FINAL

R-14 RANGE CHARACTERIZATION SURVEY REPORT

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ACRONYMS AND ABBREVIATIONS

AJMC	Army Joint Munitions Command
ANL	Argonne National Laboratory
APG	Aberdeen Proving Ground
ARL	Army Research Laboratory
bgs	below ground surface
bkgd	background
CABRERA	Cabrera Services, Inc.
CD	Compact Disc
CFR	Code of Federal Regulations
cm	centimeter(s)
cm^2	square centimeter(s)
COC	Contaminant of Concern
cpm	counts per minute
^{137}Cs	Cesium-137
DCB	dechachlorobiphenyl
DCGL	Derived Concentration Guideline Level
DGPS	Differential Global Positioning System
dpm	disintegration(s) per minute
DU	Depleted Uranium
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
FSM	Field Site Manager
ft	feet
ft^2	square feet
g	gram(s)
GWS	Gamma Walkover Survey
HEPA	High Efficiency Particulate Air
HPGe	High-Purity Germanium
in.	inch(es)
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
µg/L	microgram(s) per liter
m	meter(s)
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MDCR	Minimum Detectable Count Rate
MDL	Method Detection Limit
mg/L	milligram(s) per liter
mR/hr	milliRoentgen(s) per hour
mrem/yr	millirem per year
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAD	Normalized Absolute Difference
NaI	Sodium Iodide
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
OP	Operating Procedure
PAI	Paragon Analytics, Inc.
PCB	Polychlorinated Biphenyl
pCi/g	picoCurie(s) per gram
PM	Project Manager
PPE	Personal Protective Equipment
ppm	part(s) per million
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
ROC	Radionuclide of Concern
RPD	Relative Percent Difference
RSO	Radiation Safety Officer
sec	second(s)
SSHP	Site Safety and Health Plan
^{234}Th	Thorium-234
TMX	tetrachloro-meta-xylene
^{232}U	Uranium-232
^{234}U	Uranium-234
^{235}U	Uranium-235
^{238}U	Uranium-238

1.0 INTRODUCTION

This *Characterization Survey Report* presents the results of characterization survey and sampling activities conducted at the R-14 Range and surrounding area of the U.S. Army Research Laboratory (ARL) located at Aberdeen Proving Ground (APG) in Aberdeen, Maryland. The scope of the survey includes the evaluation of radiological and other environmental contamination of the buildings and grounds at this site. Characterization activities, including both fieldwork and document preparation, were performed by Cabrera Services, Inc. (CABRERA) for the U.S. Army Joint Munitions Command (AJMC), under Contract No. DAAA09-02-D-0024, Delivery Order 0029.

Detailed plans for the characterization survey discussed in this report are presented in the *R-14 Range Characterization Survey Work Plan* (CABRERA, 2006a), hereafter referred to as the *Work Plan*. Onsite field activities were performed December 4 to 22, 2006, in accordance with the *R-14 Range Characterization Survey Site Safety and Health Plan* (*SSHP*; CABRERA, 2006b). The field measurements and analytical data collected during this effort will be used to support the development of a *Decommissioning Plan* for the R-14 Range, in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements and guidance.

1.1 Background

The R-14 Range is a former test firing range located on Spesutie Island at APG. Historical activities involving depleted uranium (DU) have resulted in radiological contamination of the structures and grounds. ARL, who is a tenant at APG, has responsibility for this area and desires to initiate the decommissioning process so that the range can be released from its NRC Nuclear Materials License requirements (see Appendix A) and reused for other purposes.

The general layout of the R-14 Range is shown in Figure 1-1. The range includes the following buildings and structures: the R-14 Blast Chamber, Hot Line, Firing Tube (with access shed), Muffler (part of the air handling system), and Water Treatment Shed. A layout of the building area, including the approximate dimensions of each structure, is shown in Figure 1-2. The R-14 Range also includes approximately five acres of surrounding grounds consisting of the Firing Fan, fenced Laydown Yard (with Sediment Trap), and downrange Pavement and Grassy Field.

The R-14 Range was operational from 1982 until 1993. Testing operations involved firing DU penetrator rounds through the Firing Tube into the Blast Chamber from a fixed location approximately 300 feet (ft) uprange of the tube opening. Stripper/deflector plates (i.e., shredders) were mounted within the Firing Tube to strip or deflect the sabot away from the DU penetrators as they passed through. The stripped projectiles would then impact a hardened armor target mounted inside the Blast Chamber or, if they defeated the target, they would impact a backstop located a short distance behind the target.

There is an air handling system associated with the Blast Chamber, designed to minimize the escape of airborne radioactivity from the structure during firing operations. This system consists of a Muffler, Cartridge, High Efficiency Particulate Air (HEPA) filter, and induction fan. These items are contained in separate housings connected by ductwork. When operational, the induction fan would draw air out of the Blast Chamber into the Muffler, where an array of baffles would decrease the velocity of airflow and cause large airborne particulates to drop out of suspension and settle to the bottom. The air would then flow through the Cartridge and HEPA filter, with each unit removing successively smaller particles of radioactive dust.

1.2 Survey Scope

The scope of the characterization survey includes the interior and exterior surfaces of the Blast Chamber, Hot Line, Firing Tube (with access shed), Muffler, and Water Treatment Shed, as well as the Firing Fan, Laydown Yard, Sediment Trap, Pavement, and Grassy Field. Based on the nature of historical activities conducted at the range and on the time period during which the structures were built, the characterization survey addresses not only DU contamination, but also any hazardous substances suspected of being present in the building materials.

The results presented in this report will provide the basis for development of a *Decommissioning Plan* for the R-14 Range. The plan will evaluate alternative remediation approaches that may include the removal of contaminated building materials, asphalt, and soil, as well as the potential decontamination and re-use of non-porous building materials. Decommissioning activities will proceed based on NRC approval of the recommended approach. Following the completion of decommissioning activities, the results of final status surveys of the buildings and grounds will be used to demonstrate that compliance with the

NRC dose-based standard has been achieved, and the area can be released for unrestricted use in accordance with 10 CFR 20.1402.

1.3 Previous Investigations

In preparation for the characterization of the R-14 Range, the results of previous radiation surveys conducted by ARL were reviewed, as discussed in the *Work Plan*. These results identified radiological contamination on many building surfaces, especially in the Blast Chamber, as well as elevated concentrations (i.e., above background) of radioactivity at many buildings and grounds locations within the R-14 Range.

1.3.1 Building Survey Data

Data from the most recent building surveys conducted by ARL in the Blast Chamber, on the roof of the Blast Chamber, in the Hot Line building, and on the roof of the Firing Tube shed are summarized in Table 1-1. The data indicate the presence of loose contamination in concentrations of up to 1,107 disintegrations per minute (dpm) per 100 square centimeters (cm^2) alpha and 8,435 dpm/100 cm^2 beta. As expected, contamination levels at the site are highest within the Blast Chamber itself. The highest general area exposure rate (10 milliRoentgen per hour [mR/hr]) and contact exposure rate (20 mR/hr) were also measured in the Blast Chamber, near the target backstop.

Table 1-1: R-14 Range Building Survey Results (ARL Surveys)

Location	Loose Contamination [1] (dpm/100 cm^2)		Measured Exposure Rate [1] (mR/hr)	
	Alpha	Beta	General Area	Contact
Blast Chamber (roof)	9	21	0.16	0.6
Blast Chamber (interior)	1,107	8,435	10.0	20.0
Hot Line (X-ray area)	433	3,064	2.0	2.0
Hot Line (Wash area)	227	1,455	0.06	0.50
Hot Line (Changing Room)	21	73	0.02	--
Firing Tube Shed (roof)	7	32	0.04	0.06

cpm = counts per minute mR/hr = milliroentgen per hour
dpm = disintegrations per minute -- = no measurement reported
[1] Results listed are maximum measurements reported for each location during most recent surveys conducted by ARL (CABRERA, 2006a).

The previous building survey results also indicate that contamination levels in the Hot Line building are highest in the X-ray area, which directly adjoins the Blast Chamber. In general, the contamination levels in the Hot Line building appear to decrease as the distance from the Blast Chamber door increases. In the Changing Room and Wash Area, the highest contamination levels were measured in the sink drain, indicating possible contamination in the drain line that exits the building. The lowest contamination levels in the Hot Line were measured in the Changing Room, which is closest to the exit doors that separate the radiologically controlled area from the uncontrolled area. Measured exposure rates in the building followed a pattern similar to the contamination levels.

1.3.2 Soil Sample Data

In March 2006, ARL collected and analyzed 20 soil samples from various locations at the R-14 Range. The samples were analyzed using a high-purity germanium (HPGe) gamma detector, and it was assumed that all of the uranium-238 (^{238}U) detected in the samples was from DU. Data for the three soil samples exhibiting the highest uranium concentrations is summarized in Table 1-2. Two of these samples were collected from the Laydown Yard and one from the storm water Sediment Trap. As indicated in the table, uranium-235 (^{235}U) concentrations of up to 78.3 picoCuries per gram (pCi/g) and ^{238}U concentrations of up to 4,810 pCi/g were reported for these samples. The highest results for the 17 soil samples not listed in Table 1-2 were 0.22 pCi/g for ^{235}U and 3.8 pCi/g for ^{238}U. Isotopic fractions reported for each of the samples were indicative of DU.

Table 1-2: R-14 Range Soil Sample Results (ARL Surveys)

Location	^{235}U Results[1]		^{238}U Results[1]	
	Concentration (pCi/g)	+/- 2 σ (pCi/g)	Concentration (pCi/g)	+/- 2 σ (pCi/g)
Laydown Yard (north side)	78.3	0.69	4,810	0.43
Laydown Yard (south side)	39.9	0.91	2,410	0.64
Sediment Trap Outfall	5.33	2.81	360	1.63

pCi/g = picoCuries per gram
σ = sigma (standard deviation)
[1] Results listed represent the three highest measurements reported for soil samples from the R-14 Range during most recent surveys conducted by ARL (CABRERA, 2006a).

1.4 Contaminants of Concern

Radionuclides of concern (ROC) known to be present in the R-14 Range area are limited to DU isotopes (i.e., uranium-234 [^{234}U], ^{235}U, and ^{238}U) and their short-lived decay progeny (thorium-234 [^{234}Th], protactinium-234m [^{234m}Pa], and thorium-231 [^{231}Th]). The assumed DU composition is based on the isotopic uranium ratios routinely used for shipments of DU waste from APG (BARG, 1995). The activity fractions are calculated from the weight ratios and specific activities of each uranium isotope. The resulting composition consists of ^{234}U, ^{235}U, and ^{238}U activity fractions of 0.084, 0.012, and 0.904, respectively. This composition is similar to the 0.190, 0.021, 0.790 average activity fractions measured in three DU soil samples described in the Argonne National Laboratory (ANL) report *Derived Uranium Guideline for the Depleted Uranium Study Area of the Transonic Range, Aberdeen Proving Ground, Maryland* (ANL, 1999).

Other potential contaminants of concern (COCs) include hazardous substances such as asbestos, polychlorinated biphenyl compounds (PCBs), and *Resource Conservation and Recovery Act (RCRA)* metals, including mercury and lead. These substances may be present as constituents in building materials (e.g., floor tile, ceiling tile, adhesives, paint, flame-retardant materials, light bulbs or ballast, electrical systems, etc.), particularly those manufactured prior to the 1970's.

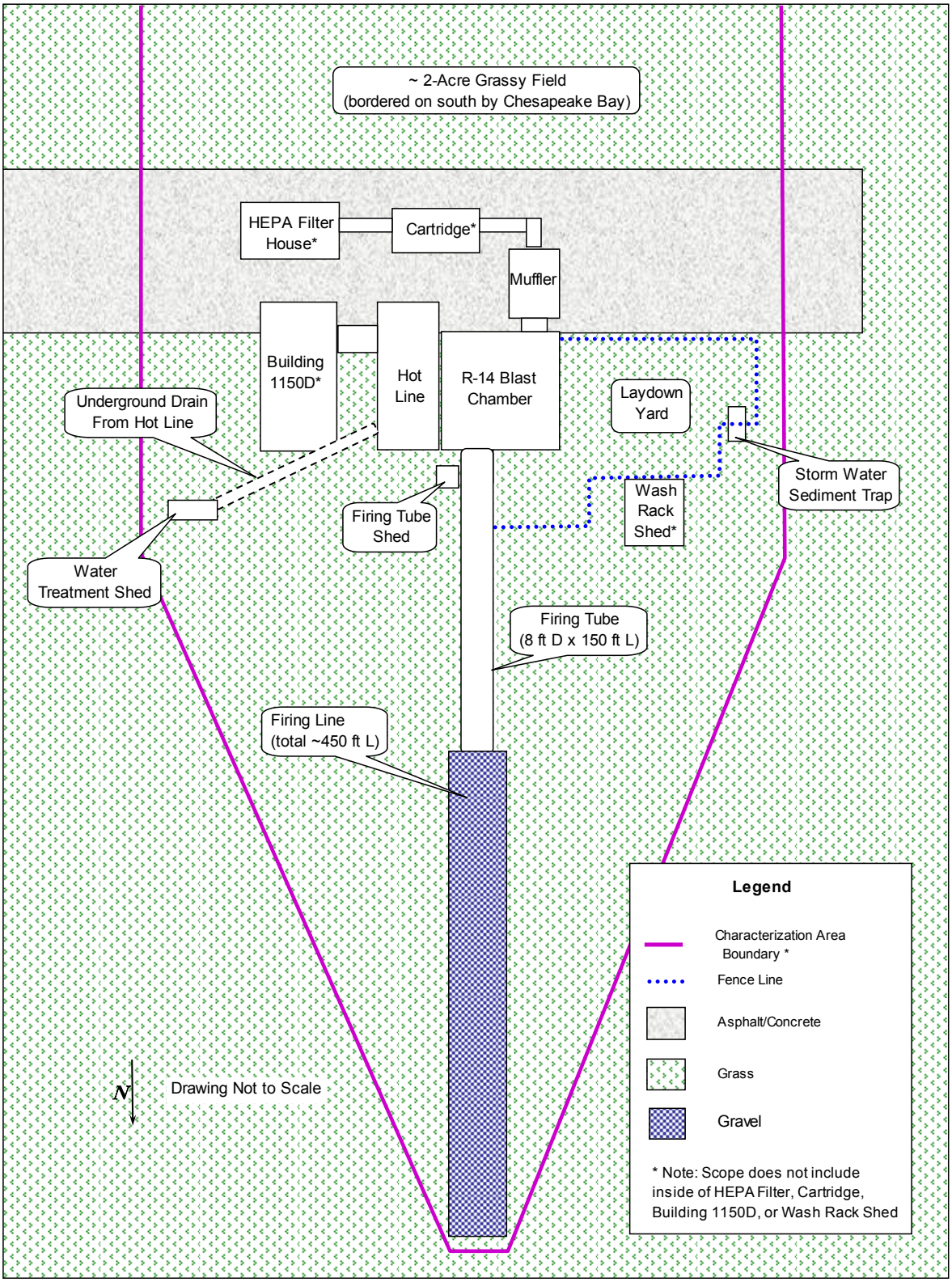

Figure 1-1: R-14 Range Area Layout

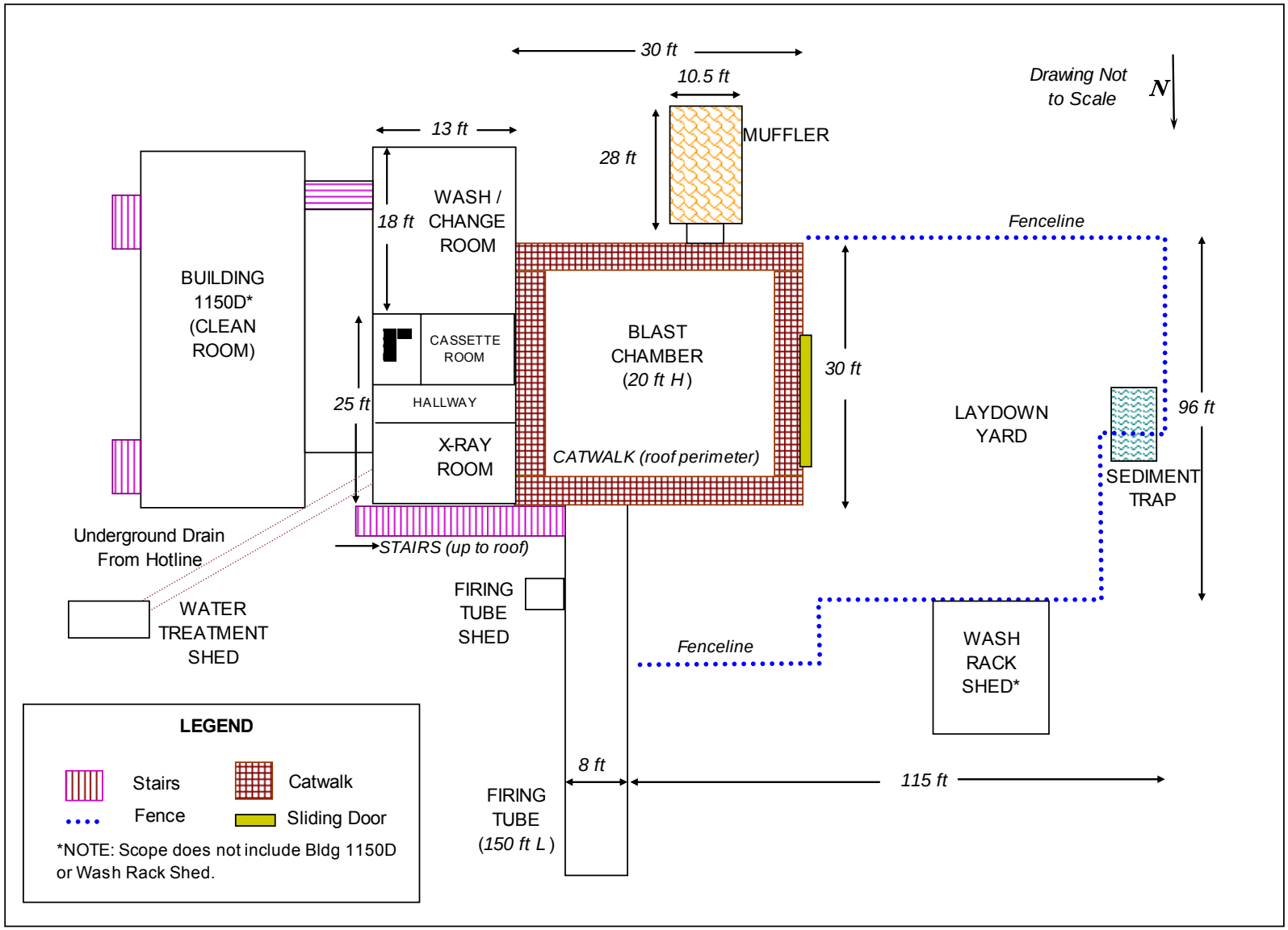

Figure 1-2: R-14 Range Building Layout

2.0 SCREENING LIMITS, INSTRUMENTATION, AND METHODOLOGY

Specific objectives for the R-14 Range characterization were as follows:

- Identify the extent to which residual contamination in the R-14 Range buildings and grounds exceeds radiation guideline limits; and
- Collect sufficient information to use in determining the appropriate disposition for materials exhibiting unacceptable levels of contamination (e.g., decontaminate and reuse, dispose as radiological waste, dispose as mixed radiological/hazardous waste).

To meet the project objectives, the following characterization survey and sampling activities were conducted:

- Gross alpha/beta scan surveys of the building interior and exterior surfaces, including floors, walls, ceilings, and building systems (e.g., pipes, floor drains, ceiling ducts, conduit, etc.);
- Integrated alpha/beta measurements at locations of highest activity observed during the building scan surveys;
- Gamma walkover survey (GWS) of asphalt and grounds;
- Collection and analysis of smear samples of building surfaces in systematic and biased locations; and
- Collection and analysis of volumetric samples of construction materials (e.g., asphalt, paint, concrete, etc.) and soil/sediment.

This section describes the screening limits, instrumentation, and methodology used to perform the characterization survey. Field activities were conducted in accordance with standard CABRERA Operating Procedures (OPs) and with the *Work Plan* (CABRERA, 2006), except as noted in the paragraphs below.

2.1 Screening Limits

To provide a basis for characterizing the levels of radiological contamination and evaluate the potential presence of hazardous constituents, screening levels were established as described below.

2.1.1 Radioactivity

Radioactivity screening limits for DU activity at the R-14 Range were developed to represent compliance with the 25-millirem per year (mrem/yr) NRC dose limit specified in 10 CFR 20.1402. The screening limits, which are listed in Table 2-1, were developed in accordance with *NUREG 1757: Consolidated NMSS Decommissioning Guidance, Vol. 2* (NRC, 2003). As shown in Table 2-1, transferable surface screening limits are 10% of the building surface screening limits, based on the NRC assumption that removable contamination activity generally comprises 10% of the total contamination activity (NRC, 2003).

The DU building surface and soil screening limits listed in Table 2-1 and described below are considered to be conservative, lower-bounding estimates of potential cleanup criteria and have been used to establish instrument/analysis sensitivity requirements for this survey.

Table 2-1: Radioactivity Screening Limits

Radionuclide of Concern	Building Surface Screening Limit (dpm/100 cm^2)[a]	Transferable Activity Limit (dpm/100 cm^2)[b]	Soil Screening Limit (pCi/g)[c]
DU	100	10	102

dpm = disintegrations per minute cm^2 = square centimeters pCi/g = picocuries per gram
[a] Building surface screening values were derived in accordance with NUREG 1757 (NRC, 2003) using DandD screening methodology (concentrations listed NUREG/CR-5512, Vol. 3, Table 5.19 for P_{crit} = 0.90 [NRC, 1999]).
[b] Transferable activity limit represents 10% of the total building surface screening limit, as recommended in NUREG 1757 (NRC, 2003).
[c] Soil screening values were derived based on site-specific DCGLs developed by Argonne National Laboratory for the Transonic Range area of APG (ANL, 1999).

Surface Activity Screening Limit

Using guidance from the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) Section 4.3.4 (NRC, 2000), the sum of ratios equation below, and knowing that there is one alpha decay per decay of each DU isotope, the gross DU surface screening limit of 100 alpha dpm / 100 square centimeters (cm^2) was derived for building and structure

surfaces (including asphalt pavement). This surface screening limit was calculated using the NRC screening levels presented in Table 5.19 of *NUREG/CR-5512, Vol. 3* (NRC, 1999), and DU activity fractions derived from the isotopic uranium weight ratios discussed in Section 1.4. The referenced NRC screening levels are 90.6 dpm/100 cm^2, 97.6 dpm/100 cm^2, and 101 dpm/100 cm^2 for ^{234}U, ^{235}U, and ^{238}U, respectively. The calculated activity fractions are 0.084, 0.012, and 0.904 for ^{234}U, ^{235}U, and ^{238}U, respectively. The surface screening limit of 100 dpm / 100 cm^2 was calculated as follows:

$$\text{Gross DU Surface Screening Limit} = \frac{1}{\left(\frac{f_1}{SL_1}\right) + \left(\frac{f_2}{SL_2}\right) + \left(\frac{f_3}{SL_3}\right)}$$

Where: $f_{1,2,3}$ = Activity fraction of each DU isotope in APG waste
$SL_{1,2,3}$ = NRC screening level for each DU radionuclide

Soil Screening Limit

The gross DU soil screening limit of 102 pCi/g was derived by applying the sum of ratios rule to the derived concentration guideline levels (DCGLs) for DU in soil developed by ANL for the Transonic Range area of APG (ANL, 1999). The DCGLs reported for three different source term mix ratios were multiplied by the activity fraction of each uranium isotope in the respective mixes; and the minimum radionuclide-specific DCGLs were selected as soil screening values for this characterization survey. The resulting values used to calculate the gross DU soil screening limit were 32 pCi/g, 4.8 pCi/g, and 190 pCi/g for ^{234}U, ^{235}U, and ^{238}U, respectively. The soil screening limit of 102 pCi/g was calculated as follows:

$$\text{Gross DU Soil Screening Limit} = \frac{1}{\left(\frac{f_1}{SL_1}\right) + \left(\frac{f_2}{SL_2}\right) + \left(\frac{f_3}{SL_3}\right)}$$

Where: $f_{1,2,3}$ = Activity fraction of each DU isotope in APG waste
$SL_{1,2,3}$ = ANL screening level for each DU radionuclide

Surface Contamination/Free Release Limit

The surface release limit of 1,000 dpm/100 cm^2 of DU alpha activity, as specified in Army Regulation 11-9: *The Army Radiation Safety Program* (Army, 1999), was used to guide the unrestricted release of tools and equipment used in the characterization effort. Radiological screening of the equipment and tools was documented on Radiological Survey Sheets to record the free release of items from the radiological controlled area.

2.1.2 Potentially Hazardous Constituents

Although the primary parameters of interest during the R-14 Range characterization were the isotopes of uranium that comprise DU (^{234}U, ^{235}U, and ^{238}U), additional parameters suspected of being present, including asbestos, lead, mercury, and PCBs, were also considered. The presence of these parameters at certain concentrations could result in the re-classification of radiological waste generated during decommissioning as mixed hazardous/radiological waste.

To evaluate the potentially hazardous nature of contaminated materials identified during the characterization effort, volumetric samples of building materials (e.g., wallboard, ceiling tile, floor tile, etc.) were collected and analyzed for hazardous parameters, as appropriate. Action levels used in the evaluation of these parameters are listed in Table 2-2.

Table 2-2: Action Levels for Chemicals of Interest

Parameter	Action Level	Reference
Asbestos	1% by weight	Definition of asbestos-containing material in 40 CFR 763
Lead	5 mg/L	Toxicity characteristic limits specified in 40 CFR 261.24
Mercury	0.2 mg/L	
PCBs	50 ppm	Waste disposal restrictions in 40 CFR 761

mg/L = milligrams per liter ppm = parts per million
PCBs = polychlorinated biphenyl compounds

2.2 Direct Radioactivity Measurements

Building surfaces were surveyed using direct scan and static measurement techniques to identify areas of above-background radioactivity, as specified in the *Work Plan*.

2.2.1 Surface Scan Surveys

Surface scanning for alpha and beta activity was performed to identify discrete locations where contaminant concentrations appeared to exceed the DU surface screening limit. Surface scans of building floors were conducted using a Ludlum Model 43-37 gas proportional detector with an active area of 582 square centimeters (cm^2). Surface scans of the interior and exterior building walls, ceilings, and other building surfaces were conducted using either the Ludlum Model 43-93 alpha/beta scintillation detector or a Ludlum Model 43-68 handheld gas proportional detector, both having an active area of 126 cm^2.

Scan measurements were obtained by moving the active area of the detector over the surface of interest at or below the scan speeds specified in the *Work Plan*, based on the assumptions listed in Table 2-3. One-minute integrated alpha/beta counts were performed at locations of highest count rates, as described in Section 2.2.2. Scanning was performed with the face of the detector at a maximum height of approximately 0.5 cm above the surface of interest.

Table 2-3: Beta Surface Scan Sensitivity Assumptions

Detector Model No.	Probe Area (cm^2)	Probe Width (cm)	Beta Bkgd (cpm)	Observation Interval (observations/sec)	MDCR (cpm)	Scan Action Level (cpm above bkgd)
43-37	582	15	1,386	1	397	800
43-68	126	9	300	1	185	400

cm = centimeter(s)
cpm = count(s) per minute
bkgd = background
cm^2 = square centimeter(s)
sec = second(s)
MDCR = minimum detectable count rate

2.2.2 Integrated Surface Measurements

Integrated direct measurements (i.e., static measurements) of surface radioactivity were performed to compare contaminant concentrations at discrete sampling locations to the building surface radioactivity screening limit indicated in Table 2-1. Integrated alpha activity measurements were performed using a Ludlum Model 43-68 handheld gas proportional detector or a Ludlum Model 43-37 gas proportional detector for all building surfaces. The calculated detector sensitivities and assumptions used for each of the detectors are presented in Table 2-4.

Integrated measurements were performed for one-minute count periods. Measurements were recorded on field sheets and summarized on a computerized spreadsheet. Net count rates were calculated as the difference between the measurement count rate and the background count rate. After adjusting the net count rates for the surface area of the detector and the instrument efficiency, the results were reported in units of dpm/100 cm^2 and used to identify specific locations where the surface screening limit was exceeded.

Table 2-4: Integrated Alpha Measurement Sensitivity Assumptions

Model No.	Count Time (min)	Bkgd Count Time (min)	Probe Area (cm^2)	Total Alpha Efficiency (cpm /dpm)	Alpha Background (cpm)	Alpha Static MDC (dpm / 100 cm^2)
43-37	1	1	582	0.165	23	18
43-68	1	1	126	0.165	5	64
43-93	1	1	126	0.111	3	79

min = minute(s)
cpm = count(s) per minute
cm^2 = square centimeter(s)
dpm = disintegration(s) per minute

2.3 Smear Sample Surveys

Smear surveys were performed as specified in the *Work Plan*. Smear samples were collected at biased locations to quantify transferable surface alpha and beta radioactivity. Smears were analyzed using a Ludlum Model 2929 dual scaler equipped with a Model 43-10-1 scintillation sample counter. Count times were set at 4 minutes for surface smear measurements and 20 minutes for background measurements. The smear sample alpha minimum detectable concentration (MDC) and relevant assumptions are provided in Table 2-5.

Smear locations and results were recorded on field sheets and summarized on a computerized spreadsheet. Net count rates were calculated as the difference between the measurement count rate and the background count rate. After adjusting the net count rates for the surface area of the smear and the instrument efficiency, the results were used to identify specific locations where the transferable analysis screening limit of 10 dpm/100 cm^2 was exceeded. To confirm the smear sample analyses, 10% of the smears were re-counted onsite using the Model 2929 and recorded as duplicate measurements.

Table 2-5: Removable Surface Activity (Smear) Sensitivity Assumptions

Instrument Model No.	Count Time (min)	Bkgd Count Time (min)	Probe Area (cm^2)	Alpha Efficiency (cpm/dpm)	Alpha Background (cpm)	Alpha Smear MDC (dpm/100 cm^2)
2929	4	20	Smear	0.33	0.8	7

min = minute(s)
cpm = count(s) per minute
MDC = minimum detectable concentration
cm^2 = square centimeter(s)
dpm = disintegration(s) per minute
bkgd = background

2.4 Gamma Walkover Survey

An outdoor gamma walkover survey (GWS) was performed as specified in the *Work Plan*. A Ludlum Model 44-20 three-inch by three-inch (3-in. x 3-in.) sodium iodide (NaI) detector coupled to a Ludlum Model 2221 ratemeter was used to measure surface gamma activity on the pavement and grounds. The system was calibrated with a cesium-137 (^{137}Cs) source, and enabled with a differential global positioning system (DGPS) so that activity measurements could be spatially referenced. The MDC for measuring DU in soil using the GWS instrumentation was calculated to be 33 pCi/g, as shown in Table 2-6. (Note: Details of the MDC calculation are presented in the *Work Plan*.)

The GWS was performed following protocol specified in MARSSIM (NRC, 2000) by walking straight parallel lines over each survey unit while moving the detector in a serpentine motion 0.05 m to 0.10 m (2 in. to 4 in.) above the ground surface. Survey passes were approximately 1 m apart in areas requiring 100% coverage and 2 m apart in areas requiring 50% coverage. Data from the ratemeter was automatically logged into the DGPS unit once per second.

After the survey was completed, the raw data was downloaded from the DGPS and sent to the data processing specialist for export into a geospatial software program. Count rates measured during the survey were correlated with their respective geographic coordinates, and the coordinates of locations representing the highest gamma readings within each localized region of the surveyed area were used to identify biased locations for soil sampling.

Table 2-6: Gamma Walkover Survey Sensitivity Assumptions

Detector Model No.	Survey Speed (m/sec)	Bkgd (cpm)	Observation Interval (observations/sec)	MDCR[1] (cpm)	MDC (pCi/g)
44-20	0.5	27,000	1	2,484	33

m = meter(s)
cpm = count(s) per minute
sec = second(s)
MDCR = minimum detectable count rate
[1] Assumes a surveyor efficiency of 50%
pCi/g = picoCurie(s) per gram
bkgd = background
g = gram(s)
MDC = minimum detectable concentration

2.5 Volumetric Sample Collection and Analysis

Volumetric samples of building materials (e.g., ceiling tiles and ceiling materials, wallboard, and floor tiles), and soil, sediment, and water samples were collected and analyzed as

specified in the *Work Plan*. Building materials were selected for sampling based on process knowledge and professional judgment regarding the potential for specific types of materials used in construction prior to the 1970's to contain hazardous constituents (e.g., asbestos in floor tiles, mastic, and flame-retardant materials; lead or other metals in paint; PCBs in paint and adhesives; etc.). Both systematic and biased soil samples were collected within the surveyed areas, as described in Section 3.0. Samples were collected, handled, and shipped in accordance with CABRERA OPs.

Volumetric samples of building materials were collected using a utility knife or other instrument appropriate for the type of material being sampled. A concrete coring machine was used to collect samples of asphalt and access the underlying soil. Soil and sediment samples were collected using a hand auger or trowel, as appropriate, and the material was homogenized in a stainless steel bowl prior to containerization. Grass, twigs, stones, and other non-soil items were removed from the sample material during homogenization of the soil samples. Water and sediment samples were collected as grab samples.

The samples collected under this characterization effort were sent off-site to accredited analytical laboratories for testing. Paragon Analytics, Inc. (PAI) in Fort Collins, CO, performed the analyses for isotopic uranium, thorium-234 (^{234}Th), RCRA metals, and PCBs. AMA Analytical Services in Lanham, MD, performed the asbestos analyses.

Field quality control (QC) samples (e.g., field duplicates) were collected and analyzed for each medium sampled, as specified in the *Work Plan*. In addition, the laboratory performed QC analyses appropriate for the individual test methods used. These are discussed in further detail in Section 4.2.

Analytical data generated for the volumetric samples of soil and building materials were used to identify specific locations where either the soil screening limit of 102 pCi/g or the chemical action levels for asbestos, PCBs, or lead were exceeded. Alpha spectrometry results were used to calculate the activity concentration of DU in the samples by summing the reported concentrations of the individual uranium isotopes. Gamma spectroscopy results for ^{234}Th were used as a surrogate to calculate the amount of DU in the samples by assuming secular equilibrium between ^{238}U and ^{234}Th, and adjusting the reported activity concentrations to account for the isotopic composition of DU. Assuming that the DU at the R-14 Range contains 90.4% ^{238}U, as discussed in Section 1.4, the activity concentration of DU in each sample is calculated as follows:

$$DU = \frac{^{234}Th}{0.904}$$

where: DU = Activity concentration of DU (pCi/g)
^{234}Th = Activity concentration of surrogate ^{234}Th (pCi/g)

3.0 SURVEY RESULTS

This section discusses the results of survey and sampling activities conducted during the R-14 Range characterization. Detailed results are presented in Appendix B for the building surveys, Appendix C for the pavement and grounds surveys, Appendix D for the volumetric sampling and analysis, and Appendix E for the asbestos inspection.

3.1 R-14 Blast Chamber

The R-14 Blast Chamber is a 20-ft high steel box with a square base that measures 30 ft on each side (see Figure 1-2). Built in 1982, this chamber was used to house the targets at which the DU munitions were fired. In addition to the target mounts, the structure also contains a 3-ft thick steel backstop on the south interior wall, which was used to stop munitions that defeated the targets. The structure has no windows, and access to the chamber is either through a large sliding steel door (approximately 15 ft wide by 30 ft high) on the west side of the building, or through a small interior door situated between the east side of the chamber and the Hot Line. A flight of stairs along the north exterior wall leads to a catwalk on the roof of the structure.

A summary of the Blast Chamber survey and sampling results is presented below. Complete results of the Blast Chamber survey are presented in Appendix B-1, along with diagrams of the survey locations. Because the structure consists predominantly of steel, no volumetric sampling was conducted other than the asbestos sampling of weather stripping, which is presented in Appendix E.

3.1.1 Interior Walls

Interior wall surveys were conducted in the Blast Chamber at evenly spaced locations (6 planned locations per wall) to provide systematic coverage of the wall surfaces. Table 3-1 presents summary statistics that describe the survey results, including the average (i.e., arithmetic mean), standard deviation, and maximum integrated measurements obtained during the survey, as measured in dpm/100 cm^2. The table also contains transferable activity data based on count rate measurements for the smear samples collected at each integrated measurement location.

The sliding steel door on the west side of the Blast Chamber was open during survey activities. As a result, four of the planned survey locations on the west wall (i.e., on the interior side of the door) were inaccessible during sampling. A small accessible section of the door was surveyed as it stood open, but most of the interior surface of the sliding door could not be reached. Additionally, due to space limitations for the man-lift that was used to access high locations on the walls, several other planned survey locations could not be reached and, therefore, adjustments were made to the specific locations at which activity data were collected.

The survey data indicate widespread areas of surface contamination on the interior walls of the Blast Chamber. The building surface and/or transferable activity screening limits were exceeded at every interior wall location surveyed. The highest levels of contamination were measured on the north wall, where the Firing Tube adjoins the chamber, and on the south wall, where the target backstop is located.

Table 3-1: Interior Wall Survey Results for the R-14 Blast Chamber

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Interior Walls		
Average	3710	254
Standard Deviation	2129	293
Maximum	8175	1071
Number of Data Points	22	22

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

Two samples of weather stripping from around the doors were collected and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey* included in Appendix E. These samples were designated S-6 and S-7, respectively. Analytical results indicate that neither sample contained detectable asbestos.

3.1.2 Ceiling

The ceiling survey was conducted in the Blast Chamber at evenly spaced locations to provide systematic coverage of the ceiling surface. Table 3-2 presents summary statistics describing the direct integrated measurements and smear sample survey results. Nine locations were planned for the ceiling survey; however, due to space limitations for the man-lift that was

used to access ceiling areas, two survey locations could not be reached and, therefore, data at those locations could not be collected.

The survey data indicate widespread areas of surface contamination on the ceiling of the Blast Chamber. Both the building surface and transferable activity screening limits were exceeded at every ceiling location surveyed. The highest levels of contamination were measured in areas close to the north wall, where the Firing Tube adjoins the chamber.

Table 3-2: Ceiling Survey Results for the R-14 Blast Chamber

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Ceiling		
Average	4239	307
Standard Deviation	1142	246
Maximum	5774	658
Number of Data Points	7	7

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.1.3 Floor

The floor survey was conducted in the Blast Chamber by performing a surface scan to identify the locations of highest radioactivity on the floor, and then collecting integrated measurements and smear sample data at these biased locations. Care was taken to include corner and wall areas, floor drains, and high traffic areas. Most of the floor area was accessible, except for the middle portion, which was covered by a large, metal table and a B-25 storage container. Table 3-3 presents summary statistics describing the results of this survey.

The survey data indicate widespread areas of surface contamination on the floor of the Blast Chamber. The building surface and/or transferable activity screening limits were exceeded at every floor location surveyed. The highest levels of contamination were measured around floor drains and on the entrance ramp along the west wall.

Table 3-3: Floor Survey Results for the R-14 Blast Chamber

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Floor		
Average	366	126
Standard Deviation	217	135
Maximum	825	572
Number of Data Points	16	16

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.1.4 Exterior Walls

The exterior wall survey was conducted on the Blast Chamber by performing a surface scan to identify the locations of highest radioactivity, and then collecting integrated measurements and smear sample data at these biased locations. Only the north and west exterior walls were surveyed due to the inaccessibility of the other two walls. Table 3-4 presents summary statistics describing the results of this survey.

The survey data indicate limited areas of surface contamination on the exterior walls of the Blast Chamber. The building surface and transferable activity screening limits were exceeded at two exterior wall locations on the north and west walls. Horizontal I-beams on the north wall exhibited elevated readings, particularly on surfaces where dust and dirt accumulation was observed. The highest level of contamination on the north wall was measured on an I-beam located above the Firing Tube. However, this location exceeded only the surface activity screening limit and not the transferable activity limit, indicating a fixed contamination condition.

On the west wall/sliding door of the Blast Chamber, areas with visible rust and/or around welding seams generally exhibited higher readings than the other surfaces. (Note: This is assumed to be due to the high natural thorium content in welding sticks.) The highest measurements were observed in the center portion of the bottom half of the sliding door. This location exceeded the transferable activity screening limit, although it did not exceed the surface activity limit.

Table 3-4: Exterior Wall Survey Results for the R-14 Blast Chamber

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
North Wall		
Average	53	1.4
Standard Deviation	53	1.0
Maximum	106	2.9
Number of Data Points	4	4
West Wall and Sliding Door		
Average	31	3.9
Standard Deviation	23	4.0
Maximum	58	10.7
Number of Data Points	6	6

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.1.5 Roof

The roof survey was conducted on the Blast Chamber by performing a surface scan to identify the locations of highest radioactivity, and then collecting integrated measurements and smear sample data at these biased locations. Stairs and a walkway allowed access to the roof area along the north, south, and east sides of the building. Table 3-5 presents summary statistics describing the results of this survey.

The survey data indicate large areas of contamination on the roof of the Blast Chamber. The building surface activity screening limit was exceeded at all four biased measurement locations, although no locations exceeded the transferable activity limit. Dust and dirt in the corners and crevices of the roof were the primary sources of elevated readings. Areas of surface contamination were observed during the scan survey at various locations across the roof surface, but the highest measurement was recorded near the western edge of the roof, where access hatches to the Blast Chamber interior are located.

Table 3-5: Roof Survey Results for the R-14 Blast Chamber

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Roof		
Average	248	4.4
Standard Deviation	233	3.8
Maximum	591	9.6
Number of Data Points	4	4

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.2 Hot Line

The Hot Line is situated east of and adjacent to the Blast Chamber (see Figure 1-2). This structure consists of a Changing/Wash Room, Cassette Room, Hallway, and X-Ray Room. The X-Ray Room was used to house equipment containing X-ray cassettes that were mounted in the Blast Chamber during range operations to evaluate the effects of target impact. The Cassette Room was used for the unloading and reloading of X-ray film used in the cassettes. A designated area of the Changing/Wash Room was used by personnel for donning personal protective equipment (PPE) prior to entering the radiological contamination areas (e.g., Cassette Room, X-Ray Room, and Blast Chamber). Another area of the Changing/Wash Room was used for doffing and/or cleaning contaminated PPE. This area still contains the hand sink and the clothes washer and dryer that were used for decontamination activities.

Contaminated wash water from the Hot Line building discharges through drain lines from the sink and washing machine. The main drain line exits the east side of the building and travels underground until surfacing at the Water Treatment Shed northeast of Building 1150D. Both the sink and washing machine are still in place; thus, it is assumed that the drain lines are still active.

The Hot Line building contains three exterior doors. The door on the west side of the building provides access between the Hot Line and the Blast Chamber, and the doors on the south and east sides of the Changing/Wash Room serve as entries/exits between the Hot Line building and other areas of the site. Inside the building, a short hallway connects the Cassette Room, X-Ray Room, Blast Chamber, and there is another hallway with a Ramp leading up to the Changing/Wash Room.

A summary of the Hot Line survey and sampling results is presented below. Complete results of the Hot Line survey are presented in Appendix B-2. Analytical results from the volumetric sampling conducted in the Hot Line building are presented in Appendix D. Results of the asbestos inspection and sampling are presented in Appendix E.

3.2.1 Interior Walls

The interior walls of the Changing/Wash Room, Cassette Room, X-Ray Room, and Hallway (including the Ramp) were included in the interior wall survey of the Hot Line. The survey was conducted by performing integrated measurements and smear sample surveys at both systematic (i.e., pre-planned) and biased (i.e., identified by scan survey results) locations. Table 3-6 presents summary statistics describing the results of the survey.

Table 3-6: Interior Wall Survey Results for the Hot Line

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Washroom		
Average	29	7.6
Standard Deviation	4.2	4.4
Maximum	35	14
Number of Data Points	4	4
Cassette Room & Hallway		
Average	266	20
Standard Deviation	211	51
Maximum	679	146
Number of Data Points	8	8
X-Ray Room		
Average	816	5.4
Standard Deviation	239	3.3
Maximum	1027	9.1
Number of Data Points	4	4

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

The survey data indicate large areas of surface contamination on the interior walls of the Cassette Room, X-Ray Room and Hallway. Both the building surface and transferable activity screening limits were exceeded at numerous interior wall locations in each of these areas. The Changing/Wash Room had only one elevated surface sample location, which was on the east wall. The highest direct measurement in the Hot Line was observed in the X-Ray

Room on the east wall, near pipes placed horizontally in the wall. The highest transferable activity was observed in the Cassette Room.

Volumetric samples of wallboard were collected from the east wall of the Cassette Room and the north wall of the Changing/Wash Room. The samples, designated HL-WN-01 and HL-WN-02, respectively, were analyzed at the off-site laboratory for isotopic uranium, PCBs, and RCRA metals. The analytical results presented in Appendix D indicate that neither sample contained constituents at concentrations higher than the radiological volumetric screening limit specified in Table 2-1 or the chemical action levels specified in Table 2-2.

Volumetric samples of wallboard from the Cassette Room (S-4) and weather stripping from the doors in the X-Ray Room (S-8 and S-9) were collected and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey* included in Appendix E. Analytical results indicate that none of the samples contained detectable asbestos.

3.2.2 Ceilings

The ceiling survey was conducted in the Hot Line by performing integrated measurements and smear sample surveys at both systematic and biased locations. Integrated readings and smear sample data were collected in both the Wash Room and Cassette Room, but due to access issues, only smears were collected in the X-Ray Room and Hallway. Table 3-7 presents summary statistics describing the results of the survey.

The survey data indicate areas of limited contamination on the ceilings in the Hot Line. An area of the X-Ray Room, directly above the platform containing equipment used in the impact analysis slightly exceeded the transferable activity limit. Additionally, the vent located in the center of the ceiling in the Cassette Room exceeded the surface screening limit.

Volumetric samples of ceiling tile were collected from the Cassette Room and Changing/ Wash Room. The samples, designated HL-CL-01 and HL-CL-02, respectively, were analyzed at the off-site laboratory for isotopic uranium, PCBs, and RCRA metals. The analytical results presented in Appendix D indicate that none of these samples contained constituents at concentrations higher than the radiological volumetric screening limit specified in Table 2-1 or the chemical action levels specified in Table 2-2.

A volumetric sample of ceiling tile from the Changing/Wash Room was collected and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey*

included in Appendix E. Analytical results indicate that this sample, designated S-4, contains greater than 1% asbestos and thus, meets the regulatory definition of asbestos-containing material (ACM).

Table 3-7: Ceiling Survey Results for the Hot Line

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Washroom		
Average	65	2.6
Standard Deviation	46	1.2
Maximum	100	3.9
Number of Data Points	3	3
Cassette Room & Hallway		
Average	19	3.8
Standard Deviation	2.1	3.6
Maximum	21	8.5
Number of Data Points	2	4
X-Ray Room		
Average	--	6.5
Standard Deviation	--	6.1
Maximum	--	10.8
Number of Data Points	--	2

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
-- - Integrated readings were not taken due to access issues
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.2.3 Floors

The floors of the Changing/Wash Room, Cassette Room, X-Ray Room, and Hallway (including the Ramp) were included in the floor survey of the Hot Line. The survey was conducted by performing a surface scan to identify the locations of highest radioactivity on the floor, and then collecting integrated measurements and smear sample data at these biased locations. Care was taken to include corners, crevices, and high traffic areas. Table 3-8 presents summary statistics describing the results of this survey.

Prior to conducting the floor survey, approximately three inches of standing water were removed from the floors of the Hallway and X-Ray Room. A submersible pump was used to remove approximately 50 gallons of water from these areas, which were collected in a single 55-gallon drum. The floors were then allowed to dry for 24 hours before they were scanned. During the survey, the rooms were inspected for roof leaks and other potential sources of

storm or process water, but none were identified. Based on conversations with site personnel, it was assumed that the water had accumulated in these rooms during the flooding associated with Hurricane Isabel in 2003.

A volumetric sample of water from the floor was collected and analyzed for total metals (including uranium) by inductively coupled plasma (ICP) analysis and isotopic uranium by alpha spectrometry. Analytical results, which are presented in Appendix D, indicate that the sample contained a total uranium concentration of 3,500 micrograms per liter (µg/L), which is more than 100 times the U.S. Environmental Protection Agency (EPA) drinking water standard of 30 µg/L (EPA, 2000). Alpha spectrometry data confirm that the isotopic ratios in this sample are indicative of DU. None of the other metals were detected at concentrations higher than their respective EPA drinking water standards.

The survey data indicate large areas of contamination on the floors in the Hot Line. Both the building surface and transferable activity screening limits were exceeded at numerous floor locations. The highest levels of contamination were observed on the floor area of the Hallway, particularly at the foot of the steps leading into the Cassette Room, at the doorway to the Blast Chamber, and near the foot of the Ramp leading from the Changing/Wash Room. The Ramp itself also had areas where the surface screening limit was exceeded.

Table 3-8: Floor Survey Results for the Hot Line

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Washroom		
Average	102	2.0
Standard Deviation	67	2.8
Maximum	225	7.4
Number of Data Points	6	6
Cassette Room & Hallway		
Average	652	60
Standard Deviation	357	61
Maximum	1331	136
Number of Data Points	7	7
X-Ray Room		
Average	482	24
Standard Deviation	196	29
Maximum	629	57
Number of Data Points	3	3

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

Volumetric samples of floor tile were collected from the Cassette Room and Changing/Wash Room. These samples, designated HL-FL-01 and HL-FL-02, respectively, were analyzed at the off-site laboratory for isotopic uranium, PCBs, and RCRA metals. The analytical results presented in Appendix D indicate that neither sample contained any constituents at concentrations higher than the radiological volumetric screening limit specified in Table 2-1 or the chemical action levels specified in Table 2-2.

Volumetric samples of floor tile and mastic were collected from the Changing/Wash Room and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey* contained in Appendix E. These samples were designated S-1 and S-2 for the flooring and associated mastic, respectively, and S-3 for the mastic beneath the vinyl baseboard. Analytical results indicate that none of the samples contained detectable asbestos.

3.2.4 Exterior Surfaces

No exterior areas of the Hot Line were surveyed. For the most part, the exterior walls of the Hot Line are directly adjacent to other buildings and cannot be surveyed until the building is dismantled.

3.2.5 Other

In addition to the interior walls, floors, and ceilings, the Hot Line survey also included furniture, drains, and other miscellaneous items scattered throughout the rooms. The following specific items were surveyed by obtaining direct measurements and smear sample data: a bench, appliances (washer/dryer), and drains in the Changing/Wash Room; shelves, a platform, and a metal cabinet in the X-Ray Room; and a table and toolbox in the Cassette Room. Table 3-9 presents summary statistics describing the results of these surveys.

Survey data indicate areas of contamination on items in the Cassette and X-Ray Rooms. The building surface screening limit was exceeded on the X-Ray Room shelves and metal cabinet, as well as on the table and toolbox located in the Cassette Room. The table and toolbox also exceeded the transferable activity limit. The highest levels of contamination were measured on the shelves located on the north and west walls of the X-Ray Room.

Table 3-9: Survey Results for Additional Items in Hot Line

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Washroom (drain, sink, washer, dryer, bench)		
Average	40	2.8
Standard Deviation	19	3.0
Maximum	66	6.8
Number of Data Points	4	6
Cassette Room & Hallway (table, toolbox)		
Average	806	130
Standard Deviation	203	25
Maximum	949	147
Number of Data Points	2	2
X-Ray Room (shelf, metal cabinet, platform)		
Average	653	3.5
Standard Deviation	461	1.4
Maximum	1102	5.1
Number of Data Points	3	3

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.3 Firing Tube

The Firing Tube is a 150-ft long cylindrical steel tube attached to the north wall of the Blast Chamber (see Figure 1-1). The tube is 8 ft in diameter and open on the north end. It contains mounting frames for steel deflector (i.e., shredder) plates that were used during testing operations to strip the sabots away from fired DU penetrators en route to the target. A small access shed associated with the Firing Tube is situated on the east side of the tube, approximately 25 feet north of the Blast Chamber. This shed houses a steel access door through which personnel can enter or exit the Firing Tube.

Results of the Firing Tube survey are presented in Appendix B-3, along with diagrams of the survey locations. Because the Firing Tube consists predominantly of steel, no volumetric sampling was conducted other than the asbestos sampling in the Firing Tube Shed, which is presented in Appendix E. A summary of the Firing Tube survey and sampling results is presented below.

3.3.1 Interior Surfaces

The interior survey of the Firing Tube was conducted by performing a floor scan to identify the locations of highest radioactivity. Integrated measurements and smear sample data were collected at ten of these biased locations, as well as at ten systematic floor locations, evenly spaced along the entire length of the structure. Table 3-10 presents summary statistics describing the results of this survey.

The survey data indicate a large area of surface contamination on the floor of the Firing Tube. Both the building surface and transferable activity screening limits were exceeded at numerous locations, with the highest levels of contamination observed in the south end of the tube, within 25 to 30 feet of the Blast Chamber. In general, both direct and transferable activity measurements decrease with increasing distance from the Blast Chamber. The occurrence of elevated radioactivity measurements appears to correspond with the location of stripper plates mounted in the tube.

Table 3-10: Interior Survey Results for the Firing Tube

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Interior (floor)		
Average	95	20
Standard Deviation	56	18
Maximum	209	71
Number of Data Points	20	20

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.3.2 Exterior Surfaces

The exterior survey of the Firing Tube was conducted by collecting integrated measurements and smear sample data at ten systematic and ten biased locations. The systematic locations were on top of the tube, evenly spaced along the entire length of the structure. The ten biased locations were on both sides of the tube, where visible cracks or seams were present. Table 3-11 presents summary statistics describing the results of this survey.

The survey data indicate a limited area of contamination on the exterior surface of the Firing Tube. The building surface activity screening limit was exceeded at two locations on the south end of the tube, near the Blast Chamber, with the highest measurement recorded on top

of the tube where the tube adjoins the chamber. None of the locations surveyed exceed the transferable activity screening limit.

Table 3-11: Exterior Survey Results for the Firing Tube

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Exterior (roof, sides)		
Average	50	1.5
Standard Deviation	79	1.4
Maximum	367	6.7
Number of Data Points	20	20

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

3.3.3 Firing Tube Shed

The Firing Tube Shed survey was conducted by performing a surface scan to identify the locations of highest radioactivity, and then collecting integrated measurements and smear sample data at six biased locations. Measurement locations included the north and south walls of the shed, both inside and out, the steps, and the inside floor. Table 3-12 presents summary statistics describing the results of this survey.

The survey data indicate only one location of surface contamination, which is in the middle section of the interior south wall of the shed. The transferable activity screening limit was exceeded at this location, although the building surface screening limit was met.

Table 3-12: Survey Results for the Firing Tube Shed

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Shed		
Average	21	5.5
Standard Deviation	12	5.3
Maximum	35	14
Number of Data Points	6	6

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

A volumetric sample of asphalt shingle was collected from the roof of the Firing Tube Shed and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey* included in Appendix E. Analytical results indicate that this sample, designated S-13, did not contain any detectable asbestos.

3.4 Other Structures

Two other structures were surveyed during the R-14 Range characterization: the Muffler and the Water Treatment Shed. Descriptions of these structures and summaries of their respective survey and sampling results are presented below.

Other structures in the vicinity of the R-14 Blast Chamber include Building 1150D (i.e., instrumentation room), the wash rack shed, and housings containing the Cartridge and HEPA filter components of the air handling system (see Figure 1-2). These structures are expected to be reused by ARL and, thus, are not included in the scope of this report or subsequent decommissioning activities.

3.4.1 Muffler

The Muffler is a component of the air handling system, situated directly downstream of the exhaust vent on the south side of the Blast Chamber (see Figure 1-2). The Muffler housing is approximately 10.5 ft wide, 28 ft long, and 6 ft tall. The steel housing contains an array of baffle plates designed to disrupt the air flow exhausted from the Blast Chamber and provide an opportunity for heavy particulates to fall out of suspension, thus reducing the radioactive dust loading in the air stream. Particulates extracted from the air stream in this manner settle to the bottom of the baffle chamber. The exhaust air is directed downstream to be further treated in the cartridge and HEPA filter units.

According to site personnel, the floor of the Muffler has never been cleaned out. Thus, it was expected to contain a layer of contaminated dust, perhaps as deep as 6 to 8 inches. However, when the field crew attempted to open the exterior door on the south end of the Muffler, water began to leak from the bottom of the opening. Due to health and safety concerns, and to prevent the possible spread of contamination, the door was immediately closed and no survey measurements or volumetric samples were collected from the interior of the Muffler. The roof and sides of the structure were inspected for possible points of entry for storm or process water, but none were identified. Similar to the water on the Hot Line floor, it was assumed

that the water accumulation in the Muffler was due to the flooding associated with Hurricane Isabel in 2003.

The Muffler survey was conducted by performing an exterior surface scan to identify locations of highest radioactivity, and then collecting integrated measurements and smear sample data at five biased locations. Measurement locations included the east and west exterior walls, the roof, the north wall, which consisted mostly of the vent pipe leading from Blast Chamber, and the south wall, which included the access door. (Note: the south wall of the Muffler was housed inside a wooden shed that also contained the generators for the ventilation system.)

Results of the Muffler survey are provided in Appendix B-4, and summarized in Table 3-13. The survey data indicate a few areas of exterior surface contamination, which appear to be limited to the south end of the structure. Both the building surface and transferable activity screening limits were exceeded at the survey location on this end, on the exterior wall underneath the access door. Scan survey data indicate similar levels of contamination on the door itself.

Table 3-13: Exterior Wall and Roof Survey of the Muffler

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Exterior Walls and Roof		
Average	54	41
Standard Deviation	62	84
Maximum	164	192
Number of Data Points	5	5

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

Volumetric samples of asphalt shingle (S-10) and underlying roofing material (S-11) were collected from the Muffler roof and analyzed for asbestos, as described in the *Report of Asbestos Containing Material Survey* included in Appendix E. Analytical results indicate that neither of the samples contained detectable asbestos.

3.4.2 Water Treatment Shed

The Water Treatment Shed is location on the east side of the Firing Fan, directly east of the Firing Tube Shed. This small wood structure contains an evaporator tank, which was used to process grey water (i.e., wash water) from the sink and washing machine in the Hot Line building. The water enters the tank through a pipe from the Hot Line, and a discharge pipe on the west wall of the building provides a means for emptying treated water from the tank.

The Water Treatment Shed survey was conducted by performing an exterior surface scan to identify the locations of highest radioactivity, and then collecting integrated measurements and smear sample data at five biased locations. Measurement locations included each exterior wall of the shed and the roof. Table 3-12 presents summary statistics describing the results of this survey. The survey data indicate no exceedances of either the building surface or transferable activity screening limit.

A volumetric sample of water from the evaporator tank was collected and analyzed for total metals (including uranium) by inductively coupled plasma (ICP) analysis and isotopic uranium by alpha spectrometry. Analytical results, which are presented in Appendix D, indicate that the sample contained a total uranium concentration of 1,200 µg/L, which is 40 times the EPA drinking water standard of 30 µg/L (EPA, 2000). Alpha spectrometry data confirm that the isotopic ratios in this sample are indicative of DU. None of the other metals were detected at concentrations higher than their respective EPA drinking water standards.

Table 3-14: Exterior Wall and Roof Survey of the Water Treatment Shed

Statistical Parameters	α Direct Reading (dpm/100 cm^2)	α Smear Results (dpm/100 cm^2)
Exterior Walls and Roof		
Average	21	3
Standard Deviation	9	3
Maximum	35	8
Number of Data Points	5	5

dpm/100 cm^2 - disintegrations per minute per 100 square centimeters
Note: Screening limits are 100 dpm/100 cm^2 for direct readings and 10 dpm/100 cm^2 for smear results.

A volumetric sample of asphalt shingle was collected from the roof of the Water Treatment Shed and analyzed for asbestos, as described in the *Report of Asbestos Containing Material*

Survey included in Appendix E. Analytical results indicate that this sample, designated S-15, did not contain any detectable asbestos.

3.5 Grounds

In addition to the structures discussed above, the characterization survey included potentially impacted grounds associated with the R-14 Range, as identified in Figure 1-1 by the area enclosed by the thick magenta line. This area comprises approximately 5 acres and consists of the Firing Fan (i.e., area of potential munitions impact between the weapon and target), Laydown Yard (i.e., fenced staging area west of the Blast Chamber), Pavement (east and south of the R-14 buildings), and Grassy Field (south of the R-14 buildings and pavement). The Laydown Yard contains a storm water sediment trap along the western fence line, which is also included in the characterization scope.

3.5.1 Firing Fan

The Firing Fan is a triangular, grass and gravel covered area that extends from the furthest location used for firing the DU rounds southward to the Blast Chamber (see Figure 1-1). Site records indicate that the furthest firing location was approximately 300 ft north of the Firing Tube; thus, the total length of the Firing Fan is approximately 450 ft. Laterally, the fan is assumed to extend from the Water Treatment Shed on the east to 25 feet beyond the west fence of the Laydown Yard, a distance of approximately 250 ft. Based on the assumed length and width of the Firing Fan, the total area is estimated to be approximately 56,000 square feet (ft^2).

The Firing Fan survey was conducted by performing a 100% GWS over the entire area, followed by the collection and analysis of soil samples. Results of the site GWS are presented in Appendix C, with a graphical depiction of the data presented in Figure C-1. Count rates up to 90,285 cpm were recorded during the GWS of the Firing Fan.

