-004	FL1G1	B02GS	00016	00001	1.00	311	311	1,708
DL040707-004	FL1G1	B02GS	00019	00001	1.00	288	288	1,581
DL040707-004	FL1G1	B02GS	00021	00001	1.00	297	297	1,631
DL040707-004	FL1G1	B02GS	00025	00001	1.00	323	323	1,774
DL040707-005	FL1G1	B02GS	00001	00001	1.00	362	362	1,988
DL040707-005	FL1G1	B02GS	00007	00001	1.00	277	277	1,521
DL040707-005	FL1G1	B02GS	00011	00001	1.00	357	357	1,960
DL040707-005	FL1G1	B02GS	00016	00001	1.00	311	311	1,708
DL040707-005	FL1G1	B02GS	00017	00001	1.00	319	319	1,752
DL040707-005	FL1G1	B02GS	00019	00001	1.00	288	288	1,581
DL040707-005	FL1G1	B02GS	00021	00001	1.00	297	297	1,631
DL040707-005	FL1G1	B02GS	00025	00001	1.00	323	323	1,774
DL040707-004	FL1Y1	B02GS	00001	00001	1.00	362	362	1,988

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL040707-004	193707	44-116	PR203147	125	0.1457	BAD8661
DL040707-005	193707	44-116	PR203147	125	0.1457	BAD8661

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Statistical Summary	dpm/100 cm²
Mean:	14
Median:	16
Standard Deviation:	11
Range:	33
Minimum:	0
Maximum:	33
Number of Measurements	
Prescribed	0
Collected	8
Reported	8

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	70
Minimum MDC:	33
Maximum MDC:	105
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	6

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL040707-006	FL1G1	A03FS	00007	00001	1.00	84	33	22	-22
DL040707-006	FL1G1	A03FS	00011	00001	1.00	33	11	11	-11
DL040707-006	FL1G1	A03FS	00016	00001	1.00	105	22	0	0
DL040707-006	FL1G1	A03FS	00017	00001	1.00	84	22	11	-11
DL040707-006	FL1G1	A03FS	00019	00001	1.00	105	22	0	0
DL040707-006	FL1G1	A03FS	00021	00001	1.00	84	22	11	-11
DL040707-006	FL1G1	A03FS	00025	00001	1.00	33	22	22	-22
DL040707-006	FL1Y1	A03FS	00001	00001	1.00	33	33	33	-33

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL040707-006	FL1G1	A03GS	00007	00001	1.00	1	1	11
DL040707-006	FL1G1	A03GS	00011	00001	1.00	0	0	0
DL040707-006	FL1G1	A03GS	00016	00001	1.00	2	2	22
DL040707-006	FL1G1	A03GS	00017	00001	1.00	1	1	11
DL040707-006	FL1G1	A03GS	00019	00001	1.00	2	2	22
DL040707-006	FL1G1	A03GS	00021	00001	1.00	1	1	11
DL040707-006	FL1G1	A03GS	00025	00001	1.00	0	0	0
DL040707-006	FL1Y1	A03GS	00001	00001	1.00	0	0	0

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL040707-006	180716	43-90	PR188387	125	0.073125	SLM2556

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Statistical Summary (contact)	μR/hr	Statistical Summary (1 meter)	μR/hr
Mean:	8.06	Mean:	8.02
Median:	7.06	Median:	7.61
Standard Deviation:	2.03	Standard Deviation:	1.25
Range:	5.53	Range:	3.81
Minimum:	6.50	Minimum:	6.74
Maximum:	12.03	Maximum:	10.55

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL040707-003	FL1G1	G01FN	00007	00001	7,868	7.7
DL040707-003	FL1G1	G01FN	00011	00001	12,284	12.0
DL040707-003	FL1G1	G01FN	00016	00001	7,256	7.1
DL040707-003	FL1G1	G01FN	00017	00001	7,164	7.0
DL040707-003	FL1G1	G01FN	00019	00001	6,636	6.5
DL040707-003	FL1G1	G01FN	00021	00001	7,076	6.9
DL040707-003	FL1G1	G01FN	00025	00001	6,904	6.8
DL040707-003	FL1Y1	G01FN	00001	00001	10,624	10.4

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL040707-003	FL1G1	G02FN	00007	00001	7,952	7.8
DL040707-003	FL1G1	G02FN	00011	00001	10,768	10.5
DL040707-003	FL1G1	G02FN	00016	00001	7,372	7.2
DL040707-003	FL1G1	G02FN	00017	00001	7,716	7.6
DL040707-003	FL1G1	G02FN	00019	00001	6,860	6.7
DL040707-003	FL1G1	G02FN	00021	00001	7,560	7.4
DL040707-003	FL1G1	G02FN	00025	00001	7,816	7.7
DL040707-003	FL1Y1	G02FN	00001	00001	9,452	9.3

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL040707-003	180718	44-10	PR188338	6.13E+10	BAD8661

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 211C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: First Floor Offices, Lobby, Conference Room, Classroom, Janitor

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	-0.06	5.31
Median:	-0.50	4.49
Standard Deviation:	1.24	4.19
Range:	3.50	13.06
Minimum:	-0.50	-0.40
Maximum:	3.00	12.66

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	13.85	20.26
Minimum LLD:	13.85	20.26
Maximum LLD:	13.85	20.26
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	8

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	No	Yes
No. Measurement > Action Level	1	7

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS040707-001	FL1	L01	N/A	FL1-1-1	-0.50	13.85	2.86	20.26
CS040707-001	FL1	L01	N/A	FL1-11-1	-0.50	13.85	2.86	20.26
CS040707-001	FL1	L01	N/A	FL1-16-1	3.00	13.85	9.40	20.26
CS040707-001	FL1	L01	N/A	FL1-17-1	-0.50	13.85	12.66	20.26
CS040707-001	FL1	L01	N/A	FL1-19-1	-0.50	13.85	-0.40	20.26
CS040707-001	FL1	L01	N/A	FL1-21-1	-0.50	13.85	6.13	20.26
CS040707-001	FL1	L01	N/A	FL1-25-1	-0.50	13.85	6.13	20.26
CS040707-001	FL1	L01	N/A	FL1-7-1	-0.50	13.85	2.86	20.26

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Statistical Summary	dpm/100 cm²
Mean:	305
Median:	133
Standard Deviation:	742
Range:	3,831
Minimum:	-267
Maximum:	3,564
Number of Measurements	
Prescribed:	0
Collected:	31
Reported:	31

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	446
Minimum MDC:	381
Maximum MDC:	605
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	18

