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DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick Street, New York City, New York

Prepared per Requirements in Contract No. GS-03-P-15-AZ-D-0015,
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EXECUTIVE SUMMARY

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) was awarded Task Order 47PC0220F0032 under Contract GS-03-P-15-AZ-D-0015 to perform investigation, design, and construction support services at the federal building located at 201 Varick Street, New York City (NYC), New York (NY) to address potential radiological and chemical contamination associated with historical research and laboratory operations conducted on the 5th Floor of the building by the Environmental Measurements Laboratory (EML) and predecessor organizations. This work is being performed on behalf of the U.S. General Services Administration (GSA). Investigation, design, and construction support services for potential contaminants of concern (PCOCs) at the project site are being conducted consistent with the guidance provided in American National Standards Institute (ANSI) *Laboratory Decommissioning* (ANSI/ASSE Z9.11), which provides a process for determining the actions necessary to properly decommission a laboratory given its current and potential future use. The decommissioning process consists of five major components: (1) needs analysis and scoping, (2) risk assessment, (3) remediation and mitigation, (4) verification and (5) documentation (ANSI/ASSE Z9.11-2016).

This Data Report was prepared to document the methodology, results, conclusions, and recommendations for characterization activities (risk assessment) that were conducted to assess the nature and extent of potential contaminants of concern (PCOCs) within the interior of drain piping located downgradient from the 5th Floor of the building (4th Floor through the Basement). Needs analysis and scoping for the subject drain piping is provided in *Report of Findings, 201 Varick Street, 4th and 5th Floor Drain Piping, New York, New York* (EA 2021).

Characterization activities for chemical and radiological PCOCs were conducted in accordance with planning documents that were reviewed and approved for use by GSA and other project stakeholders, as necessary (Department of Homeland Security and NRC). Characterization activities were planned in two stages: Stage 1 characterization includes characterization of drain piping for the 4th Floor, including in-place drain piping on the 4th Floor and the Basement and previously-removed 4th Floor drain piping that is currently containerized/stored in seven B-25 boxes in the Basement (Boxes 3638-001, 3638-002, 3638-003, 3638-004, 3638-005, 3638-006, and 3638-007); Stage 2 characterization, which will be conducted if required based on results of the Stage 1 characterization activities, will include characterization of drain piping on the 3rd Floor through the Basement (not including Basement locations already characterized during Stage 1).

Due to unforeseen field conditions, all proposed Stage 1 work locations could not be characterized. Characterization could not be completed for the piping stored in five out of seven B-25 boxes (Boxes 3638-001, 3638-002, 3638-004, 3638-006, and 3638-007) due to heath and safety concerns associated with higher-than-expected concentrations of mercury vapor that were encountered inside the B-25 boxes. In addition, characterization of Basement in-place piping was not completed because GSA did not provide authorization to proceed with that work during the Stage 1 mobilization. Characterization was completed for the in-place 4th Floor drain piping and for 4th Floor removed drain piping stored in two of the B-25 boxes (Boxes 3638-003 and 3638-005). This Data Report provides characterization information for the work elements that were completed.

Follow-up fieldwork to complete the Stage 1 characterization activities will be conducted at a later date, and a separate Data Report will be prepared to document the characterization methodology and results for that piping. In addition, the separate report will provide overall conclusions and recommendations for all drain piping associated with the 4th Floor and the Basement (i.e., it will incorporate applicable information from this report).

During the June 2021 characterization activities, field and analytical data were collected and evaluated to assess the concentrations of potential contaminants of concern (PCOCs) including mercury vapor, volatile organic compounds, and select radionuclides.

Chemical PCOCs

The characterization data for removed drain piping in Boxes 3638-003 and 3638-005 indicates that piping associated with Risers 64, 76, 128, and 145 has mercury concentrations in pipe scale/sediment that pose a potential inhalation risk for worker and/or public receptors within the building if piping interiors are exposed, and field monitoring data collected during characterization confirms that mercury vapor is present inside the piping and in the immediate work area. The piping is currently being stored within B-25 boxes in the Basement and is slated for disposal, so there is no anticipated pathway for potential exposure to building occupants as long as the piping is securely stored prior to disposal. However, the mercury impact that was identified within that 4th Floor piping may be representative of conditions in downgradient in-place piping (3rd Floor through Basement). If the mercury concentrations are representative, the downgradient piping could be a pathway for potential mercury exposure to building occupants if piping interiors are exposed. Based on the analytical and field data, no potential inhalation risk due to VOCs is identified. Until characterization is completed, downgradient piping associated with these 4th

Floor risers should be assumed to have mercury impact in scale/sediment, and precautions should be taken to protect workers and/or the public if piping interiors are exposed. At a minimum, real-time air monitoring should be conducted to assess mercury vapor levels if piping interiors are exposed. If required based on the air monitoring results, trained workers should use appropriate personal protective equipment, and work area controls (e.g., containment) should be used to limit contaminant migration and protect public receptors (if present).

For the in-place 4th Floor piping cleanouts that were evaluated (associated with Risers 64, 76, 158, and 168), solid samples could not be collected for laboratory analysis due to the small diameter of piping and/or lack of sampling material at those locations. Field instrumentation detected mercury vapor above the EPA residential RSL at one location (Riser 76), and the removed piping associated with this riser has been identified as a potential risk concern for downgradient in-place piping, if piping interiors are exposed. No determination of potential risk for mercury at Risers 158 and 168 can be assessed until the removed piping for these risers is characterized. Field data for VOCs at the in-place 4th Floor cleanout locations (Risers 64, 76, 158, and 159) does not indicate potential inhalation risk.

As previously noted, there are five additional B-25 boxes containing 4th Floor removed piping that have not yet been characterized. As such, the results in this Data Report are considered preliminary and are subject to change if new data become available. A final determination of risk for mercury and VOCs for all 4th Floor removed piping, as well as potential impacts to downgradient piping, will be completed once a complete data set is available for all seven of the B-25 boxes and characterization of downgradient piping has been completed.

Radiological PCOCs

Approximately one third of the pipe segments removed from the 4th Floor have been characterized. The characterization to date includes five of the eleven risers associated with radiologically impacted drain pipes. The drain pipes associated with the 5th Floor radiochemistry laboratories are radiologically impacted. The TEDE for residual radioactivity exceeding background is approximately 20% of the surface soil screening level, so the TEDE associated with the drain pipes is 5 mrem/yr or less. A TEDE less than 25 mrem/yr indicates the site is acceptable for unrestricted use. Based on the available characterization results, there is no indication whether residual radioactivity migrated beyond the 4th Floor drain lines.

The results of the characterization survey presented in this report are considered preliminary and are subject to change. As such, until characterization is complete, downgradient piping associated with the 4th Floor risers should be assumed to have radiological impact in scale/sediment, and precautions should be taken to protect workers and/or the public if piping interiors are exposed. At a minimum, radiological health and safety monitoring should be conducted if piping interiors are exposed. Trained workers should use appropriate personal protective equipment and work area controls to limit potential contaminant migration and protect public receptors (if present).

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ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ALARA	As Low As Reasonably Achievable
BVT	Background Threshold Limit
BZ	Breathing Zone
Cabrera	Cabrera Services Inc.
CFR	Code of Federal Regulations
cpm	Count(s) per minute
°C	Degree(s) Celsius
°F	Degree(s) Fahrenheit
DAC	Derived Air Concentration
dpm/100 cm^2	Disintegration(s) per minute per 100 square centimeters
EA	EA Engineering, P.C. and its affiliate EA Science and Technology
EML	Environmental Measurements Laboratory
EPA	U.S. Environmental Protection Agency
GSA	U.S. General Services Administration
mg/m^3	milligram(s) per cubic meter
mrem/yr	milli Roentgen Equivalent Man per year
MS	Matrix Spike
MSD	Matrix Spike Duplicate
mSv/yr	millisievert(s) per year
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
pCi/g	picocurie(s) per gram
PCOC	Potential Contaminant of Concern
PEL	Permissible Exposure Limit
PID	Photoionization Detector
ppm	Part(s) per million
QC	Quality Control
RCA	Radiological Control Area
RCRA	Resource Conservation and Recovery Act
ROC	Radioisotope of Concern
RSL	Regional Screening Level

ACRONYMS, ABBREVIATIONS, AND SYMBOLS (Continued)

SOP	Standard Operating Procedure
SSHP	Site Safety and Health Plan
TCLP	Toxicity Characteristic Leaching Procedure
TEDE	Total Effective Dose Equivalent
VOC	Volatile Organic Compound

1.0 INTRODUCTION

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) was awarded Task Order 47PC0220F0032 under Contract GS-03-P-15-AZ-D-0015 to perform investigation, design, and construction support services at the federal building located at 201 Varick Street, New York City, New York (Figures 1-1 and 1-2; Attachment A), to address potential radiological and chemical contamination associated with historical research and laboratory operations conducted on the 5th Floor of the building by the Environmental Measurements Laboratory (EML) and predecessor organizations. Investigation, design, and construction support services for potential contaminants of concern (PCOCs) at the project site are being conducted consistent with the guidance provided in American National Standards Institute (ANSI) *Laboratory Decommissioning* (ANSI/ASSE Z9.11), which provides a process for determining the actions necessary to properly decommission a laboratory given its current and potential future use. The decommissioning process consists of five major components: (1) needs analysis and scoping, (2) risk assessment, (3) remediation and mitigation, (4) verification and (5) documentation (ANSI/ASSE Z9.11-2016).

This Data Report was prepared to document the methodology, results, conclusions, and recommendations for characterization activities (risk assessment) that were conducted to assess the nature and extent of potential contaminants of concern (PCOCs) within the interior of drain piping located downgradient from the 5th Floor of the building (4th Floor through the Basement). Needs analysis and scoping for the subject drain piping is provided in *Report of Findings, 201 Varick Street, 4th and 5th Floor Drain Piping, New York, New York* (EA 2021).

This work is being performed on behalf of the U.S. General Services Administration (GSA). Radiological expertise for the subject work was provided by EA's subcontractor Cabrera Services Inc. (Cabrera). Radiological characterization activities were performed by trained Cabrera personnel and in accordance with Cabrera's U.S. Nuclear Regulatory Commission (NRC)-approved Radiation Protection Program. The piping previously removed from the 4th Floor is containerized/stored in the Basement and continues to be controlled under Cabrera's NRC radioactive material license 06-30556-01. All characterization work performed on previously removed piping was performed under Cabrera's license. The characterization work on the 4th Floor was performed consistent with Cabrera's NRC Broad Scope license and procedures. Cabrera did not implement their NRC Broad Scope license for characterization work on the 4th Floor because no licensed radioactive material was identified during performance of field activities.

Characterization activities for chemical and radiological PCOCs were conducted in accordance with the following planning documents, which were reviewed and approved for use by project stakeholders (GSA, Department of Homeland Security, and NRC):

- *Final Work Plan, Characterization of Drain Piping – 4th Floor through Basement, 201 Varick Street, New York City, New York*, dated 9 June 2021.
- *Site-Specific Safety and Health Plan, Characterization of Drain Piping – 4th Floor through Basement, 201 Varick Street, New York City, New York*, dated 9 June 2021.

Initially, characterization activities were planned in two stages as described in the approved Work Plan (EA 2021):

- Stage 1 – Characterization of drain piping for the 4th Floor, including in-place drain piping on the 4th Floor and previously-removed 4th Floor drain piping that is currently containerized/stored in seven B-25 boxes in the Basement. In-place drain piping in the Basement would also be characterized if authorized by GSA.
- Stage 2 – Characterization of drain piping on the 3rd Floor through the Basement (not including Basement locations already characterized during Stage 1).

Stage 1 field activities were scheduled for June 2021. Due to unforeseen field conditions, all proposed work locations could not be characterized. Characterization could not be completed for the piping stored in five out of seven B-25 boxes (Boxes 3638-001, 3638-002, 3638-004, 3638-006, and 3638-007) due to heath and safety concerns associated with higher-than-expected concentrations of mercury vapor that were encountered inside the B-25 boxes. In addition, characterization of Basement in-place piping was not completed because GSA did not provide authorization to proceed with that work during the Stage 1 mobilization. Characterization was completed for the in-place 4th Floor drain piping and for 4th Floor removed drain piping stored in two of the B-25 boxes (Boxes 3638-003 and 3638-005). This Data Report provides characterization information for the work elements that were completed.

Collection and evaluation of data for the drain piping in the remaining five B-25 boxes and the in-place piping in the Basement will be conducted at a later date using enhanced health and safety protocols for mercury vapor, and a separate Data Report will be prepared to document the characterization methodology and results for that piping. In addition, the separate report will provide overall conclusions and recommendations for all drain piping associated with the 4th Floor and the Basement (i.e., it will incorporate applicable information from this report). If Stage 2 characterization is determined to be necessary, a separate Data Report will be prepared to document the characterization methodology and results for that work.

1.1 OBJECTIVES

The objective of the project is to characterize the nature and extent of potential chemical and radiological impact inside drain piping associated with historical laboratory and research activities previously conducted on the 5th Floor of the federal building at 201 Varick Street, New York, NY (Figure 1-2; Attachment A) by EML and predecessor organizations. Results of the characterization will be used to assess potential impacts to the building's drain pipe network and to facilitate proper transportation and disposal of previously-removed 4th Floor drain piping and investigation-derived waste stored in Basement Room B-10. This report provides results and conclusions for the June 2021 characterization work that was conducted for in-place 4th Floor drain piping and previously-removed 4th Floor drain piping, stored in B-25 Boxes 3638-003 and 3638-005 in the Basement.

1.2 SITE DESCRIPTION AND HISTORY

The building located at 201 Varick Street is a government owned and operated facility. Research and laboratory operations were conducted on the 5th Floor of the building by EML and predecessor organizations from 1959 through the late 1990s. Radiological and chemical contaminants of concern were previously identified on the 5th Floor, and characterization and mitigation activities were conducted to address those concerns (Booz Allen Hamilton 2013). However, historical sampling results indicated that residual radiological and chemical contaminants associated with the research and laboratory operations may still be present in 4th Floor (downstream) drain piping. The Draft Final Report of Findings for the 4th and 5th Floor Drain Piping (EA 2020) indicates the following PCOCs may be present inside 4th Floor drain piping:

- Radionuclides (see Table 1-1 below)
- Mercury
- Volatile organic compounds (VOCs)

Based on results of pipe tracing activities recently conducted by GSA, sections of the 4th Floor drain piping potentially impacted with PCOCs extend further downgradient in the building, from the 3rd Floor to the Basement. Figure 1-3 (Attachment A) shows the relationship between riser locations on the 4th Floor (these risers are associated with 4th Floor drain piping that was included in the June 2021 characterization activities) and the downgradient drain piping in the Basement. As shown on Figure 1-3 (Attachment A), to facilitate the reader's understanding of the downgradient piping connectivity from the 4th Floor to the Basement, the labeled risers are "keyed"

to the 4th floor riser/column designations. The main sewer connections for the Basement drain piping, and the 4th Floor risers that ultimately discharge to each sewer connection, are also noted on the figure. The plan area of each floor is approximately 80,230 square feet.

In February 2021, much of the 4th Floor drain piping was removed and placed into the seven B-15 Boxes now located in Basement Room B-10. The 4th Floor drain piping that was removed and existing in-place is shown on Figure 1-4 (Attachment A).

Table 1-1. Potential Radionuclides of Concern

Hydrogen-3	Bismuth-207	***Uranium Series***	***Actinium Series***	***Thorium Series***
Carbon-14	Polonium-209	Uranium-238	Uranium-235	Thorium-232
Potassium-40	Thorium-229	Thorium-234	Thorium-231	Radium-228
Iron-55	Uranium-233	Protactinium-234m	Protactinium-231	Actinium-228
Cobalt-60	Uranium-236	Uranium-234	Actinium-227	Thorium-228
Nickel-63	Neptunium-237	Thorium-230	Thorium-227	Radium-224
Strontium-90	Plutonium-236	Radium-226	Radium-223	Radon-220
Technetium-99	Plutonium-238	Radon-222	Radon-219	Polonium-216
Silver-108m	Plutonium-239/240	Polonium-218	Polonium-215	Lead-212
Antimony-125	Plutoniium-241	Lead-214	Lead-211	Bismuth-212
Iodine-129	Plutonum-242	Bismuth-214	Bismuth-211	Polonium-212
Barium-133	Americium-241	Polonium-214	Thallium-207	Thallium-208
Cesium-134	Americium-243	Lead-210		
Cesium-137	Curium-243/244	Bismuth-210		
Europium-152	Curium-248	Polonium-210		
Europium-154				

1.3 DATA REPORT ORGANIZATION

This Data Report is organized as follows:

- ***Section 1, Introduction***—Presents the scope of the work, the project objective, and the site description and history.
- ***Section 2, Field Conditions and Observations***—Presents the field conditions at the time of the characterization activities.
- ***Section 3, Characterization Methodology***—Presents the sampling methodology approach for field characterization activities, including radiological and chemical surveying and sampling.

- ***Section 4, Characterization Results***—Presents the results of field screening, laboratory analyses, and radiological surveys.
- ***Section 5, Conclusions and Recommendations***—Provides conclusions based on the characterization results, and provides recommendations for existing in-place piping that is downgradient of the historical research and laboratory activities on the 5th Floor.
- ***Section 6, References***—Provides key documents used to prepare this Data Report.

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2.0 FIELD CONDITIONS AND OBSERVATIONS

2.1 GENERAL FIELD CONDITIONS

Chemical and radiological characterization of drain piping interiors for the in-place 4th Floor piping and previously-removed 4th Floor piping stored in the Basement (B-25 Boxes 3638-003 and 3638-005) was conducted 14–22 June 2021. General site conditions encountered in the Basement and on the 4th Floor are discussed below.

2.1.1 Basement

The Basement has multiple rooms, which are mainly used for building maintenance operations and for storage (Figure 1-3; Attachment A). Building maintenance personnel were occasionally observed in the Basement during the June 2021 characterization activities. Basement Room B-10 is the storage location of the B-25 boxes that contain previously-removed 4th floor drain piping (Figure 2-1; Attachment A). This room has one entrance/exit via double doors, and two wall vents in the room allow passive air flow into the east and west adjacent rooms. No air heating/cooling conditioning is present in Room B-10, and during the June characterization activities the temperature in the room was a minimum of 75 degrees Fahrenheit (°F). In addition to the B-25 boxes, one 55-gallon drum containing waste materials (used personal protective equipment, etc.) that were generated during the previous piping removal activities is stored in the room. The B-25 boxes and drum are located inside a Radiological Control Area (RCA), demarcated by radiological rope and signage, which was installed under Cabrera's U.S. Nuclear Regulatory Commission (NRC) license (Note: Cabrera provided radiological support to another GSA contractor during the 4th Floor piping removal activities in February 2021).

2.1.2 4th Floor (In-Place Drain Piping)

The 4th Floor is currently being renovated by GSA and is unoccupied. No other personnel (building personnel or public) were observed on the floor during the characterization activities. There was no air heating/cooling conditioning on the 4th Floor during the June characterization activities, and the temperature was a minimum of 70 degrees Fahrenheit (°F). Existing in-place drain piping on the 4th Floor is shown on Figure 1-3 (Attachment A). During characterization activities, pipe cleanouts (for the in-place piping that had cleanouts available for characterization) were associated with risers at Columns 64, 76, 158, and 168. Cleanouts were accessible using a step ladder.

2.2 PRE-WORK AMBIENT AIR CONDITIONS (CHEMICAL PCOCS)

Mercury vapor and VOC monitoring was conducted in work areas and at the perimeter of Basement Room B-10 prior to starting characterization activities using the field screening methodology discussed in Section 3.1.1. Results of ambient air monitoring are provided in Section 4.1.1.

2.3 PRE-WORK CONTAMINATION SURVEYS (RADIOLOGICAL PCOCS)

Radiological surveys were conducted in work areas prior to starting characterization activities, in accordance with Cabrera's NRC-approved Radiation Protection Program. In addition, prior to opening 4th Floor in-place drain piping and the B-25 Boxes containing previously removed 4th Floor drain piping segments, a dose rate or exposure rate measurement of the general work area was performed to determine if additional radiological controls were required.

Upon completion of characterization activities, post-work contamination surveys were conducted to assess and document the as-left condition of the work areas. Results of these contamination surveys are discussed in Section 4.4.

3.0 CHARACTERIZATION METHODOLOGY

Historical information indicates that PCOCs (radionuclides, mercury, and VOCs) may be present inside downgradient drain piping that originates from the 5th Floor of the building, due to previous laboratory and research activities that were conducted on that floor by various government organizations. The methodology used to assess the nature and extent of potential chemical and radiological impact associated with the historical laboratory/research activities is provided in the sections below.

Figure 3-1 (Attachment A) identifies the 4th Floor in-place drain piping locations that were sampled and surveyed during the June 2021 characterization activities. The 4th Floor in-place drain pipes that were characterized are associated with the following 4th Floor risers: Risers 64, 76, 158, and 159. These 4th Floor risers drain to the 3rd Floor piping system, which then drains down to the main sanitary sewer system in the Basement. Figure 1-3 (Attachment A) shows the connectivity for that piping between the 4th Floor risers and the Basement.

For the previously-removed 4th Floor drain piping that was stored in the B-25 boxes in the Basement, individual sections of piping had been labelled to identify the original 4th Floor location of each pipe segment and the specific 4th Floor vertical riser with which it was associated. During the June 2021 characterization activities, pipe segments from B-25 Boxes 368-003 and 368-005 were characterized. The pipe segments in those boxes are associated with the following 4th Floor risers: Risers 64, 76, 128, 144, and 145. These 4th Floor risers drain to the 3rd Floor piping system, which then drains down to the main sanitary sewer system in the Basement. Figure 1-3 shows the connectivity between the 4th Floor risers and the Basement for the piping that was characterized. A summary of the piping segments contained within each B-25 box, with the 4th Floor riser designation identified for each piping segment, is provided in Attachment B.

3.1 CHARACTERIZATION OF CHEMICAL CONSTITUENTS

Chemical characterization of drain piping included:

- Field screening of air within individual pipe sections, drains, and drain bodies for mercury vapor and VOCs.
- Collection of solid samples (pipe scale and deposits) from the interior surfaces of drain piping.
- Laboratory analysis of composite solid samples for chemical PCOCs (mercury and VOCs). Analysis of composite solid samples for toxicity characteristic leaching procedure (TCLP)

Resource Conservation and Recovery Act (RCRA) metals was also conducted to support waste disposal determination for the previously removed 4th Floor piping stored in the B-25 boxes.

3.1.1 Chemical Screening and Sampling

For both in-place 4th Floor piping and previously removed 4th Floor piping (B-25 boxes), field screening for mercury vapor and VOCs in air was conducted at piping openings/ends prior to collecting samples. Mercury concentrations were measured using a Jerome J505-0001 Atomic Fluorescence Mercury Analyzer, and VOC concentrations were measured using a RKI GX-6000 photoionization detector (PID). For quality control (QC) purposes, instruments were calibrated and/or zeroed daily according to the approved work plan procedures and manufacturer's instructions. QC records for chemical instrumentation are provided in Attachment C. Results of the field screening are provided in Section 4.

At each screening location, scale/sediment material from the piping interior (if present and accessible) was collected. Note that samples were not collected from in-place 4th Floor piping, due to the small diameter of the piping and cleanouts and/or the lack of scale/sediment inside the piping. Composite samples were prepared from sample material that was obtained from removed 4th Floor piping associated with a specific riser on the 4th Floor, to provide solid samples representing drain piping feeding into that riser. Composite samples were submitted for mercury and VOC analyses to assess the nature and extent of potential chemical constituents in the 4th Floor piping system. In addition, composite samples were submitted for waste disposal characterization (for future disposal of the removed piping). The project laboratory, Eurofins TestAmerica (a National Environmental Laboratory Accreditation Program certified laboratory), used the following analytical methods for the project samples:

- VOCs via EPA Method SW 8260C;
- Mercury via EPA Method SW 7471B;
- TCLP metals via EPA Methods SW6010C and SW7470A; and
- TCLP VOCs via EPA Method SW8260C.

Results of the chemical analyses are provided in Section 4. The laboratory analytical reports are provided in Attachment D.

3.1.2 Chemical Screening Criteria

To evaluate chemical results, data were evaluated by a human health risk assessor using

conservative screening criteria in accordance with U.S. Environment Protection Agency (EPA) guidance. Mercury and VOC results were initially compared to the most current EPA Regional Screening Levels (RSLs) for residential exposure. A site-specific screening level for a worker/industrial receptor was also developed in accordance with EPA guidance to further assess the mercury data. The RSLs assess the inhalation exposure route for volatile chemicals from soil based upon a chemical-specific volatilization factor (VF). The EPA Soil Screening Guidance: User's Guide provides the equations for the determination of the VF (EPA 2021). The VF define the relationship between the concentration of the contaminant in soil and the flux of the volatilized contaminant to air (EPA 2021). To provide a protective RSL for the inhalation route, conservative parameters are assumed to determine the potential flux of volatilized contaminants to the air. Default exposure assumptions for the resident include an exposure time of 24 hours per day for a total of 350 days per year. Default exposure assumptions for the worker include an exposure time of 8 hours per day for a total of 250 days per year. Both exposure scenarios are applicable for all age ranges of potential receptors, so there are no potential modifications for children. Because the residential exposure scenario evaluates a higher contact exposure, comparison to residential RSLs is protective of workers and other receptors who may be present in the area.

3.2 CHARACTERIZATION OF RADIOLOGICAL CONSTITUENTS

Radiological characterization of drain piping included:

- Gross beta-gamma surveys of the interior surfaces of individual pipe sections, drains, and drain bodies.
- Removable alpha and beta activity measurements of the interior surfaces of individual pipe sections, drains, and drain bodies.
- Collection of solid samples of pipe scale and deposits from the interior surfaces of individual segments of previously removed 4th Floor piping.
- Laboratory analysis of composite solid samples for radiological PCOCs, including:
    - Gamma spectroscopy for gamma-emitting radionuclides,
    - Alpha spectrometry for isotopic uranium, isotopic thorium, and isotopic plutonium,
    - Gas proportional counting for strontium-90 and technetium-99, and
    - Liquid scintillation counting for nickel-63.

3.2.1 Radiological Screening and Sampling

Based on the potential presence of elevated radioisotopes of concern (ROCs) identified during project planning, radiological survey instruments were selected and operated in accordance with

the approved site-specific Work Plan. All instrumentation was calibrated in accordance with standard operating procedures (SOPs) or manufacturer's recommendations, using National Institute of Standards and Technology (NIST) traceable radioactive sources and based on industry standard methods. Calibration and maintenance records were maintained for each instrument used to perform field activities and are provided in Attachment E. Daily QC for radiological survey instruments was performed using performance-based tolerance limits. Acceptance criteria were derived from repeated background and source response checks under a defined counting geometry during site mobilization and initial field set-up. Acceptance criteria were +/- 20% from the mean for beta/gamma instrumentation and within three standard deviations of the mean for alpha-beta instrumentation. Sources used for response checks include thorium-230 (alpha), technetium-99 (beta), and cobalt-60 (gamma). Daily checks included physical condition, battery and voltage checks, background conditions, and ensuring source response fell within the performance-based QC criteria. All daily performance checks fell within acceptance criteria and are presented in Attachment E.

For both in-place 4th Floor piping and previously removed 4th Floor piping (B-25 boxes), characterization was conducted using the following steps:

1. At pipe openings/ends, a 1-minute static beta/gamma measurement was collected using a Ludlum Model 44-6 Geiger-Mueller detector with a rotary beta shield in the open position connected to a Ludlum Model 2221 ratemeter scaler. For longer pipe segments, the probe was inserted into each accessible opening to characterize the accessible portion of the pipe.
2. A sample of removable activity was collected from the drain or drain body, or the upstream end of the pipe segment, using a smear. When the upstream end of the pipe segment could not be determined, a smear was collected from all accessible openings of the pipe segment.
3. When scale, sediment, or other deposits of solid material were present inside the pipe segment, scale/sediment material from the piping interior (if present) was collected.

Smear tests for removable alpha and beta contamination were performed by inserting a smear into the open ends of each pipe segment and applying moderate pressure. Smears were counted on-site using a Ludlum Model 43-10-1 scintillation detector coupled with a Ludlum Model 2929 dual scaler meter. All alpha and beta measurements were collected in units of counts per minute (cpm) and converted to disintegrations per minute per 100 square centimeters (dpm/100 cm^2). Beta/gamma static measurements were collected on-contact with the inside surfaces of each pipe segment. A Ludlum Model 44-6 Geiger-Mueller detector operated with the shield open, coupled with a Ludlum Model 2221 ratemeter/scaler, was used to perform the beta/gamma measurements. Beta/gamma measurements are reported in units of cpm.

Since gross beta/gamma and removable alpha and beta measurement results did not exceed established background levels, composite samples were prepared from solid (scale/sediment) material that was obtained from piping associated with a specific riser on the 4th Floor, to provide a single solid sample representing all of the drain piping feeding into that riser. Laboratory analyses included radionuclides that were identified via historical sampling to contribute more than 5% of the total activity. The project laboratory, Eurofins TestAmerica, used the following analytical methods for project samples:

- Gamma spectroscopy (cesium-137 [Cs-137], radium-226 [Ra-226], uranium-235 [U-235], uranium-238 [U-238], thorium-232 [Th-232] plus additional detects) via Method DOE EML HASL 300 4.5.2.3;
- Alpha spectroscopy of uranium-233/234 (U-233/234), U-235/236, and U-238 via Method DOE EML HASL 300 U-02-RC Mod;
- Alpha spectroscopy of thorium-228 (Th-228), thorium-230 (Th-230), and Th-232 via Method DOE EML HASL 300 Th-02-Mod;
- Alpha spectroscopy of plutonium-238 (Pu-238) and plutonium-239/240 (Pu-239/240) using Method DOE EML HASL 200 Pu-11-RC Mod;
- Nickel-63 (Ni-63) via Method DOE RESL Ni-1 Mod;
- Strontium-90 (Sr-90) via Method EPA 905.0 Mod; and
- Technetium-99 (Tc-99) via Method DOE EML HASL 300 Tc-01-RC Mod.

Results of the radiological analyses are provided in Section 4. Laboratory analytical reports are provided in Attachment D. Of note, the composite samples representing 4th Floor Riser 76 and 4th Floor Riser 128 did not have sufficient sample material to perform gamma spectroscopy measurements with sufficient sensitivity to meet the project objectives. As such, this analysis was not conducted for those samples.

3.2.2 Radiological Screening Criteria

Results of the characterization survey were evaluated against the NRC radiological criteria for unrestricted use from Code of Federal Regulations (CFR) Chapter 10 (10 CFR 20.1402). Per that guidance, a site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that does not exceed 25 milli Roentgen Equivalent Man per year (mrem/yr) (0.25 millisievert per year [mSv/yr]), including that from groundwater sources of drinking water, and if the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

Radiological characterization data were first evaluated to determine if activity exceeding

instrument or ambient site background was detected. If no radioactivity exceeding background was detected, the level of residual radioactivity distinguishable from background would be zero, so the site would be acceptable for unrestricted use.

Radiological characterization data exceeding instrument or ambient site background were next compared with typical environmental concentrations of terrestrial and anthropogenic radionuclides. Radiological characterization data consistent with environmental levels of radioactivity would be interpreted as indistinguishable from background radiation, and would result in a decision that the site was acceptable for unrestricted use.

Radiological characterization data exceeding environmental background were then evaluated against surface soil screening values equivalent to 25 mrem/yr (NRC 2000). Characterization results exceeding background by less than the surface soil screening values would result in a decision that the site was acceptable for unrestricted use.

3.3 DATA VERIFICATION METHODOLOGY

Chemical laboratory data were reviewed by the Project Chemist for compliance with the data quality objectives in the approved Work Plan and usability related to the objectives of the characterization. Laboratory sample data were reviewed to confirm that the proper number and type of samples were collected and received by the laboratory for analysis. Field notes and sample chains of custody were reviewed to identify any inconsistencies or issues related to the collection of solid samples, and laboratory data packages were reviewed to ensure the reported results are consistent with the samples provided for analysis. The results of laboratory QC measurements, including duplicates, spikes, and method blanks, were also evaluated and compared with method limits for accuracy and precision. The data verification evaluation and a statement of data usability for chemical data are provided in Attachment F.

Radiological data were reviewed by the Project Health Physicist (PHP) for compliance with the data quality objectives in the approved Work Plan and usability related to the objectives of the characterization. Instrument and ambient site background were determined for field measurements based on exploratory data analysis performed on site data. Field data were divided into data sets according to associated 4th Floor Riser pipe segments (Risers 64, 76, 128, 144, 145), remaining 4th Floor piping, and "other" data (other data included measurements on 11 unlabeled pipe segments and 12 pipe segments not associated with a specific 4th Floor Riser). Each data set was further divided by measurement type: beta/gamma static, removable alpha, and removable beta. Each

data set was evaluated using exploratory data analysis, including calculation of summary statistics and graphical representation of the data set (box plots, histograms, normal probability plots), to visually identify potential outliers and to calculate background threshold limits (BTVs). BTVs are upper bounds for background distributions such that values exceeding the BTV provide evidence of data exceeding background. BTVs were calculated as the 95% Upper Simultaneous Limit for normally distributed data, or the 95% Chebyshev Upper Prediction Limit for data sets that did not follow a specific distribution (i.e., nonparametric data). The data verification evaluation and a statement of data usability for radiological data are provided in Attachment G.

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4.0 CHARACTERIZATION RESULTS

4.1 FIELD SCREENING DATA

4.1.1 Chemical Air Monitoring

Mercury vapor and VOC air monitoring was conducted to assess ambient air conditions for the work area and perimeter prior to and during characterization activities. In addition, air monitoring was conducted at piping openings/ends to characterize the PCOC concentrations within the interior of drain piping. Characterization was conducted for the previously-removed 4th Floor drain piping (B-25 Boxes 3638-003 and 3638-005) and the in-place 4th Floor drain piping.

4.1.1.1 Ambient Air Monitoring

Results of the ambient air monitoring are provided in Attachment H (Table H-1). Air monitoring was conducted within the work area and at the perimeter of the work area during characterization activities.

Reported ambient mercury concentrations in the work areas exceeded the Action Level of 0.01 milligram per cubic meter (mg/m^3) identified in the SSHP (a conservative site-specific limit less than the OSHA PEL of 0.1 mg/m^3) when Box 3638-001 was opened. All other reported mercury concentrations in the work area were less than the Action Level. Note: Based on (1) ambient measurements when Box 3638-001 was opened, (2) the mercury measurements that were recorded directly within that container and several other boxes (Boxes 3638-002, 3638-004, 3638-006, and 3638-007) (see discussion in Section 4.1.1.2), and (3) discussions with the project Certified Industrial Hygienist, piping in Boxes 3638-001, 3638-002, 3638-004, 3638-006, and 3638-007 were not evaluated further during characterization activities (the boxes were closed/resealed).

Mercury concentrations at the perimeter of the work areas ranged from 0.00003 to 0.00032 mg/m^3, with average concentrations of 0.00016 mg/m^3 for the Basement and 0.00007 mg/m^3 for the 4th Floor. As noted in Section 2, no building maintenance personnel or public receptors were observed on the 4th Floor during work activities. In the Basement, building maintenance personnel were occasionally observed passing the entrance to Room B-10, where characterization of the B-25 boxes was being conducted. Based on the air monitoring data and potential receptor observations, there was no potential risk to industrial workers (the EPA RSL for industrial air is 0.0013 mg/m^3, based on an 8-hour workday) or residential receptors (the EPA RSL for residential air is 0.00031 mg/m^3, based on 24-hour exposure) while work was ongoing.

Reported ambient VOC concentrations (less than 1 part per million [ppm]) within the work area exceeded the background level of 0 ppm during characterization of B-25 Boxes 3638-003 and 3638-005 (note: "above background" was the conservative site-specific limit set in the SSHP). VOC concentrations in the work areas on the 4th Floor were reported at background levels (0 ppm). The SSHO discussed the total VOC measurements in the Basement with the project Certified Industrial Hygienist and determined that no action for workers was required to continue characterization, based on the low measurements. VOC concentrations at the perimeter of the work areas (Basement and 4th Floor) were reported at background levels (0 ppm); as such, there was no potential risk to industrial workers or public receptors while the work was ongoing.

4.1.1.2 Monitoring of Pipe Openings/Ends

Monitoring results for air at pipe openings/ends for the previously-removed 4th Floor drain piping (B-25 Boxes 3638-003 and 3638-005) are provided in Attachment H (Table H-2). Reported mercury concentrations in air inside piping in Box 0368-003 ranged from 0.00008 to 0.06928 mg/m^3, and reported mercury concentrations ranged from 0.00024 to 0.36142 mg/m^3 in the piping in Box 0368-0005. Upon completion of field screening, scale/sediment samples were collected and submitted to the project laboratory for mercury and VOC analyses. Reported mercury and VOC concentrations for scale/sediment samples are discussed in Section 4.2.1.

As previously noted, characterization of five B-25 boxes (Boxes 3638-001, 3638-002, 3638-004, 3638-006, and 3638-007) could not be completed during the June 2021 characterization activities due to higher-than-expected mercury vapor concentrations within the B-25 boxes. Attachment H (Table H-2) provides the mercury vapor concentrations that were measured inside those B-25 boxes. Mercury vapor concentrations ranged from 0.02 milligrams per cubic meter (mg/m^3) (Box 3638-006), which is greater than the Action Level of 0.01 mg/m^3 identified in the approved SSHP, to greater than 0.1 mg/m^3, which is the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) (29 CFR 1910.1000). At Box 3638-001, the reported mercury vapor concentration exceeded the instrument upper measurement limit of 0.5 mg/m^3, so the actual mercury vapor concentration inside this box was not defined. Characterization of these five B-25 boxes will be completed at a later date using enhanced health and safety protocols to mitigate potential mercury vapor hazards.

The 4th Floor in-place drain pipes that were characterized are associated with the following 4th Floor risers: Risers 64, 76, 158, and 168. Reported results for air monitoring conducted at the pipe cleanouts are provided in Attachment H (Table H-3). Measured mercury concentrations inside the

in-place piping ranged from 0.00004 to 0.001 mg/m^3. Due to the small diameter of the piping and cleanouts and/or the lack of scale/sediment inside the piping, solid samples could not be collected and submitted to the project laboratory for analysis. Of note, Drain 158-1 on the 4th Floor was wet and included human waste, so no characterization measurements were performed on this section of remaining drain pipe.

4.1.2 Radiological Field Measurements

Radiological survey measurements, consisting of smears and beta/gamma measurements, were performed on drain piping ends to document activity levels from the 4th Floor previously-removed and remaining piping. In addition, radiological air monitoring was conducted. Surveys were completed on previously removed piping in Boxes 3638-003 and 3638-005, which equates to approximately one third of the total amount of piping removed and stored in the seven B-25 boxes. Pipe segments associated with five of the eleven risers on the 4th Floor identified as radiologically impacted (Risers 64, 76, 128, 144, and 145) were evaluated. Since piping in all seven boxes has not been completed, the data sets for individual risers are incomplete; therefore, interpretation of the limited survey data available is preliminary and subject to change.

4.1.2.1 4th Floor Previously Removed Drain Piping

Field survey results on removed drain piping are presented in Attachment I. All beta/gamma survey results are consistent with background. Removable alpha activity exceeding background was reported for one smear sample: the activity for the smear from one end of pipe segment 46, associated with 4th Floor Riser 145, was reported at 6 cpm with an upper limit for background estimated at 5.1 cpm for this data set. The activity for the smear from the other end of pipe segment 46 was reported at 0 cpm.

4.1.2.2 4th Floor Remaining Drain Piping

Survey results for 4th Floor remaining drain piping are presented in Attachment I. No elevated survey measurements above background levels were observed. Drain 158-1 on the 4th Floor was wet and included human waste. No characterization measurements were performed on this section of remaining drain pipe. Characterization measurements were performed at Drain 158-2 (attached to Riser 158), as planned.

4.1.3 Radiological Air Monitoring

Radiological air monitoring results are presented in Attachment I. Personal breathing zone (BZ) air samples were collected to verify that radiological conditions were less than derived air concentration (DAC) levels within the work area. No alpha or beta activity concentrations in air exceeding background were detected.

4.2 ANALYTICAL DATA – CHARACTERIZATION OF PIPING

A total of seven scale/sediment samples (five environmental samples and two duplicate samples) were collected from previously removed piping in Boxes 3638-003 and 3638-005. The sampled piping is associated with 4th Floor Risers 64, 76, 128, 144, and 145. As noted previously, no samples could be collected from in-place 4th Floor drain piping due to lack of scale/sediment material and/or the small diameter of piping being characterized. An analytical sampling summary for the June 2021 characterization activities is provided in Table 4-1. Due to inadequate volume of scale/sediment for some piping, not all chemical/radiological analyses could be conducted as planned. Summary analytical tables for chemical and radiological constituents (all results) for the piping characterization activities are provided in Appendix J.

Table 4-1. Summary of Samples Analyzed for the June 2021 Characterization

B-25 Box:	3638-005	3638-005	3638-005	3638-003	3638-003
Sample ID*:	4FR-64-001 4FR-64-002 (DUP)	4FR-76-001	4FR-128-001	4FR-144-001	4FR-145-001 4FR-145-002 (DUP)
4th Floor Riser:	64	76	128	144	145
Analysis					
Mercury	X	X	X	X	X
VOCs	X	NS	NS		X
Gamma Spectroscopy	X	NS	NS	X	X
Alpha Spectroscopy (U, Th, Pu)	X	X	X	X	X
Strontium-90	X	X	X	X	X
Technetium-99	X	X	X	X	X
Nickel-63	X	X	X	X	X

Notes:
*The sample number indicates riser designation.
DUP = Duplicate sample
NS = Sample was not analyzed for the specific analysis or insufficient sample for specific analysis.
Pu = Plutonium
Th = Thorium
U = Uranium
VOC = Volatile Organic Compound
X = Sample was sent to the laboratory and the specific analysis was performed for that sample.

Analytical results for chemical and radiological constituents are discussed in Sections 4.2.1 and 4.2.2. Tables 4-2 and 4-3 provide summaries of detected chemical and radiological constituents for the removed 4th Floor drain piping, and Figure 4-1 provides a visualization of those results.

4.2.1 Chemical Constituents

Mercury and select VOC concentrations were reported for the scale/sediment samples collected from piping in B-25 Boxes 368-003 and 368-005 (associated with Risers 64, 76, 128, 144, and 145). These boxes are located in an area that building workers and building visitors with restricted access; therefore, direct contact between building workers and visitors and the scale/sediment within the piping is not expected. However, there is a potential for volatile chemicals to volatilize to indoor air. Therefore, the inhalation of volatile chemicals from the piping is considered a complete exposure route. To assess this exposure route, the scale/sediment analytical results were initially compared to the May 2021 EPA RSLs for residential soil exposures for the inhalation exposure route. Because the residential exposure scenario evaluates a higher contact exposure, initial comparison to residential RSLs is protective of workers and other receptors who may be present in the area.

No VOC concentrations were reported to exceed the residential RSLs for any of the piping sampled, indicating that inhalation of volatilized VOCs from the piping interiors presents no risk to the potential receptors for the VOCs analyzed. Of note, there are five additional B-25 boxes containing piping that requires characterization, and those boxes may contain piping from the same risers. As such, a final determination of risk for VOC constituents for all 4th Floor removed piping will be based on the total data set for all seven B-25 boxes.

The reported concentrations of mercury for samples collected from piping associated with Risers 64, 76, 128, and 145 exceeded the residential RSL. Therefore, mercury results were also compared to the worker RSL. The reported mercury concentrations from Risers 64, 128 and 145 exceed the worker RSL. The exceedance of both the residential and worker RSLs indicates that mercury may present a risk to facility workers or other potential receptors. Based on the risk evaluation, there is a potential concern for volatilization of mercury from the piping associated with Risers 64, 76, 128, and 145 for potential receptors. As previously noted, there are five additional B-25 boxes containing piping that requires characterization. A final determination of risk for mercury for all 4th Floor removed piping will be based on the total data set for all seven of the B-25 boxes.

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Table 4-2. Summary of Detected Chemical Constituents – 4th Floor Removed Piping

			Location ID:	4FR-64	4FR-64	4FR-76	4FR-128	4FR-144	4FR-145	4FR-145
			Sample Name:	4FR-64-001	4FR-64-002	4FR-76-001	4FR-128-001	4FR-144-001	4FR-145-001	4FR-145-002
			Date Sampled:	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021
			Duplicate?:		Yes					Yes
			Parent Sample:		4FR-64-001					4FR-145-001
			B-25 Box No.:	3638-005	3638-005	3638-005	3638-005	3638-003	3638-003	3638-003
Analyte	**EPA RSL[(1)] (Resident)**	**EPA RSL[(1)] (Worker)**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Mercury (SW7471B)										
Mercury	11000	46000	µg/kg	**140000 D**	**330000 D**	**35000 D**	**75000 D**	**8700 D**	**47000 J1D**	**53000 D**
Volatile Organic Compounds (SW8260C)										
Chloroform	320	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	**0.62 JJ1**	**0.55 J**
Isopropylbenzene	1900000	NE	µg/kg	**0.35 J**	**0.45 J**	--	--	--	**0.18 JJ1**	< 0.56 U
Methylene chloride	57000	NE	µg/kg	**1.4 J**	**0.38 J**	--	--	--	**5.6 J1**	**3.4 J**
Tetrachloroethene	24000	NE	µg/kg	**0.34 J**	**0.72 J**	--	--	--	**1.7 JJ1**	**1.1 J**

Notes:
(1) U.S. Environmental Protection Agency (EPA) Regional Screening Level (RSL), dated May 2021
Detected Analytes are boldfaced.
Values exceeding EPA Residential RSLs are grey shaded.
Values exceeding EPA Worker RSLs are grey shaded with red text.
µg/kg = microgram(s) per kilogram.
D = The reported value is from a dilution.
J = Estimated: The analyte was positively identified; the quantitation is an estimation.
J1 = Estimated: The quantitation or Limit of Detection is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
NE = Not Evaluated
U = Undetected at the Limit of Detection.

Table 4-3. Summary of Detected Radiological Constituents – 4th Floor Removed Piping

Location ID:		4FR-64			4FR-64			4FR-76			4FR-128			4FR-144			4FR-145			4FR-145		
Sample Name:		4FR-64-001			4FR-64-002			4FR-76-001			4FR-128-001			4FR-144-001			4FR-145-001			4FR-145-002		
Date Sampled:		6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021		
Duplicate?:		--			Yes			--			--			--			--			Yes		
Parent Sample:		--			4FR-64-001			--			--			--			--			4FR-145-001		
B-25 Box No.:		3638-005			3638-005			3638-005			3638-005			3638-003			3638-003			3638-003		
Analyte	**Unit**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**	**Result**	**Uncert**	**Qual**
Isotopic Analysis (A-01-R MOD)																						
Plutonium-238	pCi/g	< 0.126	0.0509	U	< 0.0950	0.0701	U	0.0828	0.0612		0.460	0.133		< 0.102	0.0616	U	0.164	0.0885		0.504	0.141	
Thorium-228	pCi/g	< 0.127	0.0676	U	< 0.191	0.113	U	< 0.165	0.112	U	0.432	0.139		0.222	0.122		0.541	0.154		0.747	0.182	
Thorium-230	pCi/g	< 0.151	0.0922	U	< 0.180	0.116	U	< 0.198	0.143	U	0.310	0.132		0.563	0.180		0.680	0.180		0.888	0.206	
Thorium-232	pCi/g	< 0.0841	0.0211	U	< 0.0966	0.0456	U	0.161	0.102		0.566	0.142		0.337	0.122		0.534	0.141		0.749	0.172	
Uranium-234	pCi/g	0.0792	0.0508		0.0839	0.0626		1.25	0.216		0.706	0.152		0.719	0.165		0.331	0.103		0.700	0.151	
Uranium-235	pCi/g	< 0.0415	0.0177	U	< 0.0505	0.00522	U	0.0631	0.0501		< 0.0479	0.0389	U	< 0.0594	0.0479	U	< 0.0476	0.0346	U	0.137	0.0709	
Uranium-238	pCi/g	< 0.0459	0.0372	U	0.119	0.0660		1.75	0.266		0.605	0.139		0.920	0.188		0.516	0.128		0.775	0.160	
Gamma Spectroscopy (GA-01-R MOD)																						
Cesium-137	pCi/g	< 0.0595	0.0197	U	< 0.132	0.0761	U	--	--	--	--	--	--	0.253	0.0756		< 0.106	0.0611	U	< 0.127	0.0742	U
Radium-226	pCi/g	< 0.204	0.0339	U	< 0.495	0.177	U	--	--	--	--	--	--	0.373	0.138		0.461	0.163		0.382	0.163	
Thorium-232	pCi/g	< 0.140	0.0385	U	< 0.563	0.0494	U	--	--	--	--	--	--	< 0.351	0.220	U	0.560	0.189		0.848	0.228	

Notes:
pCi/g = Picocuries per gram
Qual = Qualifier
U = Undetected at the Limit of Detection
Uncert = Uncertainty

4.2.2 Radiological Constituents

4.2.2.1 Environmental Background

Evaluation of radiological data against environmental background uses radionuclide-specific background concentrations and is performed using laboratory analytical results. Field measurement results were not evaluated against environmental background.

Several naturally-occurring terrestrial radionuclides were detected above instrument background. Terrestrial radionuclides detected in pipe scale included uranium natural decay series radionuclides (uranium-238, uranium-234, thorium-230, radium-226), thorium natural decay series radionuclides (thorium-232, thorium-228), and uranium-235. Typical average concentration ranges for terrestrial radionuclides in soil are listed in Table 4-4. Concentrations of all terrestrial radionuclides detected in pipe scale were identified as not exceeding typical average background concentrations.

Cesium-137 was an anthropogenic radionuclide detected in pipe scale that is also present in environmental background. The typical average concentration range for cesium-137 in surface soil environmental background is provided in Table 4-4. Concentrations of cesium-137 detected in pipe scale did not exceed typical average surface soil environmental background levels.

Table 4-4. Typical Average Concentration Range for Radionuclides in Surface Soil

Radionuclide	Environmental Background Range in Surface Soil (pCi/g)	Pipe Scale Maximum (pCi/g)
Uranium-238 [1,2]	0.11 to 3.78	1.75
Radium-226 [1]	0.22 to 4.32	0.461
Thorium-232 [1,3]	0.11 to 3.51	0.749
Uranium-235 [1,4]	0.005 to 0.17	0.0631
Cesium-137 [5]	0.15 to 1.5	0.253

Notes:
[1] Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME), NUREG-1575 Supp. 1, Appendix B, Table B.1, 2009.
[2] Uranium-238 assumed to be in equilibrium with uranium-234 and thorium-230.
[3] Thorium-232 assumed to be in equilibrium with thorium-228.
[4] Uranium-235 assumed to be equal to 0.045 of uranium-238 for natural uranium in background.
[5] Investigations of Natural Variations of cesium-137 Concentrations in Residential Soils, A. Wallo III et al., 1994. Range decay corrected for one half-life since publication.
pCi/g = picocuries per gram

4.2.2.2 Surface Soil Screening Levels

The only radionuclide detected in pipe scale samples that exceeded instrument and ambient site background and exceeded environmental background is plutonium-238. Detected concentrations of plutonium-238 ranged from 0.0828 to 0.504 picocuries per gram (pCi/g). Plutonium-238 was detected in samples representing 4th Floor Risers 76, 128, and 145. The environmental background concentration of plutonium-238 in surface soil is very low compared with the measured concentrations and was conservatively estimated as zero pCi/g.

The surface soil screening level for plutonium-238 equivalent to 25 mrem/yr is 2.5 pCi/g. Using the screening level for surface soil is conservative when it is applied to pipe scale. Exposure pathways for surface soil include plant and meat ingestion which contribute significantly to the TEDE estimate, and these pathways are not reasonably applied to pipe scale. In addition, pipe scale is shielded inside drain pipes and is not accessible to most members of the general public. Exposure to surface soil does not assume any shielding for outdoor exposures to surface soil.

The maximum plutonium-238 concentration is approximately 20% of the surface soil screening level.

4.3 ANALYTICAL DATA – CHARACTERIZATION OF WASTE (FUTURE DISPOSAL)

In addition to the pipe scale characterization samples analyzed for chemical constituents (see Table 4-2) and radiological constituents (see Table 4-3), samples were collected and submitted to the laboratory for TCLP metals and VOC analysis to support future disposal of the removed 4th Floor piping stored in Basement Room B-10. Analytical results for TCLP metals and VOCs, which are provided in Attachment K, are applicable for a scale/sediment waste stream. The analytical results indicate that a scale/sediment waste stream would be considered hazardous for lead. A scale/sediment waste stream was not generated during the June 2021 characterization activities. The only waste stream currently present at the site is identified as pipe debris.

4.4 POST-WORK RADIOLOGICAL SURVEY

A post-work radiological survey was performed on building surfaces to document that no residual radioactivity exceeding release limits was present following the investigation of previously-removed pipe. Survey measurements were performed in Basement Room B-10 in the areas where impacted pipe was characterized. Measurements consisted of direct measurements for alpha and

beta radioactivity, corresponding smear tests for removeable radioactivity, and general area dose rate readings. All measurements were less than Cabrera's NRC license release limits. The post removal radiological survey of building surfaces is provided in Attachment I.

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5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 DRAIN PIPING - CHEMICAL CONSTITUENTS

5.1.1 Summary of Chemical Characterization of Removed 4th Floor Piping

Mercury vapor field measurements collected at the ends/openings of piping in Boxes 3638-003 and 3638-005 show that mercury vapor was detected in many of the pipe segments, and analytical data indicates that the piping associated with 4th Floor Risers 64, 76, 128, 144, and 145 in Boxes 0368-003 and 0368-005 has scale/sediment with detectable levels of mercury. The reported results for scale/sediment samples collected from the interiors of pipe segments associated with 4th Floor Risers 64, 76, and 128 (Box 3638-005) and 4th Floor Riser 145 (Box 3638-003) exceeded the residential RSL for mercury. Reported concentrations for scale/sediment samples associated with 4th Floor Risers 64, 128, and 145 also exceeded the worker RSL for mercury.

Several VOCs (chloroform, isopropylbenzene, methylene chloride, and tetrachloethene) were detected in scale/sediment samples collected from the interiors of pipe segments. The reported VOC concentrations do not exceed residential RSLs (Note: due to lack of sufficient sample material, VOC analysis could only be conducted for piping associated with Risers 64 and 145). For all riser piping, VOCs (total) that were detected with field instrumentation during piping characterization activities had relatively low concentrations (< 1 ppm), which is consistent with the relatively low concentrations reported in the scale/sediment samples collected from Risers 64 and 145. Based on the analytical and field data that were collected, no potential inhalation risk due to VOCs is identified for any of the piping in Boxes 3638-003 and 3638-005.