Eighteen locations within the Firing Fan were selected for soil sampling. In general, sampling locations were scattered throughout the Firing Fan to obtain full coverage of the surveyed area. A few biased samples were collected from around the Water Treatment Shed and near the road along the east edge of the firing line (approximately 50 to 80 feet from the open end of the Firing Tube), where GWS results indicated elevated count rate measurements. At each sampling location, a shallow soil sample was collected from the top 6 inches of soil. At one of these locations, near the Water Treatment Shed, a deeper sample (i.e., from 6 to 12 inches

below ground surface [bgs]) was collected to investigate the potential for vertical migration of contaminants. The soil samples were analyzed at the off-site laboratory by gamma spectroscopy.

Analytical results from the Firing Fan and Water Treatment Shed soil sampling are presented in Appendix D. The ^{234Th} activity concentrations reported for samples in this area indicate no exceedances of the DU soil screening limit of 102 pCi/g. The highest reported ^{234}Th activity concentration is 8.6 pCi/g, which equates to a DU activity concentration of 9.5 pCi/g.

3.5.2 Laydown Yard

The Laydown Yard is a grass-covered area west of and adjacent to the Blast Chamber (see Figure 1-2). This area is approximately 80 ft by 125 ft, with a total estimated area of 10,000 ft^2. The Laydown Yard is surrounded by an 8-ft high chain-link fence, with a sliding gate on the south side that is wide enough to allow passage of heavy equipment. During operations, this area was used for the staging and management of range targets. The ramp and sliding steel door on the west side of the Blast Chamber provided a means of access for personnel and equipment involved with the changing out of targets between tests. A small wooden shed and a steel vault are present in the south portion of the Laydown Yard, and various appurtenances (e.g., steel frames, wooden racks, etc.) are scattered throughout the yard. Currently, many portions of the yard are overgrown with tall weeds and shrubs.

The Laydown Yard survey was conducted by performing a 100% GWS over the accessible areas of the yard, followed by the collection and analysis of soil samples. Results of the site GWS are presented in Appendix C, with a graphical depiction of the data presented in Figure C-1. Count rates of up to 999,960 cpm were recorded during the GWS of the Laydown Yard. The highest count rates were observed near the ramp leading to the Blast Chamber.

Fifteen locations within the Laydown Yard were selected for soil sampling. In general, sampling locations were scattered throughout the yard to obtain full coverage of the surveyed area. A few biased samples were collected from locations near the ramp to investigate the high count rates in that area. At each sampling location, a shallow soil sample was collected from the top 6 inches of soil. At two of these locations, a deeper sample (i.e., from 6 to 12 inches bgs) was collected to investigate the potential for vertical migration of contaminants. The soil samples were analyzed at the off-site laboratory by gamma spectroscopy. Two of the surface soil samples were also analyzed for isotopic uranium by alpha spectrometry.

Analytical results from the soil sampling conducted in the Laydown Yard are presented in Appendix D. The ^{234}Th activity concentrations reported for samples in this area indicate that ten of the fifteen surface samples exceed the DU soil screening limit of 102 pCi/g. The highest reported ^{234}Th activity concentration is 511 pCi/g, which equates to a DU activity concentration of 565 pCi/g. Alpha spectrometry data confirm that the isotopic ratios are indicative of DU. Neither subsurface sample indicates an exceedance of the soil screening limit.

3.5.3 Storm Water Sediment Trap

An in-ground, concrete-lined Sediment Trap lies along the west fence of the Laydown Yard. The trap, which is approximately 4 ft wide, 8 ft long, and 2 ft deep, collects storm water runoff from the Laydown Yard and passively removes sediment prior to discharge. A series of baffles reduces the velocity of water flowing through the trap and increases the retention time to allow sediment to settle to the bottom. Water flows out of the trap through a weir on the north side of the structure and is generally dispersed downgradient (i.e., north and west) of the trap.

The Sediment Trap survey was conducted by performing a GWS over the grounds in the vicinity of the trap, followed by the collection and analysis of soil samples. Results of the site GWS are presented in Appendix C, with a graphical depiction of the data presented in Figure C-1. Count rates of up to 46,484 cpm were recorded during the GWS of the Sediment Trap area. The highest count rates were observed directly north and west of the trap, downgradient from the trap discharge.

Three locations near the Sediment Trap were selected for soil sampling. The sampling locations were placed downgradient of the trap to evaluate the potential impacts from re-deposition of sediment in storm water effluent. At each sampling location, a shallow soil sample was collected from the top 6 inches of soil. At one of these locations, a deeper sample (i.e., from 6 to 12 inches bgs) was also collected to investigate the potential for vertical migration of contaminants. The soil samples were analyzed at the off-site laboratory by gamma spectroscopy. In addition, grab samples of water and sediment from within the trap were collected and analyzed for total metals (including uranium) by inductively coupled plasma (ICP) analysis and isotopic uranium by alpha spectrometry.

Analytical results from the soil, sediment, and water sampling conducted in the Sediment Trap area are presented in Appendix D. The ^{234}Th activity concentrations reported for

samples in this area indicate no exceedances of the DU soil screening limit of 102 pCi/g in either the surface or subsurface samples. The highest reported ^{234}Th activity concentration in soil from near the trap is 52.0 pCi/g, which equates to a DU activity concentration of 57.5 pCi/g. Alpha spectrometry data for the sediment sample from within the trap, however, indicate a ^{238}U activity concentration of 620 pCi/g, which is well in excess of the screening limit.

The water sample contained a total uranium concentration of 20 µg/L, which is less than the EPA drinking water standard of 30 µg/L (EPA, 2000). Alpha spectrometry data confirm that the isotopic ratios in the sediment and water samples are both indicative of DU. None of the other metals were detected at concentrations higher than their respective detection limits (in the sediment sample), or higher than their respective EPA drinking water standards (in the water).

3.5.4 Pavement

Included in the survey scope are approximately 6,000 ft^2 of asphalt and 4,000 ft^2 of concrete that pave the area south of and adjacent to the Blast Chamber and Hot Line. The concrete pavement provides a foundation for the air handling system components, and the asphalt pavement provides a path for vehicles and personnel traveling from one side of the range to the other. There is also a paved road that borders the east side of the Firing Fan and provides access to the east and south sides of the R-14 buildings.

For the most part, the Pavement survey was conducted by performing a GWS over the paved areas of the site, followed by the collection and analysis of biased samples of pavement and underlying soil at the locations of highest surface activity. However, in the paved area directly south of the buildings (among the air handling system units), the GWS technician was unable to obtain an unobstructed signal from the satellite and, thus, the GPS instrumentation could not receive positional correlation data. In this area, a biased scan was conducted in areas where cracks or depressions in the pavement were likely to exhibit elevated count rates so that at least one biased sampling location could be identified.

Results of the site GWS are presented in Appendix C, with a graphical depiction of the data presented in Figure C-1. Count rates of up to 17,043 cpm were recorded during the GWS of the asphalt pavement, and up to 63,963 cpm during the surface scan of the concrete pavement. The highest count rates were measured near the junction of the Muffler and the Blast Chamber exhaust vent. Other areas where count rates were noticeably elevated were at the

south entrance to the laydown yard, at a low point in the road south of the buildings, and next to the Firing Tube approximately 40 ft north of the Blast Chamber. These four locations were selected for pavement and soil sampling.

At each sampling location, volumetric samples of pavement were collected using a concrete coring machine, and samples of the top 6 inches of underlying soil were collected using a hand auger. The pavement samples were analyzed at the off-site laboratory for isotopic uranium by alpha spectrometry, and the soil samples were analyzed by gamma spectroscopy.

Analytical results from the soil and asphalt sampling conducted in the Pavement area are presented in Appendix D. The ^{234}Th activity concentrations reported for samples in this area indicate that none of the soil samples exceeds the DU soil screening limit of 102 pCi/g. The highest reported ^{234}Th activity concentration is 25.5 pCi/g, which equates to a DU activity concentration of 28.2 pCi/g. Alpha spectrometry data confirm that the isotopic ratios in the soil are indicative of DU, and that none of the asphalt samples exceeds the screening limit.

3.5.5 Grassy Field

The Grassy Field is an open area south of the R-14 buildings and pavement that is covered with tall grass. Although not strictly part of the R-14 Range, this field is considered to be potentially impacted due to re-deposition of sediment in storm water runoff from contaminated portions of the range. The Grassy Field is bounded on the north by asphalt pavement and on the south by the Chesapeake Bay. Army personnel indicated that the entire field was submerged in flood waters for several days during Hurricane Isabel in 2003, which likely facilitated additional contaminant transport.

The Grassy Field survey was conducted by performing a 100% GWS over the entire area, followed by the collection and analysis of soil samples. Results of the site GWS are presented in Appendix C, with a graphical depiction of the data presented in Figure C-1. Count rates of up to 55,356 cpm were recorded during the GWS of the Grassy Field.

Fifteen locations within the Grassy Field were selected for soil sampling. In general, sampling locations were systematically place throughout the field to obtain full coverage of the surveyed area. A few biased samples were collected from locations near the asphalt pavement north of the Grassy Field to investigate the high count rates in that area. At each sampling location, a shallow soil sample was collected from the top 6 inches of soil. At two of these locations, a deeper sample (i.e., from 6 to 12 inches bgs) was collected to investigate

the potential for vertical migration of contaminants. The soil samples were analyzed at the off-site laboratory by gamma spectroscopy. Two of the surface soil samples were also analyzed for isotopic uranium by alpha spectrometry.

Analytical results from the soil sampling conducted in the Grassy Field are presented in Appendix D. The ^{234}Th activity concentrations reported for surface and subsurface samples in this area indicate no exceedances of the DU soil screening limit of 102 pCi/g. The highest reported ^{234}Th activity concentration is 70.0 pCi/g, which equates to a DU activity concentration of 77.4 pCi/g.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

Survey and sampling activities were performed in accordance with the quality assurance (QA) and QC procedures presented in the *Work Plan* (CABRERA, 2006a) to ensure consistent and repeatable results. The personnel performing the activities were trained in the technical, QC, and health and safety aspects of the project, as well as in calibration, maintenance, and operating procedures for their assigned tasks. This section documents the results of QA/QC activities performed during this characterization effort.

Based on the information presented in this section, the survey data were deemed authentic, appropriately documented, and technically defensible. The survey methods used to collect the data were appropriate for the types of media and contaminants being measured; the field and laboratory instrumentation met the required performance and sensitivity requirements; and the data generated were representative of the areas and materials of interest.

4.1 Survey Instrumentation QC

The survey instruments specified in the *Work Plan* were used to collect characterization data for the R-14 Range. Instrumentation was used in accordance with written procedures, and was subject to daily QC requirements, as specified in the *Work Plan*. Instruments used to obtain radiological data, including DGPS equipment, were inspected for physical damage, current calibration, and erroneous readings in accordance with applicable procedures and/or protocols. Results of QC checks were recorded in field logbooks and summarized on a computerized spreadsheet. Instrumentation that did not meet the specified requirements of calibration, inspection, or response check was removed from service and replacement instruments were procured, as necessary to complete the work.

4.1.1 Minimum Detectable Concentrations

To demonstrate the ability to detect radioactivity at the screening limits listed in Table 2-1, MDCs were calculated based on the Strom & Stansbury MDC equation (i.e., Equation 3-11 of *NUREG 1507* [NRC, 1998]). MDCs were calculated for each instrument used in obtaining radiation measurements, as presented in Table 2-4. The calculation of static MDCs indicated that the field instrumentation was able to achieve the required sensitivities for alpha measurements, but not for beta. Thus, while both alpha and beta measurements were recorded

during the survey, only the alpha results were used to compare survey data to the respective transferable and direct screening limits specified in Table 2-1.

4.1.2 Instrument Calibration

Instruments used during the characterization survey were inspected prior to use to ensure satisfactory operation and current calibration traceable to the National Institute of Standards and Technology (NIST). Calibration records were shipped with the equipment and maintained onsite for review and inspection. Copies of the calibration certificates are included in Appendix F-1.

4.1.3 Instrument QC Checks

Prior to use, project instrumentation underwent initial QC checks by comparing instrument responses to benchmark values. QC checks of radiation detectors and meters included source checks to ensure consistent responses when exposed to known radiation sources. QC checks of DGPS units included checks for satellite availability and positional accuracy. Records of initial and daily performance checks are included in Appendix F-2.

Initial and daily QC checks of radiation detectors were performed in a dedicated count room, in a building at the entrance to the R-14 Range. QC source checks consisted of a one-minute integrated count performed in the count room with the designated source positioned in a reproducible geometry. This procedure was repeated ten times to establish average instrument response for each detector. The initial averages and control limits calculated for each instrument provided the respective benchmark values for subsequent QC checks.

For quantitative instruments (i.e., those used to report activity concentrations such as dpm/100 cm^2), an acceptance criterion of +/- 3σ was used. For qualitative instruments (i.e., dose rate meters and friskers), an acceptance criterion of +/- 20% of the source check true value was used. If any daily QC check was found to be outside of its acceptance criteria, the QC check was repeated. If the second QC check was also outside the acceptance criteria, the instrument was examined to check for external contamination or damage, and a third QC check was performed. If the third QC check was outside of its acceptance criteria range, the instrument was taken out of service until evaluated and approved by the Radiation Safety Officer (RSO).

4.2 Sampling and Analysis QC

Analytical test methods and sample volume, preservation, and holding time requirements were met, as presented in the *Work Plan*. Standard methodology was used for sample collection, identification, documentation, handling, packaging, shipping, and chain-of-custody.

The analytical test methods used to analyze radionuclides in volumetric samples at the off-site laboratory achieved MDCs that were at or below the soil screening criteria presented in Table 2-1. In addition, the analytical test methods used to analyze chemical constituents at the off-site laboratory achieved method detection limits (MDLs) of at least 20% of the action levels specified in Table 2-2.

To confirm the quality of sampling and analysis techniques used for this characterization effort, precision and accuracy were evaluated for the data generated during the characterization effort as described below.

4.2.1 Precision

Precision is defined as the degree to which two or more measurements are in agreement. Field precision is measured by comparing field duplicate results, and analytical precision is measured by comparing laboratory duplicate results.

<u>Field Precision</u>

Field duplicate samples were collected at a rate of 10%. To evaluate field precision of the chemical analysis results, relative percent differences (RPDs) between the primary and duplicate results were calculated as follows:

$$\text{RPD} = \frac{|\text{PR - DR}|}{\left(\frac{PR + DR}{2}\right)} \text{ x } 100$$

Where:
PR = Primary result, and
DR = Duplicate result.

RPD calculations for the field duplicate analyzed during this effort were irrelevant because all results were less than the detection limits for the respective chemical contaminants.

Precision for radionuclide results is evaluated by calculating the normalized absolute difference (NAD), which accounts for uncertainty in the laboratory results. NAD is calculated as follows:

$$NAD = \frac{|Sample - Duplicate|}{\sqrt{\sigma^2_{Sample} + \sigma^2_{Duplicate}}}$$

Where:

Sample	=	Original sample result,
Duplicate	=	Duplicate sample result,
σ_{Sample}	=	Total propagated uncertainty of the sample, and
$\sigma_{Duplicate}$	=	Total propagated uncertainty of the duplicate.

The calculated NAD results were compared to a performance criteria of less than or equal to 1.96. Calculated NAD values less than 1.96 were considered acceptable, and values greater than 1.96 were investigated for possible discrepancies in analytical precision or sources of disagreement with the following assumptions of the test:

- The sample measurement and duplicate or replicate measurement are of the same normally distributed population; and
- The standard deviations represent the true standard deviation of the measured population.

NADs for all field duplicates analyzed during this effort were less than 1.96 except for the gamma spectroscopy results for one of the laydown yard samples (LD-SO-03/LD-SO-Dup1). Based on the nature of DU contamination in this area, the discrepancies were attributed to heterogeneity of DU in the sample media.

Laboratory Precision

Laboratory precision was evaluated through laboratory duplicates for the metals and radiological analyses, and laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) and matrix spike (MS)/matrix spike duplicate (MSD) analyses for the PCBs analysis. Laboratory duplicates, LCS/LCSDs, and MS/MSDs were analyzed at a rate of one per 20 samples for each analysis performed on each matrix. The results of each set of paired samples (i.e., target/duplicate, LCS/LCSD, and MS/MSD) were in agreement within the

laboratory's internal acceptance criteria, as described in the laboratory quality assurance plan (LQAP).

Based on the evaluation of the laboratory duplicate data, laboratory precision was deemed adequate for the data generated for this characterization effort.

Smear Sample Counting Precision

As a qualitative indicator of the precision of on-site smear counting results, duplicate measurements of smear sample activity were performed for 10% of the building surface survey locations. The smears were counted onsite using the same procedures and instrumentation for the duplicate counting as for the initial counting. Duplicate count data compared favorably with the initial counting results in identifying locations where the transferable screening limit was exceeded.

4.2.2 Accuracy

Accuracy is defined as the degree to which the reported measurement represents the true value. Analytical accuracy is assessed through the evaluation of laboratory blanks, LCSs, tracer recoveries (for isotopic uranium analysis only), surrogate recoveries (for PCB analysis only), and spike recoveries (for metals only). Based on the evaluation of these samples, the overall analytical accuracy was deemed adequate for the data generated during this characterization effort.

Laboratory Method Blanks – Laboratory blanks are analyzed to evaluate the potential contamination of samples due to preparation and analytical procedures. Laboratory method blanks are digested/extracted/analyzed exactly like the field samples, and are designed to represent the matrix of interest as closely as possible. Laboratory method blanks were prepared and analyzed with each digestion/extraction/analysis batch. In addition, initial and continuing calibration blanks were analyzed for the metals analysis at a rate of one per ten samples. Laboratory blank results were less than the laboratory MDCs or reporting limits (RLs) in all analyses associated with the data generated for this characterization effort.

Laboratory Control Samples – The LCS is a laboratory spike sample that originates from a source other than the source of the calibration standards, and serves as a zero-blind check on the laboratory's accuracy. The LCSs were prepared and analyzed along with each digestion,

extraction, and analysis batch. For this characterization effort, all LCS results were within the laboratory acceptance criteria.

Tracer Recoveries – A tracer is an isotope of the radionuclide of interest that is added to the samples prior to analysis in order to assess potential bias from the chemical separation or other processes employed in the analysis on a sample-by-sample basis. Uranium-232 (^{232}U) was added as a tracer to all samples undergoing isotopic uranium analysis for this characterization effort. All tracer recoveries were within the laboratory acceptance criteria of 30 to 110% except for the following samples:

- HL-FL-01 (24.7% recovery),
- WT-SW (22.6% recovery), and
- XR-SW (27.2% recovery).

Surrogate Recoveries – Surrogates are compounds that are not commonly found in the natural environment that have similar chemical structures and similar chemical behavior as the compounds of interest. The surrogates dechachlorobiphenyl (DCB) and tetrachloro-meta-xylene (TMX) were added to PCB samples prior to extraction to assess extraction efficiency and analytical bias on a sample-by-sample basis. All surrogate recoveries were within the laboratory's acceptance criteria.

Matrix Spike and Matrix Spike Duplicates – MS/MSD analyses are performed by the laboratory to estimate the extent of bias in the analytical measurements of chemical constituents. The analytical laboratory performed MS/MSDs for the metals analyses by adding a known quantity of each analyte to representative media, and analyzing the spiked media. Bias in the results was quantified by determining the percent recovery of the spike amount. Percent recoveries were compared to a performance criterion of 100 ± 20%. Percent recoveries outside this range were investigated for possible discrepancies in measurement bias. For the spiked metals samples analyzed during this characterization effort, percent recoveries of 85 to 108% were calculated, which are within the laboratory's acceptance criteria.

4.3 Data Management and Documentation

Management of the field and analytical data generated during the characterization effort was conducted in accordance with the general requirements of the *Work Plan.*

4.3.1 Field Data

Field and QC data was recorded in logbooks and/or field sheets, scanned, and uploaded to the project computer. Data collected each day was summarized on computerized spreadsheets, as appropriate. Electronic copies of the field sheets and data spreadsheets were reviewed by the CABRERA Field Site Manager (FSM) and transmitted to the CABRERA Project Manager (PM) by email on a daily basis. In addition, a backup copy of each electronic file was maintained on compact disc (CD) or memory stick to prevent data loss.

4.3.2 Analytical Data

Samples collected during the characterization effort were identified by a unique number code that accompanied the sample from collection through analysis and data review. Standardized chain-of-custody procedures were followed from sample collection through sample analysis. The condition of shipping coolers and enclosed sample containers was documented upon receipt at the analytical laboratory. The laboratory transmitted the completed chain-of-custody form and cooler receipt checklist to the PM to confirm each sample shipment.

Analytical data reports containing results of the requested analyses were transmitted to the CABRERA PM. Each data package contained an electronic data deliverable (EDD) spreadsheet summarizing the analytical results, as well as an electronic file containing the entire case narrative and supporting data. The electronic files were uploaded to the corporate server and backed up on CD. Laboratory data reports are included in Appendix D.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A characterization survey was performed on potentially impacted buildings and grounds at the R-14 Range. Results of the surveys and sample analyses were used to identify specific areas of DU contamination in the buildings and grounds, as well as any contaminated building materials that might also contain either asbestos, PCBs, or hazardous concentrations of metals. To provide a visual reference to the various areas of the site, photographs taken before and during the characterization effort are included in Appendix G.

This section presents the conclusions of the characterization survey conducted in each area of the R-14 Range, and provides recommendations on how this information should be incorporated in the remediation approach to be outlined in the *Decommissioning Plan*. Where appropriate, conclusions drawn based on characterization data from a small number of discrete locations within a particular area are assumed to be applicable to that area in its entirety.

5.1 Structures

Elevated levels of radioactivity were detected on floors, ceilings, and walls, and on some exterior surfaces of the site buildings and structures.

5.1.1 Blast Chamber

Inside the Blast Chamber, static measurements and gross alpha smear data indicate widespread contamination on the walls, ceiling, and floor. Every interior location surveyed exceeds the building surface and/or transferable activity screening limits. Consistent with the nature of historical activities conducted at the range, the interior walls and ceiling of the Blast Chamber exhibit the highest levels of alpha contamination measured during the range characterization effort, with integrated direct measurements of up to 8,175 dpm/100 cm^2 and smear count rates of up to 1,071 dpm/100 cm^2.

On the exterior surfaces of the Blast Chamber, static measurements recorded at survey locations on the roof all exceed the building surface screening limit, although none of the smear data exceed the transferable activity screening limit. With respect to the exterior walls, only the north and west walls were surveyed due to accessibility issues on the other walls. While there was only one exceedance each of the building surface and transferable activity

screening limits, the survey data indicate the likely presence of additional contamination in crevices and on horizontal surfaces (i.e., I-beams) where radioactive dust may have accumulated. Other likely areas of potential contamination include the entrance ramp on the west side of the building and the grooved sliding door track at the top of the ramp.

Because the Blast Chamber structure consists predominantly of steel, no volumetric sampling was conducted other than asbestos sampling of weather stripping around the two doors. Analytical results indicate that neither sample contained any detectable asbestos.

Based on the conclusions of the Blast Chamber characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this building:

- All interior surfaces are assumed to be contaminated with fixed, as well as transferable contamination.
- The roof is assumed to be contaminated with fixed contamination.
- Exterior walls exhibit limited areas of contamination that should be further delineated to identify discrete areas that may potentially be decontaminated and re-used rather than disposed.

5.1.2 Hot Line

Inside the Hot Line, static measurements and gross alpha smear data indicate widespread contamination in the X-Ray Room, Cassette Room, and Hallway. Every location surveyed on the floors and walls of these areas exceeds the building surface screening limit, and approximately one-third of the locations also exceed the transferable activity limit. In addition, surveys of the furniture and other large items in these rooms (i.e., table, metal cabinet, toolbox, shelf, and platform) indicate multiple exceedances of one or both screening limits. Although not all of the planned ceiling locations were able to be surveyed due to accessibility issues, those that were surveyed did not indicate any exceedances of the screening limits.

There are only a few exceedances of the screening limits in the Changing/Wash Room and the Ramp leading from this room to the X-Ray Room hallway. One interior wall location in the Changing/Wash Room exceeds the transferable activity screening limit, and two floor

locations on the Ramp exceed the building surface screening limit. None of the ceiling survey locations in these areas exceed the radiological screening limits. Survey results for the furniture, appliances, and sink drain do not indicate any exceedances of the screening limits. However, based on the high concentration of uranium in the Water Treatment Shed evaporator tank (see Section 3.4.2), which collects contaminated water from the Hot Line drains, it would be prudent to consider all drain lines used to transport water from the Hot Line to the evaporator tank as contaminated.

Analytical data for samples of wallboard, ceiling tile, and flooring material collected from the Hot Line indicate only one exceedance of a chemical action level or volumetric screening limit. The ceiling tile in the Changing/Wash Room was found to contain greater than 1% friable asbestos and, thus, is considered ACM.

Analysis of the water pumped from the floors in the Hallway and X-Ray Room indicate a high concentration of DU. Although technically no longer part of the Hot Line building, the 50 gallons of water that were removed from the floor is noticeably contaminated and must be treated prior to discharge or disposal.

Based on the conclusions of the Hot Line characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this building:

- The walls, floors, furniture, and other items in the X-Ray Room, Cassette Room, and Hallway are assumed to be contaminated and require disposal as radioactive waste.
- The floor of the Ramp is assumed to be contaminated and requires disposal as radioactive waste.
- The east wall in the Changing/Wash Room, which is the only location in this room where the transferable activity screening limit was exceeded, should be further evaluated to determine whether it can be decontaminated and disposed as non-radioactive waste.
- The ceiling tiles in the Changing/Wash Room contain greater than 1% asbestos and require management as ACM.
- Based on historical use, and on data collected previously by ARL, the drain lines transporting water from the sink and washing machine in the Changing/Wash Room to

the Water Treatment Shed should be considered contaminated and require disposal as radioactive waste. This assumption also applies to internal drain lines and pumps that are integral to the washing machine.

- Exterior building surfaces require further evaluation prior to disposal. However, based on results of other exterior surface surveys conducted during this effort, it is assumed that few, if any, of the exterior Hot Line areas exceed either the building surface or transferable activity screening limit.

5.1.3 Firing Tube

The interior of the Firing Tube exhibits large areas of contamination, as indicated by static measurements and smear sample data. Numerous locations on the interior floor of the Firing Tube exceed both direct and transferable screening limits, especially at the south end where there is a higher frequency of shredder plates. Although the walls and ceiling of the Firing Tube were not scanned, it is assumed that they are likely contaminated, based on the premise that the contamination in the tube was caused primarily by the DU penetrators impacting the shredder plates, which would have dispersed contamination throughout the tube cross-section.

On the exterior surfaces of the Firing Tube, two locations exceed the building surface screening limit. Both locations are on the south end of the tube, with the highest measurement recorded on top of the tube where the tube adjoins the Blast Chamber. None of the locations surveyed exceeds the transferable activity screening limit.

The Firing Tube Shed survey results indicate one location of surface contamination, which is in the middle section of the interior south wall of the shed. The transferable activity screening limit was exceeded at this location, although the building surface screening limit was met.

Because the Firing Tube consists predominantly of steel, no volumetric sampling was conducted other than the asbestos sampling of the Firing Tube Shed roof. Analytical results indicate that the asphalt shingle sample collected from this location did not contain any detectable asbestos.

Based on the conclusions of the Firing Tube characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this structure:

- Interior surfaces (including shredder mounts and other appurtenances) throughout the length of the tube are assumed to be contaminated with fixed, as well as removable contamination.

- Exterior surfaces exhibit limited regions of contamination that should be further delineated to identify discrete areas that may potentially be decontaminated and re-used rather than disposed.

5.1.4 Muffler

Results of the Muffler survey indicate a few areas of exterior surface contamination, which appear to be limited to the south end of the structure where the access door is located. Both the building surface and transferable activity screening limits were exceeded at the survey location on this end, on the wall underneath the access door. Scan survey data indicate similar levels of contamination on the door itself.

The floor of the Muffler contains a mixture of water and fine particulate that must be removed prior to decommissioning and/or re-use of this structure as an air handling device. Although no volumetric samples of this material were able to be collected during the characterization effort, it is assumed that the DU concentration in the Muffler water is at least as high as that reported for the water pumped from the floor of the Hot Line, based on the similar nature of contamination (i.e., standing flood water containing radioactive dust that originated within the Blast Chamber). Assuming the water is one foot deep, it is estimated that approximately 2,200 gallons of contaminated water and sludge need to be removed from the Muffler and treated prior to discharge.

Volumetric samples of asphalt shingle and underlying roofing material were collected from the Muffler roof and analyzed for asbestos. Analytical results indicate that neither of the samples contained any detectable asbestos.

Based on the conclusions of the Muffler characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this structure:

- All interior surfaces are assumed to be contaminated based on historical use of this structure.

- The water/sludge contained on the floor of the Muffler is assumed to be contaminated and must be removed and treated.

- Only one exterior surface location (i.e., the south end of the Muffler, near the access door) exhibits contamination that should be further delineated to identify discrete areas that could be decontaminated rather than disposed.

5.1.5 Water Treatment Shed

Results of the Water Treatment Shed survey indicate no exceedances of either the building surface or transferable activity screening limit on the structure itself. Analysis of the water in the evaporator tank inside the shed, however, indicates a high concentration of depleted uranium. Any water remaining in the tank at the time of decommissioning will need to be removed and treated prior to discharge. Once the water is removed and the shed is dismantled, the evaporator tank and associated piping can be surveyed to determine the extent to which contamination is present. Considering their historical use, it is assumed that these items will be significantly contaminated.

A volumetric sample of asphalt shingle was collected from the roof of the Water Treatment Shed and analyzed for asbestos. Analytical results indicate that this sample did not contain any detectable asbestos.

Based on the conclusions of the Water Treatment Shed characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this structure:

- Contamination levels on the Water Treatment Shed walls and roof are below project screening limits.

- The water in the evaporator tank is assumed to be contaminated and must be removed and treated.

- Based on historical use, the evaporator tank and associated piping are assumed to be contaminated, but should be further evaluated to confirm this assumption prior to disposal. This assumption also applies to the floor and other low-lying components of the shed where contaminated water may have splashed or settled.

5.2 Grounds

Results of the R-14 Range Grounds sampling and analysis indicate that, of all the areas evaluated, only the Laydown Yard contains regions that exceed the DU soil screening limit of 102 pCi/g. Two-thirds of the surface soil samples (i.e., from 0 to 6 in. bgs) collected from this area contain DU at concentrations that exceed the soil screening limit. The highest reported ^{234}Th activity concentration is 511 pCi/g, which equates to a DU activity concentration of 565 pCi/g. Alpha spectrometry data confirm that isotopic ratios of uranium in the soil are indicative of DU. Analytical results of a subsurface soil sample (i.e., from 6 to 12 in. bgs), collected from one of the surface sampling locations that exceeds the screening limit, suggest that the contamination is likely limited to the top 6 inches of soil.

The storm water Sediment Trap, which is located on the west side of the Laydown Yard, contains sediment with a ^{238}U activity concentration of 620 pCi/g, which is well in excess of the soil screening limit. However, the water in the Sediment Trap contains total uranium at a concentration of 20 µg/L, which is less than the EPA drinking water standard of 30 µg/L. Alpha spectrometry data confirm that the isotopic ratios in both the sediment and water samples are indicative of DU. Neither the sediment nor the water in the trap contains metals at concentrations exceeding hazardous waste limits.

While none of the soil samples collected from the Firing Fan, Sediment Trap, Pavement, or Grassy Field contains DU at a concentration that exceeds the soil screening limit, GWS results indicate a few suspect regions of elevated radioactivity in these areas. The Firing Fan contains a region of elevated radioactivity along the east edge of the firing line, approximately 50 to 80 feet north of the north end of the Firing Tube. Other regions of elevated activity include a small grassy area downgradient of the Sediment Trap; several Pavement areas (i.e., at the junction of the Muffler and the Blast Chamber exhaust vent, the south entrance to the laydown yard, the low point in the road south of the buildings, and next to the Firing Tube approximately 40 ft north of the Blast Chamber); and the center portion of the north edge of the Grassy Field. These areas should be considered potential sites for remediation, as indicated by statistical analysis of the GWS data.

Based on the conclusions of the Grounds characterization survey, it is recommended that the following considerations be incorporated in the remediation approach for this building:

- Surface soil in the Laydown Yard is assumed to be contaminated and should be remediated to a depth of 6 inches.

- The Sediment Trap, including the concrete basin, baffles, sediment, and water, is assumed to be contaminated and should be remediated. Based on the concentration of DU in the sediment, it is assumed that the entire trap is contaminated and that the water in the trap will become readily contaminated once the sediment is disturbed.

- Additional areas of the Grounds where GWS data indicate discrete regions of elevated radioactivity should be considered potentially contaminated and either investigated further or remediated to a depth of 6 inches.

6.0 REFERENCES

ANL, 1999. *Derived Uranium Guidelines for the Depleted Uranium Study Area of the Transonic Range, Aberdeen Proving Ground, Maryland*. M. Picel and S. Kamboj, Argonne National Laboratory, Environmental Assessment Department. April 1999.

Army, 1999. *Army Regulation 11-9: The Army Radiation Safety Program*. U.S. Army. May 28, 1999.

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CABRERA, 2006a. *R-14 Range Characterization Survey Work Plan.* Cabrera Services, Inc. November 2006.

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EPA, 2000. *National Primary Drinking Water Regulations: Radionuclides*. 65 CFR 76708. December 7, 2000.

NRC, 1998. *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*. NUREG-1507. Nuclear Regulatory Commission. June 1998.

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NRC, 2000. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, NUREG-1575. U.S. Nuclear Regulatory Commission, U.S. Department of Defense, U.S. Environmental Protection Agency, and U.S. Department of Energy. August 2000.

NRC, 2003. *Consolidated NMSS Decommissioning Guidance: Characterization, Survey, and Determination of Radiological Criteria*. NUREG-1757, Vol. 2. U.S. Nuclear Regulatory Commission. September 2003.

APPENDIX A

ARL NUCLEAR MATERIALS LICENSE

Amendment No. 27

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	In accordance with the letter dated January 13, 2005,
1. Department of the Army U. S. Army Research, Development and Engineering Command Army Research Laboratory	3. License number SMB-141 is amended in its entirety to read as follows:
2. Aberdeen Proving Ground, Maryland 21005-5066	4. Expiration date June 30, 2011
	5. Docket No. 040-06394 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Natural Uranium	A. Metal and metal oxide	A. 100 kilograms
B. Depleted Uranium	B. Metal and metal oxide	B. 200,000 kilograms
C. Thorium	C. Metal and metal oxide	C. 100 kilograms
D. Transuranics and technetium-99 contaminants in depleted uranium	D. Contaminants contained in depleted uranium metal and metal oxide	D. Not to exceed 100 picocuries per gram (pCi/g) per transuranic radionuclide and 500 pCi/g total transuranics; not to exceed 500 pCi/g technetium-99

9. Authorized use:

A. through D. (1) Research and development as defined in 10 CFR 30.4; (2) fabrication, modification, and testing of components, parts and/or devices; (3) laboratory analysis and measurement studies; (4) calibration of the licensee's instruments; (5) munitions testing; and (6) processing of waste of other Department of the Army tenants located at Aberdeen Proving Ground.

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at Aberdeen Proving Ground and at temporary job sites of the licensee anywhere in the United States.

License Number
SMB-141

Docket or Reference Number
040-06394

Amendment No. 27

MATERIALS LICENSE
SUPPLEMENTARY SHEET

11. A. Licensed material shall only be used by, or under the supervision of, individuals designated, in writing, by the Radiation Safety Committee. The licensee shall maintain records of individuals designated as users for 3 years following the last use of licensed material by the individual.

    B. The Radiation Safety Officer for this license is Richard A. Markland.

12. The licensee shall not use licensed material in or on human beings except as provided otherwise by specific condition of this license.

13. The licensee shall not use licensed material in field applications where it is released except as provided otherwise by specific condition of this license.

14. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

15. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

    A. Application dated April 13, 2001 [011140434]
    B. Letter dated July 30, 2001 [ML012200458]

For the U.S. Nuclear Regulatory Commission

Date December 19, 2005

By

Elizabeth Ullrich
Commercial and R&D Branch
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406
Monday, December 19, 2005 2:38:53 PM

NUCLEAR REGULATORY COMMISSION
DOCKET NO. 040-06394
December 7, 2005

Environmental Assessment Related to Issuance of a License Amendment of U.S. Nuclear Regulatory Commission Materials License No. SMB-141, Department of the Army in Aberdeen, Maryland

Introduction

The U.S. Nuclear Regulatory Commission (NRC) has prepared this environmental assessment (EA) of the amendment of the Department of the Army's Materials License Number SMB-141, and the release of its Transonic Range, located at Aberdeen Proving Grounds, Aberdeen, Maryland, for unrestricted use. The Transonic Range is operated by the Department of the Army in Aberdeen Proving Grounds, Aberdeen, Maryland. The Department of the Army was authorized by NRC since April 12, 1961, to use radioactive materials for munitions testing and research and development purposes at the site. Actual use of licensed material at the Transonic Range began in 1973. In 2005, the Department of the Army ceased operations with licensed materials at the Transonic Range site and requested that NRC release the site for unrestricted use. The Department of the Army has conducted surveys of the Transonic Range and determined that the site meets the license termination criteria in Subpart E of 10 CFR Part 20. The NRC staff has evaluated the Department of the Army's request and the results of the surveys, and has developed an EA in accordance with the requirements of 10 CFR Part 51. Based on the staff evaluation, the conclusion of the EA is a Finding of No Significant Impact (FONSI) on human health and the environment for the proposed licensing action. The Department of the Army requested release for unrestricted use of the land mass and buildings located at Aberdeen Proving Grounds, Aberdeen, Maryland, as authorized by the NRC License No. SMB-141. The land mass contained within the Transonic Range is approximately 53,000 square meters and the two remaining structures have a total footprint of 80 square meters. This tract of land is located within an active U.S. Army testing and research facility.

License No. SMB-141 was issued in 1961 and amended periodically since that time. NRC-licensed activities performed at the Transonic Range site were limited to research and development and munitions testing using projectiles containing depleted uranium. Activities involving depleted uranium testing at the Transonic Range were conducted from 1973 to 1979. Outdoor areas were affected by the use of licensed materials.

The Proposed Action

The proposed action is to amend Materials License No. SMB-141 and release the Transonic Range, Aberdeen Proving Grounds, Aberdeen, Maryland, for unrestricted use. By letter dated January 13, 2005, the Department of the Army stated that no further actions are required to remediate the Transonic Range and requested release of the range for unrestricted use. The Department of the Army stated that licensed activities ceased completely in January 2005. Based on the licensee's historical knowledge of the site and the conditions of the facility, the licensee determined that only routine decontamination activities, in accordance with licensee radiation safety procedures, were required. A decommissioning plan was not required to be

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submitted to the NRC. The licensee surveyed the Transonic Range, decontaminated or remediated areas as needed, and provided documentation that the Range meets the license termination criteria specified in Subpart E of 10 CFR Part 20, and does not require additional decommissioning activities to be performed. The licensee demonstrated this using the screening criteria described in 65 FR 37186.

Need for the Proposed Action

The purpose of the proposed action is to amend NRC Materials License No. SMB-141, to allow for the release of the Transonic Range for unrestricted use. The licensee needs this license change because it no longer plans to conduct licensed activities at the Transonic Range. NRC is fulfilling its responsibilities under the Atomic Energy Act to make a timely decision on a proposed license amendment for release of facilities for unrestricted use that ensures protection of public health and safety and the environment. The licensee has requested the action to reduce their regulatory burden since they no longer intend to conduct licensed activities at this location.

Environmental Impacts of the Proposed Action

The affected environment was described in the Introduction. The licensee has completed all remediation at the site. The NRC staff has reviewed the surveys performed by the Department of the Army to demonstrate compliance with the 10 CFR 20.1402 license termination criteria. Based on its review, the staff has determined that the affected environment and environmental impacts associated with the release for unrestricted use of the Transonic Range are bounded by the impacts evaluated by the "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities" (NUREG-1496). The staff also finds that the proposed release for unrestricted use of the Transonic Range is in compliance with Title 10, Code of Federal Regulations, Part 20.1402, "Radiological Criteria for Unrestricted Use." The NRC has found no other activities in the area that could result in cumulative impacts.

Environmental Impacts of the Alternatives to the Proposed Action

Since the Transonic Range has already been surveyed and found acceptable for release for unrestricted use, the only alternative to the proposed action of amendment of the license and release of the Transonic Range for unrestricted use is denial of the proposed action (i.e. no action). Denial of the application would result in no change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Agencies and Persons Consulted

The NRC staff has determined that the proposed action will not affect listed species or critical habitat. Therefore, no further consultation is required under Section 7 of the Endangered Species Act. Likewise, the NRC staff have determined that the proposed action is not the type of activity that has the potential to cause effects on historic properties. Therefore, no further consultation is required under Section 106 of the National Historic Preservation Act.

NRC provided a draft of its Environmental Assessment to the Maryland Department of the Environment for review. On September 29, 2005, the Maryland Department of the Environment responded by telephone and agreed with the conclusions of the EA.

Conclusions

Based on its review, the NRC staff has concluded that the completed action complies with 10 CFR Part 20. The NRC staff have prepared this EA in support of the proposed action to amend License No. SMB-141. On the basis of the EA, NRC has concluded that there are no significant environmental impacts and the license amendment does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate.

List of Preparers

James Schmidt, Health Physicist, Division of Nuclear Materials Safety, Region I
Betsy Ullrich, Senior Health Physicist, Division of Nuclear Materials Safety, Region I

List of References

1. NRC License No. SMB-141 inspection and licensing records.

2. "Remediation and Final Status Survey, Transonic Range Depleted Uranium Study Area - Structures", Cabrera Services, dated December 28, 2004 [ADAMS Accession Nos. ML050280349 and ML050280354].

3. "Radiological Final Status survey, Transonic Range - Land Areas, Depleted Uranium Study Area", Cabrera Services, dated November 2004 [ADAMS Accession No. ML050280341].

4. Federal Register Notice, Volume 65, No. 114, page 37186, dated Tuesday, June 13, 2000, "Use of Screening Values to Demonstrate Compliance With The Federal Rule on Radiological Criteria for License Termination."

5. Title 10 Code of Federal Regulations, Part 20, Subpart E, "Radiological Criteria for License Termination."

6. Title 10, Code of Federal Regulations, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

7. NUREG-1496, "Generic Environmental Impact Statement in Support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities."

The application for the license amendment and supporting documentation are available for inspection at NRC's Public Electronic Reading Room at http://www.nrc.gov/reading-rm/adams.html. Any questions with respect to this action should be

Department of the Army
Environmental Assessment

referred to Betsy Ullrich, Commercial and R&D Branch, Division of Nuclear Materials Safety, Region I, 475 Allendale Road, King of Prussia, Pennsylvania 19406, telephone (610) 337-5040, fax (610) 337-5269.

Dated at King of Prussia, Pennsylvania this 7th day of December 2005

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

James P. Dwyer, Chief
Commercial and R&D Branch
Division of Nuclear Materials Safety
Region I

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APPENDIX B

BUILDING SURVEY RESULTS

B1: R-14 Blast Chamber
B2: Hot Line
B3: Firing Tube
B4: Muffler
B5: Water Treatment Shed

APPENDIX B-1

R-14 BLAST CHAMBER SURVEY RESULTS

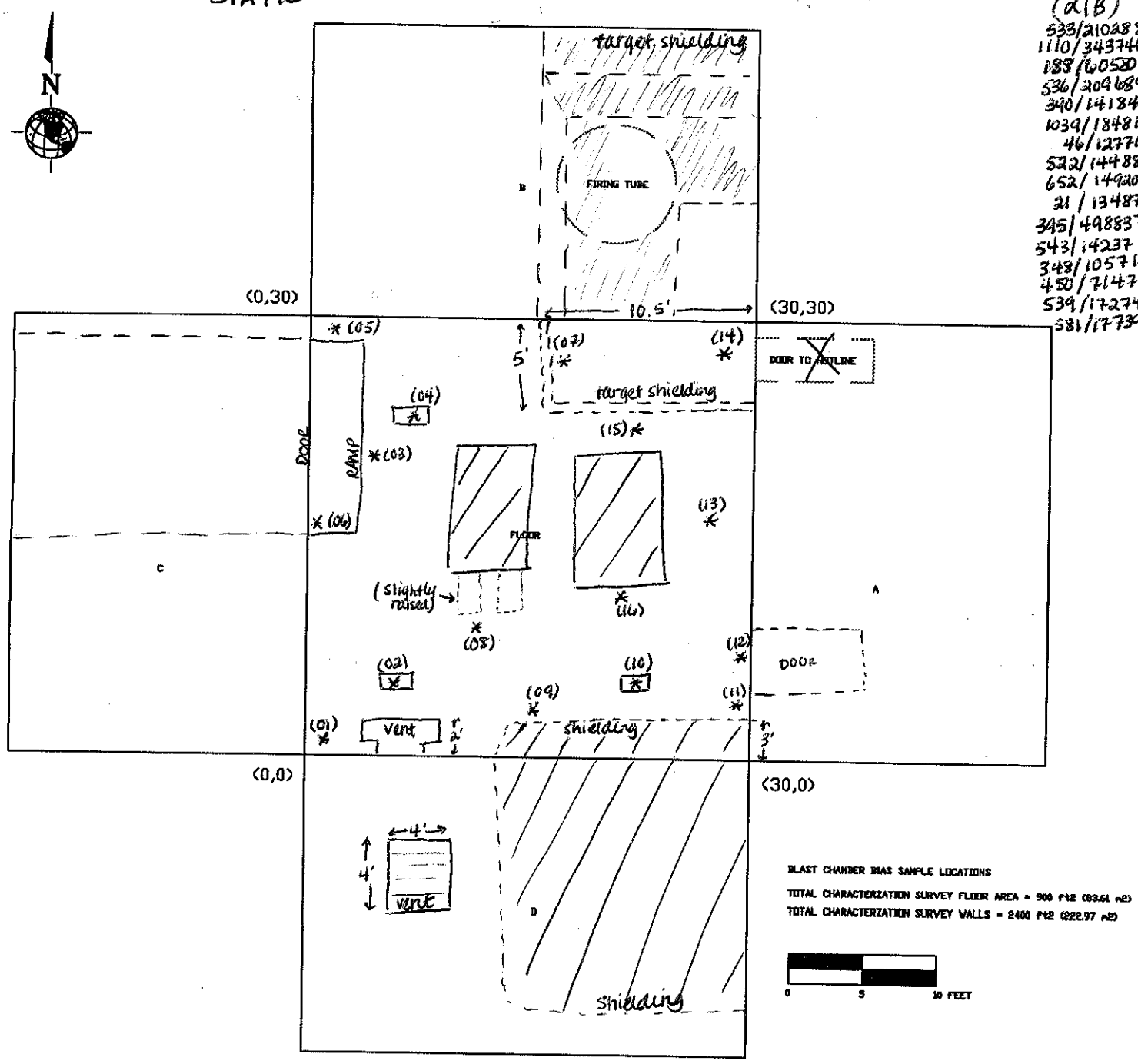
R-14 Range Radiological Survey Results
Blast Chamber

Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
INTERIORS								
Floors (Bias)								
BC-FL-01	395.7	yes	43-37 (1min)		SMB-BC-FL-01	71.2	yes	2929 (4min)
BC-FL-02	824.9	yes	43-37 (1min)		SMB-BC-FL-02	572.4	yes	2929 (4min)
BC-FL-03	139.1	yes	43-37 (1min)		SMB-BC-FL-03	46.4	yes	2929 (4min)
BC-FL-04	397.9	yes	43-37 (1min)		SMB-BC-FL-04	272.2	yes	2929 (4min)
BC-FL-05	289.3	yes	43-37 (1min)		SMB-BC-FL-05	91.9	yes	2929 (4min)
BC-FL-06	772.1	yes	43-37 (1min)		SMB-BC-FL-06	214.1	yes	2929 (4min)
BC-FL-07	33.5		43-37 (1min)		SMB-BC-FL-07	59.1	yes	2929 (4min)
BC-FL-08	387.5	yes	43-37 (1min)		SMB-BC-FL-08	127.6	yes	2929 (4min)
BC-FL-09	484.2	yes	43-37 (1min)		SMB-BC-FL-09	87.9	yes	2929 (4min)
BC-FL-10	14.9		43-37 (1min)		SMB-BC-FL-10	60.3	yes	2929 (4min)
BC-FL-11	293.1	yes	43-37 (1min)		SMB-BC-FL-11	102.3	yes	2929 (4min)
BC-FL-12	403.1	yes	43-37 (1min)		SMB-BC-FL-12	44.7	yes	2929 (4min)
BC-FL-13	258.1	yes	43-37 (1min)		SMB-BC-FL-13	55.1	yes	2929 (4min)
BC-FL-14	334.0	yes	43-37 (1min)		SMB-BC-FL-14	78.7	yes	2929 (4min)
BC-FL-15	400.2	yes	43-37 (1min)		SMB-BC-FL-15	77.5	yes	2929 (4min)
BC-FL-16	431.4	yes	43-37 (1min)		SMB-BC-FL-16	49.3	yes	2929 (4min)
Walls (Systematic)								
BC-WNA-01	3896.1	yes	43-37 (1min)		SM-BC-WNA-01	183.2	yes	2929 (4min)
BC-WNA-02	4577.4	yes	43-37 (1min)		SM-BC-WNA-02	140.0	yes	2929 (4min)
BC-WNA-03	2772.9	yes	43-37 (1min)		SM-BC-WNA-03	38.6	yes	2929 (4min)
BC-WNA-04	2976.0	yes	43-37 (1min)		SM-BC-WNA-04	46.7	yes	2929 (4min)
BC-WNA-05	3028.1	yes	43-37 (1min)		SM-BC-WNA-05	346.8	yes	2929 (4min)
BC-WNA-06	5190.3	yes	43-37 (1min)		SM-BC-WNA-06	125.6	yes	2929 (4min)
BC-WNB-01	3134.4	yes	43-37 (1min)		SM-BC-WNB-01	466.0	yes	2929 (4min)
BC-WNB-02	1815.7	yes	43-37 (1min)		SM-BC-WNB-02	316.2	yes	2929 (4min)
BC-WNB-03	5290.8	yes	43-37 (1min)		SM-BC-WNB-03	187.2	yes	2929 (4min)
BC-WNB-04	4999.9	yes	43-37 (1min)		SM-BC-WNB-04	1071.4	yes	2929 (4min)
BC-WNB-05	8175.3	yes	43-37 (1min)		SM-BC-WNB-05	1025.9	yes	2929 (4min)
BC-WNB-06	5776.5	yes	43-37 (1min)		SM-BC-WNB-06	235.0	yes	2929 (4min)
BC-WNC-01	6249.5	yes	43-37 (1min)		SM-BC-WNC-01	212.6	yes	2929 (4min)
BC-WNC-02	3956.4	yes	43-37 (1min)		SM-BC-WNC-02	155.5	yes	2929 (4min)
BC-WNC-03	533.3	yes	43-37 (1min)		SM-BC-WNC-03	58.6	yes	2929 (4min)
BC-WNC-04	126.4	yes	43-37 (1min)		SM-BC-WNC-04	25.2	yes	2929 (4min)
BC-WND-01	6435.5	yes	43-37 (1min)		SM-BC-WND-01	557.6	yes	2929 (4min)
BC-WND-02	3982.4	yes	43-37 (1min)		SM-BC-WND-02	103.7	yes	2929 (4min)
BC-WND-03	257.4	yes	43-37 (1min)		SM-BC-WND-03	8.1		2929 (4min)
BC-WND-04	1797.8	yes	43-37 (1min)		SM-BC-WND-04	104.3	yes	2929 (4min)
BC-WND-05	4936.7	yes	43-37 (1min)		SM-BC-WND-05	118.7	yes	2929 (4min)
BC-WND-06	1711.5	yes	43-37 (1min)		SM-BC-WND-06	57.6	yes	2929 (4min)

R-14 Range Radiological Survey Results
Blast Chamber

Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
Ceiling (Systematic)								
BC-CL-01	5037.1	yes	43-37 (1min)		SM-BC-CL-01	94.5	yes	2929 (4min)
BC-CL-02	2551.3	yes	43-37 (1min)		SM-BC-CL-02	131.9	yes	2929 (4min)
BC-CL-03	NA				SM-BC-CL-03	NA		
BC-CL-04	5170.3	yes	43-37 (1min)		SM-BC-CL-04	657.8	yes	2929 (4min)
BC-CL-05	3809.8	yes	43-37 (1min)		SM-BC-CL-05	124.4	yes	2929 (4min)
BC-CL-06	3292.1	yes	43-37 (1min)		SM-BC-CL-06	191.2	yes	2929 (4min)
BC-CL-07	5774.2	yes	43-37 (1min)		SM-BC-CL-07	649.8	yes	2929 (4min)
BC-CL-08	4036.7	yes	43-37 (1min)		SM-BC-CL-08	297.8	yes	2929 (4min)
BC-CL-09	NA				SM-BC-CL-09	NA		
EXTERIORS								
North Wall (Bias)								
BC-WL-05	90.7		43-37 (1min)		BC-WL-05	1.2		2929 (4min)
BC-WL-06	105.6	yes	43-37 (1min)		BC-WL-06	0.6		2929 (4min)
BC-WL-07	9.7		43-37 (1min)		BC-WL-07	2.9		2929 (4min)
BC-WL-08	5.2		43-37 (1min)		BC-WL-08	1.2		2929 (4min)
West Wall/Blast Chamber Door (Bias)								
BC-WL-04	17.9		43-37 (1min)		BC-WL-04	2.6		2929 (4min)
BC-WL-01	10.4		43-37 (1min)		BC-WL-01	6.7		2929 (4min)
BC-WL-02	6.7		43-37 (1min)		BC-WL-02	0.9		2929 (4min)
BC-WL-03	37.9		43-37 (1min)		BC-WL-03	10.7	yes	2929 (4min)
BC-RAMP-01	58.0		43-37 (1min)		SMB-BC-RAMP-01	0.9		2930 (4min)
BC-RAMP-02	56.5		43-37 (1min)		SMB-BC-RAMP-02	1.5		2931 (4min)
Roof (Bias)								
BC-RF-01	103.4	yes	43-37 (1min)		SMB-BC-RF-01	1.5		2929 (4min)
BC-RF-02	104.9	yes	43-37 (1min)		SMB-BC-RF-02	5.0		2929 (4min)
BC-RF-03	191.9	yes	43-37 (1min)		SMB-BC-RF-03	1.5		2929 (4min)
BC-RF-04	591.3	yes	43-37 (1min)		SMB-BC-RF-04	9.6		2929 (4min)

~~SURVEY~~ STATIC READINGS - BLAST CHAMBER FLOOR



(α/β)	SAMPLE NUMBER	X	Y	Z
533/210288	SB-BC-FL-01	2	1	0
1110/343746	SB-BC-FL-02	6	9	0
183/60580	SB-BC-FL-03	6	16	0
536/209689	SB-BC-FL-04	9	24	0
390/141847	SB-BC-FL-05	1	29	0
1039/184812	SB-BC-FL-06	0	14	0
46/127715	SB-BC-FL-07	17	28	0
522/144888	SB-BC-FL-08	14	8	0
652/149204	SB-BC-FL-09	16	4	0
21/134876	SB-BC-FL-10	20	8	0
345/498837	SB-BC-FL-11	30	5	0
543/142371	SB-BC-FL-12	30	12	0
348/105712	SB-BC-FL-13	29	18	0
450/71475	SB-BC-FL-14	28	28	0
539/172749	SB-BC-FL-15	25	34	0
581/177391	SB-BC-FL-16	20	12	0

FIELD NOTES:

□ = drains

BC-FL-10 had a slightly sunken drain (~ 1/2"-1").

43-37 (PR178371), 2360 (184938)
CDD 3/23/07

* All readings were bias

SURVEY DATE	SURVEY TECH
12/13/06	KA/MD

FIGURE NOTES:

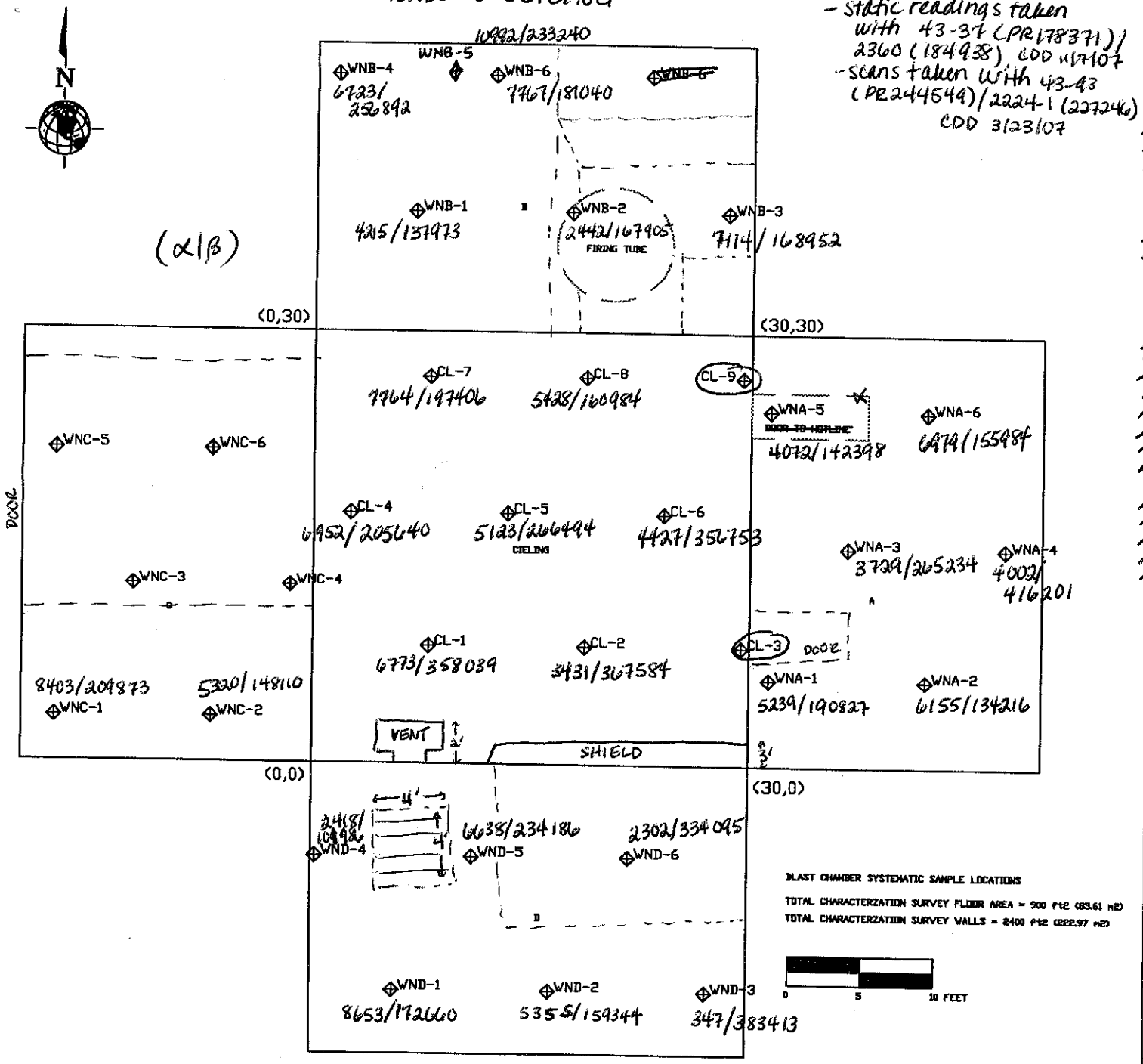
Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

STATIC READINGS - BLAST CHAMBER
WALLS & CEILING

- static readings taken with 43-37 (PR178371)/2360 (184938) CDD 1/17/07
- scans taken with 43-93 (PR244549)/2224-1 (227246) CDD 3/23/07



SAMPLE NUMBER	X	Y	Z
SS-BC-WNA-1	30.00	5.96	1.33
SS-BC-WNA-2	30.00	5.96	12.08
SS-BC-WNA-3	30.00	15.27	6.70
SS-BC-WNA-4	30.00	15.27	17.45
SS-BC-WNA-5	30.00	24.58	1.33
SS-BC-WNA-6	30.00	24.58	12.08
SS-BC-WNB-1	5.81	30.00	8.49
SS-BC-WNB-2	17.56	30.00	8.49
SS-BC-WNB-3	28.30	30.00	8.49
SS-BC-WNB-4	4 ~~1.44~~	30.00	20 ~~17.80~~
SS-BC-WNB-5	12.18	30.00	17.80
SS-BC-WNB-6	16 ~~22.93~~	30.00	17.80
SS-BC-WNC-1	0.00	3.15	17.70
SS-BC-WNC-2	0.00	3.15	6.95
SS-BC-WNC-3	0.00	12.46	12.33
SS-BC-WNC-4	0.00	12.46	1.58
SS-BC-WNC-5	0.00	21.76	17.70
SS-BC-WNC-6	0.00	21.76	6.95
SS-BC-WND-1	5.64	0.00	15.60
SS-BC-WND-2	14 ~~10.44~~	0.00	15.60
SS-BC-WND-3	26 ~~27.47~~	0.00	15.60
SS-BC-WND-4	0.26	0.00	6.28
SS-BC-WND-5	11.02	0.00	6.28
SS-BC-WND-6	21.79	0.00	6.28
SS-BC-CL-1	7.90	8.18	20.00
SS-BC-CL-2	18.86	8.18	20.00
SS-BC-CL-3	29.43	8.18	20.00
SS-BC-CL-4	2.51	17.50	20.00
SS-BC-CL-5	13.28	17.50	20.00
SS-BC-CL-6	24.05	17.50	20.00
SS-BC-CL-7	7.90	26.83	20.00
SS-BC-CL-8	18.66	26.83	20.00
SS-BC-CL-9	29.43	26.83	20.00

FIELD NOTES:
BZ/LV start ~~0940~~ 0915 (40 12/13)
stop 1500

NOTE: could not reach CL-3 and CL-9 due to boxes in middle of room (manlift would not reach).

