DRAFT
FINAL STATUS SURVEY REPORT

Post - Remedial Actions at Parcel B and Parcel C
Li Tungsten Superfund Site, Glen Cove, New York

April 2006 – August 2007

Prepared for

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ACRONYMS AND ABBREVIATIONS

2σ	Two Sigma, two standard deviation
uR/hr	microroentgens per hour
As	Arsenic
DSR	Data Summary Report
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FIG	Field Implementation Guide
FRASS	Final Remediation Action Support Survey
FRD	Final Remedial Design Report for Parcel B and Upper Parcel C of the Li Tungsten Property of Li Tungsten Superfund Site
FSS	Final Status Survey
FSSP	Final Addendum to the Sampling and Analysis Plan, Final Status Survey Plan for Parcel B and Upper Parcel C of the Li Tungsten Property of Li Tungsten Superfund Site"
FSSR	Final Status Survey Report for Parcel B and Upper Parcel C of the Li Tungsten Property of Li Tungsten Superfund Site
GCDC	Glen Cove Development Company
HP	Health Physicist
HPGe	high purity germanium
HPT	Health Physics Technician
HSCP	Final Health and Safety Contingency Plan Remedial Action at Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site
IRA	Interim Remedial Action
LCS	Laboratory Control Sample
LTSS	Li Tungsten Superfund Site
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
MDL	minimum detectable level
Metals	"Lead and Arsenic, the two metals of identified as contaminants of concern at the Li Tungsten Superfund Site "
mg/kg	milligrams per kilogram
MS	Matrix Spike
NAD	Normalized Absolute Difference
Pb	Lead
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
PCR	Project Completion Report Remedial Action at Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site
PQL	Practical Quantitation Limit
PRP	Potentially Responsible Party
QCSR	Quality Control Summary Report
Ra	Radium
Ra-226	Radium-226
Ra-228	Radium-228
RASS	Remediation Action Support Survey

ACRONYMS AND ABBREVIATIONS (Continued)

RAWP	Final Remedial Action Work Plan Remedial Action at Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site
RCRA	Resource Conservation and Recovery Act
RI/FS	Remediation Investigation/Feasibility Study
RL	Reporting Limit
ROC	Radionuclide of Concern
ROD	Record of Decision
RPD	Relative Percent Difference
SAP	Final Sampling and Analysis Plan for Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site
"Site, the "	Li Tungsten Superfund Site
SU	Survey Unit
TDY	TDY Industries Incorporated
Th	Thorium
Th-230	Thorium-230
Th-232	Thorium-232
TPU	Total Propagated Uncertainty
U	Uranium
U-238	Uranium-238
XRF	X-Ray Fluorescence

1.0 Introduction

The remedial activities conducted at Parcel B and Upper Parcel C of the Li Tungsten Superfund Site (LTSS) included the excavation of soils impacted by radionuclides and metals to satisfy the site-wide cleanup levels specified in the Record of Decision (ROD), as revised by the May 2005 Explanation of Significant Difference (ESD). The remedial activities are described in the Remedial Action Report (ECC, 2008), which will be issued under separate cover. The remedial work at the Li Tungsten site is in part fulfillment of the obligations required of the Potentially Responsible Parties (PRPs) from the Consent Judgment shown in Appendix D. Compliance with site-wide cleanup levels for soil was demonstrated using the procedures in the Multi-Agency Radiological Site Survey and Investigation Manual (MARSSIM) (EPA 402-R-97-016) and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). The Final Status Survey protocol is described in the Final Status Survey Plan (FSSP). A statistical analysis of the data obtained from the pre-excavation sampling provided the basis of the number of samples collected during the Final Status Survey (FSS). The FSS demonstrates the compliance to site cleanup levels following the scoping, characterization and the remedial actions in Parcel B and Parcel C.