5.1.2 Summary of Chemical Characterization of 4th Floor In-Place Piping

Due to the small diameters of the cleanouts and piping and/or the lack of scale/sediment, analytical samples could not be collected at the in-place cleanout sample locations on the 4th Floor. The reported field measurement at sample location 76-3 (piping associated with Riser 76) was 0.001 mg/m^3, which exceeds the EPA RSL for mercury for residential air (0.00031 mg/m^3). Field and analytical data for the removed piping associated with Riser 76 (discussed in section above) indicates a potential risk concern if piping interiors are exposed. Analytical data for 4th Floor removed piping associated with Risers 158 and 168 (stored in the uncharacterized B-25 boxes) have not yet been collected/analyzed; as such, an assessment of potential impact can't be assessed at this time.

VOC field measurement results were generally at or close to background levels (0.0 ppm). For Riser 76, field measurements for the in-place 4th Floor piping are similar to the field measurements for the 4th Floor removed piping associated with Riser 76. Analytical data for the removed piping associated with Riser 76 piping indicates no potential inhalation risk due to VOCs that were detected. Therefore, for Riser 76, based on the field/analytical results (removed piping) and the field data (in-place piping), no potential inhalation risk due to VOCs is currently identified for piping associated with that riser, if the piping interiors are exposed. Analytical data for VOCs for the removed piping for Risers 158 and 168 (stored in the uncharacterized B-25 boxes) have not yet been collected/analyzed; however, based upon the field measurements, potential inhalation risk due to VOCs is not anticipated.

5.1.3 Conclusions

5.1.3.1 Conclusions for Mercury

The characterization data for removed drain piping in Boxes 3638-003 and 3638-005 (Risers 64, 76, 128, 144, and 145) indicates that piping associated with Risers 64, 76, 128, and 145 has mercury concentrations in pipe scale/sediment that pose a potential inhalation risk for worker and/or public receptors within the building if piping interiors are exposed, and field monitoring data collected during characterization confirms that mercury vapor is present inside the piping and in the immediate work area. The piping is currently being stored within B-25 boxes in the Basement and is slated for disposal, so there is no anticipated pathway for potential exposure to building occupants as long as the piping is securely stored prior to disposal. However, the mercury impact that was identified within that 4th Floor piping may be representative of conditions in downgradient in-place piping (3rd Floor through Basement). If the mercury concentrations are representative, the downgradient piping could be a pathway for potential mercury exposure to building occupants if piping interiors are exposed.

For the in-place 4th Floor piping cleanouts that were evaluated (associated with Risers 64, 76, 158, and 168), solid samples could not be collected for laboratory analysis due to the small diameter of piping and/or lack of sampling material at those locations. Field instrumentation detected mercury vapor above the EPA residential RSL at one location (Riser 76), and the removed piping associated with this riser has been identified as a potential risk concern for downgradient in-place piping, if piping interiors are exposed. No determination of potential risk for mercury at Risers 158 and 168 can be assessed until the removed piping for these risers is characterized.

5.1.3.2 Conclusions for VOCs

Based on the analytical and field data, no potential inhalation risk due to VOCs is identified for any of the piping in Boxes 0368-003 and 0368-005, which is associated with Risers 64, 76, 128, 144, and 145. Field data for VOCs at the in-place 4th Floor cleanout locations (Risers 64, 76, 158, and 159) does not indicate potential inhalation risk.

5.1.4 Recommendations

Mercury impact with potential inhalation risk has been identified in 4th floor piping associated with Risers 64, 76, 128, and 145, and characterization of downgradient piping (3rd Floor to the Basement) has not yet been conducted. Until characterization is completed, downgradient piping associated with these 4th Floor risers should be assumed to have mercury impact in scale/sediment, and precautions should be taken to protect workers and/or the public if piping interiors are exposed. At a minimum, real-time air monitoring should be conducted to assess mercury vapor levels if piping interiors are exposed. If required based on the air monitoring results, trained workers should use appropriate personal protective equipment, and work area controls (e.g., containment) should be used to limit contaminant migration and protect public receptors (if present).

As previously noted, there are five additional B-25 boxes containing 4th Floor removed piping that have not yet been characterized. As such, the results in this Data Report are considered preliminary and are subject to change if new data become available. A final determination of risk for mercury for all 4th Floor removed piping, as well as potential impacts to downgradient piping, will be completed once a complete data set is available for all seven of the B-25 boxes and characterization of downgradient piping has been completed.

5.2 DRAIN PIPING – RADIOLOGICAL CONSTITUENTS

5.2.1 Conclusions

The drain pipes associated with the 5th Floor radiochemistry laboratories are radiologically impacted. The beta/gamma static measurements performed on pipe segments removed from the 4th Floor do not exceed ambient background. The removable beta activity measurements do not exceed ambient background. One removable alpha activity measurement associated with 4th Floor Riser 145 is a potential outlier that was identified as exceeding background. The maximum plutonium-238 concentration was identified in the pipe scale sample associated with 4th Floor Riser

145. Plutonium-238 is an alpha emitter, so the removable alpha activity exceeding background is consistent with the pipe scale sample results. The TEDE for residual radioactivity exceeding background is approximately 20% of the surface soil screening level, so the TEDE associated with the drain pipes is 5 mrem/yr or less. A TEDE less than 25 mrem/yr indicates the site is acceptable for unrestricted use.

Based on the available characterization results, there is no indication whether residual radioactivity migrated beyond the 4th Floor drain lines. Characterization of downgradient drain piping will be performed as part of Stage 2 sampling.

5.2.2 Recommendations

Approximately one third of the pipe segments removed from the 4th Floor have been characterized. The characterization to date includes five of the eleven risers associated with radiologically impacted drain pipes. The results of the characterization survey presented in this report are considered preliminary and are subject to change. As such, until characterization is complete, downgradient piping associated with the 4th Floor risers should be assumed to have radiological impact in scale/sediment, and precautions should be taken to protect workers and/or the public if piping interiors are exposed. At a minimum, radiological health and safety monitoring should be conducted if piping interiors are exposed. Trained workers should use appropriate personal protective equipment and work area controls to limit potential contaminant migration and protect public receptors (if present).

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CODE:

10 Code of Federal Regulations (CFR) 20.1402
29 CFR 1910.1000

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ATTACHMENT A

Figures

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★ - Site Location

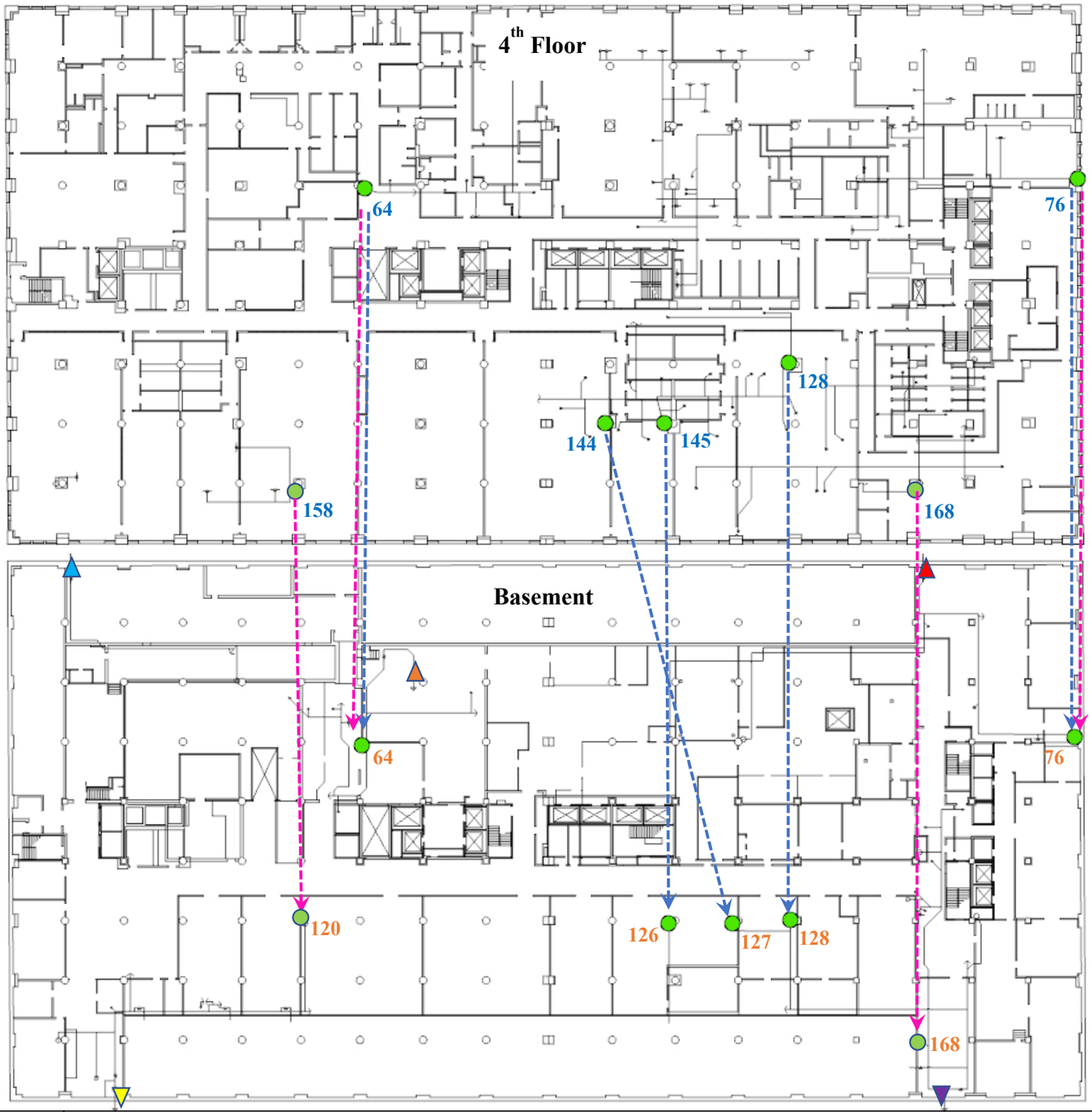
EA Engineering, P.C. and its
affiliate EA Science and Technology

Figure 1-1
Location Map
201 Varick Street, New York City, New York

★ - Site Location

EA Engineering, P.C. and its
affiliate EA Science and Technology

Figure 1-2
Site Map
201 Varick Street, New York City, New York



LEGEND

- Riser
- 64 - 4th Floor Riser/Column Number
- 64 - Basement Riser/Column Number
- Relationship Between 4th Floor Risers and Basement Piping for Boxes 3638-003 and 3638-005 (Previously-Removed Piping)
- Relationship Between 4th Floor Risers and Basement Piping for 4th Floor In-Place Piping

Basement Sewer Connection	Associated 4th Floor Riser/Column Number
▲	Risers 50, 51, and 76
▲	Risers 154 and 158
▲	Risers 111, 128, 131, 144, 145, and 168
▲	Riser 64
▲	None known

201 VARICK STREET CHARACTERIZATION SAMPLING FOR 4TH FLOOR REMOVED DRAIN PIPING BOXES 3638-003 AND 3638-005, 4TH FLOOR RISER LOCATIONS
201 Varick Street, New York, NY

Figure 1-3. Riser Relationship Between the 4th Floor and the Basement

WEST HOUSTON STREET

HUDSON STREET

VARICK STREET

KING STREET

N

Legend

- Piping Active/Remains
- Piping Removed

201 VARICK STREET CHARACTERIZATION SAMPLING 4TH FLOOR REMOVED AND REMAINING PIPING

201 Varick Street, New York, NY

Figure 1-4

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WEST HOUSTON STREET

HUDSON STREET

VARICK STREET

KING STREET

N

Box 3638-003 (Completed)

Box 3638-002 (Mercury Vapor Reading 0.43706 mg/m^3)

Box 3638-007 (Mercury Vapor Reading 0.2 mg/m^3)

Box 3638-005 (Completed)

Box 3638-006 (Mercury Vapor Reading 0.02 mg/m^3)

Box 3638-004 (Mercury Vapor Reading 0.15 mg/m^3)

Box 3638-001 (Mercury Vapor Reading >0.5 mg/m^3)

Exclusion Zone (EZ)

Passive Air Vent

Passive Air Vent

Contamination Reduction Zone (CRZ)

Support Zone (SZ)

Office Tables

Room B-10

Radiological Control Area (RCA) Boundary

Entrance/Exit

Passive Air Vent

Legend

- B-25 Box
- Passive Air Vent
- Exclusion Zone (EZ)
- Office Tables
- Contamination Reduction Zone (CRZ)
- Support Zone (SZ)

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201 VARICK STREET CHARACTERIZATION SAMPLING BASEMENT ROOM B-10 LAYOUT

201 Varick Street, New York, NY

Figure 2-1

WEST HOUSTON STREET

HUDSON STREET

VARICK STREET

KING STREET

N

Drain 64-1

Drain 64-2-1

4F-64-001

Drain 64-2-2

Drain 64-6

Drain 64-4

Drain 64-3

Drain 76-6

Drain 76-3

Drain 76-8

Drain 76-7

Drain 76-2

Drain 76-1

Drain 76-5

4F-76-001

Drain 76-9

Drain 76-4

Drain 168-1

Drain 158-3

Drain 158-2

Drain 158-1

4F-158-001

4F-168-001

Legend

- Drain - measurements collected, piping removed but drains still present
- Drain - no measurements collected, piping remains and drains still in use
- Drain - no measurements collected, piping removed but drains inaccessible and/or sealed with concrete
- Piping Active/Remains
- Piping Removed

201 VARICK STREET 4TH FLOOR REMAINING PIPING DRAIN CHARACTERIZATION SAMPLING LOCATIONS

201 Varick Street, New York, NY

Figure 3-1

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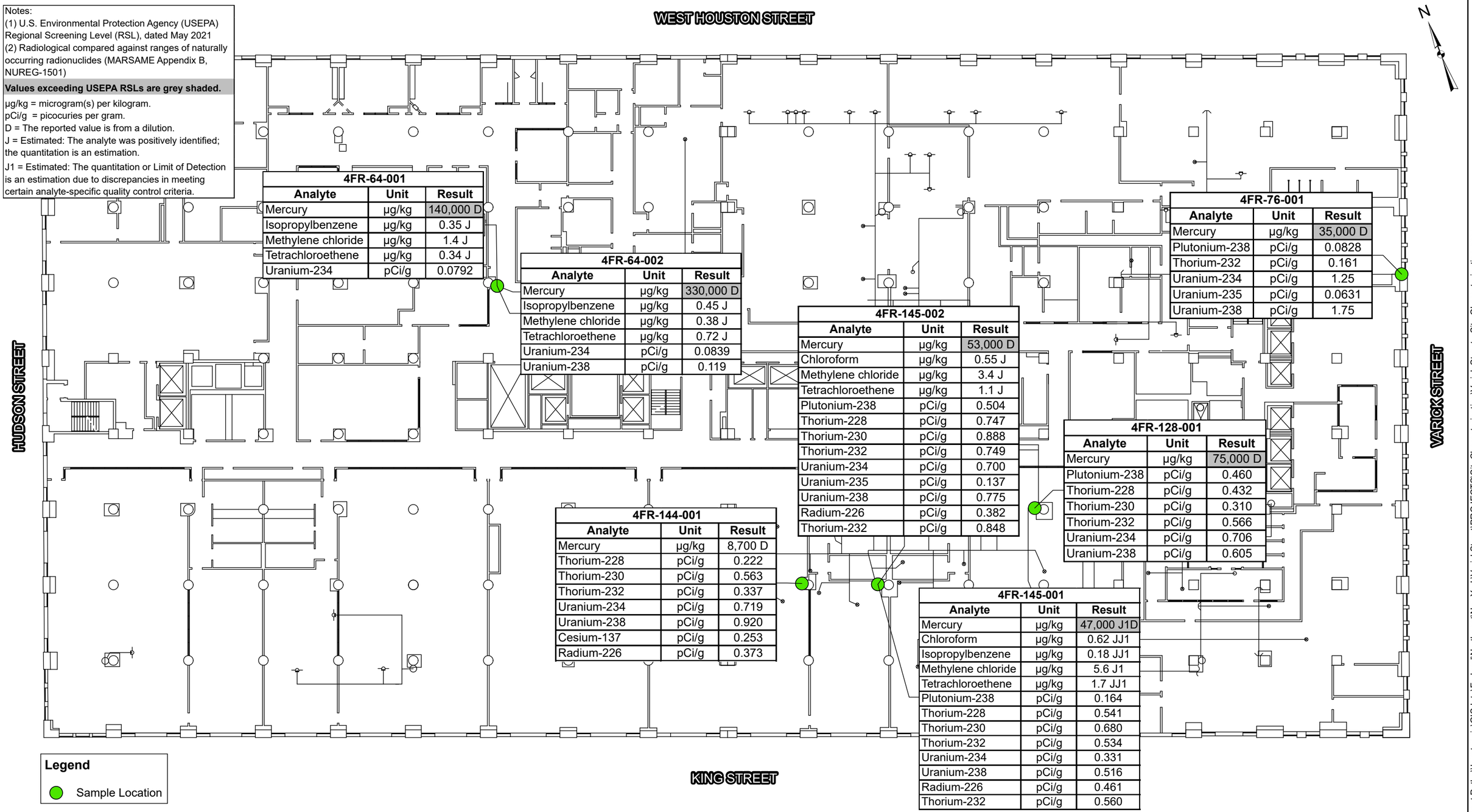
Notes:
(1) U.S. Environmental Protection Agency (USEPA) Regional Screening Level (RSL), dated May 2021
(2) Radiological compared against ranges of naturally occurring radionuclides (MARSAME Appendix B, NUREG-1501)

Values exceeding USEPA RSLs are grey shaded.

µg/kg = microgram(s) per kilogram.
pCi/g = picocuries per gram.
D = The reported value is from a dilution.
J = Estimated: The analyte was positively identified; the quantitation is an estimation.
J1 = Estimated: The quantitation or Limit of Detection is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.



4FR-64-001

Analyte	Unit	Result
Mercury	µg/kg	140,000 D
Isopropylbenzene	µg/kg	0.35 J
Methylene chloride	µg/kg	1.4 J
Tetrachloroethene	µg/kg	0.34 J
Uranium-234	pCi/g	0.0792

4FR-64-002

Analyte	Unit	Result
Mercury	µg/kg	330,000 D
Isopropylbenzene	µg/kg	0.45 J
Methylene chloride	µg/kg	0.38 J
Tetrachloroethene	µg/kg	0.72 J
Uranium-234	pCi/g	0.0839
Uranium-238	pCi/g	0.119

4FR-76-001

Analyte	Unit	Result
Mercury	µg/kg	35,000 D
Plutonium-238	pCi/g	0.0828
Thorium-232	pCi/g	0.161
Uranium-234	pCi/g	1.25
Uranium-235	pCi/g	0.0631
Uranium-238	pCi/g	1.75

4FR-145-002

Analyte	Unit	Result
Mercury	µg/kg	53,000 D
Chloroform	µg/kg	0.55 J
Methylene chloride	µg/kg	3.4 J
Tetrachloroethene	µg/kg	1.1 J
Plutonium-238	pCi/g	0.504
Thorium-228	pCi/g	0.747
Thorium-230	pCi/g	0.888
Thorium-232	pCi/g	0.749
Uranium-234	pCi/g	0.700
Uranium-235	pCi/g	0.137
Uranium-238	pCi/g	0.775
Radium-226	pCi/g	0.382
Thorium-232	pCi/g	0.848

4FR-128-001

Analyte	Unit	Result
Mercury	µg/kg	75,000 D
Plutonium-238	pCi/g	0.460
Thorium-228	pCi/g	0.432
Thorium-230	pCi/g	0.310
Thorium-232	pCi/g	0.566
Uranium-234	pCi/g	0.706
Uranium-238	pCi/g	0.605

4FR-144-001

Analyte	Unit	Result
Mercury	µg/kg	8,700 D
Thorium-228	pCi/g	0.222
Thorium-230	pCi/g	0.563
Thorium-232	pCi/g	0.337
Uranium-234	pCi/g	0.719
Uranium-238	pCi/g	0.920
Cesium-137	pCi/g	0.253
Radium-226	pCi/g	0.373

4FR-145-001

Analyte	Unit	Result
Mercury	µg/kg	47,000 J1D
Chloroform	µg/kg	0.62 JJ1
Isopropylbenzene	µg/kg	0.18 JJ1
Methylene chloride	µg/kg	5.6 J1
Tetrachloroethene	µg/kg	1.7 JJ1
Plutonium-238	pCi/g	0.164
Thorium-228	pCi/g	0.541
Thorium-230	pCi/g	0.680
Thorium-232	pCi/g	0.534
Uranium-234	pCi/g	0.331
Uranium-238	pCi/g	0.516
Radium-226	pCi/g	0.461
Thorium-232	pCi/g	0.560

Legend
Sample Location

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201 VARICK STREET CHARACTERIZATION SAMPLING FOR 4TH FLOOR REMOVED DRAIN PIPING BOXES 3638-003 AND 3638-005, 4TH FLOOR RISER LOCATIONS

201 Varick Street, New York, NY

Figure 3-2

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ATTACHMENT B

Summary of Piping in B-25 Boxes

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201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-003	B-25	144	NW	1	144
3638-003	B-25	144	NW	2	144
3638-003	B-25	144	NW	3	144
3638-003	B-25	144	NW	4	144
3638-003	B-25	144	S	5	144
3638-003	B-25	144	NW	6	145
3638-003	B-25	144	NW	7	144
3638-003	B-25	144	NW	8	145
3638-003	B-25	144	NW	9	144
3638-003	B-25	144	S	10	144
3638-003	B-25	144	S	11	144
3638-003	B-25	144	S	12	144
3638-003	B-25	144	S	13	144
3638-003	B-25	144	NW	14	144
3638-003	B-25	144	NW	15	144
3638-003	B-25	144	NW	16	145
3638-003	B-25	144	NW	17	145
3638-003	B-25	144	N	18	145
3638-003	B-25	144	N	19	145
3638-003	B-25	144	N	20	145
3638-003	B-25	144	N	21	145
3638-003	B-25	144	N	22	145
3638-003	B-25	144	N	23	145
3638-003	B-25	144	NE	24	145
3638-003	B-25	144	NE	25	145
3638-003	B-25	144	NE	26	145
3638-003	B-25	144	NW	27	145
3638-003	B-25	144	NW	28	145
3638-003	B-25	144	NW	29	145
3638-003	B-25	125	W	30	145
3638-003	B-25	125	W	31	145
3638-003	B-25	125	NW	32	145
3638-003	B-25	125	NW	33	145
3638-003	B-25	125	S	34	145
3638-003	B-25	125	S	35	145
3638-003	B-25	125	S	36	145
3638-003	B-25	125	S	37	145
3638-003	B-25	125	NE	38	145
3638-003	B-25	125	NE	39	145
3638-003	B-25	144	NE	41	145
3638-003	B-25	144	NE	42	145
3638-003	B-25	144	NE	43	145
3638-003	B-25	144	NE	44	145
3638-003	B-25	145	NW	45	145
3638-003	B-25	145	NW	46	145
3638-003	B-25	145	N	47	145

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-003	B-25	144	NE	49	145
3638-003	B-25	145	N	52	145
3638-003	B-25	145	N	53	145
3638-003	B-25	145	N	54	145
3638-003	B-25	145	N	55	145
3638-003	B-25	145	NE	57	145
3638-003	B-25	145	NE	60	145
3638-003	B-25	146	W	63	128
3638-003	B-25	145	NE	64	128
3638-003	B-25	145	NE	66	128
3638-007	B-25	144	NE	40	145
3638-007	B-25	145	W	48	128
3638-007	B-25	145	N	50	128
3638-007	B-25	145	N	51	128
3638-007	B-25	145	N	56	128
3638-007	B-25	145	NE	58	128
3638-007	B-25	145	NE	59	128
3638-007	B-25	145	NE	61	128
3638-007	B-25	164	E	62	168
3638-007	B-25	145	NE	65	128
3638-007	B-25	165	N	67	168
3638-007	B-25	165	N	68	168
3638-007	B-25	146	NW	69	128
3638-007	B-25	146	N	70	128
3638-007	B-25	146	N	71	128
3638-007	B-25	146	N	72	128
3638-007	B-25	146	N	73	128
3638-007	B-25	146	N	74	128
3638-007	B-25	146	N	75	128
3638-007	B-25	146	N	76	128
3638-007	B-25	146	NE	77	128
3638-007	B-25	146	NE	78	128
3638-007	B-25	146	NE	79	128
3638-007	B-25	146	NE	80	128
3638-007	B-25	146	NE	81	128
3638-007	B-25	146	NE	82	128
3638-007	B-25	126	N	83	128
3638-007	B-25	126	N	84	128
3638-007	B-25	126	N	85	128
3638-007	B-25	126	N	86	128
3638-007	B-25	126	N	87	128
3638-007	B-25	126	N	88	128
3638-007	B-25	146	NE	89	128
3638-007	B-25	146	NE	90	128
3638-007	B-25	147	NW	91	128
3638-007	B-25	147	NW	92	128

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-007	B-25	146	NE	93	128
3638-007	B-25	146	NE	94	128
3638-007	B-25	128	W	95	128
3638-007	B-25	128	W	96	128
3638-007	B-25	128	W	97	128
3638-007	B-25	128	NW	98	128
3638-007	B-25	128	NW	99	128
3638-007	B-25	147	N	100	128
3638-007	B-25	147	NE	105	128
3638-007	B-25	167	NW	113	168
3638-007	B-25	167	NW	114	168
3638-007	B-25	167	N	117	168
3638-007	B-25	167	NE	119	168
3638-007	B-25	148	W	122	131
3638-007	B-25	148	W	123	131
3638-007	B-25	167	E	124	168
3638-007	B-25	167	E	125	168
3638-007	B-25	166	E	126	168
3638-007	B-25	166	E	127	168
3638-007	B-25	168	E	135	168
3638-007	B-25	148	NE	157	131
3638-007	B-25	148	NE	158	131
3638-007	B-25	169	N	159	168
3638-007	B-25	169	N	160	168
3638-007	B-25	149	N	161	131
3638-007	B-25	169	N	162	168
3638-007	B-25	169	N	163	168
3638-007	B-25	147	N	227	128
3638-007	B-25	147	N	228	128
3638-007	B-25	147	NW	229	128
3638-007	B-25	145	NW	230	145
3638-007	B-25	146	NW	231	128
3638-007	B-25	145	SW	232	145
3638-007	B-25	144	N	233	145
3638-007	B-25	145	N	234	128
3638-007	B-25	148	SW	235	131
3638-007	B-25	143	N	236	145
3638-007	B-25	144	N	237	145
3638-007	B-25	145	NE	238	128
3638-007	B-25	145	SE	239	128
3638-007	B-25	149	N	240	131
3638-007	B-25	148	N	241	131
3638-007	B-25	145	SE	242	128
3638-007	B-25	146	N	243	128
3638-007	B-25	145	N	244	128
3638-007	B-25	127	SW	245	128

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-007	B-25	144	NE	246	145
3638-007	B-25	145	SW	247	145
3638-007	B-25	125	E	248	145
3638-007	B-25	144	N	249	145
3638-007	B-25	143	SE	250	145
3638-007	B-25	144	N	251	145
3638-007	B-25	143	S	252	145
3638-007	B-25	143	NW	253	145
3638-007	B-25	144	S	254	145
3638-001	B-25	147	N	101	128
3638-001	B-25	147	NE	102	131
3638-001	B-25	165	S	103	168
3638-001	B-25	165	S	104	168
3638-001	B-25	165	S	105	168
3638-001	B-25	165	N	106	168
3638-001	B-25	147	NE	108	131
3638-001	B-25	147	NE	109	131
3638-001	B-25	166	NE	110	168
3638-001	B-25	147	NE	111	131
3638-001	B-25	166	E	112	168
3638-001	B-25	147	NE	115	131
3638-001	B-25	148	NW	116	131
3638-001	B-25	148	N	118	131
3638-001	B-25	148	N	120	131
3638-001	B-25	147	N	121	128
3638-001	B-25	168	N	128	168
3638-001	B-25	166	NE	129	168
3638-001	B-25	168	N	130	168
3638-001	B-25	168	NE	131	168
3638-001	B-25	168	NE	132	168
3638-001	B-25	168	E	133	168
3638-001	B-25	168	E	134	168
3638-001	B-25	168	SE	136	168
3638-001	B-25	168	SE	137	168
3638-001	B-25	168	SE	138	168
3638-001	B-25	168	SE	139	168
3638-001	B-25	169	NW	140	168
3638-001	B-25	169	NW	141	168
3638-001	B-25	168	E	142	168
3638-001	B-25	148	E	143	131
3638-001	B-25	148	E	144	131
3638-001	B-25	148	E	145	131
3638-001	B-25	165	S	146	168
3638-001	B-25	148	NE	147	131
3638-001	B-25	149	SW	148	131
3638-001	B-25	149	SW	149	131

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-001	B-25	149	SE	150	168
3638-001	B-25	149	SE	151	168
3638-001	B-25	148	NE	152	131
3638-001	B-25	148	NE	153	131
3638-001	B-25	169	N	154	168
3638-001	B-25	169	N	155	168
3638-001	B-25	169	N	156	168
3638-001	B-25	148	E	164	131
3638-001	B-25	149	NE	165	168
3638-001	B-25	150	NW	167	168
3638-001	B-25	150	N	168	131
3638-001	B-25	150	N	169	131
3638-001	B-25	149	NE	170	168
3638-001	B-25	149	NE	171	168
3638-001	B-25	149	NE	172	168
3638-001	B-25	149	NE	173	168
3638-001	B-25	36	S	150	76
3638-002	B-25	36	S	151	76
3638-002	B-25	73	S	152	76
3638-002	B-25	35	S	153	76
3638-002	B-25	35	SE	154	76
3638-002	B-25	73	S	155	76
3638-002	B-25	73	S	156	76
3638-002	B-25	35	S	157	76
3638-002	B-25	73	S	158	76
3638-002	B-25	54	E	159	76
3638-002	B-25	54	E	160	76
3638-002	B-25	72	E	161	76
3638-002	B-25	72	N	162	76
3638-002	B-25	72	N	163	76
3638-002	B-25	72	S	164	76
3638-002	B-25	72	S	165	76
3638-002	B-25	31	N	166	50
3638-002	B-25	32	N	167	50
3638-002	B-25	31	N	168	50
3638-002	B-25	31	N	169	50
3638-002	B-25	31	N	170	50
3638-002	B-25	30	N	171	50
3638-002	B-25	30	N	172	50
3638-002	B-25	31	NW	173	50
3638-002	B-25	30	N	174	50
3638-002	B-25	30	NE	175	50
3638-002	B-25	33	N	176	50
3638-002	B-25	33	N	177	50
3638-002	B-25	33	N	178	50
3638-002	B-25	29	N	179	50

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-002	B-25	29	NE	180	50
3638-002	B-25	35	SE	181	76
3638-002	B-25	70	S	182	50
3638-002	B-25	30	NW	183	50
3638-002	B-25	30	W	184	50
3638-002	B-25	70	SE	185	50
3638-002	B-25	31	NW	186	50
3638-002	B-25	30	N	187	50
3638-002	B-25	30	N	188	50
3638-002	B-25	31	NW	189	50
3638-002	B-25	31	NW	190	50
3638-002	B-25	31	NW	191	51
3638-002	B-25	69	SE	192	50
3638-002	B-25	31	W	193	50
3638-002	B-25	70	SW	194	50
3638-002	B-25	69	S	195	51
3638-002	B-25	50	S	197	50
3638-002	B-25	31	S	198	50
3638-002	B-25	69	s	199	51
3638-002	B-25	31	S	200	50
3638-002	B-25	31	N	201	50
3638-002	B-25	70	S	202	50
3638-002	B-25	50	NW	203	50
3638-002	B-25	50	NE	204	50
3638-002	B-25	50	N	205	50
3638-002	B-25	50	N	206	50
3638-002	B-25	51	W	207	51
3638-002	B-25	51	NW	208	50
3638-002	B-25	69	S	209	51
3638-002	B-25	69	S	210	51
3638-002	B-25	69	W	211	50
3638-002	B-25	51	W	212	51
3638-002	B-25	51	W	213	51
3638-002	B-25	51	W	214	51
3638-002	B-25	51	W	215	51
3638-002	B-25	69	W	216	50
3638-002	B-25	69	NW	217	50
3638-002	B-25	50	SW	218	51
3638-002	B-25	50	SW	219	51
3638-002	B-25	50	SW	220	51
3638-002	B-25	50	SW	221	51
3638-002	B-25	50	W	222	51
3638-002	B-25	50	SW	223	51
3638-002	B-25	70	S	224	50
3638-002	B-25	70	S	225	50
3638-002	B-25	51	S	226	51

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-002	B-25	151	NW	255	168
3638-004	B-25	151	NW	256	168
3638-004	B-25	125	NW	257	145
3638-004	B-25	125	N	258	145
3638-004	B-25	125	NW	259	145
3638-004	B-25	125	NW	260	145
3638-004	B-25	158	W	261	158
3638-004	B-25	158	W	262	158
3638-004	B-25	158	W	263	158
3638-004	B-25	158	W	264	158
3638-004	B-25	157	W	265	158
3638-004	B-25	157	W	266	158
3638-004	B-25	155	W	267	158
3638-004	B-25	155	W	268	158
3638-004	B-25	154	N	269	154
3638-004	B-25	154	N	270	154
3638-004	B-25	157	W	271	158
3638-004	B-25	157	W	272	158
3638-004	B-25	157	W	273	158
3638-004	B-25	158	W	274	158
3638-004	B-25	28	E	275	64
3638-005	B-25	28	E	276	64
3638-005	B-25	66	E	277	64
3638-005	B-25	66	E	278	64
3638-005	B-25	66	E	279	64
3638-005	B-25	66	E	280	64
3638-005	B-25	66	E	281	64
3638-005	B-25	66	E	282	64
3638-005	B-25	47	E	283	64
3638-005	B-25	47	E	284	64
3638-005	B-25	66	E	285	64
3638-005	B-25	47	E	286	64
3638-005	B-25	47	E	287	64
3638-005	B-25	66	E	288	64
3638-005	B-25	66	E	289	64
3638-005	B-25	66	E	290	64
3638-005	B-25	66	S	291	64
3638-005	B-25	64	E	292	64
3638-005	B-25	66	S	293	64
3638-005	B-25	66	S	294	64
3638-005	B-25	66	W	295	64
3638-005	B-25	66	W	296	64
3638-005	B-25	66	W	297	64
3638-005	B-25	66	NW	298	64
3638-005	B-25	66	W	299	64
3638-005	B-25	66	E	300	64

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

201 Varick St 4th and 5th Floor Piping/Drains Removal
Waste Container Inventory

Waste Container Serial #	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#
3638-005	B-25	66	NW	301	64
3638-005	B-25	64	E	302	64
3638-005	B-25	64	E	303	64
3638-005	B-25	66	W	304	64
3638-005	B-25	66	SW	305	64
3638-005	B-25	65	W	306	64
3638-005	B-25	65	W	307	64
3638-005	B-25	65	S	308	64
3638-005	B-25	65	S	309	64
3638-005	B-25	65	E	310	64
3638-005	B-25	65	S	311	64
3638-005	B-25	65	S	312	64
3638-005	B-25	65	W	313	64
3638-005	B-25	65	W	314	64
3638-005	B-25	56	N	315	76
3638-005	B-25	56	N	316	76
3638-005	B-25	56	N	317	76
3638-005	B-25	56	N	318	76
3638-005	B-25	56	N	319	76
3638-005	B-25	37	N	320	76
3638-005	B-25	36	N	321	76
3638-005	B-25	55	S	322	76
3638-005	B-25	55	SE	323	76
3638-005	B-25	55	S	324	76
3638-005	B-25	55	S	325	76
3638-005	B-25	55	S	326	76
3638-005	B-25	56	SW	327	76
3638-005	B-25	56	SW	328	76
3638-005	B-25	56	SW	329	76
3638-005	B-25	80	S	330	N/A
3638-005	B-25	80	S	331	N/A
3638-005	B-25	80	S	332	N/A
3638-005	B-25	80	S	333	N/A
3638-005	B-25	80	S	334	N/A
3638-005	B-25	80	SE	335	N/A
3638-005	B-25	80	SE	336	N/A
3638-005	B-25	80	SE	337	N/A
3638-005	B-25	Gate 14	S	338	N/A
3638-005	B-25	Gate 14	S	339	N/A
3638-005	B-25	Gate 14	S	340	N/A
LP-83744270	55-Gallon Drum	N/A	N/A	N/A	N/A

Notes: All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full.

Drains were loaded into containers 3638-004 and 3638-007.

ATTACHMENT C

Quality Control Records – Chemical Instrumentation

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3375 N. Delaware Street, Chandler, AZ 85225
800.528.7411 | (f) 602.281.1745 | azic.com

Certification of Instrument Calibration

RMA # 2773587

Pine Environmental Services LLC
92 NORTH MAIN ST - BLDG 20
WINDSOR, NJ 08651

This is to certify that the Jerome **J505-0001** Atomic Fluorescence Mercury Analyzer, Serial Number **50500020**, was calibrated with standard units traceable to NIST.

Calibration Status as Received: **Out of Calibration**

	Actual	Calibration Gas	Allowable Range
Incoming:	28.59 µg/m3 Hg 0.52 % RSD	25.00 µg/m3 Hg	22.50 - 27.50 µg/m3 Hg <5%
Outgoing:	25.71 µg/m3 Hg 0.62 % RSD	25.00 µg/m3 Hg	23.75 - 26.25 µg/m3 Hg <3%
Calibration Verification:	µg/m3 Hg % RSD	0.300 µg/m3 Hg	0.255 - 0.345 µg/m3 Hg <15%

Calibration Status as Left: **In Calibration**

Estimated Uncertainty of Calibration System: 3.5%

Calibration Date: 22-Sep-2020 Recalibration Date: 21-Sep-2021

Temperature °F: 70.00 % Relative Humidity: 47.70

Approved By: Cheryl Hradek Date Approved: 24-Sep-2020
Title: Cheryl Hradek - Quality Control

Equipment Used:

Permeation Tube: S89-56540 **NIST#:** ISO13265; 072958
Calibration Date: 12-Nov-2019 **Calibration Date Due:** 12-Nov-2020

DynaCalibrator: MU-1407 **NIST#:** 19-3004
Calibration Date: 08-Nov-2019 **Calibration Date Due:** 09-Nov-2020

Digital Multimeter: 66961028 **NIST#:** 7003135
Calibration Date: 24-Feb-2020 **Calibration Date Due:** 24-Feb-2021

Mass Flow Controller: 63665 **NIST#:**227080
Calibration Date:27-Mar-20 **Calibration Date Due:** 27-Mar-21

Calibration Procedure Used: 730-0165

AMETEK Brookfield certifies that the above listed instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracy is traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY within the limitations of the Institute's calibration services, or have been derived from accepted values of natural physical constants, or have been derived by the ratio type of self-calibration techniques.
Disclaimer: Any unauthorized adjustments, removal or breaking of QC seals, or other customer modifications on your Jerome Analyzer WILL VOID this factory calibration, because any of the above acts could affect the calibration and readings of the instrument. Further, AMETEK Brookfield WILL NOT be responsible for any liabilities created as a result of using the instrument after such adjustments, seal removal, or modifications.

This document shall not be reproduced, except in full, without the written approval of AMETEK Brookfield.

RMA E20

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
2225 Tomlynn Street
Richmond, Va. 23230
Toll-free: (866) 801-PINE (7463)

Pine Environmental Services, Inc.

Instrument ID 43437
Description Jerome J505
Calibrated 6/10/2021 9:21:14AM

Manufacturer Arizona
Model Number J505
Serial Number/ Lot Number 50500020
Location Virginia
Department

State Certified
Status Pass
Temp °C 24
Humidity % 52

Calibration Specifications

Group # 1
Group Name Warmup, Purge, and Sample Test
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Ryan Armstrong

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT QC/ PACKING LIST

Description	Arizona Instruments Jerome **J505**
Instrument ID	43437
Date Prepared	6·10·21
Factory Cal. Date	9·22·20

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
Jerome j505 w/ hard case	✓	✓		
Manual	✓	✓		
Probe	✓	✓		
Charger and AC Cord	✓			
Zeroing filter	✓	✓		
Spare fritware filters (2)	✓	✓		
USB Thumb drive for data download	✓	✓		
ProCal inspection report	✓	✓		
Current factory calibration sheet	✓	✓		
Supporting Items				
Extension tubing	X	X		

Prepared by: RJA
QC checked by: cdd
Date: 6/10

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC.

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services LLC
798 Cromwell Park Dr.
Suite R & S
Glen Burnie, MD 21061

Pine Environmental Services, Inc.

Instrument ID 45378
Description RXI GX 6000 (PID ONLY)
Calibrated 6/10/2021 8:55:28AM

Manufacturer RKI
Model Number GX-6000
Serial Number/ Lot Number 883010009RN
Location Maryland
Department

State Certified
Status Pass
Temp °C 24
Humidity % 52

Calibration Specifications

Group # 1
Group Name Isobutylene
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.0

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
100.0 / 100.0	PPM	100.0	PPM	98.3	100.1	0.10%	Pass

Test Instruments Used During the Calibration

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	(As Of Cal Entry Date) Last Cal Date/ Opened Date	Next Cal Date / Expiration Date
MD ISO 100 PPM DBJ-248-100-18	MD ISO 100 PPM DBJ-248-100-18	Pine Environmental Services, Inc.	31721	DBJ-248-100-18		3/20/2023

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Andrea Henderson

All instruments are calibrated by Pine Environmental Services LLC according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services LLC of any defect within 24 hours of receipt of equipment
Please call 800-301-9663 for Technical Assistance

INSTRUMENT QC/ PACKING LIST

Description	RKI GX-6000
Instrument type	☐ 4-gas plus PID, ☑ PID only (send only 100 ppm iso.)
Instrument ID	45378
Date Calibrated	6/10

PINE
www.pine-environmental.com

Standard Items	**Prepared**	**QC check**	**Received by customer**	**Returned to Pine**
GX-6000 w/ carry case	✓	✓		
Belt Clip/ Rubber boot/ wrist strap	✓	✓		
Manual	✓	✓		
Quick reference card	✓	✓		
Tapered nozzle	X	X		
Battery charger cradle	✓	✓		
AC adapter: must be **12V, 1.25 Amp output**	✓	✓		
3' sample hose and probe, with cylindrical and hydrophobic filters installed	✓	✓		
(1 spare) Sample probe cylindrical filter	✓	✓		
(3) Hydrophobic filters, 1 installed in GX-6000, 2 spares	✓	✓		
ProCal calibration sheet	✓	✓		
Supporting Items				
12% O2, 50% LEL CH4, 50 ppm CO, and 25 ppm H2S gas mix	✓	X		
100 ppm isobutylene calibration gas mix	✓	✓		
Male 0.5 lpm regulator	✓	X		
Female 0.5 lpm regulator	✓	✓		
Tedlar bag	✓	✓		
Datalogging software				
Comm. cable				
Sample wand				
Sample tubing				
**4-gas mix calibration gas SDS ✓ *Must match cylinder with setup*				
**100 ppm isobutylene calibration gas SDS ✓ *Must match cylinder with setup*				

***SDS documents provided upon request*

Prepared by: [signature]
QC checked by: [signature]
Date: 6/10/21

This packing list is to ensure that every item needed to operate the unit was sent and received. Upon receiving a shipment, please fill out the "Received by customer" column. Call Pine within 24 hours of receiving the equipment if any pieces are missing, damaged, or malfunctioning. Thank you for choosing Pine Environmental Services LLC.

HEALTH AND SAFETY EQUIPMENT CALIBRATION LOG

Project/Site: 201 Varick Street Characterization Sampling
Project No.: 6292233 (Contract No. GS-03-P-15-AZ-D-0015, Task Order 47PC0220F0032)
Instrument: Jerome J505 Mercury Vapor Analyzer

Date	Time	Signature	Serial Number	Zeroed (Y/N)	Results and Notes (OK/High/Malfunction)
6/14/2021	1015	[signature]	50500120	Y	Background reading B-10 → 0.00017 mg/m³
6/15/2021	0855	[signature]	" "	Y	(to verify) L→ 0.00027 mg/m³
6/16/2021	0800	[signature]	" "	Y	OK
6/17/2021	0800	[signature]	" "	Y	OK
6/17/2021	1300	[signature]	" "	Y	OK
6/18/2021	0800	[signature]	" "	Y	OK
6/21/2021	1800	[signature]	" "	Y	OK
6/22/2021	1400	[signature]	" "	Y	OK

[signature] 6/22/2021

Signature of Site Safety and Health Officer Date

HEALTH AND SAFETY EQUIPMENT CALIBRATION LOG

Project/Site: 201 Varick Street Characterization Sampling
Project No.: 6292233 (Contract No. GS-03-P-15-AZ-D-0015, Task Order 47PC0220F0032)
Instrument: RKI Eagle GX-6000 Multi-gas meter (PID)

Date	Time	Signature	Serial Number	Zeroed (Y/N)	Results and Notes (OK/High/Malfunction)
6/14/2021	1045	[signature]	883010009RN	Y	OK → Background reading B-10 → 0.0ppm
6/15/2021	0845	[signature]	" "	Y	OK
6/16/2021	0800	[signature]	" "	Y	OK
6/17/2021	0800	[signature]	" "	Y	OK
6/18/2021	0800	[signature]	" "	Y	OK
6/21/2021	1800	[signature]	" "	Y	OK
6/22/2021	1410	[signature]	" "	Y	OK

[signature]
Signature of Site Safety and Health Officer

6/22/2021
Date

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ATTACHMENT D

Analytical Report (Eurofins TestAmerica)

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eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Tel: (303)736-0100

Laboratory Job ID: 280-150116-1
Client Project/Site: NUSTL Decommissioning

For:
EA Engineering, Science, and Technology
225 Schilling Circle
Suite 400
Hunt Valley, Maryland 21031

Attn: Tara Lamond

Elizabeth M. Hoerchler

Authorized for release by:
7/20/2021 2:59:55 PM
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Designee for

Rhonda Ridenhower, Client Service Manager
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Rhonda.Ridenhower@Eurofinset.com

LINKS

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The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M	Manual integrated compound.
U	Undetected at the Limit of Detection.

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
D	The reported value is from a dilution.
J	Estimated: The analyte was positively identified; the quantitation is an estimation
J1	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected at the Limit of Detection.

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 280-150116-1

Laboratory: Eurofins TestAmerica, Denver

Narrative

CASE NARRATIVE

Client: EA Engineering, Science, and Technology

Project: NUSTL Decommissioning

Report Number: 280-150116-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 06/23/2021; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 2.1° C.

RECEIPT COMMENTS

Job ID: 280-150116-1 (Continued)

Laboratory: Eurofins TestAmerica, Denver (Continued)

Total metals analysis was canceled by the client.

VOLATILE ORGANIC COMPOUNDS BY GC/MS

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3) and 4FR-64-002 (280-150116-4) were analyzed for Volatile Organic Compounds by GC/MS in accordance with SW-846 Method 1311/8260C. The samples were leached on 06/29/2021 and analyzed on 07/07/2021.

Headspace was present in the container received for the following samples to be analyzed for TCLP volatiles: 4FR-145-001 (280-150116-1), 4FR-64-001 (280-150116-3) and 4FR-64-002 (280-150116-4). The presence of headspace may have led to the loss of volatile compounds prior to the extraction procedure.

1,1-Dichloroethene failed the recovery criteria low for the MS of sample 4FR-145-001MS (280-150116-1) in batch 280-542493.

1,1-Dichloroethene failed the recovery criteria low for the MSD of sample 4FR-145-001MSD (280-150116-1) in batch 280-542493.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

VOLATILE ORGANIC COMPOUNDS (GC/MS)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3) and 4FR-64-002 (280-150116-4) were analyzed for Volatile Organic Compounds (GC/MS) in accordance with EPA SW-846 Method 8260C. The samples were analyzed on 07/02/2021.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 280-542156 and analytical batch 280-542130 were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample/duplicate (LCS/LCSD) recovery was within acceptance limits. Report data with NCM and flags. (280-150116-E-1-C MS) and (280-150116-E-1-D MSD)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP METALS (ICP)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3) and 4FR-64-002 (280-150116-4) were analyzed for TCLP metals (ICP) in accordance with EPA SW-846 Method 1311/6010C. The samples were leached on 06/25/2021, prepared on 06/28/2021 and analyzed on 06/29/2021.

Barium and Chromium were detected in method blank LB 280-541307/1-B at levels that were above the method detection limit but below the reporting limit. The values should be considered estimates, and have been flagged. If the associated sample reported a result above the MDL and/or RL, the result has been flagged.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP MERCURY

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3) and 4FR-64-002 (280-150116-4) were analyzed for TCLP mercury in accordance with EPA SW-846 Methods 1311/7470A. The samples were leached on 06/25/2021, and prepared and analyzed on 07/03/2021.

Mercury failed the recovery criteria low for the MSD of sample 4FR-64-002MSD (280-150116-4) in batch 280-542245. Mercury exceeded the RPD limit.

Sample 4FR-64-002 (280-150116-4)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

MERCURY

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for mercury in accordance with EPA SW-846 Method 7471B. The samples were prepared on 06/25/2021 and analyzed on 06/26/2021.

Job ID: 280-150116-1 (Continued)

Laboratory: Eurofins TestAmerica, Denver (Continued)

Mercury failed the recovery criteria high for the MS of sample 4FR-145-001MS (280-150116-1) in batch 280-541401.

Mercury failed the recovery criteria high for the MSD of sample 4FR-145-001MSD (280-150116-1) in batch 280-541401.

Samples 4FR-145-001 (280-150116-1)[100X], 4FR-145-002 (280-150116-2)[100X], 4FR-64-001 (280-150116-3)[500X], 4FR-64-002 (280-150116-4)[500X], 4FR-128-001 (280-150116-5)[100X], 4FR-76-001 (280-150116-6)[100X] and 4FR-144-001 (280-150116-7)[10X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 06/24/2021 and 06/25/2021.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GROSS ALPHA / BETA (GFPC)

Sample Air Sample-001 (280-150116-8) was analyzed for Gross Alpha / Beta (GFPC) in accordance with EPA 900.0. The samples were prepared on 06/30/2021 and analyzed on 07/16/2021.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 06/25/2021, prepared on 06/30/2021 and analyzed on 07/13/2021.

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU. This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.
4FR-76-001 (280-150116-6)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were dried on 06/25/2021, prepared on 06/30/2021 and analyzed on 07/13/2021.

A blank population correction was applied to account for contributions to the analyte count rate from sources other than the sample itself. Interferences may include, but are not limited to, impurities in reagents, tracers, or glassware, or effects due to the measurement process
4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6), 4FR-144-001 (280-150116-7), (LCS 160-516784/2-A), (MB 160-516784/1-A) and (280-150116-A-1-M DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 06/25/2021, prepared on 06/29/2021 and analyzed on 07/08/2021 and 07/13/2021.

Job ID: 280-150116-1 (Continued)

Laboratory: Eurofins TestAmerica, Denver (Continued)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM 226 (7 DAY INGROWTH)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4) and 4FR-144-001 (280-150116-7) were analyzed for Radium 226 (7 day ingrowth) in accordance with DOE GA_01_R. The samples were dried on 06/25/2021, prepared on 06/28/2021 and analyzed on 07/05/2021.

Sample Air Sample-001 (280-150116-8) was analyzed for Radium-226 & Other Gamma Emitters (GS) in accordance with DOE GA_01_R. The samples were prepared on 07/02/2021 and analyzed on 07/16/2021.

Radium-226 is reported in these samples at the client's request. Ra-226 is reported from the 609.31 keV line of bismuth-214. Because the samples have not had a 21-day ingrowth, the activity for Ra-226 is an estimated value and may be biased low. This bias is caused by the disruption of secular equilibrium between Ra-226 and Bi-214 by the loss of radon-222 during sample preparation.The following samples are affected: 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-144-001 (280-150116-7), (LCS 160-516430/2-A), (MB 160-516430/1-A) and (280-150116-A-7-C DU).