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL090303-001	CL1G1	B02FS	00002	00001	0.50	430	1,107	133	-133
DL090303-001	FL1C1	B02FS	00005	00001	0.50	448	1,523	463	-463
DL090303-001	FL1C1	B02FS	00007	00001	0.50	425	1,688	738	-738
DL090303-001	FL1G1	B02FS	00001	00001	0.50	400	1,044	212	-212
DL090303-001	FL1G1	B02FS	00002	00001	0.50	381	1,080	306	-306
DL090303-001	FL1G1	B02FS	00003	00001	0.50	448	1,193	133	-133
DL090303-001	FL1G1	B02FS	00004	00001	0.50	429	1,091	126	-126
DL090303-001	FL1G1	B02FS	00009	00001	0.50	434	1,123	133	-133
DL090303-001	FL1G1	B02FS	00010	00001	0.50	454	1,178	86	-86
DL090303-001	FL1G1	B02FS	00011	00001	0.50	417	1,115	204	-204
DL090303-001	FL1G1	B02FS	00012	00001	0.50	424	926	-16	16
DL090303-001	FL1G1	B02FS	00014	00001	0.50	414	1,256	361	-361
DL090303-001	FL1G1	B02FS	00015	00001	0.50	434	989	0	0
DL090303-001	FL1G1	B02FS	00016	00001	0.50	425	1,201	251	-251
DL090403-004	FL1G1	B02FS	00013	00001	0.50	605	1,636	-9	9
DL090403-004	FL1G1	B02FS	00017	00001	0.50	571	1,636	178	-178
DL090303-001	FL1Y1	B02FS	00006	00001	0.50	456	2,709	1,609	-1,609
DL090303-001	FL1Y1	B02FS	00008	00001	0.50	469	2,685	1,515	-1,515
DL090303-001	WL1G1	B02FS	00008	00001	0.50	437	4,569	3,564	-3,564
DL090303-001	WU1G1	B02FS	00001	00001	0.50	394	974	165	-165
DL090303-001	WU1G1	B02FS	00003	00001	0.50	435	793	-204	204
DL090303-001	WU1G1	B02FS	00004	00001	0.50	442	871	-157	157
DL090303-001	WU1G1	B02FS	00009	00001	0.50	419	809	-110	110

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (Act.Level-Result) (dpm/100 cm²)
DL090303-001	WU1G1	B02FS	00010	00001	0.50	427	895	-63	63
DL090303-001	WU1G1	B02FS	00011	00001	0.50	445	864	-181	181
DL090303-001	WU1G1	B02FS	00012	00001	0.50	414	840	-55	55
DL090303-001	WU1G1	B02FS	00014	00001	0.50	392	793	-8	8
DL090303-001	WU1G1	B02FS	00015	00001	0.50	462	919	-212	212
DL090303-001	WU1G1	B02FS	00016	00001	0.50	440	754	-267	267
DL090403-004	WU1G1	B02FS	00013	00001	0.50	476	1,570	579	-579
DL090403-004	WU1G1	B02FS	00017	00001	0.50	573	1,458	-9	9

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL090303-001	CL1G1	B02GS	00002	00001	0.50	124	248	974
DL090303-001	FL1C1	B02GS	00005	00001	0.50	135	270	1,060
DL090303-001	FL1C1	B02GS	00007	00001	0.50	121	242	950
DL090303-001	FL1G1	B02GS	00001	00001	0.50	108	212	832
DL090303-001	FL1G1	B02GS	00002	00001	0.50	96	192	754
DL090303-001	FL1G1	B02GS	00003	00001	0.50	135	270	1,060
DL090303-001	FL1G1	B02GS	00004	00001	0.50	123	246	966
DL090303-001	FL1G1	B02GS	00009	00001	0.50	126	252	989
DL090303-001	FL1G1	B02GS	00010	00001	0.50	139	278	1,091
DL090303-001	FL1G1	B02GS	00011	00001	0.50	116	232	911
DL090303-001	FL1G1	B02GS	00012	00001	0.50	120	240	942
DL090303-001	FL1G1	B02GS	00014	00001	0.50	114	228	895
DL090303-001	FL1G1	B02GS	00015	00001	0.50	126	252	989
DL090303-001	FL1G1	B02GS	00016	00001	0.50	121	242	950
DL090403-004	FL1G1	B02GS	00013	00001	0.50	176	352	1,645
DL090403-004	FL1G1	B02GS	00017	00001	0.50	156	312	1,458
DL090303-001	FL1Y1	B02GS	00006	00001	0.50	140	280	1,099
DL090303-001	FL1Y1	B02GS	00008	00001	0.50	149	298	1,170
DL090303-001	WL1G1	B02GS	00008	00001	0.50	128	256	1,005
DL090303-001	WU1G1	B02GS	00001	00001	0.50	103	206	809
DL090303-001	WU1G1	B02GS	00003	00001	0.50	127	254	997
DL090303-001	WU1G1	B02GS	00004	00001	0.50	131	262	1,028
DL090303-001	WU1G1	B02GS	00009	00001	0.50	117	234	919

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL090303-001	WU1G1	B02GS	00010	00001	0.50	122	244	958
DL090303-001	WU1G1	B02GS	00011	00001	0.50	133	266	1,044
DL090303-001	WU1G1	B02GS	00012	00001	0.50	114	228	895
DL090303-001	WU1G1	B02GS	00014	00001	0.50	102	204	801
DL090303-001	WU1G1	B02GS	00015	00001	0.50	144	288	1,131
DL090303-001	WU1G1	B02GS	00016	00001	0.50	130	260	1,021
DL090403-004	WU1G1	B02GS	00013	00001	0.50	106	212	991
DL090403-004	WU1G1	B02GS	00017	00001	0.50	157	314	1,467

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL090303-001	180716	44-116	PR188386	125	0.2038	JPH5419
DL090403-004	180718	44-116	PR187571	125	0.1712	JPH5419

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Statistical Summary	dpm/100 cm²
Mean:	19
Median:	9
Standard Deviation:	44
Range:	232
Minimum:	-19
Maximum:	213
Number of Measurements	
Prescribed	0
Collected	31
Reported	31

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	49
Minimum MDC:	29
Maximum MDC:	69
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	20

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL090303-002	CL1G1	A03FS	00002	00001	2.00	65	43	-3	3
DL090303-002	FL1C1	A03FS	00005	00001	2.00	41	96	80	-80
DL090303-002	FL1C1	A03FS	00007	00001	2.00	38	71	59	-59
DL090303-002	FL1G1	A03FS	00001	00001	2.00	50	28	3	-3
DL090303-002	FL1G1	A03FS	00002	00001	2.00	47	28	6	-6
DL090303-002	FL1G1	A03FS	00003	00001	2.00	55	53	22	-22
DL090303-002	FL1G1	A03FS	00004	00001	2.00	69	34	-19	19
DL090303-002	FL1G1	A03FS	00009	00001	2.00	52	46	19	-19
DL090303-002	FL1G1	A03FS	00010	00001	2.00	44	28	9	-9
DL090303-002	FL1G1	A03FS	00011	00001	2.00	47	31	9	-9
DL090303-002	FL1G1	A03FS	00012	00001	2.00	47	15	-6	6
DL090303-002	FL1G1	A03FS	00014	00001	2.00	47	53	31	-31
DL090303-002	FL1G1	A03FS	00015	00001	2.00	44	31	12	-12
DL090303-002	FL1G1	A03FS	00016	00001	2.00	55	25	-6	6
DL090403-003	FL1G1	A03FS	00013	00001	2.00	38	31	18	-18
DL090403-003	FL1G1	A03FS	00017	00001	2.00	38	15	3	-3
DL090303-002	FL1Y1	A03FS	00006	00001	2.00	65	139	93	-93
DL090303-002	FL1Y1	A03FS	00008	00001	2.00	65	62	15	-15
DL090303-002	WL1G1	A03FS	00008	00001	2.00	55	244	213	-213
DL090303-002	WU1G1	A03FS	00001	00001	2.00	50	43	19	-19
DL090303-002	WU1G1	A03FS	00003	00001	2.00	55	40	9	-9
DL090303-002	WU1G1	A03FS	00004	00001	2.00	67	34	-15	15
DL090303-002	WU1G1	A03FS	00009	00001	2.00	30	28	22	-22