1.1 Site Description

The Final Status Survey Report (FSSR) addresses areas contained in the former Li Tungsten Corporation facility, Parcel B and Parcel C. Parcel B which lies East of Dickson Lane was generally undeveloped and contains a small pond, intermittent stream and a small wetland. Parcel C which lies west of Dickson Lane includes two larger structures (the Benbow Building and the Dickson Warehouse), former surface water impoundments, and former locations of three above ground storage tanks. Parcel C` was not part of the active operating facility. This report does not include the Li Tungsten facility structures known as the Dickson Warehouse or Benbow Building.

1.2 Applicable Site Guidelines

Table 1-1 lists the Site-Wide Cleanup Levels established by the EPA, as part of the ROD and revised by the ESD. The Site-Wide Cleanup Levels are synonymous with the Derived Concentration Guideline Levels (DCGLs).

Table 1-1
Site-Wide Cleanup Levels

Parameter	Cleanup Levels
Arsenic (soil)	24 mg/kg
Lead (soil)	400 mg/kg
Arsenic (sediments)a	6 mg/kg
Lead (sediments) a	31 mg/kg
Thorium-230 + Thorium-232 (soil)	≤5 pCi/g plus background
Radium-226 + Radium-228 (soil)	≤5 pCi/g plus background
PCBs in the dumping area (middle) Of Parcel B (soil)	1 mg/kg in the top 2 feet
PCBs in the dumping area (middle) Of Parcel B (soil)	10 mg/kg in below 2 feet

(a) There are no locations in Parcels B and Upper Parcel C to which the criteria apply. Sediment criteria were obtained from the Technical Guidance For Screening Contaminated Sediment, (Technical Guidance). Criteria are identified as "To Be Considered" ARARs. As defined in the Technical Guidance, sediments are "a collection of fine-, medium-, and coarse- grain materials and organic particles that are found at the bottom of lakes and ponds, rivers and streams, bays, estuaries, and oceans". Criteria for arsenic and lead are based on oligotrophic waters with low concentrations of metals-complexing ligands and are over protective when applied to eutrophic waters. (The Technical Guidance further cautions that a decision to remediate should not be based on exceedances of these criteria.) No areas have been identified within Parcels B and Upper Parcel C that meet the definition of sediment or the criteria upon which the sediment screening criteria are based.

Appendix B Sampling and Analysis Plan, Remedial Action at Parcel B and Upper Parcel C of the Li Tungsten Property of the Li Tungsten Superfund Site. September 2002., Section 1.3, *Derived Concentration Guideline Levels,* describes the application of the DCGLs specific to Thorium-230 (Th-230), Thorium-232 (Th-232), Radium-226 (Ra-226), and Radium-228 (Ra-228). Th-232 and Ra-228 are part of the Th-232 decay chain and thus are presumed to be in secular equilibrium. Similarly, Th-230 and Ra-226 are part of the Uranium-238 (U-238) decay chain and thus are also presumed to be in secular equilibrium.

2.0 Survey Design Overview

2.1 Site Layout- Radiological Sampling

Portions of the Site have been classified as radiologically impacted or radiologically non-impacted as described in Section 1.5 Survey, Survey Unit Classification, of the SAP. The following areas have been designated for the survey, in accordance with the protocols described in MARSSIM.

Class 1 Areas - Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiological surveys). Class 1 Areas of the Site include:

- Survey Units 5 and 6 in Parcel B;
- Survey Units SU1, SU2, SU3, SU4, SU8, and SU10 in Parcel C

Class 3 Areas - Impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the $DCGL_W$, based on site operating history and previous radiological surveys. Class 3 Areas of the Site included:

- SU7 the remaining surface area outside the Class 1 locations within Parcel B;
- SU9 the remaining surface area outside the Class 1 locations within Parcel C and C'

Figure 2-1 details the locations of the Class 1 and 3 areas of the Site. **Figure 2-2** details the survey units and sampling locations for the areas of the Site.

2.2 Site Layout- Metals Sampling

Delineation of metals at the Li Tungsten site required two separate sampling tasks to demonstrate compliance to the DCGLs.. **Figure 2-3** details the metals and PCBs areas of concern at the Site. The first was a screening method where sample points followed a grid system and a pre-determined number of soil sampling locations for the Site. Screening samples using the portable XRF Unit were taken at each of the grid sampling locations. The use of the portable XRF Units (Innovex and Niton) provided an indicator as to whether the area met the metals DCGLs. Final Status metals sampling proceeded if the XRF Unit screening results indicated that the metals cleanup levels were met. Further remediation was performed if the screening indicated that the DCGLs had not been met.