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Radium-226 is reported in these samples at the client's request. Ra-226 is reported from the 609.31keV line of Bismuth-214. Because the samples have not had a 21-day ingrowth, the activity for Ra-226 is an estimated value and may be biased low. This bias is caused by the disruption of secular equilibrium between Ra-226 and Bi-214 by the loss of Radon-222 during sample preparation. Air Sample-001 (280-150116-8) and (280-150116-A-8-F DU)

The detection goal of 20pCi/sample was not met for Ra-226 for the following sample, duplicate (DU), and method blank MB). An elevated MDC can occur when higher background counts are applied to a peak ROI. This is due to the relatively small size of the peak or subsequent "force-fit" of the non-existent peak which resulted in higher than normal background counts due to statistical fluctuations in the Compton baseline. The laboratory does not believe this adversely affects the data, as the Ra-226 results are well below the RL and MDC. Air Sample-001 (280-150116-8), (MB 160-516942/1-A) and (280-150116-A-8-F DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Job ID: 280-150116-1 (Continued)

Laboratory: Eurofins TestAmerica, Denver (Continued)

TOTAL BETA STRONTIUM (GFPC)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Total Beta Strontium (GFPC) in accordance with SR-03-RC. The samples were dried on 06/25/2021, prepared on 07/02/2021 and 07/09/2021 and analyzed on 07/07/2021 and 07/13/2021.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TECHNETIUM-99 (LSC)

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Technetium-99 (LSC) in accordance with DOE Tc-02-RC. The samples were dried on 06/25/2021, prepared on 06/30/2021 and analyzed on 07/07/2021.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL DEN
6010C	Metals (ICP)	SW846	TAL DEN
7470A	Mercury (CVAA)	SW846	TAL DEN
7471B	Mercury (CVAA)	SW846	TAL DEN
Moisture	Percent Moisture	EPA	TAL DEN
900.0	Gross Alpha and Gross Beta Radioactivity	EPA	TAL SL
A-01-R	Isotopic Plutonium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
SR-03-RC	Total Beta Strontium (GFPC)	DOE	TAL SL
TC-02-RC	Technetium-99 (LSC)	DOE	TAL SL
1311	TCLP Extraction	SW846	TAL DEN
3010A	Preparation, Total Metals	SW846	TAL DEN
5030B	Purge and Trap	SW846	TAL DEN
7470A	Preparation, Mercury	SW846	TAL DEN
7471B	Preparation, Mercury	SW846	TAL DEN
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Ext_Chrom_LSC	Preparation, Extraction Chromatography	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill Geo-7	Fill Geometry, 7 Day Ingrowth	None	TAL SL
None	Direct Addition of Sample	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
EPA = US Environmental Protection Agency
None = None
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100
TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
280-150116-1	4FR-145-001	Solid	06/22/21 08:24	06/23/21 10:30	
280-150116-2	4FR-145-002	Solid	06/22/21 08:26	06/23/21 10:30	
280-150116-3	4FR-64-001	Solid	06/22/21 08:41	06/23/21 10:30	
280-150116-4	4FR-64-002	Solid	06/22/21 08:43	06/23/21 10:30	
280-150116-5	4FR-128-001	Solid	06/22/21 09:11	06/23/21 10:30	
280-150116-6	4FR-76-001	Solid	06/22/21 09:25	06/23/21 10:30	
280-150116-7	4FR-144-001	Solid	06/22/21 09:29	06/23/21 10:30	
280-150116-8	Air Sample-001	Wipe	06/22/21 09:00	06/23/21 10:30	

Method: 8260C - Volatile Organic Compounds by GC/MS

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	88	U M	88	30	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Benzene	0.55	U J1	5.5	0.20	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Bromoform	1.1	U J1	5.5	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Bromodichloromethane	1.1	U J1	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Bromomethane	2.2	U	11	0.60	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
2-Butanone (MEK)	22	U J1	22	7.1	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Carbon disulfide	0.55	U M	5.5	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Carbon tetrachloride	0.55	U J1	5.5	0.15	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Chlorobenzene	0.55	U J1	5.5	0.16	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Dibromochloromethane	1.1	U J1	5.5	0.31	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Chloroethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Chloroform	**0.62**	**J J1**	11	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Chloromethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Cyclohexane	1.1	U J1	5.5	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2-Dibromo-3-Chloropropane	1.1	U J1	11	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2-Dichlorobenzene	1.1	U J1	5.5	0.52	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,3-Dichlorobenzene	1.1	U J1	5.5	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,4-Dichlorobenzene	1.8	U J1	5.5	0.54	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1-Dichloroethane	1.1	U J1	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2-Dichloroethane	1.1	U J1	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
cis-1,2-Dichloroethene	1.1	U J1	2.8	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
trans-1,2-Dichloroethene	1.1	U J1	2.8	0.43	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1-Dichloroethene	1.1	U J1	5.5	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2-Dichloropropane	1.1	U J1	5.5	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
cis-1,3-Dichloropropene	1.1	U J1	5.5	0.34	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
trans-1,3-Dichloropropene	1.1	U J1	5.5	0.49	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Ethylbenzene	1.1	U J1	5.5	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U J1	22	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
2-Hexanone	22	U J1	22	6.8	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Isopropylbenzene	**0.18**	**J J1**	5.5	0.18	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Methyl acetate	4.4	U J1	11	1.5	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Methylcyclohexane	1.1	U J1	5.5	0.47	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Methylene Chloride	**5.6**	**J1**	5.5	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
4-Methyl-2-pentanone (MIBK)	8.8	U	22	4.2	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Methyl tert-butyl ether	0.55	U	22	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Trichlorofluoromethane	1.1	U	11	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Trichloroethene	1.1	U J1	5.5	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2,4-Trichlorobenzene	2.2	U J1	5.5	0.57	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1,1-Trichloroethane	1.1	U J1	5.5	0.36	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Vinyl chloride	2.2	U	5.5	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Xylenes, Total	2.2	U J1	5.5	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1,2,2-Tetrachloroethane	1.1	U J1	5.5	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,1,2-Trichloroethane	2.2	U J1	5.5	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Styrene	2.2	U J1	5.5	0.59	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Tetrachloroethene	**1.7**	**J J1**	5.5	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Toluene	2.2	U J1	5.5	0.71	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
Dichlorodifluoromethane	1.1	U	11	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1
1,2-Dibromoethane	1.1	U J1	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 15:52	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	*104*		*58 - 140*	*07/02/21 10:00*	*07/02/21 15:52*	*1*
4-Bromofluorobenzene (Surr)	*111*		*76 - 127*	*07/02/21 10:00*	*07/02/21 15:52*	*1*
Dibromofluoromethane (Surr)	*97*		*75 - 121*	*07/02/21 10:00*	*07/02/21 15:52*	*1*
Toluene-d8 (Surr)	*103*		*80 - 126*	*07/02/21 10:00*	*07/02/21 15:52*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	89	U	89	30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Benzene	0.56	U	5.6	0.20	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Bromoform	1.1	U	5.6	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Bromodichloromethane	1.1	U	5.6	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Bromomethane	2.2	U	11	0.60	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
2-Butanone (MEK)	22	U	22	7.1	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Carbon disulfide	0.56	U M	5.6	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Carbon tetrachloride	0.56	U	5.6	0.15	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Chlorobenzene	0.56	U	5.6	0.16	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Dibromochloromethane	1.1	U	5.6	0.31	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Chloroethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Chloroform	**0.55**	**J**	11	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Chloromethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Cyclohexane	1.1	U	5.6	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2-Dibromo-3-Chloropropane	1.1	U	11	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2-Dichlorobenzene	1.1	U	5.6	0.53	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,3-Dichlorobenzene	1.1	U	5.6	0.46	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,4-Dichlorobenzene	1.8	U	5.6	0.54	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1-Dichloroethane	1.1	U	5.6	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2-Dichloroethane	1.1	U	5.6	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
cis-1,2-Dichloroethene	1.1	U	2.8	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
trans-1,2-Dichloroethene	1.1	U	2.8	0.43	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1-Dichloroethene	1.1	U	5.6	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2-Dichloropropane	1.1	U	5.6	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
cis-1,3-Dichloropropene	1.1	U	5.6	0.35	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
trans-1,3-Dichloropropene	1.1	U	5.6	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Ethylbenzene	1.1	U	5.6	0.51	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U	22	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
2-Hexanone	22	U	22	6.8	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Isopropylbenzene	0.56	U	5.6	0.18	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Methyl acetate	4.5	U	11	1.5	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Methylcyclohexane	1.1	U	5.6	0.47	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Methylene Chloride	**3.4**	**J**	5.6	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
4-Methyl-2-pentanone (MIBK)	8.9	U	22	4.2	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Methyl tert-butyl ether	0.56	U	22	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Trichlorofluoromethane	1.1	U	11	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Trichloroethene	1.1	U	5.6	0.39	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2,4-Trichlorobenzene	2.2	U	5.6	0.58	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1,1-Trichloroethane	1.1	U	5.6	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Vinyl chloride	2.2	U	5.6	0.57	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Xylenes, Total	2.2	U	5.6	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1,2,2-Tetrachloroethane	1.1	U	5.6	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,1,2-Trichloroethane	2.2	U	5.6	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	2.2	U	5.6	0.59	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Tetrachloroethene	**1.1**	**J**	5.6	0.20	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Toluene	2.2	U	5.6	0.71	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
Dichlorodifluoromethane	1.1	U	11	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1
1,2-Dibromoethane	1.1	U	5.6	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:21	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*58 - 140*	*07/02/21 10:00*	*07/02/21 17:21*	*1*
4-Bromofluorobenzene (Surr)	*108*		*76 - 127*	*07/02/21 10:00*	*07/02/21 17:21*	*1*
Dibromofluoromethane (Surr)	*100*		*75 - 121*	*07/02/21 10:00*	*07/02/21 17:21*	*1*
Toluene-d8 (Surr)	*102*		*80 - 126*	*07/02/21 10:00*	*07/02/21 17:21*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	88	U M	88	30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Benzene	0.55	U	5.5	0.20	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Bromoform	1.1	U	5.5	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Bromodichloromethane	1.1	U	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Bromomethane	2.2	U	11	0.60	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
2-Butanone (MEK)	22	U	22	7.1	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Carbon disulfide	0.55	U M	5.5	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Carbon tetrachloride	0.55	U	5.5	0.15	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Chlorobenzene	0.55	U	5.5	0.16	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Dibromochloromethane	1.1	U	5.5	0.31	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Chloroethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Chloroform	1.1	U	11	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Chloromethane	1.1	U	11	0.32	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Cyclohexane	1.1	U	5.5	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2-Dibromo-3-Chloropropane	1.1	U	11	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2-Dichlorobenzene	1.1	U	5.5	0.52	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,3-Dichlorobenzene	1.1	U	5.5	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,4-Dichlorobenzene	1.8	U	5.5	0.54	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1-Dichloroethane	1.1	U	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2-Dichloroethane	1.1	U	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
cis-1,2-Dichloroethene	1.1	U	2.8	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
trans-1,2-Dichloroethene	1.1	U	2.8	0.43	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1-Dichloroethene	1.1	U	5.5	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2-Dichloropropane	1.1	U	5.5	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
cis-1,3-Dichloropropene	1.1	U	5.5	0.34	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
trans-1,3-Dichloropropene	1.1	U	5.5	0.49	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Ethylbenzene	1.1	U	5.5	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U	22	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
2-Hexanone	22	U	22	6.8	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Isopropylbenzene	**0.35**	**J**	5.5	0.18	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Methyl acetate	4.4	U	11	1.5	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Methylcyclohexane	1.1	U	5.5	0.47	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Methylene Chloride	**1.4**	**J**	5.5	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
4-Methyl-2-pentanone (MIBK)	8.8	U	22	4.2	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl tert-butyl ether	0.55	U	22	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Trichlorofluoromethane	1.1	U	11	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Trichloroethene	1.1	U	5.5	0.38	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2,4-Trichlorobenzene	2.2	U	5.5	0.57	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1,1-Trichloroethane	1.1	U	5.5	0.36	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Vinyl chloride	2.2	U	5.5	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Xylenes, Total	2.2	U	5.5	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1,2,2-Tetrachloroethane	1.1	U	5.5	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,1,2-Trichloroethane	2.2	U	5.5	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Styrene	2.2	U	5.5	0.59	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Tetrachloroethene	**0.34**	**J**	5.5	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Toluene	2.2	U	5.5	0.71	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
Dichlorodifluoromethane	1.1	U	11	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1
1,2-Dibromoethane	1.1	U	5.5	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 17:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*58 - 140*	*07/02/21 10:00*	*07/02/21 17:43*	*1*
4-Bromofluorobenzene (Surr)	*100*		*76 - 127*	*07/02/21 10:00*	*07/02/21 17:43*	*1*
Dibromofluoromethane (Surr)	*97*		*75 - 121*	*07/02/21 10:00*	*07/02/21 17:43*	*1*
Toluene-d8 (Surr)	*99*		*80 - 126*	*07/02/21 10:00*	*07/02/21 17:43*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	84	U M	84	29	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Benzene	0.53	U	5.3	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Bromoform	1.1	U	5.3	0.42	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Bromodichloromethane	1.1	U	5.3	0.42	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Bromomethane	2.1	U	11	0.57	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
2-Butanone (MEK)	21	U	21	6.7	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Carbon disulfide	0.53	U M	5.3	0.18	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Carbon tetrachloride	0.53	U	5.3	0.14	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Chlorobenzene	0.53	U	5.3	0.16	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Dibromochloromethane	1.1	U	5.3	0.29	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Chloroethane	1.1	U	11	0.30	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Chloroform	1.1	U	11	0.35	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Chloromethane	1.1	U	11	0.31	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Cyclohexane	1.1	U	5.3	0.39	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2-Dibromo-3-Chloropropane	1.1	U	11	0.39	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2-Dichlorobenzene	1.1	U	5.3	0.50	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,3-Dichlorobenzene	1.1	U	5.3	0.43	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,4-Dichlorobenzene	1.7	U	5.3	0.51	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1-Dichloroethane	1.1	U	5.3	0.42	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2-Dichloroethane	1.1	U	5.3	0.42	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
cis-1,2-Dichloroethene	1.1	U	2.6	0.46	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
trans-1,2-Dichloroethene	1.1	U	2.6	0.41	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1-Dichloroethene	1.1	U	5.3	0.28	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2-Dichloropropane	1.1	U	5.3	0.52	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
cis-1,3-Dichloropropene	1.1	U	5.3	0.33	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
trans-1,3-Dichloropropene	1.1	U	5.3	0.47	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Ethylbenzene	1.1	U	5.3	0.48	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U	21	0.28	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
2-Hexanone	21	U	21	6.4	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Isopropylbenzene	**0.45**	**J**	5.3	0.17	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Methyl acetate	4.2	U	11	1.4	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Methylcyclohexane	1.1	U	5.3	0.44	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Methylene Chloride	**0.38**	**J**	5.3	0.36	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
4-Methyl-2-pentanone (MIBK)	8.4	U	21	4.0	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Methyl tert-butyl ether	0.53	U	21	0.18	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Trichlorofluoromethane	1.1	U	11	0.36	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Trichloroethene	1.1	U	5.3	0.37	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2,4-Trichlorobenzene	2.1	U	5.3	0.55	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1,1-Trichloroethane	1.1	U	5.3	0.35	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Vinyl chloride	2.1	U	5.3	0.54	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Xylenes, Total	2.1	U	5.3	0.53	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1,2,2-Tetrachloroethane	1.1	U	5.3	0.45	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,1,2-Trichloroethane	2.1	U	5.3	0.53	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Styrene	2.1	U	5.3	0.56	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Tetrachloroethene	**0.72**	**J**	5.3	0.19	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Toluene	2.1	U	5.3	0.67	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
Dichlorodifluoromethane	1.1	U	11	0.47	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1
1,2-Dibromoethane	1.1	U	5.3	0.42	ug/Kg	☼	07/02/21 10:00	07/02/21 18:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*58 - 140*	*07/02/21 10:00*	*07/02/21 18:05*	*1*
4-Bromofluorobenzene (Surr)	*103*		*76 - 127*	*07/02/21 10:00*	*07/02/21 18:05*	*1*
Dibromofluoromethane (Surr)	*98*		*75 - 121*	*07/02/21 10:00*	*07/02/21 18:05*	*1*
Toluene-d8 (Surr)	*99*		*80 - 126*	*07/02/21 10:00*	*07/02/21 18:05*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0020	U	0.010	0.0016	mg/L			07/07/21 16:33	1
2-Butanone (MEK)	0.032	U	0.10	0.020	mg/L			07/07/21 16:33	1
Carbon tetrachloride	0.0040	U	0.010	0.0019	mg/L			07/07/21 16:33	1
Chlorobenzene	0.0020	U	0.010	0.0017	mg/L			07/07/21 16:33	1
Chloroform	0.0020	U	0.010	0.0016	mg/L			07/07/21 16:33	1
1,2-Dichloroethane	0.0040	U	0.010	0.0013	mg/L			07/07/21 16:33	1
1,1-Dichloroethene	0.0040	U J1	0.010	0.0023	mg/L			07/07/21 16:33	1
Tetrachloroethene	0.0040	U	0.010	0.0020	mg/L			07/07/21 16:33	1
Trichloroethene	0.0020	U	0.010	0.0016	mg/L			07/07/21 16:33	1
Vinyl chloride	0.0080	U	0.010	0.0010	mg/L			07/07/21 16:33	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*78 - 120*		*07/07/21 16:33*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*64 - 129*		*07/07/21 16:33*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP (Continued)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*78 - 121*		*07/07/21 16:33*	*1*
Dibromofluoromethane (Surr)	*101*		*79 - 119*		*07/07/21 16:33*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0020	U	0.010	0.0016	mg/L			07/07/21 16:56	1
2-Butanone (MEK)	0.032	U	0.10	0.020	mg/L			07/07/21 16:56	1
Carbon tetrachloride	0.0040	U	0.010	0.0019	mg/L			07/07/21 16:56	1
Chlorobenzene	0.0020	U	0.010	0.0017	mg/L			07/07/21 16:56	1
Chloroform	**0.0025**	**J**	0.010	0.0016	mg/L			07/07/21 16:56	1
1,2-Dichloroethane	0.0040	U	0.010	0.0013	mg/L			07/07/21 16:56	1
1,1-Dichloroethene	0.0040	U	0.010	0.0023	mg/L			07/07/21 16:56	1
Tetrachloroethene	0.0040	U	0.010	0.0020	mg/L			07/07/21 16:56	1
Trichloroethene	0.0020	U	0.010	0.0016	mg/L			07/07/21 16:56	1
Vinyl chloride	0.0080	U	0.010	0.0010	mg/L			07/07/21 16:56	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*78 - 120*		*07/07/21 16:56*	*1*
1,2-Dichloroethane-d4 (Surr)	*98*		*64 - 129*		*07/07/21 16:56*	*1*
4-Bromofluorobenzene (Surr)	*106*		*78 - 121*		*07/07/21 16:56*	*1*
Dibromofluoromethane (Surr)	*100*		*79 - 119*		*07/07/21 16:56*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0020	U	0.010	0.0016	mg/L			07/07/21 17:20	1
2-Butanone (MEK)	0.032	U	0.10	0.020	mg/L			07/07/21 17:20	1
Carbon tetrachloride	0.0040	U	0.010	0.0019	mg/L			07/07/21 17:20	1
Chlorobenzene	0.0020	U	0.010	0.0017	mg/L			07/07/21 17:20	1
Chloroform	**0.0020**	**J**	0.010	0.0016	mg/L			07/07/21 17:20	1
1,2-Dichloroethane	0.0040	U	0.010	0.0013	mg/L			07/07/21 17:20	1
1,1-Dichloroethene	0.0040	U	0.010	0.0023	mg/L			07/07/21 17:20	1
Tetrachloroethene	0.0040	U	0.010	0.0020	mg/L			07/07/21 17:20	1
Trichloroethene	0.0020	U	0.010	0.0016	mg/L			07/07/21 17:20	1
Vinyl chloride	0.0080	U	0.010	0.0010	mg/L			07/07/21 17:20	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*102*		*78 - 120*		*07/07/21 17:20*	*1*
1,2-Dichloroethane-d4 (Surr)	*100*		*64 - 129*		*07/07/21 17:20*	*1*
4-Bromofluorobenzene (Surr)	*106*		*78 - 121*		*07/07/21 17:20*	*1*
Dibromofluoromethane (Surr)	*102*		*79 - 119*		*07/07/21 17:20*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0020	U	0.010	0.0016	mg/L			07/07/21 17:43	1

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP (Continued)

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
2-Butanone (MEK)	0.032	U	0.10	0.020	mg/L			07/07/21 17:43	1
Carbon tetrachloride	0.0040	U	0.010	0.0019	mg/L			07/07/21 17:43	1
Chlorobenzene	0.0020	U	0.010	0.0017	mg/L			07/07/21 17:43	1
Chloroform	**0.0019**	**J**	0.010	0.0016	mg/L			07/07/21 17:43	1
1,2-Dichloroethane	0.0040	U	0.010	0.0013	mg/L			07/07/21 17:43	1
1,1-Dichloroethene	0.0040	U	0.010	0.0023	mg/L			07/07/21 17:43	1
Tetrachloroethene	0.0040	U	0.010	0.0020	mg/L			07/07/21 17:43	1
Trichloroethene	0.0020	U	0.010	0.0016	mg/L			07/07/21 17:43	1
Vinyl chloride	0.0080	U	0.010	0.0010	mg/L			07/07/21 17:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Toluene-d8 (Surr)	*100*		*78 - 120*		*07/07/21 17:43*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*64 - 129*		*07/07/21 17:43*	*1*
4-Bromofluorobenzene (Surr)	*107*		*78 - 121*		*07/07/21 17:43*	*1*
Dibromofluoromethane (Surr)	*102*		*79 - 119*		*07/07/21 17:43*	*1*

Method: 6010C - Metals (ICP) - TCLP

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.075	U	0.50	0.022	mg/L		06/28/21 15:35	06/29/21 12:54	1
Barium	**0.48**	**J**	1.0	0.0040	mg/L		06/28/21 15:35	06/29/21 12:54	1
Cadmium	**0.023**	**J**	0.10	0.0020	mg/L		06/28/21 15:35	06/29/21 12:54	1
Chromium	0.013	U	0.50	0.0030	mg/L		06/28/21 15:35	06/29/21 12:54	1
Lead	0.045	U	0.50	0.014	mg/L		06/28/21 15:35	06/29/21 12:54	1
Selenium	0.095	U	0.10	0.032	mg/L		06/28/21 15:35	06/29/21 12:54	1
Silver	0.025	U	0.50	0.0098	mg/L		06/28/21 15:35	06/29/21 12:54	1

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.075	U	0.50	0.022	mg/L		06/28/21 15:35	06/29/21 13:07	1
Barium	**0.39**	**J**	1.0	0.0040	mg/L		06/28/21 15:35	06/29/21 13:07	1
Cadmium	**0.045**	**J**	0.10	0.0020	mg/L		06/28/21 15:35	06/29/21 13:07	1
Chromium	**0.0037**	**J**	0.50	0.0030	mg/L		06/28/21 15:35	06/29/21 13:07	1
Lead	0.045	U	0.50	0.014	mg/L		06/28/21 15:35	06/29/21 13:07	1
Selenium	0.095	U	0.10	0.032	mg/L		06/28/21 15:35	06/29/21 13:07	1
Silver	0.025	U	0.50	0.0098	mg/L		06/28/21 15:35	06/29/21 13:07	1

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.075	U	0.50	0.022	mg/L		06/28/21 15:35	06/29/21 13:11	1
Barium	**0.61**	**J**	1.0	0.0040	mg/L		06/28/21 15:35	06/29/21 13:11	1
Cadmium	**0.36**		0.10	0.0020	mg/L		06/28/21 15:35	06/29/21 13:11	1
Chromium	0.013	U	0.50	0.0030	mg/L		06/28/21 15:35	06/29/21 13:11	1
Lead	**7.2**		0.50	0.014	mg/L		06/28/21 15:35	06/29/21 13:11	1

Method: 6010C - Metals (ICP) - TCLP (Continued)

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	0.095	U	0.10	0.032	mg/L		06/28/21 15:35	06/29/21 13:11	1
Silver	0.025	U	0.50	0.0098	mg/L		06/28/21 15:35	06/29/21 13:11	1

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.075	U	0.50	0.022	mg/L		06/28/21 15:35	06/29/21 13:14	1
Barium	**0.64**	**J**	1.0	0.0040	mg/L		06/28/21 15:35	06/29/21 13:14	1
Cadmium	**0.40**		0.10	0.0020	mg/L		06/28/21 15:35	06/29/21 13:14	1
Chromium	0.013	U	0.50	0.0030	mg/L		06/28/21 15:35	06/29/21 13:14	1
Lead	**3.4**		0.50	0.014	mg/L		06/28/21 15:35	06/29/21 13:14	1
Selenium	0.095	U	0.10	0.032	mg/L		06/28/21 15:35	06/29/21 13:14	1
Silver	0.025	U	0.50	0.0098	mg/L		06/28/21 15:35	06/29/21 13:14	1

Method: 7470A - Mercury (CVAA) - TCLP

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.0021**		0.0020	0.000030	mg/L		07/03/21 15:35	07/03/21 20:12	1

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.0018**	**J**	0.0020	0.000030	mg/L		07/03/21 15:35	07/03/21 20:14	1

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.00025**	**J**	0.0020	0.000030	mg/L		07/03/21 15:35	07/03/21 20:17	1

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.028**	**D J1**	0.010	0.00015	mg/L		07/03/21 15:35	07/03/21 20:19	5

Method: 7471B - Mercury (CVAA)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**47000**	**J1 D**	2000	650	ug/Kg	☼	06/25/21 19:15	06/26/21 17:54	100

Method: 7471B - Mercury (CVAA)

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	53000	D	2200	730	ug/Kg	☼	06/25/21 19:15	06/26/21 18:01	100

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	140000	D	10000	3300	ug/Kg	☼	06/25/21 19:15	06/26/21 18:38	500

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	330000	D	11000	3500	ug/Kg	☼	06/25/21 19:15	06/26/21 18:40	500

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-5
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	75000	D	2100	690	ug/Kg	☼	06/25/21 19:15	06/26/21 18:13	100

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-6
Matrix: Solid
Percent Solids: 95.9

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	35000	D	2000	670	ug/Kg	☼	06/25/21 19:15	06/26/21 18:15	100

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-7
Matrix: Solid
Percent Solids: 94.3

Analyte	Result	Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	8700	D	180	60	ug/Kg	☼	06/25/21 19:15	06/26/21 16:59	10

General Chemistry

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14.1		0.1	0.1	%			06/24/21 08:59	1
Percent Solids	85.9		0.1	0.1	%			06/24/21 08:59	1

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	13.7		0.1	0.1	%			06/24/21 08:59	1
Percent Solids	86.3		0.1	0.1	%			06/24/21 08:59	1

General Chemistry

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	12.6		0.1	0.1	%			06/24/21 08:59	1
Percent Solids	87.4		0.1	0.1	%			06/24/21 08:59	1

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	10.4		0.1	0.1	%			06/24/21 08:59	1
Percent Solids	89.6		0.1	0.1	%			06/24/21 08:59	1

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	10.4		0.1	0.1	%			06/25/21 09:13	1
Percent Solids	89.6		0.1	0.1	%			06/25/21 09:13	1

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	4.1		0.1	0.1	%			06/25/21 09:13	1
Percent Solids	95.9		0.1	0.1	%			06/25/21 09:13	1

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	LOQ	LOQ	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	5.7		0.1	0.1	%			06/25/21 09:13	1
Percent Solids	94.3		0.1	0.1	%			06/25/21 09:13	1

Method: 900.0 - Gross Alpha and Gross Beta Radioactivity

Client Sample ID: Air Sample-001
Date Collected: 06/22/21 09:00
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-8
Matrix: Wipe

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.321	U	0.251	0.253	10.0	0.350	pCi/Sample	06/30/21 15:30	07/16/21 17:17	1
Gross Beta	0.0175	U	0.215	0.215	10.0	0.387	pCi/Sample	06/30/21 15:30	07/16/21 17:17	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.164		0.0874	0.0885	1.00	0.105	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry) (Continued)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-239/240	0.0140	U	0.0342	0.0342	1.00	0.0682	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*85.7*		*30 - 110*	*06/30/21 14:03*	*07/13/21 09:46*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	**0.504**		0.134	0.141	1.00	0.0960	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	0.00600	U	0.0243	0.0243	1.00	0.0569	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*87.1*		*30 - 110*	*06/30/21 14:03*	*07/13/21 09:46*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.0307	U	0.0508	0.0509	1.00	0.126	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	-0.0264	U	0.0249	0.0250	1.00	0.0910	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*80.4*		*30 - 110*	*06/30/21 14:03*	*07/13/21 09:46*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0875	U	0.0697	0.0701	1.00	0.0950	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	-0.0404	U	0.0342	0.0344	1.00	0.111	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*73.1*		*30 - 110*	*06/30/21 14:03*	*07/13/21 09:46*	*1*

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	**0.460**		0.127	0.133	1.00	0.0914	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	-0.0118	U	0.0267	0.0267	1.00	0.0778	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry) (Continued)

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	87.7		30 - 110	06/30/21 14:03	07/13/21 09:46	1

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	**0.0828**		0.0608	0.0612	1.00	0.0779	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	-0.0276	U	0.0148	0.0150	1.00	0.0780	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	83.4		30 - 110	06/30/21 14:03	07/13/21 09:46	1

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.0480	U	0.0615	0.0616	1.00	0.102	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	0.0501	U	0.0560	0.0561	1.00	0.0883	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Pu-242 (T)	82.3		30 - 110	06/30/21 14:03	07/13/21 09:46	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**0.541**		0.147	0.154	1.00	0.116	pCi/g	06/30/21 14:38	07/13/21 09:48	1
Thorium-230	**0.680**		0.171	0.180	1.00	0.131	pCi/g	06/30/21 14:38	07/13/21 09:48	1
Thorium-232	**0.534**		0.134	0.141	1.00	0.0651	pCi/g	06/30/21 14:38	07/13/21 09:48	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	81.7		30 - 110	06/30/21 14:38	07/13/21 09:48	1

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30
Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**0.747**		0.170	0.182	1.00	0.106	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	**0.888**		0.192	0.206	1.00	0.123	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	**0.749**		0.161	0.172	1.00	0.0550	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	81.8		30 - 110	06/30/21 14:38	07/13/21 20:36	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	-0.00823	U	0.0676	0.0676	1.00	0.127	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	-0.0194	U	0.0922	0.0922	1.00	0.151	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	-0.0183	U	0.0211	0.0211	1.00	0.0841	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*62.4*		*30 - 110*	*06/30/21 14:38*	*07/13/21 20:36*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0411	U	0.113	0.113	1.00	0.191	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	0.0198	U	0.116	0.116	1.00	0.180	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	0.0103	U	0.0456	0.0456	1.00	0.0966	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*47.8*		*30 - 110*	*06/30/21 14:38*	*07/13/21 20:36*	*1*

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**0.432**		0.135	0.139	1.00	0.121	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	**0.310**		0.130	0.132	1.00	0.130	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	**0.566**		0.134	0.142	1.00	0.0476	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*86.7*		*30 - 110*	*06/30/21 14:38*	*07/13/21 20:36*	*1*

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	0.0900	U	0.112	0.112	1.00	0.165	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	0.120	U	0.142	0.143	1.00	0.198	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	**0.161**		0.101	0.102	1.00	0.111	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*57.5*		*30 - 110*	*06/30/21 14:38*	*07/13/21 20:36*	*1*

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	**0.222**		0.120	0.122	1.00	0.137	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-230	**0.563**		0.174	0.180	1.00	0.141	pCi/g	06/30/21 14:38	07/13/21 20:36	1
Thorium-232	**0.337**		0.119	0.122	1.00	0.0770	pCi/g	06/30/21 14:38	07/13/21 20:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*72.8*		*30 - 110*	*06/30/21 14:38*	*07/13/21 20:36*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.331**		0.0993	0.103	1.00	0.0675	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	0.0297	U	0.0345	0.0346	1.00	0.0476	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	**0.516**		0.121	0.128	1.00	0.0581	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*108*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.700**		0.139	0.151	1.00	0.0533	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	**0.137**		0.0700	0.0709	1.00	0.0522	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	**0.775**		0.146	0.160	1.00	0.0508	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*104*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.0792**		0.0504	0.0508	1.00	0.0517	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	0.00643	U	0.0177	0.0177	1.00	0.0415	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	0.0413	U	0.0370	0.0372	1.00	0.0459	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*99.0*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.0839**		0.0622	0.0626	1.00	0.0786	pCi/g	06/29/21 13:32	07/13/21 09:39	1
Uranium-235/236	-0.00261	U	0.00522	0.00522	1.00	0.0505	pCi/g	06/29/21 13:32	07/13/21 09:39	1
Uranium-238	**0.119**		0.0653	0.0660	1.00	0.0518	pCi/g	06/29/21 13:32	07/13/21 09:39	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*86.3*		*30 - 110*	*06/29/21 13:32*	*07/13/21 09:39*	*1*

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.706**		0.140	0.152	1.00	0.0489	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	0.0385	U	0.0387	0.0389	1.00	0.0479	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	**0.605**		0.130	0.139	1.00	0.0424	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*99.4*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**1.25**		0.189	0.216	1.00	0.0691	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	**0.0631**		0.0498	0.0501	1.00	0.0538	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	**1.75**		0.222	0.266	1.00	0.0432	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*90.5*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	**0.719**		0.154	0.165	1.00	0.0850	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-235/236	0.0504	U	0.0478	0.0479	1.00	0.0594	pCi/g	06/29/21 13:32	07/08/21 14:36	1
Uranium-238	**0.920**		0.171	0.188	1.00	0.0761	pCi/g	06/29/21 13:32	07/08/21 14:36	1

Tracer	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*102*		*30 - 110*	*06/29/21 13:32*	*07/08/21 14:36*	*1*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.0206	U	0.0610	0.0611	0.200	0.106	pCi/g	06/28/21 15:02	07/05/21 07:18	1
Radium-226	**0.461**		0.156	0.163	1.00	0.138	pCi/g	06/28/21 15:02	07/05/21 07:18	1
Thorium-232	**0.560**		0.180	0.189	1.00	0.238	pCi/g	06/28/21 15:02	07/05/21 07:18	1
Uranium-235	0.0605	U	0.164	0.164	2.00	0.843	pCi/g	06/28/21 15:02	07/05/21 07:18	1
Uranium-238	0.353	U	1.22	1.22	4.00	2.04	pCi/g	06/28/21 15:02	07/05/21 07:18	1

Other Detected Radionuclides	*Result*	*Qualifier*	*Count Uncert. (2σ+/-)*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*Prepared*	*Analyzed*	*Dil Fac*
Ac-228	*0.560*		*0.180*	*0.189*		*0.238*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*
Bi-214	*0.461*		*0.156*	*0.163*		*0.138*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*
K-40	*3.62*		*0.987*	*1.05*		*0.849*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*
Pb-212	*0.566*		*0.101*	*0.125*		*0.0885*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*
Pb-214	*0.525*		*0.119*	*0.131*		*0.129*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*
Tl-208	*0.189*		*0.0753*	*0.0778*		*0.0663*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:18*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.0339	U	0.0741	0.0742	0.200	0.127	pCi/g	06/28/21 15:02	07/05/21 07:19	1
Radium-226	**0.382**		0.158	0.163	1.00	0.177	pCi/g	06/28/21 15:02	07/05/21 07:19	1
Thorium-232	**0.848**		0.211	0.228	1.00	0.126	pCi/g	06/28/21 15:02	07/05/21 07:19	1
Uranium-235	0.172	U	0.538	0.538	2.00	1.13	pCi/g	06/28/21 15:02	07/05/21 07:19	1
Uranium-238	0.155	U	0.676	0.676	4.00	1.41	pCi/g	06/28/21 15:02	07/05/21 07:19	1

Other Detected Radionuclides	*Result*	*Qualifier*	*Count Uncert. (2σ+/-)*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*Prepared*	*Analyzed*	*Dil Fac*
Ac-228	*0.848*		*0.211*	*0.228*		*0.126*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*
Bi-214	*0.382*		*0.158*	*0.163*		*0.177*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*
K-40	*3.41*		*1.54*	*1.57*		*1.49*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*
Pb-212	*0.730*		*0.127*	*0.148*		*0.109*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*
Pb-214	*0.492*		*0.129*	*0.138*		*0.137*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*
Tl-208	*0.257*		*0.0728*	*0.0774*		*0.0478*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:19*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.000	U	0.0197	0.0197	0.200	0.0595	pCi/g	06/28/21 15:02	07/05/21 07:21	1
Radium-226	0.0376	U	0.0336	0.0339	1.00	0.204	pCi/g	06/28/21 15:02	07/05/21 07:21	1
Thorium-232	0.0130	U	0.0384	0.0385	1.00	0.140	pCi/g	06/28/21 15:02	07/05/21 07:21	1
Uranium-235	-0.0182	U	0.0321	0.0321	2.00	0.590	pCi/g	06/28/21 15:02	07/05/21 07:21	1
Uranium-238	-0.0357	U	0.0605	0.0606	4.00	1.27	pCi/g	06/28/21 15:02	07/05/21 07:21	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
K-40	*0.715*		*0.347*	*0.355*		*0.310*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:21*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.0348	U	0.0760	0.0761	0.200	0.132	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Radium-226	-0.0726	U	0.176	0.177	1.00	0.495	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Thorium-232	-0.0224	U	0.0493	0.0494	1.00	0.563	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Uranium-235	-0.0253	U	0.607	0.607	2.00	0.983	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Uranium-238	-0.456	U	1.15	1.15	4.00	2.00	pCi/g	06/28/21 15:02	07/05/21 07:20	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	*None*						*pCi/g*	*06/28/21 15:02*	*07/05/21 07:20*	*1*

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	**0.253**		0.0709	0.0756	0.200	0.0595	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Radium-226	**0.373**		0.132	0.138	1.00	0.130	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Thorium-232	0.0935	U	0.220	0.220	1.00	0.351	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Uranium-235	0.0378	U	0.134	0.134	2.00	0.856	pCi/g	06/28/21 15:02	07/05/21 07:20	1
Uranium-238	0.820	U	0.616	0.622	4.00	0.990	pCi/g	06/28/21 15:02	07/05/21 07:20	1

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Bi-214	*0.373*		*0.132*	*0.138*		*0.130*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:20*	*1*
K-40	*2.10*		*0.847*	*0.874*		*0.911*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:20*	*1*
Pb-212	*0.281*		*0.0883*	*0.0954*		*0.104*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:20*	*1*
Pb-214	*0.585*		*0.153*	*0.165*		*0.136*	*pCi/g*	*06/28/21 15:02*	*07/05/21 07:20*	*1*

Client Sample ID: Air Sample-001
Date Collected: 06/22/21 09:00
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-8
Matrix: Wipe

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	0.711	U	6.56	6.56		12.0	pCi/Sample	07/02/21 10:11	07/16/21 10:00	1
Radium-226	0.308	U	22.8	22.8	20.0	39.5	pCi/Sample	07/02/21 10:11	07/16/21 10:00	1
Thorium-232	1.95	U	2.49	2.49		53.0	pCi/Sample	07/02/21 10:11	07/16/21 10:00	1
Uranium-235	4.80	U	38.9	38.9		69.2	pCi/Sample	07/02/21 10:11	07/16/21 10:00	1
Uranium-238	13.5	U	37.3	37.3		78.1	pCi/Sample	07/02/21 10:11	07/16/21 10:00	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Other Detected Radionuclides	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Other Detected Radionuclide	None						pCi/Sample	07/02/21 10:11	07/16/21 10:00	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0882	U	0.113	0.113	3.00	0.187	pCi/g	07/02/21 14:29	07/07/21 13:55	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	85.7		40 - 110	07/02/21 14:29	07/07/21 13:55	1

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.189	U	0.130	0.130	3.00	0.202	pCi/g	07/02/21 14:29	07/07/21 13:55	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	87.2		40 - 110	07/02/21 14:29	07/07/21 13:55	1

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0250	U	0.126	0.126	3.00	0.222	pCi/g	07/09/21 08:35	07/13/21 17:23	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	78.3		40 - 110	07/09/21 08:35	07/13/21 17:23	1

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.119	U	0.144	0.144	3.00	0.238	pCi/g	07/09/21 08:35	07/13/21 17:23	1

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	73.0		40 - 110	07/09/21 08:35	07/13/21 17:23	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.124	U	0.135	0.135	3.00	0.221	pCi/g	07/02/21 14:29	07/07/21 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*75.9*		*40 - 110*	*07/02/21 14:29*	*07/07/21 13:55*	*1*

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.265	U	0.230	0.230	3.00	0.367	pCi/g	07/02/21 14:29	07/07/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*48.3*		*40 - 110*	*07/02/21 14:29*	*07/07/21 13:57*	*1*

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0806	U	0.133	0.133	3.00	0.225	pCi/g	07/02/21 14:29	07/07/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*84.2*		*40 - 110*	*07/02/21 14:29*	*07/07/21 13:57*	*1*

Method: TC-02-RC - Technetium-99 (LSC)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid
Percent Solids: 85.9

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.0463	U	0.292	0.292	1.00	0.520	pCi/g	06/30/21 12:04	07/07/21 09:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*98.8*		*30 - 110*	*06/30/21 12:04*	*07/07/21 09:02*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid
Percent Solids: 86.3

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.158	U	0.279	0.279	1.00	0.507	pCi/g	06/30/21 12:04	07/07/21 09:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*99.2*		*30 - 110*	*06/30/21 12:04*	*07/07/21 09:47*	*1*

Method: TC-02-RC - Technetium-99 (LSC)

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid
Percent Solids: 87.4

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.0655	U	0.291	0.291	1.00	0.520	pCi/g	06/30/21 12:04	07/07/21 10:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*98.8*		*30 - 110*	*06/30/21 12:04*	*07/07/21 10:10*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid
Percent Solids: 89.6

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.0937	U	0.278	0.278	1.00	0.501	pCi/g	06/30/21 12:04	07/07/21 10:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*103*		*30 - 110*	*06/30/21 12:04*	*07/07/21 10:32*	*1*

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.140	U	0.284	0.284	1.00	0.516	pCi/g	06/30/21 12:04	07/07/21 10:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*99.2*		*30 - 110*	*06/30/21 12:04*	*07/07/21 10:55*	*1*

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	0.122	U	0.300	0.300	1.00	0.513	pCi/g	06/30/21 12:04	07/07/21 11:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*98.8*		*30 - 110*	*06/30/21 12:04*	*07/07/21 11:18*	*1*

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	-0.220	U	0.338	0.339	1.00	0.622	pCi/g	06/30/21 12:04	07/07/21 11:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*82.5*		*30 - 110*	*06/30/21 12:04*	*07/07/21 11:40*	*1*

Surrogate Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(58-140)	(76-127)	(75-121)	(80-126)
280-150116-1	4FR-145-001	104	111	97	103
280-150116-1 MS	4FR-145-001	108	107	101	101
280-150116-1 MSD	4FR-145-001	109	115	101	104
280-150116-2	4FR-145-002	102	108	100	102
280-150116-3	4FR-64-001	100	100	97	99
280-150116-4	4FR-64-002	102	103	98	99
LCS 280-542156/1-A	Lab Control Sample	98	100	98	99
LCSD 280-542156/2-A	Lab Control Sample Dup	100	99	101	97
MB 280-542156/3-A	Method Blank	100	101	98	100

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Solid **Prep Type: TCLP**

		Percent Surrogate Recovery (Acceptance Limits)			
		TOL	DCA	BFB	DBFM
Lab Sample ID	Client Sample ID	(78-120)	(64-129)	(78-121)	(79-119)
280-150116-1	4FR-145-001	102	101	105	101
280-150116-1 MS	4FR-145-001	101	96	106	99
280-150116-1 MSD	4FR-145-001	101	98	107	100
280-150116-2	4FR-145-002	102	98	106	100
280-150116-3	4FR-64-001	102	100	106	102
280-150116-4	4FR-64-002	100	101	107	102
LB 280-541685/1-A	Method Blank	100	102	106	103
LCS 280-541685/2-A	Lab Control Sample	100	98	105	99

Surrogate Legend

TOL = Toluene-d8 (Surr)
DCA = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 280-542156/3-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 542156

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	80	U M	80	27	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Benzene	0.50	U	5.0	0.18	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Bromoform	1.0	U	5.0	0.40	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Bromodichloromethane	1.0	U	5.0	0.40	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Bromomethane	2.0	U	10	0.54	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
2-Butanone (MEK)	20	U	20	6.4	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Carbon disulfide	0.50	U M	5.0	0.17	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Carbon tetrachloride	0.50	U	5.0	0.13	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Chlorobenzene	0.50	U	5.0	0.15	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Dibromochloromethane	1.0	U	5.0	0.28	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Chloroethane	1.0	U	10	0.29	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Chloroform	1.0	U	10	0.33	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Chloromethane	1.0	U	10	0.29	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Cyclohexane	1.0	U	5.0	0.37	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2-Dibromo-3-Chloropropane	1.0	U	10	0.37	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2-Dichlorobenzene	1.0	U	5.0	0.47	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,3-Dichlorobenzene	1.0	U	5.0	0.41	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,4-Dichlorobenzene	1.6	U	5.0	0.49	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1-Dichloroethane	1.0	U	5.0	0.40	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2-Dichloroethane	1.0	U	5.0	0.40	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
cis-1,2-Dichloroethene	1.0	U	2.5	0.43	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
trans-1,2-Dichloroethene	1.0	U	2.5	0.39	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1-Dichloroethene	1.0	U	5.0	0.27	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2-Dichloropropane	1.0	U	5.0	0.50	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
cis-1,3-Dichloropropene	1.0	U	5.0	0.31	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
trans-1,3-Dichloropropene	1.0	U	5.0	0.45	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Ethylbenzene	1.0	U	5.0	0.46	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	20	0.27	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
2-Hexanone	20	U M	20	6.1	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Isopropylbenzene	0.50	U	5.0	0.17	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Methyl acetate	4.0	U	10	1.4	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Methylcyclohexane	1.0	U	5.0	0.42	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Methylene Chloride	1.0	U	5.0	0.34	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
4-Methyl-2-pentanone (MIBK)	8.0	U	20	3.8	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Methyl tert-butyl ether	0.50	U	20	0.17	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Trichlorofluoromethane	1.0	U	10	0.34	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Trichloroethene	1.0	U	5.0	0.35	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2,4-Trichlorobenzene	2.0	U	5.0	0.52	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1,1-Trichloroethane	1.0	U	5.0	0.33	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Vinyl chloride	2.0	U	5.0	0.51	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Xylenes, Total	2.0	U	5.0	0.50	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1,2,2-Tetrachloroethane	1.0	U	5.0	0.43	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,1,2-Trichloroethane	2.0	U	5.0	0.50	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Styrene	2.0	U	5.0	0.53	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Tetrachloroethene	0.50	U	5.0	0.18	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Toluene	2.0	U	5.0	0.64	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
Dichlorodifluoromethane	1.0	U	10	0.45	ug/Kg		07/02/21 10:00	07/02/21 15:30	1
1,2-Dibromoethane	1.0	U	5.0	0.40	ug/Kg		07/02/21 10:00	07/02/21 15:30	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 280-542156/3-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 542156

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	100		58 - 140	07/02/21 10:00	07/02/21 15:30	1
4-Bromofluorobenzene (Surr)	101		76 - 127	07/02/21 10:00	07/02/21 15:30	1
Dibromofluoromethane (Surr)	98		75 - 121	07/02/21 10:00	07/02/21 15:30	1
Toluene-d8 (Surr)	100		80 - 126	07/02/21 10:00	07/02/21 15:30	1

Lab Sample ID: LCS 280-542156/1-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 542156

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	200	207		ug/Kg		103	65 - 150
Benzene	50.0	47.6		ug/Kg		95	75 - 135
Bromoform	50.0	46.2		ug/Kg		92	77 - 135
Bromodichloromethane	50.0	47.4		ug/Kg		95	73 - 135
Bromomethane	50.0	47.9		ug/Kg		96	52 - 135
2-Butanone (MEK)	200	179		ug/Kg		89	45 - 177
Carbon disulfide	50.0	49.5		ug/Kg		99	45 - 150
Carbon tetrachloride	50.0	47.8		ug/Kg		96	69 - 138
Chlorobenzene	50.0	46.4		ug/Kg		93	78 - 135
Dibromochloromethane	50.0	47.8		ug/Kg		96	77 - 135
Chloroethane	50.0	48.5		ug/Kg		97	51 - 145
Chloroform	50.0	46.0		ug/Kg		92	73 - 123
Chloromethane	50.0	50.9		ug/Kg		102	41 - 138
Cyclohexane	50.0	49.1		ug/Kg		98	50 - 150
1,2-Dibromo-3-Chloropropane	50.0	41.8		ug/Kg		84	66 - 150
1,2-Dichlorobenzene	50.0	48.5		ug/Kg		97	73 - 135
1,3-Dichlorobenzene	50.0	46.8		ug/Kg		94	69 - 135
1,4-Dichlorobenzene	50.0	45.1		ug/Kg		90	73 - 135
1,1-Dichloroethane	50.0	47.2		ug/Kg		94	70 - 135
1,2-Dichloroethane	50.0	44.5		ug/Kg		89	69 - 135
cis-1,2-Dichloroethene	50.0	47.4		ug/Kg		95	76 - 135
trans-1,2-Dichloroethene	50.0	50.2		ug/Kg		100	77 - 135
1,1-Dichloroethene	50.0	51.9		ug/Kg		104	79 - 135
1,2-Dichloropropane	50.0	47.9		ug/Kg		96	72 - 121
cis-1,3-Dichloropropene	50.0	47.0		ug/Kg		94	71 - 135
trans-1,3-Dichloropropene	50.0	45.2		ug/Kg		90	71 - 135
Ethylbenzene	50.0	49.1		ug/Kg		98	73 - 125
1,1,2-Trichloro-1,2,2-trifluoroethane	50.0	53.0		ug/Kg		106	50 - 150
2-Hexanone	200	194		ug/Kg		97	67 - 150
Isopropylbenzene	50.0	47.2		ug/Kg		94	74 - 137
Methyl acetate	100	99.1		ug/Kg		99	50 - 150
Methylcyclohexane	50.0	47.2		ug/Kg		94	50 - 150
Methylene Chloride	50.0	49.2		ug/Kg		98	76 - 136
4-Methyl-2-pentanone (MIBK)	200	191		ug/Kg		95	69 - 150
Methyl tert-butyl ether	50.0	49.0		ug/Kg		98	71 - 141
Trichlorofluoromethane	50.0	54.7		ug/Kg		109	48 - 150
Trichloroethene	50.0	45.7		ug/Kg		91	77 - 135
1,2,4-Trichlorobenzene	50.0	47.5		ug/Kg		95	65 - 135

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 280-542156/1-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 542156

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
1,1,1-Trichloroethane			50.0	47.3		ug/Kg		95	70 - 135		
Vinyl chloride			50.0	49.0		ug/Kg		98	43 - 145		
Xylenes, Total			100	95.3		ug/Kg		95	76 - 135		
o-Xylene			50.0	47.9		ug/Kg		96	75 - 135		
m-Xylene & p-Xylene			50.0	47.4		ug/Kg		95	77 - 135		
1,1,2,2-Tetrachloroethane			50.0	48.6		ug/Kg		97	65 - 135		
1,1,2-Trichloroethane			50.0	48.9		ug/Kg		98	78 - 135		
Styrene			50.0	49.0		ug/Kg		98	76 - 135		
Tetrachloroethene			50.0	46.2		ug/Kg		92	76 - 135		
Toluene			50.0	45.2		ug/Kg		90	77 - 122		
Dichlorodifluoromethane			50.0	44.4		ug/Kg		89	32 - 152		
1,2-Dibromoethane			50.0	47.7		ug/Kg		95	76 - 135		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*98*		*58 - 140*
4-Bromofluorobenzene (Surr)	*100*		*76 - 127*
Dibromofluoromethane (Surr)	*98*		*75 - 121*
Toluene-d8 (Surr)	*99*		*80 - 126*

Lab Sample ID: LCSD 280-542156/2-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 542156

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone			200	219		ug/Kg		109	65 - 150	6	28
Benzene			50.0	52.5		ug/Kg		105	75 - 135	10	20
Bromoform			50.0	49.4		ug/Kg		99	77 - 135	7	20
Bromodichloromethane			50.0	52.0		ug/Kg		104	73 - 135	9	20
Bromomethane			50.0	51.3		ug/Kg		103	52 - 135	7	22
2-Butanone (MEK)			200	193		ug/Kg		96	45 - 177	7	32
Carbon disulfide			50.0	52.6		ug/Kg		105	45 - 150	6	24
Carbon tetrachloride			50.0	51.9		ug/Kg		104	69 - 138	8	20
Chlorobenzene			50.0	48.3		ug/Kg		97	78 - 135	4	20
Dibromochloromethane			50.0	50.6		ug/Kg		101	77 - 135	6	20
Chloroethane			50.0	53.3		ug/Kg		107	51 - 145	10	22
Chloroform			50.0	50.2		ug/Kg		100	73 - 123	9	20
Chloromethane			50.0	53.5		ug/Kg		107	41 - 138	5	25
Cyclohexane			50.0	53.0		ug/Kg		106	50 - 150	8	30
1,2-Dibromo-3-Chloropropane			50.0	44.9		ug/Kg		90	66 - 150	7	28
1,2-Dichlorobenzene			50.0	50.3		ug/Kg		101	73 - 135	4	20
1,3-Dichlorobenzene			50.0	48.9		ug/Kg		98	69 - 135	4	20
1,4-Dichlorobenzene			50.0	46.9		ug/Kg		94	73 - 135	4	22
1,1-Dichloroethane			50.0	52.3		ug/Kg		105	70 - 135	10	20
1,2-Dichloroethane			50.0	46.9		ug/Kg		94	69 - 135	5	20
cis-1,2-Dichloroethene			50.0	52.6		ug/Kg		105	76 - 135	10	20
trans-1,2-Dichloroethene			50.0	53.5		ug/Kg		107	77 - 135	6	20
1,1-Dichloroethene			50.0	54.5		ug/Kg		109	79 - 135	5	20
1,2-Dichloropropane			50.0	51.9		ug/Kg		104	72 - 121	8	20

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 280-542156/2-A
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 542156

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,3-Dichloropropene			50.0	50.2		ug/Kg		100	71 - 135	7	20
trans-1,3-Dichloropropene			50.0	49.3		ug/Kg		99	71 - 135	9	20
Ethylbenzene			50.0	50.6		ug/Kg		101	73 - 125	3	20
1,1,2-Trichloro-1,2,2-trifluoroethane			50.0	56.1		ug/Kg		112	50 - 150	6	20
2-Hexanone			200	200		ug/Kg		100	67 - 150	3	29
Isopropylbenzene			50.0	50.2		ug/Kg		100	74 - 137	6	20
Methyl acetate			100	107		ug/Kg		107	50 - 150	7	30
Methylcyclohexane			50.0	51.0		ug/Kg		102	50 - 150	8	30
Methylene Chloride			50.0	51.7		ug/Kg		103	76 - 136	5	21
4-Methyl-2-pentanone (MIBK)			200	206		ug/Kg		103	69 - 150	8	25
Methyl tert-butyl ether			50.0	52.8		ug/Kg		106	71 - 141	8	20
Trichlorofluoromethane			50.0	57.6		ug/Kg		115	48 - 150	5	33
Trichloroethene			50.0	48.3		ug/Kg		97	77 - 135	6	20
1,2,4-Trichlorobenzene			50.0	48.3		ug/Kg		97	65 - 135	2	26
1,1,1-Trichloroethane			50.0	51.6		ug/Kg		103	70 - 135	9	20
Vinyl chloride			50.0	51.9		ug/Kg		104	43 - 145	6	24
Xylenes, Total			100	98.6		ug/Kg		99	76 - 135	3	20
o-Xylene			50.0	49.5		ug/Kg		99	75 - 135	3	20
m-Xylene & p-Xylene			50.0	49.1		ug/Kg		98	77 - 135	3	20
1,1,2,2-Tetrachloroethane			50.0	51.6		ug/Kg		103	65 - 135	6	21
1,1,2-Trichloroethane			50.0	54.0		ug/Kg		108	78 - 135	10	20
Styrene			50.0	51.0		ug/Kg		102	76 - 135	4	20
Tetrachloroethene			50.0	48.1		ug/Kg		96	76 - 135	4	20
Toluene			50.0	49.2		ug/Kg		98	77 - 122	9	20
Dichlorodifluoromethane			50.0	46.6		ug/Kg		93	32 - 152	5	28
1,2-Dibromoethane			50.0	49.9		ug/Kg		100	76 - 135	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*58 - 140*
4-Bromofluorobenzene (Surr)	*99*		*76 - 127*
Dibromofluoromethane (Surr)	*101*		*75 - 121*
Toluene-d8 (Surr)	*97*		*80 - 126*