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL090303-002	WU1G1	A03FS	00010	00001	2.00	44	12	-6	6
DL090303-002	WU1G1	A03FS	00011	00001	2.00	55	22	-9	9
DL090303-002	WU1G1	A03FS	00012	00001	2.00	38	34	22	-22
DL090303-002	WU1G1	A03FS	00014	00001	2.00	47	12	-9	9
DL090303-002	WU1G1	A03FS	00015	00001	2.00	47	9	-12	12
DL090303-002	WU1G1	A03FS	00016	00001	2.00	38	12	0	0
DL090403-003	WU1G1	A03FS	00013	00001	2.00	41	12	-3	3
DL090403-003	WU1G1	A03FS	00017	00001	2.00	29	31	24	-24

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL090303-002	CL1G1	A03GS	00002	00001	2.00	15	8	46
DL090303-002	FL1C1	A03GS	00005	00001	2.00	5	3	15
DL090303-002	FL1C1	A03GS	00007	00001	2.00	4	2	12
DL090303-002	FL1G1	A03GS	00001	00001	2.00	8	4	25
DL090303-002	FL1G1	A03GS	00002	00001	2.00	7	4	22
DL090303-002	FL1G1	A03GS	00003	00001	2.00	10	5	31
DL090303-002	FL1G1	A03GS	00004	00001	2.00	17	9	53
DL090303-002	FL1G1	A03GS	00009	00001	2.00	9	5	28
DL090303-002	FL1G1	A03GS	00010	00001	2.00	6	3	19
DL090303-002	FL1G1	A03GS	00011	00001	2.00	7	4	22
DL090303-002	FL1G1	A03GS	00012	00001	2.00	7	4	22
DL090303-002	FL1G1	A03GS	00014	00001	2.00	7	4	22
DL090303-002	FL1G1	A03GS	00015	00001	2.00	6	3	19
DL090303-002	FL1G1	A03GS	00016	00001	2.00	10	5	31
DL090403-003	FL1G1	A03GS	00013	00001	2.00	4	2	12
DL090403-003	FL1G1	A03GS	00017	00001	2.00	4	2	12
DL090303-002	FL1Y1	A03GS	00006	00001	2.00	15	8	46
DL090303-002	FL1Y1	A03GS	00008	00001	2.00	15	8	46
DL090303-002	WL1G1	A03GS	00008	00001	2.00	10	5	31
DL090303-002	WU1G1	A03GS	00001	00001	2.00	8	4	25
DL090303-002	WU1G1	A03GS	00003	00001	2.00	10	5	31
DL090303-002	WU1G1	A03GS	00004	00001	2.00	16	8	49
DL090303-002	WU1G1	A03GS	00009	00001	2.00	2	1	6

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL090303-002	WU1G1	A03GS	00010	00001	2.00	6	3	19
DL090303-002	WU1G1	A03GS	00011	00001	2.00	10	5	31
DL090303-002	WU1G1	A03GS	00012	00001	2.00	4	2	12
DL090303-002	WU1G1	A03GS	00014	00001	2.00	7	4	22
DL090303-002	WU1G1	A03GS	00015	00001	2.00	7	4	22
DL090303-002	WU1G1	A03GS	00016	00001	2.00	4	2	12
DL090403-003	WU1G1	A03GS	00013	00001	2.00	5	3	15
DL090403-003	WU1G1	A03GS	00017	00001	2.00	2	1	6

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL090303-002	180731	43-90	PR188390	125	0.1295	BAD8661
DL090403-003	180715	43-90	PR188389	125	0.1307	JPW4121

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.92	3.32
Median:	-0.20	-0.01
Standard Deviation:	2.49	6.14
Range:	8.66	19.97
Minimum:	-0.20	-3.34
Maximum:	8.46	16.63

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	14.82	20.01
Minimum LLD:	14.82	20.01
Maximum LLD:	14.82	20.01
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	31

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	6	14

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS090303-006	CL1	L01	N/A	CL1 2-1	-0.20	14.82	6.65	20.01
CS090303-003	FL1	L01	N/A	FL1 10-1	-0.20	14.82	6.65	20.01
CS090303-003	FL1	L01	N/A	FL1 1-1	-0.20	14.82	16.63	20.01
CS090303-003	FL1	L01	N/A	FL1 11-1	-0.20	14.82	-0.01	20.01
CS090303-003	FL1	L01	N/A	FL1 12-1	-0.20	14.82	-0.01	20.01
CS090303-003	FL1	L01	N/A	FL1 14-1	-0.20	14.82	-0.01	20.01
CS090303-003	FL1	L01	N/A	FL1 15-1	-0.20	14.82	-3.34	20.01
CS090303-003	FL1	L01	N/A	FL1 16-1	-0.20	14.82	3.32	20.01
CS090303-003	FL1	L01	N/A	FL1 2-1	-0.20	14.82	-3.34	20.01
CS090303-003	FL1	L01	N/A	FL1- 4-1	-0.20	14.82	16.63	20.01
CS090303-003	FL1	L01	N/A	FL1 5-1	4.13	14.82	3.32	20.01
CS090303-003	FL1	L01	N/A	FL1 6-1	8.46	14.82	-0.01	20.01
CS090303-003	FL1	L01	N/A	FL1 7-1	4.13	14.82	-3.34	20.01

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 213C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: Structural Surfaces, 2nd Floor Offices

