



**FINAL—INDEPENDENT
VERIFICATION SURVEY REPORT
FOR EXPOSURE UNITS Z2-24,
Z2-31, Z2-32, AND Z2-36 IN ZONE 2
OF THE EAST TENNESSEE
TECHNOLOGY PARK
OAK RIDGE, TENNESSEE**

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Prepared for the
U.S. Department of Energy



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Prepared by

D.A. King, CHP, PMP



Independent Environmental Assessment and Verification Program
Oak Ridge Institute Associated Universities
Oak Ridge, Tennessee

Prepared for the
U.S. Department of Energy

FINAL REPORT

OCTOBER 2013

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FINAL REPORT

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ACRONYMS

COC	contaminant of concern
cpm	counts per minute
DOE	U.S. Department of Energy
DWP	dynamic work plan
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
EU	exposure unit
GPS	global positioning system
IV	independent verification
NaI	sodium iodide
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
PCB	polychlorinated biphenyl
PCCR	phased construction completion reports
pCi/g	picocuries per gram
PSP	project-specific plan
RL	remediation level
ROD	Record of Decision
RSS	rank set sampling
SMO	Sample Management Office
SVOC	semivolatile organic compound
VOC	volatile organic compound

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1. INTRODUCTION

The U.S. Department of Energy (DOE) Oak Ridge Office of Environmental Management selected Oak Ridge Associated Universities (ORAU), through the Oak Ridge Institute for Science and Education (ORISE) contract, to perform independent verification (IV) at Zone 2 of the East Tennessee Technology Park (ETTP) in Oak Ridge, Tennessee. ORAU has concluded IV surveys, per the project-specific plan (PSP) (ORAU 2013a) covering exposure units (EUs) Z2-24, -31, -32, and -36. The objective of this effort was to verify the following.

- Target EUs comply with requirements in the Zone 2 Record of Decision (ROD) (DOE 2005), as implemented by using the dynamic verification strategy presented in the dynamic work plan (DWP) (BJC 2007)
- Commitments in the DWP were adequately implemented, as verified via IV surveys and soil sampling

The Zone 2 ROD establishes maximum remediation level (RL_{max}) values and average RL (RL_{avg}) values for the primary contaminants of concern (COCs) U-234, U-235, U-238, Cs-137, Np-237, Ra-226, Th-232, arsenic, mercury, and polychlorinated biphenyls (PCBs). Table 1.1 lists Zone 2 COCs with associated RLs. Additional radiological and chemical contaminants were also identified during past characterization and monitoring actions, though the ROD does not present RLs for these potential contaminants. IV activities focused on the identification and quantification of ROD-specific COCs in surface soils, but also generated data for other analytes to support future decisions.

ORAU personnel also reviewed EU-specific phased construction completion reports (PCCRs) to focus IV activities and identify potential judgmental sample locations, if any. These included DOE 2007 (Z2-24), DOE 2009 (Z2-36), DOE 2010a (Z2-31), and DOE 2010b (Z2-32). Detailed descriptions of characterization and remedial activities, as applicable, are presented in those documents and are not repeated here.

Table 1.1. ETTP Zone 2 Contaminants of Concern and Associated Remediation Levels

Contaminant of Concern	Average RL	Maximum RL
Arsenic	300 mg/kg	900 mg/kg
Beryllium	2,000 mg/kg	6,000 mg/kg
Mercury	600 mg/kg	1,800 mg/kg
PCBs	10 mg/kg	100 mg/kg
Cs-137	2 pCi/g	20 pCi/g
Np-237	5 pCi/g	50 pCi/g
Ra-226	5 pCi/g	15 pCi/g
Th-232	5 pCi/g	15 pCi/g
U-234	700 pCi/g	7,000 pCi/g
U-235	8 pCi/g	80 pCi/g
U-238	50 pCi/g	500 pCi/g

PCB = polychlorinated biphenyl
 RL = remediation level
 Source: Zone 2 ROD (DOE 2005)

2. SITE DESCRIPTION

In 1945, operations began at the Oak Ridge Gaseous Diffusion Plant, later known as the K-25 site and now as ETTP, in Oak Ridge, Tennessee. The original site mission was to produce uranium hexafluoride (UF₆) to various enrichments of U-235 and was executed under the guidance of the Manhattan Engineering District and Atomic Energy Commission, predecessors to DOE. To meet projected demands for enriched uranium, the Atomic Energy Commission expanded the site between 1946 and 1954. By 1985, the demand for enriched uranium had declined. The enrichment process was placed in a standby mode and was subsequently shut down in 1987. DOE's mission at the site shifted from production to environmental restoration and reindustrialization in an effort to reduce the federal footprint within the Oak Ridge Reservation.

ETTP is sub-divided into Zones 1 and 2 based on the potential for site-operations-related contamination. Zone 2 (formerly referred to as the Oak Ridge K-25 Site or the Oak Ridge Gaseous Diffusion Plant) is comprised of over 800 acres of land inside the main fence. The area contained the main plant, laboratory, administration, disposal areas, maintenance shops, and support facilities for the former plant (DOE 2004 and DOE 2005). The Zone 2 ROD specifies the division of Zone 2 into 44 EUs that range in size from 5.9 acres (EU Z2-37) to 38 acres (EU Z2-41). The four

target EUs (Z2-24, -31, -32, and -36) are all associated with the Main Plant Group, as shown in Table 2.1 and illustrated in Fig. 2.1. The listed groups facilitated data quality objective development during the Zone 2 remedial design phase of work by placing similar facilities and their support facilities together and allowing identification of data gaps.

Table 2.1. ETTP Zone 2 EU Groups and Acreages		
Exposure Unit Group	Exposure Units	Acres
K-31/K-33 Area	Z2-01, Z2-02, Z2-03, Z2-04, Z2-05, Z2-06, Z2-07, Z2-08, Z2-09, Z2-10	223.6
Poplar Creek Area	Z2-11, Z2-12, Z2-19	58.5
K-27/K-29 Area	Z2-13, Z2-14, Z2-15	60.5
North Park Area	Z2-16, Z2-17, Z2-18	62.9
K-25 Area	Z2-20, Z2-21, Z2-22, Z2-23	87.6
Main Plant Group	Z2-24, Z2-25, Z2-26, Z2-31, Z2-32, Z2-36	100.9
Haul Road Area	Z2-27, Z2-28, Z2-38	52.3
Mitchell Branch Area	Z2-29, Z2-30, Z2-35, Z2-39, Z2-44	59.7
K-1037 Area	Z2-40	13.8
K-1070-C/D and Downgradient Area	Z2-37, Z2-41	44.0
K-1200 Complex Area	Z2-42	15.5
South Park Area	Z2-33, Z2-34, Z2-43	39.7
Total acreage		819.0

Bold italics added for emphasis; modified from BJC 2007.

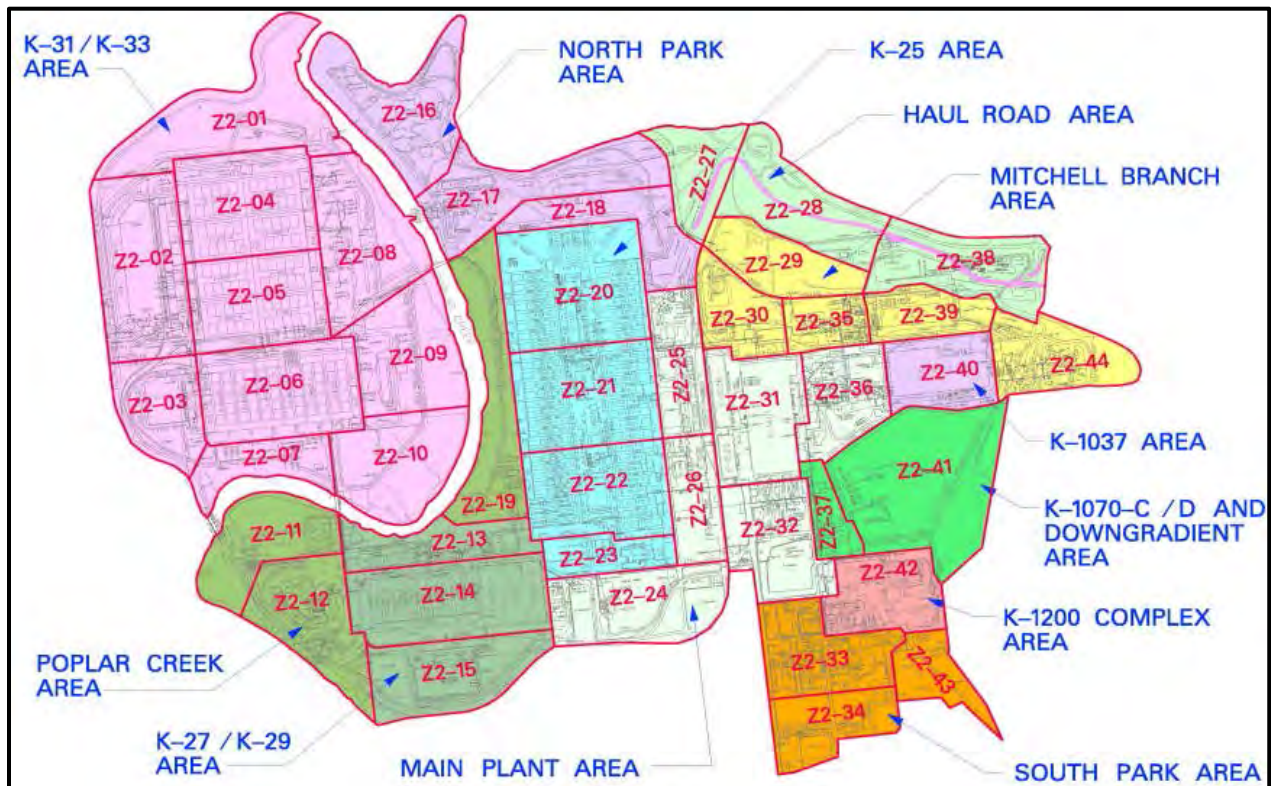


Fig. 2.1 ETTP Zone 2 Exposure Units (BJC 2007)

3. PROCEDURES

The following describes ORAU IV methods, including gamma walkover surveys, soil sampling, analytical measurements, and associated data review. Activities were performed using the PSP (ORAU 2013a), the ORAU/ORISE Survey Procedures Manual (ORAU/ORISE 2013a), and the ORAU Quality Program Manual (ORAU 2013b). Field activities were conducted from June to August of 2013 and included the collection of gamma walkover survey data, statistical/random soil sampling, and judgmental soil sampling. ORAU personnel also reviewed EU-specific PCCRs to focus IV activities and identify potential judgmental sample locations, if any.

3.1 REFERENCE SYSTEM

All survey data were referenced to global positioning system (GPS) coordinates. The specific system used was Tennessee State Plan Coordinate System, NAD 1983, meters.

3.2 GAMMA SURFACE SCANS

Gamma radiation scans of soil surfaces were conducted using a Ludlum Model 44-10 2-inch by 2-inch (2×2) sodium iodide (NaI) detector coupled with a Ludlum model 2221 ratemeter-scaler. Concurrent surveys were also performed using the “juggernaut” detection system, which includes two 4-inch by 5-inch NaI detectors coupled with Ludlum model 2221 ratemeter-scalers. Both the juggernaut and the 2×2 were mounted side-by-side on a cart and maneuvered across the EUs at a fixed height above the ground surface. Gamma detectors were coupled to the GPS data logging system that enabled real-time gamma count rate and position data capture.

3.3 SOIL SAMPLING

Surface soil samples (0–15 cm in depth) were collected from 24 random and 4 judgmental locations, though both 0–15 cm and 15–30 cm samples were collected from one judgmental location and 0–7.5 cm and 7.5–15 cm samples were collected from another judgmental location (30 total samples). Locations were either randomly selected using a rank set sampling (RSS) approach or judgmentally selected from areas exhibiting elevated NaI detector responses during gamma walkover surveys. As described in the PSP, the RSS process, following U.S. Environmental Protection Agency (EPA) guidance, was used to generate the random locations from which the soil samples were

collected (EPA 2006). One-minute static gamma measurements were collected using the 2×2 NaI detector from 18 random locations in each EU. The count data were then ranked (high, medium, or low) to determine which locations to sample and submit for laboratory analysis. After ranking those 18 measurements, 6 soil samples per EU were collected for laboratory analyses.

Sampling collection methods were consistent with Section 8.0 of the ORAU/ORISE Survey Procedures Manual (ORAU/ORISE 2013a): “Sampling Techniques.” Table 3.1 presents a summary of the containers and preservation methods used during the IV soil sampling efforts.

Table 3.1. Sample Containers and Preservation Methods		
Analysis Type	Container	Preservation
VOCs	4 oz. amber glass jar	$\leq 6^{\circ}\text{C}$ / minimize headspace
SVOCs/PCBs/PEST	8 oz. amber glass jar	$\leq 6^{\circ}\text{C}$
Metals	8 oz. amber glass jar	$\leq 6^{\circ}\text{C}$
Radionuclides	Plastic bag (~500 grams)	None

PCB = polychlorinated biphenyl
 PEST = pesticide
 SVOC = semivolatile organic compound
 VOC = volatile organic compound

4. SAMPLE ANALYSIS AND DATA EVALUATION

All surface scan data and soil samples were returned to the ORAU/ORISE facility in Oak Ridge, Tennessee for analysis and interpretation. Twelve samples were shipped to an off-site laboratory for non-radiological analyses, as described later in this report. Survey data were evaluated to determine if elevated radiation levels were present in soil, and if so, ensure that suspect areas were judgmentally sampled. Analytical results from judgmental samples were only compared to the RL_{max} values, as established by the ROD. Random samples were also compared to RL_{max} values, but were primarily used to determine mean concentrations and verify that COC concentrations across the EU do not exceed RL_{avg} values.

4.1 SAMPLE ANALYSIS

All sample analyses were performed by Oak Ridge Sample Management Office (SMO)-approved laboratories using DOE Consolidated Audit Program approved instrumentation and procedures.

Radiological analyses were specifically performed by the ORAU/ORISE Radiological and Environmental Analysis Laboratory using procedures and methodologies defined in the ORAU/ORISE Laboratory Procedures Manual (ORAU/ORISE 2013b), Sections SP3 and CP1, using germanium crystal gamma spectroscopy. Radiological decay products were used for identification and quantification of some target COCs. Table 4.1 presents a summary of the COC versus measured radionuclide (i.e., surrogates) and the gamma energy peak used to quantify soil concentrations. Radiological results were reported in units of picocuries per gram (pCi/g).

Table 4.1. Decay Products Used for Gamma Spectroscopic Analysis		
Target COC	Decay Product Used	Energy Peak (keV)
Np-237	Pa-233	311.98
Ra-226	Pb-214	351.92
Th-228	Pb-212	238.63
Th-232	Ac-228	9117
U-238	Th-234	63.29

COC = contaminant of concern

Three samples per EU were also submitted for “full-suite” analysis, which included analyses for metals, PCBs, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs). Non-radiological analyses were performed by TestAmerica Laboratory in St. Louis, Missouri. TestAmerica used current versions of EPA methodologies and procedures for the analysis of solid waste as defined by SW-846. Table 4.2 lists analysis types and their associated reference methods. Analytical results were reported in units of milligram per kilogram (mg/kg) for metals or micrograms per kilogram (µg/kg) for other chemical analytes.