Lab Sample ID: 280-150116-1 MS
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 542156

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	88	U M	226	192		ug/Kg	☼	85	65 - 150
Benzene	0.55	U J1	56.4	34.3	J1	ug/Kg	☼	61	75 - 135
Bromoform	1.1	U J1	56.4	21.5	J1	ug/Kg	☼	38	77 - 135
Bromodichloromethane	1.1	U J1	56.4	30.4	J1	ug/Kg	☼	54	73 - 135
Bromomethane	2.2	U	56.4	44.6		ug/Kg	☼	79	52 - 135
2-Butanone (MEK)	22	U J1	226	409	J1	ug/Kg	☼	181	45 - 177
Carbon disulfide	0.55	U M	56.4	32.5		ug/Kg	☼	58	45 - 150
Carbon tetrachloride	0.55	U J1	56.4	27.3	J1	ug/Kg	☼	48	69 - 138
Chlorobenzene	0.55	U J1	56.4	19.6	J1	ug/Kg	☼	35	78 - 135
Dibromochloromethane	1.1	U J1	56.4	26.3	J1	ug/Kg	☼	47	77 - 135

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 280-150116-1 MS
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 542156

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloroethane	1.1	U	56.4	48.6		ug/Kg	☼	86	51 - 145
Chloroform	0.62	J1	56.4	34.9	J1	ug/Kg	☼	61	73 - 123
Chloromethane	1.1	U	56.4	49.4		ug/Kg	☼	88	41 - 138
Cyclohexane	1.1	U J1	56.4	19.1	J1	ug/Kg	☼	34	50 - 150
1,2-Dibromo-3-Chloropropane	1.1	U J1	56.4	20.0	J1	ug/Kg	☼	35	66 - 150
1,2-Dichlorobenzene	1.1	U J1	56.4	10.9	J1	ug/Kg	☼	19	73 - 135
1,3-Dichlorobenzene	1.1	U J1	56.4	10.8	J1	ug/Kg	☼	19	69 - 135
1,4-Dichlorobenzene	1.8	U J1	56.4	10.4	J1	ug/Kg	☼	18	73 - 135
1,1-Dichloroethane	1.1	U J1	56.4	38.5	J1	ug/Kg	☼	68	70 - 135
1,2-Dichloroethane	1.1	U J1	56.4	33.9	J1	ug/Kg	☼	60	69 - 135
cis-1,2-Dichloroethene	1.1	U J1	56.4	35.6	J1	ug/Kg	☼	63	76 - 135
trans-1,2-Dichloroethene	1.1	U J1	56.4	36.9	J1	ug/Kg	☼	65	77 - 135
1,1-Dichloroethene	1.1	U J1	56.4	37.0	J1	ug/Kg	☼	66	79 - 135
1,2-Dichloropropane	1.1	U J1	56.4	34.9	J1	ug/Kg	☼	62	72 - 121
cis-1,3-Dichloropropene	1.1	U J1	56.4	30.4	J1	ug/Kg	☼	54	71 - 135
trans-1,3-Dichloropropene	1.1	U J1	56.4	26.9	J1	ug/Kg	☼	48	71 - 135
Ethylbenzene	1.1	U J1	56.4	18.4	J1	ug/Kg	☼	33	73 - 125
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U J1	56.4	29.2		ug/Kg	☼	52	50 - 150
2-Hexanone	22	U J1	226	91.7	J1	ug/Kg	☼	41	67 - 150
Isopropylbenzene	0.18	J1	56.4	16.1	J1	ug/Kg	☼	29	74 - 137
Methyl acetate	4.4	U J1	113	73.6		ug/Kg	☼	65	50 - 150
Methylcyclohexane	1.1	U J1	56.4	13.7	J1	ug/Kg	☼	24	50 - 150
Methylene Chloride	5.6	J1	56.4	45.7	J1	ug/Kg	☼	71	76 - 136
4-Methyl-2-pentanone (MIBK)	8.8	U	226	171		ug/Kg	☼	76	69 - 150
Methyl tert-butyl ether	0.55	U	56.4	46.7		ug/Kg	☼	83	71 - 141
Trichlorofluoromethane	1.1	U	56.4	38.9		ug/Kg	☼	69	48 - 150
Trichloroethene	1.1	U J1	56.4	26.4	J1	ug/Kg	☼	47	77 - 135
1,2,4-Trichlorobenzene	2.2	U J1	56.4	5.52	J J1	ug/Kg	☼	10	65 - 135
1,1,1-Trichloroethane	1.1	U J1	56.4	32.5	J1	ug/Kg	☼	58	70 - 135
Vinyl chloride	2.2	U	56.4	45.8		ug/Kg	☼	81	43 - 145
Xylenes, Total	2.2	U J1	113	36.0	J1	ug/Kg	☼	32	76 - 135
o-Xylene	2.2	U J1	56.4	18.9	J1	ug/Kg	☼	33	75 - 135
m-Xylene & p-Xylene	2.2	U J1	56.4	17.1	J1	ug/Kg	☼	30	77 - 135
1,1,2,2-Tetrachloroethane	1.1	U J1	56.4	28.2	J1	ug/Kg	☼	50	65 - 135
1,1,2-Trichloroethane	2.2	U J1	56.4	33.0	J1	ug/Kg	☼	59	78 - 135
Styrene	2.2	U J1	56.4	16.8	J1	ug/Kg	☼	30	76 - 135
Tetrachloroethene	1.7	J1	56.4	18.7	J1	ug/Kg	☼	30	76 - 135
Toluene	2.2	U J1	56.4	24.4	J1	ug/Kg	☼	43	77 - 122
Dichlorodifluoromethane	1.1	U	56.4	40.5		ug/Kg	☼	72	32 - 152
1,2-Dibromoethane	1.1	U J1	56.4	31.3	J1	ug/Kg	☼	55	76 - 135

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*108*		*58 - 140*
4-Bromofluorobenzene (Surr)	*107*		*76 - 127*
Dibromofluoromethane (Surr)	*101*		*75 - 121*
Toluene-d8 (Surr)	*101*		*80 - 126*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 280-150116-1 MSD
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 542156

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acetone	88	U M	212	201		ug/Kg	☼	95	65 - 150	4	28
Benzene	0.55	U J1	53.0	30.6	J1	ug/Kg	☼	58	75 - 135	12	20
Bromoform	1.1	U J1	53.0	17.7	J1	ug/Kg	☼	33	77 - 135	20	20
Bromodichloromethane	1.1	U J1	53.0	26.6	J1	ug/Kg	☼	50	73 - 135	13	20
Bromomethane	2.2	U	53.0	45.6		ug/Kg	☼	86	52 - 135	2	22
2-Butanone (MEK)	22	U J1	212	544	J1	ug/Kg	☼	256	45 - 177	28	32
Carbon disulfide	0.55	U M	53.0	28.6		ug/Kg	☼	54	45 - 150	13	24
Carbon tetrachloride	0.55	U J1	53.0	23.1	J1	ug/Kg	☼	44	69 - 138	16	20
Chlorobenzene	0.55	U J1	53.0	15.0	J1	ug/Kg	☼	28	78 - 135	27	20
Dibromochloromethane	1.1	U J1	53.0	22.7	J1	ug/Kg	☼	43	77 - 135	15	20
Chloroethane	1.1	U	53.0	48.2		ug/Kg	☼	91	51 - 145	1	22
Chloroform	0.62	J1	53.0	32.0	J1	ug/Kg	☼	59	73 - 123	9	20
Chloromethane	1.1	U	53.0	51.5		ug/Kg	☼	97	41 - 138	4	25
Cyclohexane	1.1	U J1	53.0	15.2	J1	ug/Kg	☼	29	50 - 150	23	30
1,2-Dibromo-3-Chloropropane	1.1	U J1	53.0	18.7	J1	ug/Kg	☼	35	66 - 150	6	28
1,2-Dichlorobenzene	1.1	U J1	53.0	9.43	J1	ug/Kg	☼	18	73 - 135	14	20
1,3-Dichlorobenzene	1.1	U J1	53.0	9.23	J1	ug/Kg	☼	17	69 - 135	15	20
1,4-Dichlorobenzene	1.8	U J1	53.0	9.12	J1	ug/Kg	☼	17	73 - 135	13	22
1,1-Dichloroethane	1.1	U J1	53.0	37.2		ug/Kg	☼	70	70 - 135	3	20
1,2-Dichloroethane	1.1	U J1	53.0	32.4	J1	ug/Kg	☼	61	69 - 135	4	20
cis-1,2-Dichloroethene	1.1	U J1	53.0	31.8	J1	ug/Kg	☼	60	76 - 135	11	20
trans-1,2-Dichloroethene	1.1	U J1	53.0	34.2	J1	ug/Kg	☼	65	77 - 135	8	20
1,1-Dichloroethene	1.1	U J1	53.0	34.6	J1	ug/Kg	☼	65	79 - 135	7	20
1,2-Dichloropropane	1.1	U J1	53.0	31.6	J1	ug/Kg	☼	60	72 - 121	10	20
cis-1,3-Dichloropropene	1.1	U J1	53.0	26.8	J1	ug/Kg	☼	51	71 - 135	12	20
trans-1,3-Dichloropropene	1.1	U J1	53.0	22.8	J1	ug/Kg	☼	43	71 - 135	16	20
Ethylbenzene	1.1	U J1	53.0	14.5	J1	ug/Kg	☼	27	73 - 125	24	20
1,1,2-Trichloro-1,2,2-trifluoroethane	1.1	U J1	53.0	25.8	J1	ug/Kg	☼	49	50 - 150	12	20
2-Hexanone	22	U J1	212	72.5	J1	ug/Kg	☼	34	67 - 150	23	29
Isopropylbenzene	0.18	J1	53.0	14.1	J1	ug/Kg	☼	27	74 - 137	14	20
Methyl acetate	4.4	U J1	106	52.4	J1	ug/Kg	☼	49	50 - 150	34	30
Methylcyclohexane	1.1	U J1	53.0	11.4	J1	ug/Kg	☼	22	50 - 150	19	30
Methylene Chloride	5.6	J1	53.0	46.3		ug/Kg	☼	77	76 - 136	1	21
4-Methyl-2-pentanone (MIBK)	8.8	U	212	178		ug/Kg	☼	84	69 - 150	3	25
Methyl tert-butyl ether	0.55	U	53.0	51.5		ug/Kg	☼	97	71 - 141	10	20
Trichlorofluoromethane	1.1	U	53.0	35.6		ug/Kg	☼	67	48 - 150	9	33
Trichloroethene	1.1	U J1	53.0	22.2	J1	ug/Kg	☼	42	77 - 135	17	20
1,2,4-Trichlorobenzene	2.2	U J1	53.0	5.06	J J1	ug/Kg	☼	10	65 - 135	9	26
1,1,1-Trichloroethane	1.1	U J1	53.0	28.8	J1	ug/Kg	☼	54	70 - 135	12	20
Vinyl chloride	2.2	U	53.0	46.4		ug/Kg	☼	87	43 - 145	1	24
Xylenes, Total	2.2	U J1	106	27.6	J1	ug/Kg	☼	26	76 - 135	26	
o-Xylene	2.2	U J1	53.0	14.6	J1	ug/Kg	☼	27	75 - 135	26	20
m-Xylene & p-Xylene	2.2	U J1	53.0	13.0	J1	ug/Kg	☼	24	77 - 135	28	20
1,1,2,2-Tetrachloroethane	1.1	U J1	53.0	26.2	J1	ug/Kg	☼	49	65 - 135	8	21
1,1,2-Trichloroethane	2.2	U J1	53.0	30.0	J1	ug/Kg	☼	56	78 - 135	10	20
Styrene	2.2	U J1	53.0	12.1	J1	ug/Kg	☼	23	76 - 135	32	20
Tetrachloroethene	1.7	J1	53.0	15.5	J1	ug/Kg	☼	26	76 - 135	19	20
Toluene	2.2	U J1	53.0	19.2	J1	ug/Kg	☼	36	77 - 122	24	20

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 280-150116-1 MSD
Matrix: Solid
Analysis Batch: 542130

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 542156

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dichlorodifluoromethane	1.1	U	53.0	40.3		ug/Kg	☼	76	32 - 152	1	28
1,2-Dibromoethane	1.1	U J1	53.0	28.6	J1	ug/Kg	☼	54	76 - 135	9	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*109*		*58 - 140*
4-Bromofluorobenzene (Surr)	*115*		*76 - 127*
Dibromofluoromethane (Surr)	*101*		*75 - 121*
Toluene-d8 (Surr)	*104*		*80 - 126*

Lab Sample ID: LB 280-541685/1-A
Matrix: Solid
Analysis Batch: 542493

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	LB Result	LB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.0020	U	0.010	0.0016	mg/L			07/07/21 14:45	1
2-Butanone (MEK)	0.032	U	0.10	0.020	mg/L			07/07/21 14:45	1
Carbon tetrachloride	0.0040	U	0.010	0.0019	mg/L			07/07/21 14:45	1
Chlorobenzene	0.0020	U	0.010	0.0017	mg/L			07/07/21 14:45	1
Chloroform	0.0020	U	0.010	0.0016	mg/L			07/07/21 14:45	1
1,2-Dichloroethane	0.0040	U M	0.010	0.0013	mg/L			07/07/21 14:45	1
1,1-Dichloroethene	0.0040	U	0.010	0.0023	mg/L			07/07/21 14:45	1
Trichloroethene	0.0020	U	0.010	0.0016	mg/L			07/07/21 14:45	1
Vinyl chloride	0.0080	U	0.010	0.0010	mg/L			07/07/21 14:45	1
Tetrachloroethene	0.0040	U	0.010	0.0020	mg/L			07/07/21 14:45	1

Surrogate	*LB %Recovery*	*LB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*64 - 129*		*07/07/21 14:45*	*1*
4-Bromofluorobenzene (Surr)	*106*		*78 - 121*		*07/07/21 14:45*	*1*
Dibromofluoromethane (Surr)	*103*		*79 - 119*		*07/07/21 14:45*	*1*
Toluene-d8 (Surr)	*100*		*78 - 120*		*07/07/21 14:45*	*1*

Lab Sample ID: LCS 280-541685/2-A
Matrix: Solid
Analysis Batch: 542493

Client Sample ID: Lab Control Sample
Prep Type: TCLP

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	0.250	0.270		mg/L		108	74 - 135
2-Butanone (MEK)	1.00	1.05		mg/L		105	44 - 150
Carbon tetrachloride	0.250	0.260		mg/L		104	67 - 135
Chlorobenzene	0.250	0.256		mg/L		102	76 - 135
Chloroform	0.250	0.264		mg/L		105	76 - 120
1,2-Dichloroethane	0.250	0.253		mg/L		101	70 - 135
1,1-Dichloroethene	0.250	0.209		mg/L		83	71 - 136
Trichloroethene	0.250	0.246		mg/L		99	73 - 135
Vinyl chloride	0.250	0.284		mg/L		114	40 - 144
Tetrachloroethene	0.250	0.233		mg/L		93	70 - 135

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 280-541685/2-A
Matrix: Solid
Analysis Batch: 542493

Client Sample ID: Lab Control Sample
Prep Type: TCLP

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*98*		*64 - 129*
4-Bromofluorobenzene (Surr)	*105*		*78 - 121*
Dibromofluoromethane (Surr)	*99*		*79 - 119*
Toluene-d8 (Surr)	*100*		*78 - 120*

Lab Sample ID: 280-150116-1 MS
Matrix: Solid
Analysis Batch: 542493

Client Sample ID: 4FR-145-001
Prep Type: TCLP

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	0.0020	U	0.250	0.238		mg/L		95	74 - 135
2-Butanone (MEK)	0.032	U	1.00	1.12	M	mg/L		112	44 - 150
Carbon tetrachloride	0.0040	U	0.250	0.223		mg/L		89	67 - 135
Chlorobenzene	0.0020	U	0.250	0.250		mg/L		100	76 - 135
Chloroform	0.0020	U	0.250	0.243		mg/L		97	76 - 120
1,2-Dichloroethane	0.0040	U	0.250	0.232		mg/L		93	70 - 135
1,1-Dichloroethene	0.0040	U J1	0.250	0.125	J1	mg/L		50	71 - 136
Trichloroethene	0.0020	U	0.250	0.222		mg/L		89	73 - 135
Vinyl chloride	0.0080	U	0.250	0.266		mg/L		107	40 - 144
Tetrachloroethene	0.0040	U	0.250	0.217		mg/L		87	70 - 135

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*96*		*64 - 129*
4-Bromofluorobenzene (Surr)	*106*		*78 - 121*
Dibromofluoromethane (Surr)	*99*		*79 - 119*
Toluene-d8 (Surr)	*101*		*78 - 120*

Lab Sample ID: 280-150116-1 MSD
Matrix: Solid
Analysis Batch: 542493

Client Sample ID: 4FR-145-001
Prep Type: TCLP

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	0.0020	U	0.250	0.233		mg/L		93	74 - 135	2	20
2-Butanone (MEK)	0.032	U	1.00	1.08		mg/L		108	44 - 150	4	32
Carbon tetrachloride	0.0040	U	0.250	0.222		mg/L		89	67 - 135	0	21
Chlorobenzene	0.0020	U	0.250	0.243		mg/L		97	76 - 135	3	20
Chloroform	0.0020	U	0.250	0.237		mg/L		95	76 - 120	2	20
1,2-Dichloroethane	0.0040	U	0.250	0.228		mg/L		91	70 - 135	2	20
1,1-Dichloroethene	0.0040	U J1	0.250	0.128	J1	mg/L		51	71 - 136	3	20
Trichloroethene	0.0020	U	0.250	0.224		mg/L		90	73 - 135	1	20
Vinyl chloride	0.0080	U	0.250	0.268		mg/L		107	40 - 144	0	24
Tetrachloroethene	0.0040	U	0.250	0.220		mg/L		88	70 - 135	1	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	*98*		*64 - 129*
4-Bromofluorobenzene (Surr)	*107*		*78 - 121*
Dibromofluoromethane (Surr)	*100*		*79 - 119*
Toluene-d8 (Surr)	*101*		*78 - 120*

Method: 6010C - Metals (ICP)

Lab Sample ID: LB 280-541307/1-B
Matrix: Solid
Analysis Batch: 541721

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 541427

Analyte	LB Result	LB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.075	U	0.50	0.022	mg/L		06/28/21 15:35	06/29/21 12:47	1
Barium	0.0120	J	1.0	0.0040	mg/L		06/28/21 15:35	06/29/21 12:47	1
Cadmium	0.0070	U	0.10	0.0020	mg/L		06/28/21 15:35	06/29/21 12:47	1
Chromium	0.00301	J	0.50	0.0030	mg/L		06/28/21 15:35	06/29/21 12:47	1
Lead	0.045	U	0.50	0.014	mg/L		06/28/21 15:35	06/29/21 12:47	1
Selenium	0.095	U	0.10	0.032	mg/L		06/28/21 15:35	06/29/21 12:47	1
Silver	0.025	U	0.50	0.0098	mg/L		06/28/21 15:35	06/29/21 12:47	1

Lab Sample ID: LCS 280-541307/2-B
Matrix: Solid
Analysis Batch: 541721

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 541427

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.00	4.66		mg/L		93	80 - 118
Barium	12.0	11.1		mg/L		92	80 - 120
Cadmium	2.00	1.86		mg/L		93	80 - 117
Chromium	6.00	5.66		mg/L		94	80 - 120
Lead	6.00	5.62		mg/L		94	80 - 120
Selenium	3.00	2.80		mg/L		93	80 - 119
Silver	1.05	0.975		mg/L		93	80 - 120

Lab Sample ID: 280-150116-1 MS
Matrix: Solid
Analysis Batch: 541721

Client Sample ID: 4FR-145-001
Prep Type: TCLP
Prep Batch: 541427

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.075	U	5.00	5.17		mg/L		103	75 - 125
Barium	0.48	J	12.0	12.5		mg/L		100	75 - 120
Cadmium	0.023	J	2.00	1.99		mg/L		98	75 - 121
Chromium	0.013	U	6.00	6.11		mg/L		102	75 - 123
Lead	0.045	U	6.00	6.07		mg/L		101	75 - 119
Selenium	0.095	U	3.00	3.09		mg/L		103	75 - 121
Silver	0.025	U	1.05	1.08		mg/L		103	75 - 120

Lab Sample ID: 280-150116-1 MSD
Matrix: Solid
Analysis Batch: 541721

Client Sample ID: 4FR-145-001
Prep Type: TCLP
Prep Batch: 541427

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.075	U	5.00	4.93		mg/L		99	75 - 125	5	20
Barium	0.48	J	12.0	12.0		mg/L		96	75 - 120	4	20
Cadmium	0.023	J	2.00	1.91		mg/L		95	75 - 121	4	20
Chromium	0.013	U	6.00	5.87		mg/L		98	75 - 123	4	20
Lead	0.045	U	6.00	5.86		mg/L		98	75 - 119	4	20
Selenium	0.095	U	3.00	2.96		mg/L		99	75 - 121	4	20
Silver	0.025	U	1.05	1.04		mg/L		99	75 - 120	4	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LB 280-541307/1-C
Matrix: Solid
Analysis Batch: 542245

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 542086

Analyte	LB Result	LB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000080	U	0.0020	0.000030	mg/L		07/03/21 15:35	07/03/21 20:07	1

Lab Sample ID: LCS 280-541307/2-C
Matrix: Solid
Analysis Batch: 542245

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 542086

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00500	0.00503		mg/L		101	90 - 116

Lab Sample ID: 280-150116-4 MS
Matrix: Solid
Analysis Batch: 542245

Client Sample ID: 4FR-64-002
Prep Type: TCLP
Prep Batch: 542086

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.028	D J1	0.00500	0.0325	D 4	mg/L		94	90 - 116

Lab Sample ID: 280-150116-4 MSD
Matrix: Solid
Analysis Batch: 542245

Client Sample ID: 4FR-64-002
Prep Type: TCLP
Prep Batch: 542086

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.028	D J1	0.00500	0.0220	D 4 J1	mg/L		-116	90 - 116	39	10

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 280-541256/1-A
Matrix: Solid
Analysis Batch: 541401

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 541256

Analyte	MB Result	MB Qualifier	LOQ	DL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	13	U	17	5.5	ug/Kg		06/25/21 19:15	06/26/21 13:20	1

Lab Sample ID: LCS 280-541256/2-A
Matrix: Solid
Analysis Batch: 541401

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 541256

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	333	344		ug/Kg		103	87 - 111

Lab Sample ID: 280-150116-1 MS
Matrix: Solid
Analysis Batch: 541401

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 541256

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	47000	J1 D	416	47900	4 D	ug/Kg	☼	298	87 - 111

Method: 7471B - Mercury (CVAA) (Continued)

Lab Sample ID: 280-150116-1 MSD
Matrix: Solid
Analysis Batch: 541401

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 541256

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	47000	J1 D	448	51000	4 D	ug/Kg	☼	974	87 - 111	6	20

Method: Moisture - Percent Moisture

Lab Sample ID: 280-150116-1 DU
Matrix: Solid
Analysis Batch: 541065

Client Sample ID: 4FR-145-001
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Moisture	14.1		15.3		%		8	20
Percent Solids	85.9		84.7		%		1	20

Method: 900.0 - Gross Alpha and Gross Beta Radioactivity

Lab Sample ID: MB 160-516794/1-A
Matrix: Wipe
Analysis Batch: 517916

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516794

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Gross Alpha	0.08164	U	0.211	0.211	10.0	0.394	pCi/Sample	06/30/21 15:30	07/09/21 19:20	1
Gross Beta	0.3176	U	0.246	0.248	10.0	0.365	pCi/Sample	06/30/21 15:30	07/09/21 19:20	1

Lab Sample ID: LCS 160-516794/2-A
Matrix: Wipe
Analysis Batch: 517916

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516794

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Gross Alpha	5.31	4.800		0.944	10.0	0.404	pCi/Sam	90	75 - 125

Lab Sample ID: LCSB 160-516794/3-A
Matrix: Wipe
Analysis Batch: 517916

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516794

Analyte	Spike Added	LCSB Result	LCSB Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Gross Beta	24.6	18.91		2.25	10.0	0.424	pCi/Sam	77	75 - 125

Lab Sample ID: 280-150116-8 DU
Matrix: Wipe
Analysis Batch: 518943

Client Sample ID: Air Sample-001
Prep Type: Total/NA
Prep Batch: 516794

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Gross Alpha	0.321	U	0.2529	U	0.254	10.0	0.394	pCi/Sam	0.13	1
Gross Beta	0.0175	U	0.4216		0.275	10.0	0.375	pCi/Sam	0.82	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-516784/1-A
Matrix: Solid
Analysis Batch: 518461

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516784

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-228	-0.04819	U	0.0437	0.0439	1.00	0.105	pCi/g	06/30/21 14:38	07/13/21 09:48	1
Thorium-230	0.1084	U	0.107	0.107	1.00	0.132	pCi/g	06/30/21 14:38	07/13/21 09:48	1
Thorium-232	0.01767	U	0.0354	0.0354	1.00	0.0581	pCi/g	06/30/21 14:38	07/13/21 09:48	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Thorium-229	*77.8*		*30 - 110*	*06/30/21 14:38*	*07/13/21 09:48*	*1*

Lab Sample ID: LCS 160-516784/2-A
Matrix: Solid
Analysis Batch: 518463

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516784

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Thorium-230			24.5	23.89		2.36	1.00	0.220	pCi/g	98	81 - 118		

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Thorium-229	*88.3*		*30 - 110*

Lab Sample ID: 280-150116-1 DU
Matrix: Solid
Analysis Batch: 518440

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 516784

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Thorium-228	0.541			0.5373		0.156	1.00	0.127	pCi/g			0.01	1
Thorium-230	0.680			0.4973		0.155	1.00	0.121	pCi/g			0.54	1
Thorium-232	0.534			0.5054		0.137	1.00	0.0646	pCi/g			0.10	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Thorium-229	*86.6*		*30 - 110*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-516575/1-A
Matrix: Solid
Analysis Batch: 517620

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516575

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Uranium-233/234	0.09090		0.0592	0.0597	1.00	0.0636	pCi/g	06/29/21 13:32	07/08/21 22:03	1
Uranium-235/236	0.007541	U	0.0207	0.0207	1.00	0.0487	pCi/g	06/29/21 13:32	07/08/21 22:03	1
Uranium-238	0.04233	U	0.0401	0.0403	1.00	0.0499	pCi/g	06/29/21 13:32	07/08/21 22:03	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Uranium-232	*84.1*		*30 - 110*	*06/29/21 13:32*	*07/08/21 22:03*	*1*

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-516575/2-A
Matrix: Solid
Analysis Batch: 517621

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516575

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Uranium-233/234	6.37	6.686		0.738	1.00	0.0644	pCi/g	105	84 - 120
Uranium-238	6.51	6.581		0.729	1.00	0.0414	pCi/g	101	82 - 122

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Uranium-232	*81.3*		*30 - 110*

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Lab Sample ID: MB 160-516779/1-A
Matrix: Solid
Analysis Batch: 518445

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516779

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.01256	U	0.0213	0.0214	1.00	0.0738	pCi/g	06/30/21 14:03	07/13/21 09:46	1
Plutonium-239/240	-0.008382	U	0.00838	0.00841	1.00	0.0560	pCi/g	06/30/21 14:03	07/13/21 09:46	1

Tracer	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Pu-242 (T)	*85.6*		*30 - 110*	*06/30/21 14:03*	*07/13/21 09:46*	*1*

Lab Sample ID: LCS 160-516779/2-A
Matrix: Solid
Analysis Batch: 518449

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516779

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Plutonium-238	5.20	5.432		0.627	1.00	0.102	pCi/g	104	80 - 125
Plutonium-239/240	5.28	5.741		0.653	1.00	0.0688	pCi/g	109	81 - 125

Tracer	*LCS %Yield*	*LCS Qualifier*	*Limits*
Pu-242 (T)	*82.8*		*30 - 110*

Lab Sample ID: 280-150116-1 DU
Matrix: Solid
Analysis Batch: 518451

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 516779

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Plutonium-238	0.164		0.1514		0.0829	1.00	0.0902	pCi/g	0.07	1
Plutonium-239/240	0.0140	U	0.008536	U	0.0256	1.00	0.0570	pCi/g	0.09	1

Tracer	*DU %Yield*	*DU Qualifier*	*Limits*
Pu-242 (T)	*86.6*		*30 - 110*

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-516430/1-A
Matrix: Solid
Analysis Batch: 517202

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516430

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.04536	U	0.0913	0.0914	0.200	0.156	pCi/g	06/28/21 15:01	07/05/21 07:23	1
Radium-226	-0.04442	U	0.210	0.210	1.00	0.368	pCi/g	06/28/21 15:01	07/05/21 07:23	1
Thorium-232	0.0000	U	0.0841	0.0841	1.00	0.155	pCi/g	06/28/21 15:01	07/05/21 07:23	1
Uranium-235	0.03219	U	0.304	0.304	2.00	0.526	pCi/g	06/28/21 15:01	07/05/21 07:23	1
Uranium-238	0.2410	U	0.461	0.462	4.00	0.798	pCi/g	06/28/21 15:01	07/05/21 07:23	1

Other Detected Radionuclides	*MB Result*	*MB Qualifier*	*Count Uncert. (2σ+/-)*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*Prepared*	*Analyzed*	*Dil Fac*
Other Detected Radionuclide	*None*						*pCi/g*	*06/28/21 15:01*	*07/05/21 07:23*	*1*

Lab Sample ID: LCS 160-516430/2-A
Matrix: Solid
Analysis Batch: 517201

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516430

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Americium-241	96.3	95.95		10.1		0.989	pCi/g	100	87 - 116
Cesium-137	26.4	25.67		2.73	0.200	0.152	pCi/g	97	87 - 120
Cobalt-60	8.80	8.343		0.878		0.0308	pCi/g	95	87 - 115

Lab Sample ID: 280-150116-7 DU
Matrix: Solid
Analysis Batch: 517188

Client Sample ID: 4FR-144-001
Prep Type: Total/NA
Prep Batch: 516430

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Cesium-137	0.253		0.1778		0.0661	0.200	0.0401	pCi/g	0.53	1
Radium-226	0.373		0.4935		0.167	1.00	0.139	pCi/g	0.40	1
Thorium-232	0.0935	U	0.4442		0.206	1.00	0.152	pCi/g	0.82	1
Uranium-235	0.0378	U	-0.05988	U	0.0850	2.00	0.744	pCi/g	0.45	1
Uranium-238	0.820	U	0.8513	U	0.785	4.00	1.13	pCi/g	0.02	1

Other Detected Radionuclides	*Sample Result*	*Sample Qual*	*DU Result*	*DU Qual*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*RER*	*RER Limit*
Ac-228	*0.0935*	*U*	*0.4442*		*0.206*		*0.152*	*pCi/g*	*0.82*	*1*
Bi-214	*0.373*		*0.4935*		*0.167*		*0.139*	*pCi/g*	*0.40*	*1*
Pb-214	*0.585*		*0.5099*		*0.146*		*0.150*	*pCi/g*	*0.24*	*1*
Tl-208	*0.116*		*0.1539*		*0.0656*		*0.0607*	*pCi/g*	*0.29*	*1*

Lab Sample ID: MB 160-516942/1-A
Matrix: Wipe
Analysis Batch: 518907

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516942

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Cesium-137	-0.5027	U	7.72	7.72		14.0	pCi/Sample	07/02/21 10:11	07/16/21 08:52	1
Radium-226	0.3080	U	22.8	22.8	20.0	39.6	pCi/Sample	07/02/21 10:11	07/16/21 08:52	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-516942/1-A
Matrix: Wipe
Analysis Batch: 518907

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516942

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Thorium-232	3.587	U	21.9	21.9		31.7	pCi/Sample	07/02/21 10:11	07/16/21 08:52	1
Uranium-235	0.7531	U	1.10	1.11		71.9	pCi/Sample	07/02/21 10:11	07/16/21 08:52	1
Uranium-238	-58.73	U	85.5	85.7		148	pCi/Sample	07/02/21 10:11	07/16/21 08:52	1

Other Detected Radionuclides	*MB Result*	*MB Qualifier*	*Count Uncert. (2σ+/-)*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*Prepared*	*Analyzed*	*Dil Fac*
Other Detected Radionuclide	*None*						*pCi/Sample*	*07/02/21 10:11*	*07/16/21 08:52*	*1*

Lab Sample ID: LCS 160-516942/2-A
Matrix: Wipe
Analysis Batch: 518907

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516942

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits
Americium-241	31600	31490		3270		102	pCi/Sam	100	87 - 116
Cesium-137	9570	9452		994		41.1	pCi/Sam	99	87 - 120
Cobalt-60	5010	4977		508		20.8	pCi/Sam	99	87 - 115

Lab Sample ID: 280-150116-8 DU
Matrix: Wipe
Analysis Batch: 518909

Client Sample ID: Air Sample-001
Prep Type: Total/NA
Prep Batch: 516942

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	RER	RER Limit
Cesium-137	0.711	U	-2.024	U	10.4		17.9	pCi/Sam	0.16	1
Radium-226	0.308	U	-5.720	U	19.8	20.0	34.4	pCi/Sam	0.14	1
Thorium-232	1.95	U	-11.97	U	37.0		42.2	pCi/Sam	0.35	1
Uranium-235	4.80	U	12.48	U	33.5		60.8	pCi/Sam	0.11	1
Uranium-238	13.5	U	9.446	U	21.6		126	pCi/Sam	0.07	1

Other Detected Radionuclides	*Sample Result*	*Sample Qual*	*DU Result*	*DU Qual*	*Total Uncert. (2σ+/-)*	*LOQ*	*MDC*	*Unit*	*RER*	*RER Limit*
Other Detected Radionuclide	*None*		*None*					*pCi/Sam*		

Method: SR-03-RC - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-517066/10-A
Matrix: Solid
Analysis Batch: 517540

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 517066

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.03033	U	0.117	0.117	3.00	0.205	pCi/g	07/02/21 14:29	07/07/21 13:58	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*88.2*		*40 - 110*	*07/02/21 14:29*	*07/07/21 13:58*	*1*

Method: SR-03-RC - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: LCS 160-517066/1-A
Matrix: Solid
Analysis Batch: 517539

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 517066

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Total Beta Strontium			8.20	7.282		0.668	3.00	0.200	pCi/g	89	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Sr Carrier	*85.3*		*40 - 110*

Lab Sample ID: 280-150116-1 DU
Matrix: Solid
Analysis Batch: 517539

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 517066

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Total Beta Strontium	0.0882	U		0.1166	U	0.127	3.00	0.208	pCi/g			0.12	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Sr Carrier	*78.5*		*40 - 110*

Lab Sample ID: MB 160-517737/5-A
Matrix: Solid
Analysis Batch: 518485

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 517737

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.02802	U	0.127	0.127	3.00	0.224	pCi/g	07/09/21 08:35	07/13/21 17:23	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Sr Carrier	*77.2*		*40 - 110*	*07/09/21 08:35*	*07/13/21 17:23*	*1*

Lab Sample ID: LCS 160-517737/1-A
Matrix: Solid
Analysis Batch: 518485

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 517737

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Total Beta Strontium			8.20	7.144		0.667	3.00	0.234	pCi/g	87	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Sr Carrier	*82.9*		*40 - 110*

Method: SR-03-RC - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: 280-150116-3 DU
Matrix: Solid
Analysis Batch: 518485

Client Sample ID: 4FR-64-001
Prep Type: Total/NA
Prep Batch: 517737

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Total Beta Strontium	0.0250	U		-0.00825 5	U	0.150	3.00	0.274	pCi/g			0.12	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Sr Carrier	*57.8*		*40 - 110*

Method: TC-02-RC - Technetium-99 (LSC)

Lab Sample ID: MB 160-516763/1-A
Matrix: Solid
Analysis Batch: 517532

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 516763

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Technetium-99	0.004925	U	0.301	0.301	1.00	0.529	pCi/g	06/30/21 12:04	07/07/21 08:17	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Re	*96.3*		*30 - 110*	*06/30/21 12:04*	*07/07/21 08:17*	*1*

Lab Sample ID: LCS 160-516763/2-A
Matrix: Solid
Analysis Batch: 517532

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 516763

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Technetium-99			10.3	9.422		1.13	1.00	0.521	pCi/g	91	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Re	*98.1*		*30 - 110*

Lab Sample ID: 280-150116-1 DU
Matrix: Solid
Analysis Batch: 517532

Client Sample ID: 4FR-145-001
Prep Type: Total/NA
Prep Batch: 516763

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Technetium-99	-0.0463	U		-0.2347	U	0.286	1.00	0.530	pCi/g			0.33	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Re	*96.9*		*30 - 110*

GC/MS VOA

Leach Batch: 541685

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	1311	
280-150116-2	4FR-145-002	TCLP	Solid	1311	
280-150116-3	4FR-64-001	TCLP	Solid	1311	
280-150116-4	4FR-64-002	TCLP	Solid	1311	
LB 280-541685/1-A	Method Blank	TCLP	Solid	1311	
LCS 280-541685/2-A	Lab Control Sample	TCLP	Solid	1311	
280-150116-1 MS	4FR-145-001	TCLP	Solid	1311	
280-150116-1 MSD	4FR-145-001	TCLP	Solid	1311	

Analysis Batch: 542130

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	8260C	542156
280-150116-2	4FR-145-002	Total/NA	Solid	8260C	542156
280-150116-3	4FR-64-001	Total/NA	Solid	8260C	542156
280-150116-4	4FR-64-002	Total/NA	Solid	8260C	542156
MB 280-542156/3-A	Method Blank	Total/NA	Solid	8260C	542156
LCS 280-542156/1-A	Lab Control Sample	Total/NA	Solid	8260C	542156
LCSD 280-542156/2-A	Lab Control Sample Dup	Total/NA	Solid	8260C	542156
280-150116-1 MS	4FR-145-001	Total/NA	Solid	8260C	542156
280-150116-1 MSD	4FR-145-001	Total/NA	Solid	8260C	542156

Prep Batch: 542156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	5030B	
280-150116-2	4FR-145-002	Total/NA	Solid	5030B	
280-150116-3	4FR-64-001	Total/NA	Solid	5030B	
280-150116-4	4FR-64-002	Total/NA	Solid	5030B	
MB 280-542156/3-A	Method Blank	Total/NA	Solid	5030B	
LCS 280-542156/1-A	Lab Control Sample	Total/NA	Solid	5030B	
LCSD 280-542156/2-A	Lab Control Sample Dup	Total/NA	Solid	5030B	
280-150116-1 MS	4FR-145-001	Total/NA	Solid	5030B	
280-150116-1 MSD	4FR-145-001	Total/NA	Solid	5030B	

Analysis Batch: 542493

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	8260C	541685
280-150116-2	4FR-145-002	TCLP	Solid	8260C	541685
280-150116-3	4FR-64-001	TCLP	Solid	8260C	541685
280-150116-4	4FR-64-002	TCLP	Solid	8260C	541685
LB 280-541685/1-A	Method Blank	TCLP	Solid	8260C	541685
LCS 280-541685/2-A	Lab Control Sample	TCLP	Solid	8260C	541685
280-150116-1 MS	4FR-145-001	TCLP	Solid	8260C	541685
280-150116-1 MSD	4FR-145-001	TCLP	Solid	8260C	541685

Metals

Prep Batch: 541256

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	7471B	
280-150116-2	4FR-145-002	Total/NA	Solid	7471B	
280-150116-3	4FR-64-001	Total/NA	Solid	7471B	

Metals (Continued)

Prep Batch: 541256 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-4	4FR-64-002	Total/NA	Solid	7471B	
280-150116-5	4FR-128-001	Total/NA	Solid	7471B	
280-150116-6	4FR-76-001	Total/NA	Solid	7471B	
280-150116-7	4FR-144-001	Total/NA	Solid	7471B	
MB 280-541256/1-A	Method Blank	Total/NA	Solid	7471B	
LCS 280-541256/2-A	Lab Control Sample	Total/NA	Solid	7471B	
280-150116-1 MS	4FR-145-001	Total/NA	Solid	7471B	
280-150116-1 MSD	4FR-145-001	Total/NA	Solid	7471B	

Leach Batch: 541307

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	1311	
280-150116-2	4FR-145-002	TCLP	Solid	1311	
280-150116-3	4FR-64-001	TCLP	Solid	1311	
280-150116-4	4FR-64-002	TCLP	Solid	1311	
LB 280-541307/1-B	Method Blank	TCLP	Solid	1311	
LB 280-541307/1-C	Method Blank	TCLP	Solid	1311	
LCS 280-541307/2-B	Lab Control Sample	TCLP	Solid	1311	
LCS 280-541307/2-C	Lab Control Sample	TCLP	Solid	1311	
280-150116-1 MS	4FR-145-001	TCLP	Solid	1311	
280-150116-1 MSD	4FR-145-001	TCLP	Solid	1311	
280-150116-4 MS	4FR-64-002	TCLP	Solid	1311	
280-150116-4 MSD	4FR-64-002	TCLP	Solid	1311	

Analysis Batch: 541401

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	7471B	541256
280-150116-2	4FR-145-002	Total/NA	Solid	7471B	541256
280-150116-3	4FR-64-001	Total/NA	Solid	7471B	541256
280-150116-4	4FR-64-002	Total/NA	Solid	7471B	541256
280-150116-5	4FR-128-001	Total/NA	Solid	7471B	541256
280-150116-6	4FR-76-001	Total/NA	Solid	7471B	541256
280-150116-7	4FR-144-001	Total/NA	Solid	7471B	541256
MB 280-541256/1-A	Method Blank	Total/NA	Solid	7471B	541256
LCS 280-541256/2-A	Lab Control Sample	Total/NA	Solid	7471B	541256
280-150116-1 MS	4FR-145-001	Total/NA	Solid	7471B	541256
280-150116-1 MSD	4FR-145-001	Total/NA	Solid	7471B	541256

Prep Batch: 541427

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	3010A	541307
280-150116-2	4FR-145-002	TCLP	Solid	3010A	541307
280-150116-3	4FR-64-001	TCLP	Solid	3010A	541307
280-150116-4	4FR-64-002	TCLP	Solid	3010A	541307
LB 280-541307/1-B	Method Blank	TCLP	Solid	3010A	541307
LCS 280-541307/2-B	Lab Control Sample	TCLP	Solid	3010A	541307
280-150116-1 MS	4FR-145-001	TCLP	Solid	3010A	541307
280-150116-1 MSD	4FR-145-001	TCLP	Solid	3010A	541307

Metals

Analysis Batch: 541721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	6010C	541427
280-150116-2	4FR-145-002	TCLP	Solid	6010C	541427
280-150116-3	4FR-64-001	TCLP	Solid	6010C	541427
280-150116-4	4FR-64-002	TCLP	Solid	6010C	541427
LB 280-541307/1-B	Method Blank	TCLP	Solid	6010C	541427
LCS 280-541307/2-B	Lab Control Sample	TCLP	Solid	6010C	541427
280-150116-1 MS	4FR-145-001	TCLP	Solid	6010C	541427
280-150116-1 MSD	4FR-145-001	TCLP	Solid	6010C	541427

Prep Batch: 542086

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	7470A	541307
280-150116-2	4FR-145-002	TCLP	Solid	7470A	541307
280-150116-3	4FR-64-001	TCLP	Solid	7470A	541307
280-150116-4	4FR-64-002	TCLP	Solid	7470A	541307
LB 280-541307/1-C	Method Blank	TCLP	Solid	7470A	541307
LCS 280-541307/2-C	Lab Control Sample	TCLP	Solid	7470A	541307
280-150116-4 MS	4FR-64-002	TCLP	Solid	7470A	541307
280-150116-4 MSD	4FR-64-002	TCLP	Solid	7470A	541307

Analysis Batch: 542245

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	TCLP	Solid	7470A	542086
280-150116-2	4FR-145-002	TCLP	Solid	7470A	542086
280-150116-3	4FR-64-001	TCLP	Solid	7470A	542086
280-150116-4	4FR-64-002	TCLP	Solid	7470A	542086
LB 280-541307/1-C	Method Blank	TCLP	Solid	7470A	542086
LCS 280-541307/2-C	Lab Control Sample	TCLP	Solid	7470A	542086
280-150116-4 MS	4FR-64-002	TCLP	Solid	7470A	542086
280-150116-4 MSD	4FR-64-002	TCLP	Solid	7470A	542086

General Chemistry

Analysis Batch: 541065

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Moisture	
280-150116-2	4FR-145-002	Total/NA	Solid	Moisture	
280-150116-3	4FR-64-001	Total/NA	Solid	Moisture	
280-150116-4	4FR-64-002	Total/NA	Solid	Moisture	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	Moisture	

Analysis Batch: 541229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-5	4FR-128-001	Total/NA	Solid	Moisture	
280-150116-6	4FR-76-001	Total/NA	Solid	Moisture	
280-150116-7	4FR-144-001	Total/NA	Solid	Moisture	

Rad

Leach Batch: 516020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Dry and Grind	

Rad (Continued)

Leach Batch: 516020 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-2	4FR-145-002	Total/NA	Solid	Dry and Grind	
280-150116-3	4FR-64-001	Total/NA	Solid	Dry and Grind	
280-150116-4	4FR-64-002	Total/NA	Solid	Dry and Grind	
280-150116-5	4FR-128-001	Total/NA	Solid	Dry and Grind	
280-150116-6	4FR-76-001	Total/NA	Solid	Dry and Grind	
280-150116-7	4FR-144-001	Total/NA	Solid	Dry and Grind	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	Dry and Grind	
280-150116-3 DU	4FR-64-001	Total/NA	Solid	Dry and Grind	
280-150116-7 DU	4FR-144-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 516430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Fill Geo-7	516020
280-150116-2	4FR-145-002	Total/NA	Solid	Fill Geo-7	516020
280-150116-3	4FR-64-001	Total/NA	Solid	Fill Geo-7	516020
280-150116-4	4FR-64-002	Total/NA	Solid	Fill Geo-7	516020
280-150116-7	4FR-144-001	Total/NA	Solid	Fill Geo-7	516020
MB 160-516430/1-A	Method Blank	Total/NA	Solid	Fill Geo-7	
LCS 160-516430/2-A	Lab Control Sample	Total/NA	Solid	Fill Geo-7	
280-150116-7 DU	4FR-144-001	Total/NA	Solid	Fill Geo-7	516020

Prep Batch: 516575

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	ExtChrom	516020
280-150116-2	4FR-145-002	Total/NA	Solid	ExtChrom	516020
280-150116-3	4FR-64-001	Total/NA	Solid	ExtChrom	516020
280-150116-4	4FR-64-002	Total/NA	Solid	ExtChrom	516020
280-150116-5	4FR-128-001	Total/NA	Solid	ExtChrom	516020
280-150116-6	4FR-76-001	Total/NA	Solid	ExtChrom	516020
280-150116-7	4FR-144-001	Total/NA	Solid	ExtChrom	516020
MB 160-516575/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-516575/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 516763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-2	4FR-145-002	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-3	4FR-64-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-4	4FR-64-002	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-5	4FR-128-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-6	4FR-76-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-7	4FR-144-001	Total/NA	Solid	Ext_Chrom_LSC	516020
MB 160-516763/1-A	Method Blank	Total/NA	Solid	Ext_Chrom_LSC	
LCS 160-516763/2-A	Lab Control Sample	Total/NA	Solid	Ext_Chrom_LSC	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	Ext_Chrom_LSC	516020

Prep Batch: 516779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	ExtChrom	516020
280-150116-2	4FR-145-002	Total/NA	Solid	ExtChrom	516020
280-150116-3	4FR-64-001	Total/NA	Solid	ExtChrom	516020

Rad (Continued)

Prep Batch: 516779 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-4	4FR-64-002	Total/NA	Solid	ExtChrom	516020
280-150116-5	4FR-128-001	Total/NA	Solid	ExtChrom	516020
280-150116-6	4FR-76-001	Total/NA	Solid	ExtChrom	516020
280-150116-7	4FR-144-001	Total/NA	Solid	ExtChrom	516020
MB 160-516779/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-516779/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	ExtChrom	516020

Prep Batch: 516784

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	ExtChrom	516020
280-150116-2	4FR-145-002	Total/NA	Solid	ExtChrom	516020
280-150116-3	4FR-64-001	Total/NA	Solid	ExtChrom	516020
280-150116-4	4FR-64-002	Total/NA	Solid	ExtChrom	516020
280-150116-5	4FR-128-001	Total/NA	Solid	ExtChrom	516020
280-150116-6	4FR-76-001	Total/NA	Solid	ExtChrom	516020
280-150116-7	4FR-144-001	Total/NA	Solid	ExtChrom	516020
MB 160-516784/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-516784/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	ExtChrom	516020

Prep Batch: 516794

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-8	Air Sample-001	Total/NA	Wipe	None	
MB 160-516794/1-A	Method Blank	Total/NA	Wipe	None	
LCS 160-516794/2-A	Lab Control Sample	Total/NA	Wipe	None	
LCSB 160-516794/3-A	Lab Control Sample	Total/NA	Wipe	None	
280-150116-8 DU	Air Sample-001	Total/NA	Wipe	None	

Prep Batch: 516942

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-8	Air Sample-001	Total/NA	Wipe	Fill Geo-7	
MB 160-516942/1-A	Method Blank	Total/NA	Wipe	Fill Geo-7	
LCS 160-516942/2-A	Lab Control Sample	Total/NA	Wipe	Fill Geo-7	
280-150116-8 DU	Air Sample-001	Total/NA	Wipe	Fill Geo-7	

Prep Batch: 517066

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	DPS-0	516020
280-150116-2	4FR-145-002	Total/NA	Solid	DPS-0	516020
280-150116-5	4FR-128-001	Total/NA	Solid	DPS-0	516020
280-150116-6	4FR-76-001	Total/NA	Solid	DPS-0	516020
280-150116-7	4FR-144-001	Total/NA	Solid	DPS-0	516020
MB 160-517066/10-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-517066/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
280-150116-1 DU	4FR-145-001	Total/NA	Solid	DPS-0	516020

Prep Batch: 517737

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-3	4FR-64-001	Total/NA	Solid	DPS-0	516020
280-150116-4	4FR-64-002	Total/NA	Solid	DPS-0	516020

Rad (Continued)

Prep Batch: 517737 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 160-517737/5-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-517737/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
280-150116-3 DU	4FR-64-001	Total/NA	Solid	DPS-0	516020

Client Sample ID: 4FR-145-001

Lab Sample ID: 280-150116-1

Date Collected: 06/22/21 08:24

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541685	06/29/21 15:54	TGH	TAL DEN
TCLP	Analysis	8260C		1	0.5 mL	5 mL	542493	07/07/21 16:33	GO	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	3010A			10 mL	50 mL	541427	06/28/21 15:35	EAS	TAL DEN
TCLP	Analysis	6010C		1			541721	06/29/21 12:54	LMT	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	7470A			30 mL	50 mL	542086	07/03/21 15:35	NK	TAL DEN
TCLP	Analysis	7470A		1			542245	07/03/21 20:12	NK	TAL DEN
Total/NA	Analysis	Moisture		1			541065	06/24/21 08:59	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0076 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517588	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0351 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518450	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0351 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518465	07/13/21 09:48	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Fill Geo-7					516430	06/28/21 15:02	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			517201	07/05/21 07:18	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0297 g	1.0 g	517066	07/02/21 14:29	JEC	TAL SL
Total/NA	Analysis	SR-03-RC		1			517539	07/07/21 13:55	ANW	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0031 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 09:02	JLP	TAL SL

Client Sample ID: 4FR-145-001

Lab Sample ID: 280-150116-1

Date Collected: 06/22/21 08:24

Matrix: Solid

Date Received: 06/23/21 10:30

Percent Solids: 85.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			5.266 g	5 mL	542156	07/02/21 10:00	GPM	TAL DEN
Total/NA	Analysis	8260C		1	5 g	5 mL	542130	07/02/21 15:52	GPM	TAL DEN
Total/NA	Prep	7471B			.59 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		100			541401	06/26/21 17:54	NK	TAL DEN

Client Sample ID: 4FR-145-002

Lab Sample ID: 280-150116-2

Date Collected: 06/22/21 08:26

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541685	06/29/21 15:54	TGH	TAL DEN
TCLP	Analysis	8260C		1	0.5 mL	5 mL	542493	07/07/21 16:56	GO	TAL DEN

Client Sample ID: 4FR-145-002

Lab Sample ID: 280-150116-2

Date Collected: 06/22/21 08:26

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	3010A			10 mL	50 mL	541427	06/28/21 15:35	EAS	TAL DEN
TCLP	Analysis	6010C		1			541721	06/29/21 13:07	LMT	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	7470A			30 mL	50 mL	542086	07/03/21 15:35	NK	TAL DEN
TCLP	Analysis	7470A		1			542245	07/03/21 20:14	NK	TAL DEN
Total/NA	Analysis	Moisture		1			541065	06/24/21 08:59	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.1037 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517590	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0288 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518454	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0288 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518444	07/13/21 20:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Fill Geo-7					516430	06/28/21 15:02	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			517200	07/05/21 07:19	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0897 g	1.0 g	517066	07/02/21 14:29	JEC	TAL SL
Total/NA	Analysis	SR-03-RC		1			517539	07/07/21 13:55	ANW	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0033 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 09:47	JLP	TAL SL

Client Sample ID: 4FR-145-002

Lab Sample ID: 280-150116-2

Date Collected: 06/22/21 08:26

Matrix: Solid

Date Received: 06/23/21 10:30

Percent Solids: 86.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			5.200 g	5 mL	542156	07/02/21 10:00	GPM	TAL DEN
Total/NA	Analysis	8260C		1	5 g	5 mL	542130	07/02/21 17:21	GPM	TAL DEN
Total/NA	Prep	7471B			.53 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		100			541401	06/26/21 18:01	NK	TAL DEN

Client Sample ID: 4FR-64-001

Lab Sample ID: 280-150116-3

Date Collected: 06/22/21 08:41

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541685	06/29/21 15:54	TGH	TAL DEN
TCLP	Analysis	8260C		1	0.5 mL	5 mL	542493	07/07/21 17:20	GO	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	3010A			10 mL	50 mL	541427	06/28/21 15:35	EAS	TAL DEN
TCLP	Analysis	6010C		1			541721	06/29/21 13:11	LMT	TAL DEN