CS090303-003	FL1	L01	N/A	FL1 8-1	-0.20	14.82	6.65	20.01
CS090303-003	FL1	L01	N/A	FL1 9-1	-0.20	14.82	6.65	20.01
CS090303-003	FL1	L01	N/A	FL1-3-1	-0.20	14.82	-3.34	20.01
CS090403-003	FL1	L01	N/A	FL1 13-1	4.13	14.82	9.98	20.01
CS090403-003	FL1	L01	N/A	FL1 17-1	-0.20	14.82	-0.01	20.01
CS090303-005	WL1	L01	N/A	WL1 8-1	-0.20	14.82	6.65	20.01
CS090303-004	WU1	L01	N/A	WU1 10-1	-0.20	14.82	-3.34	20.01
CS090303-004	WU1	L01	N/A	WU1 1-1	4.13	14.82	-3.34	20.01
CS090303-004	WU1	L01	N/A	WU1 11-1	-0.20	14.82	-0.01	20.01
CS090303-004	WU1	L01	N/A	WU1 12-1	-0.20	14.82	-0.01	20.01
CS090303-004	WU1	L01	N/A	WU1 14-1	-0.20	14.82	3.32	20.01
CS090303-004	WU1	L01	N/A	WU1 15-1	8.46	14.82	-0.01	20.01
CS090303-004	WU1	L01	N/A	WU1 16-1	-0.20	14.82	6.65	20.01
CS090303-004	WU1	L01	N/A	WU1 4-1	-0.20	14.82	16.63	20.01
CS090303-004	WU1	L01	N/A	WU1 9-1	-0.20	14.82	13.30	20.01
CS090303-004	WU1	L01	N/A	WU1-3-1	-0.20	14.82	-0.01	20.01
CS090403-004	WU1	L01	N/A	WU1 13-1	-0.20	14.82	-0.01	20.01
CS090403-004	WU1	L01	N/A	WU1 17-1	-0.20	14.82	-0.01	20.01

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 2I5C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Statistical Summary	dpm/100 cm²
Mean:	783
Median:	685
Standard Deviation:	650
Range:	2,413
Minimum:	-72
Maximum:	2,340
Number of Measurements	
Prescribed:	0
Collected:	32
Reported:	32

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	370
Minimum MDC:	293
Maximum MDC:	452
Action Level:	0
Test Performed	
No. *Collected ≥ Prescribed*	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	31

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041004-003	BE1B1	B02FS	00001	00001	1.00	444	2,853	929	-929
DL041004-003	BE1B1	B02FS	00001	00002	1.00	433	2,627	800	-800
DL041004-003	BE1B1	B02FS	00001	00003	1.00	452	2,818	822	-822
DL041004-003	BE1B1	B02FS	00001	00004	1.00	443	3,013	1,093	-1,093
DL041004-003	BE1B1	B02FS	00001	00005	1.00	308	951	49	-49
DL041004-003	BE1B1	B02FS	00001	00006	1.00	443	2,738	822	-822
DL041004-003	BE1B1	B02FS	00001	00007	1.00	440	2,938	1,044	-1,044
DL041004-003	BE1B1	B02FS	00001	00008	1.00	436	2,889	1,031	-1,031
DL041118-001	BE1B1	B02FS	00001	00009	1.00	385	2,822	1,387	-1,387
DL041118-001	BE1B1	B02FS	00001	00010	1.00	384	2,858	1,427	-1,427
DL041118-001	BE1B1	B02FS	00001	00011	1.00	388	2,920	1,458	-1,458
DL041118-001	BE1B1	B02FS	00001	00012	1.00	367	2,964	1,667	-1,667
DL041020-005	RF1G1	B02FS	00002	00001	1.00	377	1,443	120	-120
DL041020-005	RF1G1	B02FS	00002	00002	1.00	384	2,144	775	-775
DL041021-003	RF1G1	B02FS	00002	00003	1.00	293	1,148	291	-291
DL041021-003	RF1G1	B02FS	00002	00004	1.00	329	1,693	595	-595
DL041021-003	RF1G1	B02FS	00002	00005	1.00	299	1,026	131	-131
DL041021-003	RF1G1	B02FS	00002	00006	1.00	348	1,672	439	-439
DL041021-003	RF1G1	B02FS	00002	00007	1.00	319	1,178	152	-152
DL041021-003	RF1G1	B02FS	00002	00008	1.00	311	1,402	431	-431
DL041122-003	RF1G1	B02FN	GRIT2	SUB09	1.00		2,340	2,340	-2,340
DL041122-003	RF1G1	B02FN	GRIT2	SUB10	1.00		2,034	2,034	-2,034
DL041122-003	RF1G1	B02FN	GRIT2	SUB11	1.00		2,200	2,200	-2,200

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (ActLevel-Result) (dpm/100 cm²)
DL041122-003	RF1G1	B02FS	00002	TOP01	1.00	358	2,289	1,009	-1,009
DL041122-003	RF1G1	B02FS	00002	TOP03	1.00	349	1,417	187	-187
DL041122-003	RF1G1	B02FS	00002	TOP05	1.00	358	1,221	-72	72
DL041122-003	RF1G1	B02FS	00002	TOP07	1.00	335	1,374	247	-247
DL041122-003	RF1G1	B02FS	00003	00001	1.00	357	1,796	511	-511
DL041122-003	RF1G1	B02FS	00003	00002	1.00	374	1,804	391	-391
DL041122-003	RF1G1	B02FS	GRIT2	TOP09	1.00	342	1,434	260	-260
DL041122-003	RF1G1	B02FS	GRIT2	TOP10	1.00	336	1,340	209	-209
DL041122-003	RF1G1	B02FS	GRIT2	TOP11	1.00	349	1,523	294	-294

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041004-003	BE1B1	B02GS	00001	00001	1.00	433	433	1,924
DL041004-003	BE1B1	B02GS	00001	00002	1.00	411	411	1,827
DL041004-003	BE1B1	B02GS	00001	00003	1.00	449	449	1,996
DL041004-003	BE1B1	B02GS	00001	00004	1.00	432	432	1,920
DL041004-003	BE1B1	B02GS	00001	00005	1.00	203	203	902
DL041004-003	BE1B1	B02GS	00001	00006	1.00	431	431	1,916
DL041004-003	BE1B1	B02GS	00001	00007	1.00	426	426	1,893
DL041004-003	BE1B1	B02GS	00001	00008	1.00	418	418	1,858
DL041118-001	BE1B1	B02GS	00001	00009	1.00	323	323	1,436
DL041118-001	BE1B1	B02GS	00001	00010	1.00	322	322	1,431
DL041118-001	BE1B1	B02GS	00001	00011	1.00	329	329	1,462
DL041118-001	BE1B1	B02GS	00001	00012	1.00	292	292	1,298
DL041020-005	RF1G1	B02GS	00002	00001	1.00	287	287	1,323
DL041020-005	RF1G1	B02GS	00002	00002	1.00	297	297	1,369
DL041021-003	RF1G1	B02GS	00002	00003	1.00	203	203	857
DL041021-003	RF1G1	B02GS	00002	00004	1.00	260	260	1,098
DL041021-003	RF1G1	B02GS	00002	00005	1.00	212	212	895
DL041021-003	RF1G1	B02GS	00002	00006	1.00	292	292	1,233
DL041021-003	RF1G1	B02GS	00002	00007	1.00	243	243	1,026
DL041021-003	RF1G1	B02GS	00002	00008	1.00	230	230	971
DL041122-003	RF1G1	B02GS	00002	TOP01	1.00	301	301	1,281
DL041122-003	RF1G1	B02GS	00002	TOP03	1.00	289	289	1,230