Sampling to demonstrate compliance to the metals DCGLs were systematically located within the Soils Area. **Figure 2-4** and **Figure 2-5** shows metals screening and sampling areas. Metals samples were collected as a composite of 10 locations around the sampling points shown in **Figure 2-4**. Composite samples will be taken of soil in 4 square inch surface areas, to a depth of 6 inches. Composite samples will be thoroughly mixed in stainless steel bowls or aluminum pans. A 16-ounce glass sampling jar will then be filled using the mixed composite sample. Biased samples were collected from areas that exhibited a clustering of XRF Pb or As readings that exceeded the

cleanup levels. Biased samples were in addition to those shown in **Figure 2-4**. Biased samples were obtained as a composite in the same manner as the other metal samples.

2.3 Site Layout- PCB Sampling

PCB soil sampling was completed to demonstrate that the PCB impacted area met the DCGLs. A predetermined number of PCB samples were located within a grid system. The location of the PCB soil samples was within the dumping area (middle) of Parcel B.

Figure 2-6 shows the area the delineated as the PCB sampling area and locations. The PCB sampling area was itself delineated by the use of ENSYS test kits. The ENSYS test for PCBs procedure (EPA Method 4020) is provided in Appendix C. The same sampling protocol used in metal sampling was applied to the PCB samples.

3.0 Sampling and Analysis Methods

3.1 Gross Gamma Walkover Survey

Gross gamma walkover surveys was performed with the Ludlum Model 2350-1 ratemeter coupled to a Ludlum Model 44-10, 2" x 2" NaI(Tl) gamma scintillator (or equivalent), in turn linked to GPS receiver. The detector traversed the survey area in rows spaced 0.5 m apart, at a fixed height of 10 cm above soil, and at a speed of one m/s or less. The scan integration time is one second. Class 1 areas received a gamma walkover survey of 100% of the reasonably accessible areas. The Class 3 areas received a gamma walkover survey of 10% of the area most likely to potentially contain residual radioactive contamination.

3.2 Radiological Surface Soil Sample Collection

Radiological surface soil samples were collected based on the final status survey design requirements, the presence of surface anomalies (e.g. elevated count rates from gross gamma walkover surveys), and at the discretion of the Project Health Physicist. Surface sample depth was approximately 15 cm. The surface area was approximately 80 square centimeters (cm2) and this corresponded to a square of 9 cm by 9 cm or a circle of diameter 10 cm. Clean hand tools (e.g., trowel or auger) were used to remove a sample of soil from the surface over an area of approximately 80 cm^2 to a depth of 15 cm. Soil was then transferred to a stainless steel bowl. The sample contents were manually separated visually and items identifiable as non-soil components such as stones, twigs, and foreign objects were removed from the sample leaving only the soil portion. The soil sample was then thoroughly mixed to homogenize it. The approximately 1,000 grams of the soil sample was transferred to a Marinelli beaker for on site screening and then the soil sample was bagged and sealed. A beta-gamma survey of the non-soil components was performed to ensure that they did not contain radioactivity in excess of ambient background.

3.3 On-site Gamma Spectroscopy

The On-site Canberra High Purity Germanium (HPGe) Gamma Spectroscopy System was used to support characterization sampling and field surveys. This included initial screening of soil samples to verify the results of previous historical analytical information and to establish correlation between field results and field instrument detection capabilities. The on-site gamma spectroscopy system was used also for screening confirmatory samples (waste characterization samples) taken from excavated material. The XRF instrument was used to screen confirmatory samples for metals prior to shipment to the TestAmerica Lab in Edison, New Jersey.