WNC-03 - WNC-06 could not be reached because they were on the door (open)

SURVEY DATE	SURVEY TECH
12/13/06	RA / MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

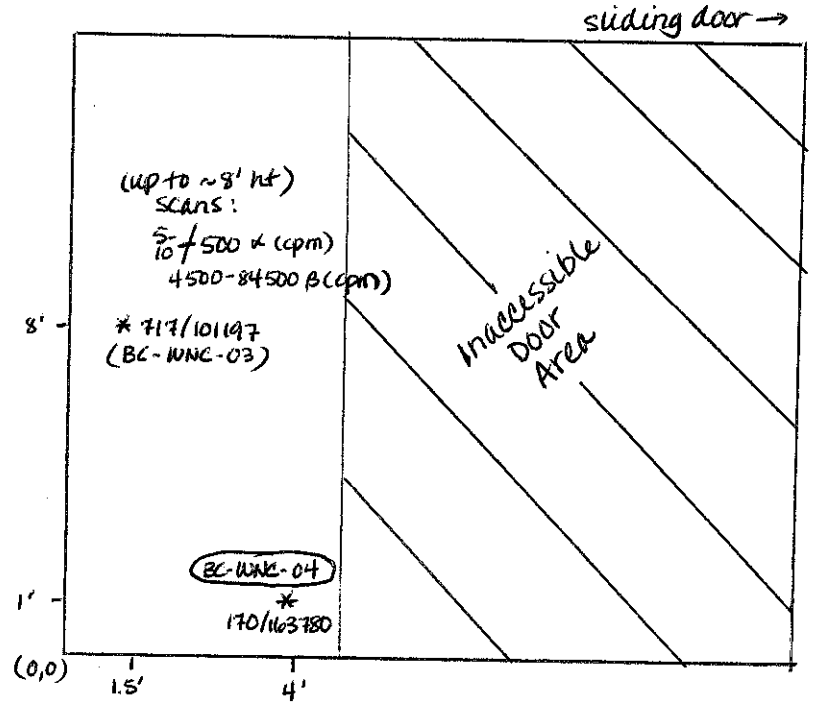
CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Site: Blast Chamber Door - Interior	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 1

Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments



static readings: 43-37/2360 ; survey readings: 43-93/2224-1

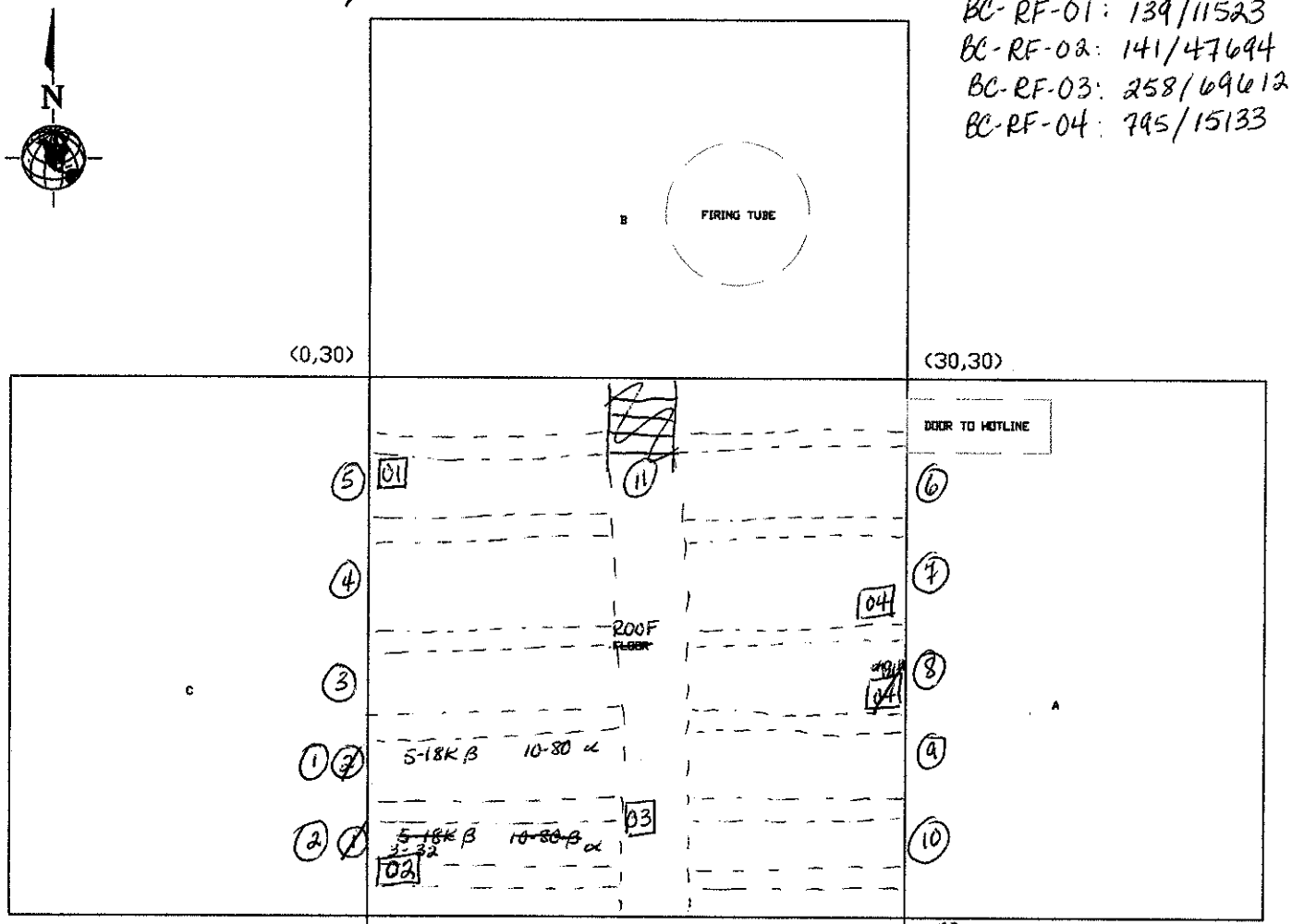
Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA / MD	12/20/06	43-37	PR178371					3/23/07
		2360	184938					3/23/07
		43-93	PR44549					~~3/23/07~~
		2224-1	257246					~~3/23/07~~ 11/7/07
Reviewed By:	Date:							

Key			
(α/β)			
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

SURVEY READINGS - BLAST CHAMBER ROOF
SCAN / STATIC READINGS

(α/β)

BC-RF-01: 139/11523
BC-RF-02: 141/47694
BC-RF-03: 258/69612
BC-RF-04: 795/15133



① = scan section of roof
02 = static reading/smear location
- - - = raised beams

- Black dust-like material settled in corners and cracks across roof surface and I-beams (10,000 - 20,000 cpm β 70-90 cpm α). Other areas showed lower α with low end of β.
- On east side bays top surface was lower than edges, which had peeling paint in multiple places. Also, highest readings occurred under I-beam ledges.
- Along middle area, highest readings were found along south half.
- Stairs to roof were scanned.

0-15 α
1000-2000 β

BLAST CHAMBER BIAS SAMPLE LOCATIONS

TOTAL CHARACTERZATION SURVEY FLOOR AREA = 900 ft2 (83.61 m2)
TOTAL CHARACTERZATION SURVEY WALLS = 2400 ft2 (222.97 m2)

0 5 10 FEET

Section

~~PASS NUMBER~~	MAX (cpm)	MIN (cpm)
1 β	5000	~~30000~~ 18000
1 α	10	80
2 β	3100	32000
2 α	0	25
3 β	1000	27500
3 α	0	30
4 β	800	10500
4 α	2	30
5 β	425	8000
5 α	0	50
6 β	500	9800
6 α	0	~~120~~ 30
7 β	400	10000
7 α	0	25
8 β	300	5200
8 α	0	110
9 β	250	13100
9 α	0	140
10 β	325	6900
10 α	0	90
11 β	250	40000
11 α	0	50

(ROOF EXTERIOR)

FIELD NOTES:
B2 start: 0905
stop: 1335
* periodic stalls due to battery

scan- 43-93: 227246/PB244549 CDD 11/7/07 (2224-1)
static- 43-68 (PR178371) 2224 (184938) CDD 6/14/07

SURVEY DATE	SURVEY TECH
12/11/06	KA/MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

(STATIC READINGS)

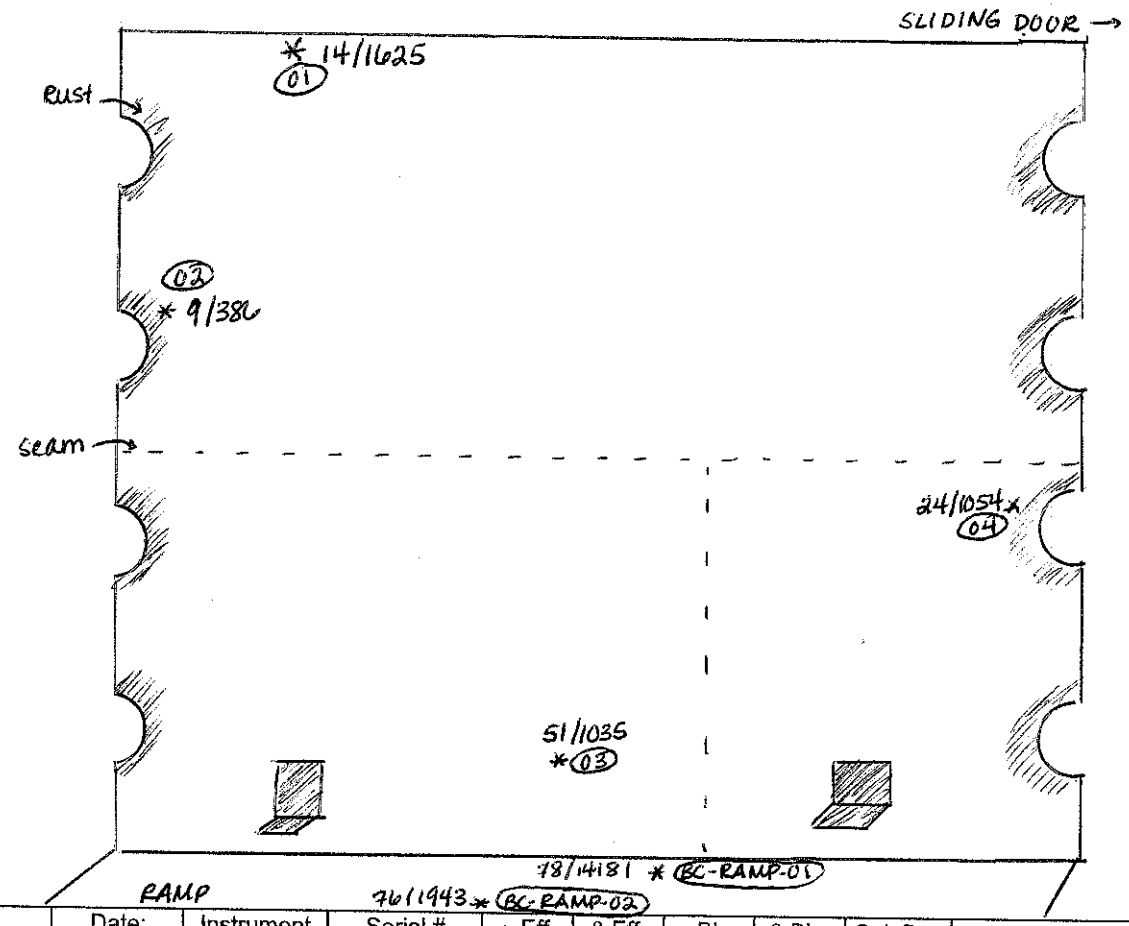
OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Site:	RWP#	Survey #	Survey Type:	
Blast Chamber Door-Exterior	N/A		Characterization	pg. 1 of 1

Smear Results CPM/100cm^2

No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Smears:
BC-WL-01
BC-WL-02
BC-WL-03
BC-WL-04



Comments
- Areas around welding seams and rusty bolt areas give higher scan readings. Ramp shows high counts closest to where it meets the door and on wheel ramps (1000-100,000 cpmβ)
- Static on top of door: 7/7750

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	12/11/06	43-37 (ST)	PR178371					3/23/07
		2360	184938					3/23/07
		43-93 (SC)	PR244549					11/7/07
Reviewed By:	Date:	2224-1	227246					11/7/07

Key (α/β)

○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

ST = static SC = scan

Scan data:

*Door: 2-30 cpm α
175-900 cpm β

Inside Track of sliding door: 10-85 cpm α
3000-5000 cpm β

* All remaining areas excluding those already noted to be higher

STATIC READINGS

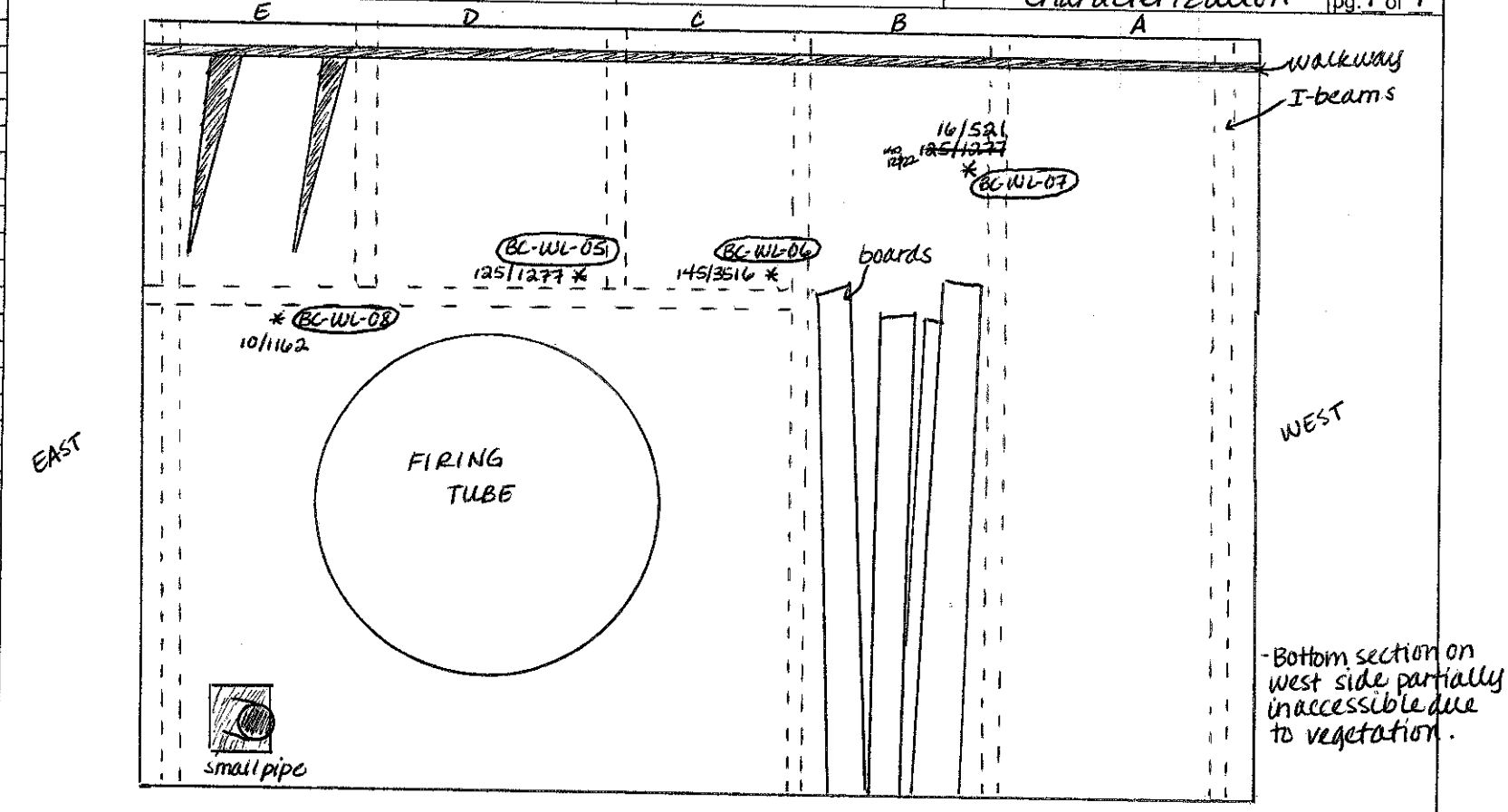
OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Blast Chamber- Exterior North Wall Site:	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 1

Smear Results
CPM/100cm^2

No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments



- Bottom section on west side partially inaccessible due to vegetation.

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA / MD	12/12/06	43-37	PR-178371					3/23/07
		2360	184938					3/23/07
Reviewed By:	Date:							

Key			
(α/β)			
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

SURVEY READINGS

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Blast Chamber-
Site: Exterior North Wall

RWP# N/A

Survey #

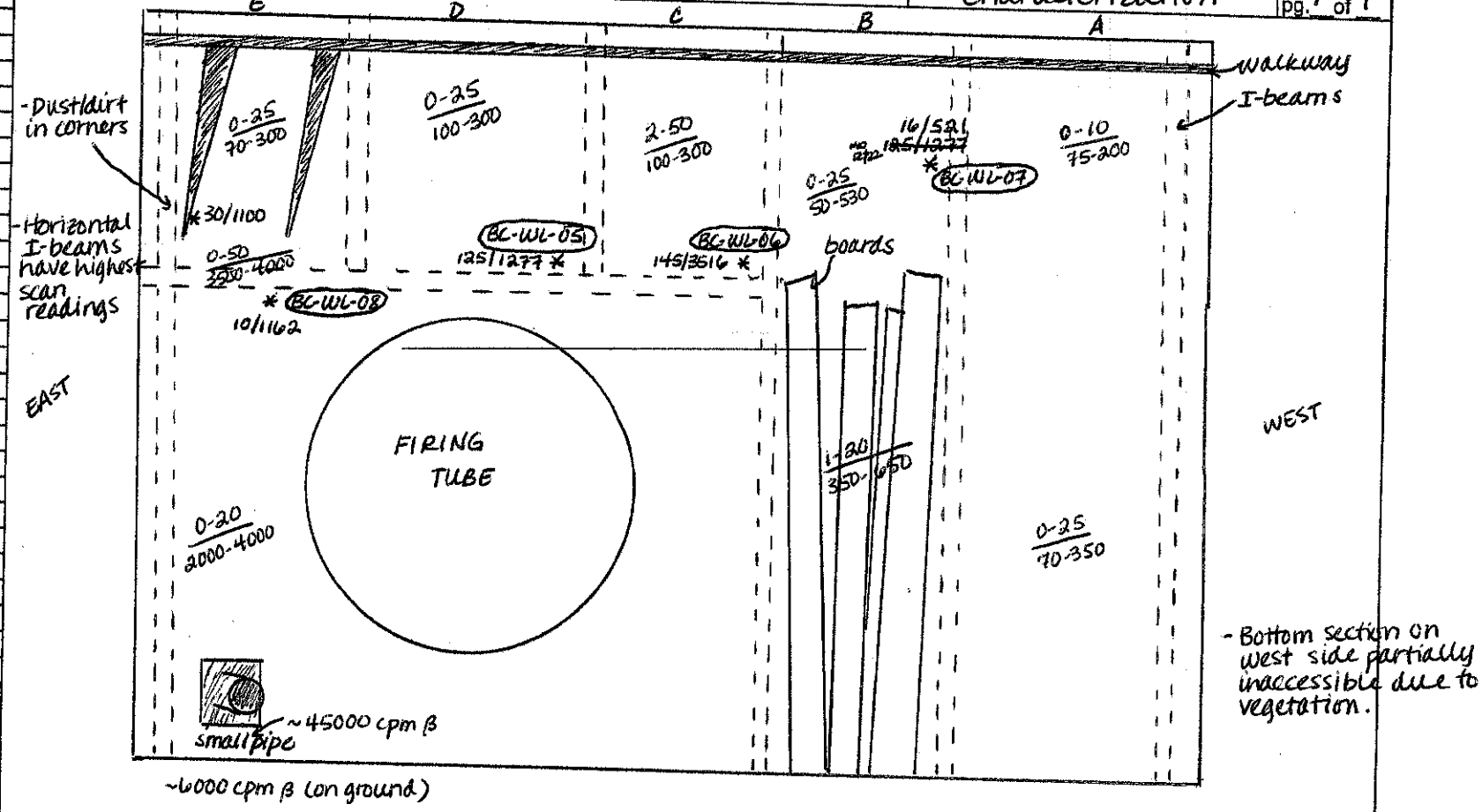
Survey Type: Characterization

pg. 1 of 1

Smear Results
CPM/100cm^2

No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments



- Bottom section on west side partially inaccessible due to vegetation.

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	12/12/06	43-93	PR244549					11/7/07
		2224-1	227246					11/7/07
Reviewed By:	Date:							

Key

(α/β)			
○	Smear	*_*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

APPENDIX B-2

HOT LINE
SURVEY RESULTS

R-14 Range Radiological Survey Results
Hot Line

Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
CHANGING/WASH ROOM								
Floor								
HL-FL-01	87.0		43-37 (1min)		HL-FL-01	0.5		2929 (4min)
HL-FL-02	43.9		43-37 (1min)		HL-FL-02	0.5		2929 (4min)
HL-FL-03	43.9		43-37 (1min)		HL-FL-03	2.2		2929 (4min)
HL-RAMP-01	90.7		43-37 (1min)		HL-RAMP-01	-0.1		2929 (4min)
HL-RAMP-02	119.8	yes	43-37 (1min)		HL-RAMP-02	1.6		2929 (4min)
HL-RAMP-03	224.6	yes	43-37 (1min)		HL-RAMP-03	7.4		2929 (4min)
Ceiling								
HLCHNG-CL-01	99.7		43-37 (1min)		HLCHNG-CL-01	1.7		2929 (4min)
HL-EVENT-01	84.1		43-37 (1min)		HL-EVENT-01	2.2		2929 (4min)
HL-WVENT-02	12.6		43-37 (1min)		HL-WVENT-02	3.9		2929 (4min)
Walls								
HL-WND-01	35.0		43-37 (1min)		HL-WND-01	7.5		2929 (4min)
HL-WNB-01	26.0		43-37 (1min)		HL-WNB-01	3.9		2929 (4min)
HL-WNA-02	29.8		43-37 (1min)		HL-WNA-02	13.8	yes	2929 (4min)
HL-WNC-03	26.0		43-37 (1min)		HL-WNC-03	5.2		2929 (4min)
Additional Materials								
HL-DRAIN-01	30.5		43-37 (1min)		HL-DRAIN-01	5.6		2929 (4min)
HL-DRAIN-02	N/A		N/A		HL-DRAIN-02	3.3		2929 (4min)
HL-WASHER-01	37.9		43-37 (1min)		HL-WASHER-01	-0.1		2929 (4min)
HL-BENCH-03	66.2		43-37 (1min)		HL-BENCH-03	6.8		2929 (4min)
HL-DRYER-04	23.8		43-37 (1min)		HL-DRYER-04	-0.1		2929 (4min)
HL-SINK-02	N/A		N/A		HL-SINK-02	1.0		2929 (4min)
CASSETTE ROOM AND HALLWAY								
Floors								
HLCAS-FL-09	494.6	yes	43-37 (1min)		HLCAS-FL-09	106.5	yes	2929 (4min)
HLCAS-FL-10	483.5	yes	43-37 (1min)		HLCAS-FL-10	127.8	yes	2929 (4min)
HLCAS-STEPS-11	371.9	yes	43-37 (1min)		HLCAS-STEPS-11	135.8	yes	2929 (4min)
HLHALL-FL-01	872.5	yes	43-37 (1min)		HLHALL-FL-01	12.6	yes	2929 (4min)
HLHALL-FL-02	307.9	yes	43-37 (1min)		HLHALL-FL-02	28.7	yes	2929 (4min)
HLHALL-FL-03	1331.4	yes	43-37 (1min)		HLHALL-FL-03	3.9		2929 (4min)
HLHALL-FL-04	702.9	yes	43-37 (1min)		HLHALL-FL-04	1.6		2929 (4min)

R-14 Range Radiological Survey Results
Hot Line

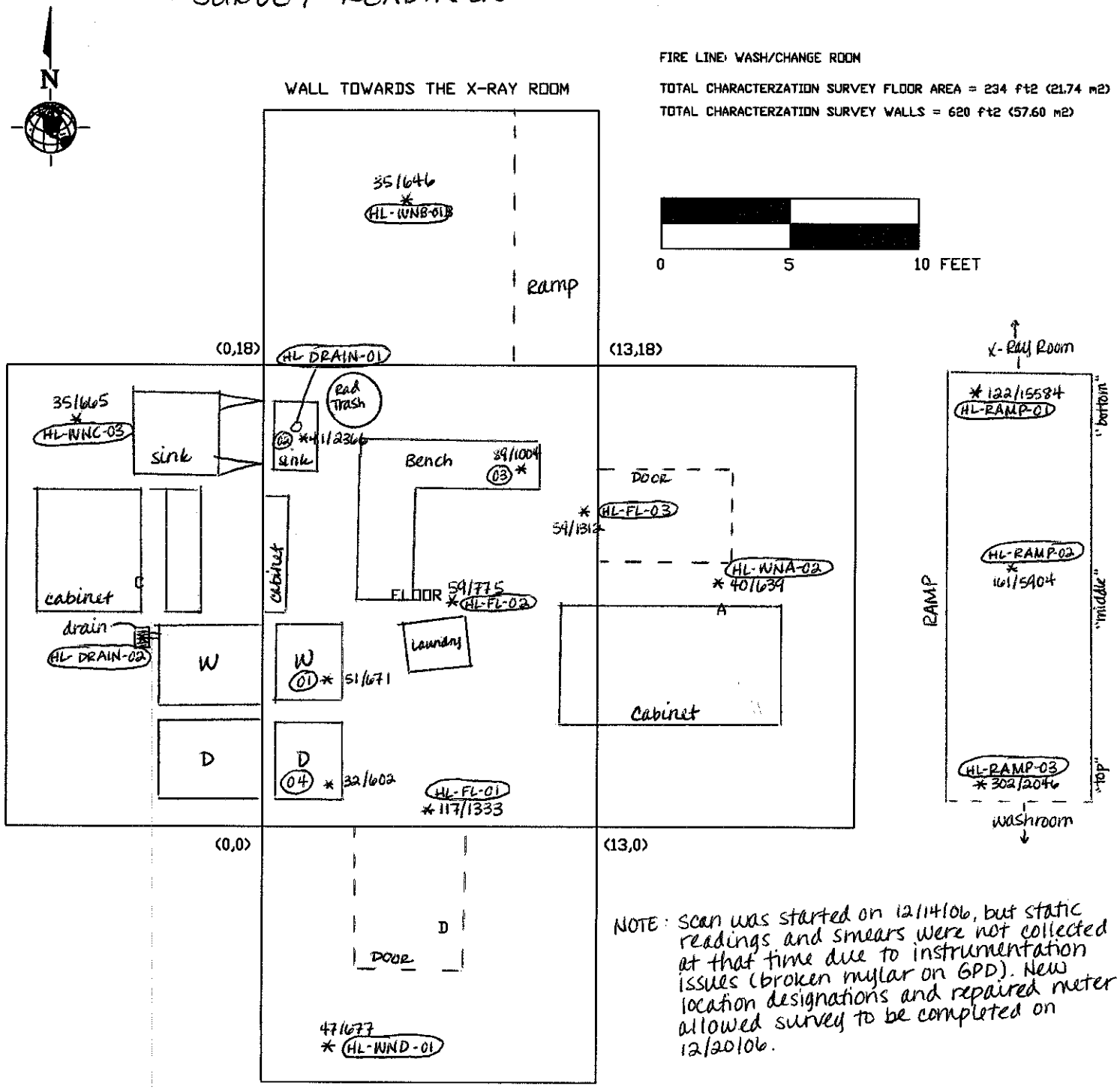
Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
Ceilings								
HLCAS-CL-05	20.8		43-37 (1min)		HLCAS-CL-05	3.3		2929 (4min)
HLCAS-VENT-06	17.9		43-37 (1min)		HLCAS-VENT-06	-0.1		2929 (4min)
HLHALL-CL-01	N/A		N/A		HLHALL-CL-01	3.3		2929 (4min)
HLHALL-CL-02	N/A		N/A		HLHALL-CL-02	8.5		2929 (4min)
Walls								
HLCAS-WNA-01	100.4	yes	43-37 (1min)		HLCAS-WNA-01	1.0		2929 (4min)
HLCAS-WNB-02	679.1	yes	43-37 (1min)		HLCAS-WNB-02	146.2	yes	2929 (4min)
HLCAS-WNC-03	208.3	yes	43-37 (1min)		HLCAS-WNC-03	6.8		2929 (4min)
HLCAS-WND-04	120.5	yes	43-37 (1min)		HLCAS-WND-04	0.5		2929 (4min)
HLHALL-WND-05	510.3	yes	43-37 (1min)		HLHALL-WND-05	2.8		2929 (4min)
HLHALL-WNA-06	146.5	yes	43-37 (1min)		HLHALL-WNA-06	0.5		2929 (4min)
HLHALL-WNC-07	179.3	yes	43-37 (1min)		HLHALL-WNC-07	-0.1		2929 (4min)
HLHALL-WNB-08	185.2	yes	43-37 (1min)		HLHALL-WNB-08	0.5		2929 (4min)
Additional Materials								
HLCAS-TABLE-07	949.1	yes	43-37 (1min)		HLCAS-TABLE-07	147.4	yes	2929 (4min)
HLCAS-TOOL-08	662.0	yes	43-37 (1min)		HLCAS-TOOL-08	112.2	yes	2929 (4min)
X-RAY ROOM								
Floors								
HLXRY-FL-01	259.6	yes	43-37 (1min)		HLXRY-FL-01	56.9	yes	2929 (4min)
HLXRY-FL-05	628.5	yes	43-37 (1min)		HLXRY-FL-05	6.8		2929 (4min)
HLXRY-FL-10	557.9	yes	43-37 (1min)		HLXRY-FL-10	6.8		2929 (4min)
Ceilings								
HLXRY-CL-01	N/A		N/A		HLXRY-CL-01	2.2		2929 (4min)
HLXRY-CL-02	N/A		N/A		HLXRY-CL-02	10.8	yes	2929 (4min)
Walls								
HLXRY-WNA-09	964.0	yes	43-37 (1min)		HLXRY-WNA-09	1.6		2929 (4min)
HLXRY-WNC-03	1026.5	yes	43-37 (1min)		HLXRY-WNC-03	3.9		2929 (4min)
HLXRY-WNC-04	494.6	yes	43-37 (1min)		HLXRY-WNC-04	6.8		2929 (4min)
HLXRY-WNB-06	780.3	yes	43-37 (1min)		HLXRY-WNB-06	9.1		2929 (4min)
Additional Materials								
HLXRY-PLAT-02	180.7	yes	43-37 (1min)		HLXRY-PLATE-02	5.1		2929 (4min)
HLXRY-METAL-08	676.9	yes	43-37 (1min)		HLXRY-METAL-08	3.3		2929 (4min)
HLXRY-SHELF-07	1102.3	yes	43-37 (1min)		HLXRY-SHELF-07	2.2		2929 (4min)

FLOOR/WALL ~~SM~~ BIAS READINGS & SMEARS (STATIC) + SURVEY READINGS

FIRE LINE: WASH/CHANGE ROOM

TOTAL CHARACTERZATION SURVEY FLOOR AREA = 234 ft2 (21.74 m2)

TOTAL CHARACTERZATION SURVEY WALLS = 620 ft2 (57.60 m2)



PASS NUMBER	MAX (cpm)	MIN (cpm)
Rad Trash α	20	0
Rad Trash β	800	600
Laundry α	40	30
Laundry β	1000	200
PPE β	1000	200
ceiling vent α	25	0
ceiling vent β	1400	300
ceiling α	20	0
ceiling β	700	200
floor β	1000	200
walls β	400	250
Broom bristles (β)	3000	
south ceiling vent β	2000	
SCBA power supply on wall β	3200	
Ramp top β	500	
Ramp middle β	2000	
Ramp bottom β	4700	3500

FIELD NOTES:

Scans: 12/14/06
43-93 (~~227246~~), 2224-1 (227246) (PR44549) CDD 1/17/07

Statics/smears: 12/20/06
43-37 (PR178371), 2360 (184938)
CDD 3/23/07

Note: could not get static reading of HL-DRAIN-02 location due to inaccessibility.

SURVEY DATE	SURVEY TECH
	KA/MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

(α/β)

NOTE: Scan was started on 12/14/06, but static readings and smears were not collected at that time due to instrumentation issues (broken mylar on GPD). New location designations and repaired meter allowed survey to be completed on 12/20/06.

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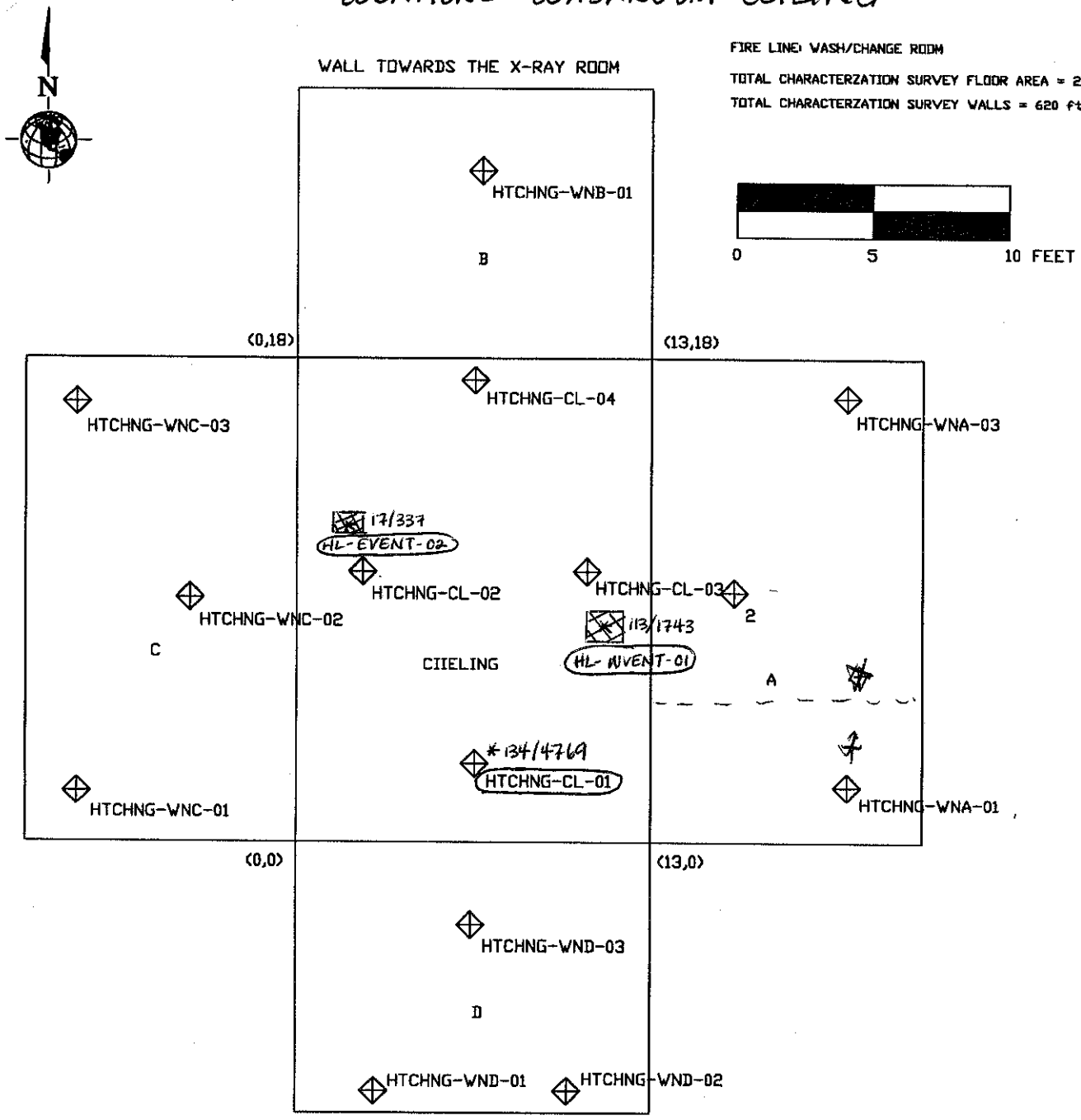
CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

SMEAR LOCATIONS - WASHROOM CEILING

FIRE LINE: WASH/CHANGE ROOM

TOTAL CHARACTERZATION SURVEY FLOOR AREA = 234 ft2 (21.74 m2)

TOTAL CHARACTERZATION SURVEY WALLS = 620 ft2 (57.60 m2)



SAMPLE NUMBER	X	Y	Z
SS-HTCHNG-CL-01	6.53	2.94	0
SS-HTCHNG-CL-02	2.41	10.06	0
SS-HTCHNG-CL-03	10.64	10.06	0
SS-HTCHNG-CL-04	6.53	17.18	0
SS-HTCHNG-WNA-01	13	2.0805	7.24
SS-HTCHNG-WNA-02	13	9.2999	3.07
SS-HTCHNG-WNA-03	13	16.5193	7.24
SS-HTCHNG-WNB-01	6.78	18	6.97
SS-HTCHNG-WNC-01	0	1.89	8.11
SS-HTCHNG-WNC-02	0	9.12	3.03
SS-HTCHNG-WNC-03	0	16.36	8.11
SS-HTCHNG-WND-01	2.6642	0	9.16
SS-HTCHNG-WND-02	9.9427	0	9.16
SS-HTCHNG-WND-03	5.4035	0	3.03

FIELD NOTES:

= vent

smears/statics on ceiling and vents

(α/β)

static readings:
43-37 (PR 178371), 2360 (184938)
CDD 3/23/07

SURVEY DATE	SURVEY TECH
~~12/14/06 - smears~~ 12/20/06	RA/MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

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CABRERA SERVICES
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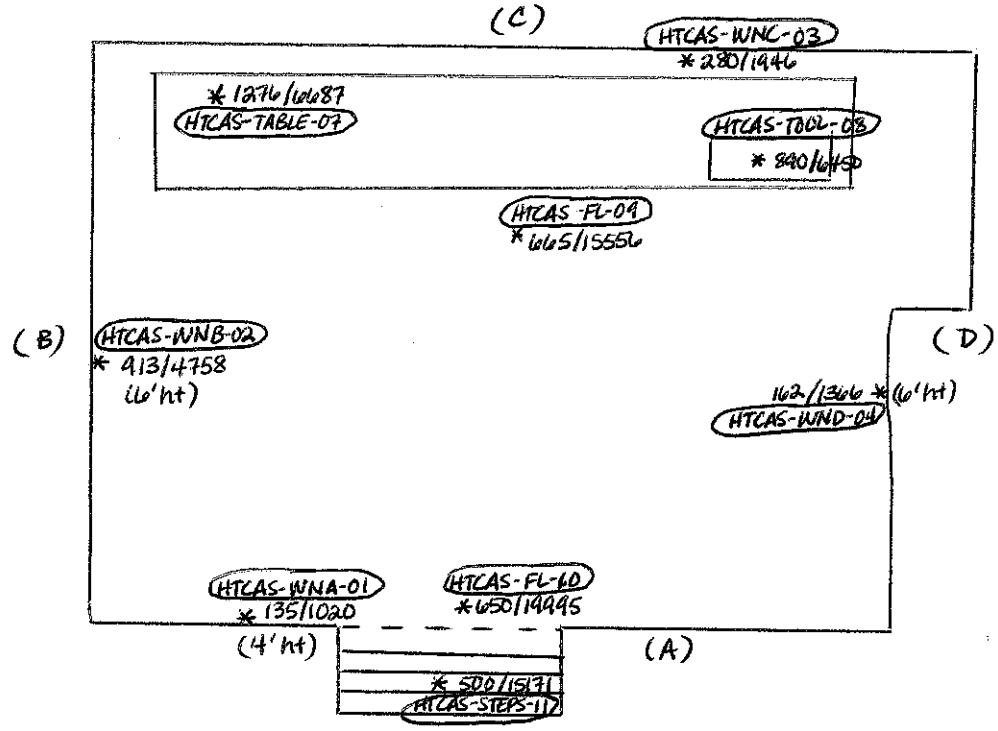
(STATIC READINGS)

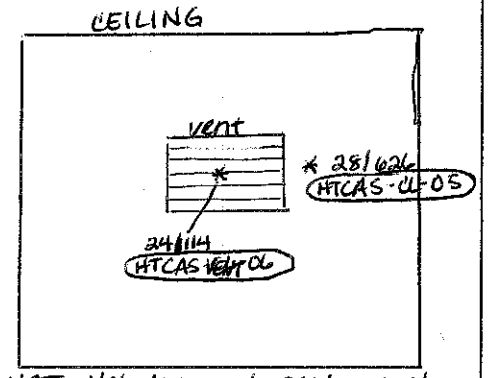
OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Site: Cassette Room - Hot Line	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 2

Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments





NOTE: Not drawn to scale, vent is located approximately in center of ceiling

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	~~43-39~~ 12/20/06	43-37	PR178371					3/23/07
		2360	184938					3/23/07
Reviewed By:	Date:							

Key (α/β)			
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

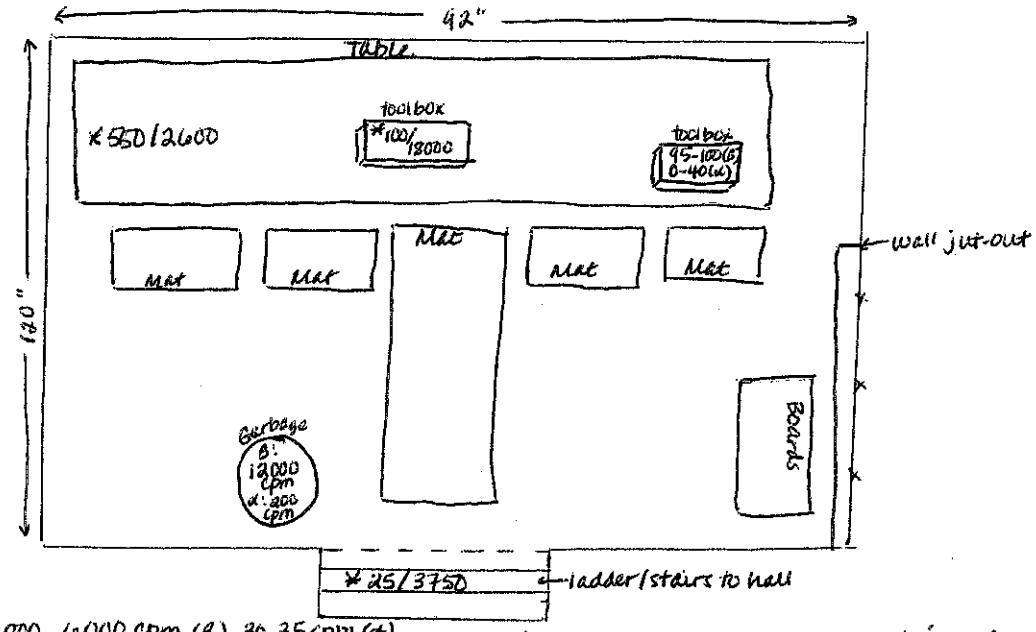
(SCAN READINGS)

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Hot Line Site: Cassette Room	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 1

Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments



Scan Readings:
- Mats on floor: 1000-6000 cpm (β), 30-35 cpm (α)
- Boards: 200-800 cpm (β), 0-25 cpm (α)
- Floor: 350-6000 cpm (β), 0-25 cpm (α)
- Walls: 250-1800 cpm (β), 200-330 cpm (α)
- Vent on ceiling: max ~8000 β (max)

- There are metal lugnuts on stairs that read ~30,000 cpm (β)

- scans completed w/ 43-93 (below), ~~static readings~~ 12/22

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	12/14/06	43-93	244549					11/7/06
		2224-1	227246					11/7/06
Reviewed By:	Date:							

Key (α/β)			
⬭	Smear	*-*	Boundary
▭	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Site: Hallway - Hot Line	RWP# N/A	Survey #	Survey Type: Characterization	pg. 2 of 2

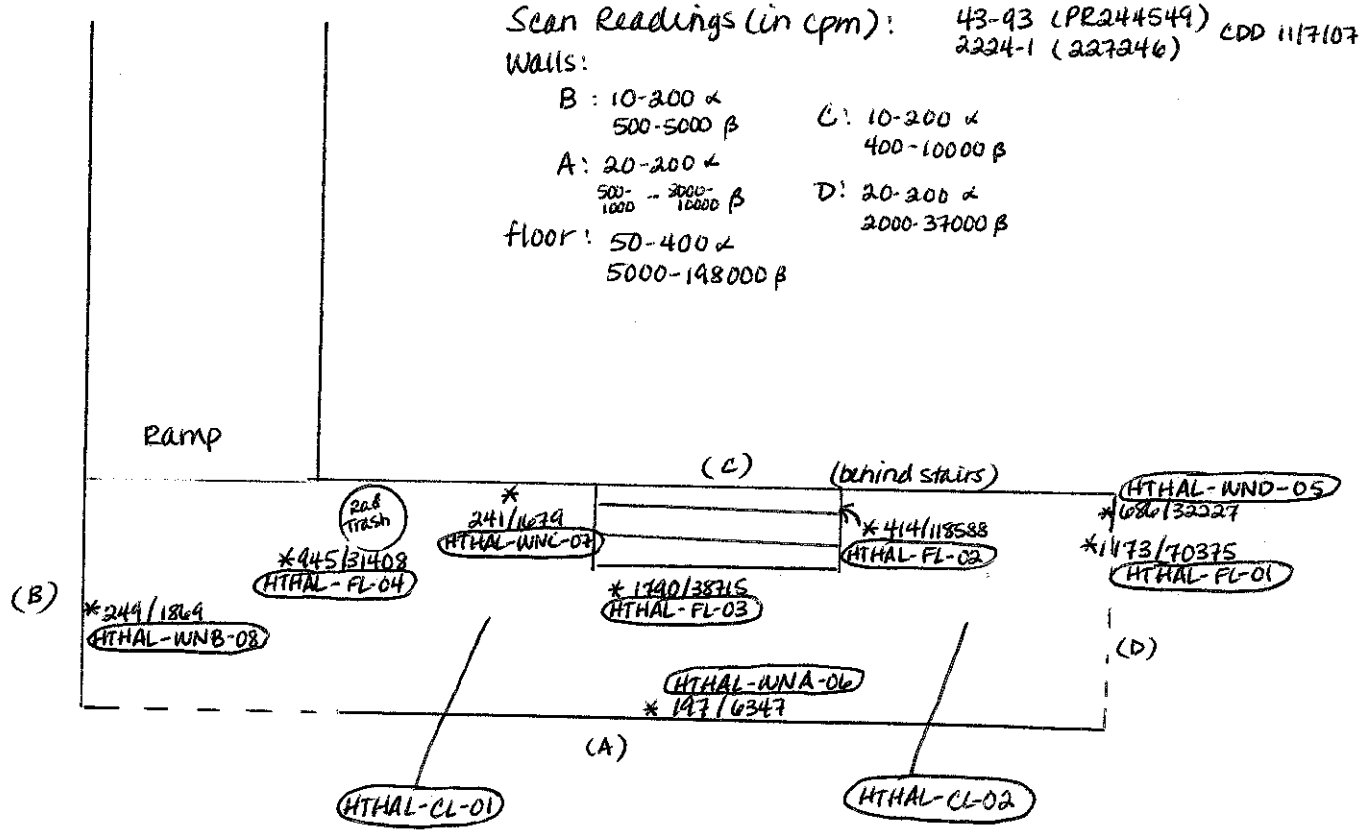
Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments

Scan Readings (in cpm): 43-93 (PR244549) CDD 11/7/07
2224-1 (227246)

Walls:
B: 10-200 α
500-5000 β
C: 10-200 α
400-10000 β
A: 20-200 α
500-1000 - 2000-10000 β
D: 20-200 α
2000-37000 β

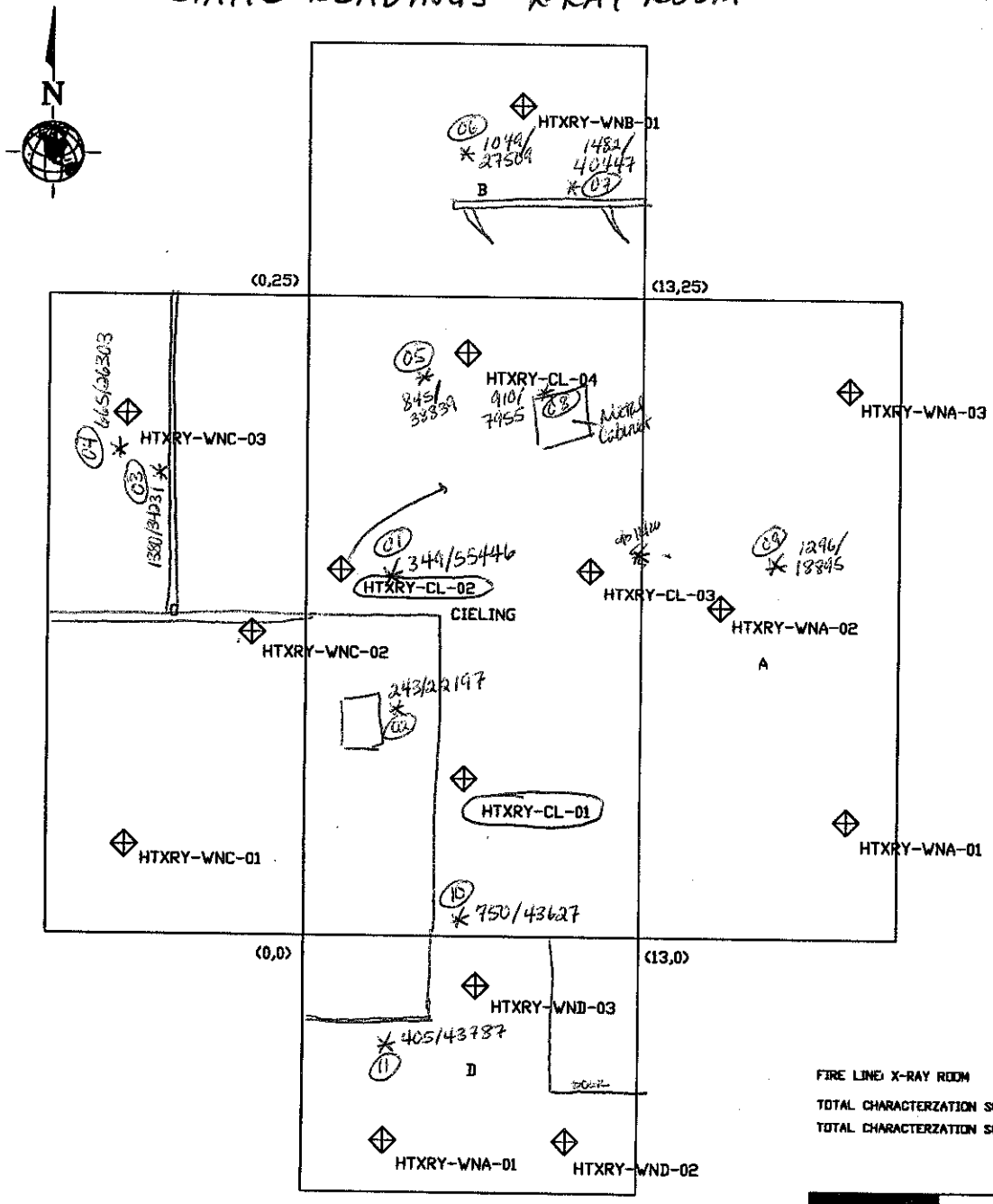
floor: 50-400 α
5000-198000 β



Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
MD	12/20/06	43-37	PR178371					3/23/07
		2360	184938					3/23/07
Reviewed By:	Date:							

Key			
(α/β)			
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

STATIC READINGS - X-RAY ROOM



(α/β)

FIRE LINE: X-RAY ROOM

TOTAL CHARACTERZATION SURVEY FLOOR AREA = 325 ft2 (30.19 m2)

TOTAL CHARACTERZATION SURVEY WALLS = 760 ft2 (70.60 m2)

0 5 10 FEET

SAMPLE NUMBER	X	Y	Z
SS-HTXRY-CL-01	6.16	8.07	0
SS-HTXRY-CL-02	1.33	14.44	0
SS-HTXRY-CL-03	10.99	14.44	0
SS-HTXRY-CL-04	6.16	22.82	0
SS-HTXRY-WNA-01	13	4.50	8.00
SS-HTXRY-WNA-02	13	13.00	3.09
SS-HTXRY-WNA-03	13	21.50	8.00
SS-HTXRY-WNB-01	8.24	25	7.59
SS-HTXRY-WNC-01	0	3.42	6.99
SS-HTXRY-WNC-02	0	11.91	2.09
SS-HTXRY-WNC-03	0	20.40	6.99
SS-HTXRY-WND-01	3.14	0	8.00
SS-HTXRY-WND-02	10.21	0	8.00
SS-HTXRY-WND-03	6.68	0	1.87

FIELD NOTES:

- Took 2 ceiling smears (circled) but not statics there.
- Statics and smears on floors, walls, also extra appliances/tables.