Table 4.2. Analysis Types and Associated Methods		
Analysis Type	Medium	Analytical Method
VOCs	Soil	EPA Method 8260
SVOCs/PCBs/PEST	Soil	EPA Method 8260/8082/8081
Metals	Soil	EPA Method 6010/6020A

EPA = U.S. Environmental Protection Agency
 PCB = polychlorinated biphenyl
 PEST = pesticides
 SVOC = semivolatile organic compound
 VOC = volatile organic compound

The SMO will also verify 100% of the electronic data deliverables and validate (at Level III) 100% of the analytical data packages. All validated data will be submitted to the Oak Ridge Environmental Information System prior to project close. During the validation process, data were assigned appropriate validation qualifier flags, as guided by SMO procedures. These flags are described as follows:

“U”: material was analyzed for but not detected above the level of the associated value

“J”: the associated value was an estimated quantity (indicating there was cause to question the accuracy or precision of the reported data)

“UJ”: the analyte was analyzed for but not detected above the associated value; however, the reported value was an estimate and demonstrated incomplete knowledge of its accuracy or precision

“R”: the analyte value reported was unusable; the integrity of the analyte’s identification, accuracy, precision, or sensitivity raised significant questions as to the validity of the information presented

“=”: the analyte value reported was detected and the integrity of the analyte’s identification, accuracy, and precision was validated

4.2 IV DATA EVALUATION

Discussions of the results in this report are grouped by EU for comparison to Zone 2 ROD RLs. In all cases, ROD COC results are compared individually to average and maximum RLs. An exceedance of a COC-specific average RL leads to additional evaluations, including sum-of-fraction calculations. Only random (not judgmental) sample results are compared to RL_{avg} values. An exceedance of a COC-specific RL_{max} leads to a recommendation for additional remediation (BJC 2007 and Salpas 2012). Remediation levels for Ra-226 and Th-232 are net values; thus the evaluation presented here includes background subtraction. Background values are 95% upper confidence level on the mean concentration as presented in DOE 2003, specifically 1.25 pCi/g for Ra-226 and 1.95 pCi/g for Th-232.

Appendix A presents, for information purposes only, a comparison of all analytical results to associated ETTP background screening levels (DOE 2003), as applicable. ETTP background

screening levels are presented in Table 4.3. Gamma walkover survey data and maps are presented for information purposes only, as there are no established quantitative criteria for comparing walkover survey results to RLs. Survey data were used to locate gross contamination from gamma-emitting COCs, if present, and to support judgmental sampling decisions. The juggernaut responses mimicked those from the 2×2 , though the significantly larger crystal volumes produced order-of-magnitude larger detector responses. Because juggernaut responses did not offer new information or impact IV decisions, associated data are not presented in this report.

Table 4.3. ETTP-Specific Background Values

Analyte	Background mg/kg or pCi/g ^a	Analyte	Background mg/kg or pCi/g ^a
Aluminum	40,300	Nickel	26.07
Antimony	1.52	Potassium	5,074.69
Arsenic	14.95	Selenium	1.47
Barium	124.93	Silicon	1,001.04
Beryllium	2.2	Silver	0.6U
Cadmium	0.22U	Sodium	497
Calcium	2,400	Strontium	87.05
Chromium	44.88	Sulfate	334
Cobalt	42	Thallium	0.4U
Copper	22.48	Vanadium	65.47
Cyanide	0.6U	Zinc	89.7
Iron	58,600	Potassium-40	32.12
Lead	37.91	Radium-226	1.25
Lithium	48.94	Thorium-228	1.86
Magnesium	3,300	Thorium-230	1.2
Manganese	2,200	Thorium-232	1.95
Mercury	0.17	Uranium-238	1.47

^aSome background values not detected in the reference sample set, thus the “U” (e.g., 0.6U for silver)
ETTP = East Tennessee Technology Park

Appendix A also presents summary statistics for all measured analytes and are organized by EU and analyte type. The frequency of detection; location of maximum results; minimum, maximum, mean, median, and standard deviation values; and comparisons to RL_{avg} , RL_{max} , and background screening values are presented. Detections are defined in Appendix A as results, not qualified with validation flags “R,” “U,” or “UJ.” Analytical results for COCs that were not detected in an EU are not

evaluated against RLs, although the summary statistics in Appendix A were generated using all data, regardless of detection status.

5. FINDINGS AND RESULTS

The following subsections present results from field sampling investigations organized by EU, starting with the lowest numbered EU (Z2-24) and ending with the highest numbered EU (Z2-36). EU-specific discussions focus on the quantification of ROD-specific COCs and on comparing associated analytical results to RLs. Specifically, mean measured concentrations from random samples are compared to the RL_{avg} values, and maximum measured concentrations from random and judgmental samples are compared to the RL_{max} values. For ease of reference, EU-specific tables and figures are presented at the end of each respective subsection.

5.1 Z2-24

Gamma walkover survey results are illustrated in Figs. 5.1 and 5.2. Figure 5.1 presents detector responses overlying an aerial photograph of the EU, and Fig. 5.2 is a histogram of detector responses. These figures suggest the presence of up to four gamma radiation populations. Moving from left to right on Fig. 5.2, the populations are as follows: 1) the roadway and parking lot, 2) transition areas including some roadway and some soil, 3) background soil, and 4) potentially contaminated soil. Surveyors reported two areas with anomalous responses. One is located in the field near the north-central edge of the EU directly south of the Fire Station No. 4 driveway. The maximum EU measurement of 15,175 cpm was collected in this area and two judgmental samples were collected from one location. The first judgmental sample (S0027) was collected from the 0–7.5 cm interval. The count rate increased from ~14,000 cpm at the surface to ~17,000 cpm at 7.5 cm, thus a second sample (S0027A) was collected from the 7.5–15 cm interval. The detector’s response again increased to ~20,000 cpm, though a third sample was not collected. The second EU area with anomalous responses is located in the northeastern corner in the grassy “finger” across the street from the large parking lot. Judgmental sample S0028 was collected from this area.

Table 5.1 presents RSS measurement data used to select the six noted soil samples. Gamma measurements were collected at two cycles of 9 (18 total) assessment locations and the data within a given cycle-set were ranked as exhibiting the lowest, medium, or highest gamma count. As shown in

Table 5.1, a soil sample was collected in accordance with the following process within each of the two cycles: Set 1 (■), lowest gamma radiation location; Set 2 (▲), medium location; and Set 3 (●), highest location. Three of these samples were subjected to full suite analysis. Figure 5.3 illustrates the location of RSS measurements and random-plus-judgmental soil samples for this EU. Note that RSS-2-1-3 and 5212S0028 appear to be co-located when they are actually over 60 ft apart. The locations cannot be resolved at this scale, thus the symbol for the judgmental sample is shown. Table 5.2 summarizes analytical results for constituents with RLs and demonstrates that measured concentrations at all sampled locations are below RL_{avg} and RL_{max} values. Based on these data and considering the data presented in the associated PCCR (DOE 2007), ORAU has concluded that the DWP was adequately implemented and found no evidence to contradict the assertion that soils within EU Z2-24 satisfy ETPP Zone 2 ROD criteria.

Though all sampled locations contain results below RL values, additional commentary is provided for completeness to address the two judgmental locations. Neither sample from location 5212S0027 produced notable COC concentrations. The area exhibiting elevated gamma measurement data was a slight depression and could represent a sediment accumulation area. The Ra-226 concentration measured at this location represents the maximum for the study area at 1.3 pCi/g, noting the next highest value is 1.0 pCi/g from a judgmental sample in Z2-32. Uranium concentrations are also slightly elevated with U-238 reported at 3.45 pCi/g and U-235 reported at 0.30 pCi/g. The U-234 concentration was not reported (only gamma spectroscopy was performed), though the value can be estimated as follows using an approach presented in Rucker 1998.

$$\frac{^{234}\text{U}}{^{235}\text{U}} = 27.18 - 0.3004 \times \left(\frac{^{238}\text{U}}{^{235}\text{U}}\right) + 0.00143 \times \left(\frac{^{238}\text{U}}{^{235}\text{U}}\right)^2$$

where ^{23X}U values are concentrations in pCi/g

For U-238 at 3.45 pCi/g and U-235 at 0.30 pCi/g, the U-234-to-U-235 ratio is ~ 24 , and the U-234 concentration is estimated to be ~ 7.2 pCi/g. Using the same approach the sample S0028 is estimated to contain ~ 64 pCi/g of U-234, calculated using the reported values of 9.02 pCi/g for U-238 and 2.42 pCi/g for U-235. Soil from location S0028 also contained 0.66 pCi/g of Cs-137, which could have contributed to the elevated gamma measurements.



Fig. 5.1. Z2-24 Gamma Walkover Survey Map

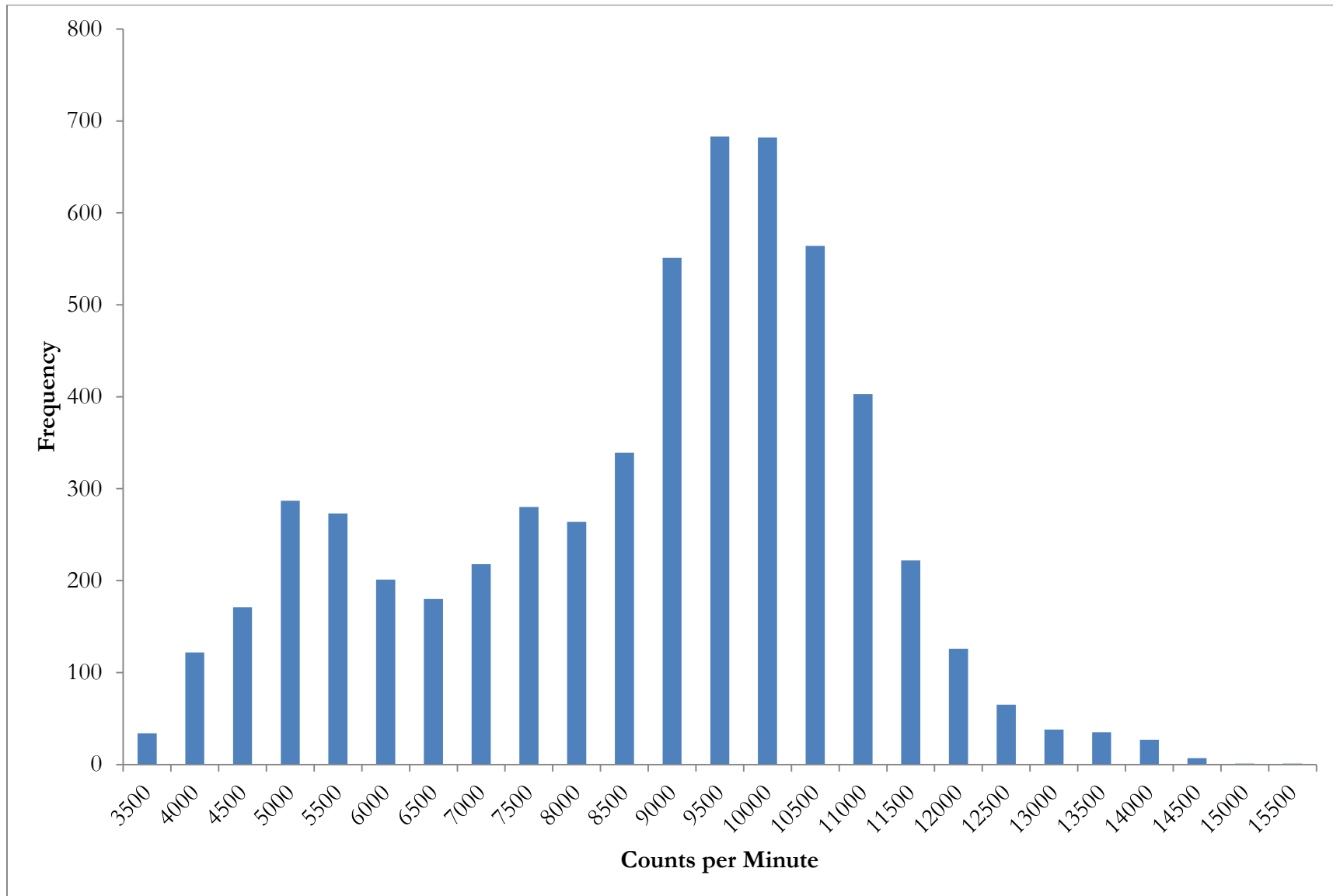


Fig. 5.2. Z2-24 Gamma Walkover Survey Histogram



Fig. 5.3. Z2-24 RSS and Sample Locations

Table 5.1. Z2-24 RSS Locations Sample Information

Easting (meters)	Northing (meters)	Cycle-Set-No.	Symbol	Meas. (cpm)	Rank (L, M, H)	Sample No.	Laboratory Analyses
744957	178388	1-1-1	■	8,956	L	—	—
745196	178467	1-1-2	■	6,466	L	5212S0001	RAD
745002	178344	1-1-3	■	10,428	L	—	—
744883	178423	1-2-1	▲	8,424	M	5212S0002	RAD
745122	178291	1-2-2	▲	8,735	M	—	—
744869	178375	1-2-3	▲	8,054	M	—	—
745062	178449	1-3-1	●	8,705	H	—	—
744942	178318	1-3-2	●	9,354	H	5212S0003	RAD, CHEM
745181	178456	1-3-3	●	8,094	H	—	—
745032	178274	2-1-1	■	5,022	L	5212S0004	RAD, CHEM
744898	178329	2-1-2	■	8,489	L	—	—
745149	178452	2-1-3	■	9,435	L	—	—
744876	178305	2-2-1	▲	8,540	M	—	—
745092	178379	2-2-2	▲	6,974	M	5212S0005	RAD, CHEM
744972	178458	2-2-3	▲	5,142	M	—	—
744866	178408	2-3-1	●	9,078	H	—	—
745114	178330	2-3-2	●	6,312	H	—	—
744864	178414	2-3-3	●	9,360	H	5212S0006	RAD

RAD = radiological analytes via gamma spectroscopic analysis

CHEM = non-radiological analytes including polychlorinated biphenyls, pesticides, semivolatile organic compounds and volatile organic compounds

Table 5.2. Z2-24 Summary Statistics and RL Evaluation

COC	Freq. of Det.	Units	Mean Value	Avg. RL	> Avg. RL? ^a	Max. Value	Max. RL	> Max. RL? ^a
Random Samples								
Arsenic	3/ 3	mg/kg	8.80	300	No	11.0	900	No
Beryllium	0/ 3	mg/kg	0.88	2,000	No	1.10	6,000	No
Mercury	0/ 3	mg/kg	0.08	600	No	0.11	1,800	No
PCB-1016	2/ 3	µg/kg	10.1	10,000	No	11.0	100,000	No
PCB-1221	1/ 3	µg/kg	10.1	10,000	No	11.0	100,000	No
PCB-1232	2/ 3	µg/kg	10.1	10,000	No	11.0	100,000	No
PCB-1242	2/ 3	µg/kg	10.1	10,000	No	11.0	100,000	No
PCB-1248	2/ 3	µg/kg	10.1	10,000	No	11.0	100,000	No
PCB-1254	3/ 3	µg/kg	6.50	10,000	No	7.00	100,000	No
PCB-1260	3/ 3	µg/kg	9.20	10,000	No	14.0	100,000	No
Cesium-137	6/ 6	pCi/g	0.29	2	No	0.64	20	No
Neptunium-237	0/ 6	pCi/g	-0.01	5	No	0.03	50	No
Radium-226	6/ 6	pCi/g	0.87	5	No	0.96	15	No
Thorium-232	6/ 6	pCi/g	1.06	5	No	1.23	15	No
Uranium-234	— ^b	pCi/g	2.10	700	No	3.75	7,000	No
Uranium-235	2/ 6	pCi/g	0.21	8	No	0.41	80	No
Uranium-238	6/ 6	pCi/g	2.10	50	No	3.75	500	No
Judgmental Samples								
Cesium-137	3/ 3	pCi/g	—	—	—	0.66	20	No
Neptunium-237	0/ 3	pCi/g	—	—	—	0.03	50	No
Radium-226	3/ 3	pCi/g	—	—	—	1.29	15	No
Thorium-232	3/ 3	pCi/g	—	—	—	1.44	15	No
Uranium-234	— ^c	pCi/g	—	—	—	63.9	7,000	No
Uranium-235	1/ 3	pCi/g	—	—	—	2.42	80	No
Uranium-238	3/ 3	pCi/g	—	—	—	9.02	500	No

^aConsidered only when the contaminant was detected; average background subtracted from Ra-226 (1.25 pCi/g) and Th-232 (1.95 pCi/g) (DOE 2003)

^bU-234 assigned U-238 concentration

^cU-234 estimated using Rucker 1998

Mean and maximum results presented in format X.XX or rounded to three significant digits.