3.4 GPS Data Collection

GPS data was collected at grade level for each sample location. The data was used to document the location (northing and easting point) of each sample location. Hand drawn maps and digital images were also used to document sample locations. The GPS link ties survey data to spatial locations using state plane coordinates for the regional satellite or coast guard beacon system.

By design, the GPS unit is self-calibrating, using data received from the satellite constellation to determine the precision and accuracy of its readings. The GPS locations were expressed in units of northing/easting (latitude/longitude). The position was referenced to a horizontal North American Datum 1983. If the GPS unit exhibited positional error in excess of one meter a data point can not be downloaded.

3.5 XRF Soil Screening

The XRF instrument was used to support characterization sampling and field surveys. This included initial screening of soil samples to verify the results of previous historical analytical information and to establish correlation between field results and field instrument detection capabilities. The XRF instrument was used to screen confirmatory samples for metals prior to shipment to the TestAmerica Lab in Edison, New Jersey.

3.6 Off-Site Laboratory Analysis of Surface Soil Samples

The off-site laboratory reported concentration values for Ra-226, Ra-228, Th-230, and Th-232 in pCi/g. The sampling data was used to confirm that previously calculated correlations remain accurate for the gamma walkover instrumentation. The off-site laboratory reported concentration values for PCBs in micrograms per kilogram and arsenic and lead in milligrams per kilogram (mg/kg). The off-site laboratory results were used to assess Final Status at LTSS.

4.0 Implementation of Final Status Survey

4.1 Comparison of Analytical Data to Site-Wide Clean-Up Levels

4.1.1 Gross Gamma Walkover Survey (GWS) Data Evaluation

Gross gamma walkover data was processed as follows:
The dose rate measurements were plotted as color-coded filled contours for visual review and evaluation. In the case of the Site there were no areas significantly above the ambient background radiation level. Additional data analysis was not required. The color-coded filled contours can be found in Appendix F.

4.1.2 On-Site Lab Gamma Spectroscopy Results

On-site gamma spectroscopy was used for screening only. All systematic results were from the offsite laboratory analyses. These results were used to verify compliance with site DCGLs.

4.1.3 Off-Site Radiological Laboratory Results

Sampling data was evaluated to determine if the remedial action had removed sufficient contaminated material so that the DCGLs were met. Subsequent review and evaluation of the radiological data is summarized in **Table 4-1** and discussed in detail in Section 5.

4.1.4 XRF Screening Evaluation

The XRF was used to screen surface soil by determining the arsenic and lead concentrations. The screening results were plotted in grids and the results were used as a basis for further remediation or used to halt remediation efforts. The XRF grids can be found in Appendix G.

4.1.5 Off-Site Chemical Laboratory Results

Sampling data was evaluated to determine if the remedial action had removed sufficient contaminated material so that the DCGLs were met. Subsequent review and evaluation of the chemical data is summarized in **Tables 4-2 and 4-3** and discussed in detail in Section 5.

5.0 FSS Survey Results

5.1 Data for Analysis By Survey Unit

5.1.1 Off-Site Radionuclides Laboratory Results

The off-site laboratory analysis for radionuclides indicates by inspection that all sample results by would meet the DCGLs with the exception of 1 sample result in survey unit 10. Additional analysis of that sample will be presented later in the Elevated Measurement Comparison in section 5.5.4.2. The complete survey unit data analysis is presented in **Tables 5-1-1 to 5-10-3** by survey unit.

5.1.2 Off-Site Lead and Arsenic Laboratory Results

The off-site laboratory analysis for lead and arsenic indicates that most of the samples are below the DCGLs and the average will meet the DCGLs. The Parcel B metals data is presented in **Table 5-11a** and the Parcel C metals data is presented in **Table 5-11b**. One location in of each of the Parcels B and C did not meet DCGLs for Arsenic. This is discussed in Section 5.6.1.

5.1.3 Off-Site Polychlorinated Biphenyls Laboratory Results

The off-site laboratory analysis for PCBs indicates that most of the samples are below the DCGLs and the average will meet the DCGLs provide a 2 foot cover is placed over the PCB area in Parcel B. The PCB data is presented in **Table 5-4**.