43-37 (PR178371)
2360 (184938)
CDD 3/23/07

SURVEY DATE	SURVEY TECH
12/20/06	KA/MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

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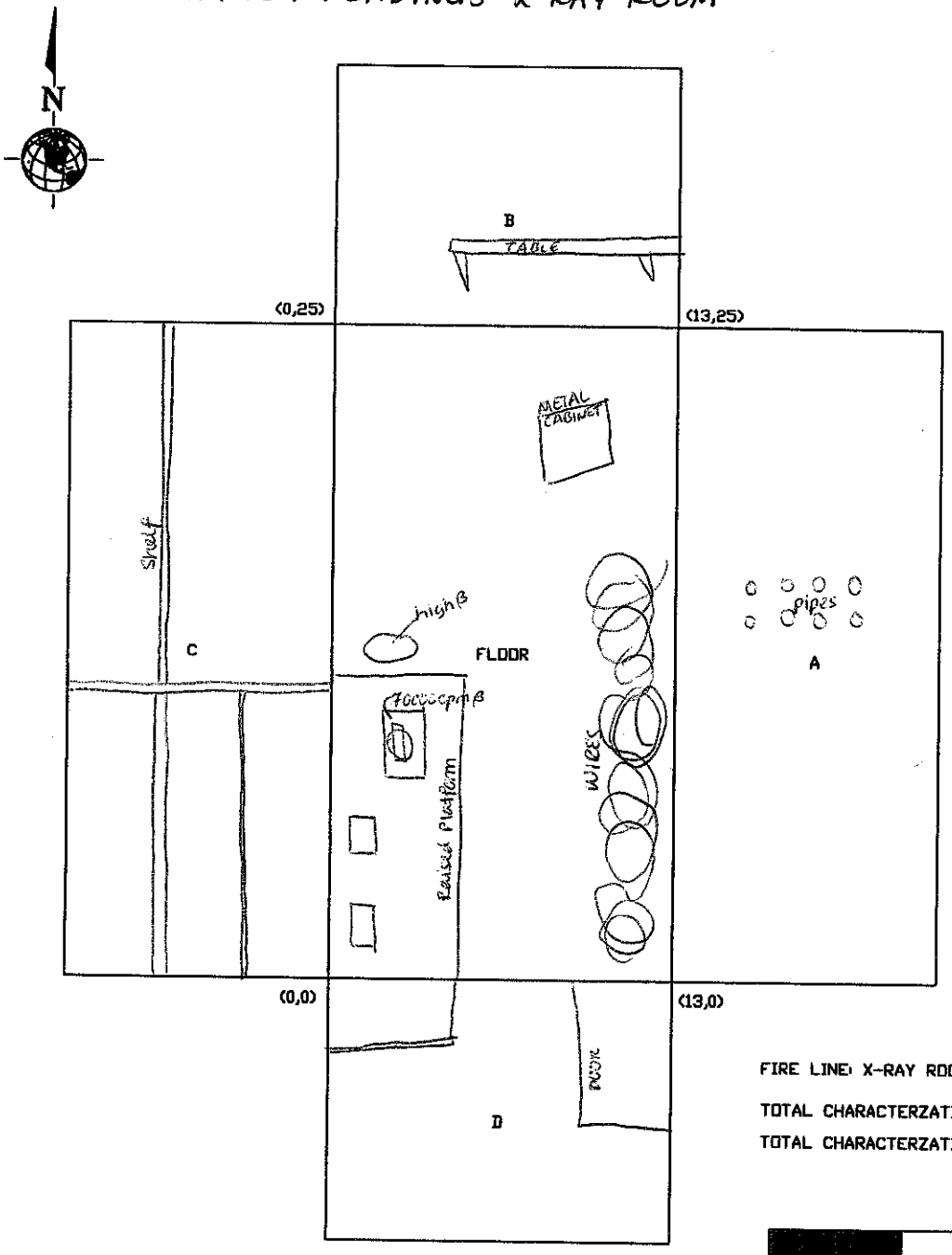
CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

SURVEY READINGS - X-RAY ROOM



FIRE LINE: X-RAY ROOM

TOTAL CHARACTERZATION SURVEY FLOOR AREA = 325 ft2 (30.19 m2)

TOTAL CHARACTERZATION SURVEY WALLS = 760 ft2 (70.60 m2)

0 5 10 FEET

PASS NUMBER	MAX (cpm)	MIN (cpm)
B (α)	20	300
B (β)	1000	175000
C-shelf (α)	20	150
C-shelf (β)	500	25000
~~Alpha~~ (β)	20	30000 (pipes)
A (α)	500	600
B-table (β)	10000	~~950~~ 40000
B-table (α)	50	950
FLOOR (α)	30	500
FLOOR (β)	5000	75000
D (α)	25	150
D (β)	3000	45000

FIELD NOTES:
Two dust covered ladders were also in room (NW corner) (~30000 cpm β) WOOD, (~10000 cpm β) METAL

43-93 (PR244919)
2224-1 (227246)
CDD 11/7/07

SURVEY DATE	SURVEY TECH
12/20/06	KA / MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

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CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

APPENDIX B-3

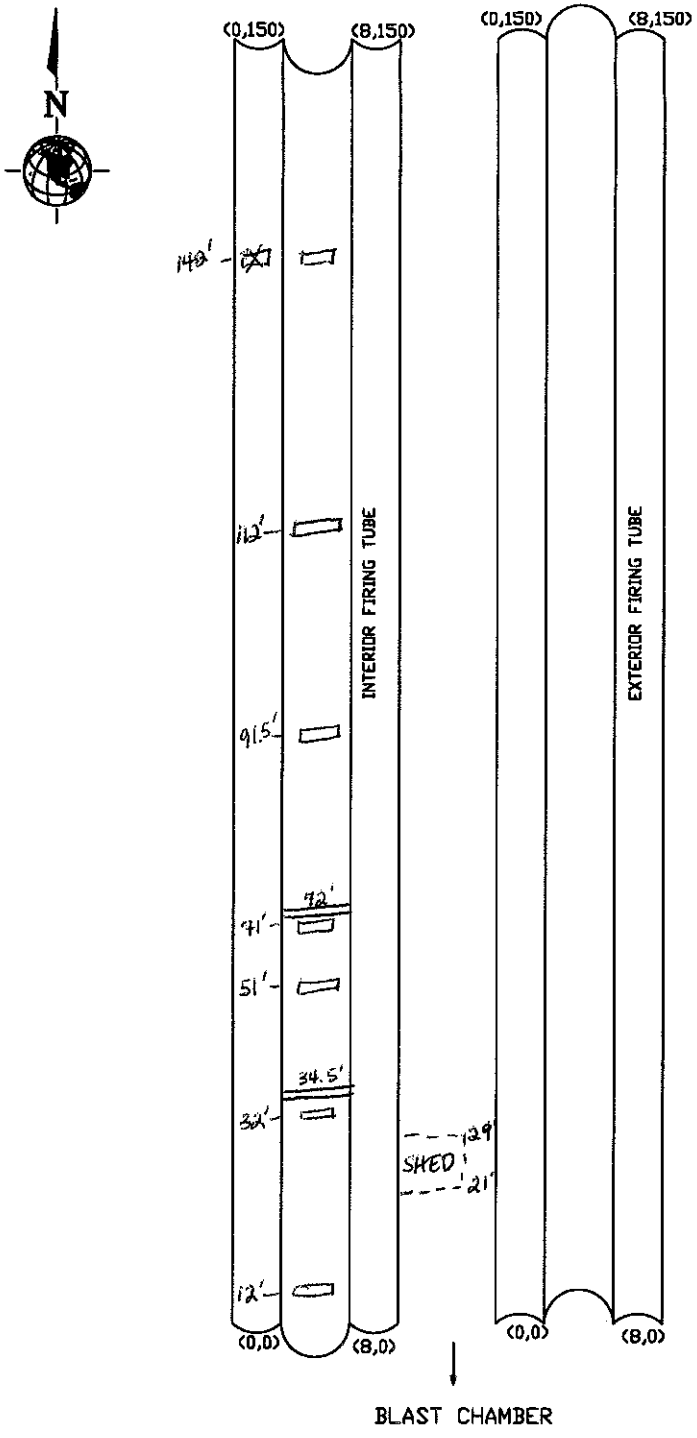
FIRING TUBE
SURVEY RESULTS

R-14 Range Radiological Survey Results
Firing Tube

Direct Measurements					Smear Measurements			
Sample ID#	Sample α (dpm/100 cm^2)	α > 100 dpm / 100 cm^2 ?	Instrument (count time)		Sample ID#	Sample α (dpm/100 cm^2)	α > 10 dpm / 100 cm^2 ?	Instrument (count time)
INTERIORS								
Systematic Readings								
FT-FL-01	198.6	yes	43-37 (1min)		SM-FT-FL-01	61.1	yes	2929 (4min)
FT-FL-02	69.2		43-37 (1min)		SM-FT-FL-02	34.6	yes	2929 (4min)
FT-FL-03	112.3	yes	43-37 (1min)		SM-FT-FL-03	11.5	yes	2929 (4min)
FT-FL-04	185.2	yes	43-37 (1min)		SM-FT-FL-04	42.1	yes	2929 (4min)
FT-FL-05	84.8		43-37 (1min)		SM-FT-FL-05	4.6		2929 (4min)
FT-FL-06	61.0		43-37 (1min)		SM-FT-FL-06	8.6		2929 (4min)
FT-FL-07	32.7		43-37 (1min)		SM-FT-FL-07	12.1	yes	2929 (4min)
FT-FL-08	44.6		43-37 (1min)		SM-FT-FL-08	9.8		2929 (4min)
FT-FL-09	47.6		43-37 (1min)		SM-FT-FL-09	6.9		2929 (4min)
FT-FL-10	45.4		43-37 (1min)		SM-FT-FL-10	14.4	yes	2929 (4min)
Biased Readings								
FL-INT-01	88.5		43-37 (1min)		SM-FL-INT-01	11.5	yes	2929 (4min)
FT-INT-02	79.6		43-37 (1min)		SM-FL-INT-02	5.8		2929 (4min)
FT-INT-03	129.4	yes	43-37 (1min)		SM-FL-INT-03	5.8		2929 (4min)
FT-INT-04	36.4		43-37 (1min)		SM-FL-INT-04	9.2		2929 (4min)
FT-INT-05	61.7		43-37 (1min)		SM-FL-INT-05	11.5	yes	2929 (4min)
FT-INT-06	34.2		43-37 (1min)		SM-FL-INT-06	19.0	yes	2929 (4min)
FT-INT-07	130.2	yes	43-37 (1min)		SM-FL-INT-07	20.2	yes	2929 (4min)
FT-INT-08	209.0	yes	43-37 (1min)		SM-FL-INT-08	70.9	yes	2929 (4min)
FT-INT-09	147.3	yes	43-37 (1min)		SM-FL-INT-09	23.0	yes	2929 (4min)
FT-INT-10	98.9		43-37 (1min)		SM-FL-INT-10	25.3	yes	2929 (4min)
EXTERIORS								
Systematic Readings								
FT-EXT-01	366.6	yes	43-68 (1min)		SMB-FT-EXT-01	-0.2		2929 (4min)
FT-EXT-02	77.6		43-68 (1min)		SMB-FT-EXT-02	1.5		2929 (4min)
FT-EXT-03	64.7		43-68 (1min)		SMB-FT-EXT-03	2.1		2929 (4min)
FT-EXT-04	30.2		43-68 (1min)		SMB-FT-EXT-04	0.9		2929 (4min)
FT-EXT-05	38.8		43-68 (1min)		SMB-FT-EXT-05	2.1		2929 (4min)
FT-EXT-06	51.8		43-68 (1min)		SMB-FT-EXT-06	0.9		2929 (4min)
FT-EXT-07	4.3		43-68 (1min)		SMB-FT-EXT-07	1.5		2929 (4min)
FT-EXT-08	12.9		43-68 (1min)		SMB-FT-EXT-08	0.3		2929 (4min)
FT-EXT-09	12.9		43-68 (1min)		SMB-FT-EXT-09	2.1		2929 (4min)
FT-EXT-10	30.2		43-68 (1min)		SMB-FT-EXT-10	2.1		2929 (4min)

R-14 Range Radiological Survey Results
Firing Tube

Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
Biased Readings								
FT-EXT-B01	107.8	yes	43-68 (1min)		SMB-FT-EXT-01	0.9		2929 (4min)
FT-EXT-B02	17.3		43-68 (1min)		SMB-FT-EXT-02	0.9		2929 (4min)
FT-EXT-B03	0.0		43-68 (1min)		SMB-FT-EXT-03	1.5		2929 (4min)
FT-EXT-B04	21.6		43-68 (1min)		SMB-FT-EXT-04	-0.2		2929 (4min)
FT-EXT-B05	47.4		43-68 (1min)		SMB-FT-EXT-05	1.5		2929 (4min)
FT-EXT-B06	25.9		43-68 (1min)		SMB-FT-EXT-06	2.1		2929 (4min)
FT-EXT-B07	12.9		43-68 (1min)		SMB-FT-EXT-07	0.9		2929 (4min)
FT-EXT-B08	20.1		43-37 (1min)		SMB-FT-EXT-08	1.5		2929 (4min)
FT-EXT-B09	28.3		43-37 (1min)		SMB-FT-EXT-09	6.7		2929 (4min)
FT-EXT-B10	21.6		43-37 (1min)		SMB-FT-EXT-10	0.9		2929 (4min)
ENTRANCE SHED (Bias)								
FT-SHED-WNA-01	13.4		43-37 (1min)		FT-SHED-WNA-01	14.3	yes	2929 (4min)
FT-SHED-WNB-02	8.9		43-37 (1min)		FT-SHED-WNB-02	7.4		2929 (4min)
FT-SHED-FL-03	35.0		43-37 (1min)		FT-SHED-FL-03	7.9		2929 (4min)
FT-SHED-WXA-04	9.7		43-37 (1min)		FT-SHED-WXA-04	1.0		2929 (4min)
FT-SHED-WXB-05	23.8		43-37 (1min)		FT-SHED-WXB-05	2.2		2929 (4min)
FT-SHED-STEPS-06	34.2		43-37 (1min)		FT-SHED-STEPS-06	0.5		2929 (4min)



MEASUREMENT DATA

FIRING TUBE
TOTAL CHARACTERIZATION SURVEY AREA =
3870.44 ft2 (359.58 m2)

0 5 10 20 30 FEET

PASS NUMBER	MAX (cpm)	MIN (cpm)

FIELD NOTES:

= crack
= shredders

SURVEY DATE	SURVEY TECH

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

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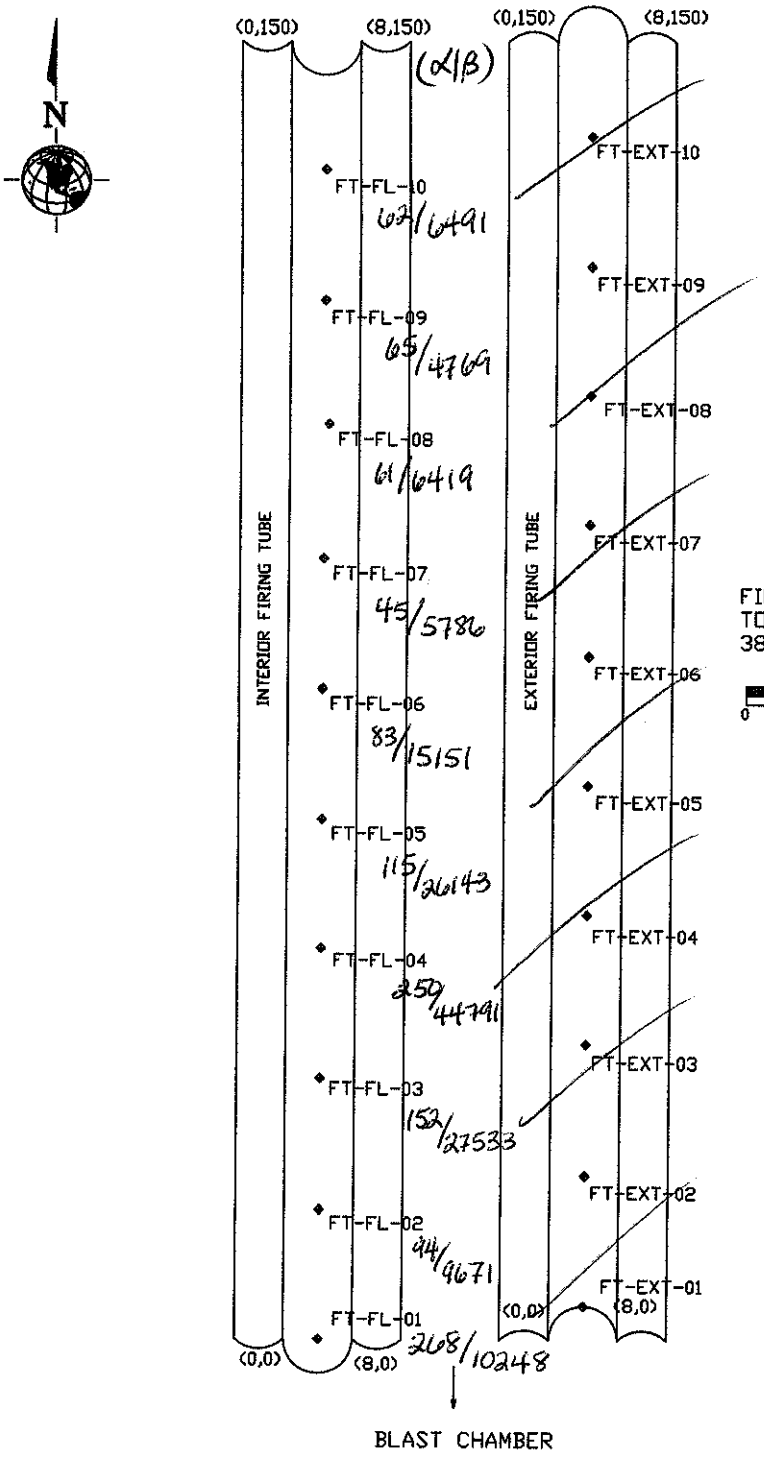
CABRERA SERVICES
RADIOLOGICAL - ENVIRONMENTAL - REMEDIATION

STATIC SYSTEMATIC READINGS- FIRING TUBE INTERIOR



FIRING TUBE
TOTAL CHARACTERIZATION SURVEY AREA =
3870.44 ft2 (359.58 m2)

0 5 10 20 30 FEET

SAMPLE NUMBER	X	Y	Z
SM-FT-FL-01	4	0	
SM-FT-FL-02	4	15	
SM-FT-FL-03	4	30	
SM-FT-FL-04	4	45	
SM-FT-FL-05	4	60	
SM-FT-FL-06	4	75	
SM-FT-FL-07	4	90	
SM-FT-FL-08	4	105	
SM-FT-FL-09	4	120	
SM-FT-FL-10	4	135	
SM-EXT-FL-01	4	0	
SM-EXT-FL-02	4	15	
SM-EXT-FL-03	4	30	
SM-EXT-FL-04	4	45	
SM-EXT-FL-05	4	60	
SM-EXT-FL-06	4	75	
SM-EXT-FL-07	4	90	
SM-EXT-FL-08	4	105	
SM-EXT-FL-09	4	120	
SM-EXT-FL-10	4	135	

NOT REPESENTED ON THIS FORM

FIELD NOTES:
LV-1 started 1105, end 1310
BZ started 1105 (Michele) end 1315.

1150 Trouble w/alarmed readings, called Joe V. Continued @ 1155.

static readings
43-37 (PR178371), 2360 (184938)
CDO 3/23/07

SURVEY DATE	SURVEY TECH
12/5/06	MD/DA

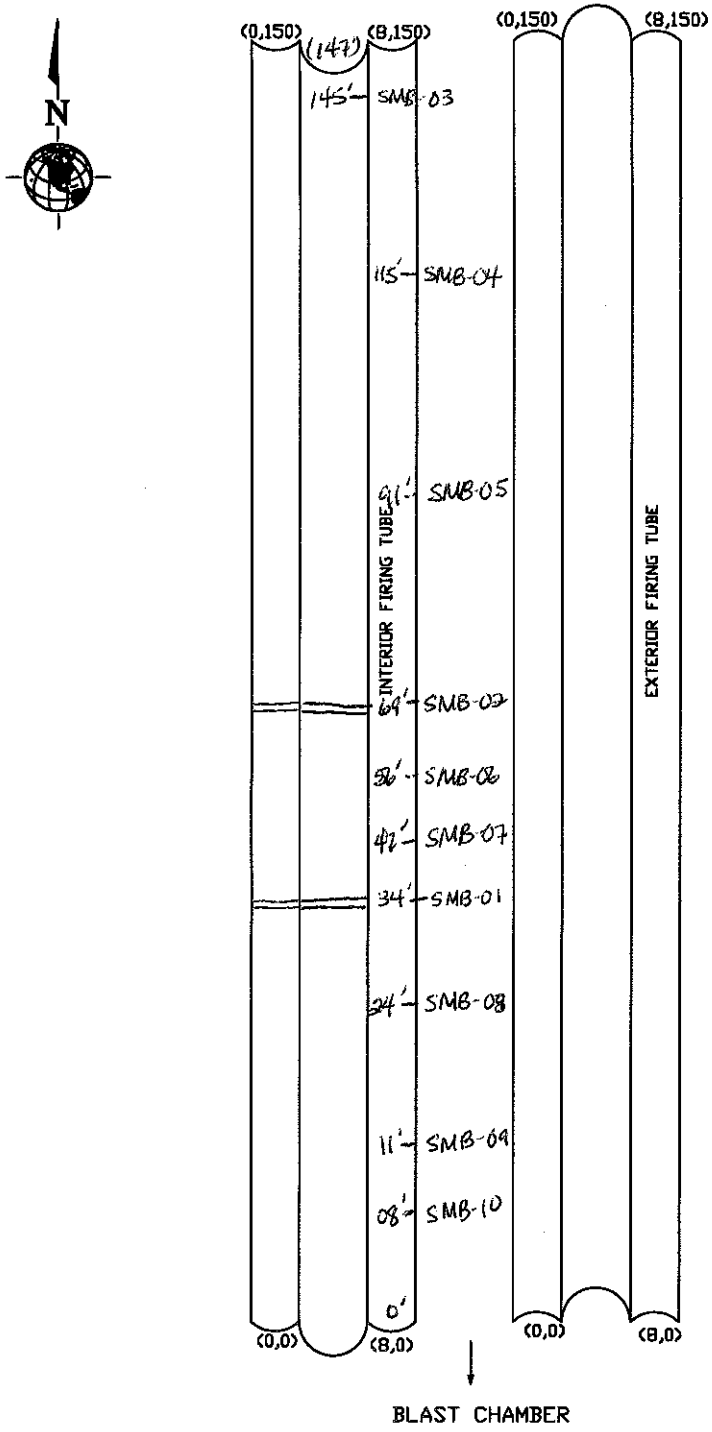
FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

STATIC BIAS READINGS - FIRING TUBE INTERIOR



(α/β)

~~SMB~~-FT-INT-01: 120/21386
~~SMB~~-FT-INT-02: 108/11464
~~SMB~~-FT-INT-03: 175/11225
~~SMB~~-FT-INT-04: 50/5862
~~SMB~~-FT-INT-05: 84/6000
~~SMB~~-FT-INT-06: 47/24615
~~SMB~~-FT-INT-07: 176/37130
~~SMB~~-FT-INT-08: 282/13571
~~SMB~~-FT-INT-09: 199/11126
~~SMB~~-FT-INT-10: 134/9649

FIRING TUBE
TOTAL CHARACTERIZATION SURVEY AREA =
3870.44 ft2 (359.58 m2)

0 5 10 20 30 FEET

Scan data:
cracks in tube:
α 80-250 cpm
β 10,000 - 45,000 cpm
N/S ends of tube:
α 100-300 cpm
β 10,000 - 12,000 cpm
Middle of tube:
α 40-300 cpm
β 6,000 - 37,000 cpm
Remaining (lower reading) floor areas:
α 50-300 cpm
β 6,000 - 11,000 cpm

SAMPLE NUMBER	X	Y	Z
SB-FT-INT-01	4	34	
SB-FT-INT-02	2	69	
SB-FT-INT-03	4	~~135~~ 145	
SB-FT-INT-04	4	115	
SB-FT-INT-05	4	91	
SB-FT-INT-06	4	56	
SB-FT-INT-07	4	47	
SB-FT-INT-08	4	24	
SB-FT-INT-09	4	11	
SB-FT-INT-10	4	8	

FIELD NOTES:
SB → SMB = smear bias
= = crack
static readings/scan readings:
43-37 (PR 178371), 2360 (184938)
CDD 3/23/07

SURVEY DATE	SURVEY TECH
12/5/06	MD/DA

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
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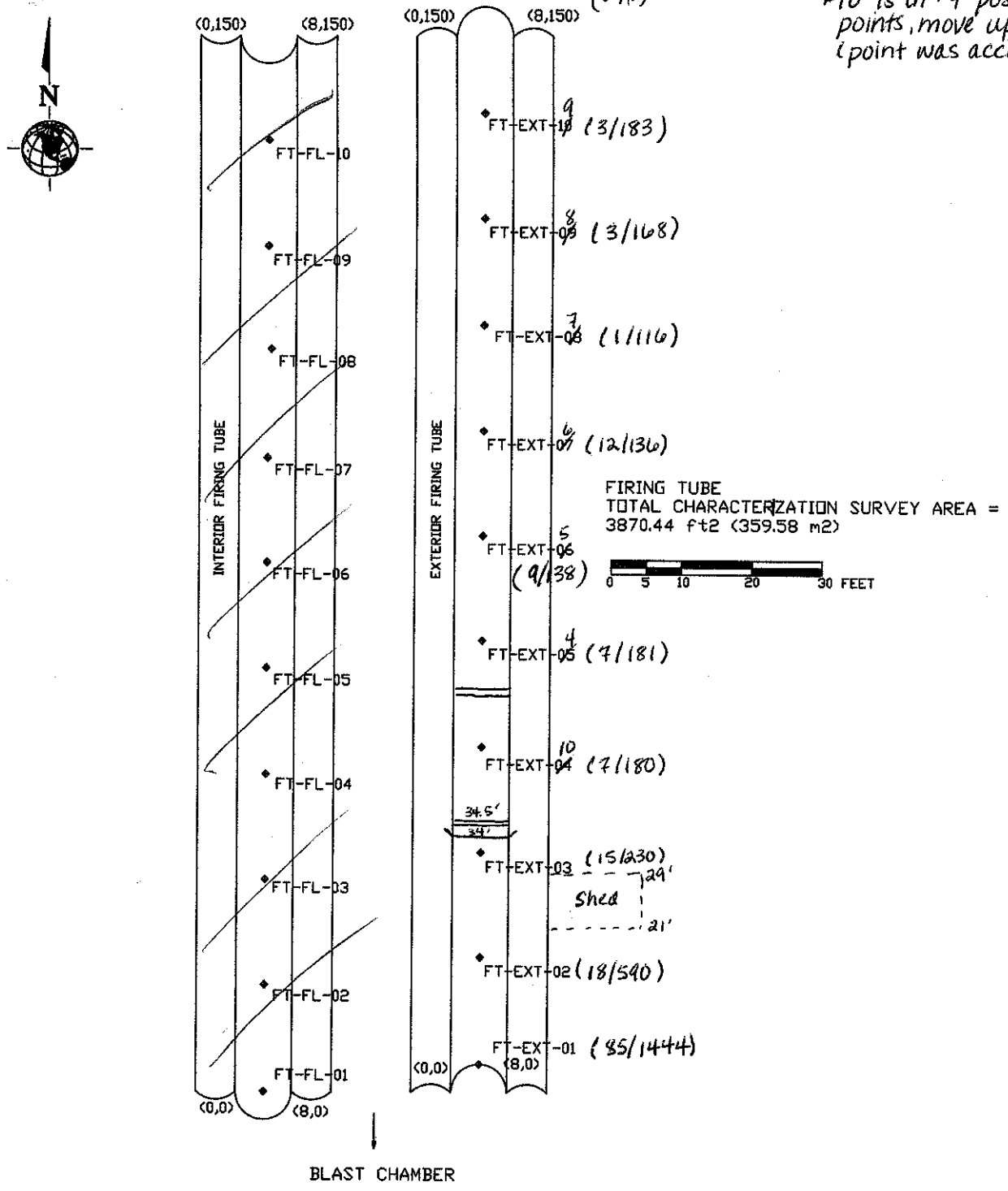
STATIC SYSTEMATIC READINGS - FIRING TUBE EXTERIOR

(2/B)

#10 is in #4 position, all points, move up 15' (from #5-#9) (point was accidentally skipped)



SAMPLE NUMBER	X	Y	Z
SM-FT-FL-01	4	0	
SM-FT-FL-02	4	15	
SM-FT-FL-03	4	30	
SM-FT-FL-04 10	4	45	
SM-FT-FL-05 4	4	60	
SM-FT-FL-06 5	4	75	
SM-FT-FL-07 6	4	90	
SM-FT-FL-08	4	105	
SM-FT-FL-09	4	120	
SM-FT-FL-10	4	135	
SM-EXT-FL-01	4	0	
SM-EXT-FL-02	4	15	
SM-EXT-FL-03	4	30	
SM-EXT-FL-04 10	4	45	
SM-EXT-FL-05 4	4	60	
SM-EXT-FL-06 5	4	75	
SM-EXT-FL-07 6	4	90	
SM-EXT-FL-08 7	4	105	
SM-EXT-FL-09 8	4	120	
SM-EXT-FL-10 9	4	135	

BAD NOMENCLATURE

FIELD NOTES:
Exterior static readings, taken w/43-68 (GPD)

= support flange
= crack

Static scan
43-68: 184938 (2224) / PR178371, COD 6/14/07
43-93: 227246 (2224-1) / PR44549, COD ~~3/23/07~~ 11/7/07

SURVEY DATE	SURVEY TECH
12/7/06	MD/JM

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
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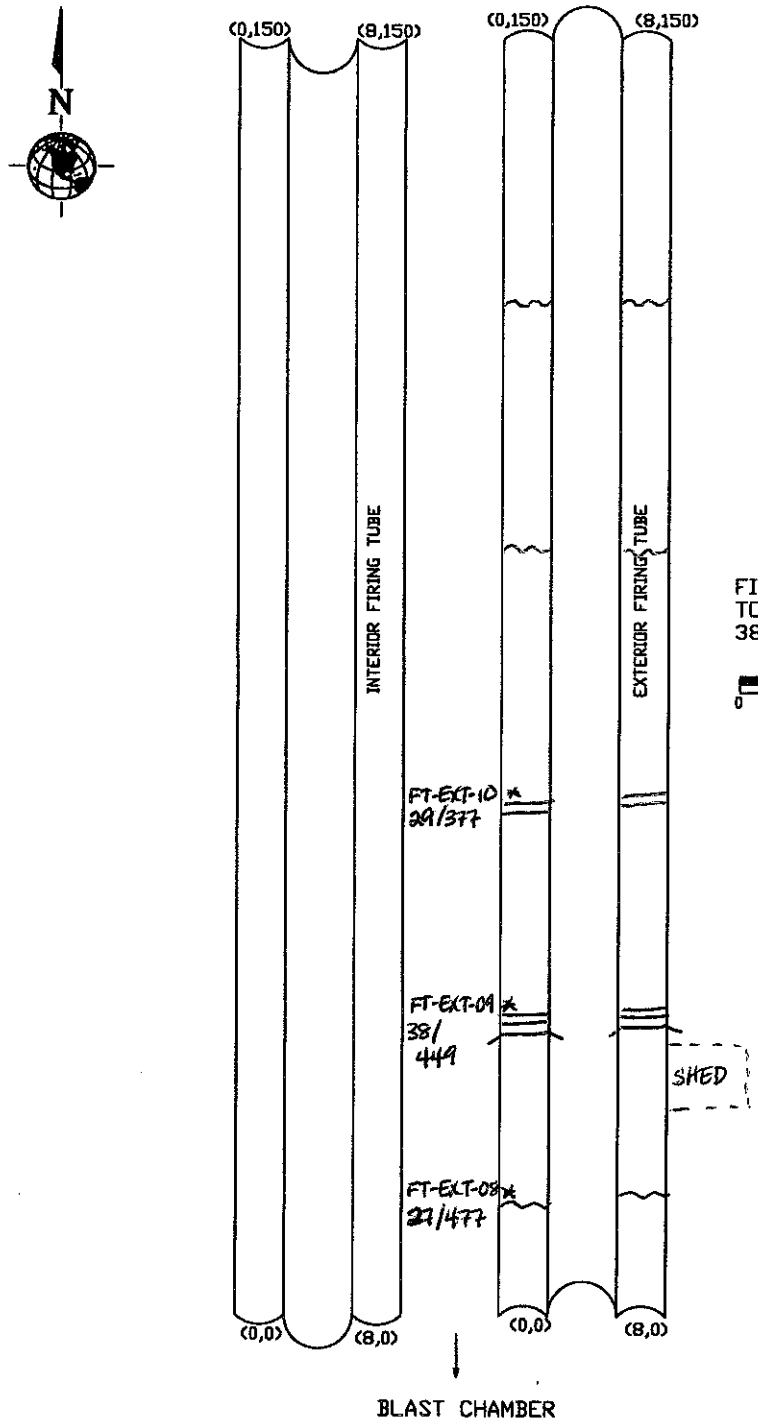
STATIC BIAS READINGS- FIRING TUBE EXTERIOR (3)



FIRING TUBE
TOTAL CHARACTERZATION SURVEY AREA =
3870.44 ft2 (359.58 m2)

0 5 10 20 30 FEET

	X	Y	Z
	~~PASS NUMBER~~	~~MAX (cpm)~~	~~MIN (cpm)~~
FT-EXT-08	0'	20'	8'
FT-EXT-09	0'	34.5'	1.5'
FT-EXT-10	0'	72'	3.5'

FIELD NOTES:

⌒ = support flange
═ = crack
〰 = seam

43-37 (PR178371)
2360 (184938)
CDD 3/23/07

SURVEY DATE	SURVEY TECH
12/20/06	KA/MD

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

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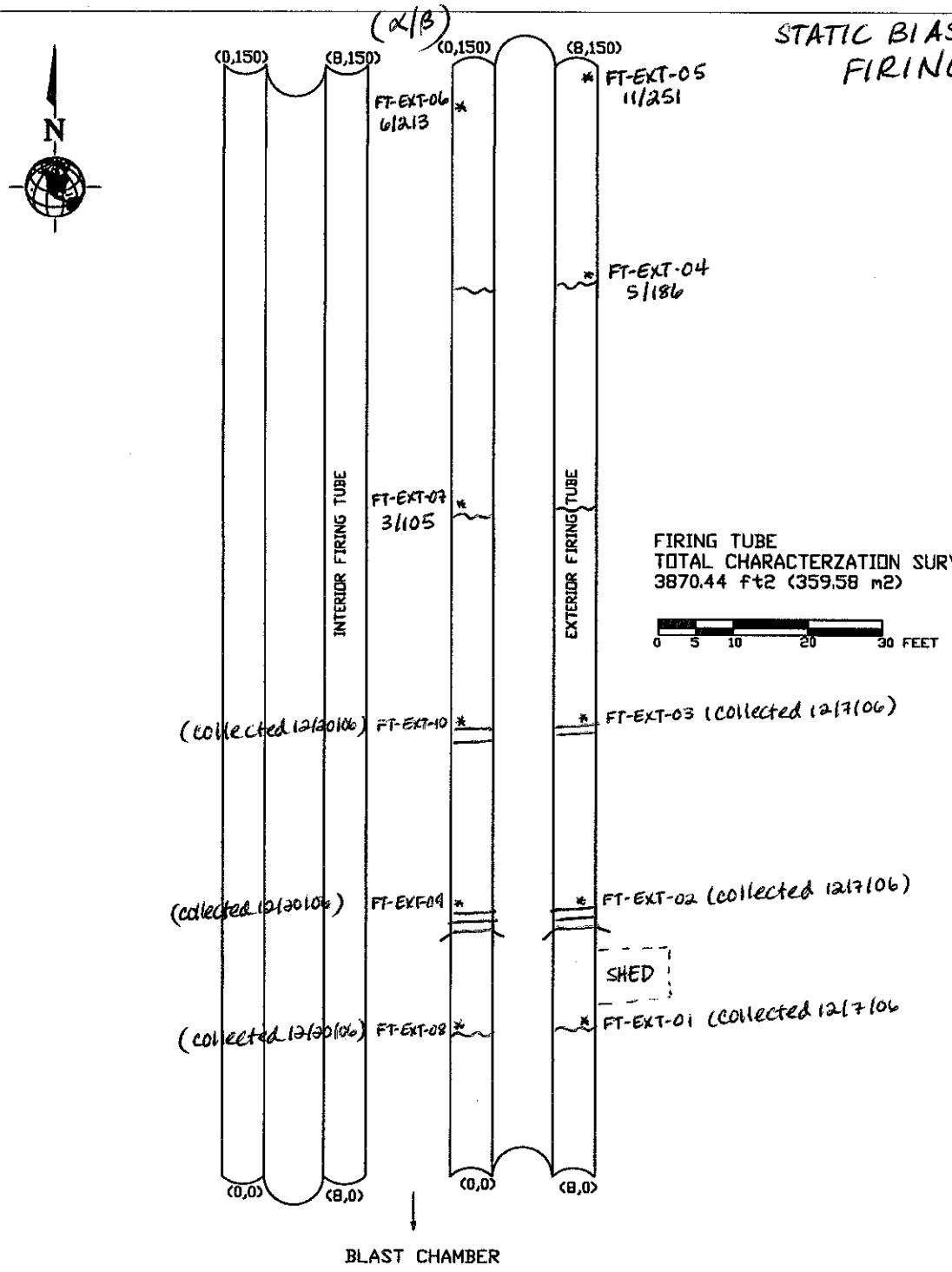
STATIC BIAS READINGS - FIRING TUBE EXTERIOR (2)



SAMPLE NUMBER	X	Y	Z
SB-FT-INT-01			
SB-FT-INT-02			
SB-FT-INT-03			
SB-FT-INT-04	8'	132'	8'
SB-FT-INT-05	8'	150'	8'
SB-FT-INT-06	0	144'	5.5'
SB-FT-INT-07	0'	5'	3.5'
SB-FT-INT-08			
SB-FT-INT-09			
SB-FT-INT-10			

FIELD NOTES:

⌣ = support flange
═ = crack
∼ = seam

static readings:
43-68 (PR178371), 2224 (184938)
CDD 6/14/07
scan readings:
43-93 (PR44549), 2284-1 (227246)
CDD 11/7/07

SURVEY DATE	SURVEY TECH
12/8/06	MD/JM

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
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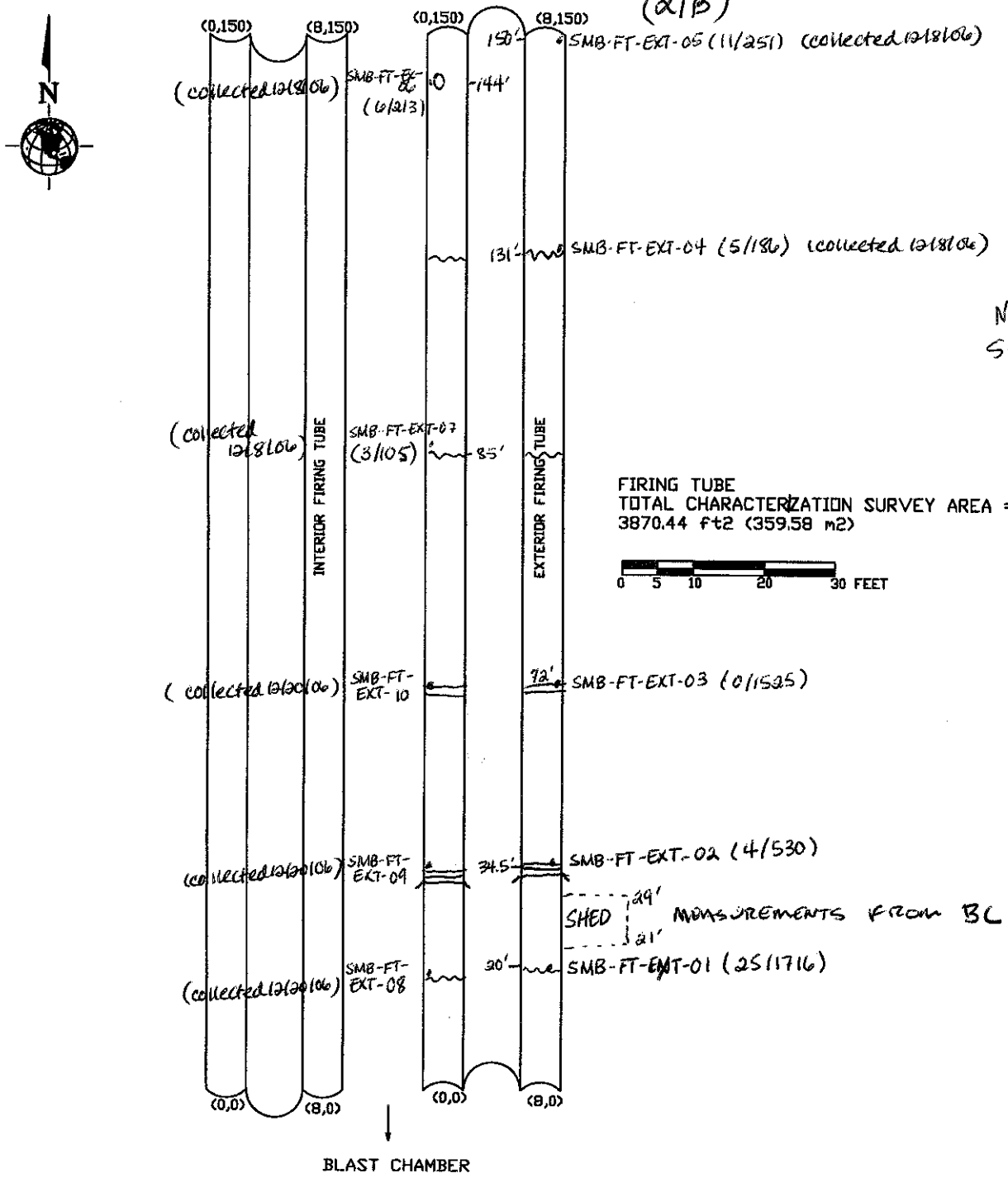
STATIC BIAS READINGS - FIRING TUBE EXTERIOR (1)

(α/β)



SAMPLE NUMBER	X	Y	Z
SB-FT-INT-01	4'	20'	8'
SB-FT-INT-02	8'	34.5'	6.5'
SB-FT-INT-03	8'	72'	2'
SB-FT-INT-04	8'	132'	8'
SB-FT-INT-05	8'	150'	8'
SB-FT-INT-06	0	144'	5.5'
SB-FT-INT-07	0'	85'	3.5'
SB-FT-INT-08	0'	20'	8.0'
SB-FT-INT-09	0'	34.5'	1.5'
SB-FT-INT-10	0'	72'	3.5'

12/7/06 (SB-FT-INT-01 to SB-FT-INT-03)
12/18/06 (SB-FT-INT-04 to SB-FT-INT-07)
12/20/06 (SB-FT-INT-08 to SB-FT-INT-10)

NOMECLATURE INT SHOULD BE EXT

FIELD NOTES:

Exterior bias readings.

scan data for FT:
Avg. readings (W/43-93): 150-250 cpm (β)
Seams ≥ 2x bkgd.

~~ = seam
= = crack
o = hole

43-68: 184938/PR178371
43-93: 227246/PR44549

SURVEY DATE	SURVEY TECH
12/7/06-12/18/06	MD/JM

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

Static survey:
43-68 : 184938/PR 178371 (2224) CDD 6/14/07
43-93 : 227246/PR 44549 (2224) CDD 11/2/07

APG R-14
DECEMBER 2006

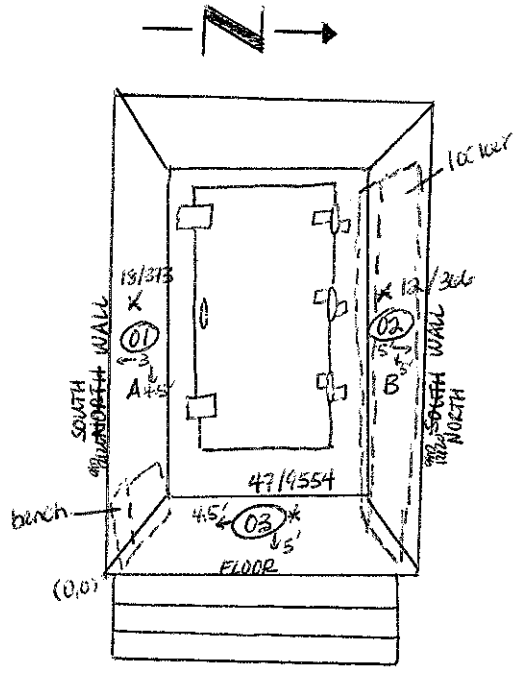
CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Firing Tube Shed Site:	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 1

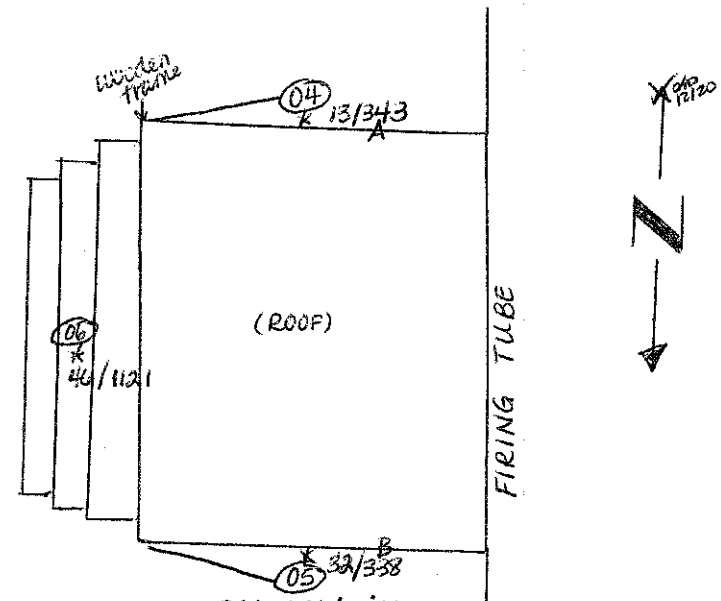
Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		

Comments



scan readings:
(A/B) 200-[illegible] cpm(β) 0-20 cpm(α)
(FLOOR) 500-13800 cpm(β)
(CEILING) 200-700 cpm (β)
(FL DOOR) 500-100 cpm(β)
(PLENUM DOOR) 200-500 cpm (β)

* scans done with 43-93 (PR244541), 2224-1 (227246), COD 11/7/07



scan readings:
(A) 75-225 β (cpm)
(B) 60-275 β (cpm)
0-15 cpm α
(STEPS) 100-500 β (cpm) 0-20 cpm α

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	12/20/06	43-37	PR178371					3/23/07
		2360	184938					3/23/07
Reviewed By:	Date:							

Key (α/β)			
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

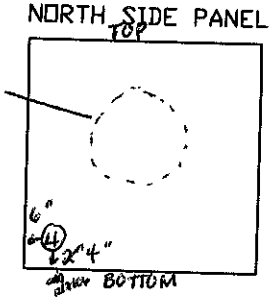
APPENDIX B-4

MUFFLER
SURVEY RESULTS

R-14 Range Radiological Survey Results
Muffler

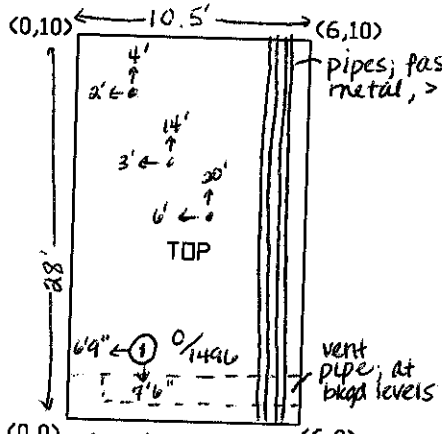
Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
EXTERIOR WALLS & ROOF								
MF-EXT-01	25.9		43-68 (1min)		MF-EXT-01	5.0		2929 (4min)
MF-EXT-02	30.2		43-68 (1min)		MF-EXT-02	3.2		2929 (4min)
MF-EXT-03	43.1		43-68 (1min)		MF-EXT-03	3.8		2929 (4min)
MF-EXT-04	8.6		43-68 (1min)		MF-EXT-04	0.9		2929 (4min)
MF-EXT-05	163.9	yes	43-68 (1min)		MF-EXT-05	191.6	yes	2929 (4min)

NORTH SIDE PANEL



Muffler pipe; bolts showing ~2x bkgd, pipe itself slightly above bkgd.

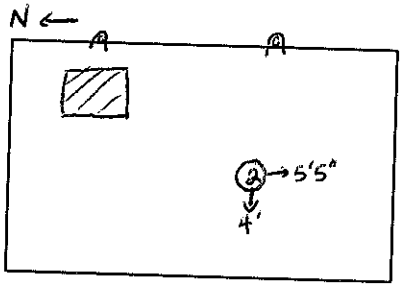
* Static readings: (α/β)
MF-01: 6/1511
MF-02: 7/124
MF-03: 10/344
MF-04: 2/544
MF-05: 38/1015
* readings taken w/43-68 (GPD)



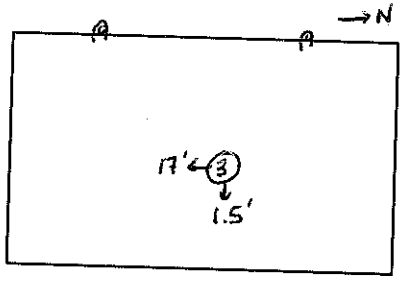
pipes; fasteners have chipped paint/exposed metal, > bkgd.

vent pipe; at bkgd levels

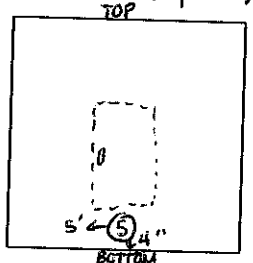
Avg ct = 175-200 cpm (β) } 43-93
= 2-5 cpm (α)



WEST SIDE PANEL



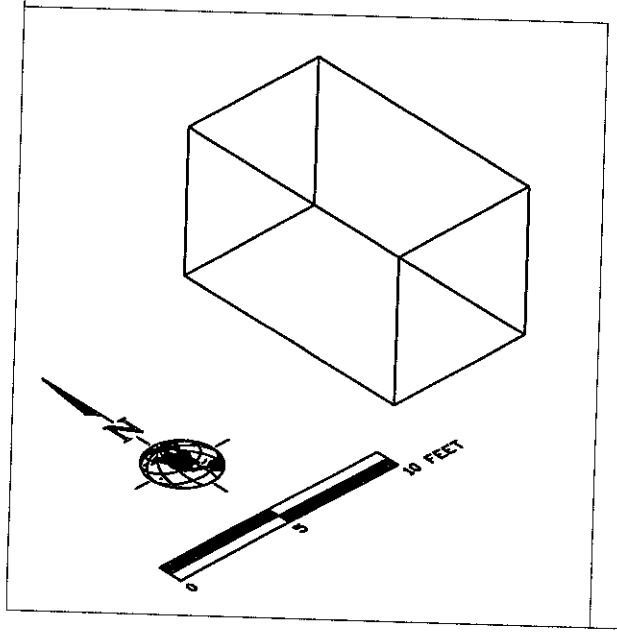
EAST SIDE PANEL



SOUTH SIDE PANEL

Highest readings on wall under door (~2000 cpm) and on bottom part of door

0



MUFFLER
TOTAL CHARACTERZATION SURVEY AREA
= 252 ft2 (23.41 m2)

BAPO

SAMPLE NUMBER	X	Y	Z
SMB-MF-EXT-01	6'9"	7'5"	9'4"
SMB-MF-EXT-02	0	5'5"	4'
SMB-MF-EXT-03	10.5'	17'	1.5'
SMB-MF-EXT-04	6"	28'	4'
SMB-MF-EXT-05	5'	0	4"

FIELD NOTES:
BZ start: 0855
stop: 1455
• = chipped paint/exposed metal
Roof avg w/43-68: same as w/43-93
43-68: 184938/PR178371
43-93: 227246/PR244549

SURVEY DATE	SURVEY TECH
12/7/06	MD/JM

FIGURE NOTES:

Relative locations of objects (i.e. doors, windows, etc.)

APG R-14
DECEMBER 2006

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

APPENDIX B-5

WATER TREATMENT SHED SURVEY RESULTS

R-14 Range Radiological Survey Results
Water Treatment Shed

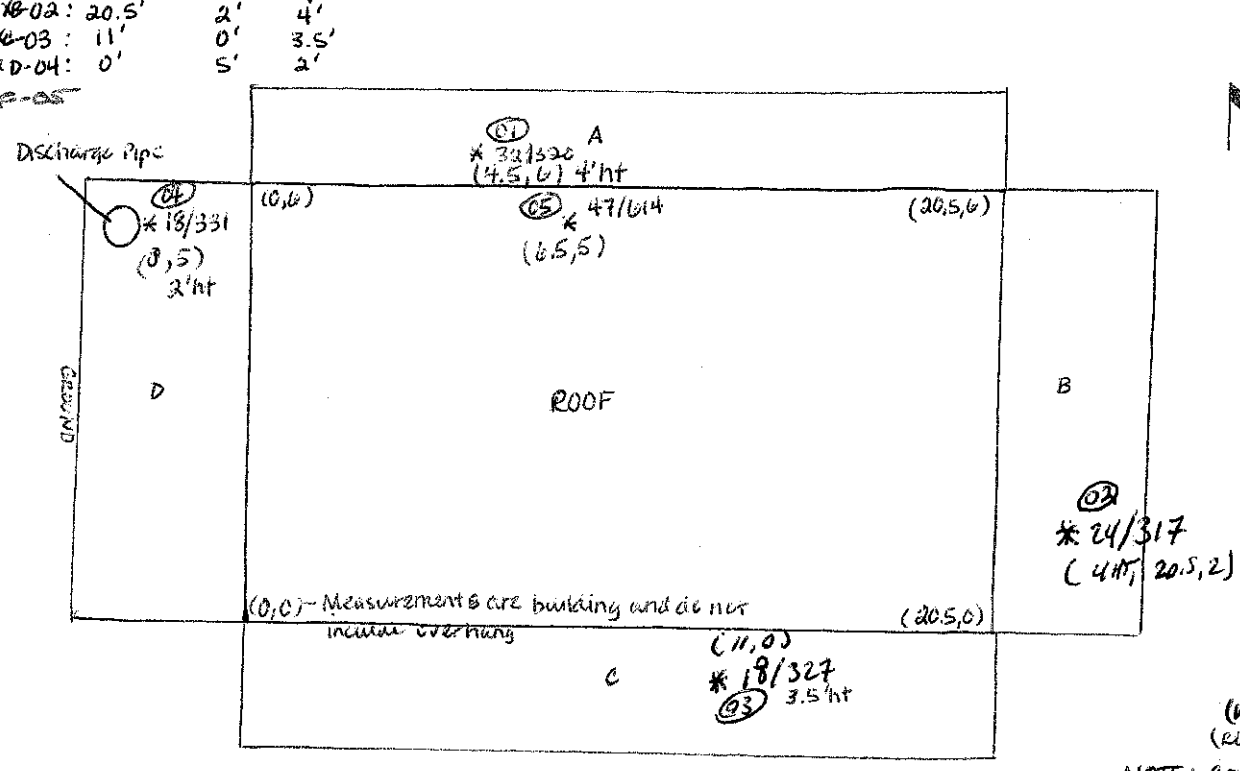
Direct Measurements					Smear Measurements			
Sample ID#	**Sample α (dpm/100 cm^2)**	**α > 100 dpm / 100 cm^2 ?**	**Instrument (count time)**		**Sample ID#**	**Sample α (dpm/100 cm^2)**	**α > 10 dpm / 100 cm^2 ?**	**Instrument (count time)**
EXTERIOR WALLS & ROOF								
WT-EXT-01	23.8		43-68 (1min)		WT-EXT-01	-0.1		2929 (4min)
WT-EXT-02	17.9		43-68 (1min)		WT-EXT-02	7.9		2929 (4min)
WT-EXT-03	13.4		43-68 (1min)		WT-EXT-03	2.8		2929 (4min)
WT-EXT-04	13.4		43-68 (1min)		WT-EXT-04	2.2		2929 (4min)
WT-RF-05	35.0		43-68 (1min)		WT-RF-05	-0.1		2929 (4min)

OP-001-02 RADIOLOGICAL SURVEY SHEET (rev 1)

Location: Water Tank Building Site:	RWP# N/A	Survey #	Survey Type: Characterization	pg. 1 of 1

Smear Results CPM/100cm^2					
No.	α	β	No.	α	β
1			26		
2			27		
3			28		
4			29		
5			30		
6			31		
7			32		
8			33		
9			34		
10			35		
11			36		
12			37		
13			38		
14			39		
15			40		
16			41		
17			42		
18			43		
19			44		
20			45		
21			46		
22			47		
23			48		
24			49		
25			50		
Comments					

	X	Y	Z
WT-WXA-01 :	4.5'	6'	4'
WT-WXB-02 :	20.5'	2'	4'
WT-WXC-03 :	11'	0'	3.5'
WT-WXD-04 :	0'	5'	2'
~~WT-EF-05~~			



scan readings:
(WALLS) 100-350 cpm β
(ROOF) 150-400 cpm β } 0-30 cpm (α)

NOTE: Could only reach first 2'-3' of roof on north side due to height and slope of roof.

— scans done with 43-93 (PR244549), 2224-1 (227046), CDD 11/7/07

Surveyed By:	Date:	Instrument	Serial #	α Eff.	β Eff.	α Bkg.	β Bkg	Cal. Due
KA/MD	12/20/06	43-37	PR178371					3/23/07
		2360	184938					3/23/07
Reviewed By:	Date:							

Key			
	(α/β)		
○	Smear	*-*	Boundary
□	Dose Rate mrem/hr	■	A/S Location
*	Direct Reading CPM/100 cm^2		
△	Grab Sample		

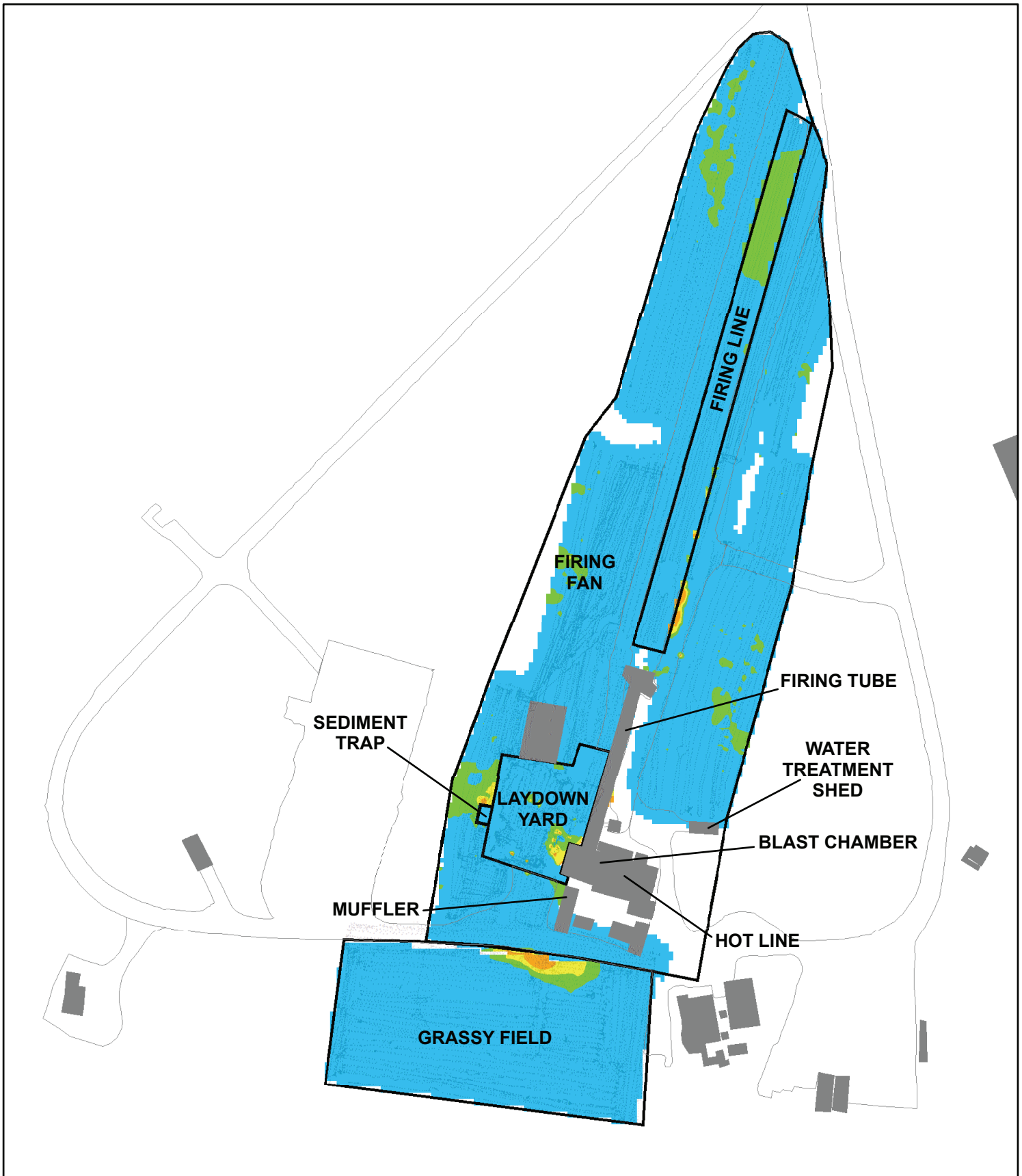
APPENDIX C

PAVEMENT AND GROUNDS SURVEY RESULTS

C1: Gamma Walkover Survey Results - Figure
C2: Gamma Walkover Survey Results - Data

APPENDIX C-1

GAMMA WALKOVER
SURVEY RESULTS – FIGURE



N
W E
S

0 50 100 200 Feet

LEGEND

Survey Areas

Z Score

- < 1
- 1 - 2
- 2 - 3
- > 3

APG R-14 Characterization
Aberdeen Proving Ground, MD

Gamma Walkover Survey Results

Date: 3/2007 File Name: 03-3040-29-C-1

Project #: 03-3040.29 Prepared By: JDM

CABRERA SERVICES
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Figure C-1

APPENDIX C-2

GAMMA WALKOVER SURVEY RESULTS – DATA (ON CD)

R-14 Range Characterization Survey
Gamma Walkover Survey Data

CPM	Northing	Easting	Date and Time	ZSCORE
999960	198117.050	478191.920	12/07/06 03:52:43pm	47.11
999960	198117.000	478191.930	12/07/06 03:52:44pm	47.11
999960	198117.010	478191.960	12/07/06 03:52:45pm	47.11
851534	198117.090	478192.040	12/07/06 03:52:46pm	39.97
798314	198117.140	478192.020	12/07/06 03:52:42pm	37.42
423322	198119.010	478188.010	12/07/06 03:49:37pm	19.38
419337	198121.090	478198.830	12/07/06 06:12:55pm	19.19
414110	198118.850	478188.130	12/07/06 03:49:37pm	18.94
404636	198119.150	478187.740	12/07/06 03:49:34pm	18.49
402205	198121.010	478198.800	12/07/06 06:12:55pm	18.37
401849	198119.140	478187.890	12/07/06 03:49:34pm	18.35
398983	198119.170	478187.610	12/07/06 03:49:32pm	18.21
389542	198122.730	478199.850	12/07/06 04:07:41pm	17.76
389466	198122.830	478199.810	12/07/06 04:07:41pm	17.76
385272	198122.620	478199.890	12/07/06 04:07:41pm	17.55
381839	198119.150	478187.810	12/07/06 03:49:34pm	17.39
379738	198120.970	478198.780	12/07/06 06:12:55pm	17.29
375853	198123.060	478199.600	12/07/06 06:12:55pm	17.10
374613	198117.040	478192.160	12/07/06 03:52:47pm	17.04
372025	198122.770	478199.480	12/07/06 06:12:55pm	16.92
364689	198122.860	478199.520	12/07/06 06:12:55pm	16.57
359252	198121.140	478198.850	12/07/06 06:12:55pm	16.30
354880	198124.810	478201.150	12/07/06 06:12:35pm	16.09
349851	198122.960	478199.760	12/07/06 04:07:41pm	15.85
348059	198124.750	478201.360	12/07/06 06:12:34pm	15.77
339609	198123.020	478199.580	12/07/06 06:12:55pm	15.36
338490	198120.930	478198.770	12/07/06 06:12:55pm	15.31
337852	198123.110	478199.610	12/07/06 06:12:55pm	15.27
337158	198122.480	478199.950	12/07/06 04:07:41pm	15.24
326295	198124.810	478200.500	12/07/06 06:12:36pm	14.72
321415	198118.630	478188.300	12/07/06 03:49:37pm	14.48
320218	198122.730	478199.470	12/07/06 06:12:55pm	14.43
317384	198124.680	478201.440	12/07/06 06:12:33pm	14.29
310666	198118.840	478199.520	12/07/06 04:08:21pm	13.97

CPM Summary Statistics	
Mean	**20188.32**
Standard Error	**102.47**
Median	**19046**
Mode	**21315**
Standard Deviation	**20796.81**
Sample Variance	**432507240.16**
Kurtosis	**554.0294795**
Skewness	**17.23486751**
Range	**994222**
Minimum	**5738**
Maximum	**999960**
Sum	**831597301**
Count	**41192**

More than 41,000 additional data points available on CD

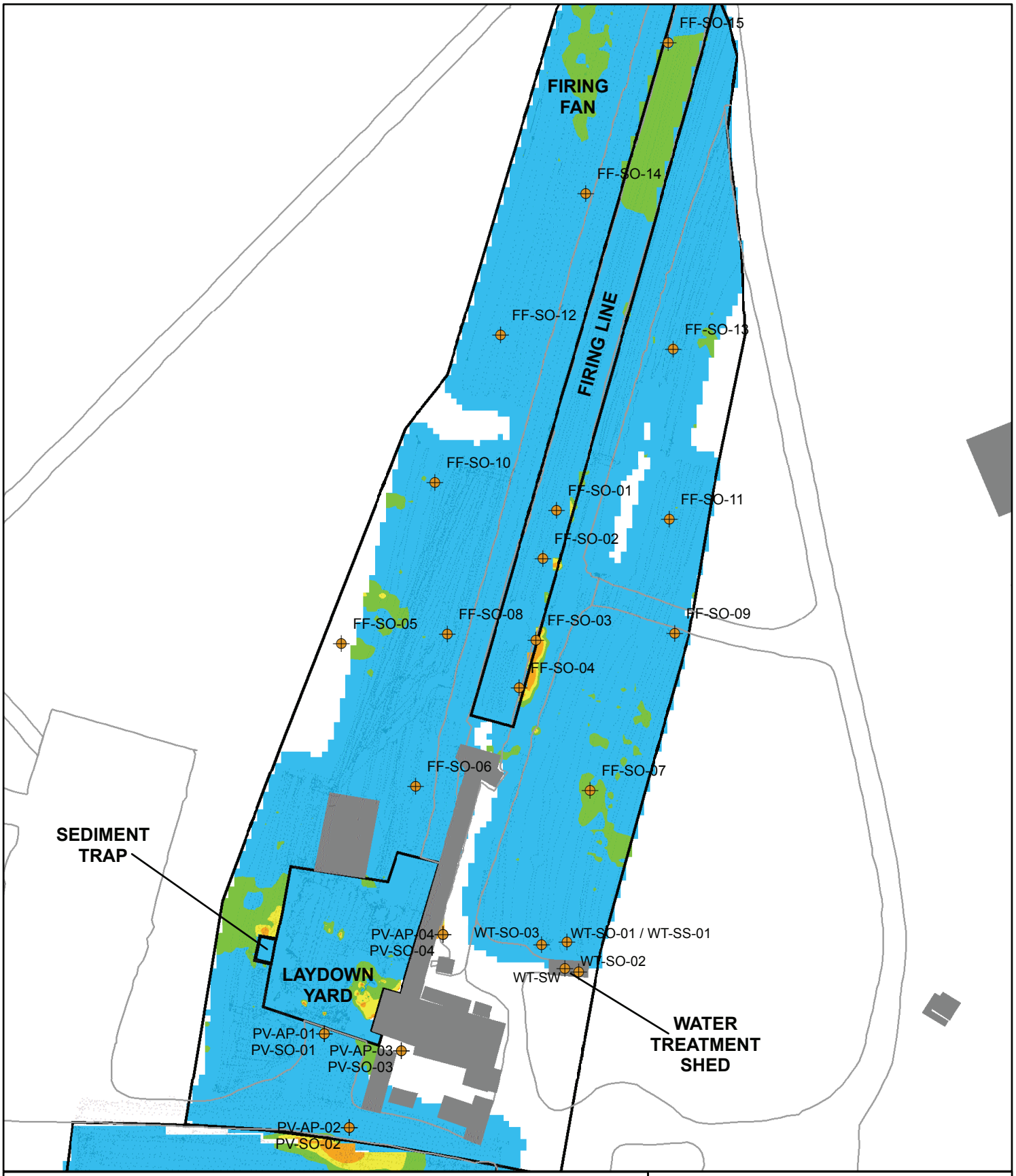
APPENDIX D

VOLUMETRIC SAMPLE COLLECTION AND ANALYSIS RESULTS

D1: Soil Sample Location Figures
D2: Sample Collection Field Sheets
D3: Chemical Analysis Results
D4: Isotopic Uranium Results
D5: Gamma Spectroscopy Results
D6: Analytical Laboratory Data Packages (on CD)

APPENDIX D-1

SOIL SAMPLE LOCATION FIGURES



N
W E
S

Feet
0 25 50 100

LEGEND

Sample Locations

Z Score

- < 1
- 1 - 2
- 2 - 3
- > 3

APG R-14 Characterization
Aberdeen Proving Ground, MD

Firing Fan and Pavement Sampling Locations

Date: 3/2007 File Name: 03-3040-29-D-1

Project #: 03-3040.29 Prepared By: JDM

CABRERA SERVICES
RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

Figure D-1

N
W E
S

0 10 20 40 Feet

LEGEND

Sample Locations

Z Score

- < 1
- 1 - 2
- 2 - 3
- > 3

APG R-14 Characterization
Aberdeen Proving Ground, MD

Lay Down Yard & Sediment Trap Sampling Locations

Date: 3/2007 File Name: 03-3040-29-D-2

Project #: 03-3040.29 Prepared By: JDM

CABRERA SERVICES
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Figure D-2

N
W E
S

0 15 30 60 Feet

LEGEND

Sample Locations

Z Score

< 1

1 - 2

2 - 3

> 3

APG R-14 Characterization
Aberdeen Proving Ground, MD

Grassy Field Sampling Locations

Date: 3/2007 File Name: 03-3040-29-D-3

Project #: 03-3040.29 Prepared By: JDM

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Figure D-3

APPENDIX D-2

SAMPLE COLLECTION FIELD SHEETS

SAMPLE IDENTIFICATION KEY

Volumetric samples collected during the R-14 characterization effort were identified by a unique number code that accompanied the sample from collection through analysis and data review. The general format of the numbering scheme was as follows:

XX - YY – NN

Where:	XX (General Location)	=	BC for Blast Chamber HL for Hot Line FT for Firing Tube ST for Sediment Trap FF for Firing Fan LD for Laydown Yard PV for Pavement GF for Grassy Field
	YY (Specific Location)	=	CL for Ceiling FL for Floor WN for Interior Wall AP for Asphalt SO for Surface Soil SS for Subsurface Soil SD for Sediment SW for Surface Water
	NN (Sample Number)	=	01, 02, 03, etc. (Numbering to start at 01 for each 4-digit location code)

Field data records documenting the collection of each volumetric sample are attached.