COC = contaminant of concern

RL = remediation level

5.2 Z2-31

Gamma walkover survey results are illustrated in Figs. 5.4 and 5.5. Figure 5.4 presents detector responses overlying an aerial photograph of the EU, and Fig. 5.5 is a histogram of detector responses. These figures suggest the presence of two main gamma radiation populations—both representing background conditions. Moving from left to right on Fig. 5.5, the populations are as follows: 1) the roadways and gravel lot, and 2) background soil. Surveyors reported no anomalous responses and no judgmental samples were collected.

Table 5.3 presents RSS measurement data used to select the six noted soil samples. Three of these samples were subject to full suite analysis. Four of the samples (S0007, S0008, S0009, and S0011) were collected below the ground surface in an attempt to reach through fill material to the original excavation surface within the former Bldg. K-1401 footprint. The maximum depth reached using hand tools was 66 cm at location 5212S0011. Figure 5.6 illustrates the location of RSS measurements and random soil samples for this EU. Table 5.4 summarizes analytical results for constituents with RLs and demonstrates that measured concentrations at all sampled locations are below RL_{avg} and RL_{max} values. Based on these data and considering the data presented in the associated PCCR (DOE 2010a), ORAU has concluded that the DWP was adequately implemented and has found no evidence to contradict the assertion that soils within EU Z2-31 satisfy ETTP Zone 2 ROD criteria.



Fig. 5.4. Z2-31 Gamma Walkover Survey Map

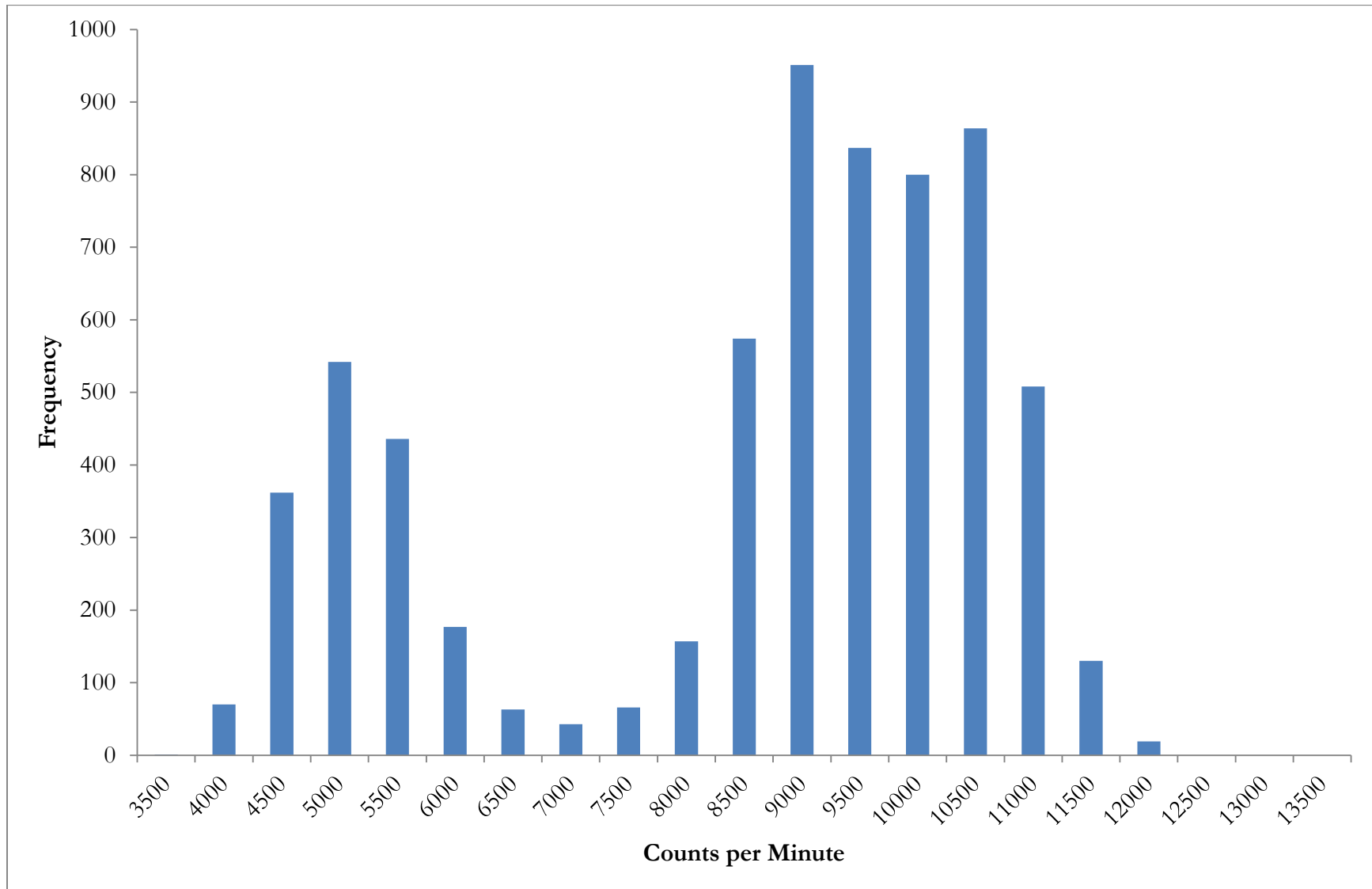


Fig. 5.5. Z2-31 Gamma Walkover Survey Histogram



Fig. 5.6. Z2-31 RSS and Sample Locations

Table 5.3. Z2-31 RSS Locations Sample Information

Easting (meters)	Northing (meters)	Cycle-Set-No.	Symbol	Meas. (cpm)	Rank (L, M, H)	Sample No.	Laboratory Analyses
745375	178926	1-1-1	■	7,983	L	5212S0007	RAD, CHEM
745255	178877	1-1-2	■	11,145	L	—	—
745343	178726	1-1-3	■	8,250	L	—	—
745275	178853	1-2-1	▲	9,188	M	—	—
745412	178984	1-2-2	▲	7,795	M	—	—
745325	178896	1-2-3	▲	9,094	M	5212S0008	RAD, CHEM
745259	179028	1-3-1	●	7,765	H	—	—
745396	178811	1-3-2	●	9,290	H	5212S0009	RAD, CHEM
745249	178949	1-3-3	●	7,957	H	—	—
745290	178700	2-1-1	■	8,710	L	—	—
745305	178743	2-1-2	■	9,755	L	—	—
745236	178876	2-1-3	■	8,396	L	5212S0010	RAD
745373	179002	2-2-1	▲	8,245	M	—	—
74534	178771	2-2-2	▲	11,852	M	—	—
745327	178898	2-2-3	▲	10,516	M	5212S0011	RAD
745408	178716	2-3-1	●	9,723	H	—	—
745276	178856	2-3-2	●	9,927	H	5212S0012	RAD
745323	178973	2-3-3	●	7,948	H	—	—

RAD = radiological analytes via gamma spectroscopic analysis

CHEM = non-radiological analytes including polychlorinated biphenyls, pesticides, semivolatile organic compounds and volatile organic compounds

Table 5.4. Z2-31 Summary Statistics and RL Evaluation

COC	Freq. of Det.	Units	Mean Value	Avg. RL	> Avg. RL? ^a	Max. Value	Max. RL	> Max. RL? ^a
Random Samples								
Arsenic	0/ 3	mg/kg	6.50	300	No	9.10	900	No
Beryllium	0/ 3	mg/kg	1.90	2,000	No	1.90	6,000	No
Mercury	0/ 3	mg/kg	0.08	600	No	0.11	1,800	No
PCB-1016	2/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1221	2/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1232	3/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1242	3/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1248	3/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1254	3/ 3	µg/kg	21.5	10,000	No	51.0	100,000	No
PCB-1260	3/ 3	µg/kg	14.8	10,000	No	31.0	100,000	No
Cesium-137	2/ 6	pCi/g	0.06	2	No	0.31	20	No
Neptunium-237	0/ 6	pCi/g	0.00	5	No	0.04	50	No
Radium-226	6/ 6	pCi/g	0.75	5	No	0.83	15	No
Thorium-232	6/ 6	pCi/g	1.15	5	No	1.69	15	No
Uranium-234	— ^b	pCi/g	1.27	700	No	1.56	7,000	No
Uranium-235	0/ 6	pCi/g	0.11	8	No	0.15	80	No
Uranium-238	6/ 6	pCi/g	1.27	50	No	1.56	500	No

^aConsidered only when the contaminant was detected; average background subtracted from Ra-226 (1.25 pCi/g) and Th-232 (1.95 pCi/g) (DOE 2003)

^bU-234 assigned U-238 concentration

Mean and maximum results presented in format X.XX or rounded to three significant digits

COC = contaminant of concern

RL = remediation level

5.3 Z2-32

Gamma walkover survey results are illustrated in Figs. 5.7 and 5.8. Figure 5.7 presents detector responses overlying an aerial photograph of the EU, and Fig. 5.8 is a histogram of detector responses. These figures suggest the presence of three gamma radiation populations, all representing background conditions. Moving from left to right on Fig. 5.8, the populations are as follows: 1) the roadway and parking lot, 2) transition areas including some roadway and some soil, and 3) background soil. The majority of the measurement data were collected in the K-1066-G storage yard, resulting in a dataset with a heavily left-skewed measurement population. Surveyors reported slight detector response anomalies in the K-1066-G storage yard and subsequently collected three judgmental samples at two locations. The first judgmental sample (S0025) was collected from the 0–15 cm depth interval in a graveled area in the center-left portion of the yard. The second judgmental sample (S0026) was collected from the 0–15 cm interval near the southeast corner of the yard. The detector response increased from ~9,600 cpm at the surface to ~12,400 cpm at 15 cm, and technicians collected a second sample (S0026A) from the 15–30 cm interval.

Table 5.5 presents RSS measurement data used to select the six noted soil samples. Three of these samples were subject to full suite analysis. Figure 5.9 illustrates the location of RSS measurements and random-plus-judgmental soil samples for this EU. Table 5.6 summarizes analytical results for constituents with RLs and demonstrates that measured concentrations at all sampled locations are below RL_{max} values. The Cs-137 result for location 5212S0017 exceeds the $2.0 \text{ pCi/g } RL_{avg}$ at 3.42 pCi/g , though the overall average of 0.68 pCi/g is below the RL_{avg} value. The U-238 and U-235 concentrations of 8.34 pCi/g and 0.75 pCi/g , respectively, suggest the presence of slightly enriched uranium. Using Rucker 1998, the U-234 concentration is estimated to be $\sim 18 \text{ pCi/g}$. These uranium concentrations are well below RLs. There were no noteworthy results reported for judgmental locations, and the relatively elevated direct gamma radiation results could be from natural variability. For example, the 1.67 pCi/g value for Th-232 (via the gamma-emitting proxy Ac-228) represents the maximum result measured during this effort. The data also suggest very slightly elevated concentrations of uranium, but well below RLs. Based on these data and considering the data presented in the associated PCCR (DOE 2010b), ORAU has concluded that the DWP was adequately implemented and has found no evidence to contradict the assertion that soils within EU Z2-32 satisfy ETIP Zone 2 ROD criteria.