5.2 Data for Analysis By Survey Unit

5.2.1 Class 1 Survey Units

The radionuclide FSS sample results of SU1, SU2, SU3, SU4, SU5, SU6, and SU8 show that none of the individual radionuclide sample results exceed the radionuclide concentrations specified in the DCGL found in **Table 1-1**.

In one instance in SU10, one radionuclide sample result (5601-FSS-SU10-1010) exceeded the ROD criteria in **Table 1-1**. Since residual radioactivity was found as an isolated area of elevated activity—in addition to residual radioactivity distributed relatively uniformly across the survey unit—the unity rule can be used to ensure that the radionuclide of concern activity concentration is within the $DCGL_w$ for specific radionuclide of concern.

> An example of the Unity Rule using the site wide clean up levels.
> DCGLs: Ra-226 + Ra-228 < 5 pCi/g and Th-230 + Th-232 < 5 pCi/g
> Survey Unit 7 average Ra-226 + Ra-228 concentration is 1.79 pCi/g and the Th-230 + Th-232 concentration is 1.58.
> 1.79/10 + 1.58/10 < 1 i.e., 0.337 <1

In all the survey units except 5601-FSS-SU10-1010 the individual sample sum of fractions from inspection was <1

This application of the unity rule is the Elevated Measurement Comparison (EMC) The EMC was completed to ensure that the total activity in the survey unit satisfied the DCGL established for the Site. For the calculation, the average concentration in the elevated area and the average concentration in the entire survey unit (d) are used:

$$\frac{d}{DCGL_W} + \frac{(\text{average concentration in elevated area} - d)}{(\text{area factor for elevated area})(DCGL_W)} < 1$$

If the calculation result is greater than one, the survey unit fails to satisfy the release criteria and further excavation of the survey unit will be required. The result of the EMC calculation for sample 5601-FSS-SU10-1010 is <1. The specific EMC calculations are shown in Section 8.5.4.2. The sampling density supports using an area factor appropriate for small areas these have higher applicable area factors than needed to demonstrate meeting the unity criterion.

5.2.2 Class Survey Units

The radionuclide FSS sample results of SU7 and SU9 show that it no case did any of the individual sample results exceed the radionuclide concentrations specified in the ROD criteria found in **Table 1-1**.

5.2.3 Background Samples

A background reference area is a geographical area from which representative samples of background conditions are selected for comparison with samples collected in specific survey units at the remediated site (NUREG-1505). The Project Health Physicist will collect 11 reference samples from the Glen Cove Park located in Glen Cove, New York. Glen Cove Park was selected as a background location as there is no indication of residual radioactive contamination and is representative of the background radiological conditions for the geographic region. The background sample results are presented as **Table 5-4** and the sample values are also used in each WRS Statistical Test.

5.2.4 Survey Unit Specific Evaluations

5.2.4.1 Wilcoxon Rank Sum (WRS) Statistical Test

The WRS test is a two-sample test that compares the distribution of a set of sample results in a survey unit to that of a set of sample results in a reference area. The test is performed by first adding the value of the $DCGL_W$ to each sample result in the reference area. The combined set of survey unit data and adjusted reference area data are listed, or ranked, in increasing numerical order. If the ranks of the adjusted reference site measurements are significantly higher than the ranks of the survey unit measurements, the survey unit

demonstrates compliance with the DCGLs. This test was chosen because contamination is present in the background at the Site.

The WRS test is effective when residual radioactivity is uniformly present throughout a survey unit (i.e., the sample distribution is symmetrical). The test is designed to detect whether or not activity exceeds the $DCGL_W$.

The Null Hypothesis tested by the WRS test at the Site is:

Null Hypothesis (H_0): The average concentration in the survey unit exceeds the average concentration in the reference area by more than the $DCGL_W$.

Alternative Hypothesis (H_a): The average concentration in the survey unit exceeds the average concentration in the reference area by less than the $DCGL_W$.