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12-18-06

LOCATION ID FIRING FAN **ACTIVITY TIME** START END **CONTAINER TIME** 1310

FIELD SAMPLE ID FF-50-01 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0 - 0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [ ] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES JAV
N 529759.683 m
E 2439449.069 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [X] S.S. SPOON [ ] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER MASSELIN

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 7479 cpm

AFTER SAMPLE COLLECTION 5878 cpm

DETECTOR Type: 3 x 3 Serial No.: 220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

DARK GREY GRAVELLY SAND, FINE TO MEDIUM GRAVELS.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

FFSAMPLE.SSF

SENT TO PARAGON 12-19-06

N 529659.611 m
E 2439445.422 m

SAMPLED BY: D. KATELEY

RECEIVED BY: JAV

CABRERA SERVICES
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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12-18-06

LOCATION ID FIRING FAH **ACTIVITY TIME** START END **CONTAINER TIME** 1325

FIELD SAMPLE ID FF-50-02 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0 - 0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [ ] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529649.291 m
E 2439444.623 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [X] S.S. SPOON [ ] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER MASSELIN

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 7653 cpm

AFTER SAMPLE COLLECTION 6105 cpm

DETECTOR Type: 3x3 Serial No.: 220900

METER Type: 2221 Serial No.: 216477

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

DARK GREY SANDY GRAVEL. GRAVEL IS SMALL TO MEDIUM SIZE.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: D. KATELEY

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1330

FIELD SAMPLE ID FF-SO-03 **QC SAMPLES COLLECTED** ~~Duplicate~~ JAV FF-SO-DUP1

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529632.285 m
E 2439446.552 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER Masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 11980 cpm

AFTER SAMPLE COLLECTION 12918 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

EDGE OF ROAD @ TOP OF DITCH NORTH EAST OF TANK.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

FF SAMPLE - SSF

Shipped to Purago 12/19/06

SAMPLED BY: KA / MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1340

FIELD SAMPLE ID FF-SO-04 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529621.815 m
E 2439445.099 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 13072 cpm

AFTER SAMPLE COLLECTION 13491 cpm

DETECTOR Type: 44-20 Serial No.: ~~97841~~ KMA 172518

METER Type: 2221 Serial No.: ~~172518~~ KMA 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

EDGE OF DITCH, SOUTH EAST OF TANK

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

Sent to Paragon 12-19-06

FF SAMPLE-SSF

SAMPLED BY: DK/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1310

FIELD SAMPLE ID FF-SO-05 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529623.597 m
E 2439406.891 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 22239 cpm

AFTER SAMPLE COLLECTION 26784 cpm

DETECTOR Type: 44-20 Serial No.: PR172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

~~15' SOUTH WEST OF NORTH END OF FIRING TUBE~~ KMA
35' WEST OF FIRING LINE

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE-SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1325

FIELD SAMPLE ID FF-SO-06 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER (silt)

LOCATION COORDINATES
N 529597.461 m
E 2439427.938 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER massellin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 19,138 cpm

AFTER SAMPLE COLLECTION 21,725 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

15' SOUTH WEST OF NORTH END OF FIRING TUBE

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1235

FIELD SAMPLE ID ~~GF-SO-07~~ JAV FF-SO-07 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529603.880 m
E 2439463.805 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 18,416 cpm

AFTER SAMPLE COLLECTION 24,338 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

25' EAST TARGET/FIRING TUBE (NORTH END)

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FF SAMPLE.SSC

SAMPLED BY: KALMO

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1315

FIELD SAMPLE ID FF-SO-08 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (SILT)

LOCATION COORDINATES
N 529629.879 m
E 2439428.151 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 7,203 cpm

AFTER SAMPLE COLLECTION 8,292 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

WEST SIDE @ TOP OF DITCH TO FIRING LINE 5' NORTH OF TANK

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: KAIMO

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1240

FIELD SAMPLE ID FF-SO-09 **QC SAMPLES COLLECTED** ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529639.386 m
E 2439474.677 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 18,821 cpm

AFTER SAMPLE COLLECTION 15,927 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97941

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on the south side of the access road running south of the blast shield (runs east/west)
Sample consists of brown, gravelly soil with sand.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06

FF SAMPLE ~~SFF~~ SSF

SAMPLED BY: MDIKA

RECEIVED BY: JAN

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1310

FIELD SAMPLE ID FF-SO-10 **QC SAMPLES COLLECTED** ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529660.350 m
E 2439419.420 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 21,235 cpm

AFTER SAMPLE COLLECTION 19,993 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located west of the firing line, across from the blast shield, approximately 20-25 feet west of the asphalt pavement.
Sample consists of brown, gravelly sandy soil with silt.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FF SAMPLE.SSF

SAMPLED BY: RA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1245

FIELD SAMPLE ID FF-SO-11 **QC SAMPLES COLLECTED** MD 12/19 ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529662.436 m
E 2439468.888 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 22,526 cpm

AFTER SAMPLE COLLECTION 21,789 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on the east side of the blast shield, approximately 15 feet SW of the back entrance to the shield.
Sample consists of brown, sandy soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06

FFSAMPLE. ~~SFF~~ SSF

SAMPLED BY: RA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1305

FIELD SAMPLE ID FF-SO-12 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529693.163 m
E 2439426.787 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 9,167 cpm

AFTER SAMPLE COLLECTION 11,978 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on the west side of the firing line, across from the NW corner of the blast shield, and approximately 25 feet from the asphalt pavement.

Sample consists of brown, gravelly sandy dirt with some silt.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: KA / MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1250

FIELD SAMPLE ID FF-SO-13 **QC SAMPLES COLLECTED** ~~Duplicate~~ AAV FF-SO-DUP2

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529697.380 m
E 2439462.673 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 21,538 cpm

AFTER SAMPLE COLLECTION 21,391 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on the east side of the firing line, just north of the blast shield and walkway, and approximately 10 feet from the asphalt pavement.

Sample consists of brown, sandy soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: KA/MD

RECEIVED BY: AAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1300

FIELD SAMPLE ID FF-SO-14 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529725.550 m
E 2439438.394 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 17,055 cpm

AFTER SAMPLE COLLECTION 13,915 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

THREE QUARTERS' UP ACCESS ROAD ON WEST SIDE OF ROAD 6" OFF ROAD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FF SAMPLE-SSF

SAMPLED BY: KA / MD

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Firing Fan **ACTIVITY TIME** START END **CONTAINER TIME** 1255

FIELD SAMPLE ID FF-SO-15 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529759.683 m
E 2439449.069 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 12,382 cpm

AFTER SAMPLE COLLECTION 13,382 cpm

DETECTOR Type: 44-20 Serial No.: 172518

METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

NORTHERN MOST POINT OF FIRING LINE. 1' OFF OF ACCESS ROAD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 FFSAMPLE.SSF

SAMPLED BY: KA/MD

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Hot Line
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 0930
FIELD SAMPLE ID: HL-CL-01
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [ ] WALLBOARD (WL)
- [x] CEILING ~~TILE~~ mat. (CL)
- [ ] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER hand pick

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ____ cpm

AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR
Type: ____
Serial No.: ____

METER
Type: ____
Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample was collected from the ceiling in the cassette room, adjacent to the east wall, approximately 7 feet south of the NE corner of the room. Sample consists of wood ceiling material.
A smear sample (HL-CL-01) was also collected

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 1/@ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/26/06
LOCATION ID: Hot Line
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 0945
FIELD SAMPLE ID: HL-CL-02
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [ ] WALLBOARD (WL)
- [x] CEILING TILE (CL)
- [ ] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER utility knife

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masslin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ____ cpm

AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR
Type: ____
Serial No.: ____

METER
Type: ____
Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample was collected from drop ceiling tile from the middle of the south end of the room, approximately, 5 feet north of the south exit door. Sample consists of ceiling tile pieces.
A smear sample (HL-CL-02) was also collected.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 1 @ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Hot Line
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 0900
FIELD SAMPLE ID: HL-FL-01
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [ ] WALLBOARD (WL)
- [ ] CEILING TILE (CL)
- [x] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER screwdriver, hand pick

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ____ cpm

AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR
Type: ____
Serial No.: ____

METER
Type: ____
Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample was collected from the area of floor just inside the doorway, approximately 2 feet in from the door. Sample was taken from the cassette room. Sample consists of linoleum tile pieces.
A smear sample (HL-FL-01) was also collected.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 @ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Hot Line
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1020
FIELD SAMPLE ID: HL-FL-02
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [ ] WALLBOARD (WL)
- [ ] CEILING TILE (CL)
- [x] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER screwdriver, hand pick

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ____ cpm

AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR
Type: ____
Serial No.: ____

METER
Type: ____
Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample was collected from the entryway in front of the south door, approximately 1-2 feet in from the door.
Sample consists of lineoleum pieces.
A smear sample (HL-FL-02) was also collected.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 @ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Hot Line
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 0845
FIELD SAMPLE ID: HL-WN-01
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [x] WALLBOARD (WL)
- [ ] CEILING TILE (CL)
- [ ] FLOOR TILE (FL)
- [ ] ~~PAINT CHIP (PT)~~ 12/21
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER hand pick

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ____ cpm
AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR
Type: ____
Serial No.: ____

METER
Type: ____
Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample was collected from the middle of the east wall in the cassette room, about 6 feet south of the NE wall and 4 feet high.
Sample consists of wallboard material ~~and paint layers on the surface~~ pieces. 12/21
A smear (HL-WN-01) was also collected.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 @ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

SAMPLED BY: KA/MD
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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06

LOCATION ID: Hot Line
ACTIVITY TIME: START _____ END _____
CONTAINER TIME: 1000

FIELD SAMPLE ID: HL-WN-02
QC SAMPLES COLLECTED: HL-WN-Dup 1

SAMPLE DATA

TYPE OF SAMPLE:
- [ ] DISCRETE
- [x] COMPOSITE

LOCATION COORDINATES: _____

MATERIAL:
- [x] WALLBOARD (WL)
- [ ] CEILING TILE (CL)
- [ ] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [x] SMEAR (SM)
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [x] OTHER hand pick

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER masselin

RINSATE BLANK ID: _____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: _____ cpm

AFTER SAMPLE COLLECTION: _____ cpm

DETECTOR
Type: _____
Serial No.: _____

METER
Type: _____
Serial No.: _____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on north wall in the washroom, next to the corner of the wall where the ramp to the x-ray room begins, at approximately 5 feet high.
Sample consists of wallboard material.
A smear (HL-WN-02) was also collected; a duplicate set of samples was collected.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[x]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[x]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	2 ~~1~~ @ 8 oz. glass	[x]
[x]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[x]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

SAMPLED BY: KA / MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization | JOB NUMBER: 03-3040.29 Task 3 | DATE: 12/18/06

LOCATION ID: Laydown yard | ACTIVITY TIME: START ____ END ____ | CONTAINER TIME: 1530

FIELD SAMPLE ID: LD-SO-01 | QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES
N ~~529581.374 m~~ JAV
E

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 37945 cpm

AFTER SAMPLE COLLECTION: 23339 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

CENTER OF YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[X]	Istopic U (Alpha Spec)		None	1 @ 16 oz plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE . SSF

N 529563.401 m
E 2439420.022 m

SAMPLED BY: KA/DK/MD

RECEIVED BY: JAV

Shipped to paragon 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization | JOB NUMBER: 03-3040.29 Task 3 | DATE: 12/18/06

LOCATION ID: Laydown yard | ACTIVITY TIME: START ____ END ____ | CONTAINER TIME: 1525

FIELD SAMPLE ID: LD-SS-01 | QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0.5-1 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529563.401 m
E 2439420.022 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 37945 cpm

AFTER SAMPLE COLLECTION: 23339 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

~~SOUTH EAST CORNER OF YARD~~ DK
CENTER of LAYDOWN YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: KA / DK / MD

RECEIVED BY: JAV

Shipped to paragon 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown Yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1540
FIELD SAMPLE ID: LD-SO-02
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529544.536m
E 2439420.546 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 24713 cpm
AFTER SAMPLE COLLECTION: 29142 cpm

DETECTOR
Type: 44-20
Serial No.: PR220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SOUTH ~~EAST~~ WEST DK CORNER OF YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[X]	Isotopic U (Alpha Spec)		None	1@ 16 oz plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE. SSF

SAMPLED BY: KA/DK/MD
RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Laydown yard **ACTIVITY TIME** START END **CONTAINER TIME** 1545

FIELD SAMPLE ID ~~LD-SS-02~~ ~~LD-SO-02~~ LD-SS-02 **QC SAMPLES COLLECTED** N/A

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529544.536 m
E 2439420.546 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 24713 cpm

AFTER SAMPLE COLLECTION 25138 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SOUTH ~~EAST~~ DK WEST CORNER OF YARD.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES LD SAMPLE.SSF

SAMPLED BY: KA/DK/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/18/06

LOCATION ID Laydown Yard **ACTIVITY TIME** START END **CONTAINER TIME** 1550

FIELD SAMPLE ID LD-SO-03 **QC SAMPLES COLLECTED** LD-SO-Dup 1

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

LOCATION COORDINATES
N 529551.423 m
E 2439425.762 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 253847 cpm

AFTER SAMPLE COLLECTION 83847 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SOUTH EAST CORNER OF ~~ENTERANCE~~ RAMP TO BLAST CHAMBER

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: KA / MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown Yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1530
FIELD SAMPLE ID: LD-SO-04
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529 556.973 m
E 2439425.551 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 119690 cpm
AFTER SAMPLE COLLECTION: 73517 cpm

DETECTOR
Type: 44-20
Serial No.: PR220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

NORTH CORNER OF RAMP TO BLAST CHAMBER

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE-SSF

SAMPLED BY: KA / DK / MD

RECEIVED BY: JAV

Shipped to Paragon 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1530
FIELD SAMPLE ID: LD-S0-05
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529547.979 m
E 2439420.289 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 47139 cpm
AFTER SAMPLE COLLECTION: 120918 cpm
DETECTOR Type: 44-9 Serial No.: PR220900
METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

6' N NORTH OF SOUTH ACCESS GATE TO YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: KA / MD

RECEIVED BY: JAW

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1510
FIELD SAMPLE ID: LD-SO-06
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE:
- [X] DISCRETE
- [ ] COMPOSITE

TYPE OF SOIL:
- [X] ORGANIC
- [X] SAND
- [X] GRAVEL
- [ ] CLAY
- [ ] OTHER

LOCATION COORDINATES
N 529581.374 m
E 2439431.225 m

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [X] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 21,335 cpm

AFTER SAMPLE COLLECTION: 22591 cpm

DETECTOR
Type: 44-20
Serial No.: PR220400

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

NORTH EAST END OF ASPHALT NEAR FENCE,

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE-SSF

SAMPLED BY: RA/MD

RECEIVED BY: JAV

Shipped to paragon 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1505
FIELD SAMPLE ID: LD-SO-07
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529570.122 m
E 2439435.481 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 42,451 cpm
AFTER SAMPLE COLLECTION: 39753 cpm

DETECTOR Type: 44-20 Serial No.: PR220900
METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SOUTH EAST CORNER NEAR ASPHALT RD.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE. SSF

SAMPLED BY: KA/MD
RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization | JOB NUMBER: 03-3040.29 Task 3 | DATE: 12/18/06

LOCATION ID: Laydown yard | ACTIVITY TIME: START ____ END ____ | CONTAINER TIME: 1500

FIELD SAMPLE ID: LD-SO-08 | QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0.-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529568.881 m
E 2439428.671 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER massdin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 40,591 cpm

AFTER SAMPLE COLLECTION: 56814 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

20' ~~WEST~~ EAST DK OF SOUTH EAST CORNER OF GARAGE. NORTH END OF YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: DK/MD

RECEIVED BY: JAV

Shipped to paragon 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1500
FIELD SAMPLE ID: LD-SO-09
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529568.194 m
E 2439421.944 m

EQUIPMENT INFORMATION

EQUIPMENT USED:
[ ] HAND CORER / AUGER
[ ] S.S. SPOON
[X] S.S. SHOVEL / TROWEL
[ ] S.S. SPATULA
[ ] GEOPROBE
[ ] OTHER ____

DECON FLUIDS USED:
[ ] DI WATER N2 PURGE
[ ] POTABLE WATER
[ ] LIQUINOX SOLUTION
[X] OTHER masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 49,532 cpm
AFTER SAMPLE COLLECTION: 53388 cpm

DETECTOR
Type: 44-20
Serial No.: PR220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

15' SOUTH FROM CENTER OF GARAGE

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE. SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown Yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1450
FIELD SAMPLE ID: LD-SO-10
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529568.751 m
E 2439411.655 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 88,615 cpm
AFTER SAMPLE COLLECTION: 45756 cpm

DETECTOR Type: 44-20 Serial No.: PR 220900
METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

20' NORTH EAST OF SEDIMENT TRAP. WEST SIDE OF YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown Yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1455
FIELD SAMPLE ID: LD-SO-11
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529563.614 m
E 2439416.289 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 42,881 cpm
AFTER SAMPLE COLLECTION: 62099 cpm

DETECTOR
Type: 44-20
Serial No.: PR220400

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

25' DUE EAST OF SEDIMENT TRAP. WEST SIDE OF YARD.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE. SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

SENT TO PARAGON 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization | JOB NUMBER: 03-3040.29 Task 3 | DATE: 12/18/06

LOCATION ID: Laydown yard | ACTIVITY TIME: START ____ END ____ | CONTAINER TIME: 1515

FIELD SAMPLE ID: LD-SO-12 | QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529564.108 m
E 2439426.938 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 49,644 cpm

AFTER SAMPLE COLLECTION: 40436 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

10' OFF NORTH WEST CORNER OF BLAST CHAMBER

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE.SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

SENT TO PARAGON 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1445
FIELD SAMPLE ID: LD-SO-13
QC SAMPLES COLLECTED: LD-SO-Dup2

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529561.483 m
E 2439411.716 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 100,936 cpm
AFTER SAMPLE COLLECTION: 83337 cpm

DETECTOR Type: 44-20 Serial No.: 220900
METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

NORTH OF STEEL SMALL CHAMBER, SOUTH WEST CORNER OF YARD

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LD SAMPLE. SSF

SAMPLED BY: KA/MD

RECEIVED BY: JAV

SENT TO PARAGON 12/19/06

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
LOCATION ID: Laydown yard
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1525
FIELD SAMPLE ID: LD-SO-14
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE:
- [X] DISCRETE
- [ ] COMPOSITE

TYPE OF SOIL:
- [X] ORGANIC
- [X] SAND
- [X] GRAVEL
- [ ] CLAY
- [ ] OTHER

LOCATION COORDINATES
N 529555.268m
E 2439421.285m

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [X] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 56486 cpm
AFTER SAMPLE COLLECTION: 35592 cpm

DETECTOR
Type: 44-20
Serial No.: PR220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

10' WEST OF B25's

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

LDSAMPLE.SSF

SAMPLED BY: DK/MD

RECEIVED BY: JAV

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CABRERA SERVICES
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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/18/06
CONTAINER TIME: 1535
LOCATION ID: Laydown yard
ACTIVITY TIME: START ____ END ____
QC SAMPLES COLLECTED: N/A
FIELD SAMPLE ID: LD-SO-15

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529551.816 m
E 2439417.603 m

EQUIPMENT INFORMATION

EQUIPMENT USED:
[ ] HAND CORER / AUGER
[ ] S.S. SPOON
[X] S.S. SHOVEL / TROWEL
[ ] S.S. SPATULA
[ ] GEOPROBE
[ ] OTHER ____

DECON FLUIDS USED:
[ ] DI WATER N2 PURGE
[ ] POTABLE WATER
[ ] LIQUINOX SOLUTION
[X] OTHER masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 33917 cpm
AFTER SAMPLE COLLECTION: 31220 cpm

DETECTOR
Type: 44-20
Serial No.: PR220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

10' NORTH OF RT SIDE OF ACCESS GATE

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

LDSAMPLE.SSF

NOTES

SAMPLED BY: KA/MD
RECEIVED BY: JAV

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Laydown Yard Driveway
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1125
FIELD SAMPLE ID: PV-AP-01
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES
N 198113 ft
E 478192 ft

MATERIAL:
[ ] WALLBOARD (WL)
[ ] CEILING TILE (CL)
[ ] FLOOR TILE (FL)
[ ] PAINT CHIP (PT)
[ ] SMEAR (SM)
[X] OTHER asphalt

EQUIPMENT INFORMATION

EQUIPMENT USED:
[X] HAND CORER / AUGER
[ ] S.S. SPOON
[X] S.S. SHOVEL / TROWEL
[ ] S.S. SPATULA
[ ] GEOPROBE
[ ] OTHER ____

DECON FLUIDS USED:
[ ] DI WATER N2 PURGE
[ ] POTABLE WATER
[ ] LIQUINOX SOLUTION
[X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: ~~64,008~~ KMA cpm
13,144 CPM

AFTER SAMPLE COLLECTION: 12021 cpm

DETECTOR
Type: 44-20
Serial No.: PR172518

METER
Type: 2221
Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on the pavement in front of the gate to the Laydown Yard.
Sample consists of asphalt. Layer was 4" thick.
A soil sample (PV-AP-01) was also collected at this location.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[X]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[ ]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ 8 oz. glass	[ ]
[ ]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[ ]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

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SAMPLED BY: DK/MOIKA
RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: Laydown yard Driveway
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1125
FIELD SAMPLE ID: PV-SO-01
QC SAMPLES COLLECTED: None

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)

TYPE OF SAMPLE:
- [X] DISCRETE
- [ ] COMPOSITE

TYPE OF SOIL:
- [ ] ORGANIC
- [X] SAND
- [X] GRAVEL
- [ ] CLAY
- [ ] OTHER

LOCATION COORDINATES
N 198113 ft
E 478192 ft

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [X] HAND CORER / AUGER
- [ ] S.S. SPOON
- [X] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 12021 cpm

AFTER SAMPLE COLLECTION: 13011 cpm

DETECTOR
Type: 44-20
Serial No.: PR172518

METER
Type: 2221
Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

See PV-AP-01 for area description.
Sample consists of light grey, sandy, gravelly soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

Soil sample was collected from beneath asphalt layer.
SENT TO PARAGON 12-21-06

SAMPLED BY: KA/DK/MD

RECEIVED BY: JAV

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: ROADWAY
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1140
FIELD SAMPLE ID: PV-AP-02
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES
N 198094 ft
E 478197 ft

MATERIAL:
[ ] WALLBOARD (WL)
[ ] CEILING TILE (CL)
[ ] FLOOR TILE (FL)
[ ] PAINT CHIP (PT)
[ ] SMEAR (SM)
[X] OTHER (asphalt)

EQUIPMENT INFORMATION

EQUIPMENT USED:
[X] HAND CORER / AUGER
[ ] S.S. SPOON
[X] S.S. SHOVEL / TROWEL
[ ] S.S. SPATULA
[ ] GEOPROBE
[ ] OTHER ____

DECON FLUIDS USED:
[ ] DI WATER N2 PURGE
[ ] POTABLE WATER
[ ] LIQUINOX SOLUTION
[X] OTHER Masselin

RINSATE BLANK ID ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 17279 cpm
AFTER SAMPLE COLLECTION: 12648 cpm

DETECTOR
Type: 44-20
Serial No.: PR172518

METER
Type: 2221
Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.) NEAR GRASSY FIELD

Sample area was located across from the Laydown Yard at the south edge of the pavement, just NW of the telephone pole/sign pole.
Sample consists of asphalt; layer was ~4" thick.
Soil sample (PV-SO-02) was collected from 0-0.5 feet at same location, Sample consists of dark grey-black, sandy, gravelly soil (Gamma Spec); 18361 cpm.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[X]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[ ]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ 8 oz. glass	[ ]
[ ]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[ ]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

SENT TO PARAGON 12-21-06

SAMPLED BY: KA/DK/MD
RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3049-29 Task 3
DATE: 12/21/06
LOCATION ID: ROADWAY
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1140
FIELD SAMPLE ID: PV-SO-02
QC SAMPLES COLLECTED: None

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE
LOCATION COORDINATES: N 198094 ft, E 478197 ft

TYPE OF SOIL: [ ] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 12648 cpm
AFTER SAMPLE COLLECTION: 18361 cpm
DETECTOR Type: 44-20 Serial No.: PR172518
METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

NEAR GRASSY field

See PV-AP-02 sheet for area description.
Sample consists of dark grey-black sandy, gravelly soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

Soil sample was collected from beneath asphalt layer.
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SAMPLED BY: KA/DK/MD
RECEIVED BY: JAV

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: MUFFLER / BLAST CHAMBER
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1205
FIELD SAMPLE ID: PV-AP-03
QC SAMPLES COLLECTED: ~~None~~ PV-AP-Dup1

SAMPLE DATA

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES: ____

MATERIAL:
- [ ] WALLBOARD (WL)
- [ ] CEILING TILE (CL)
- [ ] FLOOR TILE (FL)
- [ ] PAINT CHIP (PT)
- [ ] SMEAR (SM)
- [X] OTHER (asphalt)

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [X] HAND CORER / AUGER
- [ ] S.S. SPOON
- [X] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 63963 cpm
AFTER SAMPLE COLLECTION: 68103 cpm

DETECTOR
Type: 44-20
Serial No.: PR172518

METER
Type: 2221
Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located on pavement immediately adjacent to the south wall of the blast chamber and the west wall of the Hot Line.
Sample consists of asphalt; Layer was ~6" thick.
Soil sample was not collected at this location due to a steel plate located underneath the asphalt. Soil sample location was moved to pavement just SW of the blast chamber and west of the muffler. Sample consists of medium-grey, sandy, silty, gravelly soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[X]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[ ]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ 8 oz. glass	[ ]
[ ]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[ ]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES

Muffler meets BLAST CHAMBER

PV-SO-03 (asphalt 3" thick)
B: 45542 cpm } asphalt
A: 28471 cpm
A2: 25623 cpm - soil

DID NOT GET COORDINATES FOR THIS LOCATION. POOR PROP

SENT TO PARAGON 12-21-06

SAMPLED BY: KA / DK / MD

RECEIVED BY: JAV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: MUFFLER / BLAST CHAMBER
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1205
FIELD SAMPLE ID: PV-S0-03
QC SAMPLES COLLECTED: None

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE
LOCATION COORDINATES: ____

TYPE OF SOIL: [ ] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [X] OTHER (silt)

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: *45542 cpm, 28471
AFTER SAMPLE COLLECTION: 25623 cpm
DETECTOR Type: 44-20 Serial No.: PR172518
METER Type: 2221 Serial No.: 97841

*on top of asphalt

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

See PV-AP-03 for area description – moved due to metal plate. Sample consists of medium-grey sandy, silty, gravelly soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

Soil sample was collected from beneath asphalt layer.
SENT TO PARAGON 12-21-06

SAMPLED BY: RA/DK/MD
RECEIVED BY: JAV

DID NOT GET COORDINATES DUE TO POOR PDOP

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FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12/21/06
LOCATION ID: FIRING TUBE / BLAST CHAMBER
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1245
FIELD SAMPLE ID: PV-AP-04
QC SAMPLES COLLECTED: None

SAMPLE DATA

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES
N 198133 ft
E 478216 ft

MATERIAL:
[ ] WALLBOARD (WL)
[ ] CEILING TILE (CL)
[ ] FLOOR TILE (FL)
[ ] PAINT CHIP (PT)
[ ] SMEAR (SM)
[X] OTHER (asphalt)

EQUIPMENT INFORMATION

EQUIPMENT USED:
[X] HAND CORER / AUGER
[ ] S.S. SPOON
[X] S.S. SHOVEL / TROWEL
[ ] S.S. SPATULA
[ ] GEOPROBE
[ ] OTHER ____

DECON FLUIDS USED:
[ ] DI WATER N2 PURGE
[ ] POTABLE WATER
[ ] LIQUINOX SOLUTION
[X] OTHER masselin

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 16413 cpm
AFTER SAMPLE COLLECTION: 11857 cpm

DETECTOR
Type: 44-20
Serial No.: PR172518

METER
Type: 2221
Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was located in the pavement area between the north wall of the blast chamber, the east side of the firing tube, and south wall of the firing tube shed.
Sample consists of asphalt; layer was ~3" thick.
A soil sample was also collected (PV-SO-04) from this location. Sample consists of dark brown to orange sandy clay with gravel (Gamma spec), 13348 cpm.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ 4 oz. plastic	[X]
[ ]	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	[ ]
[ ]	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ 8 oz. glass	[ ]
[ ]	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	[ ]
[ ]	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	[ ]

NOTES: FIRING TUBE MEETS BLAST CHAMBER
SENT TO PARAGON 12-21-06

SAMPLED BY: KA / DK / ND
RECEIVED BY: JAV

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RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3049.23 Task 3
DATE: 12/21/06
LOCATION ID: FIRING TUBE / BLAST CHAMBER
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1245
FIELD SAMPLE ID: PV-SO-04
QC SAMPLES COLLECTED: None

SAMPLE DATA

DEPTH OF SAMPLE: 0-0.5 FT (BGS)
TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE
TYPE OF SOIL: [ ] ORGANIC [X] SAND [X] GRAVEL [X] CLAY [ ] OTHER
LOCATION COORDINATES: N 198133 ft, E 478216 ft.

EQUIPMENT INFORMATION

EQUIPMENT USED: [X] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____
DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER: masselin
RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 11857 cpm
AFTER SAMPLE COLLECTION: 13348 cpm
DETECTOR Type: 44-20 Serial No.: PR172518
METER Type: 2221 Serial No.: 97841

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.):

See PV-AP-04 for area description.
Sample consists of dark brown-orange sandy, clayey soil with gravel.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

Soil sample was collected from beneath asphalt layer.

SENT TO PARAGON 12-21-06

SAMPLED BY: RA/DK/MD
RECEIVED BY: JKV

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FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12-18-06

LOCATION ID: SEDIMENT TRAP
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1150

FIELD SAMPLE ID: ST-SO-01
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0. 0.5 FT (BGS)

TYPE OF SAMPLE:
- [x] DISCRETE
- [ ] COMPOSITE

TYPE OF SOIL:
- [x] ORGANIC
- [x] SAND
- [ ] GRAVEL
- [ ] CLAY
- [ ] OTHER

LOCATION COORDINATES JAV
N 529570.367 M
E 2439460.216 M

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [ ] S.S. SPOON
- [x] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER MASSELIN

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 30020 cpm

AFTER SAMPLE COLLECTION: 23589 cpm

DETECTOR
Type: 3 x 3
Serial No.: PR 220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

TAN, MEDIUM GRAIN, SAND

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[x]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES: SENT TO PARAGON 12/19/06 ST SAMPLE.SSF

WRONG COORDINATES ABOVE

CORRECTED: N 529563.360 m
E 2439404.207 m

SAMPLED BY: DAVE KATELEY

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12-18-06
LOCATION ID: SEDIMENT TRAP
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1155
FIELD SAMPLE ID: ST-SS-01
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0.5 - 1 FT (BGS)
TYPE OF SAMPLE: [ ] DISCRETE [ ] COMPOSITE
TYPE OF SOIL: [X] ORGANIC [X] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER
LOCATION COORDINATES: JAV
N 529570.367M
E 2439460.216M

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [X] S.S. SPOON [ ] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____
DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER MASSELIN
RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 19879 cpm
AFTER SAMPLE COLLECTION: 19240 cpm
DETECTOR Type: 3x3 Serial No.: PR220900
METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

TAN, MEDIUM GRAIN SAND

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES: SENT TO PARAGON 12/19/06 ST SAMPLE . SSF

WRONG COORDINATES ABOVE:
CORRECTED: 529563.360 m
2439404.207 m

SAMPLED BY: DAVE KATELEY
RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12-18-06

LOCATION ID: SEDIMENT TRAP
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1215

FIELD SAMPLE ID: ST-SO-02
QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0 - 0.5 FT (BGS)

TYPE OF SAMPLE:
- [X] DISCRETE
- [ ] COMPOSITE

LOCATION COORDINATES: JAV
N 529566.330 m
E 2439468.936 m

TYPE OF SOIL:
- [X] ORGANIC
- [X] SAND
- [ ] GRAVEL
- [ ] CLAY
- [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [X] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [X] OTHER MASCECIN

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 29530 cpm

AFTER SAMPLE COLLECTION: 32538 cpm

DETECTOR
Type: 3 x 3
Serial No.: 220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

MEDIUM BROWN, SANDY SILT

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES: SENT TO PARAGON 12/19/06 ST SAMPLE. SSR

WRONG COORDINATES ABOVE
CORRECTED: N 529562.234 m
E 2439405.454 m

SAMPLED BY: D. KATELEY
RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12-18-06

LOCATION ID: SEDIMENT TRAP
ACTIVITY TIME: START ____ END ____
CONTAINER TIME: 1235

FIELD SAMPLE ID: ST-SO-03
QC SAMPLES COLLECTED: ST-SO-Dup 1

SAMPLE DATA

DEPTH OF SAMPLE: 0 - 0.5 FT (BGS)

TYPE OF SAMPLE:
- [x] DISCRETE
- [ ] COMPOSITE

TYPE OF SOIL:
- [ ] ORGANIC
- [ ] SAND
- [ ] GRAVEL
- [ ] CLAY
- [ ] OTHER

LOCATION COORDINATES
N 529571.874 M
E 243965.303 M
JAV

EQUIPMENT INFORMATION

EQUIPMENT USED:
- [ ] HAND CORER / AUGER
- [x] S.S. SPOON
- [ ] S.S. SHOVEL / TROWEL
- [ ] S.S. SPATULA
- [ ] GEOPROBE
- [ ] OTHER ____

DECON FLUIDS USED:
- [ ] DI WATER N2 PURGE
- [ ] POTABLE WATER
- [ ] LIQUINOX SOLUTION
- [x] OTHER MASSELIN

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: 29069 cpm

AFTER SAMPLE COLLECTION: 33644 cpm

DETECTOR
Type: 3x3
Serial No.: 220900

METER
Type: 2221
Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

MEDIUM BROWN, SANDY SILT

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[x]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[x]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES: SENT TO PARAGON 12/19/06 ST SAMPLE. SSF

WRONG COORDINATES ABOVE

CORRECTED: N 529560.268 M
E 243940.835 M

SAMPLED BY: D. KUTELEY

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT: ARL R-14 Range Characterization | JOB NUMBER: 03-3040.29 Task 3 | DATE: 10-18-06

LOCATION ID: SEDIMENT TRAP | ACTIVITY TIME: START ____ END ____ | CONTAINER TIME: 1235

FIELD SAMPLE ID: ST-SO-DUP1 | QC SAMPLES COLLECTED: N/A

SAMPLE DATA

DEPTH OF SAMPLE: 0 - 0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

LOCATION COORDINATES: JAV ~~N 529571.874 M~~ ~~E 2439465.303 M~~

TYPE OF SOIL: [ ] ORGANIC [ ] SAND [ ] GRAVEL [ ] CLAY [ ] OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [X] S.S. SPOON [ ] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER ____

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER MASSELIN

RINSATE BLANK ID: ____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION N/A

BEFORE SAMPLE COLLECTION: ____ cpm

AFTER SAMPLE COLLECTION: ____ cpm

DETECTOR Type: ____ Serial No.: ____

METER Type: ____ Serial No.: ____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SAME AS SAMPLE ST-SO-Ø3

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES: DUPLICATE SAMPLE ST SAMPLE - SSF

WRONG COORDINATES ABOVE

CORRECTED: N 529560.268 M

E 2439401.835 m

SAMPLED BY: D. KATELEY

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12.21.06
LOCATION ID: SEDIMENT TRAP
ACTIVITY TIME: START 1405 END 1410
CONTAINER TIME: 1407
FIELD SAMPLE ID: ST-SW
QC SAMPLES COLLECTED: NONE

SAMPLE DATA

TYPE OF SAMPLE: ☐ DISCRETE ☑ COMPOSITE

LOCATION COORDINATES: _____

MATERIAL:
☐ WALLBOARD (WL)
☐ CEILING TILE (CL)
☐ FLOOR TILE (FL)
☐ PAINT CHIP (PT)
☐ SMEAR (SM)
☑ OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
☐ HAND CORER / AUGER
☐ S.S. SPOON
☐ S.S. SHOVEL / TROWEL
☐ S.S. SPATULA
☐ GEOPROBE
☑ OTHER DIPPER

DECON FLUIDS USED:
☐ DI WATER N2 PURGE
☐ POTABLE WATER
☐ LIQUINOX SOLUTION
☐ OTHER _____

RINSATE BLANK ID: _____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: _____ cpm
AFTER SAMPLE COLLECTION: _____ cpm

DETECTOR
Type: _____
Serial No.: _____

METER
Type: _____
Serial No.: _____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

WATER FROM SEDIMENT TRAP @ EAST PERIMETER OF LAYDOWN YARD

SAMPLE ANALYSES

PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
☑ ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ ~~4 oz.~~ 1000 ML plastic	☑
☐ GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	☐
☑ RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ ~~8 oz. glass~~ 500 ML PLASTIC	☑
☐ PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	☐
☐ ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	☐

NOTES

SAMPLED BY: DK / KMA
RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12.21.06

LOCATION ID SEDIMENT TANK **ACTIVITY TIME** START 1415 END 1420 **CONTAINER TIME** 1417

FIELD SAMPLE ID ST-SD **QC SAMPLES COLLECTED** NONE

SAMPLE DATA

TYPE OF SAMPLE: ☐ DISCRETE ☑ COMPOSITE

LOCATION COORDINATES _____

MATERIAL:
☐ WALLBOARD (WL)
☐ CEILING TILE (CL)
☐ FLOOR TILE (FL)
☐ PAINT CHIP (PT)
☐ SMEAR (SM)
☑ OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
☐ HAND CORER / AUGER
☐ S.S. SPOON
☐ S.S. SHOVEL / TROWEL
☐ S.S. SPATULA
☐ GEOPROBE
☑ OTHER NPREN

DECON FLUIDS USED:
☐ DI WATER N2 PURGE
☐ POTABLE WATER
☐ LIQUINOX SOLUTION
☐ OTHER _____

RINSATE BLANK ID _____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION _____ cpm

AFTER SAMPLE COLLECTION _____ cpm

DETECTOR
Type: _____
Serial No.: _____

METER
Type: _____
Serial No.: _____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

SEDIMENT FROM BOTTOM OF SEDIMENT TANK.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
☑	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ ~~4~~ 16 oz. plastic	☑
☐	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	☐
☑	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ 8 oz. glass	☑
☐	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	☐
☐	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	☐

NOTES

SAMPLED BY: DK / KMA

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/19/06

LOCATION ID Water ~~Tower~~ TREATMENT JAV **ACTIVITY TIME** START END **CONTAINER TIME** 1140

FIELD SAMPLE ID WT-SO-01 **QC SAMPLES COLLECTED** MD 12/19 ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0 - 0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529570.367 M
E 2439460.216 M

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [ ] OTHER

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 16417 cpm

AFTER SAMPLE COLLECTION 16888 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was 16-17K cpm.
Sample was collected off NW corner of small building, at former location of truck discharge of DU-contaminated water. Area is in grass, just north of asphalt edge.
Sample consists of brown, gravelly soil.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES

SENT TO PARAGON 12/19/06

WT SAMPLE.SSF

THIS LOCATION SELECTED BY MARYLAND DUE TO LOCATION NEAR FILL PIPE WHERE TANKER TRUCKS WOULD DISCHARGE WATER FROM OTHER RANGES

SAMPLED BY: MD

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/19/06

LOCATION ID Water ~~Tower~~ TREATMENT JAV **ACTIVITY TIME** START END **CONTAINER TIME** 1150

FIELD SAMPLE ID WT-SS-01 **QC SAMPLES COLLECTED** MD 12/19 ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0.5-1 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529570.367 M
E 2439460.216 M

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER Masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 16417 cpm

AFTER SAMPLE COLLECTION 16888 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was 16-17K cpm.
Sample was collected off NW corner of small building, at former location of truck discharge of DU-contaminated water. Area is in grass, just north of asphalt edge.
See WT-SO-01 for sample description.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 WT SAMPLE.SSF

MARKLAND SELECTED THIS LOCATION
SEE NOTE WT-SO-01

SAMPLED BY: MD

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/19/06

LOCATION ID Water ~~Tower~~ TREATMENT JAV **ACTIVITY TIME** START END **CONTAINER TIME** 1210

FIELD SAMPLE ID WT-SO-02 **QC SAMPLES COLLECTED** MD 12/19 ~~N/A~~ None

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529566.330 m
E 2439468.936 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 12889 cpm

AFTER SAMPLE COLLECTION 16513 cpm

DETECTOR Type: 44-20 Serial No.: PR 220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was 11-12K cpm.
Sample was collected on grass near the ~~NE~~ SE MD 12/19 corner of the building (small, wood roof), just east of the asphalt pavement.
Sample consists of brown, gravelly soil with some sand.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-14-06 WT SAMPLE. SSf

SAMPLED BY: MD

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
SURFACE / SUBSURFACE SOIL SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12/19/06

LOCATION ID Water ~~Tower~~ TREATMENT JAN **ACTIVITY TIME** START END **CONTAINER TIME** 1225

FIELD SAMPLE ID WT-SO-03 **QC SAMPLES COLLECTED** WT-SO-Dup1

SAMPLE DATA

DEPTH OF SAMPLE 0-0.5 FT (BGS)

TYPE OF SAMPLE: [X] DISCRETE [ ] COMPOSITE

TYPE OF SOIL: [X] ORGANIC [X] SAND [X] GRAVEL [ ] CLAY [ ] OTHER

LOCATION COORDINATES
N 529571.874 m
E 243965.303 m

EQUIPMENT INFORMATION

EQUIPMENT USED: [ ] HAND CORER / AUGER [ ] S.S. SPOON [X] S.S. SHOVEL / TROWEL [ ] S.S. SPATULA [ ] GEOPROBE [ ] OTHER

DECON FLUIDS USED: [ ] DI WATER N2 PURGE [ ] POTABLE WATER [ ] LIQUINOX SOLUTION [X] OTHER masselin

RINSATE BLANK ID

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION 13552 cpm

AFTER SAMPLE COLLECTION 15146 cpm

DETECTOR Type: 44-20 Serial No.: PR220900

METER Type: 2221 Serial No.: 216473

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

Sample area was 13-14K cpm.
Sample was collected on grass near the NE corner of the building (small, wood roof), on north side of building.
Sample consists of brown, gravelly soil with some sand.

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
[X]	DEPLETED URANIUM (GAMMA SPEC)	EPA 901.1M	None	1 @ 16 oz. plastic	[X]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]
[ ]					[ ]

NOTES SENT TO PARAGON 12-19-06 WT SAMPLE.SSF

SAMPLED BY: MD

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT ARL R-14 Range Characterization **JOB NUMBER** 03-3040.29 Task 3 **DATE** 12.21.06

LOCATION ID WATER TREATMENT **ACTIVITY TIME** START 1410 END 1415 **CONTAINER TIME** 1412

FIELD SAMPLE ID WT-SW **QC SAMPLES COLLECTED** _____

SAMPLE DATA

TYPE OF SAMPLE: ☐ DISCRETE ☑ COMPOSITE

LOCATION COORDINATES ~~N 529571.8~~ JAV

MATERIAL:
☐ WALLBOARD (WL)
☐ CEILING TILE (CL)
☐ FLOOR TILE (FL)
☐ PAINT CHIP (PT)
☐ SMEAR (SM)
☑ OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
☐ HAND CORER / AUGER
☐ S.S. SPOON
☐ S.S. SHOVEL / TROWEL
☐ S.S. SPATULA
☐ GEOPROBE
☑ OTHER DIPPER

DECON FLUIDS USED:
☐ DI WATER N2 PURGE
☐ POTABLE WATER
☐ LIQUINOX SOLUTION
☐ OTHER _____

RINSATE BLANK ID _____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION _____ cpm

AFTER SAMPLE COLLECTION _____ cpm

DETECTOR
Type: _____
Serial No.: _____

METER
Type: _____
Serial No.: _____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

WATER FROM WATER TREATMENT

SAMPLE ANALYSES

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
☑	ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ ~~1 oz.~~ 1000 ML plastic	☑
☐	GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	☐
☑	RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ ~~8 oz. glass~~ 500 ML PLASTIC	☑
☐	PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	☐
☐	ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	☐

NOTES

~~WATER~~ WT SAMPLE-SSF

SENT TO PARAGON 12-21-06

SAMPLED BY: DK / KMA

RECEIVED BY: JAV

CABRERA SERVICES
RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

FIELD DATA RECORD
VOLUMETRIC SAMPLING

PROJECT: ARL R-14 Range Characterization
JOB NUMBER: 03-3040.29 Task 3
DATE: 12.21.06
LOCATION ID: HOT LINE / X-LAY LAB
ACTIVITY TIME: START 1400 END 1405
CONTAINER TIME: 1402
FIELD SAMPLE ID: XR-SW
QC SAMPLES COLLECTED: NONE

SAMPLE DATA

TYPE OF SAMPLE: ☐ DISCRETE ☒ COMPOSITE

LOCATION COORDINATES: _____

MATERIAL:
☐ WALLBOARD (WL)
☐ CEILING TILE (CL)
☐ FLOOR TILE (FL)
☐ PAINT CHIP (PT)
☐ SMEAR (SM)
☒ OTHER

EQUIPMENT INFORMATION

EQUIPMENT USED:
☐ HAND CORER / AUGER
☐ S.S. SPOON
☐ S.S. SHOVEL / TROWEL
☐ S.S. SPATULA
☐ GEOPROBE
☒ OTHER DIPPER

DECON FLUIDS USED:
☐ DI WATER N2 PURGE
☐ POTABLE WATER
☐ LIQUINOX SOLUTION
☐ OTHER _____

RINSATE BLANK ID: _____

RADIOLOGICAL MEASUREMENTS AT SAMPLE LOCATION

BEFORE SAMPLE COLLECTION: _____ cpm
AFTER SAMPLE COLLECTION: _____ cpm

DETECTOR
Type: _____
Serial No.: _____

METER
Type: _____
Serial No.: _____

SAMPLE OBSERVATIONS (e.g., location, texture, color, odor, etc.)

HOT LINE H_2O FROM DRUM. COLLECTED STANDING WATER APROX. 50 gallons of WATER COLLECTED. DRUM IS LOCATED IN HOT LINE

SAMPLE ANALYSES

PARAMETER	METHOD NUMBER	PRESERVATION METHOD	BOTTLE TYPE/ VOLUME REQUIRED	SAMPLE COLLECTED
☒ ISOTOPIC URANIUM (ALPHA SPEC)	ASTM 3972-90M	None	1 @ ~~4 oz.~~ plastic 1000 ML.	☒
☐ GROSS ALPHA / BETA (SMEARS)	EPA 900.0	None	1 plastic bag	☐
☒ RCRA METALS (TCLP)	EPA 1311/6010/7470	Cool 4°C	1 @ ~~8 oz. glass~~ 500 ML PLASTIC	☒
☐ PCBS	EPA 8082	Cool 4°C	1 @ 4 oz. glass	☐
☐ ASBESTOS	NIOSH 7400	None	1 @ 4 oz. plastic	☐

NOTES

SAMPLED BY: DK / KMA

RECEIVED BY: JAV

APPENDIX D-3

CHEMICAL ANALYSIS RESULTS

APG R-14 Range Characterization
Metals and PCB Results

FieldID	Parameter	Result	Units	PRL	Flag	Suite	Analytical Method	Matrix	Order Number
HL-CL-01	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-CL-01	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-01	AROCLOR-1016	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1221	900	UG/KG	900	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1232	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1242	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1248	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1254	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-01	AROCLOR-1260	450	UG/KG	450	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-CL-02	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-CL-02	AROCLOR-1016	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1221	110	UG/KG	110	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1232	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1242	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1248	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1254	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-CL-02	AROCLOR-1260	57	UG/KG	57	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-FL-01	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-01	AROCLOR-1016	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	AROCLOR-1221	650	UG/KG	650	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	AROCLOR-1232	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167

APG R-14 Range Characterization
Metals and PCB Results

FieldID	Parameter	Result	Units	PRL	Flag	Suite	Analytical Method	Matrix	Order Number
HL-FL-01	AROCLOR-1242	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	AROCLOR-1248	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	AROCLOR-1254	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-01	AROCLOR-1260	320	UG/KG	320	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-FL-02	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-FL-02	AROCLOR-1016	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1221	440	UG/KG	440	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1232	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1242	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1248	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1254	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-FL-02	AROCLOR-1260	220	UG/KG	220	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-WN-01	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-01	AROCLOR-1016	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1221	200	UG/KG	200	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1232	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1242	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1248	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1254	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-01	AROCLOR-1260	100	UG/KG	100	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-WN-02	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167

APG R-14 Range Characterization
Metals and PCB Results

FieldID	Parameter	Result	Units	PRL	Flag	Suite	Analytical Method	Matrix	Order Number
HL-WN-02	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-02	AROCLOR-1016	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1221	160	UG/KG	160	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1232	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1242	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1248	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1254	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-02	AROCLOR-1260	79	UG/KG	79	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
HL-WN-DUP1	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
HL-WN-DUP1	AROCLOR-1016	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1221	180	UG/KG	180	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1232	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1242	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1248	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1254	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
HL-WN-DUP1	AROCLOR-1260	91	UG/KG	91	U	PEST/PCB	SW8082	SOLID	0612167
ST-SD	ARSENIC	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
ST-SD	BARIUM	1	MG/L	1	U	METALS	SW6010	LEACHATE	0612167
ST-SD	CADMIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
ST-SD	CHROMIUM	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
ST-SD	LEAD	0.03	MG/L	0.03	U	METALS	SW6010	LEACHATE	0612167
ST-SD	MERCURY	0.002	MG/L	0.002	U	METALS	SW7470	LEACHATE	0612167
ST-SD	SELENIUM	0.05	MG/L	0.05	U	METALS	SW6010	LEACHATE	0612167
ST-SD	SILVER	0.1	MG/L	0.1	U	METALS	SW6010	LEACHATE	0612167
ST-SW	ALUMINUM	0.2	MG/L	0.2	U	METALS	SW6010	WATER	0612167
ST-SW	ANTIMONY	0.02	MG/L	0.02	U	METALS	SW6010	WATER	0612167
ST-SW	ARSENIC	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	BARIUM	0.1	MG/L	0.1	U	METALS	SW6010	WATER	0612167
ST-SW	BERYLLIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
ST-SW	CADMIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
ST-SW	CALCIUM	3.8	MG/L	1		METALS	SW6010	WATER	0612167
ST-SW	CHROMIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	COBALT	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	COPPER	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167

APG R-14 Range Characterization
Metals and PCB Results

FieldID	Parameter	Result	Units	PRL	Flag	Suite	Analytical Method	Matrix	Order Number
ST-SW	IRON	4	MG/L	0.1		METALS	SW6010	WATER	0612167
ST-SW	LEAD	0.003	MG/L	0.003	U	METALS	SW6010	WATER	0612167
ST-SW	MAGNESIUM	1.9	MG/L	1		METALS	SW6010	WATER	0612167
ST-SW	MANGANESE	0.091	MG/L	0.01		METALS	SW6010	WATER	0612167
ST-SW	MERCURY	0.0002	MG/L	0.0002	U	METALS	SW7470	WATER	0612167
ST-SW	NICKEL	0.02	MG/L	0.02	U	METALS	SW6010	WATER	0612167
ST-SW	POTASSIUM	8.9	MG/L	1		METALS	SW6010	WATER	0612167
ST-SW	SELENIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
ST-SW	SILVER	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	SODIUM	6.7	MG/L	1		METALS	SW6010	WATER	0612167
ST-SW	THALLIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	URANIUM	20	UG/L	0.1		METALS	SW6020	WATER	0612167
ST-SW	VANADIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
ST-SW	ZINC	0.043	MG/L	0.02		METALS	SW6010	WATER	0612167
WT-SW	ALUMINUM	0.2	MG/L	0.2	U	METALS	SW6010	WATER	0612167
WT-SW	ANTIMONY	0.02	MG/L	0.02	U	METALS	SW6010	WATER	0612167
WT-SW	ARSENIC	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	BARIUM	0.1	MG/L	0.1	U	METALS	SW6010	WATER	0612167
WT-SW	BERYLLIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
WT-SW	CADMIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
WT-SW	CALCIUM	14	MG/L	1		METALS	SW6010	WATER	0612167
WT-SW	CHROMIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	COBALT	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	COPPER	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	IRON	3.6	MG/L	0.1		METALS	SW6010	WATER	0612167
WT-SW	LEAD	0.003	MG/L	0.003	U	METALS	SW6010	WATER	0612167
WT-SW	MAGNESIUM	4.1	MG/L	1		METALS	SW6010	WATER	0612167
WT-SW	MANGANESE	0.36	MG/L	0.01		METALS	SW6010	WATER	0612167
WT-SW	MERCURY	0.0002	MG/L	0.0002	U	METALS	SW7470	WATER	0612167
WT-SW	NICKEL	0.024	MG/L	0.02		METALS	SW6010	WATER	0612167
WT-SW	POTASSIUM	38	MG/L	1		METALS	SW6010	WATER	0612167
WT-SW	SELENIUM	0.0051	MG/L	0.005		METALS	SW6010	WATER	0612167
WT-SW	SILVER	0.086	MG/L	0.01		METALS	SW6010	WATER	0612167
WT-SW	SODIUM	230	MG/L	1		METALS	SW6010	WATER	0612167
WT-SW	THALLIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	**URANIUM**	**1200**	**UG/L**	**5**		**METALS**	**SW6020**	**WATER**	**0612167**
WT-SW	VANADIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
WT-SW	ZINC	0.14	MG/L	0.02		METALS	SW6010	WATER	0612167
XR-SW	ALUMINUM	1.1	MG/L	0.2		METALS	SW6010	WATER	0612167
XR-SW	ANTIMONY	0.02	MG/L	0.02	U	METALS	SW6010	WATER	0612167
XR-SW	ARSENIC	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167

APG R-14 Range Characterization
Metals and PCB Results

FieldID	Parameter	Result	Units	PRL	Flag	Suite	Analytical Method	Matrix	Order Number
XR-SW	BARIUM	0.1	MG/L	0.1	U	METALS	SW6010	WATER	0612167
XR-SW	BERYLLIUM	0.005	MG/L	0.005	U	METALS	SW6010	WATER	0612167
XR-SW	CADMIUM	0.0055	MG/L	0.005		METALS	SW6010	WATER	0612167
XR-SW	CALCIUM	23	MG/L	1		METALS	SW6010	WATER	0612167
XR-SW	CHROMIUM	0.14	MG/L	0.01		METALS	SW6010	WATER	0612167
XR-SW	COBALT	0.018	MG/L	0.01		METALS	SW6010	WATER	0612167
XR-SW	COPPER	0.044	MG/L	0.01		METALS	SW6010	WATER	0612167
XR-SW	IRON	13	MG/L	0.1		METALS	SW6010	WATER	0612167
XR-SW	LEAD	0.05	MG/L	0.003		METALS	SW6010	WATER	0612167
XR-SW	MAGNESIUM	7.6	MG/L	1		METALS	SW6010	WATER	0612167
XR-SW	MANGANESE	0.35	MG/L	0.01		METALS	SW6010	WATER	0612167
XR-SW	MERCURY	0.0002	MG/L	0.0002	U	METALS	SW7470	WATER	0612167
XR-SW	NICKEL	0.48	MG/L	0.02		METALS	SW6010	WATER	0612167
XR-SW	POTASSIUM	15	MG/L	1		METALS	SW6010	WATER	0612167
XR-SW	SELENIUM	0.0067	MG/L	0.005		METALS	SW6010	WATER	0612167
XR-SW	SILVER	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
XR-SW	SODIUM	76	MG/L	1		METALS	SW6010	WATER	0612167
XR-SW	THALLIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
XR-SW	**URANIUM**	**3500**	**UG/L**	**10**		**METALS**	**SW6020**	**WATER**	**0612167**
XR-SW	VANADIUM	0.01	MG/L	0.01	U	METALS	SW6010	WATER	0612167
XR-SW	ZINC	0.55	MG/L	0.02		METALS	SW6010	WATER	0612167

NOTES:

Bold text and yellow highlighting indicate that the soil sample exceeded the 40 CFR 261.25 toxicity characteristic for the respective constituent, or that the water sample exceeded the EPA maximum contaminant level (i.e., uranium MCL = 30 ug/L).

U = The compound was analyzed for but not detected.