Client Sample ID: 4FR-64-001

Lab Sample ID: 280-150116-3

Date Collected: 06/22/21 08:41

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	7470A			30 mL	50 mL	542086	07/03/21 15:35	NK	TAL DEN
TCLP	Analysis	7470A		1			542245	07/03/21 20:17	NK	TAL DEN
Total/NA	Analysis	Moisture		1			541065	06/24/21 08:59	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0289 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517592	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0241 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518455	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0241 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518445	07/13/21 20:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Fill Geo-7					516430	06/28/21 15:02	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			517197	07/05/21 07:21	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0135 g	1.0 g	517737	07/09/21 08:35	MJ	TAL SL
Total/NA	Analysis	SR-03-RC		1			518485	07/13/21 17:23	SCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0035 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 10:10	JLP	TAL SL

Client Sample ID: 4FR-64-001

Lab Sample ID: 280-150116-3

Date Collected: 06/22/21 08:41

Matrix: Solid

Date Received: 06/23/21 10:30

Percent Solids: 87.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			5.175 g	5 mL	542156	07/02/21 10:00	GPM	TAL DEN
Total/NA	Analysis	8260C		1	5 g	5 mL	542130	07/02/21 17:43	GPM	TAL DEN
Total/NA	Prep	7471B			.57 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		500			541401	06/26/21 18:38	NK	TAL DEN

Client Sample ID: 4FR-64-002

Lab Sample ID: 280-150116-4

Date Collected: 06/22/21 08:43

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			1.0 g	1.0 mL	541685	06/29/21 15:54	TGH	TAL DEN
TCLP	Analysis	8260C		1	0.5 mL	5 mL	542493	07/07/21 17:43	GO	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	3010A			10 mL	50 mL	541427	06/28/21 15:35	EAS	TAL DEN
TCLP	Analysis	6010C		1			541721	06/29/21 13:14	LMT	TAL DEN
TCLP	Leach	1311			1.0 g	1.0 mL	541307	06/25/21 15:25	TGH	TAL DEN
TCLP	Prep	7470A			30 mL	50 mL	542086	07/03/21 15:35	NK	TAL DEN
TCLP	Analysis	7470A		5			542245	07/03/21 20:19	NK	TAL DEN

Client Sample ID: 4FR-64-002

Lab Sample ID: 280-150116-4

Date Collected: 06/22/21 08:43

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			541065	06/24/21 08:59	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0172 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518338	07/13/21 09:39	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0434 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518456	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0434 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518449	07/13/21 20:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Fill Geo-7					516430	06/28/21 15:02	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			517188	07/05/21 07:20	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0262 g	1.0 g	517737	07/09/21 08:35	MJ	TAL SL
Total/NA	Analysis	SR-03-RC		1			518485	07/13/21 17:23	SCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0048 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 10:32	JLP	TAL SL

Client Sample ID: 4FR-64-002

Lab Sample ID: 280-150116-4

Date Collected: 06/22/21 08:43

Matrix: Solid

Date Received: 06/23/21 10:30

Percent Solids: 89.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			5.307 g	5 mL	542156	07/02/21 10:00	GPM	TAL DEN
Total/NA	Analysis	8260C		1	5 g	5 mL	542130	07/02/21 18:05	GPM	TAL DEN
Total/NA	Prep	7471B			.53 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		500			541401	06/26/21 18:40	NK	TAL DEN

Client Sample ID: 4FR-128-001

Lab Sample ID: 280-150116-5

Date Collected: 06/22/21 09:11

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			541229	06/25/21 09:13	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0132 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517600	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0539 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518457	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0539 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518450	07/13/21 20:36	FLC	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0391 g	1.0 g	517066	07/02/21 14:29	JEC	TAL SL
Total/NA	Analysis	SR-03-RC		1			517539	07/07/21 13:55	ANW	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0046 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 10:55	JLP	TAL SL

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid
Percent Solids: 89.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471B			.54 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		100			541401	06/26/21 18:13	NK	TAL DEN

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			541229	06/25/21 09:13	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.1297 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517601	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0508 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518458	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0508 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518451	07/13/21 20:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0094 g	1.0 g	517066	07/02/21 14:29	JEC	TAL SL
Total/NA	Analysis	SR-03-RC		1			517540	07/07/21 13:57	ANW	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0013 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 11:18	JLP	TAL SL

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid
Percent Solids: 95.9

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471B			.52 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		100			541401	06/26/21 18:15	NK	TAL DEN

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Client Sample ID: 4FR-144-001

Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1			541229	06/25/21 09:13	JJM	TAL DEN
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0024 g	1.0 mL	516575	06/29/21 13:32	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			517627	07/08/21 14:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0180 g	1.0 mL	516779	06/30/21 14:03	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518459	07/13/21 09:46	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	ExtChrom			1.0180 g	1.0 mL	516784	06/30/21 14:38	HVV	TAL SL
Total/NA	Analysis	A-01-R		1			518454	07/13/21 20:36	FLC	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Fill Geo-7					516430	06/28/21 15:02	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			517194	07/05/21 07:20	JCB	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	DPS-0			1.0009 g	1.0 g	517066	07/02/21 14:29	JEC	TAL SL
Total/NA	Analysis	SR-03-RC		1			517540	07/07/21 13:57	ANW	TAL SL
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			3.0032 g	1.0 g	516763	06/30/21 12:04	MAV	TAL SL
Total/NA	Analysis	TC-02-RC		1			517532	07/07/21 11:40	JLP	TAL SL

Client Sample ID: 4FR-144-001

Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7

Matrix: Solid
Percent Solids: 94.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471B			.59 g	50 mL	541256	06/25/21 19:15	NK	TAL DEN
Total/NA	Analysis	7471B		10			541401	06/26/21 16:59	NK	TAL DEN

Client Sample ID: Air Sample-001

Date Collected: 06/22/21 09:00
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-8

Matrix: Wipe

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	None			1 Sample	1.0 g	516794	06/30/21 15:30	MLO	TAL SL
Total/NA	Analysis	900.0		1	1.0 mL	1.0 mL	518943	07/16/21 17:17	SCB	TAL SL
Total/NA	Prep	Fill Geo-7			1 Sample	1.0 g	516942	07/02/21 10:11	LTC	TAL SL
Total/NA	Analysis	GA-01-R		1			518907	07/16/21 10:00	JCB	TAL SL

Laboratory References:

TAL DEN = Eurofins TestAmerica, Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: EA Engineering, Science, and Technology
Job ID: 280-150116-1
Project/Site: NUSTL Decommissioning

Laboratory: Eurofins TestAmerica, Denver

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New York	NELAP	59923	04-01-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
7470A	7470A	Solid	Mercury
8260C	5030B	Solid	2-Hexanone
8260C	5030B	Solid	Cyclohexane
8260C	5030B	Solid	Methyl acetate
8260C	5030B	Solid	Methylcyclohexane
Moisture		Solid	Percent Moisture
Moisture		Solid	Percent Solids

Laboratory: Eurofins TestAmerica, St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New York	NELAP	11616	04-01-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
900.0	None	Wipe	Gross Alpha
900.0	None	Wipe	Gross Beta
A-01-R	ExtChrom	Solid	Plutonium-238
A-01-R	ExtChrom	Solid	Plutonium-239/240
A-01-R	ExtChrom	Solid	Thorium-228
A-01-R	ExtChrom	Solid	Thorium-230
A-01-R	ExtChrom	Solid	Thorium-232
A-01-R	ExtChrom	Solid	Uranium-233/234
A-01-R	ExtChrom	Solid	Uranium-235/236
A-01-R	ExtChrom	Solid	Uranium-238
GA-01-R	Fill Geo-7	Solid	Cesium-137
GA-01-R	Fill Geo-7	Solid	Radium-226
GA-01-R	Fill Geo-7	Solid	Thorium-232
GA-01-R	Fill Geo-7	Solid	Uranium-235
GA-01-R	Fill Geo-7	Solid	Uranium-238
GA-01-R	Fill Geo-7	Wipe	Cesium-137
GA-01-R	Fill Geo-7	Wipe	Radium-226
GA-01-R	Fill Geo-7	Wipe	Thorium-232
GA-01-R	Fill Geo-7	Wipe	Uranium-235
GA-01-R	Fill Geo-7	Wipe	Uranium-238
SR-03-RC	DPS-0	Solid	Total Beta Strontium
TC-02-RC	Ext_Chrom_LSC	Solid	Technetium-99

280-150116 Chain of Custody

Chain of Custody Record

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
phone 303.736.0100 fax

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☒ RCRA ☒ Other: NRC

Client Contact	**Project Manager:** Amy Sponaugle	**Site Contact:** Rachel Giampa	**Date:** 6/22/2021	COC No:
EA Engineering, P.C. (and affiliate EA Science and Technology)	**Tel/Fax:** 410-329-5103	**Lab Contact:** Samantha Saalfield	**Carrier:** UPS	1 of 1 COCs
Address: 400 Schilling Circle, Suite 400	**Analysis Turnaround Time**			**Sampler:** RG/AN/DR
Hunt Valley, MD 21031	☐ CALENDAR DAYS ☒ WORKING DAYS			**For Lab Use Only:**
Phone: 410-527-2491	TAT if different from Below 10 business days			Walk-in Client:
FAX: 410-771-1625	☐ 2 weeks			Lab Sampling:
Project Name: NUSTL Decommissioning	☐ 1 week			
Site: 201 Varick St. - Characterization Sampling	☐ 2 days			Job / SDG No.:
PO #: [redacted] 22309	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	GA_01_R - Gamma Spec (Cs-137, Ra-226, U-235, U-238, Th-232 plus detects)	A-01-R - Isotopic Uranium	A-01-R - Isotopic Thorium	A-01-R - Isotopic Plutonium	ST-RC-0055 - Nickel 63	SR-03-RC - Stronium 89/90	TC-02-RC - Technetium 99	900.0 - Gross Alpha & Beta Radiod	8260C - TCL VOCs (GC/MS)	7471B - Mercury (CVAA)	6010C - Metals (ICP)	8260C - TCLP VOCs (Regulatory L	7470A - TCLP Mercury	6010C - TCLP RCRA Metals			Sample Specific Notes:
4FR-145-001	6/22/2021	0824	C	Soil / Sed.	5	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-145-002	6/22/2021	0826	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-64-001	6/22/2021	0841	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-64-002	6/22/2021	0843	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-128-001	6/22/2021	0911	C	Soil / Sed.	2	N	N		X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 analysis if not enough
4FR-76-001	6/22/2021	0925	C	Soil / Sed.	2	N	N		X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 analysis if not enough
4FR-144-001	6/22/2021	0929	C	Soil / Sed.	2	N	N	X*	X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 & gamma spec analyses if not enough volume
Air Sample-001	6/22/2021	0900	C	Wipe	1			X							X									

Preservation Used: 1= Ice, 2= HCl; 3= H_2SO_4; 4=HNO_3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | **Custody Seal No.:** QEC | Cooler Temp. (°C): Obs'd: 1.5 Corr'd: 2.1 Therm ID No.: 12

Relinquished by:	Company: EA Engineering	Date/Time: 6/22/21 1148	Received by:	Company: ETA/DEN	Date/Time: 6/23/21 1030
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

280-150116 Waybill

RACHEL GIAMPA
410-584-7000 5229
EA ENG SCIENCE TECH
225 SCHILLING CIRCLE
HUNT VALLEY MD 21031

50 LBS

1 OF 1

SHIP TO:
303-736-0100
TESTAMERICA DENVER
4955 YARROW STREET
ARVADA CO 80002-4517

CO 802 9-30

UPS NEXT DAY AIR

TRACKING #: 1Z 288 682 NT 9618 6036

1

BILLING: P/P
ATTENTION UPS DRIVER: SHIPPER RELEASE

Department Code: 2126
Project Phase AND Task: 6292233.007

WNRN050 25.0A 06/2021*

TM

PrintWindow... 6/22/2021

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Phone: 303-736-0100 Fax: 303-431-7171

Chain of Custody Record

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Ridenhower, Rhonda E	Carrier Tracking No(s):	COC No: 280-574607.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Rhonda.Ridenhower@Eurofinset.com	State of Origin: New York	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - New York		Job #: 280-150116-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 7/7/2021			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: NUSTL Decommissioning	Project #: 16009714			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	GA_01_R_Ra/Dry_Grind (MOD) Radium-226/228	A01R_U/Dry_Grind Standard Target List	A01R_Th/Dry_Grind Standard Target List	A01R_Pu/Dry_Grind Standard Target List	LSC_Ni/Dry_Grind (MOD) Standard Target List	SR_03_RC_Tot_Sr/Dry_Grind Standard Target List	TC_02_RC/Dry_Grind (MOD) Standard Target List	900.0/Direct_Addition Standard Target List	GA_01_R_Ra/Fill_Geo_7 (MOD) Radium-226/228	Total Number of containers	Special Instructions/Note:
			Preservation Code:														
4FR-145-001 (280-150116-1)	6/22/21	08:24 Eastern		Solid			X	X	X	X	X	X	X			3	
4FR-145-002 (280-150116-2)	6/22/21	08:26 Eastern		Solid			X	X	X	X	X	X	X			2	
4FR-64-001 (280-150116-3)	6/22/21	08:41 Eastern		Solid			X	X	X	X	X	X	X			2	
4FR-64-002 (280-150116-4)	6/22/21	08:43 Eastern		Solid			X	X	X	X	X	X	X			2	
4FR-128-001 (280-150116-5)	6/22/21	09:11 Eastern		Solid				X	X	X	X	X	X			1	
4FR-76-001 (280-150116-6)	6/22/21	09:25 Eastern		Solid				X	X	X	X	X	X			1	
4FR-144-001 (280-150116-7)	6/22/21	09:29 Eastern		Solid			X	X	X	X	X	X	X			1	
Air Sample-001 (280-150116-8)	6/22/21	09:00 Eastern		Wipe										X	X	1	

Note: Since laboratory accreditations are subject to change, Eurofins TestAmerica places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the Eurofins TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins TestAmerica attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins TestAmerica.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	JDS FE	06/24/2021 1515	FTADEN	FE		
2	FE					
3					6/25/21 0855	ETA STL

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 11/01/2020

Animal and Plant Health Inspection Service

Plant Protection & Quarantine

United States Department of Agriculture
Animal and Plant Health Inspection Service
4700 River Road
Riverdale, MD 20737

Permit to Receive Soil

Regulated by 7 CFR 330

This permit was generated electronically via the ePermits system.

PERMITTEE NAME:	Mr. Mike Ridenhower	**PERMIT NUMBER:**	P330-17-00028
COMPANY:	TestAmerica Laboratories	**APPLICATION NUMBER:**	P525-161219-001
RECEIVING ADDRESS:	13715 Rider Trail North Earth City, MO 63045	**DATE ISSUED:**	01/09/2014
MAILING ADDRESS:	13715 Rider Trail North Earth City, MO 63045		
PHONE:	(314) 298-8566 Ext. 206		
FAX:		**EXPIRES:**	**02/02/2020**

PORTS OF ARRIVAL/PLANT INSPECTION STATIONS: AK, Anchorage; AL, Huntsville; AL, Mobile; AZ, Douglas; AZ, Lukeville; AZ, Naco; AZ, Nogales; AZ, Phoenix; AZ, San Luis; AZ, Tucson; CA, Calexico; CA, El Segundo; CA, Fresno; CA, Long Beach; CA, Oakland; CA, Ontario; CA, Otay Mesa; CA, Port Hueneme; CA, Sacramento; CA, San Diego; CA, San Francisco; CA, San Jose; CA, San Ysidro; CA, Tecate; CO, Denver; CT, Hartford; CT, New Haven; DE, Dover; DE, Wilmington; FL, Ft. Lauderdale; FL, Ft. Myers; FL, Ft. Pierce; FL, Jacksonville; FL, Key West; FL, Miami; FL, Miami (Cargo, DHL, Fed Ex, UPS, etc); FL, Orlando; FL, Pensacola; FL, Port Canaveral; FL, Port Everglades; FL, Sanford; FL, Tampa; FL, West Palm Beach; GA, Atlanta; GA, Savannah; GU, Agana; HI, Hilo; HI, Honolulu; HI, Kahului; HI, Kailua-Kona; HI, Lihue; ID, Eastport; IL, Chicago; IN, Indianapolis; KY, Louisville; MA, South Boston; MD, Baltimore; MD, Beltsville; ME, Bangor; ME, Calais; ME, Houlton; ME, Portland; MI, Detroit; MI, Port Huron; MI, Romulus; MI, Sault Saint Marie; MN, Duluth; MN, Grand Portage; MN, International Falls; MN, Minneapolis; MO, Kansas City; MO, St. Louis; MP, Commonwealth of the Northern Mariana Islands; MS, Gulfport; MS, Port Bienville; MT, Raymond; MT, Roosville; MT, Sweetgrass; NC, Raleigh; NC, Wilmington; ND, Dunseith; ND, Pembina; ND, Portal; NJ, Linden; NM, Albuquerque; NM, Columbus; NM, SantaTeresa; NV, Las Vegas; NY, Albany; NY, Alexandria Bay; NY, Brooklyn; NY, Buffalo; NY, Champlain, Rouses Point; NY, Jamaica; NY, Jamaica; NY, Newburgh; OH, Ashtabula; OH, Cincinnati; OH, Cleveland; OH, Columbus; OH, Toledo; OH, Wilmington; OK, Oklahoma City; OR, Portland; PA, Allentown; PA, Harrisburg; PA, Philadelphia; PA, Pittsburgh; PA, Scranton; PR, Aguadilla; PR, Carolina; PR, Fajardo; PR, Mayaguez; PR, Ponce; RI, Warwick/Providence; SC, Charleston; TN, Memphis; TN, Nashville; TX, Austin; TX, Brownsville; TX, Corpus Christi; TX, Dallas; TX, Del Rio; TX, Eagle Pass; TX, El Paso; TX, Fabens; TX, Falcon; TX, Fort Hancock; TX, Galveston; TX, Hidalgo; TX, Humble; TX, Laredo; TX, Los Indios; TX, Pharr; TX, Port Arthur; TX, Presidio; TX, Progresso; TX, Rio Grande City; TX, Roma; TX, San Antonio; TX, Victoria; UT, Salt Lake City; VA, Dulles; VA, Norfolk; VI, St. Croix; VI, St. Thomas; VT, Berlin; WA, Blaine; WA, Oroville; WA, Port Angeles; WA, SeaTac; WA, Sumas; WI, Green Bay; WI, Milwaukee

HAND CARRY: No

Under the conditions specified, this permit authorizes the following:

Quantity of Soil per Shipment and Treatment

Over 3 lbs - Your facility MUST be inspected and approved to receive this soil

SPECIAL INSTRUCTIONS TO INSPECTORS

See permit conditions below

Permit Number P330-17-00028

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Mark A. Stull	02/02/2017

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C s 1001)

INSTRUCTIONS TO DHS CBP INSPECTORS FOR IMPORTED SOIL SHIPMENTS ROUTED TO RECEIVING FACILITY:

For hand carry of soil, an official of CBP Agricultural Programs and Trade Liaison (APTL) would have been notified to document and facilitate the entry of the soil (See hand carry conditions below if stipulated).

THIS PERMIT DOES NOT AUTHORIZE HAND-CARRY OF THE REGULATED MATERIAL. Otherwise:

1. Validate the permit in ePermits using the CBP search feature by logging on to: https://epermits.aphis.usda.gov/epermits
2. Confirm that the shipment is being routed directly to a USDA APHIS PPQ Inspected Facility authorized to receive soil by logging on to: https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform
3. Confirm that the imported shipment has a valid USDA PPQ Form 550 Black/White label.
4. Confirm that the carrier of the shipment imported under this USDA PPQ 525 permit is commercially bonded.
5. For questions or concerns, contact the USDA APHIS PPQ Permit Unit in Riverdale, MD, at 866-524-5421 and ask to speak with a compliance officer.

PERMIT GUIDANCE

Receipt or use of foreign isolates or samples from countries under sanctions requires specific permission from the U.S. Department of Treasury (see http://www.treasury.gov/resource-center/sanctions/Programs/Pages/Programs.aspx. for current country/regional listings) for current country listings.

This permit does not authorize importation, interstate movement, possession, and/or use of strains of genetically engineered regulated organisms (created by the use of recombinant DNA technology).

If an animal pathogen is identified in your shipment, to ensure appropriate safeguarding, please refer to http://www.aphis.usda.gov/import_export/animals/animal_import/animal_imports_anproducts.sh

tml.

If a human pathogen is identified, please see the CDC Etiologic Agent Import Permit Program at http://www.cdc.gov/od/eaipp/

This permit does not fulfill the requirements of other federal or state regulatory authorities. As appropriate, please contact the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Food and Drug Administration, the Centers for Disease Control and Prevention, the APHIS Veterinary Services unit, or your State's Department of Agriculture to ensure proper permitting.

If you are considering renewal of this permit, an application should be submitted at least 90 days prior to the expiration date of this permit to ensure continued coverage. Permits requiring containment facilities may take a longer period of time to process.

This permit authorizes the importation of soil from all foreign sources (except countries with sanctions or embargoes by U.S. State Department) only for chemical/ physical analysis in a controlled laboratory environment at the named facility on the permit.

All soil residues must be dry-heated, incinerated or autoclaved.

Dry Heat Treatment: use one of the following schedules:

110- 120.5 degrees C (230-249 F) for 16 hours
121-154 degrees C (250-309 F) for 2 hours
154.4 - 192.5 degrees C (310-379 F) for 30 minutes

Permit Number P330-17-00028

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Mark A. Stull	02/02/2017

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

193-220 degrees C (380-429 F) for 4 minutes
221-232 degrees C (430-450) for 2 minutes

Time starts when the entire sample reaches the required temperature, and a suitable temperature probe must be used for verification.

Autoclaving Waste

a. Waste must be autoclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a minimum of 30 minutes.

b. Autoclave tape or other indicators must be placed on each load prior to treatment. The autoclave tape or other indicator on each container must be checked to verify color change before disposal.

c. The autoclave must be professionally calibrated annually and a written record must be maintained.

d. Every 3 months, you must use a commercially available biological indicator kit that uses bacterial spores (e.g. Geobacillus species) that are rendered unviable at 121 degrees C. You must follow the manufacturer's instructions. If any growth is observed, you must have the autoclave serviced and retested.

Incineration:
With the exception of metal and glass containers, all regulated and associated material must be reduced completely to ash at the end of the incineration cycle.

PERMIT CONDITIONS

This permit authorizes the importation of soil from all foreign sources (except countries with sanctions or embargoes by U.S. State Department), and interstate/ domestic movement of soil from Hawaii, the contiguous U.S., the continental U.S., and all U.S. territories only for chemical/ physical analysis in a controlled laboratory environment at the named facility on the permit.

1. This permit is issued only for the named permit holder at the address(s) identified on this permit. This permit cannot be transferred or assigned.

2. The permit holder verifies United States residency by initialing and accepting these permit conditions. If you are not a United States resident, it is unlawful for you to initial or accept these permit conditions because a USDA 525 soil Permit can only be issued to United States residents.

3. The permit holder is solely responsible for ensuring compliance with all statutory requirements and specifically listed permit conditions. Failure to comply with the terms and conditions of this permit is cause for the following: (a) cancellation of this permit, (b) cancellation of other permits issued to the permit holder, (c) seizure and/or destruction of regulated organisms, (d) denial of future permit applications by this permit holder, (e) liability for civil penalties, and (f) criminal prosecution under provisions in the Plant Protection Act.

4. Any alteration, forgery, unauthorized use of this permit and/or associated Federal Forms are subject to civil and criminal penalties including fines and imprisonment.

5. This permit must not be used for the movement or use of plant pathogens listed in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. If any organism listed as a Select Agent is identified from materials associated with this research, the permit holder is required to notify APHIS, Agricultural Select Agent Program (ASAP) within one business day by phone at 301-851-3300, and within seven (7) days submit APHIS/CDC Form 4 (Report of Identification of a Select Agent or Toxin in a Clinical or Diagnostic Laboratory) to APHIS, ASAP; 4700 River Rd, Unit 2, Riverdale, MD 20737 (see instructions at: http://www.aphis.usda.gov/programs/ag_selectagent/index.shtml). Failure to comply with this requirement is a violation of the Agricultural Bioterrorism Protection Act of 2002.

Permit Number P330-17-00028

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Mark A. Stull	02/02/2017

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C s 1001)

6. If a regulated organism is received in this shipment, the permit holder must take all prudent measures to contain the organism(s) and notify the permit unit within one business day by calling 866-524-5421 or by e-mail to pest.permits@aphis.usda.gov. The permit holder must immediately notify the permit unit of the destruction of regulated organisms received under this permit, as above. Similarly, the permit holder must immediately notify the permit unit if facilities are destroyed or decommissioned for any reason.

7. You as the permit holder are responsible for maintaining a valid permit for as long as the soil is in your possession. APHIS does not issue extensions or renewals of existing permits; the permit holder must submit a new permit application at least three months prior to the expiration of this permit, and obtain a new permit to continue uninterrupted authorization for the soil approved under this permit.

8. If an accidental release into the environment occurs, notification must be made within one business day to APHIS, PPQ, 4700 River Rd., unit 133; Riverdale, MD 20737; 866-524-5421. A written report of the incident must be submitted identifying: (a) the name of the permit holder (responsible person), (b) the permit number, (c) the country or State of origin of the soil, (d) the nature of the release, and (e) measures already taken to contain, reduce or limit the effects of the accidentally released soil. Any plans prepared to contain, reduce or limit the effects of the accidentally released soil may be submitted as developed.

9. Without prior notice and during reasonable hours, authorized PPQ and/or State regulatory officials shall be allowed to inspect the conditions associated with the regulated soil authorized under this permit.

10. The permit holder must maintain an official permanent work assignment at the address identified on this permit. If the permit holder ceases assignment/affiliation at the address identified on this permit, or personnel circumstances change in any way, then a compliance officer must be notified at the PPQ permit unit immediately (that is, within one business day) by either (a) email to pest.permits@aphis.usda.gov, (b) fax to 301-734-4300 or 8700/5392, or (c) conventional mail to USDA PPQ Permit Unit, 4700 River Road, Riverdale, MD 20737. Should the permit holder depart from the organization/facility, the permit holder must either (a) request cancellation of this permit and comply with all permit-specific termination conditions, (b) apply for and receive a permit to move the soil to a new facility, or (c) relinquish control of the regulated soil to a qualified individual who obtained a permit for the continued use of this regulated soil prior to this permit holder's departure.

11. A copy of this permit must accompany all shipments authorized under this permit.

12. CBP-AI and PPQ have the authority to order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets, packaging, and means of conveyance). If an official of CBP-AI or PPQ determines that the shipment requires treatment as a condition of entry, is contaminated with a quarantine plant pest or pests, is commingled with prohibited plant material or the required documentation is incomplete or missing, then that official may order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets, packaging, means of conveyance).

13. All solid wood packing material (SWPM) accompanying the shipment must be in compliance with ISPM 15 treatment regulations and IPPC stamp requirements and enforcement. Noncompliant shipments will be treated, re-exported or destroyed at the consignee's expense.

14. All costs and arrangements for safeguarding and transportation of the cargo are the responsibility of the importer, broker or other parties associated with the shipment.

15. All operations must be consistent with information submitted in association with the above listed APHIS-PPQ inspected facility and subject to the conditions below.

16. Soil must be shipped in a securely closed, watertight container (primary container, test tube, vial, etc.) which must be enclosed in a second, durable watertight container (secondary container).

17. The shipment must be free from foreign matter or debris, plants and plant parts including noxious weeds and infestations by other macroorganisms such as insects, Cyst nematodes, mollusks and acari. Authorized material found to be commingled with unauthorized material will be subject to the same action (i.e. re-export, destruction) as unauthorized material.

18. The imported article can be released without treatment at the port of entry to the permittee's address listed on the permit or label or to an authorized user only if the final destination is an approved facility listed at https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform.

Permit Number P330-17-00028

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Mark A. Stull	02/02/2017

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

19. The soil must not be used in field research or release into the environment before sterilization.

The soil must not be used for isolation or culture of organisms, or for extracting and concentrating organisms from the soil.

The soil must not be used as a growing medium.

20. Further intrastate distribution of soil is not allowed without prior approval from Federal officials [State Plant Health Director or designee] (or from Federal officials with State concurrence): Access the website at http://www.aphis.usda.gov/ppq/sphd/ for a list of State Plant Health Offices. Access the website at http://nationalplantboard.org/member/index.html for a list of State Plant Regulatory Officials.

21. Further distribution of soil across state lines is not allowed without a permit from the receiving State. While in storage, all soil must be kept locked (e.g. in freezer, cabinet) in the approved lab with access limited to authorized personnel or they will be in a restricted access building that requires a key card entry and access is restricted to authorized personnel only; or it must be in locked room restricted to authorized personnel only.

22. The soil must be handled as quarantined material until sterilized. This will include keeping the soil enclosed in containers when not in use and labeling all containers and/or storage areas: "Quarantine Soil- Sterilize Before Disposal"

23. All packing material, media, substrate, and shipping containers must be sterilized or destroyed as approved and prescribed by the permit conditions after removing the soil.

24. All unconsumed soil, containers and effluent must be autoclaved, incinerated or properly sterilized by the permittee at the conclusion of the project as approved and prescribed by the permit conditions.

25. Any water residues (effluent) from the processing of soil samples must be treated by an approved sterilization procedure such as hydroclave or autoclave.

26. All soil residues must be dry-heated, incinerated or autoclaved.

Dry Heat Treatment: use one of the following schedules:

110- 120.5 degrees C (230-249 F) for 16 hours
121-154 degrees C (250-309 F) for 2 hours
154.4 - 192.5 degrees C (310-379 F) for 30 minutes
193-220 degrees C (380-429 F) for 4 minutes
221-232 degrees C (430-450) for 2 minutes

Time starts when the entire sample reaches the required temperature, and a suitable temperature probe must be used for verification.

Autoclaving Waste

a. Waste must be autoclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a minimum of 30 minutes.

b. Autoclave tape or other indicators must be placed on each load prior to treatment. The autoclave tape or other indicator on each container must be checked to verify color change before disposal.

c. The autoclave must be professionally calibrated annually and a written record must be maintained.

d. Every 3 months, you must use a commercially available biological indicator kit that uses bacterial spores (e.g. Geobacillus species) that are rendered unviable at 121 degrees C. You must follow the manufacturers instructions. If any growth is observed, you must have the autoclave serviced and retested.

Incineration:
With the exception of metal and glass containers, all regulated and associated material must be reduced completely to ash at the end of the incineration cycle.

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Mark A. Stull	02/02/2017

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27. Equipment and supplies used to conduct operations or that have contacted the soil must be decontaminated using one of the following methods:

(a) Material can be soaked in a fresh bleach solution of 10 percent (1:10) for at least 30 minutes. (1:10 is a convention that means 1 in 10 or1 part 9 parts = 10 parts total, which is a 10 percent solution)
(b) Material can be soaked in 70 percent ethanol
(c) Flamed with ethanol
(d) Treated with quaternary ammonium compounds.
Note also that autoclaving, hydroclave, incineration, and dry heat sterilization are also acceptable sterilization/decontamination methods.

28. Upon issuance of this permit (i.e., a signed PPQ 525), you will need to request the PPQ Form 550 Black/White labels at least 5 days in advance. If you applied online using ePermits, you may request the labels using the My Shipments/Labels feature. Otherwise, send your request to BlackWhiteGreenYellowlabelrequest@aphis.usda.gov. All email requests must come from the permit holder or appointee, if requested by the appointee the permit holder must be Ccd on all requests. Specify the approved port as listed on the permit and the total number of labels needed in multiples of four. You may request additional labels the same way. We will send you the labels by email as a pdf.

A label must be attached with clear tape to the exterior of each package being imported under this permit. The labels will include detailed shipping instructions. You are responsible for instructing your shipper to carefully follow these instructions. You are responsible for each import shipping label issued under this permit.
All labels must be printed in color. Failure to do so may result in refused entry or destruction of your package.

Enclose the following supplemental information in each shipment:
- Permittee Name
- Permit number
- Label number

Underlying packaging/wrapping must carry the address, billing, and any other information required to direct the shipment to its final destination (i.e., the permit holder's address; N.B., USDA APHIS does not defray any additional shipping costs incurred for transiting the shipment through an inspection station as the initial US destination).

29. Underlying packaging/wrapping must carry the address, billing, and any other information required to direct the shipment to its final destination (i.e., the permit holder's address; Please note: USDA APHIS does not defray any additional shipping costs incurred for transiting the shipment through an inspection station as the initial US destination).

END OF PERMIT CONDITIONS

Permit Number P330-17-00028

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Mark A. Stull	02/02/2017

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According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control numbers for this information collection are 0579-0054, 0068, 0129, 0198, 0257, 0310, 0317, 0322, 0337, 0346, 0363, and 0369. The time required to complete this information collection is estimated to average 1.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

OMB APPROVED 0579-0054/0068/0129/0198/0257/0310/0317/0322/0337/0346/0363/0369

UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE	COMPLIANCE AGREEMENT
1. NAME AND MAILING ADDRESS OF PERSON OR FIRM Mike Ridenhower Test America Laboratories 13715 Rider Trail North, Earth City, MO 63045 Phone# 314-~~289~~-8566 Ext. 206 Fax# 298 e-mail mike.ridenhower@testamericainc.com	2. LOCATION Same

3. REGULATED ARTICLE(S)

Non-sterilized Foreign soil; or Foreign & Regulated Domestic soil; or Domestic soil (HI and/or U.S. territories) - ANALYSIS

4. APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS

7 CFR 330, 7 CFR 318.60, and 7 CFR 301

5. I/WE AGREE TO THE FOLLOWING:

I. Transfer and Noncompliance
- A. This agreement may be immediately cancelled or revoked for noncompliance.
- B. This compliance agreement is non-transferable.
- C. Any person who knowingly violates the Plant Protection Act (PPA) (7 U.S.C. 7701 et seq.) and/or the Animal Health Protection Act (AHPA) (7 U.S.C. 8301 et. seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, a one-year prison term or both. Additionally, any person violating the PPA and/or the AHPA may be assessed civil penalties of up to $300,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater.

II. Procedures, protocols and limitations established in 'General Stipulations' (attached).

6. SIGNATURE	7. TITLE	8. DATE SIGNED
[signature]	RSO, EHSM	1/11/17

The affixing of the signatures below will validate this agreement which shall remain in effect until cancelled, but may be revised as necessary or revoked for noncompliance.

9. AGREEMENT NO.
MO-Soil-17-005

10. DATE OF AGREEMENT
1/11/2017

11. PPQ/CBP OFFICIAL (NAME AND TITLE)	12. ADDRESS
PPQO- (Paul Cooper, Plant Health Safeguarding Specialist)	USDA APHIS PPQ 4300 Goodfellow Blvd., Bldg 102E St. Louis, MO 63120 314-389-8420
13. SIGNATURE [signature]	
14. U.S. GOVERNMENT/STATE AGENCY OFFICIAL (NAME AND TITLE)	15. ADDRESS
SPRO (Collin Wamsley, State Entomologist)	Missouri Department of Agricutlure P.O. Box 630 Jefferson City, MO 65102 (573) 751-5505
16. SIGNATURE	

PPQ FORM 519
SEP 2012

Previous editions before 2010 are obsolete.

Form Approved
OMB Number 0579-0054

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE PROGRAMS

Compliance Agreement

This Compliance Agreement (CA) supplements the PPQ 330 Soil Permit; and Mike Ridenhower (hereinafter referred to as Permittee), must meet all the terms and conditions as stated on the CA and Permit documents. Although the Permittee is signing the Compliance Agreement today, authorization to receive foreign soil is not granted until an official PPQ 330 soil permit from the USDA-APHIS-PPQ, Permit Services, Riverdale, Maryland, is issued to Permittee. By signing this compliance agreement you agree to adhere to the conditions hereby stipulated to receive regulated soil.

Authorization:

This Compliance Agreement authorizes Permittee of TestAmerica Laboratories, 13715 Rider Trail North, Earth City, MO 63045, to receive untreated regulated DOMESTIC and/or FOREIGN soil for **[chemical/geological/physical/DNA-RNA extraction/analysis/growing medium]**

NOTE: Neither this CA nor a PPQ 330 permit authorizes receipt of untreated regulated soil that has been imported and/or moved domestically across state lines for the purpose of isolation of a living organism, or for extracting and concentrating organisms from the soil. Further it is not authorized for use in field research or release into the environment before treatment. Authorization to receive soil for biological purposes requires a separate PPQ 526 permit (application can be submitted via ePermits and your local USDA-APHIS-PPQ office can provide assistance and direction regarding the application process – see the Supplementary Information Attachment).

Also, neither this CA nor a PPQ 330 permit authorizes receipt of untreated regulated soil that has moved from areas under domestic quarantine for Pale Cyst Nematode, Fruit Flies, or Giant African Snail. Movement of soil from these quarantined areas requires a USDA certificate or limited permit. Contact a PPQ office in the originating state for information on obtaining a USDA certificate or limited permit.

Standard Conditions:

1. Activation of this CA requires the signature of Permittee. However, authorization to receive regulated soil is not granted until: 1) notification is received that the State Plant Regulatory Official or designee from the Missouri Department of Agriculture (MDA) and the USDA-APHIS-PPQ State Plant Health Director (SPHD) or designee have approved and signed the CA; and 2) the official

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Initial/Date MR 1/4/17

PPQ 330 permit has been received from the USDA-APHIS-PPQ, Pest Permit Services, Riverdale, Maryland.

2. Compliance Agreements and Soil Permits are non-transferable. Permittee must maintain an official permanent work assignment at the address identified on this CA. If Permittee ceases assignment/affiliation at the address identified on this CA, then the local PPQ office must be notified immediately (that is, within one business day) by either (a) **[local email]** (b) **[local fax]** (c) **[local address]**. Permittee must also contact the USDA-APHIS-PPQ permitting office at 1866-524-5421. Should Permittee depart from the organization/facility, Permittee will either (a) request cancellation of both the CA and the permit, and comply with all permit-specific termination conditions, (b) apply for and receive a permit to move the soil to a new facility, or (c) relinquish control of the regulated soil to a qualified individual who obtained a permit and CA for the continued use of this regulated soil prior to this permit holder's departure. Go to the Permits website at: (http://www.aphis.usda.gov/plant_health/permits/index.shtml) to apply for an ePermits account to initiate the process. Your local USDA-APHIS-PPQ office can provide direction (see the Supplementary Information Attachment).

3. This compliance agreement MO-Soil-17-005, is valid for the life of the permit issued by APHIS-PPQ.

4. If the regulated soil is to be used by other persons within the same organization, those persons must be under the Permittee's supervision and have received the training specified in #2 below under "Standard Operating Procedure." Otherwise, they must apply for their own permit. Notification to this office may help facilitate such circumstance(s).

5. Transfers of untreated regulated soil require prior written authorization from the local PPQ and state office. This approval comes from the local PPQ office of the State Plant Health Director (SPHD) and the State Plant Regulatory Official (SPRO) of the Missouri Department of Agriculture (MDA). Such transfer must be done at a facility that is inspected and authorized by USDA-APHIS-PPQ.

6. Without prior notice and during reasonable hours, authorized PPQ and/or State regulatory officials shall be allowed to inspect the conditions associated with the regulated soil authorized under this compliance agreement/permit.

7. Prior to preparing soil for shipment, Permittee must inform shippers to address the soil shipment exactly as it is written on the soil permit and Compliance Agreement and supply a copy of the soil permit to be included with the shipment.

8. All shipments of foreign soil must be shipped by bonded carrier from the port of arrival or Hand-Carried* from the port of arrival directly to Permittee at: TestAmerica Laboratories, 13715 Rider Trail North, Earth City, MO 63045. All shipments of regulated domestic soil must be shipped by bonded carrier to Permittee at: TestAmerica Laboratories, 13715 Rider Trail North, Earth City, MO 63045.

*NOTE: APHIS PPQ may authorize hand-carry of imported soil under the PPQ 330 Soil import permit process on a case by case basis. This change will ensure APHIS policy pertaining to

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Initial/Date MTR 1/11/17

soil importations are consistent with the unique and most recent sanitary/phytosanitary requirements to mitigate risks involved in regulating soil movement. Denial of a hand carry request will not be reason to deny issuance of a permit to move soil by other approved means.

Hand carry event is granted only if it is specifically provided for by permit. **However, hand carry is not allowed for bulk shipment of soil intended for decontamination or landfill disposal.** If hand carry authorization is granted, you must adhere to all specific permit conditions including special label requirements pertaining to the hand carry event. You can find additional information on hand carry on the USDA-APHIS website at: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/import-information/permits/regulated-organism-and-soil-permits/sa_soil/ct_handcarry.

9. Permittee must attach a PPQ Form 550 Black/White label to the exterior of each shipment being imported under the permit or, in the case of bulk shipment, include the label in the shipping manifest. If you are e-authenticated, you are instructed to request labels using the "My shipment/my label" option within ePermits at least 7 days in advance. Labels also may be requested by email at: BlackWhiteGreenYellow.labelrequest@aphis.usda.gov. All email requests must come from the permit holder or their authorized contact, if requested by an authorized contact the permit holder must be copied on all requests. You must specify PPQ Form 550 Black/White labels, the specific port(s) of entry and number of labels for each port when requesting labels. The requested labels will be sent to you through a bonded carrier.

10. For all shipments/transfers, the integrity of the sample identification must be preserved from the shipper's inventory records to the recipient. Shipper and recipient must maintain records that provide a traceable link with the shipper's sample identification system in order to preserve the integrity of the sample identification from the shipper to eventual sample destruction.

    For example, if the shipper transfers a sample designated ABC and the recipient logs it in to his/her inventory system as sample 123, the recipient must maintain and provide to the shipper a record that cross references the sample identifications. An inspector must be able to review the recipient's records and be able to trace them back to the shipper's sample numbers. If the recipient ultimately transfers the regulated material to an alternate USDA approved facility, the integrity of the sample identification must be maintained throughout the transfer process and any subsequent transfers.

    Records for each shipment should include the weight, general composition, shipper, shipment origin; and final disposition. Upon request, records of all untreated regulated soil shipments (soil received, soil disposed, and soil transferred) must be available to USDA-APHIS-PPQ and/or the MDA.

Safeguarding Conditions:

1. Soil shall be shipped in a securely closed, watertight container (primary container, test tube, vial, etc.) which shall be enclosed in a second, durable watertight container (secondary container), such as a crush-resistant cardboard box with sealed plastic bag liner. Sufficient cushioning material

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should be included in the secondary container to prevent shifting of the primary container(s) in transit and to assist in maintaining the crush resistant properties of the container. The holder of this compliance agreement is responsible for communicating these requirements to the individual(s) shipping samples to the lab.

2. All regulated soil must be safeguarded through all storage/processing/ decontamination procedures in the authorized facility (and during the transfer from processing point to a detached room for sterilization if this method is used) until sterilized by one of the treatment methods specified (See #5 below). The same applies if the soil is to be transferred to another facility that is inspected and authorized by USDA-APHIS to receive soil. A list of facilities inspected by USDA-APHIS to receive foreign and interstate (domestic) soil samples can be accessed at: https://www.aphis.usda.gov/plant_health/apps/ifars.php.

3. Upon arrival at the authorized facility the regulated material will be stored at all times in secured containment until transferred or decontaminated. Each stored sample must be labeled as regulated material under USDA Permit. The secured containment must be used to store only regulated material or, if the secured containment area also houses unregulated material, the regulated material must be clearly segregated from the unregulated material as well as being appropriately labeled. A sign must be placed on the outside of the containment: "Contents: Foreign soil and/or regulated domestic soil to be handled in accordance with USDA-APHIS-PPQ Soil Permit and/or Compliance Agreement". As long as untreated regulated soil is present, the containment and all other affected area(s) of the facility must be restricted to access by authorized personnel only. Labeling must be sufficient to readily provide for recognition of the regulated material by emergency response personnel who have the potential to affect the security of the containment as a result of their activities. Permittee is encouraged to interact with local emergency response personnel to acquaint them with all pertinent information relative to the materials regulated under this CA and associated soil permit.

4. Shipping containers and other materials associated with the shipment must be decontaminated by one of the approved treatment methods for soil (see #5 below).

5. All soil residues must be dry-heated, incinerated, hydroclaved or autoclaved or any other procedure approved by the Deputy Administrator.

   A. For Dry Heat Treatment: use one of the following schedules:

   110-120.5 degrees C (230-249 F) for 16 hours
   121-154 degrees C (250-309 F) for 2 hours
   154.4-192.5 degrees C (310-379 F) for 30 minutes
   193-220 degrees C (380-429 F) for 4 minutes
   221-232 degrees C (430-450 F) for 2 minutes

   Soil must be spread evenly throughout the treatment chamber, and the soil depth cannot exceed 6 inches. The exposure period does not begin until the entire mass reaches treatment temperature, as verified by a calibrated temperature probe.

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B. Autoclave soil and other material using the following conditions:

i. Soil must be autoclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a **minimum** of 30 minutes at 15 psi.

ii. Autoclave tape or other indicators must be placed on each bag or sharps container prior to treatment. The autoclave tape or other indicator on each container must be checked to verify color change before disposal.

iii. The autoclave log must be completed by each user for each autoclave cycle. All parameters must be noted as listed on the log for each autoclave load.

iv. If the autoclave does not attain the minimum time and/or temperature or the autoclave tape does not change color, a notation must be made in the comment section of the autoclave log. The load must then be re-autoclaved after placing new tape on the material. If minimum time and temperature is not attained on the second cycle, the user must contact the person responsible for maintaining the unit to initiate repairs. Waste can also be transferred for treatment with a functional autoclave at another facility that is approved by USDA, in accordance with #5 under "Standard Conditions" above. Contact your local PPQ office.

v. Thermometers on the autoclave must be calibrated annually, and a written record must be maintained. This must be done by an authorized autoclave service company during routine servicing.

vi. Every 6 months, you must use a commercially available test indicator kit that uses bacterial spores Bacillus stearothermophilus that are rendered unviable at 250 degrees F or 121 degrees C. For the test, ampules of B. stearothermophilus are autoclaved along with a load of waste. Upon completion of the cycle, the ampules are incubated for 48 hours and then observed for any sign of growth, which indicates insufficient sterilization. If any growth is observed, you must have the autoclave serviced and retested.

C. Hydroclave soil and other material using the following conditions:

i. Soil must be hydroclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a minimum of 30 minutes, or at 132 degrees Centigrade (267 degrees Fahrenheit) for a minimum of 15 minutes.

ii. Hydroclaves vary; therefore, the manufacturer's recommendations for hydroclave usage and maintenance must be followed, and these instructions must be readily available for review by PPQ.

iii. The hydroclave log must be completed by each user for each hydroclave cycle. All parameters must be noted as listed on the log for each hydroclave load.

iv. Observe the temperature sensor to ensure that the hydroclave maintains its required temperature. If the required temperature is not attained, you must contact the person responsible for maintaining the unit to initiate repairs. In the interim, waste must be treated either by an

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alternate treatment method, or transferred for treatment to another PPQ inspected facility, in accordance with #5 under "Standard Conditions" above.

D. Incineration: With the exception of metal and glass containers, all regulated and associated material must be reduced completely to ash at the end of the incineration cycle.

E. Any other procedure approved by the Deputy Administrator.

6. All water residues (effluent) from the processing of soil samples must be boiled dry, as long as doing so is not a violation of EPA regulations or any other health and safety standard, or treated by an approved treatment/sterilization procedure, such as those listed in #5 above. If boiled dry, the vessel used to boil away the effluent must be treated as any other equipment or supplies that have contacted the soil (see #7 below), and any residue left in the vessel must be treated by an approved treatment/sterilization procedure (see #5 above).

7 Equipment and supplies used to conduct operations or that have contacted the soil must be decontaminated using one of the following methods:

(a) Material can be soaked in a fresh household bleach solution of 10 percent for at least 30 minutes
(b) Material can be soaked in a minimum of 70 percent ethanol
(c) Flamed with ethanol
(d) Treated with quaternary ammonium compounds.

Note that autoclave, hydroclave, incineration, and dry heat sterilization are also acceptable sterilization/decontamination methods.

8. When the laboratory has control over the collection of soil samples, they must inform the collectors that equipment and hand tools used for collecting soil samples in areas subject to Federal and/or State cooperative domestic plant quarantines must be thoroughly cleaned of all soil residues at the collection site.

9. In the event Permittee receives foreign soil or regulated domestic soil with a contaminant (e.g. heavy metals like lead, mercury etc.) that prevents the regulated soil from being decontaminated by dry heat, hydroclave or autoclave and requires a disposal site such as an incinerator or landfill (subject to all applicable local, state, and federal regulations) , such site must have a valid USDA, APHIS, PPQ Soil Permit and Compliance Agreement for foreign soil or a valid Compliance Agreement for regulated domestic soil, respectively. Prior written approval from the local USDA, APHIS, PPQ office is required before movement of the soil samples to an approved disposal site.

10. All unconsumed soil, containers and effluent are to be autoclaved, incinerated or properly sterilized by Permittee at the conclusion of the project as approved and prescribed by the CA and permit conditions.

11. Permittee must maintain a valid Soil Permit and/or Compliance Agreement for soil samples to be retained for permanent study or research collections. For continuous possession a soil permit can

Any person who knowingly violates the Plant Protection Act (PPA) (7U.S.C. §§ 7701 et. Seq.) and/or the Animal Health Protection Act (AHPA) (7U.S.C. §§ 8301 et. Seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, and one year prison term, or both. Additionally, any person violating the PPA and/or the AHPA may be assessed civil penalties of up to $300,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater.

be renewed by reapplying at least three months before the current permit expires. To reapply for permit, see **"Soil Permit application/renewal procedure and the transition to ePermits"** from the Supplemental information attachment.

12. [Delete this condition if not an applicable use] Untreated regulated soil may only be used as growing media under controlled laboratory conditions and in controlled access growth chambers where: 1) access to the regulated soil, lab, and growth chamber is limited to trained authorized personnel; 2) all soil can be contained and recovered for decontamination; 3) all effluent including irrigation discharge from the regulated soil can be contained, recovered, and decontaminated; 4) all contaminated surfaces (including tubing) can be decontaminated; and 5) all plants and plant litter are destroyed according to an approved treatment method. Restricted access and regulated status of the soil must be indicated by appropriate signage. Untreated regulated soil cannot be used as growing media in greenhouses, field trials, or in any release into the environment.

13. Exact records must be kept and made available upon each visit that USDA, APHIS, PPQ or the Missouri State Department of Agriculture makes to TestAmerica Laboratories regarding:

    (1) Date of arrival of each shipment,
    (2) Origin of the soil
    (3) Total amount of soil in each shipment
    (4) Date and amount of soil used for testing purposes
    (5) Date and amount of disposed soil and amount of any remainder
    (6) For transfers of foreign soil - date, amount of soil, and copies of permit and compliance agreement of other party.
    (7) For transfers of regulated domestic soil - date, amount of soil, and copy of compliance agreement of other party.

Standard Operating Procedure (SOP):

1. Permittee at TestAmerica Laboratories must prepare a standard operating procedure (SOP) demonstrating compliance with the USDA, APHIS PPQ regulations in terms of handling, storing, safeguarding, transporting, and disposing of foreign soil or effluent, regulated domestic soil or effluent, used shipping containers, equipment and other contact waste. The SOP must contain instructions regarding the cleanup of potential spillage of regulated soil, the subsequent decontamination of affected surfaces, and the sterilization of glassware and equipment. The SOP must be posted in areas where soil is stored and where soil is processed. The SOP may be required at the time of inspection.

2. Permittee at TestAmerica Laboratories must present a training program to all employees involved in the process of handling, storing, safeguarding, transporting, and disposing of the regulated soil in accordance with USDA APHIS PPQ regulations. Training must include policy/instructions detailed in the stipulations and conditions in your PPQ 330 soil permit, the compliance agreement, and the SOP; each employee must know where the SOP is posted. Training must be completed before employees are permitted access to the regulated soil in order to process, safeguard, treat, or dispose. All employees handling regulated soil must be trained annually. Records of all training

Any person who knowingly violates the Plant Protection Act (PPA) (7U.S.C. §§ 7701 et. Seq.) and/or the Animal Health Protection Act (AHPA) (7U.S.C. §§ 8301 et. Seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, and one year prison term, or both. Additionally, any person violating the PPA and/or the AHPA may be assessed civil penalties of up to $300,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater.

Initial/Date MJR 1/11/17

administered to employees (name and dates) shall be made available to USDA, APHIS, PPQ or Missouri State Regulatory personnel upon request.

3. Records relating to a sample must be retained and made available for inspection upon request by USDA-APHIS-PPQ and/or the MDA for a period of 3 years following the decontamination/sterilization or transfer to another permitted establishment/individual. Records related to training must be retained for 3 years from the date of the records.

4. With [his/her] signature, Permittee is responsible for compliance with all conditions on the Soil Permit and the Compliance Agreement. This also includes all personnel he/she directly supervises who may be involved with the regulated domestic and/or foreign soil. In the event Permittee is no longer working in this capacity for: TestAmerica Laboratories, 13715 Rider Trail North, Earth City, MO 63045, either Permittee or TestAmerica Laboratories must immediately notify USDA, APHIS, PPQ of this change.

Any person who knowingly violates the Plant Protection Act (PPA) (7U.S.C. §§ 7701 et. Seq.) and/or the Animal Health Protection Act (AHPA) (7U.S.C. §§ 8301 et. Seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, and one year prison term, or both. Additionally, any person violating the PPA and/or the AHPA may be assessed civil penalties of up to $300,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater.