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT BETA MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041122-003	RF1G1	B02GS	00002	TOP05	1.00	304	304	1,294
DL041122-003	RF1G1	B02GS	00002	TOP07	1.00	265	265	1,128
DL041122-003	RF1G1	B02GS	00003	00001	1.00	302	302	1,285
DL041122-003	RF1G1	B02GS	00003	00002	1.00	332	332	1,413
DL041122-003	RF1G1	B02GS	GRIT2	TOP09	1.00	276	276	1,174
DL041122-003	RF1G1	B02GS	GRIT2	TOP10	1.00	266	266	1,132
DL041122-003	RF1G1	B02GS	GRIT2	TOP11	1.00	289	289	1,230

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Beta (dpm/100 cm²)	Net Beta Result (dpm/100 cm²)	Test (Act-Level-Result) (dpm/100 cm²)
DL041004-004	BE1B1	B02QS	00001	00001	1.00	409	2,525	802	-802
DL041021-005	RF1G1	B02QS	00002	00007	1.00	303	1,345	430	-430
DL041021-005	RF1G1	B02QS	00002	00008	1.00	319	1,460	443	-443

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Beta (dpm/100 cm²)
DL041004-004	BE1B1	B02PS	00001	00001	1.00	408	408	1,722
DL041021-005	RF1G1	B02PS	00002	00007	1.00	215	215	915
DL041021-005	RF1G1	B02PS	00002	00008	1.00	239	239	1,017

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041004-003	189088	44-116	PR197315	125	0.18	CEN8425
DL041004-004	192608	44-116	PR197314	125	0.1895	DRM0271
DL041020-005	193707	44-116	PR203147	125	0.1735	TDG7534
DL041021-003	192608	44-116	PR197314	125	0.1895	TDG7534
DL041021-005	189094	44-116	PR197312	125	0.188	JGS8492
DL041118-001	189088	44-116	PR197315	125	0.18	PAM7843
DL041122-003	203473	44-116	PR197312	125	0.188	TDG7534

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Statistical Summary	dpm/100 cm²
Mean:	59
Median:	59
Standard Deviation:	30
Range:	91
Minimum:	17
Maximum:	107
Number of Measurements	
Prescribed	0
Collected	7
Reported	7

Measurement Sensitivity	dpm/100 cm²
Mean MDC:	39
Minimum MDC:	25
Maximum MDC:	75
Action Level:	0
Test Performed	
No. Collected ≥ Prescribed	Yes
Max MDC < 50% Action Level	No
Measurements > Action Level	Yes
Measurement Mean > Action Level	Yes
No. Measurement > Action Level	7

Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (cpm/100 cm²)	Net Alpha Result (cpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041105-017	BE1B1	A03FS	00001	00004	1.00	63	41	33	-33
DL041105-017	BE1B1	A03FS	00001	00007	1.00	25	17	17	-17
DL041105-017	BE1B1	A03FS	00001	00008	1.00	25	83	83	-83
DL041118-002	BE1B1	A03FS	00001	00009	1.00	75	68	59	-59
DL041118-002	BE1B1	A03FS	00001	00010	1.00	29	107	107	-107
DL041118-002	BE1B1	A03FS	00001	00011	1.00	29	59	59	-59
DL041118-002	BE1B1	A03FS	00001	00012	1.00	29	59	59	-59

Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041105-017	BE1B1	A03GS	00001	00004	1.00	1	1	8
DL041105-017	BE1B1	A03GS	00001	00007	1.00	0	0	0
DL041105-017	BE1B1	A03GS	00001	00008	1.00	0	0	0
DL041118-002	BE1B1	A03GS	00001	00009	1.00	1	1	10
DL041118-002	BE1B1	A03GS	00001	00010	1.00	0	0	0
DL041118-002	BE1B1	A03GS	00001	00011	1.00	0	0	0
DL041118-002	BE1B1	A03GS	00001	00012	1.00	0	0	0

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

DIRECT ALPHA MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

QC Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Count Time (min)	Measure-ment MDC (dpm/100 cm²)	Gross Alpha (dpm/100 cm²)	Net Alpha Result (dpm/100 cm²)	Test (ActLevel - Result) (dpm/100 cm²)
DL041105-015	BE1B1	A03QS	00001	00004	1.00	57	59	52	-52

QC Download File, Average and/or Single Point (SP) Background Summary

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Bkgd Count Time (min)	Bkgd Counts	Bkgd Count Rate (cpm)	Bkdg Alpha (dpm/100 cm²)
DL041105-015	BE1B1	A03PS	00001	00004	1.00	1	1	7

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Detector Area (cm²)	Efficiency	Survey Technician
DL041105-015	203469	43-90	PR188387	125	0.10825	TEM5562
DL041105-017	180718	43-90	PR188388	125	0.0965	SLM2556
DL041118-002	192608	43-90	PR203396	125	0.082	JGS8492

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Statistical Summary	α Activity (dpm/100 cm²)	β Activity (dpm/100 cm²)
Mean:	0.51	8.74
Median:	-0.21	8.20
Standard Deviation:	1.46	6.02
Range:	3.62	20.07
Minimum:	-0.33	-2.07
Maximum:	3.29	18.00

Measurement Sensitivity	α LLD (dpm/100 cm²)	β LLD (dpm/100 cm²)
Mean LLD:	12.33	16.77
Minimum LLD:	12.27	16.39
Maximum LLD:	12.65	17.12
Action Level:	0.00	0.00

Number of Measurements	
Prescribed:	0
Collected:	18

Test Performed	α	β
No. Collected ≥ Prescribed	Yes	Yes
Max LLD < 50% Action Level	No	No
Measurements > Action Level	Yes	Yes
Measurement Mean > Action Level	Yes	Yes
No. Measurement > Action Level	4	17

Loose Surface Contamination Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	α Activity (dpm/100 cm²)	α LLD (dpm/100 cm²)	β Activity (dpm/100 cm²)	β LLD (dpm/100 cm²)
CS041116-041	BE1	L01	1	BE 1-1	3.13	12.27	1.13	17.12
CS041116-041	BE1	L01	1	BE 1-2	3.13	12.27	10.71	17.12
CS041116-041	BE1	L01	1	BE 1-3	-0.26	12.27	7.52	17.12
CS041116-041	BE1	L01	1	BE 1-4	-0.26	12.27	-2.07	17.12
CS041116-041	BE1	L01	1	BE 1-5	-0.26	12.27	1.13	17.12
CS041116-041	BE1	L01	1	BE 1-6	-0.26	12.27	4.32	17.12
CS041116-041	BE1	L01	1	BE 1-7	-0.26	12.27	7.52	17.12
CS041116-041	BE1	L01	1	BE 1-8	3.13	12.27	13.91	17.12
CS041021-001	RF1	L01	2	RF 2-1	-0.21	12.31	18.00	16.39
CS041021-001	RF1	L01	2	RF 2-2	-0.21	12.31	4.93	16.39
CS041021-001	RF1	L01	2	RF 2-3	-0.21	12.31	8.20	16.39
CS041021-001	RF1	L01	2	RF 2-4	3.29	12.31	14.73	16.39
CS041021-001	RF1	L01	2	RF 2-5	-0.21	12.31	8.20	16.39