APPENDIX D-4

ISOTOPIC URANIUM RESULTS

APG R-14 Range Characterization
Isotopic Uranium Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
HL-CL-01	U-234	0.032	+/-	0.034	pCi/g	0.042	U	714R10	SOLID	0612167
HL-CL-01	U-235	-0.005	+/-	0.034	pCi/g	0.058	U	714R10	SOLID	0612167
HL-CL-01	U-238	0.5	+/-	0.16	pCi/g	0.04		714R10	SOLID	0612167
HL-CL-02	U-234	2.37	+/-	0.47	pCi/g	0.04		714R10	SOLID	0612167
HL-CL-02	U-235	0.148	+/-	0.074	pCi/g	0.036		714R10	SOLID	0612167
HL-CL-02	U-238	7.7	+/-	1.4	pCi/g	0		714R10	SOLID	0612167
HL-FL-01	U-234	6.6	+/-	1.2	pCi/g	0	Y2	714R10	SOLID	0612167
HL-FL-01	U-235	0.72	+/-	0.22	pCi/g	0.07	Y2	714R10	SOLID	0612167
HL-FL-01	U-238	49.9	+/-	8.7	pCi/g	0	Y2	714R10	SOLID	0612167
HL-FL-02	U-234	0.9	+/-	0.22	pCi/g	0.04		714R10	SOLID	0612167
HL-FL-02	U-235	0.085	+/-	0.057	pCi/g	0.043	LT	714R10	SOLID	0612167
HL-FL-02	U-238	5.33	+/-	0.98	pCi/g	0.04		714R10	SOLID	0612167
HL-WN-01	U-234	0.32	+/-	0.12	pCi/g	0.06		714R10	SOLID	0612167
HL-WN-01	U-235	0.018	+/-	0.035	pCi/g	0.05	U	714R10	SOLID	0612167
HL-WN-01	U-238	0.98	+/-	0.25	pCi/g	0.05		714R10	SOLID	0612167
HL-WN-02	U-234	0.211	+/-	0.088	pCi/g	0.038		714R10	SOLID	0612167
HL-WN-02	U-235	0.015	+/-	0.031	pCi/g	0.049	U	714R10	SOLID	0612167
HL-WN-02	U-238	0.55	+/-	0.16	pCi/g	0.04		714R10	SOLID	0612167
HL-WN-DUP1	U-234	0.096	+/-	0.068	pCi/g	0.069	LT	714R10	SOLID	0612167
HL-WN-DUP1	U-235	0.032	+/-	0.043	pCi/g	0.067	U	714R10	SOLID	0612167
HL-WN-DUP1	U-238	0.39	+/-	0.14	pCi/g	0.05		714R10	SOLID	0612167
LD-SO-01	U-234	7.1	+/-	1.3	pCi/g	0.2	M3	714R10	SOIL	0612167
LD-SO-01	U-235	0.75	+/-	0.22	pCi/g	0.09		714R10	SOIL	0612167
LD-SO-01	U-238	50.8	+/-	8.8	pCi/g	0.1	M3	714R10	SOIL	0612167
LD-SO-02	U-234	15	+/-	2.7	pCi/g	0.1	M3	714R10	SOIL	0612167
LD-SO-02	U-235	1.71	+/-	0.4	pCi/g	0.1	M3	714R10	SOIL	0612167
LD-SO-02	**U-238**	**115**	**+/-**	**20**	**pCi/g**	**0**		**714R10**	**SOIL**	**0612167**
PV-AP-01	U-234	0.98	+/-	0.25	pCi/g	0.07		714R10	SOLID	0612167
PV-AP-01	U-235	0.13	+/-	0.077	pCi/g	0.051		714R10	SOLID	0612167
PV-AP-01	U-238	6.3	+/-	1.2	pCi/g	0		714R10	SOLID	0612167
PV-AP-02	U-234	0.59	+/-	0.16	pCi/g	0.04		714R10	SOLID	0612167
PV-AP-02	U-235	0.091	+/-	0.058	pCi/g	0.042	LT	714R10	SOLID	0612167
PV-AP-02	U-238	3.39	+/-	0.65	pCi/g	0.07		714R10	SOLID	0612167
PV-AP-03	U-234	1.86	+/-	0.39	pCi/g	0.05		714R10	SOLID	0612167
PV-AP-03	U-235	0.135	+/-	0.073	pCi/g	0.052		714R10	SOLID	0612167
PV-AP-03	U-238	12.3	+/-	2.2	pCi/g	0.1		714R10	SOLID	0612167
PV-AP-04	U-234	1.53	+/-	0.34	pCi/g	0.05		714R10	SOLID	0612167
PV-AP-04	U-235	0.173	+/-	0.087	pCi/g	0.066		714R10	SOLID	0612167
PV-AP-04	U-238	11.3	+/-	2	pCi/g	0		714R10	SOLID	0612167

APG R-14 Range Characterization
Isotopic Uranium Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
PV-AP-DUP1	U-234	1.63	+/-	0.35	pCi/g	0.04		714R10	SOLID	0612167
PV-AP-DUP1	U-235	0.177	+/-	0.085	pCi/g	0.051		714R10	SOLID	0612167
PV-AP-DUP1	U-238	12.1	+/-	2.1	pCi/g	0		714R10	SOLID	0612167
ST-SD	U-234	95	+/-	22	pCi/g	2	M3	714R10	SEDIMENT	0612167
ST-SD	U-235	12.1	+/-	5.8	pCi/g	2.5	M3	714R10	SEDIMENT	0612167
ST-SD	**U-238**	**620**	**+/-**	**120**	**pCi/g**	**0**	**M3**	**714R10**	**SEDIMENT**	**0612167**
ST-SW	U-234	1.22	+/-	0.36	pCi/L	0.1		714R10	WATER	0612167
ST-SW	U-235	0.119	+/-	0.099	pCi/L	0.054	LT	714R10	WATER	0612167
ST-SW	U-238	8.4	+/-	1.6	pCi/L	0.1		714R10	WATER	0612167
WT-SW	U-234	50	+/-	12	pCi/L	1	Y2,M3	714R10	WATER	0612167
WT-SW	U-235	5.5	+/-	2	pCi/L	0.3	Y2,M3	714R10	WATER	0612167
WT-SW	**U-238**	**375**	**+/-**	**83**	**pCi/L**	**1**	**Y2,M3**	**714R10**	**WATER**	**0612167**
XR-SW	U-234	129	+/-	29	pCi/L	2	Y2,M3	714R10	WATER	0612167
XR-SW	U-235	16.5	+/-	5.5	pCi/L	1.4	Y2,M3	714R10	WATER	0612167
XR-SW	**U-238**	**980**	**+/-**	**210**	**pCi/L**	**0**	**Y2,M3**	**714R10**	**WATER**	**0612167**

NOTES:

Sample entries in bold text and yellow highlighting indicate that DU concentrations in solid samples are higher than the soil sample screening limit of 102 pCi/g, or that DU concentrations in water samples are higher than the EPA maximum contaminant level of 30 ug/L.

MDC = Minimum Detectable Concentration

TPU = Total Propagated Uncertainty

U = Result is less than the sample-specific MDC.

LT = Result is less than the requested MDC but greater than the sample-specific MDC.

Y1 = Chemical yield is in control at 100-110%. Quantitative yield is assumed.

Y2 = Chemical yield is outside default limits.

M3 = The requested MDC was not met, but the reported activity is greater than the reported MDC.

APPENDIX D-5

GAMMA SPECTROSCOPY RESULTS

APG R-14 Range Characterization
Gamma Spectroscopy Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
FF-SO-01	Ac-228	0.12	+/-	0.23	pCi/g	0.41	U,G	713R9	SOIL	0612167
FF-SO-01	Bi-212	0.45	+/-	0.76	pCi/g	1.3	U,G	713R9	SOIL	0612167
FF-SO-01	Bi-214	0.11	+/-	0.11	pCi/g	0.17	U,G,J	713R9	SOIL	0612167
FF-SO-01	Cs-137	0.005	+/-	0.053	pCi/g	0.1	U,G	713R9	SOIL	0612167
FF-SO-01	K-40	1.7	+/-	1.1	pCi/g	1.5	G	713R9	SOIL	0612167
FF-SO-01	Pa-234m	2.2	+/-	5.7	pCi/g	10.4	U,G	713R9	SOIL	0612167
FF-SO-01	Pb-212	0.062	+/-	0.08	pCi/g	0.132	U,G	713R9	SOIL	0612167
FF-SO-01	Pb-214	0.05	+/-	0.11	pCi/g	0.19	U,G,J	713R9	SOIL	0612167
FF-SO-01	Th-234	1.8	+/-	2.8	pCi/g	4.6	U,G	713R9	SOIL	0612167
FF-SO-01	U-235	0.16	+/-	0.29	pCi/g	0.49	U,G	713R9	SOIL	0612167
FF-SO-02	Ac-228	-0.03	+/-	0.18	pCi/g	0.35	U	713R9	SOIL	0612167
FF-SO-02	Bi-212	0.05	+/-	0.68	pCi/g	1.28	U	713R9	SOIL	0612167
FF-SO-02	Bi-214	0.06	+/-	0.11	pCi/g	0.18	U,J	713R9	SOIL	0612167
FF-SO-02	Cs-137	-0.051	+/-	0.045	pCi/g	0.101	U	713R9	SOIL	0612167
FF-SO-02	K-40	0.42	+/-	0.72	pCi/g	1.24	U	713R9	SOIL	0612167
FF-SO-02	Pa-234m	4.5	+/-	5.6	pCi/g	9.1	U	713R9	SOIL	0612167
FF-SO-02	Pb-212	0.055	+/-	0.062	pCi/g	0.1	U	713R9	SOIL	0612167
FF-SO-02	Pb-214	0.059	+/-	0.07	pCi/g	0.113	U,J	713R9	SOIL	0612167
FF-SO-02	Th-234	0.2	+/-	2.6	pCi/g	4.6	U	713R9	SOIL	0612167
FF-SO-02	U-235	-0.13	+/-	0.24	pCi/g	0.46	U	713R9	SOIL	0612167
FF-SO-03	Ac-228	0.32	+/-	0.32	pCi/g	0.49	U,G	713R9	SOIL	0612167
FF-SO-03	Bi-212	-0.08	+/-	0.92	pCi/g	1.77	U,G	713R9	SOIL	0612167
FF-SO-03	Bi-214	0.48	+/-	0.22	pCi/g	0.29	G,J	713R9	SOIL	0612167
FF-SO-03	Cs-137	0.006	+/-	0.062	pCi/g	0.117	U,G	713R9	SOIL	0612167
FF-SO-03	K-40	4.9	+/-	1.7	pCi/g	1.8	G	713R9	SOIL	0612167
FF-SO-03	Pa-234m	-3.8	+/-	6	pCi/g	13.7	U,G	713R9	SOIL	0612167
FF-SO-03	Pb-212	0.48	+/-	0.17	pCi/g	0.2	G	713R9	SOIL	0612167
FF-SO-03	Pb-214	0.39	+/-	0.19	pCi/g	0.25	G,J	713R9	SOIL	0612167
FF-SO-03	Th-234	-0.6	+/-	3.5	pCi/g	6.4	U,G	713R9	SOIL	0612167
FF-SO-03	U-235	0.12	+/-	0.28	pCi/g	0.48	U,G	713R9	SOIL	0612167
FF-SO-04	Ac-228	0.52	+/-	0.32	pCi/g	0.68	U,G	713R9	SOIL	0612167
FF-SO-04	Bi-212	1	+/-	1.1	pCi/g	1.8	U,G	713R9	SOIL	0612167
FF-SO-04	Bi-214	0.38	+/-	0.17	pCi/g	0.25	G,J	713R9	SOIL	0612167
FF-SO-04	Cs-137	0.045	+/-	0.064	pCi/g	0.106	U,G	713R9	SOIL	0612167
FF-SO-04	K-40	4.8	+/-	1.6	pCi/g	1.6	G	713R9	SOIL	0612167
FF-SO-04	Pa-234m	-2.1	+/-	9.1	pCi/g	17.4	U,G	713R9	SOIL	0612167
FF-SO-04	Pb-212	0.53	+/-	0.16	pCi/g	0.2	G	713R9	SOIL	0612167
FF-SO-04	Pb-214	0.46	+/-	0.14	pCi/g	0.21	G,J	713R9	SOIL	0612167
FF-SO-04	Th-234	1.8	+/-	2.5	pCi/g	4.2	U,G	713R9	SOIL	0612167

APG R-14 Range Characterization
Gamma Spectroscopy Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
FF-SO-04	U-235	-0.47	+/-	0.38	pCi/g	0.71	U,G	713R9	SOIL	0612167
FF-SO-05	Ac-228	1.07	+/-	0.35	pCi/g	0.55	G	713R9	SOIL	0612167
FF-SO-05	Bi-212	1.7	+/-	1.2	pCi/g	1.8	U,G	713R9	SOIL	0612167
FF-SO-05	Bi-214	1.16	+/-	0.3	pCi/g	0.37	G,J	713R9	SOIL	0612167
FF-SO-05	Cs-137	0.48	+/-	0.15	pCi/g	0.16	G	713R9	SOIL	0612167
FF-SO-05	K-40	9.5	+/-	2.3	pCi/g	1.6	G	713R9	SOIL	0612167
FF-SO-05	Pa-234m	3.4	+/-	8.4	pCi/g	14.9	U,G	713R9	SOIL	0612167
FF-SO-05	Pb-212	1.29	+/-	0.28	pCi/g	0.29	G	713R9	SOIL	0612167
FF-SO-05	Pb-214	1.38	+/-	0.27	pCi/g	0.26	G,J	713R9	SOIL	0612167
FF-SO-05	Th-234	1.4	+/-	3.8	pCi/g	6.6	U,G	713R9	SOIL	0612167
FF-SO-05	U-235	0.23	+/-	0.42	pCi/g	0.7	U,G	713R9	SOIL	0612167
FF-SO-06	Ac-228	1.15	+/-	0.24	pCi/g	0.35	G	713R9	SOIL	0612167
FF-SO-06	Bi-212	1.29	+/-	0.77	pCi/g	1.13	G	713R9	SOIL	0612167
FF-SO-06	Bi-214	1.26	+/-	0.22	pCi/g	0.18	G,J	713R9	SOIL	0612167
FF-SO-06	Cs-137	0.302	+/-	0.083	pCi/g	0.09	G	713R9	SOIL	0612167
FF-SO-06	K-40	10.6	+/-	1.9	pCi/g	1.2	G	713R9	SOIL	0612167
FF-SO-06	Pa-234m	1.5	+/-	6.2	pCi/g	10.8	U,G	713R9	SOIL	0612167
FF-SO-06	Pb-212	1.29	+/-	0.2	pCi/g	0.12	G	713R9	SOIL	0612167
FF-SO-06	Pb-214	1.25	+/-	0.2	pCi/g	0.19	G,J	713R9	SOIL	0612167
FF-SO-06	Th-234	4.3	+/-	4.9	pCi/g	8	U,G	713R9	SOIL	0612167
FF-SO-06	U-235	0.1	+/-	0.34	pCi/g	0.57	U,G	713R9	SOIL	0612167
FF-SO-07	Ac-228	1.32	+/-	0.33	pCi/g	0.55	G	713R9	SOIL	0612167
FF-SO-07	Bi-212	1.14	+/-	0.86	pCi/g	1.3	U,G	713R9	SOIL	0612167
FF-SO-07	Bi-214	1.18	+/-	0.25	pCi/g	0.26	G,J	713R9	SOIL	0612167
FF-SO-07	Cs-137	0.53	+/-	0.12	pCi/g	0.11	G	713R9	SOIL	0612167
FF-SO-07	K-40	13.1	+/-	2.5	pCi/g	1.8	G	713R9	SOIL	0612167
FF-SO-07	Pa-234m	6.8	+/-	9	pCi/g	14.9	U,G	713R9	SOIL	0612167
FF-SO-07	Pb-212	1.46	+/-	0.24	pCi/g	0.18	G	713R9	SOIL	0612167
FF-SO-07	Pb-214	1.49	+/-	0.25	pCi/g	0.26	G,J	713R9	SOIL	0612167
FF-SO-07	Th-234	2.2	+/-	4.3	pCi/g	7.1	U,G	713R9	SOIL	0612167
FF-SO-07	U-235	0.44	+/-	0.41	pCi/g	0.67	U,G	713R9	SOIL	0612167
FF-SO-08	Ac-228	1.29	+/-	0.36	pCi/g	0.51	G	713R9	SOIL	0612167
FF-SO-08	Bi-212	0.8	+/-	1	pCi/g	1.7	U,G	713R9	SOIL	0612167
FF-SO-08	Bi-214	0.86	+/-	0.27	pCi/g	0.29	G,J	713R9	SOIL	0612167
FF-SO-08	Cs-137	0.217	+/-	0.093	pCi/g	0.107	G	713R9	SOIL	0612167
FF-SO-08	K-40	7	+/-	1.9	pCi/g	1.5	G	713R9	SOIL	0612167
FF-SO-08	Pa-234m	6.3	+/-	9	pCi/g	14.9	U,G	713R9	SOIL	0612167
FF-SO-08	Pb-212	1.13	+/-	0.24	pCi/g	0.23	G	713R9	SOIL	0612167
FF-SO-08	Pb-214	1.01	+/-	0.23	pCi/g	0.29	G,J	713R9	SOIL	0612167

APG R-14 Range Characterization
Gamma Spectroscopy Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
FF-SO-08	Th-234	3.9	+/-	4.2	pCi/g	6.8	U,G	713R9	SOIL	0612167
FF-SO-08	U-235	0.18	+/-	0.38	pCi/g	0.63	U,G	713R9	SOIL	0612167
FF-SO-09	Ac-228	0.5	+/-	0.34	pCi/g	0.47	G,TI	713R9	SOIL	0612167
FF-SO-09	Bi-212	1.2	+/-	1.2	pCi/g	2	U,G	713R9	SOIL	0612167
FF-SO-09	Bi-214	0.42	+/-	0.23	pCi/g	0.34	G,J	713R9	SOIL	0612167
FF-SO-09	Cs-137	0.012	+/-	0.098	pCi/g	0.175	U,G	713R9	SOIL	0612167
FF-SO-09	K-40	4.3	+/-	1.9	pCi/g	2.4	G	713R9	SOIL	0612167
FF-SO-09	Pa-234m	10.4	+/-	9.2	pCi/g	13.7	U,G	713R9	SOIL	0612167
FF-SO-09	Pb-212	0.52	+/-	0.18	pCi/g	0.24	G	713R9	SOIL	0612167
FF-SO-09	Pb-214	0.57	+/-	0.18	pCi/g	0.29	G,J	713R9	SOIL	0612167
FF-SO-09	Th-234	1.4	+/-	4.4	pCi/g	7.5	U,G	713R9	SOIL	0612167
FF-SO-09	U-235	-0.27	+/-	0.45	pCi/g	0.82	U,G	713R9	SOIL	0612167
FF-SO-10	Ac-228	1.03	+/-	0.33	pCi/g	0.54	G	713R9	SOIL	0612167
FF-SO-10	Bi-212	1.5	+/-	1.2	pCi/g	1.8	U,G	713R9	SOIL	0612167
FF-SO-10	Bi-214	1.09	+/-	0.27	pCi/g	0.3	G,J	713R9	SOIL	0612167
FF-SO-10	Cs-137	0.21	+/-	0.11	pCi/g	0.14	G	713R9	SOIL	0612167
FF-SO-10	K-40	7.1	+/-	1.9	pCi/g	1.4	G	713R9	SOIL	0612167
FF-SO-10	Pa-234m	3	+/-	8.9	pCi/g	15.8	U,G	713R9	SOIL	0612167
FF-SO-10	Pb-212	1.03	+/-	0.23	pCi/g	0.21	G	713R9	SOIL	0612167
FF-SO-10	Pb-214	0.93	+/-	0.22	pCi/g	0.28	G,J	713R9	SOIL	0612167
FF-SO-10	Th-234	1.8	+/-	3.3	pCi/g	5.5	U,G	713R9	SOIL	0612167
FF-SO-10	U-235	0.38	+/-	0.38	pCi/g	0.61	U,G	713R9	SOIL	0612167
FF-SO-11	Ac-228	1.07	+/-	0.37	pCi/g	0.6	G	713R9	SOIL	0612167
FF-SO-11	Bi-212	-0.5	+/-	1.3	pCi/g	2.5	U,G	713R9	SOIL	0612167
FF-SO-11	Bi-214	0.96	+/-	0.28	pCi/g	0.34	G,J	713R9	SOIL	0612167
FF-SO-11	Cs-137	0.61	+/-	0.17	pCi/g	0.17	G	713R9	SOIL	0612167
FF-SO-11	K-40	8.7	+/-	2.3	pCi/g	1.9	G	713R9	SOIL	0612167
FF-SO-11	Pa-234m	4	+/-	11	pCi/g	19	U,G	713R9	SOIL	0612167
FF-SO-11	Pb-212	1.25	+/-	0.26	pCi/g	0.24	G	713R9	SOIL	0612167
FF-SO-11	Pb-214	1.25	+/-	0.26	pCi/g	0.28	G,J	713R9	SOIL	0612167
FF-SO-11	Th-234	2.5	+/-	1.3	pCi/g	1.9	LT,G	713R9	SOIL	0612167
FF-SO-11	U-235	0.34	+/-	0.39	pCi/g	0.63	U,G	713R9	SOIL	0612167
FF-SO-12	Ac-228	0.23	+/-	0.14	pCi/g	0.25	U,G	713R9	SOIL	0612167
FF-SO-12	Bi-212	0.53	+/-	0.67	pCi/g	1.1	U,G	713R9	SOIL	0612167
FF-SO-12	Bi-214	0.24	+/-	0.12	pCi/g	0.17	G,J	713R9	SOIL	0612167
FF-SO-12	Cs-137	0.003	+/-	0.052	pCi/g	0.094	U,G	713R9	SOIL	0612167
FF-SO-12	K-40	2.71	+/-	0.95	pCi/g	1.04	G	713R9	SOIL	0612167
FF-SO-12	Pa-234m	1.3	+/-	5.9	pCi/g	10.5	U,G	713R9	SOIL	0612167
FF-SO-12	Pb-212	0.338	+/-	0.099	pCi/g	0.118	G	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
FF-SO-12	Pb-214	0.264	+/-	0.096	pCi/g	0.146	G,J	713R9	SOIL	0612167
FF-SO-12	Th-234	2.9	+/-	4.3	pCi/g	7.1	U,G	713R9	SOIL	0612167
FF-SO-12	U-235	-0.2	+/-	0.24	pCi/g	0.44	U,G	713R9	SOIL	0612167
FF-SO-13	Ac-228	1.16	+/-	0.39	pCi/g	0.52	G	713R9	SOIL	0612167
FF-SO-13	Bi-212	1.5	+/-	1.5	pCi/g	2.3	U,G	713R9	SOIL	0612167
FF-SO-13	Bi-214	0.73	+/-	0.27	pCi/g	0.33	G,J	713R9	SOIL	0612167
FF-SO-13	Cs-137	0.12	+/-	0.098	pCi/g	0.149	U,G	713R9	SOIL	0612167
FF-SO-13	K-40	7.9	+/-	2.1	pCi/g	1.6	G	713R9	SOIL	0612167
FF-SO-13	Pa-234m	-1.9	+/-	9.3	pCi/g	18.2	U,G	713R9	SOIL	0612167
FF-SO-13	Pb-212	1.28	+/-	0.28	pCi/g	0.26	G	713R9	SOIL	0612167
FF-SO-13	Pb-214	1.1	+/-	0.25	pCi/g	0.31	G,J	713R9	SOIL	0612167
FF-SO-13	Th-234	-1	+/-	4.2	pCi/g	7.6	U,G	713R9	SOIL	0612167
FF-SO-13	U-235	0.21	+/-	0.4	pCi/g	0.68	U,G	713R9	SOIL	0612167
FF-SO-14	Ac-228	0.22	+/-	0.37	pCi/g	0.62	U,G	713R9	SOIL	0612167
FF-SO-14	Bi-212	-0.4	+/-	1.1	pCi/g	2.2	U,G	713R9	SOIL	0612167
FF-SO-14	Bi-214	0.31	+/-	0.24	pCi/g	0.37	U,G,J	713R9	SOIL	0612167
FF-SO-14	Cs-137	0	+/-	0.11	pCi/g	0.2	U,G	713R9	SOIL	0612167
FF-SO-14	K-40	3.6	+/-	1.7	pCi/g	2	G	713R9	SOIL	0612167
FF-SO-14	Pa-234m	-1.9	+/-	8.5	pCi/g	17.8	U,G	713R9	SOIL	0612167
FF-SO-14	Pb-212	0.52	+/-	0.18	pCi/g	0.22	G	713R9	SOIL	0612167
FF-SO-14	Pb-214	0.44	+/-	0.17	pCi/g	0.27	G,J	713R9	SOIL	0612167
FF-SO-14	Th-234	1.2	+/-	1	pCi/g	1.6	U,G	713R9	SOIL	0612167
FF-SO-14	U-235	0	+/-	0.39	pCi/g	0.7	U,G	713R9	SOIL	0612167
FF-SO-15	Ac-228	0.28	+/-	0.17	pCi/g	0.33	U,G	713R9	SOIL	0612167
FF-SO-15	Bi-212	0.33	+/-	0.67	pCi/g	1.14	U,G	713R9	SOIL	0612167
FF-SO-15	Bi-214	0.26	+/-	0.12	pCi/g	0.15	G,J	713R9	SOIL	0612167
FF-SO-15	Cs-137	0	+/-	0.05	pCi/g	0.09	U,G	713R9	SOIL	0612167
FF-SO-15	K-40	2.11	+/-	0.89	pCi/g	1.12	G	713R9	SOIL	0612167
FF-SO-15	Pa-234m	0.1	+/-	4.5	pCi/g	8.5	U,G	713R9	SOIL	0612167
FF-SO-15	Pb-212	0.338	+/-	0.092	pCi/g	0.101	G	713R9	SOIL	0612167
FF-SO-15	Pb-214	0.216	+/-	0.09	pCi/g	0.146	G,J	713R9	SOIL	0612167
FF-SO-15	Th-234	-1.3	+/-	4.3	pCi/g	7.6	U,G	713R9	SOIL	0612167
FF-SO-15	U-235	0.07	+/-	0.27	pCi/g	0.46	U,G	713R9	SOIL	0612167
FF-SO-DUP1	Ac-228	0.58	+/-	0.27	pCi/g	0.44	G	713R9	SOIL	0612167
FF-SO-DUP1	Bi-212	0.6	+/-	1.1	pCi/g	1.8	U,G	713R9	SOIL	0612167
FF-SO-DUP1	Bi-214	0.36	+/-	0.2	pCi/g	0.29	G,J	713R9	SOIL	0612167
FF-SO-DUP1	Cs-137	-0.025	+/-	0.063	pCi/g	0.123	U,G	713R9	SOIL	0612167
FF-SO-DUP1	K-40	8	+/-	2	pCi/g	1.7	G	713R9	SOIL	0612167
FF-SO-DUP1	Pa-234m	4.1	+/-	8.4	pCi/g	14.5	U,G	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
FF-SO-DUP1	Pb-212	0.58	+/-	0.16	pCi/g	0.19	G	713R9	SOIL	0612167
FF-SO-DUP1	Pb-214	0.53	+/-	0.16	pCi/g	0.23	G,J	713R9	SOIL	0612167
FF-SO-DUP1	Th-234	2.1	+/-	3.8	pCi/g	6.4	U,G	713R9	SOIL	0612167
FF-SO-DUP1	U-235	0.12	+/-	0.35	pCi/g	0.6	U,G	713R9	SOIL	0612167
FF-SO-DUP2	Ac-228	0.96	+/-	0.37	pCi/g	0.77	G	713R9	SOIL	0612167
FF-SO-DUP2	Bi-212	3	+/-	1.5	pCi/g	1.7	G,TI	713R9	SOIL	0612167
FF-SO-DUP2	Bi-214	1.12	+/-	0.35	pCi/g	0.38	G,J	713R9	SOIL	0612167
FF-SO-DUP2	Cs-137	0.1	+/-	0.12	pCi/g	0.19	U,G	713R9	SOIL	0612167
FF-SO-DUP2	K-40	8.5	+/-	2.6	pCi/g	2.4	G	713R9	SOIL	0612167
FF-SO-DUP2	Pa-234m	10	+/-	13	pCi/g	20	U,G	713R9	SOIL	0612167
FF-SO-DUP2	Pb-212	1.04	+/-	0.28	pCi/g	0.31	G	713R9	SOIL	0612167
FF-SO-DUP2	Pb-214	1.07	+/-	0.27	pCi/g	0.35	G,J	713R9	SOIL	0612167
FF-SO-DUP2	Th-234	1.8	+/-	1.6	pCi/g	2.5	U,G	713R9	SOIL	0612167
FF-SO-DUP2	U-235	0.12	+/-	0.46	pCi/g	0.8	U,G	713R9	SOIL	0612167
GF-SO-01	Ac-228	1.5	+/-	0.38	pCi/g	0.6	G	713R9	SOIL	0612138
GF-SO-01	Bi-212	1.7	+/-	1.3	pCi/g	2.1	U,G	713R9	SOIL	0612138
GF-SO-01	Bi-214	1.24	+/-	0.29	pCi/g	0.29	G,J	713R9	SOIL	0612138
GF-SO-01	Cs-137	0.23	+/-	0.12	pCi/g	0.16	G	713R9	SOIL	0612138
GF-SO-01	K-40	11.7	+/-	2.6	pCi/g	2	G	713R9	SOIL	0612138
GF-SO-01	Pa-234m	21	+/-	11	pCi/g	14	G	713R9	SOIL	0612138
GF-SO-01	Pb-212	1.53	+/-	0.28	pCi/g	0.22	G	713R9	SOIL	0612138
GF-SO-01	Pb-214	1.34	+/-	0.26	pCi/g	0.28	G,J	713R9	SOIL	0612138
GF-SO-01	Th-234	18.2	+/-	5.9	pCi/g	7.8	G	713R9	SOIL	0612138
GF-SO-01	U-235	-0.08	+/-	0.57	pCi/g	0.99	U,G	713R9	SOIL	0612138
GF-SO-02	Ac-228	1.03	+/-	0.44	pCi/g	0.71	G,TI	713R9	SOIL	0612138
GF-SO-02	Bi-212	1.9	+/-	1.8	pCi/g	2.9	U,G	713R9	SOIL	0612138
GF-SO-02	Bi-214	1.09	+/-	0.36	pCi/g	0.39	G,J,TI	713R9	SOIL	0612138
GF-SO-02	Cs-137	0.2	+/-	0.14	pCi/g	0.2	U,G	713R9	SOIL	0612138
GF-SO-02	K-40	8.9	+/-	2.8	pCi/g	2.8	G	713R9	SOIL	0612138
GF-SO-02	Pa-234m	35	+/-	16	pCi/g	18	G	713R9	SOIL	0612138
GF-SO-02	Pb-212	1.26	+/-	0.31	pCi/g	0.32	G	713R9	SOIL	0612138
GF-SO-02	Pb-214	1.03	+/-	0.29	pCi/g	0.39	G,J	713R9	SOIL	0612138
GF-SO-02	Th-234	25.5	+/-	8.2	pCi/g	10.3	M3,G	713R9	SOIL	0612138
GF-SO-02	U-235	-0.33	+/-	0.73	pCi/g	1.31	U,G	713R9	SOIL	0612138
GF-SO-03	Ac-228	0.51	+/-	0.36	pCi/g	0.73	U,G	713R9	SOIL	0612138
GF-SO-03	Bi-212	0	+/-	1.9	pCi/g	3.4	U,G	713R9	SOIL	0612138
GF-SO-03	Bi-214	0.48	+/-	0.25	pCi/g	0.33	G,J,TI	713R9	SOIL	0612138
GF-SO-03	Cs-137	0.21	+/-	0.12	pCi/g	0.16	G	713R9	SOIL	0612138
GF-SO-03	K-40	5.2	+/-	2.2	pCi/g	2.4	G	713R9	SOIL	0612138

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
GF-SO-03	Pa-234m	36	+/-	18	pCi/g	22	G	713R9	SOIL	0612138
GF-SO-03	Pb-212	0.79	+/-	0.23	pCi/g	0.25	G	713R9	SOIL	0612138
GF-SO-03	Pb-214	0.73	+/-	0.23	pCi/g	0.33	G,J	713R9	SOIL	0612138
GF-SO-03	Th-234	36	+/-	12	pCi/g	15	M3,G	713R9	SOIL	0612138
GF-SO-03	U-235	-0.44	+/-	0.72	pCi/g	1.31	U,G	713R9	SOIL	0612138
GF-SO-04	Ac-228	1.14	+/-	0.36	pCi/g	0.55	G	713R9	SOIL	0612138
GF-SO-04	Bi-212	0.9	+/-	1.3	pCi/g	2.2	U,G	713R9	SOIL	0612138
GF-SO-04	Bi-214	0.95	+/-	0.32	pCi/g	0.38	G,J,TI	713R9	SOIL	0612138
GF-SO-04	Cs-137	0.24	+/-	0.11	pCi/g	0.14	G	713R9	SOIL	0612138
GF-SO-04	K-40	7.7	+/-	2.3	pCi/g	2.2	G	713R9	SOIL	0612138
GF-SO-04	Pa-234m	0	+/-	10	pCi/g	19.6	U,G	713R9	SOIL	0612138
GF-SO-04	Pb-212	1.19	+/-	0.28	pCi/g	0.28	G	713R9	SOIL	0612138
GF-SO-04	Pb-214	1.15	+/-	0.26	pCi/g	0.3	G,J	713R9	SOIL	0612138
GF-SO-04	Th-234	4.3	+/-	4.5	pCi/g	7.3	U,G	713R9	SOIL	0612138
GF-SO-04	U-235	0	+/-	0.45	pCi/g	0.8	U,G	713R9	SOIL	0612138
GF-SO-05	Ac-228	1.21	+/-	0.45	pCi/g	0.77	G	713R9	SOIL	0612138
GF-SO-05	Bi-212	2.3	+/-	1.8	pCi/g	2.6	U,G	713R9	SOIL	0612138
GF-SO-05	Bi-214	0.91	+/-	0.33	pCi/g	0.34	G,J,TI	713R9	SOIL	0612138
GF-SO-05	Cs-137	0.49	+/-	0.2	pCi/g	0.25	G	713R9	SOIL	0612138
GF-SO-05	K-40	10.6	+/-	3.2	pCi/g	2.9	G	713R9	SOIL	0612138
GF-SO-05	Pa-234m	76	+/-	26	pCi/g	24	G	713R9	SOIL	0612138
GF-SO-05	Pb-212	1.54	+/-	0.34	pCi/g	0.27	G	713R9	SOIL	0612138
GF-SO-05	Pb-214	1.12	+/-	0.29	pCi/g	0.37	G,J	713R9	SOIL	0612138
GF-SO-05	Th-234	70	+/-	19	pCi/g	21	M3,G	713R9	SOIL	0612138
GF-SO-05	U-235	0.64	+/-	0.9	pCi/g	1.48	U,G	713R9	SOIL	0612138
GF-SO-06	Ac-228	1.04	+/-	0.3	pCi/g	0.54	G	713R9	SOIL	0612138
GF-SO-06	Bi-212	1.9	+/-	1.1	pCi/g	1.5	G	713R9	SOIL	0612138
GF-SO-06	Bi-214	0.89	+/-	0.24	pCi/g	0.29	G,J	713R9	SOIL	0612138
GF-SO-06	Cs-137	0.54	+/-	0.13	pCi/g	0.11	G	713R9	SOIL	0612138
GF-SO-06	K-40	8.7	+/-	1.9	pCi/g	1.5	G	713R9	SOIL	0612138
GF-SO-06	Pa-234m	-2.1	+/-	7.5	pCi/g	14.4	U,G	713R9	SOIL	0612138
GF-SO-06	Pb-212	1.36	+/-	0.24	pCi/g	0.2	G	713R9	SOIL	0612138
GF-SO-06	Pb-214	1.21	+/-	0.23	pCi/g	0.23	G,J	713R9	SOIL	0612138
GF-SO-06	Th-234	0.6	+/-	3.5	pCi/g	6.1	U,G	713R9	SOIL	0612138
GF-SO-06	U-235	0.21	+/-	0.35	pCi/g	0.58	U,G	713R9	SOIL	0612138
GF-SO-07	Ac-228	0.98	+/-	0.22	pCi/g	0.35	G	713R9	SOIL	0612138
GF-SO-07	Bi-212	0.53	+/-	0.54	pCi/g	0.86	U,G	713R9	SOIL	0612138
GF-SO-07	Bi-214	0.9	+/-	0.18	pCi/g	0.21	G,J	713R9	SOIL	0612138
GF-SO-07	Cs-137	0.48	+/-	0.1	pCi/g	0.08	G	713R9	SOIL	0612138

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
GF-SO-07	K-40	10.5	+/-	1.9	pCi/g	1.2	G	713R9	SOIL	0612138
GF-SO-07	Pa-234m	2.4	+/-	5.7	pCi/g	9.8	U,G	713R9	SOIL	0612138
GF-SO-07	Pb-212	1.28	+/-	0.2	pCi/g	0.13	G	713R9	SOIL	0612138
GF-SO-07	Pb-214	1.14	+/-	0.19	pCi/g	0.18	G,J	713R9	SOIL	0612138
GF-SO-07	Th-234	4.4	+/-	4	pCi/g	6.5	U,G	713R9	SOIL	0612138
GF-SO-07	U-235	0.15	+/-	0.33	pCi/g	0.55	U,G	713R9	SOIL	0612138
GF-SO-08	Ac-228	1.39	+/-	0.46	pCi/g	0.73	G	713R9	SOIL	0612138
GF-SO-08	Bi-212	2.1	+/-	1.8	pCi/g	2.6	U,G	713R9	SOIL	0612138
GF-SO-08	Bi-214	1.15	+/-	0.42	pCi/g	0.5	G,J,TI	713R9	SOIL	0612138
GF-SO-08	Cs-137	0.4	+/-	0.18	pCi/g	0.22	G	713R9	SOIL	0612138
GF-SO-08	K-40	8.1	+/-	3.1	pCi/g	3.5	G	713R9	SOIL	0612138
GF-SO-08	Pa-234m	21	+/-	19	pCi/g	28	U,G	713R9	SOIL	0612138
GF-SO-08	Pb-212	1.37	+/-	0.36	pCi/g	0.39	G	713R9	SOIL	0612138
GF-SO-08	Pb-214	1.39	+/-	0.35	pCi/g	0.43	G,J	713R9	SOIL	0612138
GF-SO-08	Th-234	21.6	+/-	8.7	pCi/g	11.8	M3,G	713R9	SOIL	0612138
GF-SO-08	U-235	0.58	+/-	0.78	pCi/g	1.28	U,G	713R9	SOIL	0612138
GF-SO-09	Ac-228	0.99	+/-	0.28	pCi/g	0.5	G	713R9	SOIL	0612138
GF-SO-09	Bi-212	1.2	+/-	1.2	pCi/g	1.9	U,G	713R9	SOIL	0612138
GF-SO-09	Bi-214	1.17	+/-	0.25	pCi/g	0.29	G,J	713R9	SOIL	0612138
GF-SO-09	Cs-137	0.55	+/-	0.13	pCi/g	0.12	G	713R9	SOIL	0612138
GF-SO-09	K-40	8.4	+/-	2	pCi/g	2.1	G	713R9	SOIL	0612138
GF-SO-09	Pa-234m	8	+/-	8.6	pCi/g	13.8	U,G	713R9	SOIL	0612138
GF-SO-09	Pb-212	1.37	+/-	0.24	pCi/g	0.21	G	713R9	SOIL	0612138
GF-SO-09	Pb-214	1.36	+/-	0.23	pCi/g	0.24	G,J	713R9	SOIL	0612138
GF-SO-09	Th-234	7.9	+/-	4.6	pCi/g	7.1	LT,G	713R9	SOIL	0612138
GF-SO-09	U-235	0.38	+/-	0.44	pCi/g	0.73	U,G	713R9	SOIL	0612138
GF-SO-10	Ac-228	1.24	+/-	0.39	pCi/g	0.6	G	713R9	SOIL	0612138
GF-SO-10	Bi-212	0.9	+/-	1.2	pCi/g	2	U,G	713R9	SOIL	0612138
GF-SO-10	Bi-214	1.14	+/-	0.32	pCi/g	0.32	G,J	713R9	SOIL	0612138
GF-SO-10	Cs-137	0.38	+/-	0.15	pCi/g	0.17	G	713R9	SOIL	0612138
GF-SO-10	K-40	8	+/-	2.4	pCi/g	2.4	G	713R9	SOIL	0612138
GF-SO-10	Pa-234m	-2.1	+/-	10	pCi/g	20.5	U,G	713R9	SOIL	0612138
GF-SO-10	Pb-212	1.49	+/-	0.31	pCi/g	0.27	G	713R9	SOIL	0612138
GF-SO-10	Pb-214	1.07	+/-	0.26	pCi/g	0.3	G,J	713R9	SOIL	0612138
GF-SO-10	Th-234	4.5	+/-	4	pCi/g	6.2	U,G	713R9	SOIL	0612138
GF-SO-10	U-235	0.09	+/-	0.44	pCi/g	0.77	U,G	713R9	SOIL	0612138
GF-SO-11	Ac-228	1.14	+/-	0.29	pCi/g	0.45	G	713R9	SOIL	0612138
GF-SO-11	Bi-212	1.44	+/-	0.92	pCi/g	1.32	G	713R9	SOIL	0612138
GF-SO-11	Bi-214	1.14	+/-	0.24	pCi/g	0.23	G,J	713R9	SOIL	0612138

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
GF-SO-11	Cs-137	0.38	+/-	0.11	pCi/g	0.12	G	713R9	SOIL	0612138
GF-SO-11	K-40	11.1	+/-	2.2	pCi/g	1.3	G	713R9	SOIL	0612138
GF-SO-11	Pa-234m	6	+/-	8.7	pCi/g	14.4	U,G	713R9	SOIL	0612138
GF-SO-11	Pb-212	1.55	+/-	0.26	pCi/g	0.17	G	713R9	SOIL	0612138
GF-SO-11	Pb-214	1	+/-	0.2	pCi/g	0.22	G,J	713R9	SOIL	0612138
GF-SO-11	Th-234	3.5	+/-	3.7	pCi/g	6	U,G	713R9	SOIL	0612138
GF-SO-11	U-235	0.05	+/-	0.34	pCi/g	0.58	U,G	713R9	SOIL	0612138
GF-SO-12	Ac-228	0.93	+/-	0.24	pCi/g	0.38	G	713R9	SOIL	0612138
GF-SO-12	Bi-212	0.8	+/-	0.95	pCi/g	1.55	U,G	713R9	SOIL	0612138
GF-SO-12	Bi-214	1.04	+/-	0.21	pCi/g	0.22	G,J	713R9	SOIL	0612138
GF-SO-12	Cs-137	0.5	+/-	0.11	pCi/g	0.09	G	713R9	SOIL	0612138
GF-SO-12	K-40	10.4	+/-	2	pCi/g	1.4	G	713R9	SOIL	0612138
GF-SO-12	Pa-234m	6.6	+/-	6.6	pCi/g	10.5	U,G	713R9	SOIL	0612138
GF-SO-12	Pb-212	1.3	+/-	0.21	pCi/g	0.16	G	713R9	SOIL	0612138
GF-SO-12	Pb-214	1.17	+/-	0.2	pCi/g	0.2	G,J	713R9	SOIL	0612138
GF-SO-12	Th-234	9.1	+/-	5.3	pCi/g	8	G	713R9	SOIL	0612138
GF-SO-12	U-235	0.17	+/-	0.39	pCi/g	0.64	U,G	713R9	SOIL	0612138
GF-SO-13	Ac-228	1.14	+/-	0.34	pCi/g	0.59	G	713R9	SOIL	0612138
GF-SO-13	Bi-212	1.2	+/-	1.2	pCi/g	1.9	U,G	713R9	SOIL	0612138
GF-SO-13	Bi-214	0.97	+/-	0.25	pCi/g	0.27	G,J	713R9	SOIL	0612138
GF-SO-13	Cs-137	0.49	+/-	0.14	pCi/g	0.16	G	713R9	SOIL	0612138
GF-SO-13	K-40	11.3	+/-	2.5	pCi/g	2.2	G	713R9	SOIL	0612138
GF-SO-13	Pa-234m	0.7	+/-	8.2	pCi/g	15.1	U,G	713R9	SOIL	0612138
GF-SO-13	Pb-212	1.73	+/-	0.29	pCi/g	0.22	G	713R9	SOIL	0612138
GF-SO-13	Pb-214	1.21	+/-	0.24	pCi/g	0.29	G,J	713R9	SOIL	0612138
GF-SO-13	Th-234	2	+/-	4	pCi/g	6.8	U,G	713R9	SOIL	0612138
GF-SO-13	U-235	-0.26	+/-	0.47	pCi/g	0.84	U,G	713R9	SOIL	0612138
GF-SO-14	Ac-228	1.28	+/-	0.4	pCi/g	0.65	G	713R9	SOIL	0612138
GF-SO-14	Bi-212	0.1	+/-	1.3	pCi/g	2.4	U,G	713R9	SOIL	0612138
GF-SO-14	Bi-214	1.07	+/-	0.32	pCi/g	0.32	G,J,TI	713R9	SOIL	0612138
GF-SO-14	Cs-137	0.56	+/-	0.17	pCi/g	0.15	G	713R9	SOIL	0612138
GF-SO-14	K-40	9.3	+/-	2.5	pCi/g	2.2	G	713R9	SOIL	0612138
GF-SO-14	Pa-234m	-7	+/-	11	pCi/g	23	U,G	713R9	SOIL	0612138
GF-SO-14	Pb-212	1.26	+/-	0.3	pCi/g	0.31	G	713R9	SOIL	0612138
GF-SO-14	Pb-214	1.11	+/-	0.27	pCi/g	0.33	G,J	713R9	SOIL	0612138
GF-SO-14	Th-234	6.3	+/-	5.1	pCi/g	7.9	U,G	713R9	SOIL	0612138
GF-SO-14	U-235	0.29	+/-	0.47	pCi/g	0.79	U,G	713R9	SOIL	0612138
GF-SO-15	Ac-228	1.07	+/-	0.23	pCi/g	0.33	G	713R9	SOIL	0612138
GF-SO-15	Bi-212	1.1	+/-	0.65	pCi/g	0.93	G	713R9	SOIL	0612138

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
GF-SO-15	Bi-214	0.98	+/-	0.18	pCi/g	0.18	G,J	713R9	SOIL	0612138
GF-SO-15	Cs-137	0.56	+/-	0.11	pCi/g	0.09	G	713R9	SOIL	0612138
GF-SO-15	K-40	9.9	+/-	1.8	pCi/g	1.2	G	713R9	SOIL	0612138
GF-SO-15	Pa-234m	4.3	+/-	5.3	pCi/g	8.7	U,G	713R9	SOIL	0612138
GF-SO-15	Pb-212	1.22	+/-	0.19	pCi/g	0.13	G	713R9	SOIL	0612138
GF-SO-15	Pb-214	1.2	+/-	0.19	pCi/g	0.17	G,J	713R9	SOIL	0612138
GF-SO-15	Th-234	4.4	+/-	4.3	pCi/g	7	U,G	713R9	SOIL	0612138
GF-SO-15	U-235	0.05	+/-	0.3	pCi/g	0.51	U,G	713R9	SOIL	0612138
GF-SO-DUP1	Ac-228	1.1	+/-	0.44	pCi/g	0.66	G,TI	713R9	SOIL	0612138
GF-SO-DUP1	Bi-212	1.2	+/-	1.5	pCi/g	2.5	U,G	713R9	SOIL	0612138
GF-SO-DUP1	Bi-214	0.75	+/-	0.33	pCi/g	0.44	G,J,TI	713R9	SOIL	0612138
GF-SO-DUP1	Cs-137	0.2	+/-	0.13	pCi/g	0.18	G	713R9	SOIL	0612138
GF-SO-DUP1	K-40	6.5	+/-	2.2	pCi/g	1.8	G	713R9	SOIL	0612138
GF-SO-DUP1	Pa-234m	61	+/-	22	pCi/g	22	G	713R9	SOIL	0612138
GF-SO-DUP1	Pb-212	0.7	+/-	0.23	pCi/g	0.27	G	713R9	SOIL	0612138
GF-SO-DUP1	Pb-214	0.72	+/-	0.23	pCi/g	0.31	G,J	713R9	SOIL	0612138
GF-SO-DUP1	Th-234	47.7	+/-	6.8	pCi/g	3.6	G	713R9	SOIL	0612138
GF-SO-DUP1	U-235	0.55	+/-	0.43	pCi/g	0.66	U,G	713R9	SOIL	0612138
GF-SO-DUP2	Ac-228	1.41	+/-	0.34	pCi/g	0.48	G	713R9	SOIL	0612138
GF-SO-DUP2	Bi-212	1.1	+/-	1.2	pCi/g	1.9	U,G	713R9	SOIL	0612138
GF-SO-DUP2	Bi-214	1.35	+/-	0.3	pCi/g	0.3	G,J	713R9	SOIL	0612138
GF-SO-DUP2	Cs-137	0.58	+/-	0.14	pCi/g	0.13	G	713R9	SOIL	0612138
GF-SO-DUP2	K-40	11.6	+/-	2.5	pCi/g	2	G	713R9	SOIL	0612138
GF-SO-DUP2	Pa-234m	10.4	+/-	9.3	pCi/g	14.3	U,G	713R9	SOIL	0612138
GF-SO-DUP2	Pb-212	1.62	+/-	0.28	pCi/g	0.22	G	713R9	SOIL	0612138
GF-SO-DUP2	Pb-214	1.37	+/-	0.25	pCi/g	0.25	G,J	713R9	SOIL	0612138
GF-SO-DUP2	Th-234	3.1	+/-	3.9	pCi/g	6.4	U,G	713R9	SOIL	0612138
GF-SO-DUP2	U-235	0.08	+/-	0.47	pCi/g	0.81	U,G	713R9	SOIL	0612138
GF-SS-01	Ac-228	1.76	+/-	0.48	pCi/g	0.65	G,TI	713R9	SOIL	0612138
GF-SS-01	Bi-212	2	+/-	1.3	pCi/g	1.8	G	713R9	SOIL	0612138
GF-SS-01	Bi-214	1.08	+/-	0.32	pCi/g	0.34	G,J	713R9	SOIL	0612138
GF-SS-01	Cs-137	0.27	+/-	0.13	pCi/g	0.17	G	713R9	SOIL	0612138
GF-SS-01	K-40	10.5	+/-	2.7	pCi/g	2.4	G	713R9	SOIL	0612138
GF-SS-01	Pa-234m	21	+/-	14	pCi/g	20	G,TI	713R9	SOIL	0612138
GF-SS-01	Pb-212	1.52	+/-	0.3	pCi/g	0.24	G	713R9	SOIL	0612138
GF-SS-01	Pb-214	1.3	+/-	0.27	pCi/g	0.29	G,J	713R9	SOIL	0612138
GF-SS-01	Th-234	14.9	+/-	6.3	pCi/g	8.9	M3,G	713R9	SOIL	0612138
GF-SS-01	U-235	0.34	+/-	0.61	pCi/g	1.01	U,G	713R9	SOIL	0612138
GF-SS-02	Ac-228	1.18	+/-	0.33	pCi/g	0.56	G	713R9	SOIL	0612138

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
GF-SS-02	Bi-212	1.31	+/-	0.95	pCi/g	1.41	U,G	713R9	SOIL	0612138
GF-SS-02	Bi-214	1.08	+/-	0.25	pCi/g	0.3	G,J	713R9	SOIL	0612138
GF-SS-02	Cs-137	0.04	+/-	0.084	pCi/g	0.143	U,G	713R9	SOIL	0612138
GF-SS-02	K-40	10.1	+/-	2.3	pCi/g	2.2	G	713R9	SOIL	0612138
GF-SS-02	Pa-234m	6.1	+/-	9.5	pCi/g	15.9	U,G	713R9	SOIL	0612138
GF-SS-02	Pb-212	1.54	+/-	0.27	pCi/g	0.2	G	713R9	SOIL	0612138
GF-SS-02	Pb-214	1.28	+/-	0.24	pCi/g	0.26	G,J	713R9	SOIL	0612138
GF-SS-02	Th-234	3	+/-	3.2	pCi/g	5.2	U,G	713R9	SOIL	0612138
GF-SS-02	U-235	0.43	+/-	0.38	pCi/g	0.6	U,G	713R9	SOIL	0612138
LD-SO-01	Ac-228	0.33	+/-	0.36	pCi/g	0.58	U,G	713R9	SOIL	0612167
LD-SO-01	Bi-212	0.3	+/-	1.3	pCi/g	2.3	U,G	713R9	SOIL	0612167
LD-SO-01	Bi-214	0.37	+/-	0.22	pCi/g	0.31	G,J	713R9	SOIL	0612167
LD-SO-01	Cs-137	0.013	+/-	0.078	pCi/g	0.143	U,G	713R9	SOIL	0612167
LD-SO-01	K-40	3.8	+/-	1.7	pCi/g	2.2	G	713R9	SOIL	0612167
LD-SO-01	Pa-234m	74	+/-	20	pCi/g	13	G	713R9	SOIL	0612167
LD-SO-01	Pb-212	0.59	+/-	0.2	pCi/g	0.27	G	713R9	SOIL	0612167
LD-SO-01	Pb-214	0.41	+/-	0.17	pCi/g	0.26	G,J	713R9	SOIL	0612167
LD-SO-01	Th-234	64	+/-	11	pCi/g	10	M3,G	713R9	SOIL	0612167
LD-SO-01	U-235	0.74	+/-	0.49	pCi/g	0.74	LT,G,TI	713R9	SOIL	0612167
LD-SO-02	Ac-228	0.34	+/-	0.31	pCi/g	0.46	U,G	713R9	SOIL	0612167
LD-SO-02	Bi-212	-0.2	+/-	0.96	pCi/g	1.91	U,G	713R9	SOIL	0612167
LD-SO-02	Bi-214	0.16	+/-	0.16	pCi/g	0.25	U,G,J	713R9	SOIL	0612167
LD-SO-02	Cs-137	-0.063	+/-	0.081	pCi/g	0.169	U,G	713R9	SOIL	0612167
LD-SO-02	K-40	4.3	+/-	1.7	pCi/g	1.7	G	713R9	SOIL	0612167
LD-SO-02	Pa-234m	74	+/-	21	pCi/g	15	G	713R9	SOIL	0612167
LD-SO-02	Pb-212	0.41	+/-	0.17	pCi/g	0.24	G	713R9	SOIL	0612167
LD-SO-02	Pb-214	0.31	+/-	0.14	pCi/g	0.24	G,J	713R9	SOIL	0612167
LD-SO-02	Th-234	77	+/-	17	pCi/g	17	M3,G	713R9	SOIL	0612167
LD-SO-02	U-235	1.04	+/-	0.48	pCi/g	0.88	LT,G	713R9	SOIL	0612167
LD-SO-03	Ac-228	0.58	+/-	0.26	pCi/g	0.57	G	713R9	SOIL	0612167
LD-SO-03	Bi-212	0.8	+/-	1.5	pCi/g	2.5	U,G	713R9	SOIL	0612167
LD-SO-03	Bi-214	0.48	+/-	0.23	pCi/g	0.32	G,J	713R9	SOIL	0612167
LD-SO-03	Cs-137	0.018	+/-	0.093	pCi/g	0.165	U,G	713R9	SOIL	0612167
LD-SO-03	K-40	5.5	+/-	2	pCi/g	2.2	G	713R9	SOIL	0612167
LD-SO-03	Pa-234m	163	+/-	31	pCi/g	13	G	713R9	SOIL	0612167
LD-SO-03	Pb-212	0.49	+/-	0.2	pCi/g	0.27	G	713R9	SOIL	0612167
LD-SO-03	Pb-214	0.36	+/-	0.2	pCi/g	0.29	G,J	713R9	SOIL	0612167
LD-SO-03	**Th-234**	**145**	**+/-**	**21**	**pCi/g**	**14**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-03	U-235	2.48	+/-	0.66	pCi/g	1.03	LT,G	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
LD-SO-04	Ac-228	0.72	+/-	0.43	pCi/g	0.61	G,TI	713R9	SOIL	0612167
LD-SO-04	Bi-212	-0.3	+/-	2.1	pCi/g	3.7	U,G	713R9	SOIL	0612167
LD-SO-04	Bi-214	0.38	+/-	0.26	pCi/g	0.39	U,G,J	713R9	SOIL	0612167
LD-SO-04	Cs-137	0	+/-	0.14	pCi/g	0.25	U,G	713R9	SOIL	0612167
LD-SO-04	K-40	4.2	+/-	1.6	pCi/g	1.8	G	713R9	SOIL	0612167
LD-SO-04	Pa-234m	663	+/-	92	pCi/g	20	G	713R9	SOIL	0612167
LD-SO-04	Pb-212	0.44	+/-	0.22	pCi/g	0.33	G	713R9	SOIL	0612167
LD-SO-04	Pb-214	0.45	+/-	0.3	pCi/g	0.46	U,G,J	713R9	SOIL	0612167
LD-SO-04	**Th-234**	**511**	**+/-**	**64**	**pCi/g**	**27**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-04	U-235	8.3	+/-	1.4	pCi/g	1.9	G	713R9	SOIL	0612167
LD-SO-05	Ac-228	0.59	+/-	0.39	pCi/g	0.56	G,TI	713R9	SOIL	0612167
LD-SO-05	Bi-212	2	+/-	1.6	pCi/g	2.5	U,G	713R9	SOIL	0612167
LD-SO-05	Bi-214	0.35	+/-	0.2	pCi/g	0.28	G,J	713R9	SOIL	0612167
LD-SO-05	Cs-137	-0.04	+/-	0.11	pCi/g	0.21	U,G	713R9	SOIL	0612167
LD-SO-05	K-40	4	+/-	1.5	pCi/g	1.7	G	713R9	SOIL	0612167
LD-SO-05	Pa-234m	380	+/-	57	pCi/g	17	G	713R9	SOIL	0612167
LD-SO-05	Pb-212	0.42	+/-	0.24	pCi/g	0.37	G	713R9	SOIL	0612167
LD-SO-05	Pb-214	0.56	+/-	0.23	pCi/g	0.35	G,J	713R9	SOIL	0612167
LD-SO-05	**Th-234**	**233**	**+/-**	**32**	**pCi/g**	**19**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-05	U-235	4.24	+/-	0.91	pCi/g	1.44	LT,G	713R9	SOIL	0612167
LD-SO-06	Ac-228	0.74	+/-	0.45	pCi/g	0.81	U,G	713R9	SOIL	0612167
LD-SO-06	Bi-212	2	+/-	2.2	pCi/g	3.5	U,G	713R9	SOIL	0612167
LD-SO-06	Bi-214	0.58	+/-	0.32	pCi/g	0.46	G,J	713R9	SOIL	0612167
LD-SO-06	Cs-137	-0.05	+/-	0.15	pCi/g	0.27	U,G	713R9	SOIL	0612167
LD-SO-06	K-40	5.6	+/-	1.9	pCi/g	1.9	G	713R9	SOIL	0612167
LD-SO-06	Pa-234m	491	+/-	75	pCi/g	30	G	713R9	SOIL	0612167
LD-SO-06	Pb-212	0.65	+/-	0.31	pCi/g	0.46	G	713R9	SOIL	0612167
LD-SO-06	Pb-214	0.88	+/-	0.34	pCi/g	0.52	G,J	713R9	SOIL	0612167
LD-SO-06	**Th-234**	**328**	**+/-**	**45**	**pCi/g**	**24**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-06	U-235	5.3	+/-	1.3	pCi/g	2.1	LT,G	713R9	SOIL	0612167
LD-SO-07	Ac-228	0.5	+/-	0.42	pCi/g	0.63	U,G	713R9	SOIL	0612167
LD-SO-07	Bi-212	0.3	+/-	1.4	pCi/g	2.5	U,G	713R9	SOIL	0612167
LD-SO-07	Bi-214	0.21	+/-	0.18	pCi/g	0.28	U,G,J	713R9	SOIL	0612167
LD-SO-07	Cs-137	0.03	+/-	0.11	pCi/g	0.19	U,G	713R9	SOIL	0612167
LD-SO-07	K-40	1.7	+/-	1.4	pCi/g	2.1	U,G	713R9	SOIL	0612167
LD-SO-07	Pa-234m	168	+/-	34	pCi/g	20	G	713R9	SOIL	0612167
LD-SO-07	Pb-212	0.38	+/-	0.17	pCi/g	0.24	G	713R9	SOIL	0612167
LD-SO-07	Pb-214	0.31	+/-	0.2	pCi/g	0.3	G,J	713R9	SOIL	0612167
LD-SO-07	**Th-234**	**127**	**+/-**	**20**	**pCi/g**	**15**	**M3,G**	**713R9**	**SOIL**	**0612167**