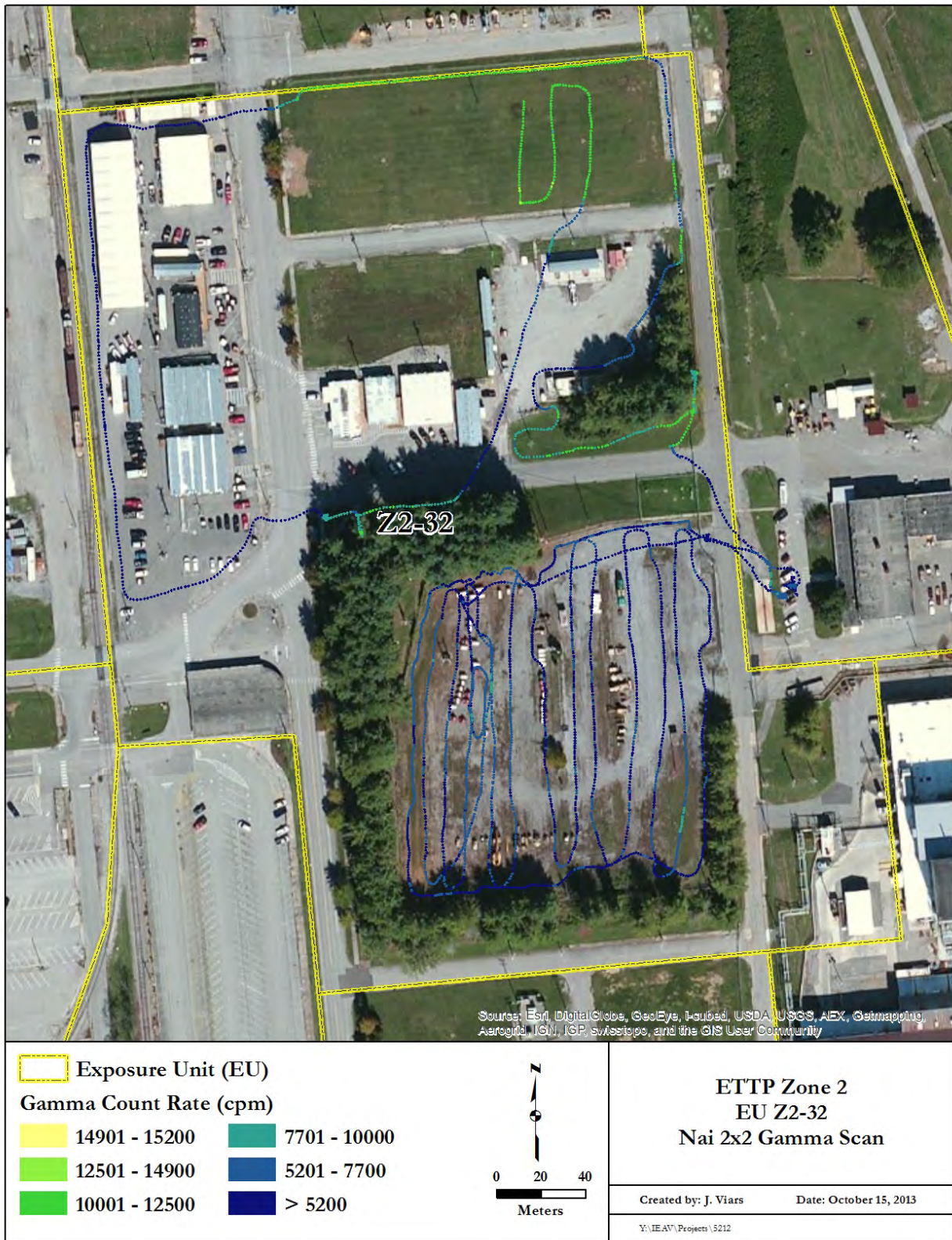


Fig. 5.7. Z2-32 Gamma Walkover Survey Map

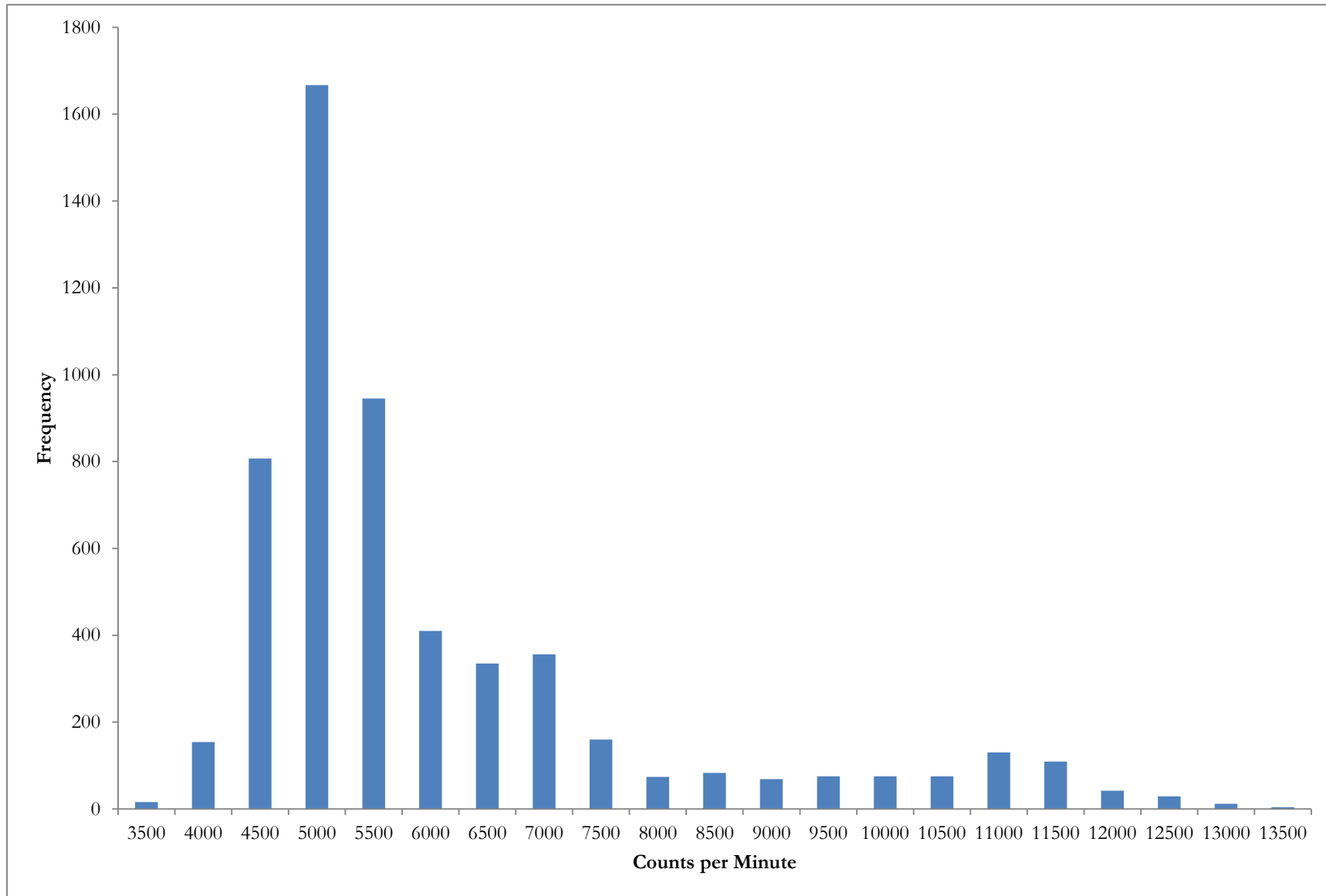


Fig. 5.8. Z2-32 Gamma Walkover Survey Histogram



Fig. 5.9. Z2-32 RSS and Sample Locations

Table 5.5. Z2-32 RSS Locations Sample Information

Easting (meters)	Northing (meters)	Cycle-Set-No.	Symbol	Meas. (cpm)	Rank (L, M, H)	Sample No.	Laboratory Analyses
745294	178526	1-1-1	■	8,101	L	—	—
745424	178635	1-1-2	■	7,195	L	—	—
745330	178422	1-1-3	■	4,467	L	5212S0013	RAD, CHEM
745281	178651	1-2-1	▲	7,760	M	5212S0014	RAD, CHEM
745388	178460	1-2-2	▲	4,611	M	—	—
745313	178542	1-2-3	▲	9,423	M	—	—
745427	178511	1-3-1	●	4,593	H	—	—
745349	178626	1-3-2	●	9,014	H	—	—
745505	178434	1-3-3	●	9,086	H	5212S0015	RAD
745364	178664	2-1-1	■	11,019	L	—	—
745298	178500	2-1-2	■	8,649	L	—	—
745442	178587	2-1-3	■	5,599	L	5212S0016	RAD
745325	178490	2-2-1	▲	8,480	M	5212S0017	RAD
745383	178528	2-2-2	▲	7,865	M	—	—
745310	178648	2-2-3	▲	10,110	M	—	—
745461	178451	2-3-1	●	5,515	H	—	—
745290	178595	2-3-2	●	7,802	H	—	—
745422	178681	2-3-3	●	11,350	H	5212S0018	RAD, CHEM

RAD = radiological analytes via gamma spectroscopic analysis

CHEM = non-radiological analytes including polychlorinated biphenyls, pesticides, semivolatile organic compounds and volatile organic compounds

Table 5.6. Z2-32 Summary Statistics and RL Evaluation

COC	Freq. of Det.	Units	Mean Value	Avg. RL	> Avg. RL? ^a	Max. Value	Max. RL	> Max. RL? ^a
Random Samples								
Arsenic	2/ 3	mg/kg	8.03	300	No	11.0	900	No
Beryllium	3/ 3	mg/kg	0.89	2,000	No	1.00	6,000	No
Mercury	0/ 3	mg/kg	0.12	600	No	0.17	1,800	No
PCB-1016	0/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1221	0/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1232	0/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1242	0/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1248	0/ 3	µg/kg	10.7	10,000	No	11.0	100,000	No
PCB-1254	1/ 3	µg/kg	151	10,000	No	420	100,000	No
PCB-1260	1/ 3	µg/kg	82.6	10,000	No	220	100,000	No
Cesium-137	4/ 6	pCi/g	0.68	2	No	3.42	20	No
Neptunium-237	0/ 6	pCi/g	0.00	5	No	0.03	50	No
Radium-226	6/ 6	pCi/g	0.82	5	No	0.98	15	No
Thorium-232	6/ 6	pCi/g	1.1	5	No	1.35	15	No
Uranium-234	— ^b	pCi/g	2.9	700	No	18.0	7,000	No
Uranium-235	1/ 6	pCi/g	0.24	8	No	0.75	80	No
Uranium-238	6/ 6	pCi/g	2.9	50	No	8.34	500	No
Judgmental Samples								
Cesium-137	0/ 3	pCi/g	—	—	—	0.02	20	No
Neptunium-237	0/ 3	pCi/g	—	—	—	<0.01	50	No
Radium-226	3/ 3	pCi/g	—	—	—	1.01	15	No
Thorium-232	3/ 3	pCi/g	—	—	—	1.67	15	No
Uranium-234	— ^b	pCi/g	—	—	—	2.07	7,000	No
Uranium-235	0/ 3	pCi/g	—	—	—	0.17	80	No
Uranium-238	3/ 3	pCi/g	—	—	—	2.07	500	No

^aConsidered only when the contaminant was detected; average background subtracted from Ra-226 (1.25 pCi/g) and Th-232 (1.95 pCi/g) (DOE 2003)

^bU-234 assigned U-238 concentration (average and judgmental) or estimated per Rucker 1998 (maximum random). Mean and maximum results presented in format X.XX or rounded to three significant digits

COC = contaminant of concern

RL = remediation level

5.4 Z2-36

Gamma walkover survey results are illustrated in Figs. 5.10 and 5.11. Figure 5.10 presents detector responses overlying an aerial photograph of the EU, and Fig. 5.11 is a histogram of detector responses. These figures suggest the presence of three main gamma radiation populations representing background conditions. Moving from left to right on Fig. 5.11, the populations are as follows: 1) the roadway and parking lot, 2) transition areas including some roadway and some soil, and 3) background soil. Surveyors reported no anomalous responses and no judgmental samples were collected. Detector responses in the northeast corner of the EU were slightly elevated, though those results are very likely due to licensed radiological material maintained in the Babcock Services facility and not from environmental contamination.

Table 5.7 presents RSS measurement data used to select the six noted soil samples. Three of these samples were subject to full suite analysis. Figure 5.12 illustrates the location of RSS measurements and random soil samples for this EU. Table 5.8 summarizes analytical results for constituents with RLs and demonstrates that measured concentrations at all sampled locations are below RL_{avg} and RL_{max} values. Based on these data and considering the data presented in the associated PCCR (DOE 2009), ORAU has concluded that the DWP was adequately implemented and has found no evidence to contradict the assertion that soils within EU Z2-36 satisfy ETTP Zone 2 ROD criteria.



Fig. 5.10. Z2-36 Gamma Walkover Survey Map

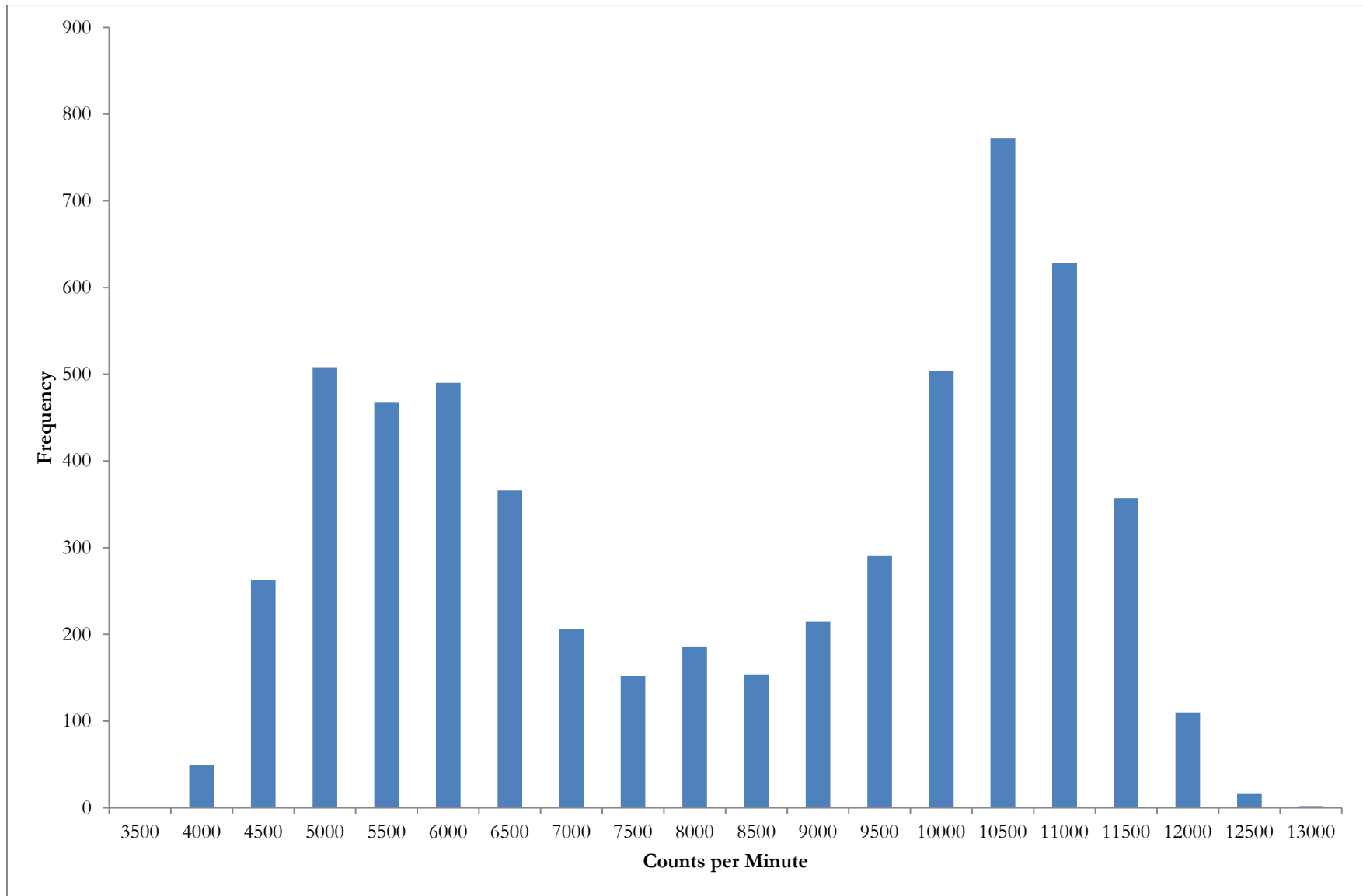


Fig. 5.11. Z2-36 Gamma Walkover Survey Histogram



Fig. 5.12. Z2-36 RSS and Sample Locations

Table 5.7. EU Z2-36 RSS Locations Sample Information

Easting (meters)	Northing (meters)	Cycle-Set-No.	Symbol	Meas. (cpm)	Rank (L, M, H)	Sample No.	Laboratory Analyses
745443	179052	1-1-1	■	6,670	L	5212S0019	RAD, CHEM
745507	178879	1-1-2	■	10,115	L	—	—
745634	178990	1-1-3	■	6,821	L	—	—
745427	178804	1-2-1	▲	10,520	M	—	—
745554	178916	1-2-2	▲	9,777	M	5212S0020	RAD
745491	179027	1-2-3	▲	8,191	M	—	—
745443	178979	1-3-1	●	6,937	H	—	—
745586	179064	1-3-2	●	8,006	H	5212S0021	RAD, CHEM
745524	178817	1-3-3	●	6,649	H	—	—
745461	178928	2-1-1	■	8,235	L	—	—
745588	179040	2-1-2	■	6,390	L	5212S0022	RAD
745429	178854	2-1-3	■	9,524	L	—	—
745556	178965	2-2-1	▲	7,737	M	5212S0023	RAD, CHEM
745540	178982	2-2-2	▲	5,211	M	—	—
745477	178796	2-2-3	▲	10,508	M	—	—
745603	178907	2-3-1	●	7,529	H	—	—
745445	179019	2-3-2	●	5,154	H	—	—
745572	178833	2-3-3	●	11,223	H	5212S0024	RAD

RAD = radiological analytes via gamma spectroscopic analysis

CHEM = non-radiological analytes including polychlorinated biphenyls, pesticides, semivolatile organic compounds and volatile organic compounds

Table 5.8. Z2-36 Summary Statistics and RL Evaluation

COC	Freq. of Det.	Units	Mean Value	Avg. RL	> Avg. RL? ^a	Max. Value	Max. RL	> Max. RL? ^a
Random Samples								
Arsenic	3/ 3	mg/kg	6.00	300	No	8.50	900	No
Beryllium	0/ 3	mg/kg	0.53	2,000	No	0.81	6,000	No
Mercury	0/ 3	mg/kg	0.07	600	No	0.10	1,800	No
PCB-1016	2/ 3	ug/kg	10.6	10,000	No	11.0	100,000	No
PCB-1221	2/ 3	ug/kg	10.6	10,000	No	11.0	100,000	No
PCB-1232	2/ 3	ug/kg	10.6	10,000	No	11.0	100,000	No
PCB-1242	0/ 3	ug/kg	10.6	10,000	No	11.0	100,000	No
PCB-1248	2/ 3	ug/kg	10.6	10,000	No	11.0	100,000	No
PCB-1254	0/ 3	ug/kg	6.67	10,000	No	6.90	100,000	No
PCB-1260	2/ 3	ug/kg	50.6	10,000	No	130	100,000	No
Cesium-137	5/ 6	pCi/g	0.12	2	No	0.28	20	No
Neptunium-237	0/ 6	pCi/g	0.02	5	No	0.05	50	No
Radium-226	6/ 6	pCi/g	0.76	5	No	0.94	15	No
Thorium-232	6/ 6	pCi/g	1.21	5	No	1.43	15	No
Uranium-234	— ^b	pCi/g	1.55	700	No	2.53	7,000	No
Uranium-235	0/ 6	pCi/g	0.12	8	No	0.19	80	No
Uranium-238	6/ 6	pCi/g	1.55	50	No	2.53	500	No

^aConsidered only when the contaminant was detected; average background subtracted from Ra-226 (1.25 pCi/g) and Th-232 (1.95 pCi/g) (DOE 2003)

^bU-234 assigned U-238 concentration

Mean and maximum results presented in format X.XX or rounded to three significant digits

COC = contaminant of concern

RL = remediation level

6. CONCLUSIONS

ORAU conducted IV surveys in support of DOE’s remediation efforts in Zone 2 of ETTP in Oak Ridge, Tennessee. IV activities included a review of EU-specific PCCRs, gamma walkover surveys, and soil sample collection/analysis over four EUs. Several isolated areas with gamma radiation in excess of ambient background levels were identified. However, soil samples collected from these judgmental locations as well as the random samples, demonstrated that concentrations were below the maximum concentration RLs and that the average RLs for each EU were satisfied. Based on this evidence, ORAU has concluded that the DWP was adequately implemented and has found no evidence to contradict the assertion that soils within subject EUs satisfy ETTP Zone 2 ROD criteria.