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

REMOVABLE CONTAMINATION MEASUREMENT RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

CS041021-001	RF1	L01	2	RF 2-6	-0.21	12.31	14.73	16.39
CS041021-001	RF1	L01	2	RF 2-7	-0.21	12.31	1.67	16.39
CS041021-001	RF1	L01	2	RF 2-8	-0.21	12.31	11.47	16.39
CS041123-050	RF1	L01	N/A	3-1	-0.33	12.65	14.04	16.86
CS041123-050	RF1	L01	N/A	3-2	-0.33	12.65	17.23	16.86

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

Statistical Summary	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	N/A	1.769E-01	0.04
Median:	N/A	1.788E-01	0.04
Standard Deviation:	N/A	1.380E-02	0.01
Range:	N/A	3.001E-02	0.02
Minimum:	N/A	1.600E-01	0.03
Maximum:	N/A	1.900E-01	0.06

Measurement Sensitivity	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:	1.491E-01	1.042E-01
Minimum MDC:	1.129E-01	7.364E-02
Maximum MDC:	2.151E-01	1.402E-01
Action Level:	3.80	11.71

Number of Measurements	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	4	4
Positve Results:	0	4

Test Performed	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	No	No	No
Measurement Mean > Action Level	N/A	No	No
No. Measurement > Action Level	0	0	0

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041022-001	RF1	L11	2	N/A	105.8	1.236E-01	1.861E-01	8.060E-02		0.05
CS041022-002	RF1	L11	2	N/A	115.8	1.129E-01	1.600E-01	7.364E-02		0.04
CS041022-003	RF1	L11	2	N/A	60.8	2.151E-01	1.714E-01	1.402E-01		0.07
CS041022-004	RF1	L11	2	N/A	90.4	1.447E-01	1.900E-01	1.225E-01		0.05

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: C1141 215C1 **Package Type:** Structure

Survey Area Name: Reactor Office and Laboratory Building (1141)

Survey Unit Name: ROLB Roof & Exterior Walls (Rev. 0)

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = < 0.1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL Red = > 9.9X AL

$$Unity\ Test = \frac{C_{60Co}}{Act\ Level_{60Co}} + \frac{C_{137Cs}}{Act\ Level_{137Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041022-001	1.134E-01				2.328E+00		2.845E-01		
MDC =>	*8.668E-02*				*3.079E+00*		*3.444E-01*		
CS041022-002					2.404E+00				
MDC =>					*2.640E+00*				
CS041022-003									
MDC =>									
CS041022-004									
MDC =>									

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Statistical Summary (contact)	μR/hr	Statistical Summary (1 meter)	μR/hr
Mean:	9.16	Mean:	8.42
Median:	7.76	Median:	7.70
Standard Deviation:	2.87	Standard Deviation:	2.16
Range:	9.65	Range:	8.51
Minimum:	6.12	Minimum:	6.27
Maximum:	15.77	Maximum:	14.78

Contact Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041021-009	LA1S1	G01FN	00001	00001	7,242	7.0
DL041021-009	LA1S1	G01FN	00001	00002	7,975	7.8
DL041021-009	LA1S1	G01FN	00001	00003	7,528	7.3
DL041021-009	LA1S1	G01FN	00001	00004	7,291	7.1
DL041021-009	LA1S1	G01FN	00001	00005	6,940	6.8
DL041021-009	LA1S1	G01FN	00001	00006	6,911	6.7
DL041021-009	LA1S1	G01FN	00001	00007	6,287	6.1
DL041021-009	LA1S1	G01FN	00001	00008	7,085	6.9
DL041021-009	LA1S1	G01FN	00001	00009	7,092	6.9
DL041021-009	LA1S1	G01FN	00001	00010	7,370	7.2
DL041021-009	LA1S1	G01FN	00001	00011	11,753	11.4
DL041021-009	LA1S1	G01FN	00001	00031	9,814	9.6
DL041022-005	LA1S1	G01FN	00001	00012	10,252	10.0
DL041022-005	LA1S1	G01FN	00001	00013	13,373	13.0
DL041022-005	LA1S1	G01FN	00001	00014	10,343	10.1
DL041022-005	LA1S1	G01FN	00001	00015	8,735	8.5
DL041022-005	LA1S1	G01FN	00001	00016	8,055	7.8
DL041022-005	LA1S1	G01FN	00001	00017	8,430	8.2
DL041022-005	LA1S1	G01FN	00001	00018	7,520	7.3
DL041022-005	LA1S1	G01FN	00001	00019	7,285	7.1
DL041022-005	LA1S1	G01FN	00001	00020	7,119	6.9
DL041022-005	LA1S1	G01FN	00001	00021	7,452	7.3
DL041022-005	LA1S1	G01FN	00001	00022	8,040	7.8
DL041022-005	LA1S1	G01FN	00001	00023	7,029	6.8
DL041022-005	LA1S1	G01FN	00001	00026	7,822	7.6
DL041022-005	LA1S1	G01FN	00001	00027	8,196	8.0
DL041022-005	LA1S1	G01FN	00001	00028	7,886	7.7
DL041022-005	LA1S1	G01FN	00001	00029	7,000	6.8

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MWH Constructors

NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

DL041022-005	LA1S1	G01FN	00001	00030	7,078	6.9
DL041026-001	LA1S1	G01FN	00001	00024	13,673	13.4
DL041026-001	LA1S1	G01FN	00001	00025	12,404	12.1
DL060904-001	LA1S1	G01FN	00001	00052	15,462	15.5
DL060904-001	LA1S1	G01FN	00001	00053	12,443	12.4
DL060904-001	LA1S1	G01FN	00001	00054	15,771	15.8
DL060904-001	LA1S1	G01FN	00001	00055	13,208	13.2
DL060904-001	LA1S1	G01FN	00001	00056	13,981	14.0
DL060904-001	LA1S1	G01FN	00001	00057	13,771	13.8