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
LD-SO-07	U-235	2.29	+/-	0.72	pCi/g	1.36	LT,G	713R9	SOIL	0612167
LD-SO-08	Ac-228	0.37	+/-	0.4	pCi/g	0.63	U,G	713R9	SOIL	0612167
LD-SO-08	Bi-212	1	+/-	1.2	pCi/g	2	U,G	713R9	SOIL	0612167
LD-SO-08	Bi-214	0.61	+/-	0.25	pCi/g	0.3	G,J	713R9	SOIL	0612167
LD-SO-08	Cs-137	-0.08	+/-	0.1	pCi/g	0.2	U,G	713R9	SOIL	0612167
LD-SO-08	K-40	3.1	+/-	1.7	pCi/g	2.2	G	713R9	SOIL	0612167
LD-SO-08	Pa-234m	46	+/-	18	pCi/g	21	G	713R9	SOIL	0612167
LD-SO-08	Pb-212	0.5	+/-	0.19	pCi/g	0.24	G	713R9	SOIL	0612167
LD-SO-08	Pb-214	0.39	+/-	0.17	pCi/g	0.33	G,J	713R9	SOIL	0612167
LD-SO-08	Th-234	37.9	+/-	9	pCi/g	10	M3,G	713R9	SOIL	0612167
LD-SO-08	U-235	0.8	+/-	0.53	pCi/g	0.81	U,G	713R9	SOIL	0612167
LD-SO-09	Ac-228	0.45	+/-	0.38	pCi/g	0.59	U,G	713R9	SOIL	0612167
LD-SO-09	Bi-212	0.8	+/-	1.6	pCi/g	2.6	U,G	713R9	SOIL	0612167
LD-SO-09	Bi-214	0.36	+/-	0.31	pCi/g	0.49	U,G,J	713R9	SOIL	0612167
LD-SO-09	Cs-137	0.02	+/-	0.1	pCi/g	0.18	U,G	713R9	SOIL	0612167
LD-SO-09	K-40	4.9	+/-	1.7	pCi/g	1.7	G	713R9	SOIL	0612167
LD-SO-09	Pa-234m	303	+/-	49	pCi/g	21	G	713R9	SOIL	0612167
LD-SO-09	Pb-212	0.44	+/-	0.2	pCi/g	0.28	G	713R9	SOIL	0612167
LD-SO-09	Pb-214	0.32	+/-	0.23	pCi/g	0.35	U,G,J	713R9	SOIL	0612167
LD-SO-09	**Th-234**	**242**	**+/-**	**33**	**pCi/g**	**16**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-09	U-235	3.68	+/-	0.73	pCi/g	0.85	LT,G	713R9	SOIL	0612167
LD-SO-10	Ac-228	0.53	+/-	0.39	pCi/g	0.57	U,G	713R9	SOIL	0612167
LD-SO-10	Bi-212	0.3	+/-	1.6	pCi/g	2.8	U,G	713R9	SOIL	0612167
LD-SO-10	Bi-214	0.45	+/-	0.25	pCi/g	0.36	G,J	713R9	SOIL	0612167
LD-SO-10	Cs-137	0.078	+/-	0.096	pCi/g	0.156	U,G	713R9	SOIL	0612167
LD-SO-10	K-40	4.2	+/-	1.7	pCi/g	1.8	G	713R9	SOIL	0612167
LD-SO-10	Pa-234m	153	+/-	32	pCi/g	19	G	713R9	SOIL	0612167
LD-SO-10	Pb-212	0.46	+/-	0.19	pCi/g	0.25	G	713R9	SOIL	0612167
LD-SO-10	Pb-214	0.25	+/-	0.18	pCi/g	0.34	U,G,J	713R9	SOIL	0612167
LD-SO-10	**Th-234**	**123**	**+/-**	**19**	**pCi/g**	**14**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-10	U-235	2.43	+/-	0.86	pCi/g	1.32	LT,G	713R9	SOIL	0612167
LD-SO-11	Ac-228	0.4	+/-	0.23	pCi/g	0.41	U,G	713R9	SOIL	0612167
LD-SO-11	Bi-212	0.2	+/-	1.1	pCi/g	2	U,G	713R9	SOIL	0612167
LD-SO-11	Bi-214	0.33	+/-	0.17	pCi/g	0.23	G,J	713R9	SOIL	0612167
LD-SO-11	Cs-137	-0.048	+/-	0.07	pCi/g	0.144	U,G	713R9	SOIL	0612167
LD-SO-11	K-40	4.4	+/-	1.5	pCi/g	1.5	G	713R9	SOIL	0612167
LD-SO-11	Pa-234m	56	+/-	19	pCi/g	21	G	713R9	SOIL	0612167
LD-SO-11	Pb-212	0.57	+/-	0.18	pCi/g	0.22	G	713R9	SOIL	0612167
LD-SO-11	Pb-214	0.58	+/-	0.19	pCi/g	0.27	G,J	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
LD-SO-11	Th-234	53.8	+/-	10	pCi/g	9.6	M3,G	713R9	SOIL	0612167
LD-SO-11	U-235	1.31	+/-	0.45	pCi/g	0.76	LT,G	713R9	SOIL	0612167
LD-SO-12	Ac-228	0.49	+/-	0.35	pCi/g	0.5	U,G	713R9	SOIL	0612167
LD-SO-12	Bi-212	0.2	+/-	1.5	pCi/g	2.7	U,G	713R9	SOIL	0612167
LD-SO-12	Bi-214	0.5	+/-	0.27	pCi/g	0.38	G,J	713R9	SOIL	0612167
LD-SO-12	Cs-137	-0.05	+/-	0.1	pCi/g	0.2	U,G	713R9	SOIL	0612167
LD-SO-12	K-40	5.1	+/-	1.8	pCi/g	1.9	G	713R9	SOIL	0612167
LD-SO-12	Pa-234m	157	+/-	31	pCi/g	13	G	713R9	SOIL	0612167
LD-SO-12	Pb-212	0.5	+/-	0.19	pCi/g	0.24	G	713R9	SOIL	0612167
LD-SO-12	Pb-214	0.36	+/-	0.18	pCi/g	0.25	G,J	713R9	SOIL	0612167
LD-SO-12	**Th-234**	**116**	**+/-**	**18**	**pCi/g**	**14**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-12	U-235	1.63	+/-	0.58	pCi/g	1.01	LT,G	713R9	SOIL	0612167
LD-SO-13	Ac-228	0.41	+/-	0.41	pCi/g	0.64	U,G	713R9	SOIL	0612167
LD-SO-13	Bi-212	-0.3	+/-	1.6	pCi/g	2.9	U,G	713R9	SOIL	0612167
LD-SO-13	Bi-214	0.53	+/-	0.28	pCi/g	0.39	G,J	713R9	SOIL	0612167
LD-SO-13	Cs-137	-0.01	+/-	0.12	pCi/g	0.21	U,G	713R9	SOIL	0612167
LD-SO-13	K-40	3.7	+/-	1.6	pCi/g	2	G	713R9	SOIL	0612167
LD-SO-13	Pa-234m	305	+/-	50	pCi/g	19	G	713R9	SOIL	0612167
LD-SO-13	Pb-212	0.34	+/-	0.2	pCi/g	0.29	G	713R9	SOIL	0612167
LD-SO-13	Pb-214	0.36	+/-	0.17	pCi/g	0.28	G,J	713R9	SOIL	0612167
LD-SO-13	**Th-234**	**253**	**+/-**	**34**	**pCi/g**	**16**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-13	U-235	3.83	+/-	0.82	pCi/g	1.1	LT,G	713R9	SOIL	0612167
LD-SO-14	Ac-228	0.4	+/-	0.28	pCi/g	0.47	U,G	713R9	SOIL	0612167
LD-SO-14	Bi-212	0	+/-	1.2	pCi/g	2.3	U,G	713R9	SOIL	0612167
LD-SO-14	Bi-214	0.5	+/-	0.22	pCi/g	0.28	G,J	713R9	SOIL	0612167
LD-SO-14	Cs-137	-0.093	+/-	0.09	pCi/g	0.19	U,G	713R9	SOIL	0612167
LD-SO-14	K-40	4.7	+/-	1.8	pCi/g	2	G	713R9	SOIL	0612167
LD-SO-14	Pa-234m	53	+/-	18	pCi/g	15	G	713R9	SOIL	0612167
LD-SO-14	Pb-212	0.54	+/-	0.19	pCi/g	0.24	G	713R9	SOIL	0612167
LD-SO-14	Pb-214	0.38	+/-	0.17	pCi/g	0.27	G,J	713R9	SOIL	0612167
LD-SO-14	Th-234	55	+/-	11	pCi/g	10	M3,G	713R9	SOIL	0612167
LD-SO-14	U-235	1	+/-	0.55	pCi/g	0.81	LT,G	713R9	SOIL	0612167
LD-SO-15	Ac-228	0.39	+/-	0.28	pCi/g	0.4	U,G	713R9	SOIL	0612167
LD-SO-15	Bi-212	0.24	+/-	0.85	pCi/g	1.53	U,G	713R9	SOIL	0612167
LD-SO-15	Bi-214	0.31	+/-	0.18	pCi/g	0.26	G,J	713R9	SOIL	0612167
LD-SO-15	Cs-137	-0.041	+/-	0.061	pCi/g	0.129	U,G	713R9	SOIL	0612167
LD-SO-15	K-40	5.1	+/-	1.6	pCi/g	1.3	G	713R9	SOIL	0612167
LD-SO-15	Pa-234m	43	+/-	14	pCi/g	13	G	713R9	SOIL	0612167
LD-SO-15	Pb-212	0.35	+/-	0.16	pCi/g	0.22	G	713R9	SOIL	0612167

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LD-SO-15	Pb-214	0.34	+/-	0.15	pCi/g	0.26	G,J	713R9	SOIL	0612167
LD-SO-15	Th-234	43.2	+/-	9	pCi/g	8.6	M3,G	713R9	SOIL	0612167
LD-SO-15	U-235	0.67	+/-	0.33	pCi/g	0.43	LT,G,TI	713R9	SOIL	0612167
LD-SO-DUP1	Ac-228	0.86	+/-	0.65	pCi/g	1	U,G	713R9	SOIL	0612167
LD-SO-DUP1	Bi-212	0.8	+/-	3	pCi/g	5.2	U,G	713R9	SOIL	0612167
LD-SO-DUP1	Bi-214	0.01	+/-	0.45	pCi/g	0.76	U,G,J	713R9	SOIL	0612167
LD-SO-DUP1	Cs-137	-0.02	+/-	0.22	pCi/g	0.38	U,G	713R9	SOIL	0612167
LD-SO-DUP1	K-40	4.5	+/-	2	pCi/g	2.5	G	713R9	SOIL	0612167
LD-SO-DUP1	Pa-234m	1280	+/-	160	pCi/g	30	G	713R9	SOIL	0612167
LD-SO-DUP1	Pb-212	0.23	+/-	0.32	pCi/g	0.53	U,G	713R9	SOIL	0612167
LD-SO-DUP1	Pb-214	0.66	+/-	0.58	pCi/g	0.94	U,G,J	713R9	SOIL	0612167
LD-SO-DUP1	**Th-234**	**537**	**+/-**	**69**	**pCi/g**	**36**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-DUP1	U-235	10.3	+/-	2	pCi/g	3.1	G	713R9	SOIL	0612167
LD-SO-DUP2	Ac-228	0.49	+/-	0.42	pCi/g	0.64	U,G	713R9	SOIL	0612167
LD-SO-DUP2	Bi-212	0.5	+/-	1.5	pCi/g	2.7	U,G	713R9	SOIL	0612167
LD-SO-DUP2	Bi-214	0.48	+/-	0.28	pCi/g	0.4	G,J	713R9	SOIL	0612167
LD-SO-DUP2	Cs-137	0.03	+/-	0.12	pCi/g	0.21	U,G	713R9	SOIL	0612167
LD-SO-DUP2	K-40	4.4	+/-	1.6	pCi/g	1.6	G	713R9	SOIL	0612167
LD-SO-DUP2	Pa-234m	309	+/-	51	pCi/g	22	G	713R9	SOIL	0612167
LD-SO-DUP2	Pb-212	0.51	+/-	0.22	pCi/g	0.32	G	713R9	SOIL	0612167
LD-SO-DUP2	Pb-214	0.51	+/-	0.25	pCi/g	0.35	G,J	713R9	SOIL	0612167
LD-SO-DUP2	**Th-234**	**281**	**+/-**	**38**	**pCi/g**	**20**	**M3,G**	**713R9**	**SOIL**	**0612167**
LD-SO-DUP2	U-235	3.39	+/-	0.85	pCi/g	1.33	LT,G	713R9	SOIL	0612167
LD-SS-01	Ac-228	0.41	+/-	0.29	pCi/g	0.42	U,G	713R9	SOIL	0612167
LD-SS-01	Bi-212	0.43	+/-	0.97	pCi/g	1.67	U,G	713R9	SOIL	0612167
LD-SS-01	Bi-214	0.36	+/-	0.2	pCi/g	0.28	G,J	713R9	SOIL	0612167
LD-SS-01	Cs-137	0.01	+/-	0.058	pCi/g	0.107	U,G	713R9	SOIL	0612167
LD-SS-01	K-40	5.9	+/-	1.7	pCi/g	1.4	G	713R9	SOIL	0612167
LD-SS-01	Pa-234m	24.4	+/-	9.5	pCi/g	7.9	G	713R9	SOIL	0612167
LD-SS-01	Pb-212	0.48	+/-	0.16	pCi/g	0.2	G	713R9	SOIL	0612167
LD-SS-01	Pb-214	0.34	+/-	0.14	pCi/g	0.22	G,J	713R9	SOIL	0612167
LD-SS-01	Th-234	23.9	+/-	6	pCi/g	6.4	G	713R9	SOIL	0612167
LD-SS-01	U-235	0.47	+/-	0.37	pCi/g	0.58	U,G	713R9	SOIL	0612167
LD-SS-02	Ac-228	0.52	+/-	0.23	pCi/g	0.41	G	713R9	SOIL	0612167
LD-SS-02	Bi-212	0.81	+/-	0.8	pCi/g	1.23	U,G	713R9	SOIL	0612167
LD-SS-02	Bi-214	0.47	+/-	0.18	pCi/g	0.21	G,J	713R9	SOIL	0612167
LD-SS-02	Cs-137	-0.01	+/-	0.054	pCi/g	0.104	U,G	713R9	SOIL	0612167
LD-SS-02	K-40	4	+/-	1.3	pCi/g	1.1	G	713R9	SOIL	0612167
LD-SS-02	Pa-234m	31	+/-	12	pCi/g	14	G	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
LD-SS-02	Pb-212	0.27	+/-	0.14	pCi/g	0.2	G	713R9	SOIL	0612167
LD-SS-02	Pb-214	0.31	+/-	0.12	pCi/g	0.16	G,J	713R9	SOIL	0612167
LD-SS-02	Th-234	25.8	+/-	6.7	pCi/g	7.9	G	713R9	SOIL	0612167
LD-SS-02	U-235	0.45	+/-	0.38	pCi/g	0.6	U,G	713R9	SOIL	0612167
PV-SO-01	Ac-228	0.32	+/-	0.38	pCi/g	0.62	U,G	713R9	SOLID	0612167
PV-SO-01	Bi-212	0.4	+/-	1.1	pCi/g	1.9	U,G	713R9	SOLID	0612167
PV-SO-01	Bi-214	0.12	+/-	0.19	pCi/g	0.32	U,G,J	713R9	SOLID	0612167
PV-SO-01	Cs-137	-0.074	+/-	0.071	pCi/g	0.155	U,G	713R9	SOLID	0612167
PV-SO-01	K-40	2.2	+/-	1.5	pCi/g	2.2	G	713R9	SOLID	0612167
PV-SO-01	Pa-234m	4.7	+/-	7.3	pCi/g	12.3	U,G	713R9	SOLID	0612167
PV-SO-01	Pb-212	0.4	+/-	0.16	pCi/g	0.2	G	713R9	SOLID	0612167
PV-SO-01	Pb-214	0.22	+/-	0.14	pCi/g	0.26	U,G,J	713R9	SOLID	0612167
PV-SO-01	Th-234	4.6	+/-	3.7	pCi/g	5.8	U,G	713R9	SOLID	0612167
PV-SO-01	U-235	0.62	+/-	0.44	pCi/g	0.67	U,G	713R9	SOLID	0612167
PV-SO-02	Ac-228	0.5	+/-	0.24	pCi/g	0.37	G	713R9	SOIL	0612167
PV-SO-02	Bi-212	0.97	+/-	0.84	pCi/g	1.27	U,G	713R9	SOIL	0612167
PV-SO-02	Bi-214	0.24	+/-	0.18	pCi/g	0.27	U,G,J	713R9	SOIL	0612167
PV-SO-02	Cs-137	0.51	+/-	0.13	pCi/g	0.1	G	713R9	SOIL	0612167
PV-SO-02	K-40	3.3	+/-	1.4	pCi/g	1.8	G	713R9	SOIL	0612167
PV-SO-02	Pa-234m	3.9	+/-	7.2	pCi/g	12.3	U,G	713R9	SOIL	0612167
PV-SO-02	Pb-212	0.46	+/-	0.14	pCi/g	0.18	G	713R9	SOIL	0612167
PV-SO-02	Pb-214	0.4	+/-	0.14	pCi/g	0.22	G,J	713R9	SOIL	0612167
PV-SO-02	Th-234	2.2	+/-	3.6	pCi/g	6.1	U,G	713R9	SOIL	0612167
PV-SO-02	U-235	0.11	+/-	0.34	pCi/g	0.58	U,G	713R9	SOIL	0612167
PV-SO-03	Ac-228	0.16	+/-	0.34	pCi/g	0.59	U,G	713R9	SOIL	0612167
PV-SO-03	Bi-212	0.9	+/-	1.1	pCi/g	1.8	U,G	713R9	SOIL	0612167
PV-SO-03	Bi-214	0.38	+/-	0.21	pCi/g	0.3	G,J	713R9	SOIL	0612167
PV-SO-03	Cs-137	0.067	+/-	0.079	pCi/g	0.127	U,G	713R9	SOIL	0612167
PV-SO-03	K-40	3.6	+/-	1.6	pCi/g	2	G	713R9	SOIL	0612167
PV-SO-03	Pa-234m	33	+/-	13	pCi/g	13	G	713R9	SOIL	0612167
PV-SO-03	Pb-212	0.48	+/-	0.16	pCi/g	0.2	G	713R9	SOIL	0612167
PV-SO-03	Pb-214	0.37	+/-	0.17	pCi/g	0.3	G,J	713R9	SOIL	0612167
PV-SO-03	Th-234	25.5	+/-	7	pCi/g	8.6	M3,G	713R9	SOIL	0612167
PV-SO-03	U-235	0.37	+/-	0.37	pCi/g	0.59	U,G	713R9	SOIL	0612167
PV-SO-04	Ac-228	0.56	+/-	0.23	pCi/g	0.4	G	713R9	SOIL	0612167
PV-SO-04	Bi-212	1.2	+/-	1.1	pCi/g	1.6	U,G	713R9	SOIL	0612167
PV-SO-04	Bi-214	0.42	+/-	0.19	pCi/g	0.25	G,J	713R9	SOIL	0612167
PV-SO-04	Cs-137	0.042	+/-	0.07	pCi/g	0.118	U,G	713R9	SOIL	0612167
PV-SO-04	K-40	4.5	+/-	1.6	pCi/g	1.8	G	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
PV-SO-04	Pa-234m	14.4	+/-	9	pCi/g	12.3	G,TI	713R9	SOIL	0612167
PV-SO-04	Pb-212	0.57	+/-	0.16	pCi/g	0.19	G	713R9	SOIL	0612167
PV-SO-04	Pb-214	0.56	+/-	0.16	pCi/g	0.2	G,J	713R9	SOIL	0612167
PV-SO-04	Th-234	7.8	+/-	3.7	pCi/g	5.4	LT,G	713R9	SOIL	0612167
PV-SO-04	U-235	0.23	+/-	0.39	pCi/g	0.64	U,G	713R9	SOIL	0612167
ST-SO-01	Ac-228	0.28	+/-	0.26	pCi/g	0.39	U,G	713R9	SOIL	0612167
ST-SO-01	Bi-212	0.6	+/-	1	pCi/g	1.8	U,G	713R9	SOIL	0612167
ST-SO-01	Bi-214	0.15	+/-	0.16	pCi/g	0.25	U,G,J	713R9	SOIL	0612167
ST-SO-01	Cs-137	0.048	+/-	0.065	pCi/g	0.108	U,G	713R9	SOIL	0612167
ST-SO-01	K-40	0.7	+/-	1	pCi/g	1.7	U,G	713R9	SOIL	0612167
ST-SO-01	Pa-234m	34	+/-	13	pCi/g	13	G	713R9	SOIL	0612167
ST-SO-01	Pb-212	0.09	+/-	0.12	pCi/g	0.2	U,G	713R9	SOIL	0612167
ST-SO-01	Pb-214	-0.01	+/-	0.14	pCi/g	0.25	U,G,J	713R9	SOIL	0612167
ST-SO-01	Th-234	22.2	+/-	6.5	pCi/g	8.1	M3,G	713R9	SOIL	0612167
ST-SO-01	U-235	0.49	+/-	0.41	pCi/g	0.64	U,G	713R9	SOIL	0612167
ST-SO-02	Ac-228	0.7	+/-	0.37	pCi/g	0.56	G	713R9	SOIL	0612167
ST-SO-02	Bi-212	2.1	+/-	1.5	pCi/g	2.2	U,G	713R9	SOIL	0612167
ST-SO-02	Bi-214	0.97	+/-	0.33	pCi/g	0.36	G,J	713R9	SOIL	0612167
ST-SO-02	Cs-137	0.14	+/-	0.12	pCi/g	0.19	U,G	713R9	SOIL	0612167
ST-SO-02	K-40	8.9	+/-	2.6	pCi/g	2.3	G	713R9	SOIL	0612167
ST-SO-02	Pa-234m	36	+/-	17	pCi/g	19	G	713R9	SOIL	0612167
ST-SO-02	Pb-212	1.33	+/-	0.3	pCi/g	0.27	G	713R9	SOIL	0612167
ST-SO-02	Pb-214	1.07	+/-	0.28	pCi/g	0.37	G,J	713R9	SOIL	0612167
ST-SO-02	Th-234	37.1	+/-	9.8	pCi/g	11.1	M3,G	713R9	SOIL	0612167
ST-SO-02	U-235	0.71	+/-	0.57	pCi/g	0.89	U,G	713R9	SOIL	0612167
ST-SO-03	Ac-228	1.26	+/-	0.59	pCi/g	0.67	G,TI	713R9	SOIL	0612167
ST-SO-03	Bi-212	1.4	+/-	1.8	pCi/g	3	U,G	713R9	SOIL	0612167
ST-SO-03	Bi-214	1.13	+/-	0.35	pCi/g	0.4	G,J	713R9	SOIL	0612167
ST-SO-03	Cs-137	0.1	+/-	0.16	pCi/g	0.27	U,G	713R9	SOIL	0612167
ST-SO-03	K-40	9.1	+/-	3.1	pCi/g	3.3	G	713R9	SOIL	0612167
ST-SO-03	Pa-234m	33	+/-	17	pCi/g	19	G	713R9	SOIL	0612167
ST-SO-03	Pb-212	0.95	+/-	0.28	pCi/g	0.32	G	713R9	SOIL	0612167
ST-SO-03	Pb-214	1.28	+/-	0.31	pCi/g	0.36	G,J	713R9	SOIL	0612167
ST-SO-03	Th-234	52	+/-	16	pCi/g	19	M3,G	713R9	SOIL	0612167
ST-SO-03	U-235	0.27	+/-	0.76	pCi/g	1.3	U,G	713R9	SOIL	0612167
ST-SO-DUP1	Ac-228	1.1	+/-	0.36	pCi/g	0.66	G	713R9	SOIL	0612167
ST-SO-DUP1	Bi-212	0.9	+/-	1.7	pCi/g	2.8	U,G	713R9	SOIL	0612167
ST-SO-DUP1	Bi-214	0.97	+/-	0.31	pCi/g	0.32	G,J	713R9	SOIL	0612167
ST-SO-DUP1	Cs-137	0.25	+/-	0.14	pCi/g	0.2	G,TI	713R9	SOIL	0612167

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FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
ST-SO-DUP1	K-40	9.3	+/-	2.6	pCi/g	1.8	G	713R9	SOIL	0612167
ST-SO-DUP1	Pa-234m	36	+/-	16	pCi/g	17	G	713R9	SOIL	0612167
ST-SO-DUP1	Pb-212	1.24	+/-	0.31	pCi/g	0.33	G	713R9	SOIL	0612167
ST-SO-DUP1	Pb-214	1.2	+/-	0.28	pCi/g	0.31	G,J	713R9	SOIL	0612167
ST-SO-DUP1	Th-234	34.8	+/-	5.3	pCi/g	3.3	G	713R9	SOIL	0612167
ST-SO-DUP1	U-235	1.28	+/-	0.74	pCi/g	1.12	LT,G,TI	713R9	SOIL	0612167
ST-SS-01	Ac-228	0.07	+/-	0.22	pCi/g	0.41	U,G	713R9	SOIL	0612167
ST-SS-01	Bi-212	0.72	+/-	0.83	pCi/g	1.32	U,G	713R9	SOIL	0612167
ST-SS-01	Bi-214	0.03	+/-	0.15	pCi/g	0.27	U,G,J	713R9	SOIL	0612167
ST-SS-01	Cs-137	0.073	+/-	0.073	pCi/g	0.113	U,G	713R9	SOIL	0612167
ST-SS-01	K-40	1.5	+/-	1.1	pCi/g	1.6	U,G	713R9	SOIL	0612167
ST-SS-01	Pa-234m	11	+/-	7.8	pCi/g	10.3	G,TI	713R9	SOIL	0612167
ST-SS-01	Pb-212	0.17	+/-	0.11	pCi/g	0.15	G	713R9	SOIL	0612167
ST-SS-01	Pb-214	0.27	+/-	0.13	pCi/g	0.17	G,J	713R9	SOIL	0612167
ST-SS-01	Th-234	12.1	+/-	5.2	pCi/g	7.3	G	713R9	SOIL	0612167
ST-SS-01	U-235	0.08	+/-	0.39	pCi/g	0.67	U,G	713R9	SOIL	0612167
WT-SO-01	Ac-228	0.86	+/-	0.26	pCi/g	0.47	G	713R9	SOIL	0612167
WT-SO-01	Bi-212	1.6	+/-	1.2	pCi/g	1.9	U,G	713R9	SOIL	0612167
WT-SO-01	Bi-214	0.58	+/-	0.19	pCi/g	0.23	G,J	713R9	SOIL	0612167
WT-SO-01	Cs-137	0.004	+/-	0.072	pCi/g	0.128	U,G	713R9	SOIL	0612167
WT-SO-01	K-40	6.8	+/-	1.8	pCi/g	1.9	G	713R9	SOIL	0612167
WT-SO-01	Pa-234m	5.2	+/-	8	pCi/g	13.3	U,G	713R9	SOIL	0612167
WT-SO-01	Pb-212	0.85	+/-	0.19	pCi/g	0.19	G	713R9	SOIL	0612167
WT-SO-01	Pb-214	0.63	+/-	0.16	pCi/g	0.22	G,J	713R9	SOIL	0612167
WT-SO-01	Th-234	4.8	+/-	4.1	pCi/g	6.5	U,G	713R9	SOIL	0612167
WT-SO-01	U-235	0.18	+/-	0.38	pCi/g	0.65	U,G	713R9	SOIL	0612167
WT-SO-02	Ac-228	1.1	+/-	0.42	pCi/g	0.68	G	713R9	SOIL	0612167
WT-SO-02	Bi-212	2	+/-	1.3	pCi/g	1.8	G	713R9	SOIL	0612167
WT-SO-02	Bi-214	0.92	+/-	0.29	pCi/g	0.32	G	713R9	SOIL	0612167
WT-SO-02	Cs-137	0.03	+/-	0.11	pCi/g	0.19	U,G	713R9	SOIL	0612167
WT-SO-02	K-40	9.5	+/-	2.6	pCi/g	2.5	G	713R9	SOIL	0612167
WT-SO-02	Pa-234m	14	+/-	13	pCi/g	20	U,G	713R9	SOIL	0612167
WT-SO-02	Pb-212	1.2	+/-	0.26	pCi/g	0.26	G	713R9	SOIL	0612167
WT-SO-02	Pb-214	0.8	+/-	0.22	pCi/g	0.29	G,J	713R9	SOIL	0612167
WT-SO-02	Th-234	8.6	+/-	4.9	pCi/g	7.3	G	713R9	SOIL	0612167
WT-SO-02	U-235	0.41	+/-	0.58	pCi/g	0.95	U,G	713R9	SOIL	0612167
WT-SO-03	Ac-228	0.48	+/-	0.4	pCi/g	0.61	U,G	713R9	SOIL	0612167
WT-SO-03	Bi-212	0.09	+/-	0.95	pCi/g	1.8	U,G	713R9	SOIL	0612167
WT-SO-03	Bi-214	0.34	+/-	0.21	pCi/g	0.31	G,J	713R9	SOIL	0612167

APG R-14 Range Characterization
Gamma Spectroscopy Results

FieldID	Parameter	Result		TPU	Units	MDC	Flag	Analytical Method	Matrix	Order Number
WT-SO-03	Cs-137	0.058	+/-	0.072	pCi/g	0.116	U,G	713R9	SOIL	0612167
WT-SO-03	K-40	5.9	+/-	1.9	pCi/g	1.7	G	713R9	SOIL	0612167
WT-SO-03	Pa-234m	-1	+/-	11	pCi/g	22	U,G	713R9	SOIL	0612167
WT-SO-03	Pb-212	0.58	+/-	0.17	pCi/g	0.19	G	713R9	SOIL	0612167
WT-SO-03	Pb-214	0.3	+/-	0.16	pCi/g	0.29	G,J	713R9	SOIL	0612167
WT-SO-03	Th-234	2.9	+/-	1.3	pCi/g	1.7	LT,G	713R9	SOIL	0612167
WT-SO-03	U-235	0.46	+/-	0.4	pCi/g	0.63	U,G	713R9	SOIL	0612167
WT-SO-DUP1	Ac-228	0.38	+/-	0.36	pCi/g	0.55	U,G	713R9	SOIL	0612167
WT-SO-DUP1	Bi-212	1.2	+/-	1.1	pCi/g	1.5	U,G	713R9	SOIL	0612167
WT-SO-DUP1	Bi-214	0.29	+/-	0.23	pCi/g	0.35	U,G,J	713R9	SOIL	0612167
WT-SO-DUP1	Cs-137	-0.017	+/-	0.071	pCi/g	0.142	U,G	713R9	SOIL	0612167
WT-SO-DUP1	K-40	5.9	+/-	1.9	pCi/g	1.7	G	713R9	SOIL	0612167
WT-SO-DUP1	Pa-234m	6.6	+/-	9.3	pCi/g	15.4	U,G	713R9	SOIL	0612167
WT-SO-DUP1	Pb-212	0.5	+/-	0.18	pCi/g	0.23	G	713R9	SOIL	0612167
WT-SO-DUP1	Pb-214	0.38	+/-	0.21	pCi/g	0.29	G,J	713R9	SOIL	0612167
WT-SO-DUP1	Th-234	3	+/-	1.3	pCi/g	1.9	LT,G	713R9	SOIL	0612167
WT-SO-DUP1	U-235	-0.11	+/-	0.36	pCi/g	0.67	U,G	713R9	SOIL	0612167
WT-SS-01	Ac-228	0.66	+/-	0.3	pCi/g	0.48	G	713R9	SOIL	0612167
WT-SS-01	Bi-212	0.7	+/-	1.1	pCi/g	1.9	U,G	713R9	SOIL	0612167
WT-SS-01	Bi-214	0.36	+/-	0.19	pCi/g	0.26	G,J	713R9	SOIL	0612167
WT-SS-01	Cs-137	0.04	+/-	0.1	pCi/g	0.18	U,G	713R9	SOIL	0612167
WT-SS-01	K-40	6.7	+/-	2.1	pCi/g	1.6	G	713R9	SOIL	0612167
WT-SS-01	Pa-234m	7.8	+/-	9.8	pCi/g	15.8	U,G	713R9	SOIL	0612167
WT-SS-01	Pb-212	0.67	+/-	0.2	pCi/g	0.23	G	713R9	SOIL	0612167
WT-SS-01	Pb-214	0.6	+/-	0.2	pCi/g	0.33	G,J	713R9	SOIL	0612167
WT-SS-01	Th-234	3.1	+/-	1.4	pCi/g	1.9	LT,G	713R9	SOIL	0612167
WT-SS-01	U-235	0.39	+/-	0.39	pCi/g	0.63	U,G	713R9	SOIL	0612167

NOTES:

Sample entries in bold text and yellow highlighting indicate that DU concentrations are higher than the soil sample screening limit of 102 pCi/g.

1 pCi/g Th-234 is equivalent to 1.1 pCi/g DU. Thus, Th-234 results greater than 92 pCi/g indicate an exceedance of the soil sample screening limit.

G = Sample density differs by more than 15% of LCS density.

J = Result is an estimated value detected at less than the sample-specific MDC.

LT = Result is less than requested MDC, but greater than sample-specific MDC.

M3 = The requested MDC was not met, but the reported activity is greater than the reported MDC.

MDC = Minimum Detectable Concentration

TI = Nuclide identification is tentative.

TPU = Total Propagated Uncertainty

U = Result is less than the sample-specific MDC or less than the associated TPU.

APPENDIX D-6

ANALYTICAL LABORATORY DATA PACKAGES (ON CD)

APPENDIX E

ASBESTOS INSPECTION REPORT

EA Engineering, Science
and Technology, Inc.

1319 Woodbridge Station Way, Suite 200.
Edgewood, Maryland 21040
Telephone: 410-538-8202
Fax: 410-538-8207
www.eaest.com

26 December 2006

Ms. Barbara Duletsky
Cabrera Services, Inc.
5091 Mt. Ellen Court
St. Charles, MO 63304

RE: Report of Asbestos Containing Material Survey
Hot Line Building at R-14 Range – Aberdeen Proving Ground, Maryland

Dear Ms. Duletsky:

EA Engineering, Science, and Technology, Inc. (EA) has completed an Asbestos Containing Materials (ACM) Survey at the Hot Line Building, at the R-14 Range, located on Spesutie Island, in the Aberdeen Area of Aberdeen Proving Ground (APG), Maryland. Sampling activities included the collection of 15 bulk samples of suspect ACM from the Hot Line Building and five small sheds (adjacent to the Hot Line Building).

Current Federal and State environmental statutes require that certain potentially hazardous materials that may be affected by building renovation activities be identified and removed prior to conducting these activities. In the case of asbestos, Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and State of Maryland regulatory requirements contained in 40 CFR 61, 29 CFR 1926.1101, and COMAR 26.11.22, respectively, require that ACM be identified, and that friable ACM be removed prior to conducting renovation activities that may disturb these materials. This requirement also applies to non-friable ACM that may become friable as a result of renovation activities.

SAMPLING PROCEDURES

On 7 December 2006, an EA inspector conducted a walk-through visual inspection and sampling of suspect ACM within the interior and exterior areas of the Hot Line Building and five small sheds (adjacent to the Hot Line Building), located on Spesutie Island, on APG. The ACM inspection procedures were conducted in accordance with Asbestos Hazard Emergency Response Act (AHERA) guidelines and included identifying homogeneous areas of suspect ACM, determining suspect ACM friability, and assessing the homogeneous areas of suspect ACM to determine overall condition. Suspect ACM was sampled in accordance with AHERA guidelines. The inspection was conducted by EPA AHERA accredited and Maryland licensed asbestos building inspector. Non-destructive asbestos sampling procedures were employed for the asbestos inspection and were limited to readily accessible areas of the site buildings.

According to Richard Markland of the US Army Research Laboratory (ARL), in 1979 to 1980, an experimental facility was constructed in the R-14 Range area, and was utilized for "hard impact" depleted uranium testing. The facility consisted of a 24x24x30-foot steel target chamber, with three trailers attached as support facilities. The trailers were set upon a large steel

plate that acted both as a foundation and a contamination control barrier. These trailers were then covered over with a single roof to provide a weather barrier for the personnel.

In 1995, the trailers and roof were removed and replaced with a more efficient support facility. The new support facility consisted of two buildings that could function independently, connected by only a walkway. One of the buildings, Building 1150D, was to be used for test equipment assembly and would be kept free of contamination. The other building, the Hot Line Building, was constructed to house the dirty operations (Rad waste containers, washing machine, dryer, and step-off area).

As a result of previous activities, the Hot Line Building has become contaminated to a low level and will be decommissioned along with the target chamber. As part of the decommissioning process, an ACM survey was conducted on the building.

Suspect materials, from the Hot Line Building and five small sheds (adjacent to the Hot Line Building), were grouped into homogeneous areas (uniform in color and texture and appearing identical in every other respect) and were sampled in a manner consistent with the EPA AHERA regulations.

Samples were submitted to AMA Analytical Services in Lanham, Maryland. AMA is an independent laboratory accredited by the National Institute of Science and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) and the American Industrial Hygiene Association. Analyses were performed by polarized light microscopy (PLM) in accordance with EPA Method EPA/600/R-93/116.

The asbestos inspection form is provided in Attachment I. The asbestos sampling location diagram is provided in Attachment II. Asbestos laboratory analytical results, as well as the chain-of-custody form, is included in Attachment III, and the Inspector's certification is included in Attachment IV.

FINDINGS

The following visual observations were made during the asbestos inspection:

Hot Line Building

According to Mr. Markland, the Hot Line Building is elevated on pressure treated lumber to avoid elevated water levels during the frequent high tides at the facility. He also stated that the building is of wood frame construction with metal siding and roofing. According to visual observations, the interior of the Wash/Change Room and Cassette Room is fiberglass insolated, with gypsum drywall finishing and vinyl sheet-covered flooring. The interior walls, floor and ceiling of the X-Ray Room is covered with metal plating, beneath which is concrete. The Blast

Chamber has a concrete floor and metal plate coverings on the walls and ceiling. No windows were observed in any of the rooms within the Hot Line Building.

Pumphouse Shed

The Pumphouse Shed has an approximate footprint of 15x15-feet, and is located southwest of the Hot Line Building. The shed is of metal sheet construction with an asphalt-shingled roof, on a concrete slab foundation. There were no windows observed within the Pumphouse Shed.

Firing Tube Shed

The Firing Tube Shed has an approximate footprint of 10x10-feet and is adjacent to the Hot Line Building. The shed is of wood construction with an asphalt-shingled roof. There were no windows observed within the Firing Tube Shed.

Muffler Building

The Muffler Building is of wood construction with wood paneling on the interior and metal siding and an asphalt shingled roof on the exterior. The building has a concrete slab foundation. No windows were observed in the Muffler Building.

Evaporator Tank Shed

The Evaporator Tank Shed has an approximate footprint of 5x15-feet and is located southwest of the Hot Line Building, adjacent to the Pumphouse Shed. The shed is of wooden construction with an asphalt-shingled roof. No windows were observed within the Evaporator Shed.

Entry Shed

The Entry Shed to the Laydown Yard has an approximate footprint of 5x5-feet. The shed is of wooden construction with an asphalt-shingled roof. There were no windows observed within the Entry Shed.

RESULTS

ACM are defined by EPA standards as materials determined to contain greater than one- percent asbestos. Based on the analytical results, there was no asbestos detected in any of the fifteen samples collected from the Hot Line Building or the five small sheds (adjacent to the Hot Line Building).

DISCLAIMER

EA does not warrant that there is no asbestos or hazardous materials in areas of the facility not inspected as part of this scope of work, nor does EA accept any liability if such is found at some future time, or could have been found if additional analyses or studies were conducted. EA does not assume responsibility for other environmental issues that may be associated with the subject facility.

In view of the rapidly changing status of environmental laws, regulations, and guidelines, EA cannot be responsible for changes in laws, regulations, or guidelines that occur after the study has been completed and which may affect the facility. This report was prepared for the Cabrera Services, Inc., by EA Engineering, Science, and Technology, Inc. Any transfer of information contained in this report can be conducted only if written consent is provided by Cabrera Services, Inc.

CLOSING

Thank you for the opportunity to provide environmental services to Cabrera Services, Inc. Should you have any questions or comments regarding this report; please do not hesitate to call me directly at (410) 538-8202 extension 105.

Respectfully yours,
EA ENGINEERING, SCIENCE AND TECHNOLOGY

Gordon Porter

Gordy Porter
Project Manager

CC: A. Marcum

ATTACHMENT I:

ASBESTOS INSPECTION FORMS

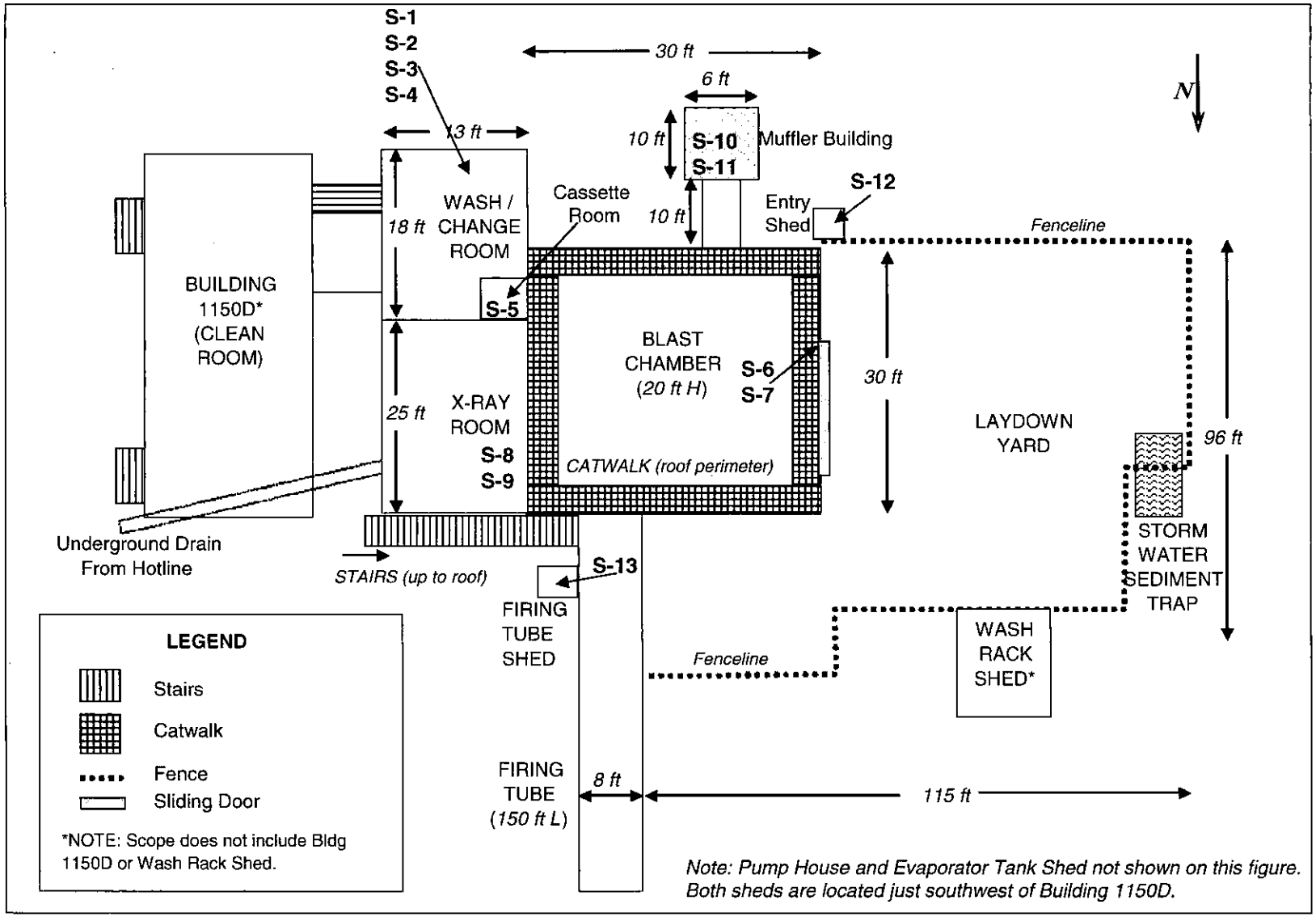
Location: ARL R-14 Range Hot Line Building – Spesutie Island, Aberdeen Area, APG
Date: 7 December 2006
Inspector: Anna-Lisa Marcum

ASBESTOS INSPECTION SAMPLING FORM

Location	Sample Number	Type of Material	Description (Color/Size)	Friable (Yes/No)
Wash/Change Room	S-1	Vinyl flooring	Tan speckled pattern, full sheet	No
	S-2	Mastic	Tan (beneath S-1)	No
	S-3	Mastic	Tan (beneath tan vinyl baseboard)	No
	S-4	Ceiling Tile	2x2 white with fissure pattern	Yes
Cassette Room	S-5	Dry wall	White	No
Blast Chamber	S-6	Cloth (woven) weather stripping	Located on exterior door – tan color	No
	S-7	Rubber weather stripping	Located on entry door to blast chamber from breezeway – black in color	No
X-Ray Room	S-8	Foam weather stripping	Located on entry door to X-Ray room – gray in color	No
	S-9	Rubber weather stripping	Located beneath S-8 – black in color	No
Muffler Building	S-10	Exterior asphalt roof shingle	Black	No
	S-11	Roof material beneath S-10	Black	No
Entry Shed to Laydown Yard	S-12	Exterior asphalt roof shingle	Black	No
Firing Tube Shed	S-13	Exterior asphalt roof shingle	Black	No
Pumphouse	S-14	Caulking material	Located on exterior and interior of shed around pipe chase connected to the exterior electrical fuse box	No
Evaporator Tank Shed	S-15	Exterior asphalt roof shingle	Black	No

ATTACHEMNT II:

SAMPLING LOCATION DIAGRAMS



Sample Locations – Hot Line Building, R-14 Range, APG

ATTACHMENT III:

LABORATORY ANALYTICAL RESULTS

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	EA Engineering Sciene & Technology	**Job Name:**	APG-R-14 Range	**Chain Of Custody:**	500602
Address:	1319 Woodbridge Station Way, Suite 200	**Job Location:**	APG, Aberdeen, MD	**Date Analyzed:**	12/14/2006
	Edgewood, Maryland 21040	**Job Number:**	Not Provided	**Person Submitting:**	Anna-Lisa Marcum
		P.O. Number:	Not Provided		

Attention: Anna-Lisa Marcum

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments
0718750	S-1	NAD	--	--	--	--	--	2	10	--	2	86	Multi	Layered	PC	
0718751	S-2	NAD	--	--	--	--	--	--	2	--	--	98	Beige	Homogeneous	PC	
0718752	S-3	NAD	--	--	--	--	--	--	--	--	--	100	Beige	Homogeneous	PC	
0718753	S-4	NAD	--	--	--	--	35	--	25	--	--	40	Multi	Layered	PC	
0718754	S-5	NAD	--	--	--	--	--	TR	TR	--	--	100	White	Homogeneous	PC	
0718755	S-6	NAD	--	--	--	--	--	--	TR	--	98	2	Beige	Homogeneous	PC	
0718756	S-7	NAD	--	--	--	--	--	--	--	--	--	100	Black	Homogeneous	PC	
0718757	S-8	NAD	--	--	--	--	--	--	--	--	--	100	Gray	Homogeneous	PC	
0718758	S-9	NAD	--	--	--	--	--	--	TR	--	--	100	Black	Homogeneous	PC	
0718759	S-10	NAD	--	--	--	--	--	5	--	--	--	95	Black	Homogeneous	PC	
0718760	S-11	NAD	--	--	--	--	--	--	40	--	--	60	Black	Homogeneous	PC	
0718761	S-12	NAD	--	--	--	--	--	--	10	--	--	90	Black	Homogeneous	PC	
0718762	S-13	NAD	--	--	--	--	--	5	--	--	--	95	Black	Homogeneous	PC	
0718763	S-14	NAD	--	--	--	--	--	--	--	--	--	100	Gray	Homogeneous	PC	
0718764	S-15	NAD	--	--	--	--	--	5	--	--	--	95	Black	Homogeneous	PC	

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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An AIHA (#8863), NVLAP (# 101143), & New York ELAP (#10920) Accredited Laboratory
4475 Forbes Blvd. • Lanham, MD 20706 • (301) 459-2640 • Toll Free (800) 346-0961 • Fax (301) 459-2643

12-14-2006 17:02 AMA ANALYTICAL SERVICES 3014592643

AMA Analytical Services, Inc.

A Specialized Environmental Laboratory

CERTIFICATE OF ANALYSIS

NVLAP 101143-0
NY ELAP 10920
AIHA 100470

Client:	EA Engineering Sciene & Technology	**Job Name:**	APG-R-14 Range	**Chain Of Custody:**	500602
Address:	1319 Woodbridge Station Way, Suite 200	**Job Location:**	APG, Aberdeen, MD	**Date Analyzed:**	12/14/2006
	Edgewood, Maryland 21040	**Job Number:**	Not Provided	**Person Submitting:**	Anna-Lisa Marcum
		P.O. Number:	Not Provided		

Attention: Anna-Lisa Marcum

Summary of Polarized Light Microscopy

AMA Sample Number	Client Sample #	Total Asbestos	Chrysotile Percent	Amosite Percent	Crocidolite Percent	Other Asbestos Percent	Mineral Wool Percent	Fiberglass Percent	Organic Percent	Synthetic Percent	Other Percent	Particulate Percent	Sample Color	Homogeneity	Analyst ID	Comments

The following footnotes only apply to those samples which the total asbestos result is flagged with a note number.

1 TEM RECOMMENDATION - Please note, due to resolution limitations with optical microscopy and/or interference from matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos. It is recommended that the additional analytical technique of TEM be used to check for asbestos fibers below the resolution limits of optical microscopy.

2 MATRIX REDUCTION RECOMMENDATION - Please note, due to interference from the matrix components of this sample, results which are reported via PLM as negative or trace (<1%) for asbestos may contain a significant quantity of asbestos which is obscured from view. It is recommended that the additional preparation technique of gravimetric reduction be performed on this sample to minimize the obscuring effects of matrix components, followed by reanalysis by PLM and/or TEM.

Analysis Method - EPA/600/R-93/116 dated July 1993

NAD = "No Asbestos Detected" TR = "Trace equals less than 1% of this component"

P. Chai

Peerawut Chaikeenee

This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products. As a mutual protection to clients, the public and these Laboratories, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us. Sample types, locations and collection protocols are based upon the information provided by the persons submitting them and, unless collected by personnel of these Laboratories, we expressly disclaim any knowledge and liability for the accuracy and completeness of this information. Residual sample material will be discarded in accordance with the appropriate regulatory guidelines, unless otherwise requested by the client. NVLAP Accreditation applies only to polarized light microscopy of bulk samples and transmission electron microscopy of AHERA air samples. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) [redacted]

Mailing/Billing Information:
1. Client Name: EA Engineering
2. Address 1: 1319 Woodbridge Station Way
3. Address 2: Suite 200
4. Address 3: Edgewood, MD 21040
5. Phone #: 410-538-8202 Fax #: 410-538-8207

Submittal Information:
1. Job Name: APG - R-14 RANGE
2. Job Location: APG, Aberdeen MD
3. Job #: _____ P.O. #: _____
4. Contact Person: Anna-Lisa Marcum @ phone # 410-538-8202
5. Submitted by: Anna-Lisa Marcum Signature: [signature]

Reporting Information (Results will be provided as soon as technically feasible):

Date & Time Results Required: 12 / 15 / 06 @ 1 pm ☐Immd. ☐24hr ☐48hr ☒72hr ☐5 Day + ☐Immd. After-Hours* ☐24hr After-Hours* ☐Late-Night* (*must be pre-scheduled)

☐ Verbals: _____ @ cell # _____ ☐ Fax Copy: _____ @ fax # _____ ☐ Email Copy: amarcum @ earst.com

Asbestos Analysis

PCM Air – Please Indicate Filter Type:
PC MCE Porosity_____ in a 25mm 37mm
☐ NIOSH 7400_____(QTY)
☐ Fiberglass_____(QTY)

TEM Air – Please Indicate Filter Type:
PC MCE Porosity_____ in a 25mm 37mm
☐ AHERA _____(QTY)
☐ NIOSH 7402 _____(QTY)
☐ Other (specify_____)_____(QTY)

PLM Bulk
☒ EPA 600 – Visual Estimate 15 (QTY)
☐ EPA Point Count_____(QTY)
☐ NY State Friable_____(QTY)
☐ Grav. Reduction ELAP 198.1_____(QTY)
☐ Other (specify_____)_____(QTY)

TEM Bulk
☐ ELAP 198.4/Chatfield_____(QTY)
☐ NY State PLM/TEM_____(QTY)
☐ Residual Ash_____(QTY)

TEM Dust
☐ Qual. (pres/abs) Vacuum/Dust_____(QTY)
☐ Quan. (s/area) Vacuum D5755-95 _____(QTY)
☐ Quan. (s/area)Dust D6480-99_____(QTY)

TEM Water
☐ Qual. (pres/abs)_____(QTY)
☐ ELAP 198.2/EPA 100.2_____(QTY)
☐ EPA 100.1_____(QTY)

Lead Analysis
☐ Paint Chip_____(QTY)
☐ Dust Wipe (wipe type_____)_____(QTY)
☐ Air_____(QTY)
☐ Soil/Solid_____(QTY)
☐ TCLP_____(QTY)
☐ Drinking Water_____(QTY)
☐ Waste Water_____(QTY)
☐ Dust Wipe Furnace (wipe type_____)_____(QTY)

Miscellaneous Analysis
☐ Radon_____(QTY)
☐ Other (specify_____)_____(QTY)

SAMPLE ANALYSIS INFORMATION

CLIENT ID NUMBER	SAMPLE LOCATION	DATE	VOLUME (LITERS)	WIPE AREA	ANALYSIS: TEM	PCM	PLM	LEAD	OTHER	MATRIX: AIR	BULK	WIPE	WATER AND OTHER	CLIENT CONTACT (LABORATORY STAFF ONLY)
S-1	Wash/Change	12/07/06					X				X			Date/Time: Contact: By:
S-2	Room	↓					X				X			
S-3	↓						X				X			
S-4	↓						X				X			
S-5	Cassette Rm						X				X			Date/Time: Contact: By:
S-6	Blast Chamber						X				X			
S-7	↓						X				X			
S-8	X-Ray Rm						X				X			
S-9	↓						X				X			Date/Time: Contact: By:
S-10	Muffler Bldg						X				X			
S-11	↓						X				X			
S-12	Entry Shed						X				X			
S-13	Firing Tube Shed	12/07/06					X				X			

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time RCVD: ____ / ____ / ____ @ ____ Via: _____ By (Print): _____ Sign: _____
2. Date/Time Analyzed: ____ / ____ / ____ @ ____ By (Print): _____ Sign: _____

AMA Analytical Services, Inc.
AIHA (#8863) NVLAP (#1143) NY ELAP (10920)
4475 Forbes Blvd. • Lanham, MD 20706
(301) 459-2640 • (800) 346-0961 • Fax (301) 459-2643
www.amalab.com

CHAIN OF CUSTODY

(Please Refer To This Number For Inquires) [redacted]

Mailing/Billing Information:

1. Client Name: EA Engineering
2. Address 1: 1319 Woodbridge Station Way
3. Address 2: Suite 200
4. Address 3: Edgewood, MD 21040
5. Phone #: 410-538-8202 Fax #: 410-538-8207

Submittal Information:

1. Job Name: APG - R-14 Range
2. Job Location: APG, Aberdeen, MD
3. Job #: _____ P.O. #: _____
4. Contact Person: Annalisa Marcum @ phone # 410-538-8202
5. Submitted by: Annalisa Marcum Signature: [signature]

Reporting Information (Results will be provided as soon as technically feasible):

Date & Time Results Required: 12/15/06 @ 1 pm ☐Immd. ☐24hr ☐48hr ☒72hr ☐5 Day + ☐Immd. After-Hours* ☐24hr After-Hours* ☐Late-Night* (*must be pre-scheduled)

☐ Verbals: _____ @ cell # _____ ☐ Fax Copy: _____ @ fax # _____ ☐ Email Copy: amarcum @ eaest.com

Asbestos Analysis

PCM Air – Please Indicate Filter Type:
PC MCE Porosity____ in a 25mm 37mm
☐ NIOSH 7400 ____(QTY)
☐ Fiberglass ____(QTY)

TEM Air – Please Indicate Filter Type:
PC MCE Porosity____ in a 25mm 37mm
☐ AHERA ____(QTY)
☐ NIOSH 7402 ____(QTY)
☐ Other (specify____)____(QTY)

PLM Bulk
☒ EPA 600 – Visual Estimate 15 (QTY)
☐ EPA Point Count ____(QTY)
☐ NY State Friable ____(QTY)
☐ Grav. Reduction ELAP 198.1 ____(QTY)
☐ Other (specify____)____(QTY)

TEM Bulk
☐ ELAP 198.4/Chatfield ____(QTY)
☐ NY State PLM/TEM ____(QTY)
☐ Residual Ash ____(QTY)

TEM Dust
☐ Qual. (pres/abs) Vacuum/Dust ____(QTY)
☐ Quan. (s/area) Vacuum D5755-95 ____(QTY)
☐ Quan. (s/area)Dust D6480-99 ____(QTY)

TEM Water
☐ Qual. (pres/abs) ____(QTY)
☐ ELAP 198.2/EPA 100.2 ____(QTY)
☐ EPA 100.1 ____(QTY)

Lead Analysis
☐ Paint Chip ____(QTY)
☐ Dust Wipe (wipe type____)____(QTY)
☐ Air ____(QTY)
☐ Soil/Solid ____(QTY)
☐ TCLP ____(QTY)
☐ Drinking Water ____(QTY)
☐ Waste Water ____(QTY)
☐ Dust Wipe Furnace (wipe type____)____(QTY)

Miscellaneous Analysis
☐ Radon ____(QTY)
☐ Other (specify____)____(QTY)

SAMPLE ANALYSIS INFORMATION

CLIENT ID NUMBER	SAMPLE LOCATION	DATE	VOLUME (LITERS)	WIPE AREA	ANALYSIS: TEM	PCM	PLM	LEAD	OTHER	MATRIX: AIR	BULK	WIPE	WATER AND OTHER	CLIENT CONTACT (LABORATORY STAFF ONLY)
5-14	Pump house	12/07/06					X				X			Date/Time: Contact: By:
5-15	Evaporator Tank shed	12/07/06					X				X			
														Date/Time: Contact: By:
														Date/Time: Contact: By:

LABORATORY STAFF ONLY: (CUSTODY)

1. Date/Time RCVD: ____/____/____ @ ____ Via: ____ By (Print): ____ Sign: ____
2. Date/Time Analyzed: ____/____/____ @ ____ By (Print): ____ Sign: ____

ATTACHMENT IV:

INSPECTOR CERTIFICATION

AEROSOL MONITORING & ANALYSIS, INC.

This is to certify that

ANNA-LISA MARCUM

has met the attendance requirements and successfully completed the course entitled

4-Hr EPA AHERA Inspector Refresher

For Accreditation Under TSCA Title II.

2/10/2006	*2/10/2006*	*2/10/2007*	*DAVID TRUMAN*	David Truman
Course Date	***Exam Date***	***Expiration Date***	***Principal Instructor***	
082347	*VA082347*		*E. RUSH BARNETT*	E. Rush Barnett
Certification No.	***Virginia Certification No.***		***Course Director***	

1331 Ashton Road *P.O. Box 646* *Hanover, MD 21076* *P: 410-684-3327* *F: 410-684-3724*

www.amatraining.com

APPENDIX F

INSTRUMENT QUALITY CONTROL AND CALIBRATION DATA

F1: Calibration Certificates
F2: Control Chart Data

APPENDIX F-1

CALIBRATION CERTIFICATES

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

Instrument Inventory Log

Vendor	Make	Model / Probe	S/N	Cal Cert	Date Rec'd	Date Ret'd	Comments
Ludlum	Scaler	2929	200051	5/3/07	11/30/06	12/22/06	
	Sample counter	43-10-1	PR215948	5/3/07	11/30/06		
Bicron		Micro Rem	C853F	12/22/06	11/30/06		
Ludlum	Scaler/ Ratemeter	2224	183048	6/14/07	11/30/06		+ cord
Ludlum	Survey meter	3	135696	5/3/07	11/30/06		+ cord
Ludlum	Scaler/ Ratemeter	2224-1	162426	8/23/07	11/30/06		+ cord
Ludlum	Scaler/ Ratemeter	2224-1	227246	11/7/07	11/30/06		+ cord
Ludlum	Probe	~~PR145224~~ 44-9 2nd 11/30/06	PR145224	5/3/07	11/30/06		coupled with Model 3
Ludlum	GPD	43-68	PR161781	6/14/07	11/30/06		coupled with #183048
Ludlum		43-93	PR193921	8/23/07	11/30/06		coupled with #162426
Ludlum		43-93	PR244549	11/7/07	11/30/06		coupled with #227246
RSA	Air Sampler	LV-1	2803/2541	2/8/07	11/30/06		
Ludlum	Scaler/ ratemeter	2221	216473	6/19/07	11/30/06		+ cord
Ludlum	Scaler/ ratemeter	2221	97841	6/5/07	11/30/06		+ cord
Ludlum	Data Logger	2360	184938	3/23/07	11/30/06		+ cord
Ludlum	3x3 NaI	44-20	PR220900	6/19/07	11/30/06		coupled with #216473
Ludlum	3x3 NaI	44-20	PR172518	6/5/07	11/30/06		coupled with 2nd 11/30/06 ~~#172518~~ 97841
Ludlum	GPD	43-37	PR178371	3/23/07	11/30/06		coupled with #184938
Airchek	Sampler	224-PCXR4	602729	11/27/07	11/30/06		+ charger, case
Airchek	Sampler	224-PCXR4	612207	11/27/07	11/30/06		+ charger, case
PhDLite	Atmospheric Monitor		10623	9/29/04	11/30/06		
Canon	Digital camera	PC1045	6626210797	—	11/30/06		+ charger
Trimble	GPS	Handheld unit-TSC1	0220175080	—	11/30/06		+ assoc. parts
Trimble	GPS	Hand held unit-TSC1	0220133726	—	11/30/06		+ assoc. parts

Project# 03-3040.29/03

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 254538 / 301773

Ludlum Measurements, Inc. Model 2929 Serial No. 200051

Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR215948

Cal. Date 3-May-06 Cal Due Date 3-May-07 Cal. Interval 1 Year Meterface 202-014

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 36 % Alt 698.8 mm Hg

☐ New Instrument Instrument Received ☑ Within Toler. +-10% ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☑ Mechanical ck. ☐ Window Operation

☑ Audio ck.

☑ Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 600 V = 2.40 on High Voltage dial. High Voltage set with detector connected.

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1998 V

COMMENTS:

Effs @ 4pi:
Th230 - 30.8%
Tc99 - 34.1%
SrY90 - 42.6%
Ni63 - 3.2%

Refer to plateau sheet for source info.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	39991(0)	39991(0)
	40K cpm	3999(0)	3999(0)
	4K cpm	400(0)	400(0)
	400 cpm	40(0)	40(0)
	40 cpm	4(0)	4(0)

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	39992(0)	39999(0)
	40K cpm	3999(0)	3999(0)
	4K cpm	400(0)	400(0)
	400 cpm	40(0)	40(0)
	40 cpm	4(0)	4(0)

*Uncertainty within ± 10% C.F. within ± 20%

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. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230 #5020-03 ☑ Beta S/N Tc99 #5279-01/SrY90 #4016/Ni63 #4017 ☐ Other

m 500 S/N 134709 ☐ Oscilloscope S/N ☑ Multimeter S/N 86250390

Calibrated By: W Rhein Date 3 MAY 06

Reviewed By: Michael J Thomas Date 3-May-06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C25 11/26/2003

AC Inst. Only ☑ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 215948

Customer CABRERA SERVICES

Counter 2929 Serial No. 200051

Count Time 1 Minute

Other

Order #. 254538 / 301773

Alpha Input Sensitivity 175 mV

Beta Input Sensitivity 4 mV

Beta Window 50 mV

Distance Source to Detector Tray

High Voltage	Background Alpha	Background Beta	Isotope Th 230 Size 5730 DPM Alpha	Isotope Th 230 Size 5730 DPM Beta	Isotope Tc 99 Size 28800 DPM Alpha	Isotope Tc 99 Size 28800 DPM Beta	Isotope Sr 90 Size 54306 DPM Alpha	Isotope Sr 90 Size 54306 DPM Beta
500	Ø	26	1559	131	12	4286	4	18261
525	Ø	35	1664	137	7	5689	2	21590
550	Ø	42	1630	159	15	6942	15	16942
575	Ø	54	1649	217	9	8930	4	23549
600	Ø	64	1766	346	9	9902	4	23202
625	Ø	57	1767	403	11	11115	28	21529
650	Ø	59	1743	595	7	11687	14	19275
675	Ø	82	1763	1416	10	12061	481	16874

☐ 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 W A Robin Date 3 May 06

FORM C4B 04/09/2003

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-10-1 Serial No. PR 215948

Order #. 254538 / 301773

Customer CABRERA SERVICES

Alpha Input Sensitivity 175 mV

Counter 2929 Serial No. 200051

Beta Input Sensitivity 4 mV

Count Time 1 Minute

Beta Window 50 mV

Other

Distance Source to Detector Tray

High Voltage	Background Alpha	Background Beta	Isotope Ni63 Size 291,364 DPM Alpha	Beta	Isotope Size Alpha	Beta	Isotope Size Alpha	Beta
500	Ø	26	1	35				
525	Ø	35	4	94				
550	Ø	42	1	737				
575	Ø	54	2	4044				
600	Ø	64	1	9396				
625	Ø	57	2	15308				
650	Ø	59	0	21854				
675	Ø	82	3	27958				

☐ 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 [illegible] Date 3 May 06

FORM C4B 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 247655/298001

Mfg. Bicron Model MICRO REM Serial No. C853F

Mfg. Model Serial No.