Table 6.1. Summary of IV Findings

EU	Exceeds Avg. RL	Exceeds Max. RL	Satisfied ROD Criteria	Comments
24	No	No	Yes	Low levels of enriched uranium were detected in two small areas, though concentrations are well below RLs.
31	No	No	Yes	—
32	No	No	Yes	One Cs-137 value at a random location exceeds the 2.0 pCi/g RL_{avg} but the overall EU average is well below the limit. Low levels of enriched uranium were detected in one small area, though concentrations are well below RLs.
36	No	No	Yes	—

EU = exposure unit
 RL = remediation level
 ROD = Record of Decision

7. REFERENCES

- BJC 2007. *Zone 2 Dynamic Work Plan, East Tennessee Technology Park, Oak Ridge, Tennessee*. Bechtel Jacobs Company, LLC. Oak Ridge, Tennessee. January.
- DOE 2003. *Soil Background Supplemental Data Set for the East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2105&D1. U.S. Department of Energy Office of Environmental Management. September.
- DOE 2004. *Proposed Plan for Contaminated Soil, Buried Waste, and Subsurface Structures in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2110&D3. U.S. Department of Energy Office of Environmental Management. July.
- DOE 2005. *Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2161&D2. U.S. Department of Energy Office of Environmental Management, Oak Ridge, Tennessee.
- DOE 2007. *Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2723&D1. U.S. Department of Energy Office of Environmental Management, Oak Ridge, Tennessee. September.
- DOE 2009. *Fiscal Year 2009 Phased Construction Completion Report for EU Z2-36 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2399&D1. U.S. Department of Energy Office of Environmental Management, Oak Ridge, Tennessee. March.
- DOE 2010a. *Fiscal Year 2010 Phased Construction Completion Report for EU Z2-31 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2443&D2. U.S. Department of Energy Office of Environmental Management, Oak Ridge, Tennessee. August.
- DOE 2010b. *Fiscal Year 2010 Phased Construction Completion Report for EU Z2-32 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/OR/01-2443&D1. U.S. Department of Energy Office of Environmental Management, Oak Ridge, Tennessee. February.
- EPA 2006. *Data Quality Assessment: Statistical Methods for Practitioners*. EPA QA/G-9S. U.S. Environmental Protection Agency. Washington, DC. February.
- ORAU 2013a. *Project-Specific Plan for the Independent Verification Survey of Select Zone 2 Exposure Units at the East Tennessee Technology Park, Oak Ridge, Tennessee*. Oak Ridge Associated Universities. Oak Ridge, Tennessee. May 29.
- ORAU 2013b. *Quality Program for the Independent Environmental Assessment and Verification Program*. Oak Ridge Associated Universities. Oak Ridge, Tennessee. August 15.
- ORAU/ORISE 2013a. *Survey Procedures Manual for the Independent Environmental Assessment and Verification Program*. Prepared by Oak Ridge Associated Universities under the Oak Ridge Institute for Science and Education contract. Oak Ridge, Tennessee. January 18.

ORAU/ORISE 2013b. *Laboratory Procedures Manual for the Independent Environmental Assessment and Verification Program*. Prepared by Oak Ridge Associated Universities under the Oak Ridge Institute for Science and Education contract. Oak Ridge, Tennessee. August 15.

Rucker, T.L. and Johnson Jr., C.M. 1998. "Relationship between isotopic uranium activities and total uranium at various uranium enrichments," *Journal of Radioanalytical and Nuclear Chemistry*, Vol. 235, Nos 1-2, pgs 47-52.

Salpas, Peter 2012. E-mail from Peter Salpas to Donald Dunning titled "ETTP Zone 1 & 2 Questions" explaining why sum-of-fractions is not used at the East Tennessee Technology Park for demonstrating compliance with Records of Decision. July 30.