1 Meter Survey Measurement Results by Download File, Surface/Material, Room/Item and SML

Download ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Logged Counts (cpm)	Exposure Rate (μr/hr)
DL041021-009	LA1S1	G02FN	00001	00001	6,773	6.6
DL041021-009	LA1S1	G02FN	00001	00002	7,321	7.1
DL041021-009	LA1S1	G02FN	00001	00003	7,256	7.1
DL041021-009	LA1S1	G02FN	00001	00004	6,954	6.8
DL041021-009	LA1S1	G02FN	00001	00005	6,679	6.5
DL041021-009	LA1S1	G02FN	00001	00006	6,724	6.5
DL041021-009	LA1S1	G02FN	00001	00007	6,440	6.3
DL041021-009	LA1S1	G02FN	00001	00008	6,596	6.4
DL041021-009	LA1S1	G02FN	00001	00009	6,691	6.5
DL041021-009	LA1S1	G02FN	00001	00010	6,863	6.7
DL041021-009	LA1S1	G02FN	00001	00011	10,286	10.0
DL041021-009	LA1S1	G02FN	00001	00031	8,405	8.2
DL041022-005	LA1S1	G02FN	00001	00012	9,509	9.3
DL041022-005	LA1S1	G02FN	00001	00013	11,318	11.0
DL041022-005	LA1S1	G02FN	00001	00014	9,952	9.7
DL041022-005	LA1S1	G02FN	00001	00015	8,563	8.3
DL041022-005	LA1S1	G02FN	00001	00016	8,222	8.0
DL041022-005	LA1S1	G02FN	00001	00017	8,067	7.9
DL041022-005	LA1S1	G02FN	00001	00018	7,501	7.3
DL041022-005	LA1S1	G02FN	00001	00019	7,031	6.8
DL041022-005	LA1S1	G02FN	00001	00020	6,667	6.5
DL041022-005	LA1S1	G02FN	00001	00021	7,203	7.0
DL041022-005	LA1S1	G02FN	00001	00022	8,153	7.9
DL041022-005	LA1S1	G02FN	00001	00023	6,952	6.8
DL041022-005	LA1S1	G02FN	00001	00026	7,914	7.7
DL041022-005	LA1S1	G02FN	00001	00027	7,396	7.2
DL041022-005	LA1S1	G02FN	00001	00028	8,353	8.1
DL041022-005	LA1S1	G02FN	00001	00029	6,736	6.6

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA MEASUREMENT RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

DL041022-005	LA1S1	G02FN	00001	00030	6,718	6.5
DL041026-001	LA1S1	G02FN	00001	00024	15,118	14.8
DL041026-001	LA1S1	G02FN	00001	00025	12,606	12.3
DL060904-001	LA1S1	G02FN	00001	00052	11,206	11.2
DL060904-001	LA1S1	G02FN	00001	00053	10,796	10.8
DL060904-001	LA1S1	G02FN	00001	00054	11,267	11.3
DL060904-001	LA1S1	G02FN	00001	00055	11,356	11.4
DL060904-001	LA1S1	G02FN	00001	00056	11,774	11.8
DL060904-001	LA1S1	G02FN	00001	00057	10,766	10.8

Download File, Instrument Summary and Survey Technician

Download ID	M2350 SN	Det Model	Detector SN	Gamma Cal Factor	Survey Technician
DL041026-001	193707	44-10	PR198931	6.14E+10	PAM7843
DL041022-005	203470	44-10	PR196941	6.16E+10	RDF6510
DL041021-009	203470	44-10	PR196941	6.16E+10	PAM7843
DL060904-001	180715	44-10	PR188344	6.00E+10	JPW4121

* The Gamma Cal Factor used to convert the counts per minute into an exposure rate was obtained using a Cs-137 source.

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 30111 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Statistical Summary

	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
Mean:	6.555E-01	2.108E+00	0.19
Median:	2.878E-01	2.869E-01	0.03
Standard Deviation:	7.930E-01	4.036E+00	0.36
Range:	4.567E+00	1.897E+01	1.58
Minimum:	3.250E-02	1.158E-01	0.02
Maximum:	4.567E+00	1.908E+01	1.60

Measurement Sensitivity

	Co-60 (pCi/g)	Cs-137 (pCi/g)
Mean MDC:	4.386E-02	6.366E-02
Minimum MDC:	2.833E-02	1.847E-02
Maximum MDC:	7.182E-02	1.241E-01
Action Level:	3.80	11.71

Number of Measurements

	Co-60 (pCi/g)	Cs-137 (pCi/g)
Prescribed:	0	0
Collected:	37	37
Positve Results:	17	37

Test Performed

	Co-60 (pCi/g)	Cs-137 (pCi/g)	Unity Test
No. Collected ≥ Prescribed	Yes	Yes	
Max MDC < 10% Action Level	Yes	Yes	
Measurements > Action Level	Yes	Yes	No
Measurement Mean > Action Level	No	No	No
No. Measurement > Action Level	1	1	3

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041025-001	SA1	L04	1	1	311.5		4.198E-02	2.837E-01	5.476E-02	[redacted]
CS041025-002	SA1	L04	1	2	337.4	8.293E-02	3.876E-02	1.887E-01	2.527E-02	[redacted]
CS041025-003	SA1	L04	1	3	388		3.371E-02	3.417E-01	4.859E-02	[redacted]
CS041025-004	SA1	L04	1	4	382.5	3.250E-02	3.419E-02	2.724E-01	6.458E-02	[redacted]
CS041025-005	SA1	L04	1	5	405.5		3.225E-02	3.350E-01	3.646E-02	[redacted]

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 30111 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041025-006	SA1	L04	1	6	386.3		3.385E-02	4.186E-01	4.324E-02	0.04
CS041025-007	SA1	L04	1	7	461.6		2.833E-02	2.358E-01	1.847E-02	0.03
CS041025-008	SA1	L04	1	8	401.7		3.256E-02	2.710E-01	4.807E-02	0.03
CS041025-009	SA1	L04	1	9	364.9		3.584E-02	3.787E-01	4.377E-02	0.04
CS041025-010	SA1	L04	1	10	369.7		3.537E-02	2.328E-01	6.802E-02	0.03
CS041025-011	SA1	L04	1	11	368.6	1.149E+00	6.404E-02	2.082E+00	8.907E-02	0.48
CS041025-012	SA1	L04	1	31	390	1.018E-01	3.353E-02	1.158E-01	5.977E-02	0.04
CS041025-013	SA1	L04	1	12	315.5	2.878E-01	6.309E-02	2.009E+00	4.191E-02	0.25
CS041025-015	SA1	L04	1	13	325.6	5.568E-01	6.114E-02	7.115E+00	9.567E-02	0.75
CS041025-016	SA1	L04	1	14	328.2	3.519E-01	3.985E-02	2.227E+00	8.602E-02	0.28
CS041025-017	SA1	L04	1	15	310.6	5.591E-02	4.211E-02	1.882E-01	6.070E-02	0.03
CS041025-018	SA1	L04	1	16	323.3		4.045E-02	1.940E-01	4.235E-02	0.03
CS041025-019	SA1	L04	1	17	304.1		4.301E-02	2.703E-01	6.350E-02	0.03
CS041025-020	SA1	L04	1	18	338		3.869E-02	2.021E-01	5.439E-02	0.03
CS041025-022	SA1	L04	1	19	319.6		4.092E-02	2.922E-01	5.851E-02	0.04
CS041025-023	SA1	L04	1	20	318.6		4.105E-02	2.532E-01	5.243E-02	0.03
CS041025-024	SA1	L04	1	21	310.1		4.217E-02	2.987E-01	7.966E-02	0.04
CS041025-025	SA1	L04	1	22	333.2		3.925E-02	1.761E-01	4.678E-02	0.03
CS041025-026	SA1	L04	1	23	311.5	1.022E-01	4.198E-02	2.869E-01	8.907E-02	0.05
CS041025-027	SA1	L04	1	26	316.8	5.825E-02	4.128E-02	2.266E-01	5.803E-02	0.03
CS041025-028	SA1	L04	1	27	318		5.190E-02	2.877E-01	4.777E-02	0.04
CS041025-029	SA1	L04	1	28	320.4		4.082E-02	2.530E-01	7.275E-02	0.03
CS041025-030	SA1	L04	1	29	352.1		3.714E-02	2.313E-01	5.130E-02	0.03
CS041025-031	SA1	L04	1	30	386		3.388E-02	1.860E-01	4.763E-02	0.02
CS041026-001	SA1	L04	1	25	286		4.573E-02	3.845E-01	7.893E-02	0.04
CS041026-002	SA1	L04	1	24	356.6	1.464E-01	3.667E-02	2.710E-01	5.287E-02	0.05