Initial/Date MVE 1/11/17

Application Number P525-181219-001

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE

APPLICATION FOR PERMIT TO RECEIVE SOIL

NAME OF APPLICANT AND UNITED STATES ADDRESS OF RECEIVING FACILITY:

Name: Mr. Mike Ridenhower
Organization: TestAmerica Laboratories
Department:
Location Address: 13715 Rider Trail North
Earth City, MO 63045
Mailing Address: 13715 Rider Trail North
Earth City, MO 63045
Phone: 314-298-8566 Ext. 206
Alternate Phone:
FAX:
Email: mike.ridenhower@testamericainc.com
Alternate Email:

Hand Carry: No

REQUEST TYPE:
☐ New Permit ☐ Amendment ☒ Renewal Without Changes ☐ Renewal With Changes

Previous Permit Number: P330-14-00016

Quantity per Shipment and Treatment	Countries or Continents of Origin	Ports of Arrival / Plant Inspection Stations
Over 3 lbs - Your facility MUST be inspected and approved to receive this soil	Africa; Antarctica; Asia; Australia; Caribbean Islands ; Europe; North America; South America	AK, Anchorage; AL, Huntsville; AL, Mobile; AZ, Douglas; AZ, Lukeville; AZ, Naco; AZ, Nogales; AZ, Phoenix; AZ, San Luis; AZ, Tucson; CA, Calexico; CA, El Segundo; CA, Fresno; CA, Long Beach; CA, Oakland; CA, Ontario; CA, Otay Mesa; CA, Port Hueneme; CA, Sacramento; CA, San Diego; CA, San Francisco; CA, San Jose; CA, San Ysidro; CA, Tecate; CO, Denver; CT, Hartford; CT, New Haven; DE, Dover; DE, Wilmington; FL, Ft. Lauderdale; FL, Ft. Myers; FL, Ft. Pierce; FL, Jacksonville; FL, Key West; FL, Miami; FL, Miami (Cargo, DHL, Fed Ex, UPS, etc); FL, Orlando; FL, Pensacola; FL, Port Canaveral; FL, Port Everglades; FL, Sanford; FL, Tampa; FL, West Palm Beach; GA, Atlanta; GA, Savannah; GU, Agana; HI, Hilo; HI, Honolulu; HI, Kahului; HI, Kailua-Kona; HI, Lihue; ID, Eastport; IL, Chicago; IN, Indianapolis; KY, Louisville; MA, South Boston; MD, Baltimore; MD, Beltsville; ME, Bangor; ME, Calais; ME, Houlton; ME, Portland; MI, Detroit; MI, Port Huron; MI, Romulus; MI, Sault Saint Marie; MN, Duluth; MN, Grand Portage; MN, International Falls; MN, Minneapolis; MO, Kansas City; MO, St. Louis; MP, Commonwealth of the Northern Mariana Islands; MS, Gulfport; MS, Port Bienville; MT, Raymond; MT, Roosville; MT, Sweetgrass; NC, Raleigh; NC, Wilmington; ND, Dunseith; ND, Pembina; ND, Portal; NJ, Linden; NM, Albuquerque; NM, Columbus; NM, Santa Teresa; NV, Las Vegas; NY, Albany; NY, Alexandria Bay; NY, Brooklyn; NY, Buffalo; NY, Champlain, Rouses Point; NY, Jamaica; NY, Jamaica; NY, Newburgh; OH, Ashtabula; OH, Cincinnati; OH, Cleveland; OH, Columbus; OH, Toledo; OH, Wilmington; OK, Oklahoma City; OR, Portland; PA, Allentown; PA, Harrisburg; PA, Philadelphia; PA, Pittsburgh; PA, Scranton; PR, Aguadilla; PR, Carolina; PR, Fajardo; PR, Mayaguez; PR, Ponce; RI, Warwick/Providence; SC, Charleston; TN, Memphis; TN, Nashville; TX, Austin; TX, Brownsville; TX, Corpus Christi; TX, Dallas; TX, Del Rio; TX, Eagle Pass; TX, El Paso; TX, Fabens; TX, Falcon; TX, Fort Hancock; TX, Galveston; TX, Hidalgo; TX, Humble; TX, Laredo; TX, Los Indios; TX, Pharr; TX, Port Arthur; TX, Presidio; TX, Progresso; TX, Rio Grande City; TX, Roma; TX, San Antonio; TX, Victoria; UT, Salt Lake City; VA, Dulles; VA, Norfolk; VI, St. Croix; VI, St. Thomas; VT, Berlin; WA, Blaine; WA, Oroville; WA, Port Angeles; WA, SeaTac; WA, Sumas; WI, Green Bay; WI, Milwaukee

Intended Use	Description
Chemical or physical analysis	

Proposed Method of Sterilization
Incineration

Will the soil from the receiving facility be moved without sterilization?	No
Explanation:	

ATTACHMENTS

ST-HS-0006 Rev 4.pdf
ST-HS-0006 Rev_6.pdf
ST-HS-0006_Rev_7.pdf

PPQ FORM 525A
WARNING: Any alteration, forgery or unauthorized use of this document is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

SIGNATURE OF APPLICANT

DATE

Dec 19, 2016

PPQ FORM 525A
WARNING. Any alteration, forgery or unauthorized use of this document is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 280-150116-1

Login Number: 150116
List Number: 4
Creator: Dubicki, Adam L

List Source: Eurofins TestAmerica, Denver

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 280-150116-1

Login Number: 150116
List Number: 5
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 06/25/21 12:03 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)
280-150116-1	4FR-145-001	85.7
280-150116-1 DU	4FR-145-001	86.6
280-150116-2	4FR-145-002	87.1
280-150116-3	4FR-64-001	80.4
280-150116-4	4FR-64-002	73.1
280-150116-5	4FR-128-001	87.7
280-150116-6	4FR-76-001	83.4
280-150116-7	4FR-144-001	82.3
LCS 160-516779/2-A	Lab Control Sample	82.8
MB 160-516779/1-A	Method Blank	85.6

Tracer/Carrier Legend

Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Th-229 (30-110)
280-150116-1	4FR-145-001	81.7
280-150116-1 DU	4FR-145-001	86.6
280-150116-2	4FR-145-002	81.8
280-150116-3	4FR-64-001	62.4
280-150116-4	4FR-64-002	47.8
280-150116-5	4FR-128-001	86.7
280-150116-6	4FR-76-001	57.5
280-150116-7	4FR-144-001	72.8
LCS 160-516784/2-A	Lab Control Sample	88.3
MB 160-516784/1-A	Method Blank	77.8

Tracer/Carrier Legend

Th-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	U-232 (30-110)
280-150116-1	4FR-145-001	108
280-150116-2	4FR-145-002	104
280-150116-3	4FR-64-001	99.0
280-150116-4	4FR-64-002	86.3
280-150116-5	4FR-128-001	99.4
280-150116-6	4FR-76-001	90.5
280-150116-7	4FR-144-001	102
LCS 160-516575/2-A	Lab Control Sample	81.3
MB 160-516575/1-A	Method Blank	84.1

Tracer/Carrier Legend

U-232 = Uranium-232

Tracer/Carrier Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Sr (40-110)
280-150116-1	4FR-145-001	85.7
280-150116-1 DU	4FR-145-001	78.5
280-150116-2	4FR-145-002	87.2
280-150116-3	4FR-64-001	78.3
280-150116-3 DU	4FR-64-001	57.8
280-150116-4	4FR-64-002	73.0
280-150116-5	4FR-128-001	75.9
280-150116-6	4FR-76-001	48.3
280-150116-7	4FR-144-001	84.2
LCS 160-517066/1-A	Lab Control Sample	85.3
LCS 160-517737/1-A	Lab Control Sample	82.9
MB 160-517066/10-A	Method Blank	88.2
MB 160-517737/5-A	Method Blank	77.2

Tracer/Carrier Legend

Sr = Sr Carrier

Method: TC-02-RC - Technetium-99 (LSC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Re (30-110)
280-150116-1	4FR-145-001	98.8
280-150116-1 DU	4FR-145-001	96.9
280-150116-2	4FR-145-002	99.2
280-150116-3	4FR-64-001	98.8
280-150116-4	4FR-64-002	103
280-150116-5	4FR-128-001	99.2
280-150116-6	4FR-76-001	98.8
280-150116-7	4FR-144-001	82.5
LCS 160-516763/2-A	Lab Control Sample	98.1
MB 160-516763/1-A	Method Blank	96.3

Tracer/Carrier Legend

Re = Re

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Denver
4955 Yarrow Street
Arvada, CO 80002
Tel: (303)736-0100

Laboratory Job ID: 280-150116-2
Client Project/Site: NUSTL Decommissioning

For:
EA Engineering, Science, and Technology
225 Schilling Circle
Suite 400
Hunt Valley, Maryland 21031

Attn: Tara Lamond

Elizabeth M. Hoerchler

Authorized for release by:
8/9/2021 6:24:41 PM
Elizabeth Hoerchler, Project Manager I
Elizabeth.Hoerchler@Eurofinset.com

Designee for

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 280-150116-2

Laboratory: Eurofins TestAmerica, Denver

Narrative

CASE NARRATIVE

Client: EA Engineering, Science, and Technology

Project: NUSTL Decommissioning

Report Number: 280-150116-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 06/23/2021; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 2.1 C.

NICKEL63

Samples 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001 (280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6) and 4FR-144-001 (280-150116-7) were analyzed for Nickel 59/63 in accordance with STL-RC-0055. The samples were leached on 06/25/2021, prepared on 08/02/2021 and analyzed on 08/05/2021.

The following samples did not meet the requested limit (RL) due to a reduced sample volume, which can be attributed to the presence of matrix interferences noted during the initial preparation: 4FR-145-001 (280-150116-1), 4FR-145-002 (280-150116-2), 4FR-64-001

Job ID: 280-150116-2 (Continued)

Laboratory: Eurofins TestAmerica, Denver (Continued)

(280-150116-3), 4FR-64-002 (280-150116-4), 4FR-128-001 (280-150116-5), 4FR-76-001 (280-150116-6), 4FR-144-001 (280-150116-7), (LCS 160-521022/2-A), (MB 160-521022/1-A) and (280-150116-A-2-R DU). The data have been reported with this narrative.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Method	Method Description	Protocol	Laboratory
ST-RC-0055	Nickel-59/Nickel-63 (LSC)	TAL-STL	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Ext_Chrom_LSC	Preparation, Extraction Chromatography	None	TAL SL

Protocol References:

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-150116-1	4FR-145-001	Solid	06/22/21 08:24	06/23/21 10:30
280-150116-2	4FR-145-002	Solid	06/22/21 08:26	06/23/21 10:30
280-150116-3	4FR-64-001	Solid	06/22/21 08:41	06/23/21 10:30
280-150116-4	4FR-64-002	Solid	06/22/21 08:43	06/23/21 10:30
280-150116-5	4FR-128-001	Solid	06/22/21 09:11	06/23/21 10:30
280-150116-6	4FR-76-001	Solid	06/22/21 09:25	06/23/21 10:30
280-150116-7	4FR-144-001	Solid	06/22/21 09:29	06/23/21 10:30

Method: ST-RC-0055 - Nickel-59/Nickel-63 (LSC)

Client Sample ID: 4FR-145-001
Date Collected: 06/22/21 08:24
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-1
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	3.34	U	4.58	4.59	5.00	7.74	pCi/g	08/02/21 14:23	08/05/21 11:49	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*64.7*		*40 - 110*	*08/02/21 14:23*	*08/05/21 11:49*	*1*

Client Sample ID: 4FR-145-002
Date Collected: 06/22/21 08:26
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-2
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	4.50	U	4.23	4.25	5.00	7.03	pCi/g	08/02/21 14:23	08/05/21 12:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*71.9*		*40 - 110*	*08/02/21 14:23*	*08/05/21 12:56*	*1*

Client Sample ID: 4FR-64-001
Date Collected: 06/22/21 08:41
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-3
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	9.64	U	6.12	6.20	5.00	9.86	pCi/g	08/02/21 14:23	08/05/21 15:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*50.3*		*40 - 110*	*08/02/21 14:23*	*08/05/21 15:10*	*1*

Client Sample ID: 4FR-64-002
Date Collected: 06/22/21 08:43
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-4
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	7.31	U	5.59	5.64	5.00	9.21	pCi/g	08/02/21 14:23	08/05/21 16:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*54.5*		*40 - 110*	*08/02/21 14:23*	*08/05/21 16:16*	*1*

Client Sample ID: 4FR-128-001
Date Collected: 06/22/21 09:11
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-5
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	6.35	U	6.39	6.43	5.00	10.6	pCi/g	08/02/21 14:23	08/05/21 17:23	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*46.3*		*40 - 110*	*08/02/21 14:23*	*08/05/21 17:23*	*1*

Method: ST-RC-0055 - Nickel-59/Nickel-63 (LSC)

Client Sample ID: 4FR-76-001
Date Collected: 06/22/21 09:25
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-6
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	8.44	U	5.53	5.60	5.00	8.96	pCi/g	08/02/21 14:23	08/05/21 18:30	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*57.1*		*40 - 110*	*08/02/21 14:23*	*08/05/21 18:30*	*1*

Client Sample ID: 4FR-144-001
Date Collected: 06/22/21 09:29
Date Received: 06/23/21 10:30

Lab Sample ID: 280-150116-7
Matrix: Solid

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	5.53	U	5.14	5.17	5.00	8.47	pCi/g	08/02/21 14:23	08/05/21 19:37	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*56.4*		*40 - 110*	*08/02/21 14:23*	*08/05/21 19:37*	*1*

Method: ST-RC-0055 - Nickel-59/Nickel-63 (LSC)

Lab Sample ID: MB 160-521022/1-A
Matrix: Solid
Analysis Batch: 521470

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 521022

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	Prepared	Analyzed	Dil Fac
Nickel-63	4.739	U	3.22	3.26	5.00	5.24	pCi/g	08/02/21 14:23	08/05/21 09:35	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ni Carrier	*97.5*		*40 - 110*	*08/02/21 14:23*	*08/05/21 09:35*	*1*

Lab Sample ID: LCS 160-521022/2-A
Matrix: Solid
Analysis Batch: 521470

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 521022

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit	%Rec	%Rec. Limits		
Nickel-63			86.2	78.56		10.0	5.00	5.08	pCi/g	91	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ni Carrier	*98.9*		*40 - 110*

Lab Sample ID: 280-150116-2 DU
Matrix: Solid
Analysis Batch: 521470

Client Sample ID: 4FR-145-002
Prep Type: Total/NA
Prep Batch: 521022

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	MDC	Unit			RER	RER Limit
Nickel-63	4.50	U		3.648	U	5.88	5.00	9.91	pCi/g			0.08	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ni Carrier	*48.6*		*40 - 110*

Rad

Leach Batch: 516020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Dry and Grind	
280-150116-2	4FR-145-002	Total/NA	Solid	Dry and Grind	
280-150116-3	4FR-64-001	Total/NA	Solid	Dry and Grind	
280-150116-4	4FR-64-002	Total/NA	Solid	Dry and Grind	
280-150116-5	4FR-128-001	Total/NA	Solid	Dry and Grind	
280-150116-6	4FR-76-001	Total/NA	Solid	Dry and Grind	
280-150116-7	4FR-144-001	Total/NA	Solid	Dry and Grind	
280-150116-2 DU	4FR-145-002	Total/NA	Solid	Dry and Grind	

Prep Batch: 521022

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-150116-1	4FR-145-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-2	4FR-145-002	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-3	4FR-64-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-4	4FR-64-002	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-5	4FR-128-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-6	4FR-76-001	Total/NA	Solid	Ext_Chrom_LSC	516020
280-150116-7	4FR-144-001	Total/NA	Solid	Ext_Chrom_LSC	516020
MB 160-521022/1-A	Method Blank	Total/NA	Solid	Ext_Chrom_LSC	
LCS 160-521022/2-A	Lab Control Sample	Total/NA	Solid	Ext_Chrom_LSC	
280-150116-2 DU	4FR-145-002	Total/NA	Solid	Ext_Chrom_LSC	516020

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Client Sample ID: 4FR-145-001

Lab Sample ID: 280-150116-1

Date Collected: 06/22/21 08:24

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2267 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 11:49	JLP	TAL SL

Client Sample ID: 4FR-145-002

Lab Sample ID: 280-150116-2

Date Collected: 06/22/21 08:26

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2256 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 12:56	JLP	TAL SL

Client Sample ID: 4FR-64-001

Lab Sample ID: 280-150116-3

Date Collected: 06/22/21 08:41

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2277 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 15:10	JLP	TAL SL

Client Sample ID: 4FR-64-002

Lab Sample ID: 280-150116-4

Date Collected: 06/22/21 08:43

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2332 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 16:16	JLP	TAL SL

Client Sample ID: 4FR-128-001

Lab Sample ID: 280-150116-5

Date Collected: 06/22/21 09:11

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2260 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 17:23	JLP	TAL SL

Lab Chronicle

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Client Sample ID: 4FR-76-001

Lab Sample ID: 280-150116-6

Date Collected: 06/22/21 09:25

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2233 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 18:30	JLP	TAL SL

Client Sample ID: 4FR-144-001

Lab Sample ID: 280-150116-7

Date Collected: 06/22/21 09:29

Matrix: Solid

Date Received: 06/23/21 10:30

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Leach	Dry and Grind			1.0 g	1.0 g	516020	06/25/21 13:44	LAM	TAL SL
Total/NA	Prep	Ext_Chrom_LSC			0.2312 g	1.0 g	521022	08/02/21 14:23	LAR	TAL SL
Total/NA	Analysis	ST-RC-0055		1			521470	08/05/21 19:37	JLP	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: EA Engineering, Science, and Technology
Job ID: 280-150116-2
Project/Site: NUSTL Decommissioning

Laboratory: Eurofins TestAmerica, St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
New York	NELAP	11616	04-01-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
ST-RC-0055	Ext_Chrom_LSC	Solid	Nickel-63

TestAmerica Denver
4955 Yarrow Street

Arvada, CO 80002
phone 303.736.0100 fax

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☒ RCRA ☒ Other: NRC

Client Contact	**Project Manager:** Amy Sponaugle	**Site Contact:** Rachel Giampa	**Date:** 6/22/2021	COC No:
EA Engineering, P.C. (and affiliate EA Science and Technology)	**Tel/Fax:** 410-329-5103	**Lab Contact:** Samantha Saalfield	**Carrier:** UPS	1 of 1 COCs
Address: 400 Schilling Circle, Suite 400	**Analysis Turnaround Time**			**Sampler:** RG/AN/DR
Hunt Valley, MD 21031	☐ CALENDAR DAYS ☒ WORKING DAYS			**For Lab Use Only:**
Phone: 410-527-2491	TAT if different from Below 10 business days			Walk-in Client:
FAX: 410-771-1625	☐ 2 weeks			Lab Sampling:
Project Name: NUSTL Decommissioning	☐ 1 week			
Site: 201 Varick St. - Characterization Sampling	☐ 2 days			Job / SDG No.:
PO #: [redacted] 22309	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	GA_01_R - Gamma Spec (Cs-137, Ra-226, U-235, U-238, Th-232 plus detects)	A-01-R - Isotopic Uranium	A-01-R - Isotopic Thorium	A-01-R - Isotopic Plutonium	ST-RC-0055 - Nickel 63	SR-03-RC - Stronium 89/90	TC-02-RC - Technetium 99	900.0 - Gross Alpha & Beta Radioa	8260C - TCL VOCs (GC/MS)	7471B - Mercury (CVAA)	6010C - Metals (ICP)	8260C - TCLP VOCs (Regulatory L	7470A - TCLP Mercury	6010C - TCLP RCRA Metals			Sample Specific Notes:
4FR-145-001	6/22/2021	0824	C	Soil / Sed.	5	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-145-002	6/22/2021	0826	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-64-001	6/22/2021	0841	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-64-002	6/22/2021	0843	C	Soil / Sed.	4	N	N	X	X	X	X	X	X	X		X	X	X	X	X	X			
4FR-128-001	6/22/2021	0911	C	Soil / Sed.	2	N	N		X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 analysis if not enough
4FR-76-001	6/22/2021	0925	C	Soil / Sed.	2	N	N		X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 analysis if not enough
4FR-144-001	6/22/2021	0929	C	Soil / Sed.	2	N	N	X*	X	X	X	X*	X	X			X							Insufficient volume - After analysis for 7471B, run remaining for rad. *Remove Ni-63 & gamma spec analyses if not enough volume
Air Sample-001	6/22/2021	0900	C	Wipe	1			X							X									

Preservation Used: 1= Ice, 2= HCl; 3= H_2SO_4; 4=HNO_3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | **Custody Seal No.:** QEC | Cooler Temp. (°C): Obs'd: 1.5 Corr'd: 2.1 Therm ID No.: 12

Relinquished by:	Company: EA Engineering	Date/Time: 6/22/21 1148	Received by:	Company: ETA/DEN	Date/Time: 6/23/21 1030
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 4.3, dated 12/05/2013

280-150116 Waybill

RACHEL GIAMPA
410-584-7000 5229
EA ENG SCIENCE TECH
225 SCHILLING CIRCLE
HUNT VALLEY MD 21031

50 LBS

1 OF 1

SHIP TO:
303-736-0100
TESTAMERICA DENVER
4955 YARROW STREET
ARVADA CO 80002-4517

CO 802 9-30

UPS NEXT DAY AIR

TRACKING #: 1Z 288 682 NT 9618 6036

1

BILLING: P/P
ATTENTION UPS DRIVER: SHIPPER RELEASE

Department Code: 2126
Project Phase AND Task: 6292233.007

TM

PrintWindow... 6/22/2021

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 280-150116-2

Login Number: 150116
List Number: 4
Creator: Dubicki, Adam L

List Source: Eurofins TestAmerica, Denver

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: EA Engineering, Science, and Technology

Job Number: 280-150116-2

Login Number: 150116
List Number: 5
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 06/25/21 12:03 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: EA Engineering, Science, and Technology
Project/Site: NUSTL Decommissioning

Job ID: 280-150116-2

Method: ST-RC-0055 - Nickel-59/Nickel-63 (LSC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ni
Lab Sample ID	Client Sample ID	(40-110)
280-150116-1	4FR-145-001	64.7
280-150116-2	4FR-145-002	71.9
280-150116-2 DU	4FR-145-002	48.6
280-150116-3	4FR-64-001	50.3
280-150116-4	4FR-64-002	54.5
280-150116-5	4FR-128-001	46.3
280-150116-6	4FR-76-001	57.1
280-150116-7	4FR-144-001	56.4
LCS 160-521022/2-A	Lab Control Sample	98.9
MB 160-521022/1-A	Method Blank	97.5

Tracer/Carrier Legend

Ni = Ni Carrier

ATTACHMENT E

Quality Control Records – Radiological Instrumentation

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EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 7008
P.O.# 10-0260

Description of Standard:

Model No. DNS-12 Serial No. 7104-10 Isotope Tc-99

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi beta emission rate was measured using an internal gas flow proportional chamber. Absolute counting of beta particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated beta source S/N 75323-201.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

7,760 ± 388

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

12,400 ± 621 (0.00559 μCi)

The uncertainty of the measurement is 5 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by:

Calibration Technician: Art Reust Q.A. Manager: Charlotte McCuistion

Calibration Date: 6-21-2010 Reviewed Date: 6/22/10

Source Manufacturing Lab
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 761-5413 Fax (505) 761-5416
areust@eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 7008
P.O.# 10-0260

Description of Standard:

Model No. DNS-11 Serial No. 7103-10 Isotope Th-230

Electroplated on polished SS disc, 0.79 mm thick.

Total diameter of 4.77 cm and an active diameter of 4.45 cm.

The radioactive material is permanently fixed to the disc by heat treatment without any covering over the active surface.

Measurement Method:

The 2pi alpha emission rate was measured using an internal gas flow proportional chamber. Absolute counting of alpha particles emitted in the hemisphere above the active surface was verified by counting above, below, and at the operative voltage. The calibration is traceable to NIST by reference to an NIST calibrated alpha source S/N 75322-201

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was:

7,900 ± 237

The total disintegration rate (dpm) assuming 1.5% backscatter of alpha particles from the surface of the disc, was:

15,600 ± 467 (0.00701 μCi)

The uncertainty of the measurement is 3 %, which is the sum of random counting error at the 99% confidence level, and the estimated upper limit of systematic error in this measurement.

Calibrated by: ART REUST Reviewed by:

Calibration Technician: Q.A. Manager:

Calibration Date: 6-16-2010 Reviewed Date: 6/22/10

Source Manufacturing Lab
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 761-5413 Fax (505) 761-5416
areust@eberlineservices.com

Eckert & Ziegler
Isotope Products

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

CERTIFICATE OF CALIBRATION
GAMMA STANDARD SOURCE

Radionuclide:	Co-60	**Customer:**	CABRERA SERVICES, INC.
Half-life:	5.272 ± 0.001 years	**P.O. No.:**	12-0217
Catalog No.:	GF-060-D	**Reference Date:**	15-May-12 12:00 PST
Source No.:	1592-30-6	**Contained Radioactivity:**	1.047 **µCi** 38.74 **kBq**

Physical Description:

A. Capsule type:	D (25.4 mm OD x 6.35 mm THK)
B. Nature of active deposit:	Evaporated metallic salt
C. Active diameter/volume:	5 mm
D. Backing:	Epoxy
E. Cover:	Acrylic

Radioimpurities:

None detected

Method of Calibration:

This source was assayed using gamma ray spectrometry.

Peak energy used for integration:	1173, 1333 keV
Branching ratio used:	0.9986, 0.9998 gammas per decay

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.5 %
B. Type B (systematic) uncertainty:	± 3.0 %
C. Uncertainty in aliquot weighing:	± 0.0 %
D. Total uncertainty at the 99% confidence level:	± 3.0 %

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from IAEA-TECDOC-619, 1991.
- This source has a working life of 5 years.

Daniel James Van Deusen — Quality Control

16-Apr-12 — Date

EZIP Ref. No.: 1592-30

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA A2LA ACCREDITED CERT # 4084.01

Customer ENVIRONMENTAL RESTORATION GRP ORDER NO. 20393357/504172

Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 168040

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR179861

Cal. Date 10-Feb-21 Cal Due Date 10-Feb-22 Cal. Interval 1 Year Meterface 202-855

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 25 % Alt 707.0 mm Hg

☐ New Instrument Instrument Received ☐ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☑ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☑ Geotropism
☑ Audio ck. ☑ Alarm Setting ck. ☑ Batt. ck. ☐ RS-232 Port OK

☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set 775 V

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1500 / 1503 V

Firmware Version: 39010n 24
Alpha Threshold: 120 mV
Beta Threshold: 3.5 mV
Beta Window: 30 mV
Overload Set to Simulate light leak
Instrument calibrated with a 39" cable.
High voltage set with detector NOT CONNECTED

(EEPROM Settings)
User Time: 0.1
Alpha Alarm: 999999
Beta Alarm: 999999
A/B Alarm: 999999
Model 2360 Date: 02/10/2021
Calibration Date Due: 02/10/2022

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
X 1000	400 Kcpm	N/A	400
X 1000	100 Kcpm		99
X 100	40 Kcpm		400
X 100	10 Kcpm		99
X 10	4 Kcpm		400
X 10	1 Kcpm		99
X 1	400 cpm		400
X 1	100 cpm		99

Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
Digital Readout	400 K cpm	N/A	40007 (9)
	40 K cpm		4000
	4 K cpm		400
	400 cpm		40
	40 cpm		4

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
Log Scale			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013

ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☑ Alpha S/N P239: 2928 ☑ Beta S/N Tc99: 5279 ☐ Other

☑ m 500 S/N 315137 ☐ Oscilloscope S/N ☑ Multimeter S/N 92780460

Calibrator Josie Ruiz Josie Ruiz Title Technician Date 10 feb 21

QC'd By Title Final QC Date 10 Feb 21

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

www.ludlums.com

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

Bench Test Data For Detector

Customer ENVIRONMENTAL RESTORATION GRP ORDER NO. 20393357/504172

Detector 43-93 Serial No. PR179861

Counter 2360 Serial No. 168040

Count Time 1Minute

Other

Alpha Input Sensitivity 120 mV

Beta Input Sensitivity 3.5 mV

Beta Window 30 mV

Distance Source to Detector Surface

High Voltage	Background		Isotope Pu 239 Size 25.2 kdpm		Isotope Tc 99 Size 28.8 kdpm		Isotope Sr/90 Size 29028 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
725	0	115	4826	350	7	4054	0	5364
750	1	152	5427	403	7	5377	1	6329
✓775	1	247	5524	466	7	6384	0	7354
800	0	255	5769	581	6	7153	0	7916
825	0	331	5751	785	8	8195	3	7746

☐ Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.

☐ Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Josie Ruiz Josie Ruiz Date 10 feb 21

• *Serving The Nuclear Industry Since 1962* •

Certificate of Calibration

Personnel Air Sampler Calibration Form

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite #150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Manufacturer: MSA Model Number: Escort ELF Lapel Air Sampler Serial Number: 16366

Temperature: 75 °F Relative Humidity: 20 % Barometric Pressure: 24.54 in. Hg

Single point calibration at two different flow rates. Actual flow rate is expressed as average of six tests. Sampler flow rate adjusted to match average.

Digital Flow Run Number	Test 1 (2000 cc/min)	Test 2 (3000 cc/min)
1	2050	2976
2	2101	2988
3	2048	2970
4	2040	2947
5	2031	2919
6	2087	2947
Average:	2059.5	2957.8
Adjustment Set:	☑	☑

Flow Fault Check: ☑

Final Flow Setting: 2.5 LPM

Comments: Comments:

Reference Instrument:

Air Flow Calibrator: ☑ MSA DIGICAL Calibrator sn: 020158 ☐ A.P. Buck mini-Buck Calibrator sn: 053058

Calibrated By: [signature] Calibration Date: 6-2-21

Reviewed By: [signature] Review Date: 06-02-21

ERG Form ITC. 106.B

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323C-2009

Certificate of Calibration

Personnel Air Sampler Calibration Form

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite #150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Manufacturer: MSA Model Number: Escort ELF Lapel Air Sampler Serial Number: A3-48593

Temperature: 75 °F Relative Humidity: 20 % Barometric Pressure: 24.54 in. Hg

Single point calibration at two different flow rates. Actual flow rate is expressed as average of six tests. Sampler flow rate adjusted to match average.

Digital Flow Run Number	Test 1 (2000 cc/min)	Test 2 (3000 cc/min)
1	2045	3035
2	2005	3005
3	1856	2848
4	2010	2864
5	1986	3029
6	1992	2843
Average:	1982.3	2937.3
Adjustment Set:	☑	☑

Flow Fault Check: ☑

Final Flow Setting: 2.5 LPM

Comments: Comments:

Reference Instrument:

Air Flow Calibrator: ☑ MSA DIGICAL Calibrator sn: 020158 ☐ A.P. Buck mini-Buck Calibrator sn: 053058

Calibrated By: [signature] Calibration Date: 6-2-21

Reviewed By: [signature] Review Date: 06-02-21

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323C-2009

F&J SPECIALTY PRODUCTS, INC.

PO Box 2888
Ocala, Florida 34478-2888
Tel: (352) 680-1177 • (352) 680-1178
Fax: (352) 680-1454
Email: fandj@fjspecialty.com Internet: www.fjspecialty.com
The Nucleus of Quality Air Monitoring Programs

Quality Control Procedure
STP Flow Rate Vs. Indicated Flow Rate

General Information

Serial Number: 004679

PO #: LV-1D

Calibration Type: New Unit

Customer: Environmental Restoration Group

QA Manual: Company Quality Manual, Rev. 7, 01/08/2009

1. **A. Test Facility :** F&J Calibration Lab

   B. Elevation : Sea Level

   C. Date of Test : 5/13/2021

   D. Atmospheric Pressure : 29.9 **Reference Pressure :** 29.92 **"Hg**

   E. Inlet Temperature to System : 74.1 **Reference Temperature :** 70 **Degrees F**

   F. Digital Venturi Calibrator :

   (A) Manufacturer : F&J SPECIALTY PRODUCTS, INC.
   (B) Model # : WCMT-VFD-4
   (C) Serial # : 20043

   G. Air Sampler System Model LV-1D

Motor Serial No. : 1119309449

(1) Air Sampler Observed Flow Rate LPM	(2) Temp. & Pressure Correction	Air Sampler STP Flow Rate (1) x (2)	Digital Calibrator STP Flow Rate
100.00	0.8884	88.84	89.80
80.00	0.9253	74.02	74.50
60.00	0.9525	57.15	58.70
40.00	0.9729	38.92	39.70

*** **The AVERAGE PERCENT DEVIATION ACROSS THE RANGE IS :** 1.58

The Reference Flow Meter Device bears letters of certification traceable to the National Institute of Standards and Technology(NIST).

FLOW RATE vs. INDICATED FLOW RATE
QUALITY CONTROL PROCEDURE FJ-1

Model # : LV-1D **Serial #:** 004679 **Customer:** Environmental Restoration Group

New Unit

II. TEST DATA

Filters Utilized:

Particulate: FP47M

Charcoal / Silver Zeolite: None

(1) Flow Indicated on Rotometer (LPM)	(2) Atmospheric Pressure (in. Hg)	(3) Inlet Temperature (Degrees F)	(4) Gauge Pressure (in. Hg)	(5) Temperature and Pressure Correction	(6) Calculated Flow (1) X (5) (SLPM)	(7) Digital Calibrator STP Flow (SLPM)	(8) Percent Deviation ((7) - (6))/(7) (%)
100	29.9	74.1000	6.1005	0.8884	88.84	89.80	1.06
80	29.9	74.1000	4.0866	0.9253	74.02	74.50	0.64
60	29.9	74.1000	2.5431	0.9525	57.15	58.70	2.64
40	29.9	74.1000	1.3598	0.9729	38.92	39.70	1.97

(5) Temperature and Pressure Correction = Sqr((((2) - (4)) / 29.92) * (530 / (460 + (3))))

Average Deviation: 1.58

Performed by: Jai Soussan

Date: 5/13/2021

Reference Pressure : 29.92 "Hg

Reference Temperature : 70 **Degrees F**

Inspected by: Dean Peterson

Date: 05/13/2021

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Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA ACCREDITED CERT # 4084.01

Customer CABRERA SERVICES INC ORDER NO. 20392433/503535

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 218266

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR229628

Cal. Date 27-Jan-21 Cal Due Date 27-Jan-22 Cal. Interval 1 Year Meterface 202-608

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 35 % Alt 706.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck.
☐ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set 900 V Input Sens. 28 mV Det. Oper. 900 V at 28 mV Threshold Dial Ratio = mV

☐ HV Readout (2 points) Ref./Inst. / V Ref./Inst. / V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
X100	150 mR/hr	1.5	1.5
X100	50 mR/hr	0.55	0.55
X10	15 mR/hr	1.5	1.5
X10	5 mR/hr	0.5	0.5
X1	1.5 mR/hr=4910cpm	1.5	1.5
X1	1.0 mR/hr	1.0	1.0
X.1	491 cpm	1.5	1.5
X.1	163 cpm	0.5	0.5

X0.1 **Range(s) Calibrated Electronically**

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013
ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☑ G112 ☑ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982 ☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 238275 ☐ Oscilloscope S/N ☑ Multimeter S/N 70602489

Calibrator Duaine Jackson Duaine Jackson Title Calibrator Date 27JAN21

QC'd By Title Final QC Date 27 Jan 21

This certificate shall not be reproduced except in full without the written approval of Ludlum Measurements, Inc.

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite #150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter/Detector: Manufacturer: Ludlum Model Number: 2929 & 43-10-1 Serial Number: 271413 & PR291575

- [x] Mechanical Check
- [ ] F/S Response Check
- [ ] Geotropism
- [ ] Meter Zeroed
- [x] THR/WIN Operation
- [ ] Reset Check
- [x] Audio Check
- [ ] Battery Check

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [x] 39-inch [ ] 72-inch [ ] Other:

Source Distance: [ ] Contact [ ] 6 inches [x] Other: In Planchet

Source Geometry: [ ] Side [ ] Below [x] Other: In Planchet

Alpha Threshold: 175 mV Beta Threshold: 4 mV Beta Window: 50 mV

Barometric Pressure: 24.6 inches Hg Temperature: 74 °F Relative Humidity: 20 %

Pulser: Ludlum 500-1 sn 347243 Multimeter: n/a

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	Integrated 1-Min. Count "As Found" α	Integrated 1-Min. Count "As Found" β	Integrated 1-Min. Count "Reading" α	Integrated 1-Min. Count "Reading" β
x 1000	400 Kcpm	397939	397956	397939	397956
x 100	40 Kcpm	39796	39797	39796	39797
x 10	4 Kcpm	3980	3980	3980	3980
x 1	400 cpm	398	396	398	396

Count Time (min) 1.0

High Voltage	Pot. Setting	Background Counts α	Background Counts β	Alpha Source Counts Gross α	Alpha Source Counts Gross β	Alpha Source Counts Net α	Alpha Source Counts Net β	Beta Source Counts Gross α	Beta Source Counts Gross β	Beta Source Counts Net α	Beta Source Counts Net β	Other Source Counts Gross α	Other Source Counts Gross β	Other Source Counts Net α	Other Source Counts Net β
550	2.40	0	14	1683	594	1683	580	2	1159	2	1145				
600	2.60	1	47	3349	383	3348	336	2	2594	1	2547				
650	2.80	1	50	4070	378	4069	328	5	3557	4	3507				
700	3.00	4	100	4494	488	4490	388	4	4380	0	4280				

Recommended HV (VDC) 650 Pot. Setting 2.80

Additional Comments:

Alpha Source: Th-230 sn:4098-03 12,800dpm/6,520cpm (1/4/12) 47mm disk Total Efficiency: 0.156 4π Efficiency: 0.318

Beta Source: Tc-99 sn:4099-03 17,700dpm/11,100cpm (1/4/12) 47mm disk Total Efficiency: 0.079 4π Efficiency: 0.198

Other Source: Total Efficiency: n/a 4π Efficiency: n/a

NOTE: The total efficiency provided is calculated per ISO-7503/NUREG 1575 (MARSSIM): Total Efficiency = Instrument Efficiency × Source Efficiency; where Instrument Efficiency is calculated as net counts ÷ source 2π emission rate. The 4π efficiency is calculated as net counts ÷ source 4π activity. The provided efficiencies are radionuclide specific and are calculated using source counts and background counts at the recommended operating HV. The provided efficiencies are for general information purposes only and are not intended to replace user efficiency calculation method or results.

Calibrated By: Calibration Date 6/14/21 Calibration Due: 6/14/22

Reviewed By: Date: 06-14-21

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ilac-MRA A2LA ACCREDITED CERT # 4084.01

Customer CABRERA SERVICES INC ORDER NO. 20392433/503535

Mfg. Thermo Model MICRO REM Serial No. 1844

Model Serial No.

Cal. Date 27-Jan-21 Cal Due Date 27-Jan-22 Cal. Interval 1 Year Meterface

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 35 % Alt 706.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☐ F/S Resp. ck ☑ Reset ck. ☐ Window Operation ☐ Geotropism
☐ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck.

☐ Calibrated in accordance with LMI SOP 14.8 ☑ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set V Input Sens. mV Det. Oper. V at mV Threshold Dial Ratio = mV

☐ HV Readout (2 points) Ref./Inst. / V Ref./Inst. / V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading. Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
x 1000	150 mrem/hr	150	150
x 1000	50 mrem/hr	45	45
x 100	15 mrem/hr	150	150
x 100	5 mrem/hr	45	45
x 10	1500 µrem/hr	150	150
x 10	500 µrem/hr	45	45
x 1	150 µrem/hr	150	150
x 1	100 µrem/hr	100	100
x0.1	15 µrem/hr	150	150
x0.1			

Range(s) Calibrated Electronically

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013
ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☑ G112 ☑ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☑ Other Cs-137: 3561282A

☐ m 500 S/N ☐ Oscilloscope S/N ☐ Multimeter S/N

Calibrator Duaine Jackson Title Calibrator Date 27JAN21

QC'd By Title Final QC Date 27 Jan 21

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer of Scientific and Industrial Instruments

www.ludlums.com

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
501 Oak Street
325-235-5494
Sweetwater, TX 79556, U.S.A.

ACCREDITED
CERT # 4084.01

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 161580

Mfg. Ludlum Measurements, Inc. Model 44-6 Serial No. PR051218

Cal. Date 19-May-21 Cal Due Date 19-May-22 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 710.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☑ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☑ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck.
☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set Comments V Input Sens. 30 mV Det. Oper. Comments V at 30 mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1990 V

COMMENTS:

Cal'd with WIN in 'OUT' position ; Firmware:261027 ; OL checked but not set

Instrument set up so 44-6 & G1 can be used with 30ft cable & 50ft cable

Operating voltage for 44-6 = 900v
Operating voltage for G1 = 1100v

Currently set for 44-6

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
x1K	400kcpm	400	400
x1K	100kcpm	100	100
x100	40kcpm	400	400
x100	10kcpm	100	100
x10	4kcpm	400	400
x10	1kcpm	100	100
x1	400cpm	400	400
x1	100cpm	100	100

ALL **Range(s) Calibrated Electronically**

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	400kcpm	39986(e)	39986(e)
	40kcpm	3999	3999
	4kcpm	400	400
	400cpm	40	40
	40cpm	4	4

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	500kcpm	500K	500K
	50kcpm	50K	50K
	5kcpm	5K	5K
	500cpm	500	500
	50cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013.
ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☑ 781 ☑ TT31 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☐ Other

☑ m 500 S/N 190566 ☐ Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrator Jason Flores Title Calibrator Date 19-MAY-21

QC'd By Title Final QC Date 19 May 21

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AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

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Sweetwater, TX 79556, U.S.A.

CONVERSION CHART
FOR REFERENCE ONLY

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Date 19-May-21

Model 2221 Serial No. 161580 Detector Model 44-6 Serial No. PR051218

Source Cs 137, 54mCi; 4mCi High Voltage 900 V

Readings Taken w/30ft cable Input Sensitivity 30 mV

Reference Point	"As Found" Readings (CPM): Analog	Range/Scale	After Adjustment Readings (CPM): Analog	Range/Scale
150 mR/hr	140	x1K	140	x1K
50 mR/hr	55	S	55	S
15 mR/hr	180	x100	180	x100
5 mR/hr	60	S	60	S
1.5 mR/hr	180	x10	180	x10
1.0 mR/hr	120	S	120	S

Reference Point	"As Found" Readings: Digital	Count Time	After Adjustment Readings: Digital	Count Time
150 mR/hr	13811	6sec.	13811	6sec.
50 mR/hr	5476		5476	
15 mR/hr	1778		1778	
5 mR/hr	612		612	
1.5 mR/hr	185		185	
1.0 mR/hr	117		117	

Signature: Jason Flores Date 19-May-21

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CONVERSION CHART
FOR REFERENCE ONLY

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Date 19-May-21

Model 2221 Serial No. 161580 Detector Model 44-6 Serial No. PR051218

Source Cs137, 54mCi; 4mCi; High Voltage 900 V

Readings Taken w/50ft cable. Input Sensitivity 30 mV

Reference Point	"As Found" Readings (CPM): Analog	Range/Scale	After Adjustment Readings (CPM): Analog	Range/Scale
150 mR/hr	140	x1K	140	x1K
50 mR/hr	55	S	55	S
15 mR/hr	180	x100	180	x100
5 mR/hr	60	S	60	S
1.5 mR/hr	180	x10	180	x10
1.0 mR/hr	120	S	120	S

Reference Point	"As Found" Readings: Digital	Count Time	After Adjustment Readings: Digital	Count Time
150 mR/hr	13643	6sec.	13643	6sec.
50 mR/hr	5484		5484	
15 mR/hr	1744		1744	
5 mR/hr	599		599	
1.5 mR/hr	186		186	
1.0 mR/hr	116		116	

Signature: Jason Flores Date 19-MAY-21

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Bench Test Data For Detector

Detector G1 Serial No. C3586

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Counter 2221 Serial No. 161580 Counter Input Sensitivity 30 mV

Count Time 6 sec. Distance Source to Detector Surface

Other Plateaud w/30Ft CaBle

High Voltage	Background	Isotope I^{129} Size 1685Yadm	Isotope Size	Isotope Size	Isotope Size
800	106	1889			
850	102	1893			
900	105	1941			
950	101	1987			
1000	107	2030			
1050	104	2020			
1100	112	2015			
1150	109	2039			
1200	122	2066			
1250	128	2046			
1300	133	2068			
1350	259	2597			

Signature Jason Flores Date 19-May-21

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Sweetwater, TX 79556, U.S.A.

Bench Test Data For Detector

Detector G1 Serial No. C3586

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Counter 2221 Serial No. 161580 Counter Input Sensitivity 30 mV

Count Time 60 sec. Distance Source to Detector Surface

Other Plateaud w/ 50ft cable

High Voltage	Background	Isotope I-129 Size 1685 Dpm	Isotope Size	Isotope Size	Isotope Size
800	112	223			
850	107	1879			
900	100	1888			
950	110	1944			
1000	115	1987			
1050	122	2015			
1100	125	2023			
1150	120	2017			
1200	129	2026			
1250	137	2037			
1300	132	2047			
1350	167	2166			
1400	190	2475			

Signature Jason Flores Date 19-MAY-21

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CERTIFICATE OF CALIBRATION

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Sweetwater, TX 79556, U.S.A.

ilac-MRA ACCREDITED CERT # 4084.01

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Mfg. Ludlum Measurements, Inc. Model 2224-1 Serial No. 227246

Mfg. Ludlum Measurements, Inc. Model 43-5 Serial No. PR202380

Cal. Date 13-May-21 Cal Due Date 13-May-22 Cal. Interval 1 Year Meterface 202-848

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 32 % Alt 708.0 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☑ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity
☑ F/S Resp. ck ☑ Reset ck. ☑ Window Operation ☐ Geotropism
☑ Audio ck. ☐ Alarm Setting ck. ☑ Batt. ck.
☑ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set 750 V Input Sens. Comment mV Det. Oper. 750 V at Comment mV Threshold Dial Ratio ____ = ____ mV

☑ HV Readout (2 points) Ref./Inst. 500 / 502 V Ref./Inst. 1000 / 1001 V

COMMENTS:

```
Alpha Sens: 120mv      OL set to simulate light leak
 Beta Sens: 3.5mv      Firmware: 390094
Beta Window: 30mv      HV set with detector not connected

Calibrated with instrument in Alpha mode only
```

Cal'D w/ 5ft cable

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading. Gamma uncertainty within 5.0% of reading. Neutron uncertainty within 7.0% of reading. Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
x1000	800k cpm	800	800
x1000	200k cpm	200	200
x100	80k cpm	800	800
x100	20k cpm	200	200
x10	8k cpm	800	800
x10	2k cpm	200	200
x1	800 cpm	800	800
x1	200 cpm	200	200

ALL **Range(s) Calibrated Electronically**

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
	800kcpm	79956 (c)	79956 (c)
	80kcpm	7996	7996
	8kcpm	799	Sit. 4799
	800cpm	80	80
	80cpm	8	8

Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.
Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323AB-2013
ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521 ☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982 ☐ E551 ☐ 5105 ☐ CSV280

☑ Alpha S/N Pu239 SN:7053 24900dpm ☐ Beta S/N ____ ☐ Other ____

☑ m 500 S/N 190566 ☐ Oscilloscope S/N ____ ☑ Multimeter S/N 86250390

Calibrator Jason Flores Title Calibrator Date 13-May-21

QC'd By [signature] Title Final QC Date 19 May 21

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AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed: ____

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Bench Test Data For Alpha Detector

Detector 43-5 Serial No. PR202380

Customer CABRERA SERVICES INC ORDER NO. 20399401/508300

Counter 2224-1 Serial No. 227246 Counter Input Sensitivity 120 mV

Count Time 1min. Distance Source to Detector Surface

Isotope Pu239 SN:7053 24900dpm Other Plateaud in ALPHA Mode only

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

Alpha Scintillation Detector

HV Plateau	Background	Source Count
1000	0	3057
650	0	3335
700	0	3472
750	0	3495
800	2	3508
850	8	3522

Operating Voltage Set at 750 V

Air Proportional	43-5	43-65	43-90	Background	Meter Reading	Range/Scale
Toe	Toe	L/S*	Toe	0	3315	1min
Center	Center	Center	Center	0	3495	
Heel	Heel	Other**	Heel	0	3407	

☐ Uniformity (± 10%) Average Efficiency 13.67 % (4Pi)

* Least Sensitive Position (Heel of Detector)
** Opposite Least Sensitive Position (Top of Detector)

Signature Jason Flores Date 13-MAY-21

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:	2929	Detector:	43-10-1	Calibration Date:	6/14/2021
Serial #:	271413	Serial #:	PR291575	12 month calibration:	OK
Detector Active Area or Area Covered by Smear (cm^2):	100				

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.2729	Th-230	7103-10	15,600	6/16/2010	7.54E+04	15,598	20	10	1	0.16	0.12	4250.2	74.74
Beta	0.2025	Tc-99	7104-10	12,400	6/21/2010	2.11E+05	12,400	200	10	1	26.65	0.96	2523.0	44.89

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail		MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta						
6/16/2021	1	249	4198	2544	0.1	24.9	4197.9	2519.1	PASS	PASS	PASS	PASS	14.99	100	Yes	Yes		BB
6/16/2021	0	249	4211	2611	0.0	24.9	4211.0	2586.1	PASS	PASS	PASS	PASS	10.99	100	Yes	Yes		BB
6/17/2021	3	254	4223	2486	0.3	25.4	4222.7	2460.6	PASS	PASS	PASS	PASS	17.92	101	Yes	Yes		BB
6/17/2021	1	254	4212	2564	0.1	25.4	4211.9	2538.6	PASS	PASS	PASS	PASS	14.99	101	Yes	Yes		BB
6/18/2021	2	250	4058	2485	0.2	25.0	4057.8	2460.0	PASS	PASS	*QUESTION*	PASS	16.65	100	Yes	Yes		JG
6/18/2021	2	250	4282	2485	0.2	25.0	4281.8	2460.0	PASS	PASS	PASS	PASS	16.65	100	Yes	Yes		JG
6/18/2021	1	258	4132	2505	0.1	25.8	4131.9	2479.2	PASS	PASS	PASS	PASS	14.99	101	Yes	Yes		JG
6/21/2021	2	267	4148	2469	0.2	26.7	4147.8	2442.3	PASS	PASS	PASS	PASS	16.65	103	Yes	Yes		JG
6/21/2021	2	277	4108	2492	0.2	27.7	4107.8	2464.3	PASS	PASS	PASS	PASS	16.65	105	Yes	Yes		JG
6/22/2021	1	264	4255	2502	0.1	26.4	4254.9	2475.6	PASS	PASS	PASS	PASS	14.99	102	Yes	Yes		JG
6/22/2021	3	285	4183	2640	0.3	28.5	4182.7	2611.5	PASS	PASS	PASS	PASS	17.92	106	Yes	Yes		JG

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	X_m-X_i	$(X_m-X_i)^2$
1	4282	-24.45	597.8025
2	4278	-20.45	418.2025
3	4224	33.55	1125.603
4	4135	122.55	15018.5
5	4167	90.55	8199.303
6	4336	-78.45	6154.402
7	4161	96.55	9321.903
8	4332	-74.45	5542.802
9	4265	-7.45	55.5025
10	4324	-66.45	4415.602
11	4258	-0.45	0.2025
12	4277	-19.45	378.3025
13	4309	-51.45	2647.102
14	4321	-63.45	4025.902
15	4288	-30.45	927.2025
16	4320	-62.45	3900.002
17	4147	110.55	12221.3
18	4243	14.55	211.7025
19	4266	-8.45	71.4025
20	4218	39.55	1564.203
Sum total	85151		76796.95
X_m	4257.55		

Instrument/Detector	2929 / 43-10-1
Serial # / Serial#	271413/PR291575
Date Performed	16-Jun-21
Count time interval (minutes)	1
Source Used	Th-230
Alpha Efficiency	0.2729

X^2 = 18.04

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	$X_m - X_i$	$(X_m - X_i)^2$
1	2534	3.25	10.5625
2	2541	-3.75	14.0625
3	2556	-18.75	351.5625
4	2592	-54.75	2997.563
5	2488	49.25	2425.563
6	2609	-71.75	5148.063
7	2587	-49.75	2475.063
8	2592	-54.75	2997.563
9	2479	58.25	3393.063
10	2518	19.25	370.5625
11	2556	-18.75	351.5625
12	2545	-7.75	60.0625
13	2543	-5.75	33.0625
14	2475	62.25	3875.063
15	2472	65.25	4257.563
16	2476	61.25	3751.563
17	2470	67.25	4522.563
18	2550	-12.75	162.5625
19	2591	-53.75	2889.063
20	2571	-33.75	1139.063
Sum total	50745		41225.75
X_m	2537.25		

Instrument/Detector	2929 / 43-10-1
Serial # / Serial#	271413/PR291575
Date Performed	16-Jun-21
Count time interval (minutes)	1
Source Used	Tc-99
Beta Efficiency	0.2025

X^2 = 16.25

Note: Accept χ^2 if between 8.91 and 32.8

Counting Instrument:	Ludlum 2360	Detector:	43-93	Calibration Date:	2/10/2021
Serial #:	168040	Serial #:	PR179861	12 month calibration:	OK
Detector Active Area or Area Covered by Smear (cm^2):	100				

	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA (DPM/100cm^2)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.1717	Th-230	7103-10	15,600	6/16/2010	7.54E+04	15,598	100	1	1	1.40	1.26	2690.1	74.07
Beta	0.1567	Tc-99	7104-10	12,400	6/21/2010	2.11E+05	12,400	1000	1	1	108.00	8.19	1834.8	45.13

Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail						
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)	α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
6/14/2021	0	90	2735	1952	0.0	90.0	2735.0	1862.0	PASS	PASS	PASS	PASS	17.47	301	Yes	Yes		VS
6/14/2021	1	107	2685	1973	1.0	107.0	2684.0	1866.0	PASS	PASS	PASS	PASS	44.57	326	Yes	Yes		VS
6/15/2021	2	116	2720	1873	2.0	116.0	2718.0	1757.0	PASS	PASS	PASS	PASS	55.79	339	Yes	Yes		JG
6/15/2021	0	93	2645	1920	0.0	93.0	2645.0	1827.0	PASS	PASS	PASS	PASS	17.47	305	Yes	Yes		JG
6/16/2021	2	102	2734	2030	2.0	102.0	2732.0	1928.0	PASS	PASS	PASS	*QUESTION*	55.79	319	Yes	Yes		JG
6/16/2021	2	102	2734	1853	2.0	102.0	2732.0	1751.0	PASS	PASS	PASS	PASS	55.79	319	Yes	Yes		JG
6/16/2021	0	113	2698	1952	0.0	113.0	2698.0	1839.0	PASS	PASS	PASS	PASS	17.47	335	Yes	Yes		BB
6/17/2021	1	94	2593	2001	1.0	94.0	2592.0	1907.0	PASS	PASS	PASS	PASS	44.57	307	Yes	Yes		JG
6/17/2021	0	100	2641	2014	0.0	100.0	2641.0	1914.0	PASS	PASS	PASS	PASS	17.47	316	Yes	Yes		JG
6/18/2021	2	109	2557	1894	2.0	109.0	2555.0	1785.0	PASS	PASS	PASS	PASS	55.79	329	Yes	Yes		JG
6/18/2021	0	113	2533	1961	0.0	113.0	2533.0	1848.0	PASS	PASS	*QUESTION*	PASS	17.47	335	Yes	Yes		BB
6/18/2021	0	113	2579	1961	0.0	113.0	2579.0	1848.0	PASS	PASS	PASS	PASS	17.47	335	Yes	Yes		BB
6/21/2021	2	97	2775	1932	2.0	97.0	2773.0	1835.0	PASS	PASS	PASS	PASS	55.79	312	Yes	Yes		JG
6/21/2021	3	104	2591	1935	3.0	104.0	2588.0	1831.0	PASS	PASS	PASS	PASS	64.41	322	Yes	Yes		JG
6/22/2021	0	104	2558	1917	0.0	104.0	2558.0	1813.0	PASS	PASS	PASS	PASS	17.47	322	Yes	Yes		JG
6/22/2021	2	115	2641	1925	2.0	115.0	2639.0	1810.0	PASS	PASS	PASS	PASS	55.79	338	Yes	Yes		BB