APPENDIX A
ANALYTICAL DATA SUMMARY STATISTICS AND ZONE 2 THRESHOLDS

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
24	METAL	Aluminum	3/ 3	mg/kg	5212S0003A	11000	14000	12000	11000	1732.0508		No		No	40300	No
24	METAL	Antimony	3/ 3	mg/kg	5212S0005A	1.5	2.1	1.73	1.6	0.3215		No		No	1.52	Yes
24	METAL	Arsenic	3/ 3	mg/kg	5212S0005A	7.5	11	8.8	7.9	1.9157	300	No	900	No	14.95	No
24	METAL	Barium	3/ 3	mg/kg	5212S0003A	47	180	96.67	63	72.6108		No		No	125	Yes
24	METAL	Beryllium	0/ 3	mg/kg		0.56	1.1	0.88	0.99	0.2854	2000	No	6000	No	2.2	No
24	METAL	Boron	0/ 3	mg/kg		3.7	17	11.9	15	7.1715		No		No	2.2	Yes
24	METAL	Cadmium	0/ 3	mg/kg		0.19	0.25	0.22	0.23	0.0306		No		No	0.22	Yes
24	METAL	Calcium	3/ 3	mg/kg	5212S0004A	1400	84000	34133.33	17000	43884.5455		No		No	2400	Yes
24	METAL	Chromium	0/ 3	mg/kg		9.4	17	13.47	14	3.828		No		No	44.88	No
24	METAL	Cobalt	0/ 3	mg/kg		8.4	13	10.8	11	2.3065		No		No	42	No
24	METAL	Copper	0/ 3	mg/kg		12	60	29	15	26.8887		No		No	22.48	Yes
24	METAL	Iron	3/ 3	mg/kg	5212S0005A	12000	34000	22000	20000	11135.5287		No		No	58600	No
24	METAL	Lead	0/ 3	mg/kg		24	39	30	27	7.9373		No		No	37.91	Yes
24	METAL	Lithium	0/ 3	mg/kg		3.9	16	9.97	10	6.0501		No		No	48.94	No
24	METAL	Magnesium	3/ 3	mg/kg	5212S0004A	540	15000	5746.67	1700	8034.5836		No		No	3300	Yes
24	METAL	Manganese	3/ 3	mg/kg	5212S0003A	290	4700	1903.33	720	2431.5084		No		No	2200	Yes
24	METAL	Mercury	0/ 3	mg/kg		0.06	0.11	0.08	0.076	0.0255	600	No	1800	No	0.17	No
24	METAL	Molybdenum	0/ 3	mg/kg		0.7	0.78	0.73	0.72	0.0416		No		No		No
24	METAL	Nickel	1/ 3	mg/kg	5212S0005A	14	93	44	25	42.7902		No		No	26.07	Yes
24	METAL	Potassium	3/ 3	mg/kg	5212S0005A	840	1300	1036.67	970	237.1357		No		No	5075	No
24	METAL	Selenium	0/ 3	mg/kg		2.8	3.3	3.13	3.3	0.2887		No		No	1.47	Yes
24	METAL	Silver	0/ 3	mg/kg		0.45	0.58	0.52	0.53	0.0656		No		No	0.6	No
24	METAL	Sodium	3/ 3	mg/kg	5212S0003A	91	120	107	110	14.7309		No		No	497	No
24	METAL	Thallium	0/ 3	mg/kg		2.9	3.8	3.37	3.4	0.4509		No		No	0.4	Yes
24	METAL	Uranium	2/ 3	mg/kg	5212S0005A	28	60	46.33	51	16.5025		No		No		No
24	METAL	Vanadium	3/ 3	mg/kg	5212S0004A	24	29	26.67	27	2.5166		No		No	65.47	No
24	METAL	Zinc	3/ 3	mg/kg	5212S0005A	26	87	52	43	31.4802		No		No	89.7	No
24	PPCB	PCB-1016	2/ 3	ug/kg	5212S0003A	9.3	11	10.1	10	0.8544	10000	No	100000	No		No
24	PPCB	PCB-1221	1/ 3	ug/kg	5212S0004A	9.3	11	10.1	10	0.8544	10000	No	100000	No		No
24	PPCB	PCB-1232	2/ 3	ug/kg	5212S0003A	9.3	11	10.1	10	0.8544	10000	No	100000	No		No
24	PPCB	PCB-1242	2/ 3	ug/kg	5212S0003A	9.3	11	10.1	10	0.8544	10000	No	100000	No		No
24	PPCB	PCB-1248	2/ 3	ug/kg	5212S0003A	9.3	11	10.1	10	0.8544	10000	No	100000	No		No
24	PPCB	PCB-1254	3/ 3	ug/kg	5212S0003A	5.9	7	6.5	6.6	0.5568	10000	No	100000	No		No
24	PPCB	PCB-1260	3/ 3	ug/kg	5212S0004A	6.6	14	9.2	7	4.1617	10000	No	100000	No		No
24	RADS	Cesium-137	6/ 6	pCi/g	5212S0005	0.048	0.643	0.29	0.2085	0.2631	2	No	20	No		No
24	RADS	Neptunium-237	0/ 6	pCi/g		-0.044	0.026	-0.01	-0.014	0.0314		No		No		No
24	RADS	Radium-226	6/ 6	pCi/g	5212S0003	0.76	0.956	0.87	0.873	0.0679		No		No		No
24	RADS	Thorium-232	6/ 6	pCi/g	5212S0005	0.87	1.23	1.06	1.08	0.13		No		No		No
24	RADS	Uranium-235	2/ 6	pCi/g	5212S0006	0.076	0.411	0.21	0.1895	0.1115	8	No	80	No		No
24	RADS	Uranium-238	6/ 6	pCi/g	5212S0006	0.89	3.75	2.1	2.08	1.0667		No		No		No
24	SVOA	1,2,4-Trichlorobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	1,2-Dichlorobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	1,3-Dichlorobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	1,4-Dichlorobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,3,4,6-Tetrachlorophenol	2/ 3	ug/kg	5212S0005A	35	42	39	40	3.6056		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
24	SVOA	2,4,5-Trichlorophenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,4,6-Trichlorophenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,4-Dichlorophenol	2/ 3	ug/kg	5212S0005A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,4-Dimethylphenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,4-Dinitrophenol	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	2,4-Dinitrotoluene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2,6-Dinitrotoluene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Chloronaphthalene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Chlorophenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Methyl-4,6-dinitrophenol	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	2-Methylnaphthalene	2/ 3	ug/kg	5212S0005A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Methylphenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Nitrobenzenamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	2-Nitrophenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	3,3'-Dichlorobenzidine	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	3-Nitrobenzenamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	4-Bromophenyl phenyl ether	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	4-Chloro-3-methylphenol	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	4-Chlorobenzenamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	4-Chlorophenyl phenyl ether	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	4-Nitrobenzenamine	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	4-Nitrophenol	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	Acenaphthene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Acenaphthylene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Aniline	3/ 3	ug/kg	5212S0003A	64	75	70.67	73	5.8595		No		No		No
24	SVOA	Anthracene	3/ 3	ug/kg	5212S0004A	40	65	49	42	13.8924		No		No		No
24	SVOA	Benz(a)anthracene	2/ 3	ug/kg	5212S0005A	42	240	116.33	67	107.8255		No		No		No
24	SVOA	Benzenemethanol	3/ 3	ug/kg	5212S0003A	55	65	61	63	5.2915		No		No		No
24	SVOA	Benzo(a)pyrene	2/ 3	ug/kg	5212S0004A	42	240	118	72	106.7146		No		No		No
24	SVOA	Benzo(b)fluoranthene	2/ 3	ug/kg	5212S0004A	42	350	163.33	98	164.065		No		No		No
24	SVOA	Benzo(ghi)perylene	2/ 3	ug/kg	5212S0004A	42	160	84	50	65.9394		No		No		No
24	SVOA	Benzo(k)fluoranthene	3/ 3	ug/kg	5212S0004A	40	150	77.33	42	62.9391		No		No		No
24	SVOA	Benzoic acid	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	Bis(2-chloroethoxy)methane	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Bis(2-chloroethyl) ether	1/ 3	ug/kg	5212S0003A	35	42	39.33	41	3.7859		No		No		No
24	SVOA	Bis(2-chloroisopropyl) ether	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Bis(2-ethylhexyl)phthalate	3/ 3	ug/kg	5212S0003A	48	57	53.33	55	4.7258		No		No		No
24	SVOA	Butyl benzyl phthalate	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Carbazole	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Chrysene	2/ 3	ug/kg	5212S0004A	42	240	116.33	67	107.8255		No		No		No
24	SVOA	Dibenz(a,h)anthracene	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Dibenzofuran	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Diethyl phthalate	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Dimethyl phthalate	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Di-n-butyl phthalate	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
24	SVOA	Di-n-octylphthalate	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Diphenyldiazene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Fluoranthene	3/ 3	ug/kg	5212S0004A	56	490	222	120	234.2904		No		No		No
24	SVOA	Fluorene	2/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Hexachlorobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Hexachlorobutadiene	2/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Hexachlorocyclopentadiene	2/ 3	ug/kg	5212S0005A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	Hexachloroethane	2/ 3	ug/kg	5212S0005A	35	42	39	40	3.6056		No		No		No
24	SVOA	Indeno(1,2,3-cd)pyrene	3/ 3	ug/kg	5212S0004A	42	160	84	50	65.9394		No		No		No
24	SVOA	Isophorone	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	m+p Methylphenol	3/ 3	ug/kg	5212S0003A	71	84	78.67	81	6.8069		No		No		No
24	SVOA	Naphthalene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Nitrobenzene	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	N-Nitrosodimethylamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	N-Nitroso-di-n-propylamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	N-Nitrosodiphenylamine	3/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Pentachlorophenol	3/ 3	ug/kg	5212S0003A	350	410	386.67	400	32.1455		No		No		No
24	SVOA	Phenanthrene	3/ 3	ug/kg	5212S0004A	42	220	106.33	57	98.7235		No		No		No
24	SVOA	Phenol	1/ 3	ug/kg	5212S0003A	35	42	39	40	3.6056		No		No		No
24	SVOA	Pyrene	3/ 3	ug/kg	5212S0004A	42	330	150.33	79	156.6918		No		No		No
24	SVOA	Pyridine	2/ 3	ug/kg	5212S0005A	71	84	78.67	81	6.8069		No		No		No
24	VOA	1,1,1-Trichloroethane	0/ 3	ug/kg		0.46	0.55	0.51	0.52	0.0458		No		No		No
24	VOA	1,1,2,2-Tetrachloroethane	0/ 3	ug/kg		0.42	0.51	0.47	0.49	0.0473		No		No		No
24	VOA	1,1,2-Trichloroethane	0/ 3	ug/kg		0.6	0.73	0.68	0.7	0.0681		No		No		No
24	VOA	1,1-Dichloroethane	0/ 3	ug/kg		0.41	0.5	0.46	0.48	0.0473		No		No		No
24	VOA	1,1-Dichloroethene	0/ 3	ug/kg		1.7	2.1	1.93	2	0.2082		No		No		No
24	VOA	1,2-Dichloroethane	0/ 3	ug/kg		0.92	1.1	1.04	1.1	0.1039		No		No		No
24	VOA	1,2-Dichloropropane	0/ 3	ug/kg		0.4	0.48	0.45	0.46	0.0416		No		No		No
24	VOA	2-Butanone	0/ 3	ug/kg		2	2.4	2.23	2.3	0.2082		No		No		No
24	VOA	2-Hexanone	1/ 3	ug/kg	5212S0003A	1.9	2.3	2.13	2.2	0.2082		No		No		No
24	VOA	4-Methyl-2-pentanone	3/ 3	ug/kg	5212S0003A	0.77	0.93	0.86	0.89	0.0833		No		No		No
24	VOA	Acetone	3/ 3	ug/kg	5212S0003A	6.9	8.2	7.67	7.9	0.6807		No		No		No
24	VOA	Benzene	3/ 3	ug/kg	5212S0003A	0.27	0.32	0.3	0.3	0.0252		No		No		No
24	VOA	Bromodichloromethane	2/ 3	ug/kg	5212S0003A	0.27	0.32	0.3	0.3	0.0252		No		No		No
24	VOA	Bromoform	3/ 3	ug/kg	5212S0003A	0.39	0.47	0.44	0.45	0.0416		No		No		No
24	VOA	Bromomethane	3/ 3	ug/kg	5212S0003A	1.2	1.4	1.3	1.3	0.1		No		No		No
24	VOA	Carbon disulfide	3/ 3	ug/kg	5212S0003A	0.73	0.88	0.82	0.84	0.0777		No		No		No
24	VOA	Carbon tetrachloride	1/ 3	ug/kg	5212S0004A	0.54	0.65	0.6	0.62	0.0569		No		No		No
24	VOA	Chlorobenzene	0/ 3	ug/kg		0.4	0.48	0.45	0.46	0.0416		No		No		No
24	VOA	Chloroethane	2/ 3	ug/kg	5212S0003A	0.55	0.66	0.61	0.63	0.0569		No		No		No
24	VOA	Chloroform	0/ 3	ug/kg		0.4	0.48	0.45	0.46	0.0416		No		No		No
24	VOA	Chloromethane	1/ 3	ug/kg	5212S0003A	0.69	0.83	0.77	0.79	0.0721		No		No		No
24	VOA	cis-1,2-Dichloroethene	0/ 3	ug/kg		0.64	0.76	0.71	0.73	0.0624		No		No		No
24	VOA	cis-1,3-Dichloropropene	1/ 3	ug/kg	5212S0004A	0.64	0.76	0.71	0.73	0.0624		No		No		No
24	VOA	Dibromochloromethane	0/ 3	ug/kg		0.44	0.52	0.49	0.5	0.0416		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
24	VOA	Ethylbenzene	0/ 3	ug/kg		0.32	0.38	0.36	0.37	0.0321		No		No		No
24	VOA	Methylene chloride	1/ 3	ug/kg	5212S0004A	1.7	2	1.87	1.9	0.1528		No		No		No
24	VOA	Styrene	0/ 3	ug/kg		0.37	0.45	0.42	0.43	0.0416		No		No		No
24	VOA	Tetrachloroethene	0/ 3	ug/kg		0.34	0.41	0.38	0.39	0.0361		No		No		No
24	VOA	Toluene	3/ 3	ug/kg	5212S0003A	0.74	0.89	0.83	0.85	0.0777		No		No		No
24	VOA	Total Xylene	2/ 3	ug/kg	5212S0003A	0.9	1.1	1	1	0.1		No		No		No
24	VOA	trans-1,2-Dichloroethene	0/ 3	ug/kg		1	1.2	1.1	1.1	0.1		No		No		No
24	VOA	trans-1,3-Dichloropropene	0/ 3	ug/kg		0.37	0.45	0.42	0.43	0.0416		No		No		No
24	VOA	Trichloroethene	0/ 3	ug/kg		0.41	0.5	0.46	0.48	0.0473		No		No		No
24	VOA	Vinyl chloride	0/ 3	ug/kg		0.46	0.55	0.51	0.52	0.0458		No		No		No
31	METAL	Aluminum	3/ 3	mg/kg	5212S0008A	13000	14000	13333.33	13000	577.3503		No		No	40300	No
31	METAL	Antimony	0/ 3	mg/kg		7.1	7.1	7.1	7.1	0		No		No	1.52	Yes
31	METAL	Arsenic	0/ 3	mg/kg		3.8	9.1	6.5	6.6	2.6514	300	No	900	No	14.95	No
31	METAL	Barium	3/ 3	mg/kg	5212S0009A	82	130	100.67	90	25.7164		No		No	125	Yes
31	METAL	Beryllium	0/ 3	mg/kg		1.9	1.9	1.9	1.9	0	2000	No	6000	No	2.2	No
31	METAL	Boron	0/ 3	mg/kg		17	17	17	17	0		No		No	2.2	Yes
31	METAL	Cadmium	0/ 3	mg/kg		1.1	1.1	1.1	1.1	0		No		No	0.22	Yes
31	METAL	Calcium	3/ 3	mg/kg	5212S0007A	2200	27000	11566.67	5500	13467.1205		No		No	2400	Yes
31	METAL	Chromium	1/ 3	mg/kg	5212S0007A	32	45	36.33	32	7.5056		No		No	44.88	Yes
31	METAL	Cobalt	1/ 3	mg/kg	5212S0009A	25	42	32	29	8.8882		No		No	42	No
31	METAL	Copper	0/ 3	mg/kg		11	19	16	18	4.3589		No		No	22.48	No
31	METAL	Iron	3/ 3	mg/kg	5212S0007A	31000	36000	32666.67	31000	2886.7513		No		No	58600	No
31	METAL	Lead	1/ 3	mg/kg	5212S0007A	17	40	28.67	29	11.5036		No		No	37.91	Yes
31	METAL	Lithium	0/ 3	mg/kg		7.3	16	12.1	13	4.4193		No		No	48.94	No
31	METAL	Magnesium	3/ 3	mg/kg	5212S0007A	2500	11000	5633.33	3400	4669.404		No		No	3300	Yes
31	METAL	Manganese	3/ 3	mg/kg	5212S0009A	280	3600	1446.67	460	1867.0119		No		No	2200	Yes
31	METAL	Mercury	0/ 3	mg/kg		0.04	0.11	0.08	0.086	0.0356	600	No	1800	No	0.17	No
31	METAL	Molybdenum	0/ 3	mg/kg		3.5	3.5	3.5	3.5	0		No		No		No
31	METAL	Nickel	0/ 3	mg/kg		11	27	20.67	24	8.5049		No		No	26.07	Yes
31	METAL	Potassium	3/ 3	mg/kg	5212S0007A	3700	3700	3700	3700	0		No		No	5075	No
31	METAL	Selenium	0/ 3	mg/kg		3.2	3.2	3.2	3.2	0		No		No	1.47	Yes
31	METAL	Silver	2/ 3	mg/kg	5212S0007A	2.6	2.6	2.6	2.6	0		No		No	0.6	Yes
31	METAL	Sodium	3/ 3	mg/kg	5212S0007A	520	520	520	520	0		No		No	497	Yes
31	METAL	Thallium	2/ 3	mg/kg	5212S0007A	17	17	17	17	0		No		No	0.4	Yes
31	METAL	Uranium	3/ 3	mg/kg	5212S0009A	58	120	96	110	33.2866		No		No		No
31	METAL	Vanadium	3/ 3	mg/kg	5212S0007A	27	35	29.67	27	4.6188		No		No	65.47	No
31	METAL	Zinc	3/ 3	mg/kg	5212S0008A	30	52	44.33	51	12.4231		No		No	89.7	No
31	PPCB	PCB-1016	2/ 3	ug/kg	5212S0007A	10	11	10.67	11	0.5774	10000	No	100000	No		No
31	PPCB	PCB-1221	2/ 3	ug/kg	5212S0007A	10	11	10.67	11	0.5774	10000	No	100000	No		No
31	PPCB	PCB-1232	3/ 3	ug/kg	5212S0007A	10	11	10.67	11	0.5774	10000	No	100000	No		No
31	PPCB	PCB-1242	3/ 3	ug/kg	5212S0007A	10	11	10.67	11	0.5774	10000	No	100000	No		No
31	PPCB	PCB-1248	3/ 3	ug/kg	5212S0007A	10	11	10.67	11	0.5774	10000	No	100000	No		No
31	PPCB	PCB-1254	3/ 3	ug/kg	5212S0008A	6.5	51	21.47	6.9	25.5774	10000	No	100000	No		No
31	PPCB	PCB-1260	3/ 3	ug/kg	5212S0008A	6.5	31	14.8	6.9	14.031	10000	No	100000	No		No
31	RADS	Cesium-137	2/ 6	pCi/g	5212S0012	-0.012	0.307	0.06	0.0065	0.1243	2	No	20	No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
31	RADS	Neptunium-237	0/ 6	pCi/g		-0.032	0.037	0	-0.005	0.0257		No		No		No
31	RADS	Radium-226	6/ 6	pCi/g	5212S0010	0.679	0.826	0.75	0.7595	0.0654		No		No		No
31	RADS	Thorium-232	6/ 6	pCi/g	5212S0008	0.75	1.69	1.15	1.03	0.3318		No		No		No
31	RADS	Uranium-235	0/ 6	pCi/g		-0.016	0.15	0.11	0.1335	0.063	8	No	80	No		No
31	RADS	Uranium-238	6/ 6	pCi/g	5212S0012	0.9	1.56	1.27	1.26	0.2536		No		No		No
31	SVOA	1,2,4-Trichlorobenzene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	1,2-Dichlorobenzene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	1,3-Dichlorobenzene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	1,4-Dichlorobenzene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,3,4,6-Tetrachlorophenol	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,4,5-Trichlorophenol	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,4,6-Trichlorophenol	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,4-Dichlorophenol	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,4-Dimethylphenol	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,4-Dinitrophenol	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	2,4-Dinitrotoluene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2,6-Dinitrotoluene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Chloronaphthalene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Chlorophenol	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Methyl-4,6-dinitrophenol	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	2-Methylnaphthalene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Methylphenol	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Nitrobenzenamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	2-Nitrophenol	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	3,3'-Dichlorobenzidine	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	3-Nitrobenzenamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	4-Bromophenyl phenyl ether	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	4-Chloro-3-methylphenol	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	4-Chlorobenzenamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	4-Chlorophenyl phenyl ether	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	4-Nitrobenzenamine	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	4-Nitrophenol	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	Acenaphthene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Acenaphthylene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Aniline	3/ 3	ug/kg	5212S0007A	71	75	73	73	2		No		No		No
31	SVOA	Anthracene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benz(a)anthracene	1/ 3	ug/kg	5212S0008A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benzenemethanol	3/ 3	ug/kg	5212S0007A	62	64	63	63	1		No		No		No
31	SVOA	Benzo(a)pyrene	1/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benzo(b)fluoranthene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benzo(ghi)perylene	1/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benzo(k)fluoranthene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Benzoic acid	2/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	Bis(2-chloroethoxy)methane	1/ 3	ug/kg	5212S0008A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Bis(2-chloroethyl) ether	2/ 3	ug/kg	5212S0007A	40	42	41	41	1		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
31	SVOA	Bis(2-chloroisopropyl) ether	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Bis(2-ethylhexyl)phthalate	3/ 3	ug/kg	5212S0007A	54	56	55.33	56	1.1547		No		No		No
31	SVOA	Butyl benzyl phthalate	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Carbazole	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Chrysene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Dibenz(a,h)anthracene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Dibenzofuran	1/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Diethyl phthalate	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Dimethyl phthalate	3/ 3	ug/kg	5212S0007A	40	150	77	41	63.2218		No		No		No
31	SVOA	Di-n-butyl phthalate	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Di-n-octylphthalate	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Diphenyldiazene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Fluoranthene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Fluorene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Hexachlorobenzene	2/ 3	ug/kg	5212S0008A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Hexachlorobutadiene	2/ 3	ug/kg	5212S0008A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Hexachlorocyclopentadiene	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	Hexachloroethane	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Indeno(1,2,3-cd)pyrene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Isophorone	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	m+p Methylphenol	3/ 3	ug/kg	5212S0007A	79	83	81.33	82	2.0817		No		No		No
31	SVOA	Naphthalene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Nitrobenzene	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	N-Nitrosodimethylamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	N-Nitroso-di-n-propylamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	N-Nitrosodiphenylamine	3/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Pentachlorophenol	3/ 3	ug/kg	5212S0007A	390	410	400	400	10		No		No		No
31	SVOA	Phenanthrene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Phenol	1/ 3	ug/kg	5212S0008A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Pyrene	2/ 3	ug/kg	5212S0007A	40	41	40.67	41	0.5774		No		No		No
31	SVOA	Pyridine	2/ 3	ug/kg	5212S0007A	79	83	81.33	82	2.0817		No		No		No
31	VOA	1,1,1-Trichloroethane	0/ 3	ug/kg		0.52	0.54	0.53	0.52	0.0115		No		No		No
31	VOA	1,1,2,2-Tetrachloroethane	0/ 3	ug/kg		0.48	0.5	0.49	0.49	0.01		No		No		No
31	VOA	1,1,2-Trichloroethane	0/ 3	ug/kg		0.68	0.71	0.7	0.7	0.0153		No		No		No
31	VOA	1,1-Dichloroethane	0/ 3	ug/kg		0.47	0.49	0.48	0.48	0.01		No		No		No
31	VOA	1,1-Dichloroethene	0/ 3	ug/kg		1.9	2	1.97	2	0.0577		No		No		No
31	VOA	1,2-Dichloroethane	0/ 3	ug/kg		1	1.1	1.07	1.1	0.0577		No		No		No
31	VOA	1,2-Dichloropropane	0/ 3	ug/kg		0.46	0.47	0.46	0.46	0.0058		No		No		No
31	VOA	2-Butanone	0/ 3	ug/kg		2.3	2.4	2.33	2.3	0.0577		No		No		No
31	VOA	2-Hexanone	0/ 3	ug/kg		2.1	2.2	2.17	2.2	0.0577		No		No		No
31	VOA	4-Methyl-2-pentanone	0/ 3	ug/kg		0.88	0.91	0.89	0.89	0.0153		No		No		No
31	VOA	Acetone	1/ 3	ug/kg	5212S0007A	7.8	16	10.57	7.9	4.7057		No		No		No
31	VOA	Benzene	3/ 3	ug/kg	5212S0007A	0.3	0.31	0.3	0.3	0.0058		No		No		No
31	VOA	Bromodichloromethane	2/ 3	ug/kg	5212S0007A	0.3	0.31	0.3	0.3	0.0058		No		No		No
31	VOA	Bromoform	3/ 3	ug/kg	5212S0007A	0.44	0.46	0.45	0.45	0.01		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
31	VOA	Bromomethane	2/ 3	ug/kg	5212S0008A	1.3	1.4	1.33	1.3	0.0577		No		No		No
31	VOA	Carbon disulfide	2/ 3	ug/kg	5212S0007A	0.83	0.86	0.84	0.84	0.0153		No		No		No
31	VOA	Carbon tetrachloride	2/ 3	ug/kg	5212S0007A	0.61	0.64	0.62	0.62	0.0153		No		No		No
31	VOA	Chlorobenzene	0/ 3	ug/kg		0.46	0.47	0.46	0.46	0.0058		No		No		No
31	VOA	Chloroethane	1/ 3	ug/kg	5212S0007A	0.62	0.65	0.63	0.63	0.0153		No		No		No
31	VOA	Chloroform	1/ 3	ug/kg	5212S0007A	0.46	0.47	0.46	0.46	0.0058		No		No		No
31	VOA	Chloromethane	2/ 3	ug/kg	5212S0008A	0.78	0.81	0.79	0.79	0.0153		No		No		No
31	VOA	cis-1,2-Dichloroethene	2/ 3	ug/kg	5212S0008A	0.72	0.75	0.73	0.73	0.0153		No		No		No
31	VOA	cis-1,3-Dichloropropene	0/ 3	ug/kg		0.72	0.75	0.73	0.73	0.0153		No		No		No
31	VOA	Dibromochloromethane	1/ 3	ug/kg	5212S0008A	0.49	0.51	0.5	0.5	0.01		No		No		No
31	VOA	Ethylbenzene	0/ 3	ug/kg		0.36	0.37	0.37	0.37	0.0058		No		No		No
31	VOA	Methylene chloride	0/ 3	ug/kg		1.9	2	1.93	1.9	0.0577		No		No		No
31	VOA	Styrene	0/ 3	ug/kg		0.42	0.44	0.43	0.43	0.01		No		No		No
31	VOA	Tetrachloroethene	0/ 3	ug/kg		0.38	0.4	0.39	0.39	0.01		No		No		No
31	VOA	Toluene	1/ 3	ug/kg	5212S0009A	0.84	0.87	0.85	0.85	0.0153		No		No		No
31	VOA	Total Xylene	2/ 3	ug/kg	5212S0007A	1	1.1	1.03	1	0.0577		No		No		No
31	VOA	trans-1,2-Dichloroethene	2/ 3	ug/kg	5212S0008A	1.1	1.2	1.13	1.1	0.0577		No		No		No
31	VOA	trans-1,3-Dichloropropene	0/ 3	ug/kg		0.42	0.44	0.43	0.43	0.01		No		No		No
31	VOA	Trichloroethene	3/ 3	ug/kg	5212S0007A	0.47	0.49	0.48	0.48	0.01		No		No		No
31	VOA	Vinyl chloride	2/ 3	ug/kg	5212S0007A	0.52	0.54	0.53	0.52	0.0115		No		No		No
32	METAL	Aluminum	3/ 3	mg/kg	5212S0013A	8400	11000	10133.33	11000	1501.1107		No		No	40300	No
32	METAL	Antimony	2/ 3	mg/kg	5212S0013A	1.4	1.7	1.57	1.6	0.1528		No		No	1.52	Yes
32	METAL	Arsenic	2/ 3	mg/kg	5212S0014A	4.9	11	8.03	8.2	3.0534	300	No	900	No	14.95	No
32	METAL	Barium	3/ 3	mg/kg	5212S0013A	61	100	79.67	78	19.5533		No		No	125	No
32	METAL	Beryllium	3/ 3	mg/kg	5212S0014A	0.68	1	0.89	1	0.1848	2000	No	6000	No	2.2	No
32	METAL	Boron	2/ 3	mg/kg	5212S0013A	3.3	3.6	3.5	3.6	0.1732		No		No	2.2	Yes
32	METAL	Cadmium	0/ 3	mg/kg		0.22	0.9	0.45	0.24	0.387		No		No	0.22	Yes
32	METAL	Calcium	3/ 3	mg/kg	5212S0018A	7000	16000	10000	7000	5196.1524		No		No	2400	Yes
32	METAL	Chromium	3/ 3	mg/kg	5212S0013A	9.3	13	11.1	11	1.852		No		No	44.88	No
32	METAL	Cobalt	3/ 3	mg/kg	5212S0014A	12	17	15	16	2.6458		No		No	42	No
32	METAL	Copper	3/ 3	mg/kg	5212S0013A	14	39	23	16	13.8924		No		No	22.48	Yes
32	METAL	Iron	3/ 3	mg/kg	5212S0014A	17000	24000	20333.33	20000	3511.8846		No		No	58600	No
32	METAL	Lead	3/ 3	mg/kg	5212S0013A	13	43	28	28	15		No		No	37.91	Yes
32	METAL	Lithium	3/ 3	mg/kg	5212S0018A	8.5	14	10.6	9.3	2.9715		No		No	48.94	No
32	METAL	Magnesium	3/ 3	mg/kg	5212S0018A	1300	6100	3000	1600	2688.8659		No		No	3300	Yes
32	METAL	Manganese	3/ 3	mg/kg	5212S0013A	510	1700	1303.33	1700	687.0468		No		No	2200	No
32	METAL	Mercury	0/ 3	mg/kg		0.08	0.17	0.12	0.1	0.0473	600	No	1800	No	0.17	No
32	METAL	Molybdenum	3/ 3	mg/kg	5212S0013A	0.69	0.76	0.74	0.76	0.0404		No		No		No
32	METAL	Nickel	3/ 3	mg/kg	5212S0013A	19	140	60.67	23	68.7338		No		No	26.07	Yes
32	METAL	Potassium	3/ 3	mg/kg	5212S0018A	900	1600	1166.67	1000	378.5939		No		No	5075	No
32	METAL	Selenium	3/ 3	mg/kg	5212S0013A	0.99	2.2	1.76	2.1	0.6716		No		No	1.47	Yes
32	METAL	Silver	1/ 3	mg/kg	5212S0013A	0.51	0.57	0.55	0.56	0.0321		No		No	0.6	No
32	METAL	Sodium	3/ 3	mg/kg	5212S0013A	100	110	106.67	110	5.7735		No		No	497	No
32	METAL	Thallium	0/ 3	mg/kg		3.3	3.7	3.53	3.6	0.2082		No		No	0.4	Yes
32	METAL	Uranium	0/ 3	mg/kg		23	26	24.67	25	1.5275		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
32	METAL	Vanadium	0/ 3	mg/kg		20	31	24.67	23	5.6862		No		No	65.47	No
32	METAL	Zinc	3/ 3	mg/kg	5212S0013A	49	1300	467.33	53	721.1133		No		No	89.7	Yes
32	PPCB	PCB-1016	0/ 3	ug/kg		10	11	10.67	11	0.5774	10000	No	100000	No		No
32	PPCB	PCB-1221	0/ 3	ug/kg		10	11	10.67	11	0.5774	10000	No	100000	No		No
32	PPCB	PCB-1232	0/ 3	ug/kg		10	11	10.67	11	0.5774	10000	No	100000	No		No
32	PPCB	PCB-1242	0/ 3	ug/kg		10	11	10.67	11	0.5774	10000	No	100000	No		No
32	PPCB	PCB-1248	0/ 3	ug/kg		10	11	10.67	11	0.5774	10000	No	100000	No		No
32	PPCB	PCB-1254	1/ 3	ug/kg	5212S0018A	6.8	420	150.93	26	233.2162	10000	No	100000	No		No
32	PPCB	PCB-1260	1/ 3	ug/kg	5212S0018A	6.8	220	82.6	21	119.2035	10000	No	100000	No		No
32	RADS	Cesium-137	4/ 6	pCi/g	5212S0017	-0.001	3.42	0.68	0.151	1.3472	2	No	20	No		No
32	RADS	Neptunium-237	0/ 6	pCi/g		-0.026	0.033	0	0.005	0.0203		No		No		No
32	RADS	Radium-226	6/ 6	pCi/g	5212S0014	0.504	0.983	0.82	0.849	0.1662		No		No		No
32	RADS	Thorium-232	6/ 6	pCi/g	5212S0014	0.84	1.35	1.1	1.135	0.2013		No		No		No
32	RADS	Uranium-235	1/ 6	pCi/g	5212S0017	0.08	0.75	0.24	0.1465	0.2549	8	No	80	No		No
32	RADS	Uranium-238	6/ 6	pCi/g	5212S0017	1.48	8.34	2.9	1.695	2.7021		No		No		No
32	SVOA	1,2,4-Trichlorobenzene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	1,2-Dichlorobenzene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	1,3-Dichlorobenzene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	1,4-Dichlorobenzene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,3,4,6-Tetrachlorophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,4,5-Trichlorophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,4,6-Trichlorophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,4-Dichlorophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,4-Dimethylphenol	2/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,4-Dinitrophenol	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	2,4-Dinitrotoluene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2,6-Dinitrotoluene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Chloronaphthalene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Chlorophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Methyl-4,6-dinitrophenol	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	2-Methylnaphthalene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Methylphenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Nitrobenzamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	2-Nitrophenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	3,3'-Dichlorobenzidine	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	3-Nitrobenzamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	4-Bromophenyl phenyl ether	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	4-Chloro-3-methylphenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	4-Chlorobenzamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	4-Chlorophenyl phenyl ether	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	4-Nitrobenzamine	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	4-Nitrophenol	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	Acenaphthene	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Acenaphthylene	1/ 3	ug/kg	5212S0013A	39	100	60	41	34.6554		No		No		No
32	SVOA	Aniline	2/ 3	ug/kg	5212S0014A	70	74	72.67	74	2.3094		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
32	SVOA	Anthracene	1/ 3	ug/kg	5212S0013A	39	120	66.67	41	46.1988		No		No		No
32	SVOA	Benz(a)anthracene	2/ 3	ug/kg	5212S0013A	41	690	310.33	200	338.2755		No		No		No
32	SVOA	Benzenemethanol	3/ 3	ug/kg	5212S0013A	61	64	63	64	1.7321		No		No		No
32	SVOA	Benzo(a)pyrene	2/ 3	ug/kg	5212S0013A	41	620	287	200	299.1438		No		No		No
32	SVOA	Benzo(b)fluoranthene	1/ 3	ug/kg	5212S0013A	41	870	393.67	270	428.1125		No		No		No
32	SVOA	Benzo(ghi)perylene	2/ 3	ug/kg	5212S0013A	41	280	143.67	110	123.0054		No		No		No
32	SVOA	Benzo(k)fluoranthene	2/ 3	ug/kg	5212S0013A	41	390	180.33	110	184.8251		No		No		No
32	SVOA	Benzoic acid	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	Bis(2-chloroethoxy)methane	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Bis(2-chloroethyl) ether	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Bis(2-chloroisopropyl) ether	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Bis(2-ethylhexyl)phthalate	3/ 3	ug/kg	5212S0013A	53	56	55	56	1.7321		No		No		No
32	SVOA	Butyl benzyl phthalate	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Carbazole	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Chrysene	1/ 3	ug/kg	5212S0013A	41	660	290.33	170	326.5736		No		No		No
32	SVOA	Dibenz(a,h)anthracene	1/ 3	ug/kg	5212S0013A	39	67	49	41	15.6205		No		No		No
32	SVOA	Dibenzofuran	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Diethyl phthalate	0/ 3	ug/kg		39	41	40.33	41	1.1547		No		No		No
32	SVOA	Dimethyl phthalate	2/ 3	ug/kg	5212S0018A	41	50	44	41	5.1962		No		No		No
32	SVOA	Di-n-butyl phthalate	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Di-n-octylphthalate	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Diphenyldiazene	2/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Fluoranthene	3/ 3	ug/kg	5212S0013A	41	1400	560.33	240	733.9485		No		No		No
32	SVOA	Fluorene	2/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Hexachlorobenzene	2/ 3	ug/kg	5212S0014A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Hexachlorobutadiene	2/ 3	ug/kg	5212S0014A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Hexachlorocyclopentadiene	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	Hexachloroethane	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Indeno(1,2,3-cd)pyrene	3/ 3	ug/kg	5212S0013A	41	350	170.33	120	160.5314		No		No		No
32	SVOA	Isophorone	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	m+p Methylphenol	3/ 3	ug/kg	5212S0013A	78	82	80.67	82	2.3094		No		No		No
32	SVOA	Naphthalene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Nitrobenzene	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	N-Nitrosodimethylamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	N-Nitroso-di-n-propylamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	N-Nitrosodiphenylamine	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Pentachlorophenol	3/ 3	ug/kg	5212S0013A	390	410	403.33	410	11.547		No		No		No
32	SVOA	Phenanthrene	3/ 3	ug/kg	5212S0013A	41	440	177.67	52	227.2539		No		No		No
32	SVOA	Phenol	3/ 3	ug/kg	5212S0013A	39	41	40.33	41	1.1547		No		No		No
32	SVOA	Pyrene	3/ 3	ug/kg	5212S0013A	41	850	347	150	439.0068		No		No		No
32	SVOA	Pyridine	3/ 3	ug/kg	5212S0013A	78	82	80.67	82	2.3094		No		No		No
32	VOA	1,1,1-Trichloroethane	0/ 3	ug/kg		0.51	0.54	0.53	0.53	0.0153		No		No		No
32	VOA	1,1,2,2-Tetrachloroethane	0/ 3	ug/kg		0.47	0.5	0.49	0.49	0.0153		No		No		No
32	VOA	1,1,2-Trichloroethane	0/ 3	ug/kg		0.67	0.71	0.69	0.7	0.0208		No		No		No
32	VOA	1,1-Dichloroethane	0/ 3	ug/kg		0.46	0.49	0.48	0.48	0.0153		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
32	VOA	1,1-Dichloroethene	0/ 3	ug/kg		1.9	2	1.97	2	0.0577		No		No		No
32	VOA	1,2-Dichloroethane	0/ 3	ug/kg		1	1.1	1.07	1.1	0.0577		No		No		No
32	VOA	1,2-Dichloropropane	0/ 3	ug/kg		0.45	0.48	0.46	0.46	0.0153		No		No		No
32	VOA	2-Butanone	0/ 3	ug/kg		2.3	2.4	2.33	2.3	0.0577		No		No		No
32	VOA	2-Hexanone	0/ 3	ug/kg		2.1	2.2	2.17	2.2	0.0577		No		No		No
32	VOA	4-Methyl-2-pentanone	0/ 3	ug/kg		0.86	0.91	0.89	0.89	0.0252		No		No		No
32	VOA	Acetone	0/ 3	ug/kg		7.6	8.1	7.87	7.9	0.2517		No		No		No
32	VOA	Benzene	0/ 3	ug/kg		0.29	0.31	0.3	0.31	0.0115		No		No		No
32	VOA	Bromodichloromethane	0/ 3	ug/kg		0.29	0.31	0.3	0.31	0.0115		No		No		No
32	VOA	Bromoform	0/ 3	ug/kg		0.44	0.46	0.45	0.45	0.01		No		No		No
32	VOA	Bromomethane	0/ 3	ug/kg		1.3	1.4	1.33	1.3	0.0577		No		No		No
32	VOA	Carbon disulfide	0/ 3	ug/kg		0.81	0.86	0.84	0.84	0.0252		No		No		No
32	VOA	Carbon tetrachloride	0/ 3	ug/kg		0.6	0.64	0.62	0.62	0.02		No		No		No
32	VOA	Chlorobenzene	0/ 3	ug/kg		0.45	0.48	0.46	0.46	0.0153		No		No		No
32	VOA	Chloroethane	0/ 3	ug/kg		0.61	0.65	0.63	0.64	0.0208		No		No		No
32	VOA	Chloroform	0/ 3	ug/kg		0.45	0.48	0.46	0.46	0.0153		No		No		No
32	VOA	Chloromethane	0/ 3	ug/kg		0.77	0.81	0.79	0.79	0.02		No		No		No
32	VOA	cis-1,2-Dichloroethene	0/ 3	ug/kg		0.71	0.75	0.73	0.73	0.02		No		No		No
32	VOA	cis-1,3-Dichloropropene	0/ 3	ug/kg		0.71	0.75	0.73	0.73	0.02		No		No		No
32	VOA	Dibromochloromethane	0/ 3	ug/kg		0.48	0.51	0.5	0.5	0.0153		No		No		No
32	VOA	Ethylbenzene	3/ 3	ug/kg	5212S0014A	0.35	0.38	0.37	0.37	0.0153		No		No		No
32	VOA	Methylene chloride	3/ 3	ug/kg	5212S0014A	1.9	2	1.93	1.9	0.0577		No		No		No
32	VOA	Styrene	3/ 3	ug/kg	5212S0014A	0.41	0.44	0.43	0.43	0.0153		No		No		No
32	VOA	Tetrachloroethene	2/ 3	ug/kg	5212S0013A	0.38	0.4	0.39	0.39	0.01		No		No		No
32	VOA	Toluene	3/ 3	ug/kg	5212S0014A	0.82	0.88	0.85	0.86	0.0306		No		No		No
32	VOA	Total Xylene	3/ 3	ug/kg	5212S0014A	1	1.1	1.03	1	0.0577		No		No		No
32	VOA	trans-1,2-Dichloroethene	3/ 3	ug/kg	5212S0014A	1.1	1.2	1.13	1.1	0.0577		No		No		No
32	VOA	trans-1,3-Dichloropropene	2/ 3	ug/kg	5212S0013A	0.41	0.44	0.43	0.43	0.0153		No		No		No
32	VOA	Trichloroethene	0/ 3	ug/kg		0.46	0.49	0.48	0.48	0.0153		No		No		No
32	VOA	Vinyl chloride	0/ 3	ug/kg		0.51	0.54	0.53	0.53	0.0153		No		No		No
36	METAL	Aluminum	3/ 3	mg/kg	5212S0023A	5800	11000	8266.67	8000	2610.2363		No		No	40300	No
36	METAL	Antimony	1/ 3	mg/kg	5212S0021A	1.4	1.6	1.47	1.4	0.1155		No		No	1.52	Yes
36	METAL	Arsenic	3/ 3	mg/kg	5212S0023A	4.1	8.5	6	5.4	2.2605	300	No	900	No	14.95	No
36	METAL	Barium	3/ 3	mg/kg	5212S0019A	60	220	122.33	87	85.6524		No		No	125	Yes
36	METAL	Beryllium	0/ 3	mg/kg		0.37	0.81	0.53	0.41	0.2433	2000	No	6000	No	2.2	No
36	METAL	Boron	0/ 3	mg/kg		3.2	3.6	3.37	3.3	0.2082		No		No	2.2	Yes
36	METAL	Cadmium	0/ 3	mg/kg		0.21	0.24	0.22	0.22	0.0153		No		No	0.22	Yes
36	METAL	Calcium	3/ 3	mg/kg	5212S0021A	1400	240000	97466.67	51000	125904.1434		No		No	2400	Yes
36	METAL	Chromium	0/ 3	mg/kg		7.1	16	10.77	9.2	4.6522		No		No	44.88	No
36	METAL	Cobalt	0/ 3	mg/kg		5.6	11	8.43	8.7	2.7099		No		No	42	No
36	METAL	Copper	0/ 3	mg/kg		6.2	27	13.53	7.4	11.6779		No		No	22.48	Yes
36	METAL	Iron	3/ 3	mg/kg	5212S0019A	13000	17000	15333.33	16000	2081.666		No		No	58600	No
36	METAL	Lead	0/ 3	mg/kg		6.6	21	12.37	9.5	7.616		No		No	37.91	No
36	METAL	Lithium	0/ 3	mg/kg		4.7	27	18.23	23	11.8896		No		No	48.94	No
36	METAL	Magnesium	3/ 3	mg/kg	5212S0021A	520	38000	21506.67	26000	19139.7527		No		No	3300	Yes