Cal. Date 22-Dec-05 Cal Due Date 22-Dec-06 Cal. Interval 1 Year Meterface 0-200µrem

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 23 % Alt 705.8 mm H

☐ 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. (Min. Volt) VDC

☐ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☑ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set V Input Sens. mV Det. Oper. V at mV Threshold Dial Ratio =

☐ 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.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	150 mR/hr	160	150
x1000	50 mR/hr	50	51
x100	15 mR/hr	155	150
x100	5 mR/hr	50	50
x10	1500 µR/hr	160	150
x10	500 µR/hr	52	50
x1	150 µR/hr	160	150
x1	100 µR/hr	95	95
x0.1	15 µR/hr	150	150
x0.1			

*Uncertainty within ± 10% C.F. within ± 20%

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 o 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 technique The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-19

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☑ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☑ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N ☐ Beta S/N ☐ Other

m 500 S/N ☐ Oscilloscope S/N ☐ Multimeter S/N

Calibrated By: Duane Jackson Date 22-Dec-05

Reviewed By: Date 23 Dec 05

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. ☐ Passed Dielectric (Hi-Pot) and Continuity Test

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SEVICES ORDER NO. 257311/303297

Mfg. Ludlum Measurements, Inc. Model 2224 Serial No. 183048

Mfg. Ludlum Measurements, Inc. Model 43-68 Serial No. PR-161781

Cal. Date 14-Jun-06 Cal Due Date 14-Jun-07 Cal. Interval 1 Year Meterface 202-783

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 51 % Alt 700.8 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. (Min. Volt) 2.2 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1650 V Input Sens. Comments mV Det. Oper. 1650 V at Comments mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

Alpha threshold=120mv
Beta threshold=3.5mv
Beta window=50mv
Overload was checked but not set.
High voltage set with detector disconnected.
Firmware#390063
Calibrated with a 5' cable.

Eff. Th230 sn:1495 ,Eff.≈ 23 % 4pi
Eff. Tc99 sn:5296-04,Eff.≈ 26 % 4pi
Eff. Ni-63 sn:4017 ,Eff.≈ 6.4 % 4pi
Eff. Sr90y90sn:4016 ,Eff.≈ 30 % 4pi
See plateau for details.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm	400	400
x1000	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

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	39974 (0)	39974 (0)	Log Scale			
	40kcpm	3997	3997				
	4kcpm	399	399				
	400cpm	40	40				
	40cpm	4	4				

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.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230sn:1495 ☑ Beta S/N Tc99sn:5296-04/Ni-63sn:4017/Sr90Y90sn:4016 ☐ Other

☑ m 500 S/N 50800 ☐ Oscilloscope S/N ☑ Multimeter S/N 83990502

Calibrated By: Charles Risk Date 14 Jun 06

Reviewed By: [illegible] Date 14 Jun 06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 11/26/2003

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR-161781 Order #. 257311/303297

Customer CABRERA SEVICES Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 183048 Beta Input Sensitivity 3.5 mV

Count Time 1Minute Beta Window 50 mV

Other w/5' cable Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Tc 99 Size 33200dpm Alpha	Isotope Tc 99 Size 33200dpm Beta	Isotope Sr90Y90 Size 59120dpm Alpha	Isotope Sr90Y90 Size 59120dpm Beta	Isotope NI-63 Size 290757dpm Alpha	Isotope NI-63 Size 290757dpm Beta
1550	0	149	6	10450	3	14688	2	19433
1575	3	198	12	11008	3	16889	2	21115
1600	3	247	19	10912	17	18070	3	20362
1625	1	289	91	10145	73	18773	3	19818
1650	3	330	369	9034	296	18250	4	19026
1675	9	359	726	7809	762	16490	79	16736

☐ 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 Charles Lisk Date 14 Jun 06

FORM C4B 04/09/2003

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-68 Serial No. PR-161781 Order #. 257311/303297

Customer CABRERA SEVICES

Alpha Input Sensitivity 120 mV

Counter 2224 Serial No. 183048

Beta Input Sensitivity 3.5 mV

Count Time 1Minute

Beta Window 50 mV

Other w/5' cable

Distance Source to Detector Surface

High Voltage	Background		Isotope Th230 Size 19800 dpm		Isotope ____ Size ____		Isotope ____ Size ____	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
1550	0	149	3668	1533				
1575	3	198	3882	1579				
1600	3	247	4068	1553				
1625	1	289	4251	1361				
1650	2	320	4523	1259				
1675	9	359	4526	1114				

☐ 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 Charles Lisb Date 14 Jun 06

FORM C4B 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 254788 / 301922

Mfg. Ludlum Measurements, Inc. Model 3 Serial No. 135696

Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR145224

Cal. Date 3-May-06 Cal Due Date 3-May-07 Cal. Interval 1 Year Meterface 202-002

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 39 % Alt 698.8 mm H

☐ 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. (Min. Volt) 2.2 VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 900 V Input Sens. 34 mV Det. Oper. 900 V at 34 mV Threshold Dial Ratio ____ = ____

☐ 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.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 100	400kcpm	4K	4K
X 100	100kcpm	1K	1K
X 10	40kcpm	4K	4K
X 10	10kcpm	1K	1K
X 1	4kcpm	4K	4K
X 1	1kcpm	1K	1K
X 0.1	400cpm	4K	4K
X 0.1	100cpm	1K	1K

*Uncertainty within ± 10% C.F. within ± 20% ALL **Range(s) Calibrated Electronically**

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
Digital Readout				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 o 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 technique The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-19

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-3

☐ Alpha S/N ____ ☐ Beta S/N ____ ☐ Other ____

m 500 S/N 189509 ☐ Oscilloscope S/N ____ ☑ Multimeter S/N 71300492

Calibrated By: Wendell Wyllum Date 3-MAY-06

Reviewed By: Michael J Thomas Date 3-May-06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. ☐ Passed Dielectric (Hi-Pot) and Continuity Test

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46
SWEETWATER, TEXAS 79556, U.S.A.

CONVERSION CHART

Customer CABRERA SERVICES Date 3-May-06 Order #. 254788 / 301922

Model 3 Serial No. 135696 Detector Model 44-9 Serial No. PR145224

Source Cs137, 1162, E552 High Voltage 900 V

Input Sensitivity 34 mV

Reference Point	"As Found" Readings (CPM): Meter Reading	Range/Scale	After Adjustment Readings (CPM): Meter Reading	Range/Scale
150 mR/hr	4.2K	x100	4.2K	x100
50 mR/hr	2K	x100	2K	x100
15 mR/hr	0.7K	x100	0.7K	x100
5 mR/hr	2.1K	x10	2.1K	x10
1.5 mR/hr	0.55K	x10	0.55K	x10
1.0 mR/hr	3K	x1	3K	x1

Signature: Wendell Williams Date 3-MAY-06

FORM C17-1A 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 261531/305134

Ludlum Measurements, Inc. Model 2224-1 Serial No. 162426

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR 193921

Cal. Date 23-Aug-06 Cal Due Date 23-Aug-07 Cal. Interval 1 Year Meterface 202-848

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 46 % Alt 701.8 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. (Min. Volt) 2.2 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

nstrument Volt Set 825 V Input Sens. comments mV Det. Oper. 825 V at comments mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 501 V Ref./Inst. 1000 / 999 V

COMMENTS:

Alpha Sens.:120mv
Beta Sens.:3.5mv
Beta Window:30mv
H.V. set with detector disconnected.
Firmware;390096
instrument calibrated with 5' cable.
EFF. for: Th230=22%, Tc99=21%, Ni63=0.13%, Sr90Y90=36%
4 pi efficiencies (refer to plateau sheet for details).
Overload set to simulate light leak.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	800k cpm	n/a	800
x1000	200k cpm		200
x100	80k cpm		800
x100	20k cpm		200
x10	8k cpm		800
x10	2k cpm		200
x1	800 cpm		800
x1	200 cpm		200

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	800kcpm	n/a	798123	Log Scale			
	80kcpm		79800				
	8kcpm		7990				
	800cpm		798				
	80cpm		80				

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.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394 ☐ 1122 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230:5020-04 ☑ Beta S/N Tc99:5279-04/Sr90Y90:5281- Ni63: 99NI220 ☐ Other

m 500 S/N 949940 ☐ Oscilloscope S/N ☑ Multimeter S/N 78401031

Calibrated By: [signature] Date 23-Aug-06

Reviewed By: [signature] Date 23-Aug-06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 06/02/2006

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR 193921

Customer CABRERA SERVICES

Counter 2224-1 Serial No. 162426

Count Time 1Minute

Other

Order #. 261531/305134

Alpha Input Sensitivity 120 mV

Beta Input Sensitivity 3.5 mV

Beta Window 30 mV

Distance Source to Detector Surface

High Voltage	Background		Isotope Tc99 Size 28,800 dpm		Isotope Sr90Y90 Size 113,696 dpm		Isotope Ni63 Size 290,376 dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
750	1	90	5	2665	8	21997	1	70
775	2	114	8	3811	4	29885	5	114
800	2	152	13	5022	1	36220	4	218
825	1	199	8	6109	1	41313	2	584
850	2	267	9	7169	2	44628	2	1309
875	1	326	5	8098	9	45677	1	2638

☐ 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 Scott Stone Date 23-Aug.06

FORM C4B 04/09/2003

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR 193921

Order #. 261531/305134

Customer CABRERA SERVICES

Alpha Input Sensitivity 120 mV

Counter 2224-1 Serial No. 162426

Beta Input Sensitivity 3.5 mV

Count Time 1Minute

Beta Window 30 mV

Other

Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Th230 Size 4395 dpm Alpha	Isotope Th230 Size 4395 dpm Beta	Isotope ____ Size ____ Alpha	Isotope ____ Size ____ Beta	Isotope ____ Size ____ Alpha	Isotope ____ Size ____ Beta
750	1	90	782	165				
775	2	114	843	206				
800	2	152	865	234				
825	1	199	944	328				
850	2	267	955	473				
875	1	326	947	501				

☐ 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 [illegible] Date 23-Aug.06

FORM C4B 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER DERRICK ALBERT - GUEST ORDER NO. 266247

Ludlum Measurements, Inc. Model 2224-1 Serial No. 227246

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR 244549

Cal. Date 7-Nov-06 Cal Due Date 7-Nov-07 Cal. Interval 1 Year Meterface 202-848

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 33 % Alt 703.8 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. (Min. Volt) 2.2 VDC

☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 800 V Input Sens. comments mV Det. Oper. 800 V at comments mV Threshold Dial Ratio = mV

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1500 / 1500 V

COMMENTS:

Alpha sensitivity = 120 mV

Beta sensitivity = 3.5 mV

Beta window = 30 mV

Overload set simulating light leak.
High Voltage set with detector connected.
Firmware #39009 n04

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	800kcpm		800
x1000	200kcpm		200
x100	80kcpm		800
x100	20kcpm		200
x10	8kcpm		800
x10	2kcpm		200
x1	800cpm		800
x1	200cpm		200

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	800kcpm		799881	Log Scale			
	80kcpm		79970				
	8kcpm		8000				
	800cpm		800				
	80cpm		80				

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. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: ☐ S-394 ☐ 1122 ☐ 781

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N 4337 Pu239 ☑ Beta S/N 918 Sr90, 635/83 Tc99 ☐ Other

m 500 S/N 141244 ☐ Oscilloscope S/N ☑ Multimeter S/N 68160950

Calibrated By: Joyce Allred Date 07-Nov-06

Reviewed By: Diana De Leon Date 7 Nov 06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 06/02/2006

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR 244549 Order #. 266247

Customer DERRICK ALBERT - GUEST Alpha Input Sensitivity 120 mV

Counter 2224-1 Serial No. 227246 Beta Input Sensitivity 3.5 mV

Count Time 1Minute Beta Window 30 mV

Other Distance Source to Detector Surface

High Voltage	Background		Isotope Pu 239 Size 30,900dpm		Isotope Sr 90+90 Size 104,634dpm		Isotope Tc 99 Size 22,900dpm	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
750	1	67	6361	317	0	17678	5	1822
775	0	107	6673	327	0	23978	3	2692
→ 800	0	127	7033	365	0	28349	3	3539
825	1	180	7157	428	1	31688	6	4551
850	1	224	7269	657	3	32986	10	5436

☐ 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 Joyce Althof Date 07-Nov-06

FORM C4B 04/09/2003

CERTIFICATE OF CALIBRATION
(AIR SAMPLER)

RSA Laboratories, Inc.
21 Pendleton Drive, P.O. Box 61
Hebron, Connecticut 06248
(860) 228-0721 Fax (860) 228-4402

Customer and Contact: **Cabrera Services, Inc., Attn: Larry Pawlus (860) 289-1885**
Customer Address: **809 Main Street, East Hartford, CT 06108**

Inst. Mfr. **F&J Specialty Products** Inst. Model **LV-1** Inst. s/n **2803**
Reference Inst. **F&J Venturi D-812** Inst. s/n **2541**

Cal. Date **08 February 2006** Due Date **08 February 2007** Cal. Interval **1 year**

Barometric Press: Actual **29.60** in. Hg Corrected to: 29.44 in. Hg
Temperature: Actual **64°F** Corrected to: 65.2°F
Filters Used: ☒Particulate ☐Charcoal/silver zeolite ☐Other:

Measurement	Air Sampler Flow Rate (LPM)	Ref. Inst. Flow Rate (LPM)	Percent Deviation
1	**19.59**	**19.93**	**1.71**
2	**39.18**	**37.87**	**-3.46**
3	**48.97**	**46.83**	**-4.56**
4	**58.76**	**55.80**	**-5.31**
5	**78.35**	**73.74**	**-6.26**
6			
7			
8			
9			
10			
11			
12			

****Average percent deviation across the range = -3.58**

This is to certify that RSA Laboratories, Inc. of Hebron, Connecticut, has on this date certified this air sampler to be within the accuracy specified above. The Reference Flow Device bears Letters of Certification traceable to the National Institute of Science and Technology. RSA Laboratories, Inc. ID# **10348**.

Calibrated by: **Kurt D. Newton** Date: **08 February 2006**

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 257193/303229

Ludlum Measurements, Inc. Model 2221 Serial No. 216473

Mfg. Ludlum Measurements, Inc. Model 44-20 Serial No. PR220900

Cal. Date 19-Jun-06 Cal Due Date 19-Jun-07 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 71 °F RH 47 % Alt 700.8 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. (Min. Volt) 4.4 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper. Comments V at Comments mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 2004 V

COMMENTS:

	Peak settings	Gross Counts
High Voltage:	715 V	1100V
Threshold dial:	642	100(10mv)
Window dial:	40	n/a
Window Position:	"IN"	"OUT"
Resolution for Cs137:	≈9.2%	n/a

Calibrated using ~~30 inch~~ cable. 5ft

Model 2221 currently set for Peak settings
Firmware: 261028
High voltage set with detector connected.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1K	400kcpm	400	400
X 1K	100kcpm	100	100
X 100	40kcpm	400	400
X 100	10kcpm	100	100
X 10	4kcpm	400	400
X 10	1kcpm	100	100
X 1	400cpm	400	400
X 1	100cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	40168(0)	40168(0)		500kcpm	500K	500K
	40kcpm	4014(0)	4014(0)		50kcpm	50K	50K
	4kcpm	401(0)	401(0)		5kcpm	5K	5K
	400cpm	40(0)	40(0)		500cpm	500	500
	40cpm	4(0)	4(0)		50cpm	55	55

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. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Am-241 ≈ 0.79uCi

m 500 S/N 57881 ☐ Oscilloscope S/N ☑ Multimeter S/N 56110559R

Calibrated By: Michael J Thomas Date 19-June-06

Reviewed By: [illegible] Date 20 Jun 06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 11/26/2003

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-20 Serial No. PR 220900

Customer CABRERA SERVICES Order #. 257193/303229

Counter 2221 Serial No. 216473 Counter Input Sensitivity 10 mV

Count Time 6sec Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am-241 Size 0.79uCi	Isotope Size	Isotope Size	Isotope Size
700	1421	1504			
750	1873	2046			
800	2026	15890			
850	2209	16451			
900	1904	19250			
950	1842	20441			
1000	1834	20660			
1050	1948	20989			
1100	1989	20823			
1150	1925	21030			
1200	1915	20816			
1250	1940	20780			
1300	2087	21121			

Signature Michael J Thomas Date 19-JUN-06

FORM C4A 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 256202 / 302712

Ludlum Measurements, Inc. Model 2221 Serial No. 97841

Mfg. Ludlum Measurements, Inc. Model 44-20 Serial No. PR-172518

Cal. Date 5-Jun-06 Cal Due Date 5-Jun-07 Cal. Interval 1 Year Meterface 202-159

Check mark ☑ applies to applicable instr. and/or detector/AW mfg. spec. T. 74 °F RH 35 % Alt 697.8 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. (Min. Volt) 4.4 VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper. Comments V at Comments mV Threshold Dial Ratio 100 = 10 mV

☑ HV Readout (2 points) Ref./Inst. 500 / 498 V Ref./Inst. 2000 / 1995 V

COMMENTS:

	Peak Settings	Gross Counts
High Voltage:	704V	1050V
Threshold:	642	100(10mV)
Window:	40	N/A
WIN Position:	"IN"	"OUT"

Firmware: 26 10 27

Overload checked but not set.
HV set w/detector connected.
Instrument currently set for Gross Counts.

Resolution for Cs137 ≈ 9.82%

Calibrated using 12' C-cable.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1K	400kcpm	390	400
X 1K	100kcpm	97	100
X 100	40kcpm	390	400
X 100	10kcpm	97	100
X 10	4kcpm	390	400
X 10	1kcpm	97	100
X 1	400cpm	390	400
X 1	100cpm	97	100

*Uncertainty within ± 10% C.F. within ± 20% ALL Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	39983(0)	39983(0)
	40kcpm	3995	3995
	4kcpm	400	400
	400cpm	40	40
	40cpm	4	4

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Log Scale	500kcpm	500K	550K
	50kcpm	45K	50K
	5kcpm	4.5K	5K
	500cpm	450	500
	50cpm	55	55

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. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☐ Alpha S/N ☐ Beta S/N ☑ Other Am241 ≈ 0.83 μCi

m 500 S/N 81084 ☐ Oscilloscope S/N ☑ Multimeter S/N 78401030

Calibrated By: Sebastn Ceballos Date 05-Jun-06

Reviewed By: [signature] Date 6 June 06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 11/26/2003

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 44-20 Serial No. PR-172518

Customer CABRERA SERVICES Order #. 256202 / 302712

Counter 2221 Serial No. 97841 Counter Input Sensitivity 10 mV

Count Time 6 sec. Distance Source to Detector Surface

Other

High Voltage	Background	Isotope Am 241 Size ≈0.83 μCi	Isotope Size	Isotope Size	Isotope Size
800V	2,391	17,749			
850	2,337	20,434			
900	2,446	22,778			
950	2,393	23,358			
1000	2,348	23,510			
* 1050	2,448	23,986			
1100	2,524	23,335			
1150	2,566	23,717			
1200	2,530	24,534			
1250	2,707	23,495			

Signature Sebastr Ceballos Date 05-Jun-06

FORM C4A 04/09/2003

Designer and Manufacturer of Scientific and Industrial Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER CABRERA SERVICES ORDER NO. 252136/300508

Ludlum Measurements, Inc. Model 2360 Serial No. 184938

Mfg. Ludlum Measurements, Inc. Model 43-37 Serial No. PR-178371

Cal. Date 23-Mar-06 Cal Due Date 23-Mar-07 Cal. Interval 1 Year Meterface 202-855

Check mark ☑ applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 709.8 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. (Min. Volt) _____ VDC
☑ Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. ☐ Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 1675 V

☑ HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 1500 / 1500 V

Firmware Version: 39010N27
Alpha Threshold: 90
Beta Threshold: 4
Beta Window: 40
Overload Checked but not set
Instrument calibrated with a 5' cable.
High voltage set with detector Disconnected

(EEPROM Settings)
User Time: 001.0
Alpha Alarm: 050000
Beta Alarm: 050000
A/B Alarm: 050000
Model 2360 Date: 03/23/2006
Calibration Date Due: 03/23/2007

COMMENTS:
4pi efficiencies(see plateau for details)
Tc-99sn:5279-04 ≈ 31.1 % Sr90Y90sn: 4016 ≈ 23.8 %
Ni-63sn: 4017 ≈ 4.8 % Th-230 sn: 121495 ≈ 20.7 %

Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X1000	400 kcpm	400	400
X1000	100 kcpm	90	90
X100	40 kcpm	400	400
X100	10 kcpm	95	95
X10	4 kcpm	400	400
X10	1 kcpm	95	95
X1	400 cpm	400	400
X1	100 cpm	90	90

*Uncertainty within ± 10% C.F. within ± 20% **Range(s) Calibrated Electronically**

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400 kcpm	40059 (0)	40059 (0)	Log Scale			
	40 kcpm	9956	9956				
	4 kcpm	4006	4006				
	400 cpm	996	996				
	40 cpm	40	40				

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. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:
Cs-137 Gamma S/N ☐ 1162 ☐ G112 ☐ M565 ☐ 5105 ☐ T1008 ☐ T879 ☐ E552 ☐ E551 ☐ 720 ☐ 734 ☐ 1616 ☐ Neutron Am-241 Be S/N T-304

☑ Alpha S/N Th230sn: 121495 ☑ Beta S/N Tc99sn: 5279-04 Sr90Y90sn: 4016 / Ni-63sn: 4017 ☐ Other

m 500 S/N 50800 ☐ Oscilloscope S/N ☑ Multimeter S/N 83990502

Calibrated By: [signature] Date 23 Mar 06

Reviewed By: Michael S Shown Date 24-Mar-06

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22S 11/26/2003

AC Inst. Only ☐ Passed Dielectric (Hi-Pot) and Continuity Test ☐ Failed:

Designer and Manufacturer of Scientific and Industrial Instruments

Revised 9 May 06 By CS

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-37 Serial No. PR-178371 Order #. 252136/300508

Customer CABRERA SERVICES Alpha Input Sensitivity 90 mV

Counter 2360 Serial No. 184938 Beta Input Sensitivity 4 mV

Count Time 1 Minute Beta Window 40 mV

Other w/5' cable Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Th 230 Size 19800 dpm Alpha	Isotope Th 230 Size 19800 dpm Beta	Isotope Ni-63 Size 291364 dpm Alpha	Isotope Ni-63 Size 291364 dpm Beta	Isotope Sr 90/Y90 Size 59453 dpm Alpha	Isotope Sr 90/Y90 Size 59453 dpm Beta
1625	3	248	3569	1345	3	11715	3	9856
1650	3	347	3772	1490	3	13272	0	12383
1675	1	394	4099	1660	6	14487	7	14567
1700	4	571	4073	1873	2	15589	13	16253
1725	4	731	4250	1996	3	15129	50	18101

☐ 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 Charles Lisk Date 23 Mar 06

FORM C4B 04/09/2003

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-37 Serial No. PR-178371

Order #. 252136/300508

Customer CABRERA SERVICES

Alpha Input Sensitivity 90 mV

Counter 2360 Serial No. 184938

Beta Input Sensitivity 4 mV

Count Time 1 Minute

Beta Window 40 mV

Other 5' cable

Distance Source to Detector Surface

High Voltage	Background Alpha	Background Beta	Isotope Tc99 Size 28800dpm Alpha	Beta	Isotope ____ Size ____ Alpha	Beta	Isotope ____ Size ____ Alpha	Beta
1625	3	248	9	7417				
1650	3	347	8	8421				
1675	1	394	16	9371				
1700	4	571	16	9511				
1725	4	731	44	9570				

☐ 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 Charles Lisk Date 23 Mar 06

FORM C4B 04/09/2003

CABRERA SERVICES
RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

Source Data Page

Source	Activity	S/N	Half Life (years)	Generation Date	Vendor
Tc-99	17,300 dpm	JAN 1130 2848-01		6/5/01	Eberline
Th-230	22,800 dpm	KMA ~~1131~~ 2897-01		6/11/01	Eberline
Sr Y-90	4500 dpm	JAN 1144 8343		5/12/04	Eberline
Cs-137	1 µCi	1139			~~The Source~~ Tennelec JD 11/30/06

Project#_____

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 3759
P.O.# 01-325

Description of Standard:

Model No. DNS-12 Serial No. 2898-01 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 2148/90.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

10,800 ± 432

The total disintegration rate (dpm) assuming 25 % backscatter of beta particles from the surface of the disc, was:

17,300 ± 692 (0.00780 μCi)

The uncertainty of the measurement is 4 %, 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: Barbara M. Friberg

Calibration Technician: Art Reust Q.A. Representative: [signature]

Calibration Date: 6-05-2001 Reviewed Date: 6/11/01

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Alpha Standard

S.O.# 3759
P.O.# 01-325

Description of Standard:

Model No. DNS-11 Serial No. 2897-01 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 2393/91.

Measurement Result:

The observed alpha particles emitted from the surface of the disc per minute (cpm) on the calibration date was:

11,400 ± 343

The total disintegration rate (dpm) assuming no backscatter of alpha particles from the surface of the disc, was:

22,800 ± 685 (0.0103 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: Barbara M. Fuhrey

Calibration Technician: Art Reust Q.A. Representative: [illegible]

Calibration Date: 6-11-2001 Reviewed Date: 6/11/01

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

EBERLINE SERVICES

CERTIFICATE OF CALIBRATION

Electroplated Beta Standard

S.O.# 6058
P.O.# 04-386

Description of Standard:

Model No. DNS-2 Serial No. 8343 Isotope SrY-90

Electroplated on polished Ni disc, 0.79 mm thick.

Total diameter of 3.18 cm and an active diameter of 2.54 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 4001-02.

Measurement Result:

The observed beta count rate from the surface of the disc per minute (cpm) on the calibration date was:

3,150 ± 126

The total disintegration rate (dpm) assuming 40 % backscatter of beta particles from the surface of the disc, was:

4,500 ± 180 (0.00203 μCi)

The uncertainty of the measurement is 4 %, 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: Deborah N. Garcia

Calibration Technician: Art Reust Q.A. Representative:

Calibration Date: 5-12-2004 Reviewed Date: 051204

Analytical Services
7021 Pan American Freeway NE
Albuquerque, New Mexico 87109-4238
(505) 345-3461 Fax (505) 761-5416
Toll Free (866) RAD-LABS (723-5227)
www.eberlineservices.com

APPENDIX F-2

CONTROL CHART DATA

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2929		Detector:	43-10-1		Calibration Date:		5/3/2006								
Serial #:			200051		Serial #:	215948		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	0.4340	Th230	2897-01	22,800	6/11/2001	7.54E+04	22,799	100	20	1	0.03	0.03	7504.3	74.69				
Beta	0.3120	SrY90	8343	4,500	5/12/2004	2.88E+01	4,230	500	20	1	34.50	1.40	1974.9	61.54				

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				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
12/5/2006	0	758	7596	2001	0.0	37.9	7596.0	1963.1	PASS	*QUESTION*	PASS	PASS	6.91	76	Yes	Yes		
12/6/2006	1	680	7663	1946	0.1	34.0	7663.0	1912.0	PASS	PASS	*QUESTION*	PASS	8.65	73	Yes	Yes		
12/7/2006	1	670	7662	1960	0.1	33.5	7662.0	1926.5	PASS	PASS	*QUESTION*	PASS	8.65	72	Yes	Yes		
12/8/2006	2	683	7599	1947	0.1	34.2	7598.9	1912.9	*QUESTION*	PASS	PASS	PASS	9.37	73	Yes	Yes		
12/11/2006	5	683	7464	1971	0.3	34.2	7463.8	1936.9	**FAIL**	PASS	PASS	PASS	10.80	73	Yes	Yes		
12/11/06-R	2	744	7464	1971	0.1	37.2	7463.9	1933.8	*QUESTION*	PASS	PASS	PASS	9.37	76	Yes	Yes		
12/12/2006	2	718	7500	2049	0.1	35.9	7499.9	2013.1	*QUESTION*	PASS	PASS	PASS	9.37	74	Yes	Yes		
12/13/2006	1	682	7555	1907	0.1	34.1	7555.0	1872.9	PASS	PASS	PASS	PASS	8.65	73	Yes	Yes		
12/14/2006	0	648	7829	2029	0.0	32.4	7829.0	1996.6	PASS	PASS	**FAIL**	PASS	6.91	71	Yes	Yes		
12/14/06-R	0	648	7717	2029	0.0	32.4	7717.0	1996.6	PASS	PASS	*QUESTION*	PASS	6.91	71	Yes	Yes		
12/15/2006	2	732	7565	2018	0.1	36.6	7564.9	1981.4	*QUESTION*	PASS	PASS	PASS	9.37	75	Yes	Yes		
12/18/2006	0	706	7519	1974	0.0	35.3	7519.0	1938.7	PASS	PASS	PASS	PASS	6.91	74	Yes	Yes		
12/19/2006	1	691	7614	1963	0.1	34.6	7614.0	1928.5	PASS	PASS	PASS	PASS	8.65	73	Yes	Yes		
12/20/2006	0	717	7632	2011	0.0	35.9	7632.0	1975.2	PASS	PASS	PASS	PASS	6.91	74	Yes	Yes		
12/21/2006	1	720	7533	2000	0.1	36.0	7533.0	1964.0	PASS	PASS	PASS	PASS	8.65	74	Yes	Yes		
12/22/2006	1	692	7475	1984	0.1	34.6	7475.0	1949.4	PASS	PASS	PASS	PASS	8.65	73	Yes	Yes		

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2360		Detector:	43-37		Calibration Date:		3/23/2006								
Serial #:			184938		Serial #:	178371		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						582												
	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	0.2310	Th-230	2897-01	22,800	6/11/2001	7.54E+04	22,799	1000	1	1	0.90	0.74	3988.6	70.35				
Beta	0.3830	SrY-90	1144	4,500	5/12/2004	2.88E+01	4,230	1000	1	1	170.40	10.17	1622.0	40.17				

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				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
12/5/2006	1	167	3998	1894	1.0	167.0	3997.0	1727.0	PASS	PASS	PASS	*QUESTION*	5.69	28	Yes	Yes		JAV
12/6/2006	0	161	4081	1785	0.0	161.0	4081.0	1624.0	PASS	PASS	PASS	PASS	2.23	28	Yes	Yes		JAV
12/7/2006	3	160	3848	1785	3.0	160.0	3845.0	1625.0	*QUESTION*	PASS	*QUESTION*	PASS	8.23	28	Yes	Yes		JAV
12/8/2006	0	160	3902	1768	0.0	160.0	3902.0	1608.0	PASS	PASS	PASS	PASS	2.23	28	Yes	Yes		JAV
12/11/2006	0	153	3806	1812	0.0	153.0	3806.0	1659.0	PASS	PASS	*QUESTION*	PASS	2.23	27	Yes	Yes		JAV
12/12/2006	3	174	3303	1099	3.0	174.0	3300.0	925.0	*QUESTION*	PASS	**FAIL**	**FAIL**	8.23	29	Yes	Yes		JAV
12/12/2006-R	3	174	3996	1710	3.0	174.0	3993.0	1536.0	*QUESTION*	PASS	PASS	*QUESTION*	8.23	29	Yes	Yes		JAV
12/13/2006	1	168	3919	1822	1.0	168.0	3918.0	1654.0	PASS	PASS	PASS	PASS	5.69	28	Yes	Yes		JAV
12/14/2006	0	152	3922	1806	0.0	152.0	3922.0	1654.0	PASS	PASS	PASS	PASS	2.23	27	Yes	Yes		JAV
12/18/2006	3	160	4107	1796	3.0	160.0	4104.0	1636.0	*QUESTION*	PASS	PASS	PASS	8.23	28	Yes	Yes		JAV
12/19/2006	3	160	4133	1901	3.0	160.0	4130.0	1741.0	*QUESTION*	PASS	*QUESTION*	*QUESTION*	8.23	28	Yes	Yes		JAV
12/20/2006	0	162	3999	1876	0.0	162.0	3999.0	1714.0	PASS	PASS	PASS	*QUESTION*	2.23	28	Yes	Yes		JAV
12/21/2006	1	151	3812	1842	1.0	151.0	3811.0	1691.0	PASS	PASS	*QUESTION*	PASS	5.69	27	Yes	Yes		JAV
																		JAV

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:			2224		Detector:	43-68		Calibration Date:		6/14/2006								
Serial #:			183048		Serial #:	161781		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						126												
	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	0.1840	Th-230	2897-01	22,800	6/11/2001	7.54E+04	22,799	1000	20	1	0.08	0.06	3186.9	79.98				
Beta	0.1580	SrY-90	1144	4,500	5/12/2004	2.88E+01	4,230	1000	20	1	14.47	1.24	943.7	21.04				

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				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
12/5/2006	3	304	3261	962	0.2	15.2	3260.9	946.8	PASS	PASS	PASS	PASS	18.57	81	Yes	Yes		
12/6/2006	3	219	3312	954	0.2	11.0	3311.9	943.1	PASS	*QUESTION*	PASS	PASS	18.57	71	Yes	Yes		
12/7/2006	0	287	3043	985	0.0	14.4	3043.0	970.7	PASS	PASS	PASS	PASS	12.94	79	Yes	Yes		
12/8/2006	0	323	3348	968	0.0	16.2	3348.0	951.9	PASS	PASS	*QUESTION*	PASS	12.94	83	Yes	Yes		

CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

Counting Instrument:	2224-1	Detector:	43-93
Serial #:	162426	Serial #:	193921
Detector Active Area or Area Covered by Smear (cm^2):	125		

Calibration Date: 8/23/2007
12 month calibration: OK

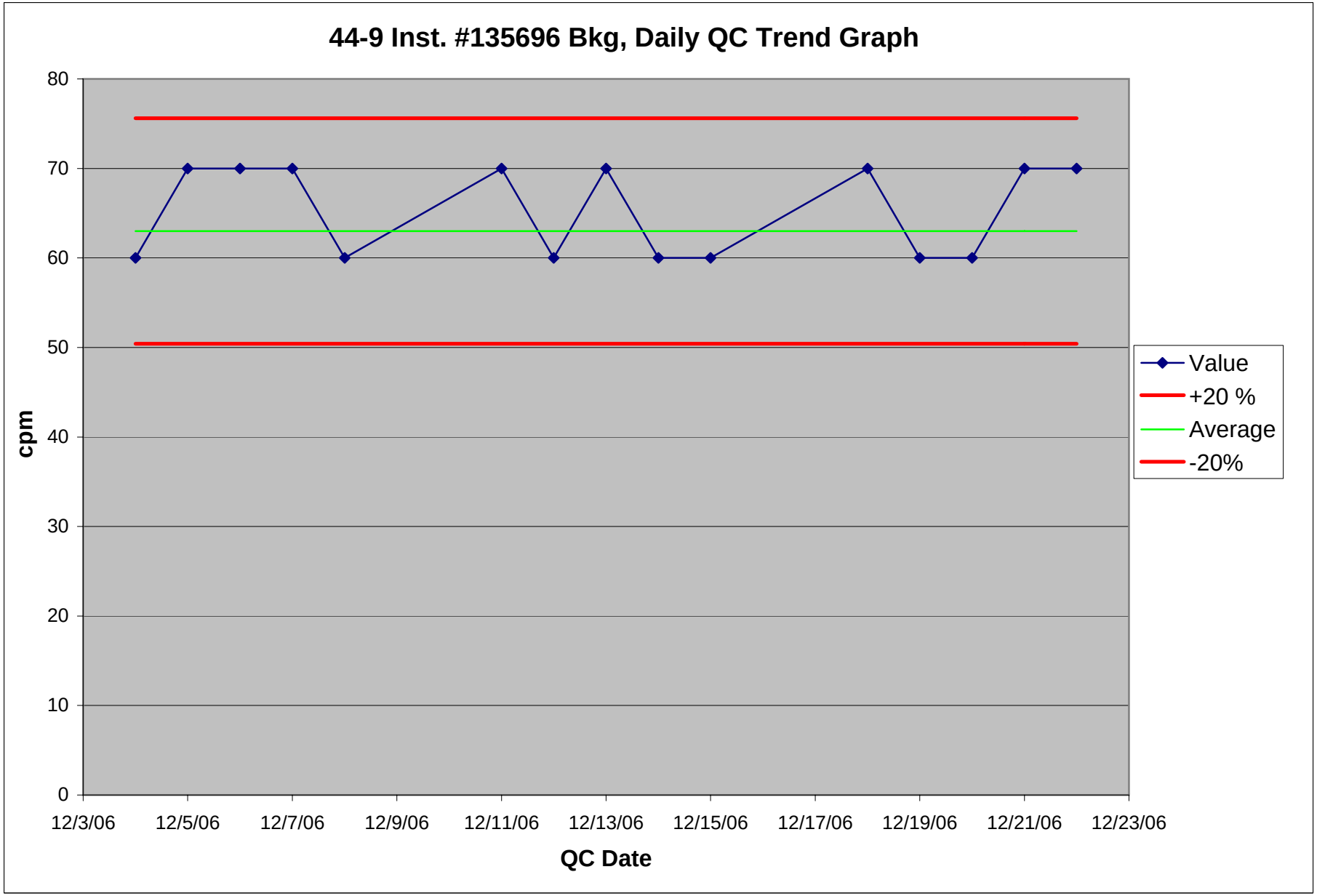
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (DPM)	Source Creation Date	$T_{1/2}$ (yr)	Source Decayed Activity	Required MDA ($DPM/100cm^2$)	Control Chart & Daily Bkg Count Time	Control Chart & Daily Source-Sample Count Time	Control Chart bkg Average α/β cpm	Control Chart bkg 1 sigma, cpm	Control Chart Source-bkg Average α/β cpm	Control Chart source 1 sigma, cpm
Alpha	0.2540	Th-230	2897-01	22,800	6/11/2001	7.54E+04	22,799	100	20	1	0.02	0.02	4399.2	59.39
Beta	0.3650	SrY-90	1144	4,500	5/12/2004	2.88E+01	4,231	1000	20	1	7.47	0.67	1686.5	35.65

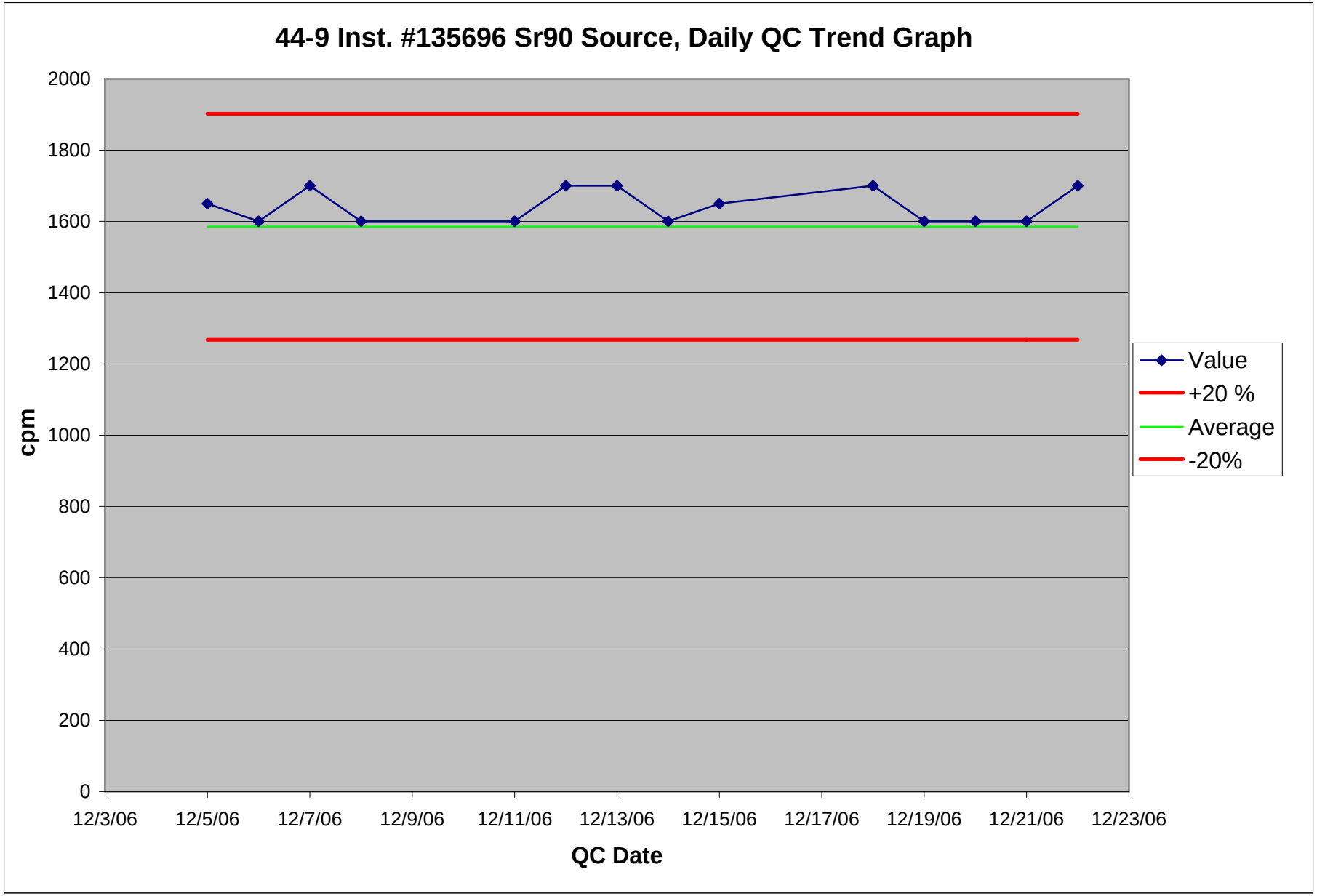
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
12/4/2006	0	151	4446	1733	0.0	7.6	4446.0	1725.5	PASS	PASS	PASS	PASS	9.45	27	Yes	Yes		JAV
12/5/2006	0	160	4470	1698	0.0	8.0	4470.0	1690.0	PASS	PASS	PASS	PASS	9.45	27	Yes	Yes		JAV
12/6/2006	1	189	4385	1686	0.1	9.5	4385.0	1676.6	PASS	*QUESTION*	PASS	PASS	11.82	29	Yes	Yes		
12/7/2006	1	166	4446	1674	0.1	8.3	4446.0	1665.7	PASS	PASS	PASS	PASS	11.82	28	Yes	Yes		
12/8/2006	0	179	4524	1709	0.0	9.0	4524.0	1700.1	PASS	*QUESTION*	*QUESTION*	PASS	9.45	29	Yes	Yes		
12/11/2006	0	181	4438	1824	0.0	9.1	4438.0	1815.0	PASS	*QUESTION*	PASS	**FAIL**	9.45	29	Yes	Yes		
12/11/2006-R	0	181	4438	1736	0.0	9.1	4438.0	1727.0	PASS	*QUESTION*	PASS	PASS	9.45	29	Yes	Yes		
12/12/2006	1	178	4419	1812	0.1	8.9	4419.0	1803.1	PASS	*QUESTION*	PASS	**FAIL**	11.82	29	Yes	Yes		

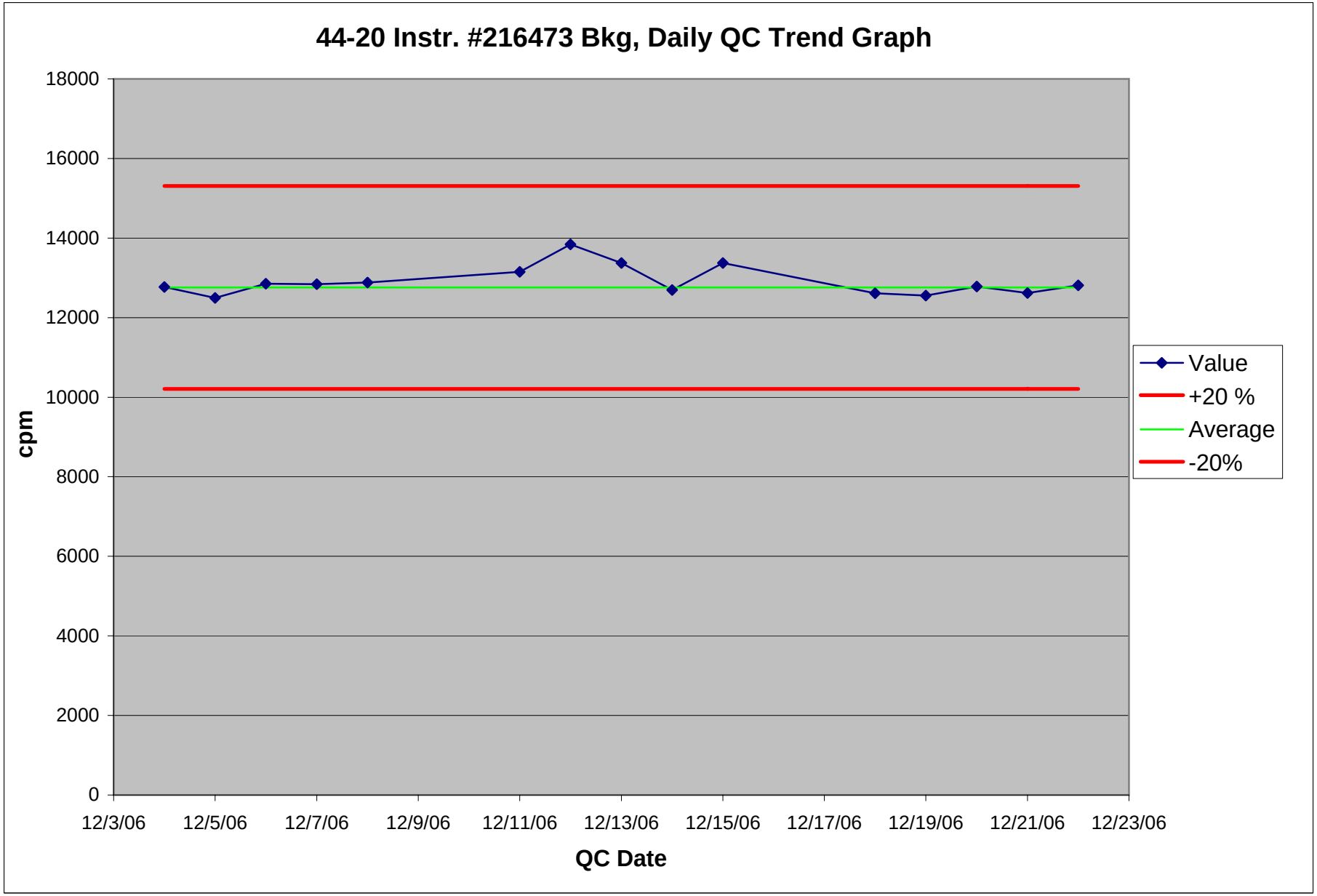
CABRERA ALPHA-BETA COUNTING INSTRUMENT (Rev 6)

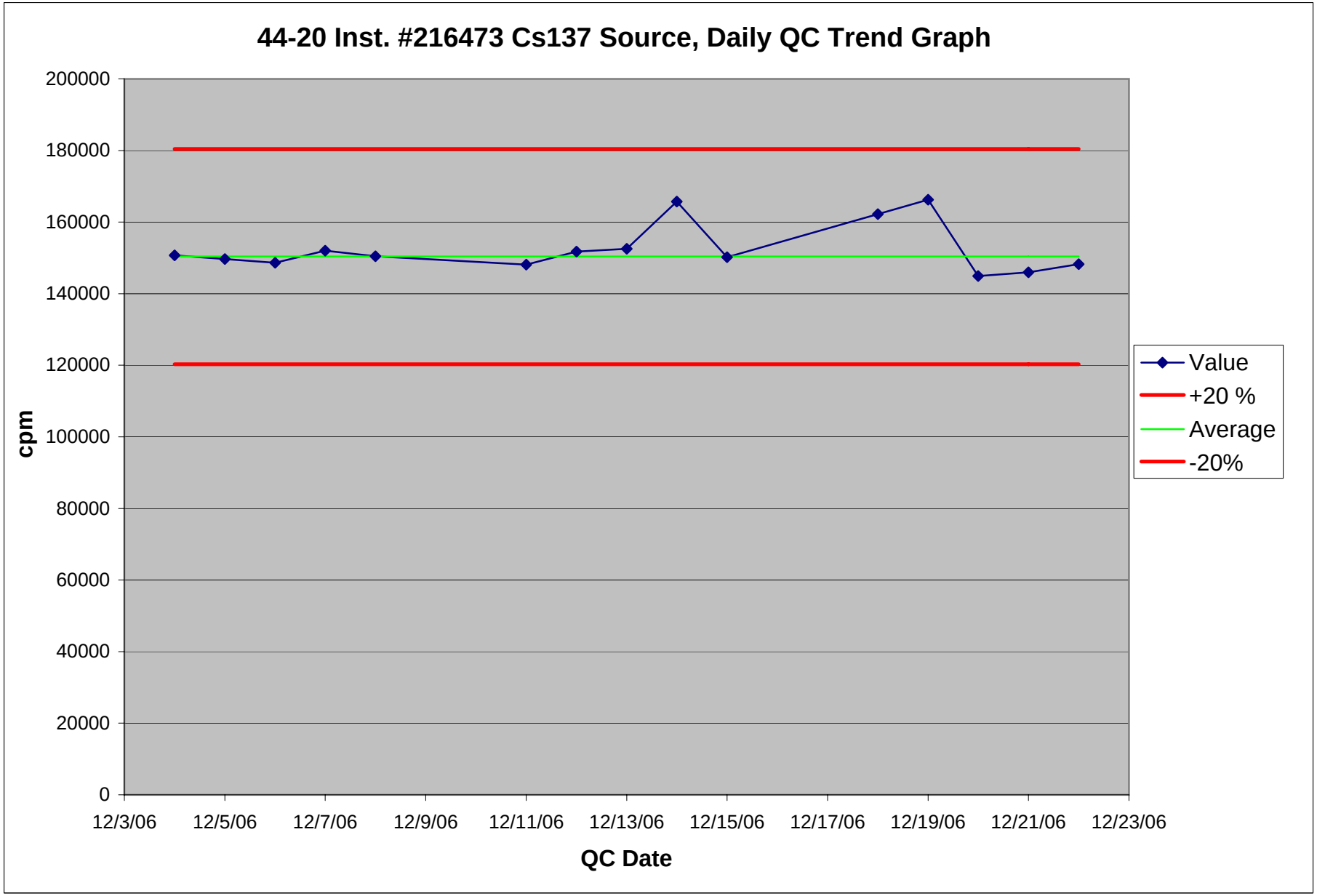
Counting Instrument:			2224-1		Detector:	43-93		Calibration Date:		11/7/2006								
Serial #:			227246		Serial #:	244549		12 month calibration:		OK								
Detector Active Area or Area Covered by Smear (cm^2):						100												
	Efficiency (fraction)	Source Nuclide	Source Number	Original Source Activity (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		Th-230	2897-01	22,800	6/11/2001	7.54E+04	22,799	100	20	1	0.03	0.04	4649.8	43.27				
Beta		SrY-90	1144	4,500	5/12/2004	2.88E+01	4,231	1000	20	1	5.57	0.26	1462.4	43.80				

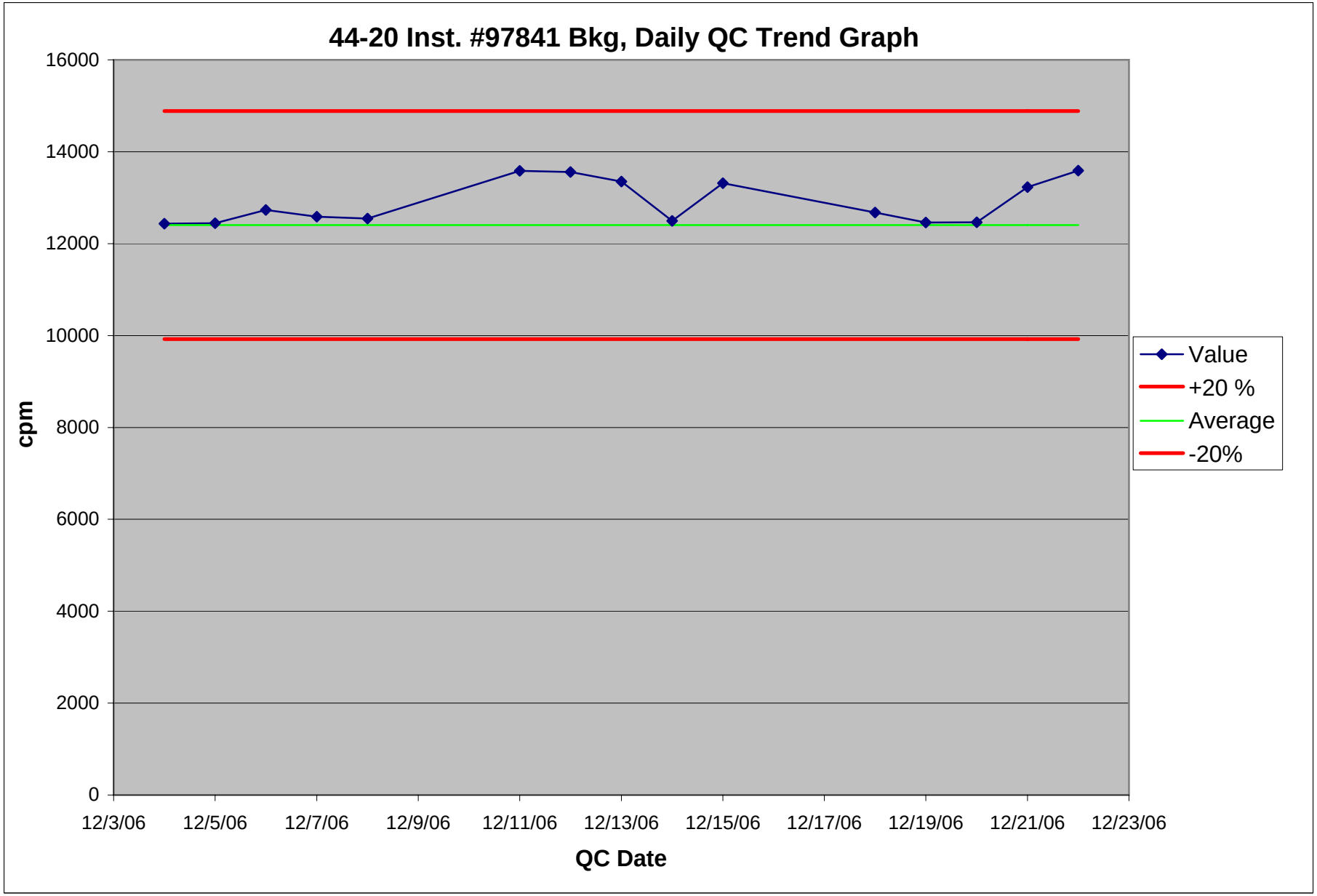
Date	Daily Bkg Counts		Daily Check Source Counts		Daily Bkg Rate (cpm)		Net Daily Source Rate (cpm)		Bkg QC Pass/Fail		Source QC Pass/Fail				α MDA OK?	β MDA OK?	H.P. Technician	Technician Initials
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta	MDA α (dpm)	MDA β (dpm)				
12/4/2006	0	118	4591	1441	0.0	5.9	4591.0	1435.1	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/5/2006	2	105	4598	1401	0.1	5.3	4597.9	1395.8	*QUESTION*	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/6/2006	0	110	4594	1456	0.0	5.5	4594.0	1450.5	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/7/2006	0	109	4634	1469	0.0	5.5	4634.0	1463.6	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/8/2006	2	124	4599	1478	0.1	6.2	4598.9	1471.8	*QUESTION*	*QUESTION*	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/11/2006	0	121	4479	1501	0.0	6.1	4479.0	1495.0	PASS	PASS	**FAIL**	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/11/06-R	0	121	4601	1501	0.0	6.1	4601.0	1495.0	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/12/2006	1	101	4654	1476	0.1	5.1	4654.0	1471.0	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/13/2006	1	100	4566	1445	0.1	5.0	4566.0	1440.0	PASS	*QUESTION*	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/14/2006	1	120	4638	1477	0.1	6.0	4638.0	1471.0	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/15/2006	2	128	4631	1532	0.1	6.4	4630.9	1525.6	*QUESTION*	**FAIL**	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/15/06-R	0	119	4631	1532	0.0	6.0	4631.0	1526.1	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/18/2006	1	121	4691	1468	0.1	6.1	4691.0	1462.0	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/19/2006	0	126	4621	1422	0.0	6.3	4621.0	1415.7	PASS	*QUESTION*	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/20/2006	0	119	4615	1437	0.0	6.0	4615.0	1431.1	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/21/2006	1	104	4596	1421	0.1	5.2	4596.0	1415.8	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
12/22/2006	0	114	4629	1489	0.0	5.7	4629.0	1483.3	PASS	PASS	PASS	PASS	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		

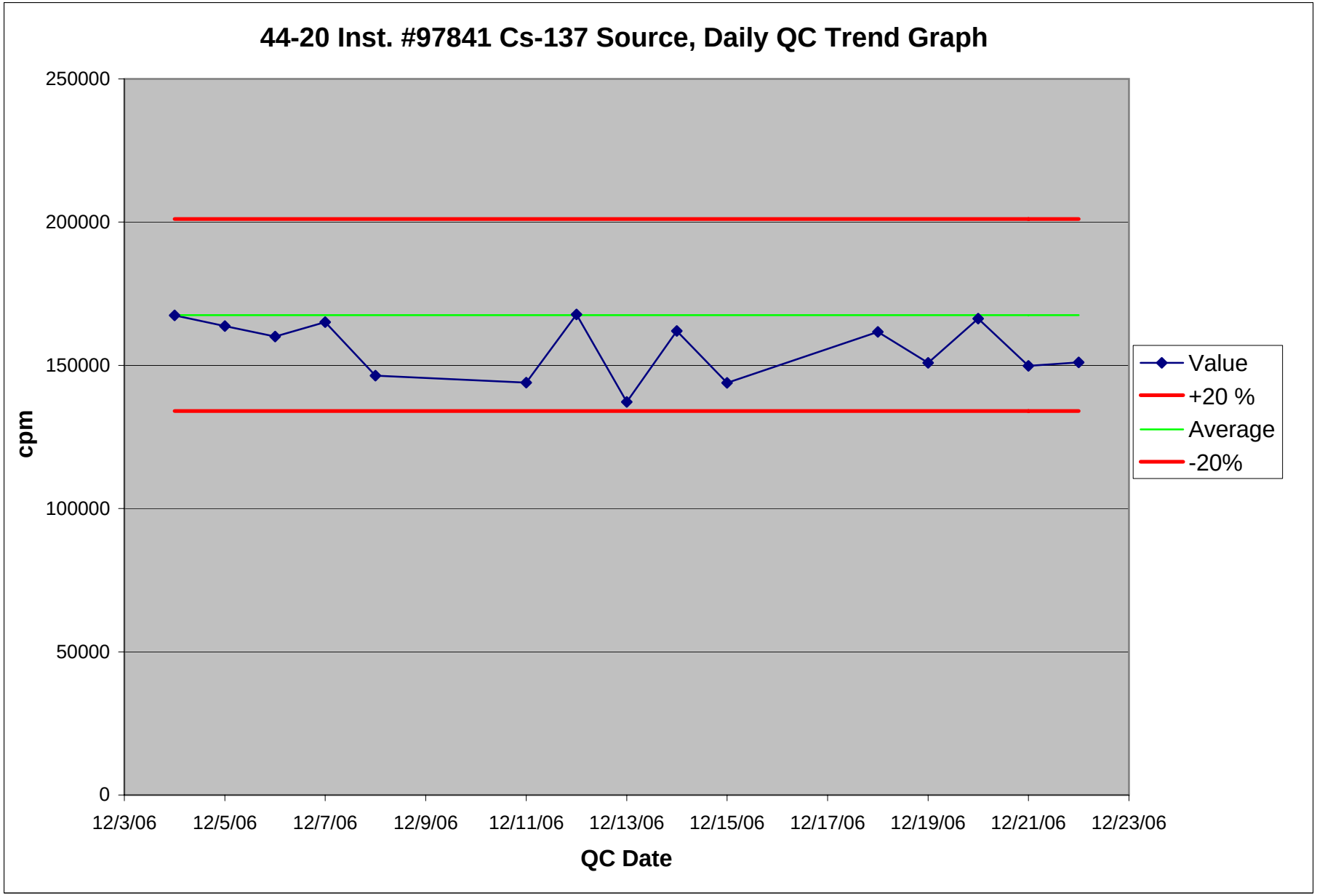

44-9 Inst. #135696 Bkg, Daily QC Trend Graph
80
70
60
50
40
30
20
10
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%


44-9 Inst. #135696 Sr90 Source, Daily QC Trend Graph
2000
1800
1600
1400
1200
1000
800
600
400
200
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%


44-20 Instr. #216473 Bkg, Daily QC Trend Graph
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%


44-20 Inst. #216473 Cs137 Source, Daily QC Trend Graph
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%


44-20 Inst. #97841 Bkg, Daily QC Trend Graph
16000
14000
12000
10000
8000
6000
4000
2000
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%


44-20 Inst. #97841 Cs-137 Source, Daily QC Trend Graph
250000
200000
150000
100000
50000
0
cpm
12/3/06
12/5/06
12/7/06
12/9/06
12/11/06
12/13/06
12/15/06
12/17/06
12/19/06
12/21/06
12/23/06
QC Date
Value
+20 %
Average
-20%

APPENDIX G

SITE PHOTOGRAPHS (ON CD)

(September/December 2006)