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	$X_m - X_i$	$(X_m - X_i)^2$
1	2749	-69.15	4781.723
2	2712	-32.15	1033.623
3	2670	9.85	97.0225
4	2655	24.85	617.5225
5	2660	19.85	394.0225
6	2860	-180.15	32454.02
7	2588	91.85	8436.422
8	2643	36.85	1357.922
9	2664	15.85	251.2225
10	2714	-34.15	1166.223
11	2673	6.85	46.9225
12	2631	48.85	2386.322
13	2692	-12.15	147.6225
14	2659	20.85	434.7225
15	2671	8.85	78.3225
16	2659	20.85	434.7225
17	2636	43.85	1922.822
18	2687	-7.15	51.1225
19	2714	-34.15	1166.223
20	2660	19.85	394.0225
Sum total	53597		57652.55
X_m	2679.85		

Instrument/Detector	2360/43-93
Serial # / Serial#	168040/PR179861
Date Performed	14-Jun-21
Count time interval (minutes)	1
Source Used	Th-230
Alpha Efficiency	0.1717

X^2 = 21.51

Note: Accept χ^2 if between 8.91 and 32.8

Equipment Chi-Square Distribution Worksheet

Count No.	X_i	$X_m - X_i$	$(X_m - X_i)^2$
1	1941	2.5	6.25
2	1870	73.5	5402.25
3	1886	57.5	3306.25
4	1924	19.5	380.25
5	1964	-20.5	420.25
6	1929	14.5	210.25
7	1965	-21.5	462.25
8	1985	-41.5	1722.25
9	2013	-69.5	4830.25
10	1951	-7.5	56.25
11	1951	-7.5	56.25
12	1984	-40.5	1640.25
13	1979	-35.5	1260.25
14	1972	-28.5	812.25
15	1971	-27.5	756.25
16	1916	27.5	756.25
17	1981	-37.5	1406.25
18	2007	-63.5	4032.25
19	1820	123.5	15252.25
20	1861	82.5	6806.25
Sum total	38870		49575
X_m	1943.5		

Instrument/Detector	2360/43-93
Serial # / Serial#	168040/PR179861
Date Performed	14-Jun-21
Count time interval (minutes)	1
Source Used	Tc-99
Beta Efficiency	0.1567

X^2 = 25.51

Note: Accept χ^2 if between 8.91 and 32.8

Inst.# 1844	
QC Daily Source	
Date	Result (µrem/hr)	P/F
6/15/2021	14	Pass
6/15/2021	15	Pass
6/16/2021	11	Pass
6/16/2021	11	Pass
6/17/2021	12	Pass
6/17/2021	11	Pass
6/18/2021	11	Pass
6/18/2021	11	Pass
6/21/2021	11	Pass
6/21/2021	11	Pass
6/22/2021	11	Pass
6/22/2021	12	Pass

Inst.# 1844		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (µrem/hr)		
6/15/2021	10		
6/15/2021	9		
6/15/2021	13		
6/15/2021	13		
6/15/2021	15		
6/15/2021	12		
6/15/2021	15		
6/15/2021	13		
6/15/2021	14		
6/15/2021	14		
	Average		
	13		

Micro-Rem #1844

Inst.# 1844		
QC Daily Source		
Date	Result (µrem/hr)	P/F
6/15/2021	170	Pass
6/15/2021	170	Pass
6/16/2021	165	Pass
6/16/2021	170	Pass
6/17/2021	160	Pass
6/17/2021	170	Pass
6/18/2021	160	Pass
6/18/2021	170	Pass
6/21/2021	160	Pass
6/21/2021	160	Pass
6/22/2021	165	Pass
6/22/2021	170	Pass

Inst.# 1844		Source Ser. #	1592-30-6
Initial Source Readings		Nuclide	Co-60
Date	Result (µrem/hr)		
6/15/2021	170		
6/15/2021	170		
6/15/2021	165		
6/15/2021	165		
6/15/2021	170		
6/15/2021	170		
6/15/2021	170		
6/15/2021	165		
6/15/2021	170		
6/15/2021	170		
	Average		
	169		

Micro-Rem #1844

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Inst.# 161580		
QC Daily Source		
Date	Result (cpm)	P/F
6/14/2021	15	Pass
6/14/2021	16	Pass
6/15/2021	12	Pass
6/15/2021	15	Pass
6/16/2021	12	Pass
6/16/2021	11	Pass
6/17/2021	11	Pass
6/17/2021	11	Pass
6/18/2021	12	Pass
6/18/2021	14	Pass
6/21/2021	11	Pass
6/21/2021	14	Pass
6/22/2021	11	Pass
6/22/2021	11	Pass

Inst.# 161580		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (cpm)		
6/14/2021	12		
6/14/2021	10		
6/14/2021	17		
6/14/2021	18		
6/14/2021	11		
6/14/2021	14		
6/14/2021	11		
6/14/2021	9		
6/14/2021	16		
6/14/2021	18		
	Average		
	14		

Ludlum 2221 with 44-6 161580 / PR051218

Inst.# 161580		
QC Daily Source		
Date	Result (cpm)	P/F
6/14/2021	800	Pass
6/14/2021	719	Pass
6/15/2021	809	Pass
6/15/2021	876	Pass
6/16/2021	836	Pass
6/16/2021	824	Pass
6/17/2021	828	Pass
6/17/2021	863	Pass
6/18/2021	797	Pass
6/18/2021	862	Pass
6/21/2021	829	Pass
6/21/2021	841	Pass
6/22/2021	851	Pass
6/22/2021	869	Pass

Inst.# 161580		Source Ser. #	1592-30-6
Initial Source Readings		Nuclide	Co-60
Date	Result (cpm)		
6/14/2021	723		
6/14/2021	722		
6/14/2021	736		
6/14/2021	801		
6/14/2021	773		
6/14/2021	716		
6/14/2021	743		
6/14/2021	706		
6/14/2021	734		
6/14/2021	765		
	Average		
	742		

Inst.# 218266		
QC Daily Source		
Date	Result (cpm)	P/F
6/14/2021	40	Pass
6/14/2021	40	Pass
6/15/2021	40	Pass
6/15/2021	50	Pass
6/16/2021	40	Pass
6/16/2021	50	Pass
6/17/2021	40	Pass
6/17/2021	40	Pass
6/18/2021	40	Pass
6/18/2021	40	Pass
6/21/2021	40	Pass
6/21/2021	40	Pass
6/22/2021	40	Pass
6/22/2021	50	Pass

Inst.# 218266		Source Ser. #	Bkg
Initial Source Readings		Nuclide	Bkg
Date	Result (cpm)		
6/14/2021	30		
6/14/2021	40		
6/14/2021	50		
6/14/2021	40		
6/14/2021	30		
6/14/2021	50		
6/14/2021	50		
6/14/2021	40		
6/14/2021	40		
6/14/2021	60		
	Average		
	43		

Model 12 with 44-9 218266 / PR229628

Inst.# 218266		
QC Daily Source		
Date	Result (cpm)	P/F
6/14/2021	2100	Pass
6/14/2021	2000	Pass
6/15/2021	2000	Pass
6/15/2021	2000	Pass
6/16/2021	2000	Pass
6/16/2021	2100	Pass
6/17/2021	2000	Pass
6/17/2021	2000	Pass
6/18/2021	2000	Pass
6/18/2021	2000	Pass
6/21/2021	2000	Pass
6/21/2021	2000	Pass
6/22/2021	2000	Pass
6/22/2021	2100	Pass

Inst.# 218266		Source Ser. #	7104-10
Initial Source Readings		Nuclide	Tc-99
Date	Result (cpm)		
6/14/2021	2000		
6/14/2021	2100		
6/14/2021	2000		
6/14/2021	2000		
6/14/2021	2200		
6/14/2021	2100		
6/14/2021	2100		
6/14/2021	2000		
6/14/2021	2100		
6/14/2021	2200		
	Average		
	2080		

Model 12 with 44-9 218266 / PR229628

ATTACHMENT F

Data Verification – Chemical Constituents

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ATTACHMENT F
DATA VERIFICATION – CHEMICAL CONSTITUENTS

Sample Integrity

The laboratory data report indicates that all samples were received in good condition, cooler temperature upon receipt was within the criterion of 4±2 degrees Celsius (°C), and technical holding time requirements were met. Three of the four sample containers for TCLP VOC analysis were noted to have contained headspace, which could have led to the loss of VOCs prior to extraction; however, results for these three samples were consistent with the results for the sample that did not contain headspace, and results for all four samples were well below the toxicity thresholds.

Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks associated with the chemical analyses with the following exception: barium and chromium were detected in one method blank associated with the TCLP metals analysis, at concentrations above the method detection limits but below the limits of quantitation. Detected TCLP results for these metals in project samples were more than two orders of magnitude below the toxicity thresholds and were "J" qualified as estimated. The barium TCLP results for the project samples were consistently more than an order of magnitude greater than the blank detection, indicating that blank contamination likely had minimal impact on the reported result. For chromium, the one detection in a project sample was of similar magnitude to the blank detection; this detected TCLP chromium result may be biased high.

Laboratory Control Samples

Laboratory control samples are prepared by spiking a clean matrix with the analytes of interest, at known concentrations. Laboratory control samples were analyzed as required by the methods, and a laboratory control sample duplicate was also analyzed for the total VOC analysis. Percent recoveries and relative percent differences were within the method acceptance limits, indicating that the methods were appropriately in control and producing accurate results.

MS/MSD Samples

Matrix spike (MS) and matrix spike duplicate (MSD) samples are prepared by spiking an aliquot of project sample with a spike containing analytes of known concentration and are used to evaluate the impact of sample matrix on analyte quantitation. MS/MSD analyses were performed on project

samples 4FR-64-002 (mercury TCLP) and 4FR-145-001 (other analyses), in accordance with the analytical methods. Percent recoveries were within acceptance limits for all analytes except as described below.

Multiple VOCs had recoveries below acceptance criteria, and 2-butanone had recovery above acceptance criteria, in the MS and MSD of sample 4FR-145-001 associated with total VOC analysis. 1,1-Dichloroethene also had a reported recovery below acceptance criteria in the MS and MSD of sample 4FR-145-001 associated with TCLP VOC analyses. The laboratory indicated that matrix interference was the suspected cause of the recovery issues, given that the LCS recoveries were within acceptance criteria. Evidence of matrix interference indicates some uncertainty in the quantitation of results, and the affected VOCs in the parent sample (4FR-145-001) were "J1" qualified as estimated.

Recoveries of total mercury in the MS and MSD of sample 4FR-145-001 associated with the total mercury analysis were above acceptance criteria. Additionally, mercury recovery in the MS and MSD of sample 4FR-64-002 associated with the mercury TCLP analysis was inconsistent (94% in the MS, -116% in the MSD). The associated mercury results in the parent samples were "J1" qualified as estimated. However, the spike concentration for the total mercury MS and MSD was less than one percent of the concentration detected in the parent sample, and the spike concentration for the TCLP mercury MS and MSD was approximately one-fifth the concentration detected in the parent sample. MS and MSD results outside acceptance criteria are typically not considered to indicate an issue with data quality when the spike concentration is less than one-fourth the concentration in the parent sample.

Laboratory Surrogates

The laboratory data report indicates that surrogates were added to samples for VOC analysis as required by the method, and all surrogate recoveries were within QC limits.

Dilutions

The samples for total mercury analysis required dilution, ranging from 10x to 500x, due to the high concentrations of mercury present. One sample for TCLP mercury analysis also underwent 5x dilution. The reporting limits were adjusted accordingly. Associated results were "D" qualified; however, the dilutions should not affect data quality.

Summary of Data Quality

Several results were qualified by the laboratory due to laboratory blank detections, MS/MSD results outside acceptance criteria, and dilutions due to high concentrations. However, none of the issues are significant enough to prevent use of the data in making project decisions. The data are usable as reported and qualified.

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ATTACHMENT G

Data Verification – Radiological Constituents

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ATTACHMENT G
DATA VERIFICATION – RADIOLOGICAL CONSTITUENTS

Instrument and ambient site background were determined for field measurements based on exploratory data analysis performed on site data. Field data were divided into data sets according to associated 4th Floor Riser pipe segments (Risers 64, 76, 128, 144, 145), remaining 4th Floor piping, and other. Other data included measurements on the 11 unlabeled pipe segments and 12 pipe segments not associated with a specific 4th Floor Riser. Each data set was further divided by measurement type; beta/gamma static, removable alpha, and removable beta.

Each data set was evaluated using exploratory data analysis including calculation of summary statistics, graphical representation of the data set (box plots, histograms, normal probability plots) to visually identify potential outliers, and calculation of background threshold limits (BTVs). BTVs are upper bounds for background distributions such that values exceeding the BTV provide evidence of data exceeding background. BTVs were calculated as the 95% Upper Simultaneous Limit for normally distributed data, or the 95% Chebyshev Upper Prediction Limit for data sets that did not follow a specific distribution (i.e., nonparametric data).

Beta/gamma static data sets followed normal or approximate normal distributions with no outliers. All seven beta/gamma static data sets have similar average results and range of results. All beta/gamma static measurements were identified as not exceeding background. The beta/gamma results are summarized in Table G-1.

Removable alpha data sets did not follow a known distribution. Alpha counts are primarily zero or one and are more closely associated with binomial distributions or step functions. The maximum removable alpha count (pipe segment 46-2, 4th Floor Riser 145) represents a potential outlier and was identified as exceeding background. The removable alpha results are summarized in Table G-2.

Removable beta data sets followed normal or approximate normal distributions with no outliers. All seven removable beta data sets have similar average results and range of results. All removable beta measurements were identified as not exceeding background. The removable beta results are summarized in Table G-3.

Laboratory analytical results were evaluated against instrument background by the laboratory. All results receiving a “U” flag were identified as not exceeding background. The laboratory results are provided in Attachment D.

Table G-1. Summary of Beta/Gamma Static Measurements (cpm)

Data Set	Mean	Median	St. Dev.	Minimum	Maximum	BTV
4FR 64	8.1	8	2.6	2	14	16.5
4FR 76	11.3	11	3.4	5	18	20.5
4FR 128	7.7	7	2.8	4	12	13.2
4FR 144	9.4	10	3.2	3	16	17.6
4FR 145	9.2	9	3.7	2	22	22.0
4th Floor	9.6	9	3.3	4	16	17.7
Other	9.0	8.5	3.2	4	18	20.6

Notes:
4FR = 4th Floor Riser
BTV = Background threshold limit
cpm = Counts per minute
St. Dev. = Standard Deviation

Table G-2. Summary of Removable Alpha Measurements (cpm)

Data Set	Mean	Median	St. Dev.	Minimum	Maximum	BTV
4FR 64	0.37	0	0.59	0	3	3.0
4FR 76	0.40	0	0.71	0	2	3.5
4FR 128	0.71	0	0.95	0	2	5.1
4FR 144	0.36	0	0.49	0	1	2.6
4FR 145	0.44	0	0.99	0	6	4.8
4th Floor	0.24	0	0.44	0	1	2.2
Other	0.26	0	0.54	0	2	2.7

Notes:
4FR = 4th Floor Riser
BTV = Background threshold limit
cpm = Counts per minute
St. Dev. = Standard Deviation

Table G-3. Summary of Removable Beta Measurements (cpm)

Data Set	Mean	Median	St. Dev.	Minimum	Maximum	BTV
4FR 64	29.0	29	6.0	17	45	48.1
4FR 76	29.6	30	5.9	18	39	45.2
4FR 128	30.1	29	4.3	26	39	40.0
4FR 144	30.2	30	5.7	21	40	44.9
4FR 145	28.7	29	6.4	12	44	48.9
4th Floor	27.2	27	5.5	20	38	40.9
Other	27.5	27	4.9	19	39	41.6

Notes:
4FR = 4th Floor Riser
BTV = Background threshold limit
cpm = Counts per minute
St. Dev. = Standard Deviation

ATTACHMENT H

Chemical Field Data

Table H-1. Ambient Air Monitoring Record
Table H-2. Previously Removed 4th Floor Drain Piping
Table H-3. In-Place 4th Floor Drain Piping

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Table H-1. Ambient Air Monitoring Record

Date	Time	Location	Mercury Vapor			Volatile Organic Compounds		Notes
			OSHA PEL (mg/m^3) [c]	EA Action Level (mg/m^3) [c]	Measured Ambient Air Concentration (mg/m^3) [a]	EA Action Level (ppm) [b,c]	Measured Ambient Air Concentration (ppm) [a]	
6/14/2021	1015	Room B-10	0.1	0.01	0.00017	Background	0	Background ambient readings
6/14/2021	1020	Room B-10	0.1	0.01	0.00027	Background	0	Background ambient readings
6/15/2021	0855	Room B-10	0.1	0.01	0.00004	Background	0	Background ambient readings
6/15/2021	0930	Room B-10	0.1	0.01	0.00008	Background	0	Ambient readings when Box 3638-003 opened
6/15/2021	0940	Room B-10	0.1	0.01	0.00006	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	0950	Room B-10	0.1	0.01	0.00009	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1000	Room B-10	0.1	0.01	0.00010	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1010	Room B-10	0.1	0.01	0.00007	Background	**0.2**	Ambient readings during Box 3638-003 work
6/15/2021	1020	Room B-10	0.1	0.01	0.00014	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1030	Room B-10	0.1	0.01	0.00012	Background	**0.3**	Ambient readings during Box 3638-003 work
6/15/2021	1040	Room B-10	0.1	0.01	0.00016	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1050	Room B-10	0.1	0.01	0.00018	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1100	Room B-10	0.1	0.01	0.00012	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1110	Room B-10	0.1	0.01	0.00015	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1120	Room B-10	0.1	0.01	0.00011	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1130	Room B-10	0.1	0.01	0.00016	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1140	Room B-10	0.1	0.01	0.00008	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1250	Room B-10	0.1	0.01	0.00019	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1300	Room B-10	0.1	0.01	0.00016	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1310	Room B-10	0.1	0.01	0.00022	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1320	Room B-10	0.1	0.01	0.00020	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1330	Room B-10	0.1	0.01	0.00032	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1340	Room B-10	0.1	0.01	0.00019	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1350	Room B-10	0.1	0.01	0.00023	Background	**0.2**	Ambient readings during Box 3638-003 work
6/15/2021	1400	Room B-10	0.1	0.01	0.00026	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1410	Room B-10	0.1	0.01	0.00031	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1420	Room B-10	0.1	0.01	0.00024	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1430	Room B-10	0.1	0.01	0.00018	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1440	Room B-10	0.1	0.01	0.00025	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1450	Room B-10	0.1	0.01	0.00029	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1500	Room B-10	0.1	0.01	0.00024	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1510	Room B-10	0.1	0.01	0.00021	Background	**0.1**	Ambient readings during Box 3638-003 work
6/15/2021	1520	Room B-10	0.1	0.01	0.00030	Background	**0.1**	Ambient readings during Box 3638-003 work

Table H-1. Ambient Air Monitoring Record

Date	Time	Location	Mercury Vapor			Volatile Organic Compounds		Notes
			OSHA PEL (mg/m^3) [c]	EA Action Level (mg/m^3) [c]	Measured Ambient Air Concentration (mg/m^3) [a]	EA Action Level (ppm) [b,c]	Measured Ambient Air Concentration (ppm) [a]	
6/15/2021	1530	Room B-10	0.1	0.01	0.00029	Background	0	Ambient readings during Box 3638-003 work
6/15/2021	1540	Room B-10	0.1	0.01	0.00025	Background	**0.1**	Ambient readings after Box 3638-003 closed
6/15/2021	1550	Room B-10	0.1	0.01	0.00022	Background	0	
6/15/2021	1600	Room B-10	0.1	0.01	0.00019	Background	0	As-left background ambient readings
6/16/2021	0800	Hallway outside of Room B-10	0.1	0.01	0.00005	Background	0	Background ambient readings
6/16/2021	0900	Room B-10	0.1	0.01	0.00623	Background	**0.4**	Ambient readings when Box 3638-002 opened
6/16/2021	0911	Room B-10	0.1	0.01	0.00518	Background	**0.6**	Ambient readings after Box 3638-002 closed
6/16/2021	0922	Room B-10	0.1	0.01	0.00215	Background	**0.3**	Ambient readings when Box 3638-007 opened
6/16/2021	0930	Room B-10	0.1	0.01	0.00236	Background	**0.4**	Ambient readings after Box 3638-007 opened
6/16/2021	0940	Room B-10	0.1	0.01	0.00298	Background	**0.3**	Ambient readings after Box 3638-007 closed
6/16/2021	1005	Room B-10	0.1	0.01	0.00224	Background	**0.3**	Ambient readings when Box 3638-006 opened
6/16/2021	1015	Room B-10	0.1	0.01	0.00333	Background	**0.4**	Ambient readings after Box 3638-006 closed
6/16/2021	1024	Room B-10	0.1	0.01	0.00297	Background	**0.3**	Ambient readings when Box 3638-004 opened
6/16/2021	1028	Room B-10	0.1	0.01	0.00314	Background	**0.4**	Ambient readings after Box 3638-004 closed
6/16/2021	1041	Room B-10	0.1	0.01	**0.01452**	Background	**1.2**	Ambient readings when Box 3638-001 opened
6/16/2021	1045	Room B-10	0.1	0.01	0.00921	Background	**0.9**	Ambient readings after Box 3638-001 closed
6/16/2021	1047	Room B-10	0.1	0.01	0.00562	Background	**0.4**	
6/16/2021	1115	Room B-10	0.1	0.01	0.00336	Background	**0.1**	Ambient readings when Box 3638-005 opened
6/16/2021	1120	Room B-10	0.1	0.01	0.00311	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1130	Room B-10	0.1	0.01	0.00327	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1140	Room B-10	0.1	0.01	0.00289	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1150	Room B-10	0.1	0.01	0.00277	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1300	Room B-10	0.1	0.01	0.00324	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1310	Room B-10	0.1	0.01	0.00318	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1320	Room B-10	0.1	0.01	0.00294	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1330	Room B-10	0.1	0.01	0.00355	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1340	Room B-10	0.1	0.01	0.00268	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1350	Room B-10	0.1	0.01	0.00297	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1400	Room B-10	0.1	0.01	0.00364	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1410	Room B-10	0.1	0.01	0.00336	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1420	Room B-10	0.1	0.01	0.00310	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1430	Room B-10	0.1	0.01	0.00276	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1440	Room B-10	0.1	0.01	0.00284	Background	**0.1**	Ambient readings during Box 3638-005 work

Table H-1. Ambient Air Monitoring Record

Date	Time	Location	Mercury Vapor			Volatile Organic Compounds		Notes
			OSHA PEL (mg/m^3) [c]	EA Action Level (mg/m^3) [c]	Measured Ambient Air Concentration (mg/m^3) [a]	EA Action Level (ppm) [b,c]	Measured Ambient Air Concentration (ppm) [a]	
6/16/2021	1450	Room B-10	0.1	0.01	0.00269	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1500	Room B-10	0.1	0.01	0.00247	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1510	Room B-10	0.1	0.01	0.00358	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1520	Room B-10	0.1	0.01	0.00267	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1530	Room B-10	0.1	0.01	0.00280	Background	**0.1**	Ambient readings during Box 3638-005 work
6/16/2021	1540	Room B-10	0.1	0.01	0.00200	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1550	Room B-10	0.1	0.01	0.00284	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1600	Room B-10	0.1	0.01	0.00273	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1610	Room B-10	0.1	0.01	0.00259	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1620	Room B-10	0.1	0.01	0.00199	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1630	Room B-10	0.1	0.01	0.00100	Background	0	Ambient readings during Box 3638-005 work
6/16/2021	1640	Hallway outside of Room B-10	0.1	0.01	0.00031	Background	0	As-left background ambient readings
6/17/2021	0730	Hallway outside of Room B-10	0.1	0.01	0.00013	Background	0	Background ambient readings
6/17/2021	0740	Room B-10	0.1	0.01	**0.01397**	Background	**1.6**	Ambient readings when Box 3638-001 opened
6/17/2021	0745	Room B-10	0.1	0.01	0.00964	Background	**0.7**	Ambient readings after Box 3638-001 closed
6/17/2021	0930	Room B-10	0.1	0.01	0.00050	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	0940	Room B-10	0.1	0.01	0.00043	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	0950	Room B-10	0.1	0.01	0.00064	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1000	Room B-10	0.1	0.01	0.00047	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1010	Room B-10	0.1	0.01	0.00039	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1020	Room B-10	0.1	0.01	0.00020	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1030	Room B-10	0.1	0.01	0.00035	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1040	Room B-10	0.1	0.01	0.00046	Background	**0.1**	Ambient readings during Box 3638-005 work
6/17/2021	1050	Room B-10	0.1	0.01	0.00043	Background	**0.1**	Ambient readings during Box 3638-005 work
6/17/2021	1100	Room B-10	0.1	0.01	0.00038	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1110	Room B-10	0.1	0.01	0.00031	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1120	Room B-10	0.1	0.01	0.00030	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1130	Room B-10	0.1	0.01	0.00042	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1150	Room B-10	0.1	0.01	0.00048	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1300	Hallway outside of Room B-10	0.1	0.01	0.00032	Background	--	Background ambient readings (zeroed mercury vapor analyzer again after turning it off)
6/17/2021	1310	Room B-10	0.1	0.01	0.00029	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1320	Room B-10	0.1	0.01	0.00037	Background	0	Ambient readings during Box 3638-005 work

Table H-1. Ambient Air Monitoring Record

Date	Time	Location	Mercury Vapor			Volatile Organic Compounds		Notes
			OSHA PEL (mg/m^3) [c]	EA Action Level (mg/m^3) [c]	Measured Ambient Air Concentration (mg/m^3) [a]	EA Action Level (ppm) [b,c]	Measured Ambient Air Concentration (ppm) [a]	
6/17/2021	1330	Room B-10	0.1	0.01	0.00043	Background	**0.1**	Ambient readings during Box 3638-005 work
6/17/2021	1340	Room B-10	0.1	0.01	0.00030	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1350	Room B-10	0.1	0.01	0.00039	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1400	Room B-10	0.1	0.01	0.00036	Background	**0.1**	Ambient readings during Box 3638-005 work
6/17/2021	1410	Room B-10	0.1	0.01	0.00045	Background	**0.1**	Ambient readings during Box 3638-005 work
6/17/2021	1420	Room B-10	0.1	0.01	0.00038	Background	0	Ambient readings during Box 3638-005 work
6/17/2021	1430	Room B-10	0.1	0.01	0.00027	Background	0	Ambient readings after Box 3638-005 closed
6/17/2021	1440	Room B-10	0.1	0.01	0.00031	Background	0	As-left background ambient readings
6/18/2021	0800	Hallway outside of Room B-10	0.1	0.01	0.00012	Background	0	Background ambient readings
6/18/2021	0900	4th Floor Column 64	0.1	0.01	0.00005	Background	0	Background ambient readings for 4th Floor at Column 64
6/18/2021	0925	4th Floor Column 64	0.1	0.01	0.00004	Background	0	Ambient readings during Column 64 work
6/18/2021	0934	4th Floor Column 64	0.1	0.01	0	Background	0	Ambient readings during Column 64 work
6/18/2021	0941	4th Floor Column 64	0.1	0.01	0.00002	Background	0	Ambient readings during Column 64 work
6/18/2021	0945	4th Floor Column 64	0.1	0.01	0	Background	0	Ambient readings during Column 64 work
6/18/2021	0958	4th Floor Column 64	0.1	0.01	0.00002	Background	0	Ambient readings during Column 64 work
6/18/2021	0952	4th Floor Column 64	0.1	0.01	0.00015	Background	0	Ambient readings during Column 64 work
6/18/2021	1012	4th Floor Column 64	0.1	0.01	0.00006	Background	0	Ambient readings during Column 64 work
6/18/2021	1004	4th Floor Column 64	0.1	0.01	0.00001	Background	0	Ambient readings during Column 64 work
6/18/2021	1055	4th Floor Column 158	0.1	0.01	0	Background	0	Background ambient readings for 4th Floor at Column 158
6/18/2021	1100	4th Floor Column 158	0.1	0.01	0.00001	Background	0	Ambient readings during Column 158 work
6/18/2021	1115	4th Floor Column 158	0.1	0.01	0.00011	Background	0	Ambient readings during Column 158 work
6/18/2021	1125	4th Floor Column 158	0.1	0.01	0.00008	Background	0	Ambient readings during Column 158 work
6/18/2021	1130	4th Floor Column 168	0.1	0.01	0	Background	0	Background ambient readings for 4th Floor at Column 168
6/18/2021	1131	4th Floor Column 168	0.1	0.01	0.00023	Background	0	Ambient readings during Column 168 work
6/18/2021	1350	4th Floor Column 76	0.1	0.01	0.00015	Background	0	Background ambient readings for 4th Floor at Column 76
6/18/2021	1354	4th Floor Column 76	0.1	0.01	0.00017	Background	0	Ambient readings during Column 76 work
6/18/2021	1400	4th Floor Column 76	0.1	0.01	0.00013	Background	0	Ambient readings during Column 76 work
6/18/2021	1420	4th Floor Column 76	0.1	0.01	0.00021	Background	0	Ambient readings during Column 76 work
6/18/2021	1430	4th Floor Column 76	0.1	0.01	0.00014	Background	0	Ambient readings during Column 76 work
6/18/2021	1438	4th Floor Column 76	0.1	0.01	0.0006	Background	0	Ambient readings during Column 76 work
6/18/2021	1441	4th Floor Column 76	0.1	0.01	0.00051	Background	0	Ambient readings during Column 76 work
6/18/2021	1452	4th Floor near freight elevator	0.1	0.01	0.00016	Background	0	As-left background ambient readings for 4th Floor
6/21/2021	1800	Hallway outside of Room B-10	0.1	0.01	0.00003	Background	0	Background ambient readings

Table H-1. Ambient Air Monitoring Record

Date	Time	Location	Mercury Vapor			Volatile Organic Compounds		Notes
			OSHA PEL (mg/m^3) [c]	EA Action Level (mg/m^3) [c]	Measured Ambient Air Concentration (mg/m^3) [a]	EA Action Level (ppm) [b,c]	Measured Ambient Air Concentration (ppm) [a]	
6/21/2021	1850	Room B-10	0.1	0.01	0.00005	Background	0	As-left background ambient readings
6/22/2021	1410	Hallway outside of Room B-10	0.1	0.01	0.00004	Background	0	As-left background ambient readings

Notes:

[a] Ambient air readings were taken at breathing level approximately 2 feet away from opened box/piping of concern.

[b] The EA VOC action level is the field "background" level or the concentration that is observed in the work area prior to encountering any drain piping interiors.

[c] As described in the Site-Specific Safety and Health Plan, Characterization of Drain Piping – 4th Floor through Basement for 201 Varick Street, New York City, New York. Dated June 2021.

Bold = Value above the EA Action Level

Red = Value above the OSHA PEL

mg/m^3 = Milligram per cubic meter

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit

ppm = Parts per million

VOC = Volatile organic compound

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Table H-2. 201 Varick Street 4th Floor Previously Removed Piping/Drains Evaluation

Waste Container Serial Number [a]	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Pipe Piece Number	Parent Riser	Mercury Vapor			Volatile Organic Compounds		Notes
						OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	
3638-003	B-25	N/A	N/A	N/A	N/A	0.1	0.01	0.00032	Background	0	Readings within Box 3638-003 when first opened lid
3638-003	B-25	144	NW	1	144	0.1	0.01	0.00021	Background	**0.7**	
3638-003	B-25	144	NW	2	144	0.1	0.01	0.00021	Background	**0.4**	
3638-003	B-25	144	NW	3	144	0.1	0.01	**0.01061**	Background	0	
3638-003	B-25	144	NW	4	144	0.1	0.01	0.00021	Background	**0.4**	
3638-003	B-25	144	S	5	144	0.1	0.01	0.00025	Background	**1.9**	
3638-003	B-25	144	NW	6	145	0.1	0.01	0.00072	Background	**1.2**	
3638-003	B-25	144	NW	7	144	0.1	0.01	--	Background	--	Piping not found in Box 3638-003
3638-003	B-25	144	NW	8	145	0.1	0.01	--	Background	--	Piping not found in Box 3638-003
3638-003	B-25	144	NW	9	144	0.1	0.01	--	Background	--	Piping not found in Box 3638-003
3638-003	B-25	144	S	10	144	0.1	0.01	0.00021	Background	**0.3**	
3638-003	B-25	144	S	11	144	0.1	0.01	0.00024	Background	**0.6**	
3638-003	B-25	144	S	12	144	0.1	0.01	0.00008	Background	**3.2**	
3638-003	B-25	144	S	13	144	0.1	0.01	0.00021	Background	**1.3**	
3638-003	B-25	144	NW	14	144	0.1	0.01	0.00003	Background	**0.3**	
3638-003	B-25	144	NW	15	144	0.1	0.01	0.00023	Background	0	
3638-003	B-25	144	NW	16	145	0.1	0.01	0.00023	Background	**0.4**	
3638-003	B-25	144	NW	17	145	0.1	0.01	0.00070	Background	**1.2**	
3638-003	B-25	144	N	18	145	0.1	0.01	0.00026	Background	**2.5**	
3638-003	B-25	144	N	19	145	0.1	0.01	0.00026	Background	0	
3638-003	B-25	144	N	20	145	0.1	0.01	0.00030	Background	0	
3638-003	B-25	144	N	21	145	0.1	0.01	0.00028	Background	**0.1**	
3638-003	B-25	144	N	22	145	0.1	0.01	0.00070	Background	**0.4**	
3638-003	B-25	144	N	23	145	0.1	0.01	0.00031	Background	**1.2**	
3638-003	B-25	144	NE	24	145	0.1	0.01	**0.01477**	Background	**0.4**	
3638-003	B-25	144	NE	25	145	0.1	0.01	0.00023	Background	**1.4**	
3638-003	B-25	144	NE	26	145	0.1	0.01	**0.06928**	Background	**1.5**	
3638-003	B-25	144	NW	27	145	0.1	0.01	0.00018	Background	**1.9**	
3638-003	B-25	144	NW	28	145	0.1	0.01	0.00017	Background	**0.4**	
3638-003	B-25	144	NW	29	145	0.1	0.01	0.00057	Background	**0.1**	
3638-003	B-25	125	W	30	145	0.1	0.01	0.00018	Background	0	
3638-003	B-25	125	W	31	145	0.1	0.01	0.00036	Background	0	
3638-003	B-25	125	NW	32	145	0.1	0.01	0.00073	Background	0	
3638-003	B-25	125	NW	33	145	0.1	0.01	0.00037	Background	**0.3**	
3638-003	B-25	125	S	34	145	0.1	0.01	0.00039	Background	**0.1**	
3638-003	B-25	125	S	35	145	0.1	0.01	0.00030	Background	**2.8**	
3638-003	B-25	125	S	36	145	0.1	0.01	0.00027	Background	**3.8**	
3638-003	B-25	125	S	37	145	0.1	0.01	0.00030	Background	**1.6**	
3638-003	B-25	125	NE	38	145	0.1	0.01	0.00026	Background	**2.0**	
3638-003	B-25	125	NE	39	145	0.1	0.01	0.00052	Background	**0.1**	

Table H-2. 201 Varick Street 4th Floor Previously Removed Piping/Drains Evaluation

Waste Container Serial Number [a]	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Pipe Piece Number	Parent Riser	Mercury Vapor			Volatile Organic Compounds		Notes
						OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	
3638-003	B-25	144	NE	41	145	0.1	0.01	0.00032	Background	**0.1**	
3638-003	B-25	144	NE	42	145	0.1	0.01	0.00073	Background	0	
3638-003	B-25	144	NE	43	145	0.1	0.01	0.00029	Background	**0.4**	
3638-003	B-25	144	NE	44	145	0.1	0.01	0.00047	Background	**0.2**	
3638-003	B-25	145	NW	45	145	0.1	0.01	0.00036	Background	**0.5**	
3638-003	B-25	145	NW	46	145	0.1	0.01	0.00012	Background	**4.0**	
3638-003	B-25	145	N	47	145	0.1	0.01	0.00111	Background	**0.1**	
3638-003	B-25	144	NE	49	145	0.1	0.01	0.00363	Background	0	
3638-003	B-25	145	N	52	145	0.1	0.01	0.00146	Background	**1.0**	
3638-003	B-25	145	N	53	145	0.1	0.01	0.00043	Background	**0.4**	
3638-003	B-25	145	N	54	145	0.1	0.01	0.00046	Background	0	
3638-003	B-25	145	N	55	145	0.1	0.01	0.00030	Background	0	
3638-003	B-25	145	NE	57a	145	0.1	0.01	0.00142	Background	**4.3**	Straight section; 2 sections were named 145-NE-57
3638-003	B-25	145	NE	57b	145	0.1	0.01	0.00068	Background	0	Elbow section; 2 sections were named 145-NE-57
3638-003	B-25	145	NE	60	145	0.1	0.01	0.00051	Background	**0.4**	
3638-003	B-25	146	W	63	128	0.1	0.01	0.00055	Background	0	
3638-003	B-25	145	NE	64	128	0.1	0.01	0.00071	Background	0	
3638-003	B-25	145	NE	66	128	0.1	0.01	0.00046	Background	0	
3638-006	B-25	N/A	N/A	N/A	N/A	0.1	0.01	**0.02000**	Background	**1.4**	Readings within Box 3638-006 when first opened lid
3638-007	B-25	128	NW	99	128	0.1	0.01	**0.20000**	Background	**2.4**	Readings within Box 3638-007 when first opened lid (mercury vapor dropped to 0.02 mg/m^3 when lid removed for 10 minutes)
3638-001	B-25	N/A	N/A	N/A	N/A	0.1	0.01	**> 0.50000**	Background	**6.2**	Readings within Box 3638-001 when first opened lid (mercury vapor analyzer alarmed)
3638-002	B-25	N/A	N/A	N/A	N/A	0.1	0.01	**0.43706**	Background	**2.5**	Readings within Box 3638-002 when first opened lid
3638-004	B-25	N/A	N/A	N/A	N/A	0.1	0.01	**0.15000**	Background	**1.7**	Readings within Box 3638-004 when first opened lid
3638-005	B-25	N/A	N/A	N/A	N/A	0.1	0.01	0.00746	Background	0	Readings within Box 3638-005 when first opened lid
3638-004	B-25	28	E	275	64	0.1	0.01	0.00094	Background	0	Piping named 28-SE-275 - assuming same (28-E-275 previously shown in Box 3638-004)
3638-005	B-25	28	E	276	64	0.1	0.01	0.00060	Background	0	
3638-005	B-25	66	E	277	64	0.1	0.01	0.00059	Background	**1.3**	
3638-005	B-25	66	E	278	64	0.1	0.01	0.00037	Background	**1.8**	
3638-005	B-25	66	E	279	64	0.1	0.01	0.00337	Background	**0.4**	
3638-005	B-25	66	E	280	64	0.1	0.01	0.00075	Background	**1.2**	
3638-005	B-25	66	E	281	64	0.1	0.01	0.00112	Background	**0.4**	
3638-005	B-25	66	E	282	64	0.1	0.01	0.00028	Background	0	
3638-005	B-25	47	E	283	64	0.1	0.01	0.00095	Background	0	
3638-005	B-25	47	E	284	64	0.1	0.01	0.00059	Background	0	
3638-005	B-25	66	E	285	64	0.1	0.01	0.00066	Background	0	
3638-005	B-25	47	E	286	64	0.1	0.01	0.00093	Background	0	

Table H-2. 201 Varick Street 4th Floor Previously Removed Piping/Drains Evaluation

Waste Container Serial Number [a]	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Pipe Piece Number	Parent Riser	Mercury Vapor			Volatile Organic Compounds		Notes
						OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	
3638-005	B-25	47	E	287	64	0.1	0.01	0.00067	Background	0	
3638-005	B-25	66	E	288	64	0.1	0.01	0.00060	Background	0	
3638-005	B-25	66	E	289	64	0.1	0.01	0.00636	Background	0	
3638-005	B-25	66	E	290	64	0.1	0.01	0.00091	Background	0	
3638-005	B-25	66	S	291	64	0.1	0.01	0.00118	Background	**0.4**	
3638-005	B-25	64	E	292	64	0.1	0.01	**0.01425**	Background	0	
3638-005	B-25	66	S	293	64	0.1	0.01	**0.36142**	Background	**1.2**	
3638-005	B-25	66	S	294	64	0.1	0.01	0.00194	Background	**1.3**	
3638-005	B-25	66	W	295	64	0.1	0.01	0.00062	Background	**0.7**	
3638-005	B-25	66	W	296	64	0.1	0.01	0.00212	Background	0	
3638-005	B-25	66	W	297	64	0.1	0.01	0.00052	Background	0	
3638-005	B-25	66	NW	298	64	0.1	0.01	0.00068	Background	**0.8**	
3638-005	B-25	66	W	299	64	0.1	0.01	0.00041	Background	**0.7**	
3638-005	B-25	66	E	300	64	0.1	0.01	0.00318	Background	0	
3638-005	B-25	66	NW	301	64	0.1	0.01	0.00064	Background	**0.2**	
3638-005	B-25	64	E	302	64	0.1	0.01	0.00077	Background	**0.1**	
3638-005	B-25	64	E	303	64	0.1	0.01	0.00039	Background	0	
3638-005	B-25	66	W	304	64	0.1	0.01	0.00067	Background	**0.1**	
3638-005	B-25	66	SW	305	64	0.1	0.01	0.00145	Background	0	
3638-005	B-25	65	W	306a	64	0.1	0.01	0.00053	Background	**1.5**	
3638-005	B-25	65	W	306b	64	0.1	0.01	0.00040	Background	**1.9**	New unnamed piping section
3638-005	B-25	65	W	307	64	0.1	0.01	0.00029	Background	0	
3638-005	B-25	65	S	308	64	0.1	0.01	0.00066	Background	0	
3638-005	B-25	65	S	309	64	0.1	0.01	0.00058	Background	0	
3638-005	B-25	65	E	310	64	0.1	0.01	0.00070	Background	**0.5**	
3638-005	B-25	65	S	311	64	0.1	0.01	0.00051	Background	**0.6**	
3638-005	B-25	65	S	312	64	0.1	0.01	0.00054	Background	**1.5**	
3638-005	B-25	65	W	313	64	0.1	0.01	0.00041	Background	**1.6**	
3638-005	B-25	65	W	314	64	0.1	0.01	0.00027	Background	**2.7**	
3638-005	B-25	56	N	315	76	0.1	0.01	0.00028	Background	**1.7**	
3638-005	B-25	56	N	316	76	0.1	0.01	0.00109	Background	**0.1**	
3638-005	B-25	56	N	317	76	0.1	0.01	0.00076	Background	**0.6**	
3638-005	B-25	56	N	318	76	0.1	0.01	0.00058	Background	**1.0**	
3638-005	B-25	56	N	319	76	0.1	0.01	--	Background	--	Piping not found in Box 3638-005
3638-005	B-25	37	N	320	76	0.1	0.01	0.00079	Background	0	
3638-005	B-25	36	N	321	76	0.1	0.01	0.00086	Background	**2.3**	
3638-005	B-25	55	S	322	76	0.1	0.01	0.00187	Background	0	
3638-005	B-25	55	SE	323	76	0.1	0.01	0.00069	Background	**0.3**	
3638-005	B-25	55	S	324	76	0.1	0.01	0.00066	Background	0	
3638-005	B-25	55	S	325	76	0.1	0.01	0.00054	Background	0	

Table H-2. 201 Varick Street 4th Floor Previously Removed Piping/Drains Evaluation

Waste Container Serial Number [a]	Type of Container	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Pipe Piece Number	Parent Riser	Mercury Vapor			Volatile Organic Compounds		Notes
						OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	
3638-005	B-25	55	S	326	76	0.1	0.01	--	Background	--	Piping not found in Box 3638-005
3638-005	B-25	56	SW	327	76	0.1	0.01	0.00119	Background	**1.7**	
3638-005	B-25	56	SW	328	76	0.1	0.01	0.00103	Background	**0.2**	
3638-005	B-25	56	SW	329	76	0.1	0.01	0.00024	Background	**0.9**	
3638-005	B-25	80	S	330	N/A	0.1	0.01	0.00119	Background	**0.1**	
3638-005	B-25	80	S	331	N/A	0.1	0.01	0.00059	Background	**0.1**	
3638-005	B-25	80	S	332	N/A	0.1	0.01	0.00080	Background	**0.3**	
3638-005	B-25	80	S	333	N/A	0.1	0.01	0.00024	Background	**1.5**	
3638-005	B-25	80	S	334	N/A	0.1	0.01	0.00108	Background	0	
3638-005	B-25	80	SE	335	N/A	0.1	0.01	0.00093	Background	**0.4**	
3638-005	B-25	80	SE	336	N/A	0.1	0.01	0.00109	Background	**0.2**	
3638-005	B-25	80	SE	337	N/A	0.1	0.01	0.00056	Background	**2.2**	
3638-005	B-25	Gate 14	S	338	N/A	0.1	0.01	0.00063	Background	0	
3638-005	B-25	Gate 14	S	339	N/A	0.1	0.01	0.00076	Background	**0.6**	Contained potential asbestos
3638-005	B-25	Gate 14	S	340	N/A	0.1	0.01	0.00059	Background	**0.4**	
3638-005	B-25	Gate 14	S	341	N/A	0.1	0.01	0.00085	Background	**0.2**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-1	N/A	0.1	0.01	0.00100	Background	0	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-2	N/A	0.1	0.01	--	Background	--	Contained potential asbestos - bag not opened
3638-005	B-25	N/A	N/A	NO ID-3	N/A	0.1	0.01	--	Background	--	Contained potential asbestos - bag not opened
3638-005	B-25	N/A	N/A	NO ID-4	N/A	0.1	0.01	0.00512	Background	**0.2**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-5	N/A	0.1	0.01	0.00492	Background	**1.2**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-6	N/A	0.1	0.01	0.00097	Background	**0.4**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-7	N/A	0.1	0.01	0.00131	Background	**0.2**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-8	N/A	0.1	0.01	0.00194	Background	0	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-9	N/A	0.1	0.01	0.00078	Background	0	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-10	N/A	0.1	0.01	0.00080	Background	**0.1**	New unnamed piping section
3638-005	B-25	N/A	N/A	NO ID-11	N/A	0.1	0.01	0.00097	Background	**0.2**	New unnamed piping section

Notes:

[a] All B-25 containers are 100% full except for 3638-003 (80% full) and 3638-001 (50% full). The 55-gallon drum is 70% full. Drains were loaded into containers 3638-004 and 3638-007.

[b] Pipe/drain evaluation readings were taken from within the piping of concern.

[c] The EA VOC action level is the field "background" level or the concentration that is observed in the work area prior to encountering any drain piping interiors.

[d] As described in the Site-Specific Safety and Health Plan, Characterization of Drain Piping – 4th Floor through Basement for 201 Varick Street, New York City, New York. Dated June 2021.

Bold = Value above the EA Action Level

Red = Value above the OSHA PEL

mg/m^3 = Milligram per cubic meter

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit

ppm = Parts per million

VOC = Volatile organic compound

Table H-3. 201 Varick Street 4th Floor Remaining Piping/Drain Evaluation

Sample Name	Riser Number	Drain Number [a]	Date	Time	Mercury Vapor			Volatile Organic Compounds		Notes
					OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	
4F-64-001	64	--	6/18/2021	0925	0.1	0.01	0.00006	Background	0	Vertical piping - no sediment/scale available for sample collection
--	64	64-1	6/18/2021	0934	0.1	0.01	0.00004	Background	0	
--	64	64-2-1	6/18/2021	0941	0.1	0.01	0.00009	Background	0	East drain
--	64	64-2-2	6/18/2021	0945	0.1	0.01	0.00013	Background	0	West drain
--	64	64-3	6/18/2021	0958	0.1	0.01	0.00009	Background	0	
--	64	64-4	6/18/2021	0952	0.1	0.01	0.00005	Background	0	
--	64	64-5	6/18/2021	1012	0.1	0.01	0.00008	Background	0	
--	64	64-6	6/18/2021	1004	0.1	0.01	0.00017	Background	0	
4F-158-001	158	--	6/18/2021	1100	0.1	0.01	0	Background	**0.1**	Not enough sediment/scale available for sample collection
--	158	158-1	6/18/2021	1115	0.1	0.01	--	Background	--	Residual liquids/bio flowed out of capped drain
--	158	158-2	6/18/2021	1125	0.1	0.01	0.0001	Background	0	
--	158	158-3	6/18/2021	--	0.1	0.01	--	Background	--	Drain currently in use, but not active - did not open
4F-168-001	168	--	6/18/2021	1131	0.1	0.01	0.00009	Background	**0.1**	Sediment/scale inaccessible for sample collection - Piping too narrow
--	168	168-1	6/18/2021	--	0.1	0.01	--	Background	--	Drain currently in use, but not active - did not open
4F-76-001	76	--	6/18/2021	1354	0.1	0.01	0.00018	Background	0	Sediment/scale inaccessible for sample collection - Piping too narrow
--	76	76-1	6/18/2021	1400	0.1	0.01	0.00025	Background	0	
--	76	76-2	6/18/2021	1420	0.1	0.01	0.00026	Background	0	
--	76	76-3	6/18/2021	1430	0.1	0.01	0.00102	Background	0	
--	76	76-4	6/18/2021	1438	0.1	0.01	0.00027	Background	0	
--	76	76-5	6/18/2021	1441	0.1	0.01	0.00034	Background	**0.1**	
--	76	76-6	6/18/2021	--	0.1	0.01	--	Background	--	Drain sealed with concrete
--	76	76-7	6/18/2021	--	0.1	0.01	--	Background	--	Newly installed drain currently in use/active
--	76	76-8	6/18/2021	--	0.1	0.01	--	Background	--	Newly installed drain currently in use/active
--	76	76-9	6/18/2021	--	0.1	0.01	--	Background	--	Drain sealed with concrete

Notes:

[a] See Figure 3-4.

[b] Pipe/drain evaluation readings were taken from within the piping of concern.

[c] The EA VOC action level is the field "background" level or the concentration that is observed in the work area prior to encountering any drain piping interiors.

[d] As described in the Site-Specific Safety and Health Plan, Characterization of Drain Piping – 4th Floor through Basement for 201 Varick Street, New York City, New York. Dated June 2021.