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
36	METAL	Manganese	2/ 3	mg/kg	5212S0023A	240	720	440	360	249.7999		No		No	2200	No
36	METAL	Mercury	0/ 3	mg/kg		0.048	0.1	0.07	0.049	0.0297	600	No	1800	No	0.17	No
36	METAL	Molybdenum	0/ 3	mg/kg		0.67	0.99	0.78	0.69	0.1793		No		No		No
36	METAL	Nickel	1/ 3	mg/kg	5212S0019A	9.2	42	21.07	12	18.1828		No		No	26.07	Yes
36	METAL	Potassium	3/ 3	mg/kg	5212S0019A	820	1600	1140	1000	408.4116		No		No	5075	No
36	METAL	Selenium	0/ 3	mg/kg		0.91	1.8	1.4	1.5	0.4528		No		No	1.47	Yes
36	METAL	Silver	0/ 3	mg/kg		0.5	0.57	0.53	0.52	0.0361		No		No	0.6	No
36	METAL	Sodium	2/ 3	mg/kg	5212S0021A	100	150	120	110	26.4575		No		No	497	No
36	METAL	Thallium	0/ 3	mg/kg		3.2	3.7	3.4	3.3	0.2646		No		No	0.4	Yes
36	METAL	Uranium	2/ 3	mg/kg	5212S0023A	11	15	12.67	12	2.0817		No		No		No
36	METAL	Vanadium	2/ 3	mg/kg	5212S0019A	11	31	19.67	17	10.2632		No		No	65.47	No
36	METAL	Zinc	3/ 3	mg/kg	5212S0019A	36	57	47	48	10.5357		No		No	89.7	No
36	PPCB	PCB-1016	2/ 3	ug/kg	5212S0023A	9.8	11	10.6	11	0.6928	10000	No	100000	No		No
36	PPCB	PCB-1221	2/ 3	ug/kg	5212S0023A	9.8	11	10.6	11	0.6928	10000	No	100000	No		No
36	PPCB	PCB-1232	2/ 3	ug/kg	5212S0023A	9.8	11	10.6	11	0.6928	10000	No	100000	No		No
36	PPCB	PCB-1242	0/ 3	ug/kg		9.8	11	10.6	11	0.6928	10000	No	100000	No		No
36	PPCB	PCB-1248	2/ 3	ug/kg	5212S0021A	9.8	11	10.6	11	0.6928	10000	No	100000	No		No
36	PPCB	PCB-1254	0/ 3	ug/kg		6.2	6.9	6.67	6.9	0.4041	10000	No	100000	No		No
36	PPCB	PCB-1260	2/ 3	ug/kg	5212S0019A	6.9	130	50.63	15	68.8528	10000	No	100000	No		No
36	RADS	Cesium-137	5/ 6	pCi/g	5212S0024	0.004	0.282	0.12	0.0695	0.1136	2	No	20	No		No
36	RADS	Neptunium-237	0/ 6	pCi/g		-0.005	0.05	0.02	0.0155	0.0232		No		No		No
36	RADS	Radium-226	6/ 6	pCi/g	5212S0023	0.639	0.936	0.76	0.7085	0.1232		No		No		No
36	RADS	Thorium-232	6/ 6	pCi/g	5212S0020	0.98	1.43	1.21	1.2	0.1726		No		No		No
36	RADS	Uranium-235	0/ 6	pCi/g		0.053	0.193	0.12	0.116	0.0504	8	No	80	No		No
36	RADS	Uranium-238	6/ 6	pCi/g	5212S0024	0.86	2.53	1.55	1.425	0.5696		No		No		No
36	SVOA	1,2,4-Trichlorobenzene	1/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	1,2-Dichlorobenzene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	1,3-Dichlorobenzene	0/ 3	ug/kg		37	42	40.33	42	2.8868		No		No		No
36	SVOA	1,4-Dichlorobenzene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,3,4,6-Tetrachlorophenol	1/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,4,5-Trichlorophenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,4,6-Trichlorophenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,4-Dichlorophenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,4-Dimethylphenol	1/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,4-Dinitrophenol	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	2,4-Dinitrotoluene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2,6-Dinitrotoluene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Chloronaphthalene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Chlorophenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Methyl-4,6-dinitrophenol	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	2-Methylnaphthalene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Methylphenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Nitrobenzamine	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	2-Nitrophenol	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	3,3'-Dichlorobenzidine	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
36	SVOA	3-Nitrobenzenamine	2/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	4-Bromophenyl phenyl ether	2/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	4-Chloro-3-methylphenol	2/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	4-Chlorobenzenamine	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	4-Chlorophenyl phenyl ether	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	4-Nitrobenzenamine	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	4-Nitrophenol	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	Acenaphthene	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Acenaphthylene	3/ 3	ug/kg	5212S0021A	42	84	59.67	53	21.7792		No		No		No
36	SVOA	Aniline	3/ 3	ug/kg	5212S0021A	67	75	72.33	75	4.6188		No		No		No
36	SVOA	Anthracene	3/ 3	ug/kg	5212S0021A	40	42	41.33	42	1.1547		No		No		No
36	SVOA	Benz(a)anthracene	3/ 3	ug/kg	5212S0021A	42	220	150.67	190	95.296		No		No		No
36	SVOA	Benzenemethanol	3/ 3	ug/kg	5212S0021A	58	65	62.67	65	4.0415		No		No		No
36	SVOA	Benzo(a)pyrene	3/ 3	ug/kg	5212S0019A	42	330	227.33	310	160.8146		No		No		No
36	SVOA	Benzo(b)fluoranthene	3/ 3	ug/kg	5212S0019A	42	420	274	360	203.1453		No		No		No
36	SVOA	Benzo(ghi)perylene	3/ 3	ug/kg	5212S0019A	42	540	277.33	250	250.1226		No		No		No
36	SVOA	Benzo(k)fluoranthene	3/ 3	ug/kg	5212S0019A	42	220	140.67	160	90.5612		No		No		No
36	SVOA	Benzoic acid	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	Bis(2-chloroethoxy)methane	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Bis(2-chloroethyl) ether	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Bis(2-chloroisopropyl) ether	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Bis(2-ethylhexyl)phthalate	1/ 3	ug/kg	5212S0019A	51	100	69.33	57	26.727		No		No		No
36	SVOA	Butyl benzyl phthalate	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Carbazole	1/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Chrysene	2/ 3	ug/kg	5212S0021A	42	220	157.33	210	100.0067		No		No		No
36	SVOA	Dibenz(a,h)anthracene	2/ 3	ug/kg	5212S0021A	42	73	52.33	42	17.8979		No		No		No
36	SVOA	Dibenzofuran	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Diethyl phthalate	1/ 3	ug/kg	5212S0023A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Dimethyl phthalate	3/ 3	ug/kg	5212S0021A	41	42	41.67	42	0.5774		No		No		No
36	SVOA	Di-n-butyl phthalate	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Di-n-octylphthalate	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Diphenyldiazene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Fluoranthene	3/ 3	ug/kg	5212S0021A	42	320	224	310	157.6959		No		No		No
36	SVOA	Fluorene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Hexachlorobenzene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Hexachlorobutadiene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Hexachlorocyclopentadiene	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	Hexachloroethane	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Indeno(1,2,3-cd)pyrene	2/ 3	ug/kg	5212S0019A	42	460	264	290	210.2094		No		No		No
36	SVOA	Isophorone	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	m+p Methylphenol	3/ 3	ug/kg	5212S0021A	74	84	80.33	83	5.5076		No		No		No
36	SVOA	Naphthalene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Nitrobenzene	2/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	N-Nitrosodimethylamine	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	N-Nitroso-di-n-propylamine	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
36	SVOA	N-Nitrosodiphenylamine	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Pentachlorophenol	3/ 3	ug/kg	5212S0021A	370	410	396.67	410	23.094		No		No		No
36	SVOA	Phenanthrene	3/ 3	ug/kg	5212S0021A	42	97	76.67	91	30.1717		No		No		No
36	SVOA	Phenol	3/ 3	ug/kg	5212S0021A	37	42	40.33	42	2.8868		No		No		No
36	SVOA	Pyrene	3/ 3	ug/kg	5212S0021A	42	250	180.67	250	120.0889		No		No		No
36	SVOA	Pyridine	3/ 3	ug/kg	5212S0021A	74	84	80.33	83	5.5076		No		No		No
36	VOA	1,1,1-Trichloroethane	0/ 3	ug/kg		0.48	0.54	0.52	0.54	0.0346		No		No		No
36	VOA	1,1,2,2-Tetrachloroethane	1/ 3	ug/kg	5212S0021A	0.45	0.51	0.49	0.5	0.0321		No		No		No
36	VOA	1,1,2-Trichloroethane	0/ 3	ug/kg		0.64	0.72	0.69	0.72	0.0462		No		No		No
36	VOA	1,1-Dichloroethane	1/ 3	ug/kg	5212S0023A	0.43	0.49	0.47	0.49	0.0346		No		No		No
36	VOA	1,1-Dichloroethene	3/ 3	ug/kg	5212S0021A	1.8	2	1.93	2	0.1155		No		No		No
36	VOA	1,2-Dichloroethane	1/ 3	ug/kg	5212S0021A	0.97	1.1	1.06	1.1	0.0751		No		No		No
36	VOA	1,2-Dichloropropane	0/ 3	ug/kg		0.42	0.48	0.46	0.48	0.0346		No		No		No
36	VOA	2-Butanone	0/ 3	ug/kg		2.1	2.4	2.3	2.4	0.1732		No		No		No
36	VOA	2-Hexanone	0/ 3	ug/kg		2	2.2	2.13	2.2	0.1155		No		No		No
36	VOA	4-Methyl-2-pentanone	0/ 3	ug/kg		0.81	0.92	0.88	0.92	0.0635		No		No		No
36	VOA	Acetone	0/ 3	ug/kg		7.2	8.2	7.83	8.1	0.5508		No		No		No
36	VOA	Benzene	0/ 3	ug/kg		0.28	0.32	0.3	0.31	0.0208		No		No		No
36	VOA	Bromodichloromethane	1/ 3	ug/kg	5212S0021A	0.28	0.32	0.3	0.31	0.0208		No		No		No
36	VOA	Bromoform	3/ 3	ug/kg	5212S0021A	0.41	0.47	0.45	0.47	0.0346		No		No		No
36	VOA	Bromomethane	3/ 3	ug/kg	5212S0021A	1.2	1.4	1.33	1.4	0.1155		No		No		No
36	VOA	Carbon disulfide	3/ 3	ug/kg	5212S0021A	0.77	0.87	0.84	0.87	0.0577		No		No		No
36	VOA	Carbon tetrachloride	2/ 3	ug/kg	5212S0021A	0.57	0.64	0.62	0.64	0.0404		No		No		No
36	VOA	Chlorobenzene	3/ 3	ug/kg	5212S0021A	0.42	0.48	0.46	0.48	0.0346		No		No		No
36	VOA	Chloroethane	2/ 3	ug/kg	5212S0023A	0.58	0.66	0.63	0.65	0.0436		No		No		No
36	VOA	Chloroform	3/ 3	ug/kg	5212S0021A	0.42	0.48	0.46	0.48	0.0346		No		No		No
36	VOA	Chloromethane	2/ 3	ug/kg	5212S0023A	0.72	0.82	0.79	0.82	0.0577		No		No		No
36	VOA	cis-1,2-Dichloroethene	0/ 3	ug/kg		0.67	0.76	0.73	0.76	0.052		No		No		No
36	VOA	cis-1,3-Dichloropropene	0/ 3	ug/kg		0.67	0.76	0.73	0.76	0.052		No		No		No
36	VOA	Dibromochloromethane	0/ 3	ug/kg		0.46	0.52	0.5	0.52	0.0346		No		No		No
36	VOA	Ethylbenzene	0/ 3	ug/kg		0.33	0.38	0.36	0.38	0.0289		No		No		No
36	VOA	Methylene chloride	0/ 3	ug/kg		1.8	2	1.93	2	0.1155		No		No		No
36	VOA	Styrene	0/ 3	ug/kg		0.39	0.44	0.42	0.44	0.0289		No		No		No
36	VOA	Tetrachloroethene	0/ 3	ug/kg		0.36	0.4	0.39	0.4	0.0231		No		No		No
36	VOA	Toluene	3/ 3	ug/kg	5212S0021A	0.78	0.88	0.85	0.88	0.0577		No		No		No
36	VOA	Total Xylene	2/ 3	ug/kg	5212S0021A	0.95	1.1	1.05	1.1	0.0866		No		No		No
36	VOA	trans-1,2-Dichloroethene	3/ 3	ug/kg	5212S0021A	1	1.2	1.13	1.2	0.1155		No		No		No
36	VOA	trans-1,3-Dichloropropene	2/ 3	ug/kg	5212S0021A	0.39	0.44	0.42	0.44	0.0289		No		No		No
36	VOA	Trichloroethene	2/ 3	ug/kg	5212S0021A	0.43	0.49	0.47	0.49	0.0346		No		No		No
36	VOA	Vinyl chloride	3/ 3	ug/kg	5212S0021A	0.48	0.54	0.52	0.54	0.0346		No		No		No
24 Bias	RADS	Cesium-137	3/ 3	pCi/g		0.147	0.66	0.32	0.151	0.295	2	No	20	No		No
24 Bias	RADS	Neptunium-237	0/ 3	pCi/g		-0.003	0.031	0.01	0.008	0.0173		No		No		No
24 Bias	RADS	Radium-226	3/ 3	pCi/g	5212S0027	0.796	1.29	1.1	1.2	0.2631		No		No		No
24 Bias	RADS	Thorium-232	3/ 3	pCi/g	5212S0027	0.99	1.44	1.28	1.42	0.2542		No		No		No
24 Bias	RADS	Uranium-235	1/ 3	pCi/g		0.24	2.42	0.99	0.3	1.2417	8	No	80	No		No