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS061004-001	SA1	L04	1	52	297	1.278E+00	7.070E-02	1.908E+01	1.066E-01	1.97
CS061004-002	SA1	L04	1	53	297.2	2.302E-01	6.017E-02	3.835E+00	6.497E-02	0.39
CS061004-003	SA1	L04	1	54	349.5	6.629E-01	6.395E-02	6.997E+00	7.320E-02	0.77
CS061004-004	SA1	L04	1	55	315.7	8.478E-01	7.182E-02	9.114E+00	9.701E-02	1.00
CS061004-005	SA1	L04	1	56	296.2	6.322E-01	4.415E-02	7.665E+00	1.092E-01	0.82
CS061004-006	SA1	L04	1	57	281	4.567E+00	4.654E-02	1.071E+01	1.241E-01	2.12

QC Gamma Spectral Analysis Results by Sample File, Surface/Material, Room/Item and SML

Sample ID	Surface/ Material (LC3)	Detector/ Count Type (LC4)	Room or Item No. (LC5)	SML (LC6)	Sample Weight (g)	Co-60 Result (pCi/g*)	Co-60 MDC (pCi/g*)	Cs-137 Result (pCi/g*)	Cs-137 MDC (pCi/g*)	Unity Test
CS041025-014	SA1	Q01	1	12	299.7	2.674E-01	4.364E-02	2.306E+00	8.242E-02	0.27
CS041025-021	SA1	Q01	1	18	363.4		5.265E-02	2.464E-01	4.971E-02	0.03

* For smears counted by gamma spectral analysis (Sample Weight = 1 g) the actual reporting units are Total Activity in pCi.

Legend - Green = 50 to 1X AL Blue = 0.1 to 0.9X AL Yellow = 0.9 to 9.9X AL

$$Unity\ Test = \frac{C_{^{60}Co}}{Act\ Level_{^{60}Co}} + \frac{C_{^{137}Cs}}{Act\ Level_{^{137}Cs}}$$

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041025-001									
MDC =>									
CS041025-002					1.371E+00				
MDC =>					*1.213E+00*				
CS041025-003	2.835E-02				1.192E+00				
MDC =>	*2.363E-02*				*1.151E+00*				
CS041025-004					1.442E+00				
MDC =>					*9.965E-01*				

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041025-005					1.136E+00	1.748E-01			
MDC =>					*9.473E-01*	*3.276E-01*			
CS041025-006					1.003E+00				
MDC =>					*1.060E+00*				
CS041025-007					9.409E-01				
MDC =>					*8.606E-01*				
CS041025-008					1.320E+00		1.199E-01		
MDC =>					*1.117E+00*		*1.337E-01*		
CS041025-009					1.319E+00			2.468E-01	
MDC =>					*1.086E+00*			*2.094E-01*	
CS041025-010					1.292E+00	2.940E-01			
MDC =>					*1.232E+00*	*3.490E-01*			
CS041025-011					1.437E+00	3.279E-01			
MDC =>					*1.352E+00*	*3.762E-01*			
CS041025-012	8.018E-02				1.091E+00				
MDC =>	*3.440E-02*				*9.211E-01*				
CS041025-013					1.395E+00				
MDC =>					*1.082E+00*				
CS041025-015			5.129E-01		9.995E-01				
MDC =>			*2.690E-01*		*1.355E+00*				
CS041025-016					1.784E+00		1.254E-01		
MDC =>					*1.191E+00*		*1.630E-01*		
CS041025-017					1.478E+00				
MDC =>					*1.455E+00*				
CS041025-018									
MDC =>									
CS041025-019									
MDC =>									
CS041025-020	3.766E-02				1.050E+00	3.005E-01			
MDC =>	*2.713E-02*				*1.127E+00*	*3.700E-01*			
CS041025-022					1.539E+00				
MDC =>					*1.088E+00*				

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
Sandusky, Ohio

GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS041025-023					1.493E+00				
MDC =>					*1.297E+00*				
CS041025-024					1.290E+00				
MDC =>					*1.276E+00*				
CS041025-025						2.652E-01			
MDC =>						*3.261E-01*			
CS041025-026					1.190E+00				
MDC =>					*1.285E+00*				
CS041025-027					1.366E+00				
MDC =>					*1.370E+00*				
CS041025-028					1.852E+00				
MDC =>					*1.441E+00*				
CS041025-029					1.099E+00				
MDC =>					*1.083E+00*				
CS041025-030					7.653E-01				
MDC =>					*8.949E-01*				
CS041025-031					1.288E+00				
MDC =>					*1.069E+00*				
CS041026-001					1.341E+00				
MDC =>					*1.518E+00*				
CS041026-002									
MDC =>									
CS061004-001		4.509E-01	9.772E-01				2.568E-01		
MDC =>		*1.458E-01*	*3.757E-01*				*2.707E-01*		
CS061004-002			3.704E-01						
MDC =>			*1.805E-01*						
CS061004-003		1.751E-01	3.477E-01		1.072E+00				
MDC =>		*1.002E-01*	*1.982E-01*		*1.565E+00*				
CS061004-004		2.254E-01	5.897E-01		1.418E+00				
MDC =>		*9.216E-02*	*2.737E-01*		*1.586E+00*				
CS061004-005		2.041E-01		2.103E-01	1.222E+00		1.508E-01		
MDC =>		*1.092E-01*		*1.545E-01*	*1.815E+00*		*2.016E-01*		

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NASA PLUM BROOK REACTOR FACILITY DECOMMISSIONING
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GAMMA SPECTRAL ANALYSIS RESULTS

Survey Package Number: A2500 301I1 **Package Type:** Environ

Survey Area Name: Outside Perimeter Fence

Survey Unit Name: Outside Perimeter Fence - Environs - SU1 (Rev. 0)

Other Plant Derived Radionuclides Identified

Sample ID	Nb-94 (pCi/g)	Ag-108m (pCi/g)	Eu-152 (pCi/g)	Eu-154 (pCi/g)	Th-234 (pCi/g)	U-235 (pCi/g)	Am-241 (pCi/g)	Cm-243 (pCi/g)	Cm-245 (pCi/g)
CS061004-006	1.993E-01	1.920E-01	4.375E-01		2.144E+00				
MDC =>	*1.358E-01*	*1.352E-01*	*3.018E-01*		*1.922E+00*				

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