Bold = Value above the EA Action Level

Red = Value above the OSHA PEL

Table H-3. 201 Varick Street 4th Floor Remaining Piping/Drain Evaluation

Sample Name	Riser Number	Drain Number [a]	Date	Time	Mercury Vapor			Volatile Organic Compounds		Notes
					OSHA PEL (mg/m^3) [d]	EA Action Level (mg/m^3) [d]	Measured Concentration (mg/m^3) [b]	EA Action Level (ppm) [c,d]	Measured Concentration (ppm) [b]	

mg/m^3 = Milligram per cubic meter
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Limit
ppm = Parts per million
VOC = Volatile organic compound

ATTACHMENT I

Radiological Field Data

Table I-1. Piping Field Survey Results Summary
Table I-2. Personnel Air Monitoring Data
Table I-3. Final Basement Room B-10 Release Survey

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TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Collection Date
3638T003	144	NW	1-1	144	11	1	36	3	52	6/15/2021
3638T003	144	NW	1-2	144	5	0	27	-1	8	6/15/2021
3638T003	144	NW	2-1	144	9	1	40	3	72	6/15/2021
3638T003	144	NW	2-2	144	11	0	36	-1	52	6/15/2021
3638T003	144	NW	3-1	144	6	0	36	-1	52	6/15/2021
3638T003	144	NW	3-2	144	4	0	37	-1	57	6/15/2021
3638T003	144	NW	4-1	144	14	0	31	-1	28	6/15/2021
3638T003	144	NW	4-2	144	12	0	33	-1	38	6/15/2021
3638T003	144	S	5-1	144	8	1	25	3	-2	6/15/2021
3638T003	144	S	5-2	144	11	1	39	3	67	6/15/2021
3638T003	144	NW	6-1	145	6	1	24	3	-7	6/15/2021
3638T003	144	NW	6-2	145	8	1	32	3	33	6/15/2021
3638T003	144	NW	6-3	145	11	1	27	3	8	6/15/2021
3638T003	144	NW	7	144	N/A - PIPING NOT LOCATED IN CONTAINER "003"					6/15/2021
3638T003	144	NW	8	145						6/15/2021
3638T003	144	NW	9	144						6/15/2021
3638T003	144	S	10-1	144	10	0	27	-1	8	6/15/2021
3638T003	144	S	10-2	144	7	0	33	-1	38	6/15/2021
3638T003	144	S	11-1	144	9	0	23	-1	-12	6/15/2021
3638T003	144	S	11-2	144	8	1	29	3	18	6/15/2021
3638T003	144	S	12-1	144	10	0	26	-1	3	6/15/2021
3638T003	144	S	12-2	144	3	0	33	-1	38	6/15/2021
3638T003	144	S	13-1	144	13	1	22	3	-17	6/15/2021
3638T003	144	S	13-2	144	16	0	25	-1	-2	6/15/2021
3638T003	144	NW	14-1	144	10	1	25	3	-2	6/15/2021
3638T003	144	NW	14-2	144	11	0	31	-1	28	6/15/2021
3638T003	144	NW	15-1	144	10	0	29	-1	18	6/15/2021
3638T003	144	NW	15-2	144	8	1	21	3	-22	6/15/2021
3638T003	144	NW	16-1	145	17	1	26	3	3	6/15/2021
3638T003	144	NW	16-2	145	8	1	36	3	52	6/15/2021
3638T003	144	NW	17-1	145	5	0	22	-1	-17	6/15/2021
3638T003	144	NW	17-2	145	15	0	33	-1	38	6/15/2021
3638T003	144	NW	17-3	145	5	0	39	-1	67	6/15/2021
3638T003	144	N	18-1	145	7	1	34	3	42	6/15/2021
3638T003	144	N	18-2	145	5	0	30	-1	23	6/15/2021
3638T003	144	N	18-3	145	10	0	33	-1	38	6/15/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Collection Date
3638T003	144	N	19-1	145	7	0	23	-1	-12	6/15/2021
3638T003	144	N	19-2	145	11	0	21	-1	-22	6/15/2021
3638T003	144	N	19-3	145	4	0	33	-1	38	6/15/2021
3638T003	144	N	19-4	145	9	0	26	-1	3	6/15/2021
3638T003	144	N	20-1	145	2	0	19	-1	-32	6/15/2021
3638T003	144	N	20-2	145	9	0	21	-1	-22	6/15/2021
3638T003	144	N	21-1	145	3	0	21	-1	-22	6/15/2021
3638T003	144	N	21-2	145	22	2	36	6	52	6/15/2021
3638T003	144	N	22-1	145	9	0	32	-1	33	6/15/2021
3638T003	144	N	22-1	145	5	0	24	-1	-7	6/15/2021
3638T003	144	N	23-1	145	9	0	22	-1	-17	6/15/2021
3638T003	144	N	23-2	145	10	0	26	-1	3	6/15/2021
3638T003	144	NE	24-1	145	12	0	26	-1	3	6/15/2021
3638T003	144	NE	24-2	145	11	0	30	-1	23	6/15/2021
3638T003	144	NE	25-1	145	14	0	25	-1	-2	6/15/2021
3638T003	144	NE	25-2	145	8	0	35	-1	47	6/15/2021
3638T003	144	NE	26-1	145	8	0	30	-1	23	6/15/2021
3638T003	144	NE	26-2	145	11	0	39	-1	67	6/15/2021
3638T003	144	NW	27-1	145	10	0	34	-1	42	6/15/2021
3638T003	144	NW	27-2	145	9	2	33	6	38	6/15/2021
3638T003	144	NW	27-3	145	10	Closed Cap no smear		N/A	N/A	6/15/2021
3638T003	144	NW	28-1	145	6	0	32	-1	33	6/15/2021
3638T003	144	NW	28-2	145	10	1	44	3	92	6/15/2021
3638T003	144	W	29-1	145	9	0	34	-1	42	6/15/2021
3638T003	144	W	29-2	145	13	0	36	-1	52	6/15/2021
3638T003	125	W	30-1	145	7	0	31	-1	28	6/15/2021
3638T003	125	W	30-2	145	10	0	23	-1	-12	6/15/2021
3638T003	125	W	30-3	145	11	0	12	-1	-66	6/15/2021
3638T003	125	W	31-1	145	12	0	27	-1	8	6/15/2021
3638T003	125	W	31-1	145	18	0	40	-1	72	6/15/2021
3638T003	125	NW	32-1	145	7	0	41	-1	77	6/15/2021
3638T003	125	NW	32-2	145	5	2	36	6	52	6/15/2021
3638T003	125	NW	33-1	145	11	0	32	-1	33	6/15/2021
3638T003	125	NW	33-2	145	10	0	39	-1	67	6/15/2021
3638T003	125	S	34-1	145	10	0	24	-1	-7	6/15/2021
3638T003	125	S	34-2	145	8	0	29	-1	18	6/15/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Collection Date
3638T003	125	S	35-1	145	12	0	26	-1	3	6/15/2021
3638T003	125	S	35-2	145	11	0	29	-1	18	6/15/2021
3638T003	125	S	36-1	145	12	0	29	-1	18	6/15/2021
3638T003	125	S	36-2	145	4	0	30	-1	23	6/15/2021
3638T003	125	S	37-1	145	13	0	31	-1	28	6/15/2021
3638T003	125	S	37-2	145	6	0	33	-1	38	6/15/2021
3638T003	125	NE	38-1	145	7	0	39	-1	67	6/15/2021
3638T003	125	NE	38-2	145	10	0	24	-1	-7	6/15/2021
3638T003	125	NE	39-1	145	8	2	25	6	-2	6/15/2021
3638T003	125	NE	39-2	145	8	1	25	3	-2	6/15/2021
3638T003	144	NE	41-1	145	11	0	31	-1	28	6/15/2021
3638T003	144	NE	41-2	145	13	0	22	-1	-17	6/15/2021
3638T003	144	NE	42-1	145	6	0	39	-1	67	6/15/2021
3638T003	144	NE	42-2	145	7	0	32	-1	33	6/15/2021
3638T003	144	NE	43-1	145	8	0	18	-1	-37	6/15/2021
3638T003	144	NE	43-2	145	8	0	19	-1	-32	6/15/2021
3638T003	144	NE	44-1	145	7	1	27	3	8	6/15/2021
3638T003	144	NE	44-2	145	9	0	19	-1	-32	6/15/2021
3638T003	144	NE	44-3	145	5	0	27	-1	8	6/15/2021
3638T003	145	NW	45-1	145	10	0	20	-1	-27	6/15/2021
3638T003	145	NW	45-2	145	3	0	26	-1	3	6/15/2021
3638T003	145	NW	45-3	145	5	0	34	-1	42	6/15/2021
3638T003	145	NW	45-4	145	6	0	23	-1	-12	6/15/2021
3638T003	145	NW	46-1	145	9	0	25	-1	-2	6/15/2021
3638T003	145	NW	46-2	145	12	**6***	35	**21***	47	6/15/2021
3638T003	145	N	47-1	145	10	1	19	3	-32	6/15/2021
3638T003	145	N	47-2	145	10	0	22	-1	-17	6/15/2021
3638T003	144	NE	49-1	145	6	3	20	10	-27	6/15/2021
3638T003	144	NE	49-2	145	2	0	29	-1	18	6/15/2021
3638T003	145	N	52-1	145	17	4	31	14	28	6/15/2021
3638T003	145	N	52-2	145	11	0	39	-1	67	6/15/2021
3638T003	145	N	53-1	145	4	0	26	-1	3	6/15/2021
3638T003	145	N	53-2	145	7	3	30	10	23	6/15/2021
3638T003	145	N	54-1	145	15	0	25	-1	-2	6/15/2021
3638T003	145	N	54-2	145	12	0	33	-1	38	6/15/2021
3638T003	145	N	55-1	145	11	2	27	6	8	6/15/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Collection Date
3638T003	145	N	55-2	145	13	0	19	-1	-32	6/15/2021
3638T003	145	NE	57-1	145	8	0	23	-1	-12	6/15/2021
3638T003	145	NE	57-2	145	20	1	26	3	3	6/15/2021
3638T003	145	NE	57-3	145	11	0	30	-1	23	6/15/2021
3638T003	145	NE	57-4	145	7	1	29	3	18	6/15/2021
3638T003	145	NE	60-1	145	10	0	32	-1	33	6/15/2021
3638T003	145	NE	60-2	145	9	1	37	3	57	6/15/2021
3638T003	146	W	63-1	128	9	2	26	6	3	6/15/2021
3638T003	146	W	63-2	128	7	0	31	-1	28	6/15/2021
3638T003	145	NE	64-1	128	12	0	29	-1	18	6/15/2021
3638T003	145	NE	64-2	128	4	0	39	-1	67	6/15/2021
3638T003	145	NE	64-3	128	10	2	27	6	8	6/15/2021
3638T003	145	NE	66-1	128	5	0	30	-1	23	6/15/2021
3638T003	145	NE	66-2	128	7	1	29	3	18	6/15/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
3638T005	28	E	275-1	64	11	1	32	3	35	6/17/2021
3638T005	28	E	275-2	64	8	1	39	3	69	6/17/2021
3638T005	28	E	276-1	64	9	0	30	-1	25	6/17/2021
3638T005	28	E	276-2	64	14	0	36	-1	54	6/17/2021
3638T005	66	E	277-1	64	2	0	21	-1	-20	6/17/2021
3638T005	66	E	277-2	64	6	0	27	-1	10	6/17/2021
3638T005	66	E	278-1	64	7	1	32	3	35	6/17/2021
3638T005	66	E	278-2	64	11	1	40	3	74	6/17/2021
3638T005	66	E	279-1	64	11	1	41	3	79	6/16/2021
3638T005	66	E	279-2	64	10	0	29	-1	20	6/16/2021
3638T005	66	E	280-1	64	7	0	26	-1	5	6/17/2021
3638T005	66	E	280-2	64	10	0	32	-1	35	6/17/2021
3638T005	66	E	281	64	7	0	25	-1	0	6/16/2021
3638T005	66	E	282-1	64	8	0	26	-1	5	6/17/2021
3638T005	66	E	282-2	64	11	0	29	-1	20	6/17/2021
3638T005	47	E	283-1	64	8	0	26	-1	5	6/17/2021
3638T005	47	E	283-2	64	8	0	45	-1	99	6/17/2021
3638T005	47	E	284-1	64	7	1	36	3	54	6/17/2021
3638T005	47	E	284-2	64	10	0	25	-1	0	6/17/2021
3638T005	66	E	285-1	64	3	2	25	7	0	6/17/2021
3638T005	66	E	285-2	64	6	0	31	-1	30	6/17/2021
3638T005	47	E	286-1	64	5	1	24	3	-5	6/17/2021
3638T005	47	E	286-2	64	9	0	33	-1	40	6/17/2021
3638T005	47	E	287-1	64	5	1	36	3	54	6/17/2021
3638T005	47	E	287-2	64	8	0	29	-1	20	6/17/2021
3638T005	66	E	288-1	64	6	0	24	-1	-5	6/17/2021
3638T005	66	E	288-2	64	6	0	29	-1	20	6/17/2021
3638T005	66	E	289-1	64	10	0	31	-1	30	6/17/2021
3638T005	66	E	289-2	64	12	0	26	-1	5	6/17/2021
3638T005	66	E	289-3	64	11	1	40	3	74	6/17/2021
3638T005	66	E	290-1	64	4	0	21	-1	-20	6/17/2021
3638T005	66	E	290-2	64	11	0	39	-1	69	6/17/2021
3638T005	66	S	291	64	12	0	24	-1	-5	6/16/2021
3638T005	64	E	292-1	64	4	0	21	-1	-20	6/17/2021
3638T005	64	E	292-2	64	8	0	28	-1	15	6/17/2021
3638T005	66	S	293-1	64	4	1	19	3	-30	6/16/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
3638T005	66	S	293-2	64	9	1	28	3	15	6/16/2021
3638T005	66	S	294-1	64	6	0	29	-1	20	6/16/2021
3638T005	66	S	294-2	64	12	0	32	-1	35	6/16/2021
3638T005	66	W	295-1	64	9	0	27	-1	10	6/16/2021
3638T005	66	W	295-2	64	6	1	27	3	10	6/16/2021
3638T005	66	W	296-1	64	8	0	26	-1	5	6/16/2021
3638T005	66	W	296-2	64	6	1	29	3	20	6/16/2021
3638T005	66	W	297-1	64	3	0	33	-1	40	6/17/2021
3638T005	66	W	297-2	64	6	0	32	-1	35	6/17/2021
3638T005	66	NW	298-1	64	11	1	38	3	64	6/17/2021
3638T005	66	NW	298-2	64	3	0	29	-1	20	6/17/2021
3638T005	66	W	299	64	12	1	23	3	-10	6/17/2021
3638T005	66	E	300-1	64	10	0	26	-1	5	6/17/2021
3638T005	66	E	300-2	64	7	0	29	-1	20	6/17/2021
3638T005	66	E	300-3	64	8	0	32	-1	35	6/17/2021
3638T005	66	NW	301	64	8	1	20	3	-25	6/16/2021
3638T005	66	NW	301-1	64	8	1	19	3	-30	6/17/2021
3638T005	66	NW	301-1	64	5	0	20	-1	-25	6/17/2021
3638T005	64	E	302-1	64	9	1	30	3	25	6/17/2021
3638T005	64	E	302-2	64	9	1	22	3	-15	6/17/2021
3638T005	64	E	303-1	64	7	0	37	-1	59	6/17/2021
3638T005	64	E	303-2	64	8	0	25	-1	0	6/17/2021
3638T005	64	E	303-3	64	5	0	29	-1	20	6/17/2021
3638T005	66	W	304-1	64	11	0	33	-1	40	6/17/2021
3638T005	66	W	304-2	64	6	0	29	-1	20	6/17/2021
3638T005	66	W	304-3	64	14	0	21	-1	-20	6/17/2021
3638T005	66	SW	305-1	64	9	0	23	-1	-10	6/17/2021
3638T005	66	SW	305-2	64	4	0	22	-1	-15	6/17/2021
3638T005	65	W	306-1	64	11	1	29	3	20	6/17/2021
3638T005	65	W	306-2	64	6	0	31	-1	30	6/17/2021
3638T005	65	W	306-3	64	9	1	22	3	-15	6/17/2021
3638T005	65	W	306-4	64	7	0	39	-1	69	6/17/2021
3638T005	65	W	306 DUP-1	64	7	0	31	-1	30	6/17/2021
3638T005	65	W	306 DUP-2	64	10	0	36	-1	54	6/17/2021
3638T005	65	W	307-1	64	4	1	26	3	5	6/17/2021
3638T005	65	W	307-1	64	10	0	24	-1	-5	6/17/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
3638T005	65	S	308-1	64	5	1	29	3	20	6/17/2021
3638T005	65	S	308-2	64	9	3	26	10	5	6/17/2021
3638T005	65	S	309	64	9	2	36	7	54	6/17/2021
3638T005	65	E	310-1	64	12	0	17	-1	-40	6/17/2021
3638T005	65	E	310-2	64	8	0	26	-1	5	6/17/2021
3638T005	65	S	311-1	64	12	1	28	3	15	6/17/2021
3638T005	65	S	311-2	64	10	0	26	-1	5	6/17/2021
3638T005	65	S	311-3	64	6	0	30	-1	25	6/17/2021
3638T005	65	S	311-4	64	5	0	39	-1	69	6/17/2021
3638T005	65	S	312-1	64	9	0	25	-1	0	6/17/2021
3638T005	65	S	312-2	64	9	0	26	-1	5	6/17/2021
3638T005	65	W	313-1	64	11	0	27	-1	10	6/17/2021
3638T005	65	W	313-2	64	10	0	39	-1	69	6/17/2021
3638T005	65	W	314	64						
3638T005	56	N	315	76	Piping Not located in Container "005"					
3638T005	56	N	316-1	76	7	1	28	3	15	6/16/2021
3638T005	56	N	316-2	76	10	1	30	3	25	6/16/2021
3638T005	56	N	316-3	76	6	0	22	-1	-15	6/16/2021
3638T005	56	N	317-1	76	9	0	29	-1	20	6/16/2021
3638T005	56	N	317-2	76	15	2	37	7	59	6/16/2021
3638T005	56	N	318-1	76	14	0	31	-1	30	6/16/2021
3638T005	56	N	318-2	76	9	0	27	-1	10	6/16/2021
3638T005	56	N	319	76	Piping Not located in Container "005"					
3638T005	37	N	320	76	5	1	31	3	30	6/16/2021
3638T005	36	N	321-1	76	11	0	34	-1	44	6/16/2021
3638T005	36	N	321-2	76	11	2	37	7	59	6/16/2021
3638T005	55	S	322-1	76	11	0	26	-1	5	6/16/2021
3638T005	55	S	322-2	76	17	0	31	-1	30	6/16/2021
3638T005	55	SE	323-1	76	15	1	25	3	0	6/16/2021
3638T005	55	SE	323-2	76	10	0	24	-1	-5	6/16/2021
3638T005	55	S	324-1	76	12	0	24	-1	-5	6/16/2021
3638T005	55	S	324-2	76	14	0	39	-1	69	6/16/2021
3638T005	55	S	325-1	76	11	0	20	-1	-25	6/16/2021
3638T005	55	S	325-2	76	18	0	26	-1	5	6/16/2021
3638T005	55	S	326	76	Piping Not located in Container "005"					
3638T005	56	SW	327-1	76	11	0	32	-1	35	6/16/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
3638T005	56	SW	327-2	76	9	0	39	-1	69	6/16/2021
3638T005	56	SW	328-1	76	14	0	18	-1	-35	6/16/2021
3638T005	56	SW	328-2	76	6	0	28	-1	15	6/16/2021
3638T005	56	SW	329-1	76	11	0	33	-1	40	6/16/2021
3638T005	56	SW	329-2	76	16	0	39	-1	69	6/16/2021
3638T005	56	SW	329-3	76	10	2	30	7	25	6/16/2021
3638T005	80	S	330-1	N/A	8	0	25	-1	0	6/16/2021
3638T005	80	S	330-2	N/A	5	0	29	-1	20	6/16/2021
3638T005	80	S	331-1	N/A	10	0	27	-1	10	6/16/2021
3638T005	80	S	331-1	N/A	8	0	39	-1	69	6/16/2021
3638T005	80	S	332-1	N/A	4	0	31	-1	30	6/16/2021
3638T005	80	S	332-2	N/A	8	0	28	-1	15	6/16/2021
3638T005	80	S	333-1	N/A	4	0	27	-1	10	6/16/2021
3638T005	80	S	333-2	N/A	7	2	22	7	-15	6/16/2021
3638T005	80	S	333-3	N/A	5	0	35	-1	49	6/16/2021
3638T005	80	S	334	N/A	9	0	25	-1	0	6/16/2021
3638T005	80	SE	335-1	N/A	12	0	23	-1	-10	6/16/2021
3638T005	80	SE	335-2	N/A	10	0	29	-1	20	6/16/2021
3638T005	80	SE	336-1	N/A	9	0	23	-1	-10	6/16/2021
3638T005	80	SE	336-2	N/A	9	2	36	7	54	6/16/2021
3638T005	80	SE	337-1	N/A	8	0	28	-1	15	6/16/2021
3638T005	80	SE	337-2	N/A	6	0	23	-1	-10	6/16/2021
3638T005	Gate 14	S	338-1	N/A	9	0	22	-1	-15	6/16/2021
3638T005	Gate 14	S	338-2	N/A	8	0	29	-1	20	6/16/2021
3638T005	Gate 14	S	339-1	N/A	7	0	31	-1	30	6/16/2021
3638T005	Gate 14	S	339-2	N/A	12	1	19	3	-30	6/16/2021
3638T005	Gate 14	S	340-1	N/A	9	0	24	-1	-5	6/16/2021
3638T005	Gate 14	S	340-2	N/A	11	0	28	-1	15	6/16/2021
3638T005	Gate 14	S	340-3	N/A	10	0	38	-1	64	6/16/2021
3638T005	Gate 14	S	341-1	N/A	17	0	24	-1	-5	6/16/2021
3638T005	Gate 14	S	341-2	N/A	11	0	23	-1	-10	6/16/2021
3638T005	Gate 14	S	341-3	N/A	16	1	25	3	0	6/16/2021
3638T005	28	NA	275-1	64	11	1	32	3	35	6/16/2021
3638T005	28	NA	275-2	64	8	1	39	3	69	6/16/2021
3638T005	65	NA	306-1	64	7	0	31	-1	30	6/16/2021
3638T005	65	NA	306-2	64	10	0	36	-1	54	6/16/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Waste Container Serial #	Nearest Column to Pipe Removed	Downstream Direction of Pipe	Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
3638T005	66	NA	301-1	64	8	1	19	3	-30	6/16/2021
3638T005	66	NA	301-2	64	5	0	20	-1	-25	6/16/2021
No ID# 1-1	NA	NA	NA	NA	6	1	20	3	-25	6/16/2021
No ID# 1-2	NA	NA	NA	NA	5	0	24	-1	-5	6/16/2021
No ID# 2	NA	NA	NA	NA	9	0	26	-1	5	6/16/2021
No ID# 3-1	NA	NA	NA	NA	7	0	28	-1	15	6/16/2021
No ID# 3-2	NA	NA	NA	NA	9	0	31	-1	30	6/16/2021
No ID# 4-1	NA	NA	NA	NA	8	1	35	3	49	6/16/2021
No ID# 4-2	NA	NA	NA	NA	11	1	30	3	25	6/16/2021
No ID# 5-1	NA	NA	NA	NA	14	0	26	-1	5	6/16/2021
No ID# 5-2	NA	NA	NA	NA	8	0	23	-1	-10	6/16/2021
No ID# 6-1	NA	NA	NA	NA	12	0	26	-1	5	6/16/2021
No ID# 6-2	NA	NA	NA	NA	8	1	33	3	40	6/16/2021
No ID# 7	NA	NA	NA	NA	5	0	23	-1	-10	6/16/2021
No ID# 8	NA	NA	NA	NA	8	0	35	-1	49	6/16/2021
No ID# 9	NA	NA	NA	NA	10	0	30	-1	25	6/16/2021
No ID# 10	NA	NA	NA	NA	18	1	22	3	-15	6/16/2021
No ID# 11	NA	NA	NA	NA	8	0	29	-1	20	6/16/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-1. PIPING FIELD SURVEY RESULTS SUMMARY

Location	Pipe ID/ Piece #	Riser#	Model 44-6 1 min Static (Beta/Gamma) Pipe Opening/End (cpm)	Alpha - Smear Results (cpm)	Beta - Smear Results (cpm)	Alpha - Smear Results (dpm/100 cm^2)	Beta - Smear Results (dpm/100 cm^2)	Date
4th Floor	4F-64-001	64	9	0	20	-1	-25	6/18/2021
4th Floor	4F-64-001 D1	64	14	0	22	-1	-15	6/18/2021
4th Floor	4F-64-001 D2.1	64	5	1	25	3	0	6/18/2021
4th Floor	4F-64-001 D2.2	64	6	0	20	-1	-25	6/18/2021
4th Floor	4F-64-001 D3	64	9	1	33	3	40	6/18/2021
4th Floor	4F-64-001 D4	64	9	0	34	-1	44	6/18/2021
4th Floor	4F-64-001 D5	64	9	1	31	3	30	6/18/2021
4th Floor	4F-64-001 D6	64	10	0	24	-1	-5	6/18/2021
4th Floor	4F-76-001	76	4	0	31	-1	30	6/18/2021
4th Floor	4F-76-001 D1	76	12	1	34	3	44	6/18/2021
4th Floor	4F-76-001 D2	76	16	0	21	-1	-20	6/18/2021
4th Floor	4F-76-001 D3	76	10	0	28	-1	15	6/18/2021
4th Floor	4F-76-001 D4	76	10	0	38	-1	64	6/18/2021
4th Floor	4F-76-001 D5	76	15	0	23	-1	-10	6/18/2021
4th Floor	4F-158-001	158	10	0	28	-1	15	6/18/2021
4th Floor	4F-158-001 D2	158	7	0	27	-1	10	6/18/2021
4th Floor	4F-168-001	168	8	0	24	-1	-5	6/18/2021

* Exceeds Background Threshold Value (BTV; see Attachment G)

Note: Counts per minute (cpm) results are total (or gross) measurements not corrected for background.

Disintegrations per minute per 100 square centimeter (dpm/100 cm2) results are net results corrected for ambient background.

TABLE I-2. PERSONAL AIR MONITORING DATA

PERSONNEL AIR MONITORING DATA CALCULATION LOG (Rev 7)

Counting Instrument:		2929		**Detector:**	43-10-1		**Cal. Date:**	6/14/2021												
Serial #:		271413		**Serial #:**	PR291575		**Cal. Due Date OK?**	OK												

Radiation Type	Counting Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Sample Count time (min)	Background Count time (min)		**Limiting Alpha Isotope of Concern**			**Limiting Beta Isotope of Concern**						
Alpha	0.2729	Th-230	7103-10	15,600	6/16/2010	7.54E+04	15598	10	10		Isotope	10CFR20 Occup. DAC		Isotope	10CFR20 Occup. DAC					
Beta	0.2025	Tc-99	7104-10	12,400	6/21/2010	2.11E+05	12400	10	10		Ra-226	3.00E-10		Sr-90	2.00E-09					

Person Monitored	**Air Sample Start Time Period Date/Time**	**Air Sample End Time Period Date/Time**	**Count Date**	**Total BZ Run Time (min)**	**Flow rate (lpm)**	**Sample Gross Alpha (Counts)**	**Sample Gross Beta (Counts)**	**Alpha Bkg (cpm)**	**Beta Bkg (cpm)**	**Filter Efficiency (fraction)**	**Sample Alpha Activity (dpm)**	**Sample Beta Activity (dpm)**	**Alpha Count Concen. (uCi/cc)**	**Beta Count Concen. (uCi/cc)**	**Alpha DAC-hours**	**Beta DAC-hours**	**Alpha MDA (uCi/cc)**	**Beta MDA (uCi/cc)**
06152021-BZ1	6/15/21 0:00	6/15/21 0:00	06/16/21	388	2.5	5	240	0.1	24.9	1.00	1	-4	6.81E-13	-2.06E-12	0.0	0.0	1.25E-12	1.75E-11
06152021-BZ2	6/15/21 0:00	6/15/21 0:00	06/16/21	255	2.5	7	253	0.1	24.9	1.00	2	2	1.55E-12	1.40E-12	0.0	0.0	1.91E-12	2.66E-11
06162021-BZ1	6/16/21 0:00	6/16/21 0:00	06/17/21	504	2.5	5	240	0.3	25.4	1.00	1	-7	2.62E-13	-2.47E-12	0.0	0.0	1.41E-12	1.36E-11
06162021-BZ2	6/16/21 0:00	6/16/21 0:00	06/17/21	503	2.5	10	265	0.3	25.4	1.00	3	5	9.19E-13	1.95E-12	0.0	0.0	1.41E-12	1.36E-11
06172021-BZ1	6/17/21 0:00	6/17/21 0:00	06/18/21	221	2.5	2	275	0.2	25	1.00	0	12	0.00E+00	1.01E-11	0.0	0.0	2.78E-12	3.07E-11
06172021-BZ2	6/17/21 0:00	6/17/21 0:00	06/18/21	221	2.5	2	277	0.2	25	1.00	0	13	0.00E+00	1.09E-11	0.0	0.0	2.78E-12	3.07E-11
06182021-BZ1	6/18/21 0:00	6/18/21 0:00	06/21/21	153	2.5	7	260	0.2	26.7	1.00	2	-3	2.16E-12	-4.07E-12	0.0	0.0	4.01E-12	4.58E-11

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TABLE I-3. FINAL BASEMENT ROOM B-10 RELEASE SURVEY

CABRERA SERVICES

Location: 4th floor through Basement **Site**: 201 Varick Street, NewYork City, NY	Project Name: Characterization of Drain Piping	Survey # DP-OUT-002	Survey Type: Release Survey	pg. 1 of 1

CPM/100cm²

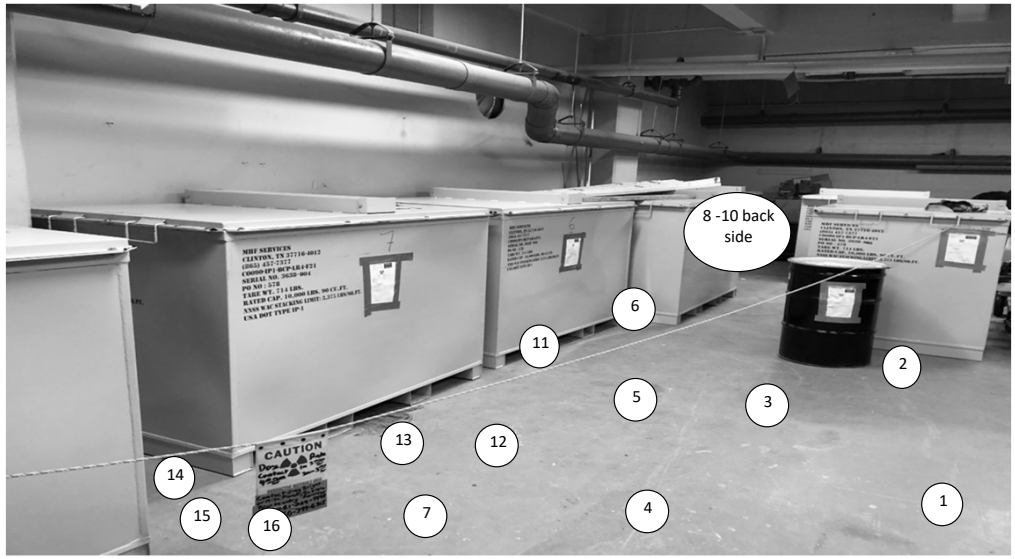
Static			Smears		
No.	α	β	No.	α	β
1	4	211	1	1	24
2	1	175	2	1	20
3	4	189	3	0	35
4	5	180	4	0	27
5	4	164	5	0	26
6	3	165	6	1	19
7	1	179	7	1	26
8	0	165	8	3	19
9	1	176	9	1	27
10	2	143	10	0	31
11	3	136	11	0	27
12	3	160	12	0	26
13	2	149	13	0	27
14	3	132	14	0	25
15	4	196	15	1	35
16	0	167	16	0	27

DPM/100cm²

Static			Smears		
No.	α	β	No.	α	β
1	12	128	1	3.3	-12
2	-6	-102	2	3.3	-32
3	12	-13	3	-0.4	42
4	17	-70	4	-0.4	3
5	12	-172	5	-0.4	-2
6	6	-166	6	3.3	-37
7	-6	-77	7	3.3	-2
8	-12	-166	8	10.6	-37
9	-6	-96	9	3.3	3
10	0	-306	10	-0.4	23
11	6	-351	11	-0.4	3
12	6	-198	12	-0.4	-2
13	0	-268	13	-0.4	3
14	6	-377	14	-0.4	-7
15	12	32	15	3.3	42
16	-12	-153	16	-0.4	3

Static and smears were collected from the same location. All taken from the concrete floor

Background taken on Concrete



Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	γ Bkg	Cal. Due
Juan Garza	22-Jun-21	Model 2929	271413						
		44-10-1	PR291575	0.2729	0.2025	0.1	26.4	NA	14-Jun-22
		Model 2360	168040						
		43-93	PR179861	0.1717	0.1567	2	191	NA	10-Feb-22
Reviewed By:	Date:								
B.Badaoui	6/22/2021								

B. Badaoui

Key	
□	A/S Location
-	Boundary
○	Smear
□	Dose Rate in μR/hr
*	Direct Reading CPM/direct frisk
△	Grab Sample

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ATTACHMENT J

Analytical Summary Tables

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Summary of Analytical Results for Mercury and Volatile Organic Compounds - 4th Floor Removed Piping (B-25 Boxes 3638-003 and 3638-005)
201 Varick Street, New York City, New York

			Location ID:	4FR-64	4FR-64	4FR-76	4FR-128	4FR-144	4FR-145	4FR-145
			Sample Name:	4FR-64-001	4FR-64-002	4FR-76-001	4FR-128-001	4FR-144-001	4FR-145-001	4FR-145-002
			Date Sampled:	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021
			Duplicate?:		Yes					Yes
			Parent Sample:		4FR-64-001					4FR-145-001
			B-25 Box No.:	3638-005	3638-005	3638-005	3638-005	3638-003	3638-003	3638-003
Analyte	**EPA RSL[(1)] (Residential)**	**EPA RSL[(1)] (Worker)**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Mercury (SW7471B)										
Mercury	11000	46000	µg/kg	**140000 D**	**330000 D**	**35000 D**	**75000 D**	**8700 D**	**47000 J1D**	**53000 D**
Volatile Organic Compounds (SW8260C)										
1,1,1-Trichloroethane	8100000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,1,2,2-Tetrachloroethane	600	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,1,2-Trichloro-1,2,2-trifluoroethane	6700000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,1,2-Trichloroethane	1100	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 UJ1	< 2.2 U
1,1-Dichloroethane	3600	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,1-Dichloroethene	230000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,2,4-Trichlorobenzene	24000	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 UJ1	< 2.2 U
1,2-Dibromo-3-chloropropane	5.3	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,2-Dibromoethane	36	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,2-Dichlorobenzene	1800000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,2-Dichloroethane	460	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,2-Dichloropropane	2500	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,3-Dichlorobenzene	--	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
1,4-Dichlorobenzene	2600	NE	µg/kg	< 1.8 U	< 1.7 U	--	--	--	< 1.8 UJ1	< 1.8 U
2-Butanone	27000000	NE	µg/kg	< 22 U	< 21 U	--	--	--	< 22 UJ1	< 22 U
2-Hexanone	200000	NE	µg/kg	< 22 U	< 21 U	--	--	--	< 22 UJ1	< 22 U
4-Methyl-2-pentanone	33000000	NE	µg/kg	< 8.8 U	< 8.4 U	--	--	--	< 8.8 U	< 8.9 U
Acetone	61000000	NE	µg/kg	< 88 UM	< 84 UM	--	--	--	< 88 UM	< 89 U
Benzene	1200	NE	µg/kg	< 0.55 U	< 0.53 U	--	--	--	< 0.55 UJ1	< 0.56 U
Bromodichloromethane	290	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Bromoform	19000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Bromomethane	6800	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 U	< 2.2 U
Carbon disulfide	770000	NE	µg/kg	< 0.55 UM	< 0.53 UM	--	--	--	< 0.55 UM	< 0.56 UM
Carbon tetrachloride	650	NE	µg/kg	< 0.55 U	< 0.53 U	--	--	--	< 0.55 UJ1	< 0.56 U

Summary of Analytical Results for Mercury and Volatile Organic Compounds - 4th Floor Removed Piping (B-25 Boxes 3638-003 and 3638-005)
201 Varick Street, New York City, New York

			Location ID:	4FR-64	4FR-64	4FR-76	4FR-128	4FR-144	4FR-145	4FR-145
			Sample Name:	4FR-64-001	4FR-64-002	4FR-76-001	4FR-128-001	4FR-144-001	4FR-145-001	4FR-145-002
			Date Sampled:	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021
			Duplicate?:		Yes					Yes
			Parent Sample:		4FR-64-001					4FR-145-001
			B-25 Box No.:	3638-005	3638-005	3638-005	3638-005	3638-003	3638-003	3638-003
Analyte	**EPA RSL[(1)] (Residential)**	**EPA RSL[(1)] (Worker)**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
Chlorobenzene	280000	NE	µg/kg	< 0.55 U	< 0.53 U	--	--	--	< 0.55 UJ1	< 0.56 U
Chloroethane	14000000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 U	< 1.1 U
Chloroform	320	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	**0.62 JJ1**	**0.55 J**
Chloromethane	110000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 U	< 1.1 U
cis-1,2-Dichloroethene	160000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
cis-1,3-Dichloropropene	1800	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Cyclohexane	6500000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Dibromochloromethane	8300	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Dichlorodifluoromethane	87000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 U	< 1.1 U
Ethylbenzene	5800	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Isopropylbenzene	1900000	NE	µg/kg	**0.35 J**	**0.45 J**	--	--	--	**0.18 JJ1**	< 0.56 U
Methyl acetate	78000000	NE	µg/kg	< 4.4 U	< 4.2 U	--	--	--	< 4.4 UJ1	< 4.5 U
Methyl tert-butyl ether	47000	NE	µg/kg	< 0.55 U	< 0.53 U	--	--	--	< 0.55 U	< 0.56 U
Methylcyclohexane	6500000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Methylene chloride	57000	NE	µg/kg	**1.4 J**	**0.38 J**	--	--	--	**5.6 J1**	**3.4 J**
Styrene	6000000	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 UJ1	< 2.2 U
Tetrachloroethene	24000	NE	µg/kg	**0.34 J**	**0.72 J**	--	--	--	**1.7 JJ1**	**1.1 J**
Toluene	4900000	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 UJ1	< 2.2 U
trans-1,2-Dichloroethene	1600000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
trans-1,3-Dichloropropene	1800	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Trichloroethene	940	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 UJ1	< 1.1 U
Trichlorofluoromethane	23000000	NE	µg/kg	< 1.1 U	< 1.1 U	--	--	--	< 1.1 U	< 1.1 U
Vinyl chloride	59	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 U	< 2.2 U
Xylenes, total	580000	NE	µg/kg	< 2.2 U	< 2.1 U	--	--	--	< 2.2 UJ1	< 2.2 U

Notes:

(1) U.S. Environmental Protection Agency (EPA) Regional Screening Level (RSL), dated May 2021

Detected Analytes are boldfaced.

Summary of Analytical Results for Mercury and Volatile Organic Compounds - 4th Floor Removed Piping (B-25 Boxes 3638-003 and 3638-005)
201 Varick Street, New York City, New York

			Location ID:	4FR-64	4FR-64	4FR-76	4FR-128	4FR-144	4FR-145	4FR-145
			Sample Name:	4FR-64-001	4FR-64-002	4FR-76-001	4FR-128-001	4FR-144-001	4FR-145-001	4FR-145-002
			Date Sampled:	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021	6/22/2021
			Duplicate?:		Yes					Yes
			Parent Sample:		4FR-64-001					4FR-145-001
			B-25 Box No.:	3638-005	3638-005	3638-005	3638-005	3638-003	3638-003	3638-003
Analyte	**EPA RSL[(1)] (Residential)**	**EPA RSL[(1)] (Worker)**	**Unit**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**

Values exceeding USEPA Residential RSLs are grey shaded.
Values exceeding USEPA Worker RSLs are grey shaded with red text.
µg/kg = microgram(s) per kilogram.
D = The reported value is from a dilution.
J = Estimated: The analyte was positively identified; the quantitation is an estimation.
J1 = Estimated: The quantitation or Limit of Detection is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
M = Manual integrated compound.
NE = Not Evaluated

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Summary of Analytical Results for Radionuclides - 4th Floor Removed Piping (B-25 Boxes 3638-003 and 3638-005)
201 Varick Street, New York City, New York

Location ID:		4FR-64			4FR-64			4FR-76			4FR-128			4FR-144			4FR-145			4FR-145		
Sample Name:		4FR-64-001			4FR-64-002			4FR-76-001			4FR-128-001			4FR-144-001			4FR-145-001			4FR-145-002		
Date Sampled:		6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021			6/22/2021		
Duplicate?:					Yes															Yes		
Parent Sample:					4FR-64-001															4FR-145-001		
B-25 Box No.:		3638-005			3638-005			3638-005			3638-005			3638-005			3638-003			3638-003		
Analyte	**Unit**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**	**Result**	**Uncertainty**	**Qual**
Isotopic Analysis (A-01-R MOD)																						
Plutonium-238	pCi/g	< 0.126	0.0509	U	< 0.0950	0.0701	U	0.0828	0.0612		0.460	0.133		< 0.102	0.0616	U	0.164	0.0885		0.504	0.141	
Plutonium-239/240	pCi/g	< 0.0910	0.0250	U	< 0.111	0.0344	U	< 0.0780	0.0150	U	< 0.0778	0.0267	U	< 0.0883	0.0561	U	< 0.0682	0.0342	U	< 0.0569	0.0243	U
Thorium-228	pCi/g	< 0.127	0.0676	U	< 0.191	0.113	U	< 0.165	0.112	U	0.432	0.139		0.222	0.122		0.541	0.154		0.747	0.182	
Thorium-230	pCi/g	< 0.151	0.0922	U	< 0.180	0.116	U	< 0.198	0.143	U	0.310	0.132		0.563	0.180		0.680	0.180		0.888	0.206	
Thorium-232	pCi/g	< 0.0841	0.0211	U	< 0.0966	0.0456	U	0.161	0.102		0.566	0.142		0.337	0.122		0.534	0.141		0.749	0.172	
Uranium-234	pCi/g	0.0792	0.0508		0.0839	0.0626		1.25	0.216		0.706	0.152		0.719	0.165		0.331	0.103		0.700	0.151	
Uranium-235	pCi/g	< 0.0415	0.0177	U	< 0.0505	0.00522	U	0.0631	0.0501		< 0.0479	0.0389	U	< 0.0594	0.0479	U	< 0.0476	0.0346	U	0.137	0.0709	
Uranium-238	pCi/g	< 0.0459	0.0372	U	0.119	0.0660		1.75	0.266		0.605	0.139		0.920	0.188		0.516	0.128		0.775	0.160	
Gamma Spectroscopy (GA-01-R MOD)																						
Cesium-137	pCi/g	< 0.0595	0.0197	U	< 0.132	0.0761	U							0.253	0.0756		< 0.106	0.0611	U	< 0.127	0.0742	U
Radium-226	pCi/g	< 0.204	0.0339	U	< 0.495	0.177	U							0.373	0.138		0.461	0.163		0.382	0.163	
Thorium-232	pCi/g	< 0.140	0.0385	U	< 0.563	0.0494	U							< 0.351	0.220	U	0.560	0.189		0.848	0.228	
Uranium-235	pCi/g	< 0.590	0.0321	U	< 0.983	0.607	U							< 0.856	0.134	U	< 0.843	0.164	U	< 1.13	0.538	U
Uranium-238	pCi/g	< 1.27	0.0606	U	< 2.00	1.15	U							< 0.990	0.622	U	< 2.04	1.22	U	< 1.41	0.676	U
Strontium (SR-03-RC MOD)																						
Total Beta Strontium	pCi/g	< 0.222	0.126	U	< 0.238	0.144	U	< 0.367	0.230	U	< 0.221	0.135	U	< 0.225	0.133	U	< 0.187	0.113	U	< 0.202	0.130	U
Technetium (Tc-02-RC)																						
Technetium-99	pCi/g	< 0.520	0.291	U	< 0.501	0.278	U	< 0.513	0.300	U	< 0.516	0.284	U	< 0.622	0.339	U	< 0.520	0.292	U	< 0.507	0.279	U
Nickel (ST-RC-0055)																						
Technetium-99	pCi/g	<9.64	6.20	U	<7.31	5.64	U	<8.44	5.60	U	<6.35	6.43	U	<5.53	5.17	U	<3.34	4.59	U	<4.50	4.25	U

Notes:
pCi/g = picocuries per gram.
Qual = Qualifier
U = Undetected at the Limit of Detection.

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ATTACHMENT K

Waste Characterization Results

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Summary of Analytical Results for TCLP Metals and TCLP VOCs - 4th Floor Removed Piping (B-25 Boxes 3638-003 and 3638-005)
201 Varick Street, New York City, New York

		Location ID:	4FR-64	4FR-64	4FR-145	4FR-145
		Sample Name:	4FR-64-001	4FR-64-002	4FR-145-001	4FR-145-002
		Date Sampled:	6/22/2021	6/22/2021	6/22/2021	6/22/2021
Analyte	**RCRA**	**Unit**	**Result**	**Result**	**Result**	**Result**
Metals (SW6010C & SW7470A)						
Arsenic	5.0	mg/l	< 0.075 U	< 0.075 U	< 0.075 U	< 0.075 U
Barium	100.0	mg/l	0.61 J	0.64 J	0.48 J	0.39 J
Cadmium	1.0	mg/l	0.36	0.40	0.023 J	0.045 J
Chromium	5	mg/l	< 0.013 U	< 0.013 U	< 0.013 U	0.0037 J
Lead	5.0	mg/l	**7.2**	3.4	< 0.045 U	< 0.045 U
Mercury	0.2	mg/l	0.00025 J	0.028 DJ1	0.0021	0.0018 J
Selenium	1.0	mg/l	< 0.095 U	< 0.095 U	< 0.095 U	< 0.095 U
Silver	5.0	mg/l	< 0.025 U	< 0.025 U	< 0.025 U	< 0.025 U
VOCs (SW8260C)						
1,1-Dichloroethene	0.7	mg/l	< 0.0040 U	< 0.0040 U	< 0.0040 UJ1	< 0.0040 U
1,2-Dichloroethane	0.5	mg/l	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
2-Butanone	200.0	mg/l	< 0.032 U	< 0.032 U	< 0.032 U	< 0.032 U
Benzene	0.5	mg/l	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.0020 U
Carbon tetrachloride	0.5	mg/l	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
Chlorobenzene	100.0	mg/l	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.0020 U
Chloroform	6.0	mg/l	0.0020 J	0.0019 J	< 0.0020 U	0.0025 J
Tetrachloroethene	0.7	mg/l	< 0.0040 U	< 0.0040 U	< 0.0040 U	< 0.0040 U
Trichloroethene	0.5	mg/l	< 0.0020 U	< 0.0020 U	< 0.0020 U	< 0.0020 U
Vinyl chloride	0.2	mg/l	< 0.0080 U	< 0.0080 U	< 0.0080 U	< 0.0080 U

Notes:

Values exceeding the RCRA standards are boldfaced.

mg/l = Milligram(s) per liter.

D = The reported value is from a dilution.

J = Estimated: The analyte was positively identified; the quantitation is an estimation.

J1 = Estimated: The quantitation or Limit of Detection is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U = Undetected at the Limit of Detection.

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ATTACHMENT L

Photograph Log

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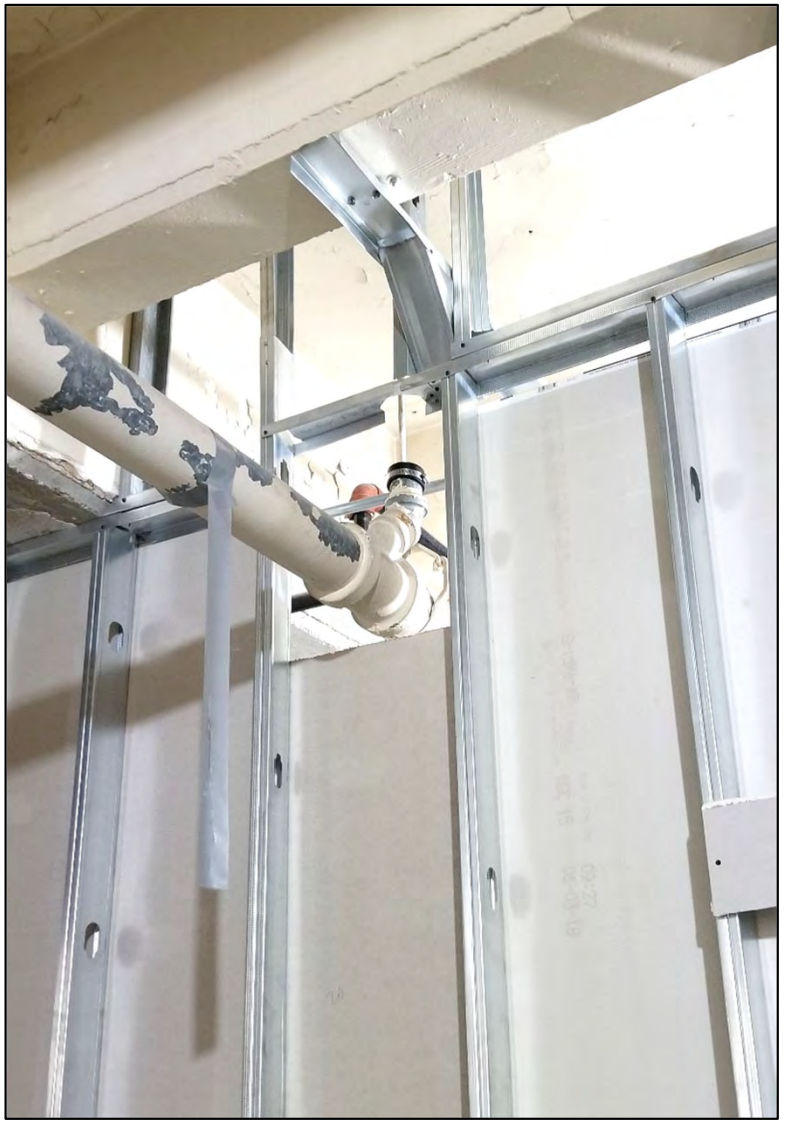
Appendix L - Photograph Log
DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick St.
New York, NY

Photos 1 and 2: 4th Floor remaining piping sampling location 4FR-64-001 at 4th Floor Riser 64.

Appendix L - Photograph Log
DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick St.
New York, NY

Photo 3: 4th Floor remaining piping locations at Drains 64-2-1 and 64-2-2.

Photo 4: 4th Floor remaining piping location at Drain 64-3.



Photos 5 and 6: 4th Floor remaining piping sampling location 4FR-76-001 at 4th Floor Riser 76.

Appendix L - Photograph Log
DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick St.
New York, NY

Photo 7: 4th Floor remaining piping sampling location 4FR-76-001 at 4th Floor Riser 76.

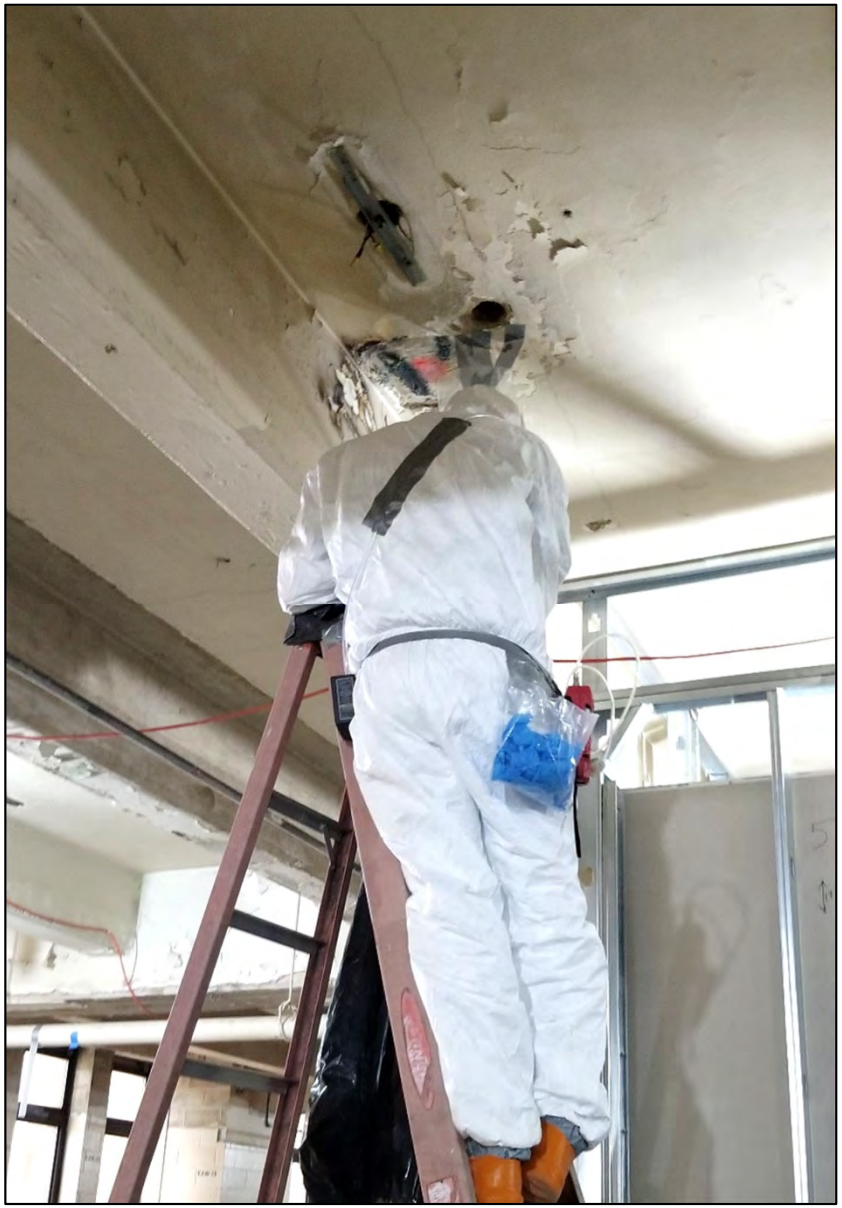
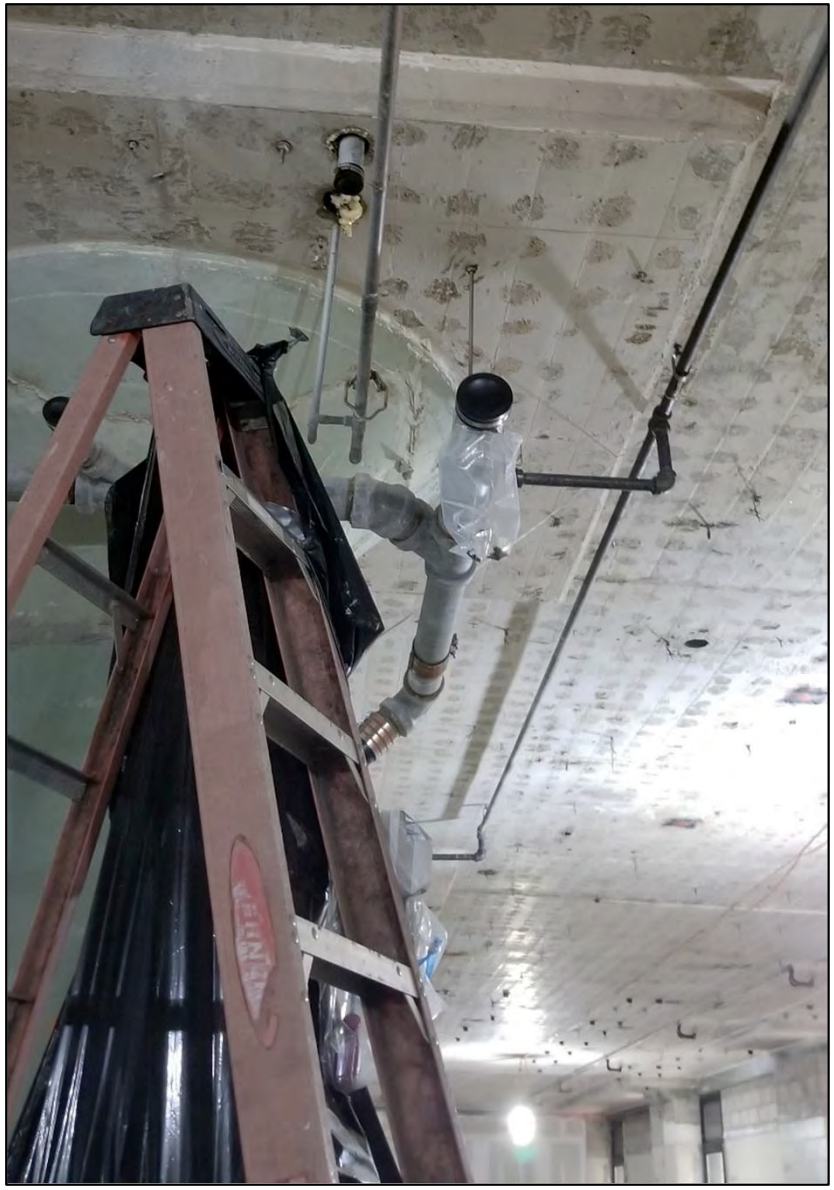


Photo 8: 4th Floor remaining piping location at Drain 76-2.

Appendix L - Photograph Log
DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick St.
New York, NY



Photos 9 and 10: 4th Floor remaining piping sampling location 4FR-158-001 at 4th Floor Riser 158 and Drain 158-1.

Appendix L - Photograph Log
DATA REPORT
Characterization of Drain Piping – In-Place 4th Floor Piping and Removed Piping in B-25 Boxes 3638-003 and 3638-005
201 Varick St.
New York, NY

Photos 11 and 12: 4th Floor remaining piping sampling location 4FR-168-001 at 4th Floor Riser 168.