Z2 EU	Analyte Type	Analyte	Freq of Dets	Units	Location of Max Value	Min	Max	Mean	Median	StdDev	RL (Avg)	> RL (Avg)	RL (Max)	> RL (Max)	Bkg	> Bkg
24 Bias	RADS	Uranium-238	3/ 3	pCi/g		2.99	9.02	5.15	3.45	3.3565		No		No		No
32 Bias	RADS	Cesium-137	0/ 3	pCi/g		-0.02	0.021	-0.01	-0.019	0.0234	2	No	20	No		No
32 Bias	RADS	Neptunium-237	0/ 3	pCi/g		-0.014	-0.006	-0.01	-0.013	0.0044		No		No		No
32 Bias	RADS	Radium-226	3/ 3	pCi/g	5212S0025	0.786	1.01	0.87	0.818	0.1212		No		No		No
32 Bias	RADS	Thorium-232	3/ 3	pCi/g	5212S0025	1.02	1.67	1.3	1.21	0.3342		No		No		No
32 Bias	RADS	Uranium-235	0/ 3	pCi/g		0.061	0.17	0.11	0.095	0.0558	8	No	80	No		No
32 Bias	RADS	Uranium-238	3/ 3	pCi/g	5212S0025	1.23	2.07	1.62	1.56	0.4232		No		No		No