The Null Hypothesis is assumed to be true unless the statistical test indicates that it should be rejected in favor of the alternative. Any difference between the reference area and survey unit concentration distributions is assumed to be due to a shift in the survey unit concentrations to higher values (i.e. due to the presence of residual radioactivity in addition to background that exceeds cleanup criteria). Survey units can meet the release criteria even though some measurements are greater than some reference area measurements. Also, survey unit measurements can exceed some reference area measurements by more than the $DCGL_W$. The result of the hypothesis test determines whether or not the survey unit as a whole meets the DCGLs.

Two underlying assumptions of the WRS test are:

- Samples from the reference area and survey unit are independent, either identically or similarly distributed random samples; and
- Each measurement is independent of every other measurement, regardless of the set of samples from which it came.

Performing the WRS Test

The WRS test is applied as outlined in the following six steps by MARSSIM:

Step 1

Obtain the adjusted reference area measurements, Z_i, by adding the $DCGL_W$ to each reference area measurement, X_I, ($Z_i = X_i + DCGL_W$).

Step 2

The *m* adjusted reference sample measurements, Z_I, from the reference area and the *n* sample measurements, Y_I, from the survey unit are pooled and ranked in order of increasing

size from 1 to N, where N = $m + n$.

Step 3

If several measurements are tied (i.e., have the same value), they are all assigned the average rank of that group of tied measurements.

Step 4

If there are t "less than" values, they are all given the average of the ranks from 1 to t. Therefore, they are all assigned the rank $t(t+1)/2t = (t+1)/2$, which is the average of the first t integers. If there is more than one detection limit, all observations below the largest detection limit should be treated as "less than" values

Step 5

Sum the ranks of the adjusted measurements from the reference area, W_r. Note that since the sum of the first N integers is N(N+1)/2, one can equivalently sum the ranks of the measurements from the survey unit, W_s, and compute $W_r = N(N+1)/2$ B W_s.

Step 6

Compare W_r with the critical value given in MARSSIM for the appropriate values of n, m, and σ. If W_r is greater than the tabulated value, reject the Null Hypothesis that the survey unit exceeds the release criterion.

The complete set of WRS evaluations for survey units 1-10 are in **Tables 5-1-1 to 5-10-3**

5.2.4.2 Wilcoxon Rank Sum (WRS) Statistical Test

When an elevated "hot spot" is found, the Elevated Measurement Comparison (EMC) protocol may be used to determine whether a sufficiently small area exists that supports a large enough area factor to reduce the unity statistic to less than one. In the event that a hot spot is either of large areal extent or sufficiently elevated that an area factor cannot be used that brings the EMC below 1, then one or more additional measures are required. Either additional sampling to refine the area of the hot spot, further remediation, or petitioning for an alternate concentration limit would be required. Since the EMC protocol easily demonstrates meeting the criterion based on the existing data, no remediation is required. Smaller area factors than supported by the sampling and analysis density could be used. Neither further sampling nor further remediation is required. Sampling density for the area in SU10 (5601-FSS-SU10-1010-N, S, E, W) supports an area factor of 1 to 3 m^2 these would be 12.5 and 6.2, respectively. However, an area factor as high as for 100 m^2 area (as low as 1.8) would still enable the data to pass the unity rule.

The EMC is used in conjunction with the Wilcoxon test to compare the test area to a reference area to determine if the aggregate area or any hot spot exceeds a specified value $DCGL_{EMC}$ (DCGL related to an area factor that takes in to consideration risk from various dose pathways), or $DCGL_W$.

Calculation:

EMC Calculation
Given d = delta for entire survey unit

$$\frac{(d/DCGLw) + ((\text{average concentration in elevated area} - d)}{(\text{area factor for elevated area} \times DCGLw))} > 1$$

(DCGLw = DCGL plus background) (2.85 pCi/g +0.69 pCi/g)

(1.03 pCi/g / 3.54 pCi/g) + (5.42 pCi/g - 1.03 pCi/g) / (12.5 x 3.54 pCi/g) = 0.3911 pCi/g < 1

Surrounding sample points used to delineate the area:

	Th-232 pCi/g
5601-FSS-SU10-1010-S	1.57
5601-FSS-SU10-1010-N	17.90
5601-FSS-SU10-1010-E	1.17
5601-FSS-SU10-1010-W	1.05
average	**5.42**

Area Factor (F_a) from Table 5.6 Marssim (RESRAD 1 pCi/g)

Th-232	100 m^2	30 m^2	10 m^2	3 m^2	1 m^2
Fa	1.8	2.3	3.2	6.2	12.5
EMC statistic: to pass, must be less than 1	0.98	0.83	0.68	0.49	0.39

Note: The elevated area was estimated to be 1 m^2, area would fail *only* if the contaminated area exceeded 100 m^2

5.3 Chemical Contamination Area(s) Evaluation

5.3.1 Lead and Arsenic

Tables 5-11a and **5-11b** present the reported analytical results for the metals samples collected from Parcel B and C. **Table 5-14a** and **Table 5-14b** presents the statistical analysis of the samples results of the certified, off-site analysis. **Figure 2-4** presents the locations sampled in both areas.

Statistical analysis was performed according to Chapter 9 of SW-846, using the mathematical model of Table 6-1 in SW-846. The Final Status Sample results that indicate the cleanup criteria for metals have been achieved were evaluated to determine the confidence level of the data population.

For the set of data, S^2, the standard deviation (S), and the standard error of the mean (S_x) will be calculated. The formula for calculating S follows (SW-846):

$$S = \sqrt{S^2}$$

The formula for calculating S_x is (from SW-846):

$$S_{\bar{x}} = \frac{S}{\sqrt{n}}$$

The confidence level (CL) is then determined. The formula for calculating the CL is (SW-846):

$$CL = \bar{x} \pm t_{.20} * S_{\bar{x}}$$

The population set is considered uncontaminated if a sufficient number of samples were collected and the upper limit of the CL is less than the cleanup criteria for each metal contaminant of concern. The number of samples for each metal contaminant of concern is calculated in the sample, S^2.

Statistical analysis of the laboratory results for samples collected indicate that both Parcel B and C meet the ROD metals cleanup standards for lead and arsenic. Specifically, the calculated means, *x*, of metals for the area of Parcel B and C are less than respective ROD cleanup criteria. Although there are isolated "hot spots" remaining for Arsenic, the decision rules for clean-up were implemented and the clean-up objectives were met. See Table 4-2 for a summary of decision rule implementation for metal samples. There are institutional controls to be implemented for small areas as noted in Table 4-2. A sufficient number of samples, *n*, were collected as required by the statistical test.

$$n = (t^2_{.20} * S^2)/\Delta^2$$

Please note that the calculated number of samples as listed below:

- Arsenic, n = 1.59, and Lead, n = 4.78E-2, for Parcel B
- Arsenic, n = 8.94E-01, and Lead, n = 3.66E-02, for Parcel C

Calculated sampling frequencies represent the minimum number of samples that must be obtained based upon the variability of the data population and their value relative to the cleanup goal. The analytical data exhibited little variability and the reported results were all much less than the cleanup goal, so the calculated minimum number of samples, n, was a fraction of a whole number. These are then rounded up to the next nearest whole number.

5.3.2 Polychlorinated Biphenyls

The Remedial Action Work Plan (RAWP) called for the excavation and removal of polychlorinated biphenyls (PCB) from the dumping area in the middle of Parcel B. As directed, excavation was performed and samples were then collected. The upper northern half of the Parcel B PCB area was covered with at least 2-feet of soil cover to meet the ROD cleanup standard of 10 mg/kg for

subsurface soils greater then 2-feet depth. The lower southern half of the Parcel B PCB area was also covered with 2-feet of soil cover to ensure that the entire sample area meets the ROD cleanup standard of 1 mg/kg for surface soils.

Figure 2-5 details the PCB sampling locations.

Table 5-12 presents the results for PCBs as reported by the off-site laboratory. Total PCBs are determined by summing the individual reported results for each sample. **Table 5-15** presents the statistical analysis of the calculated Total PCB sample results of the off-site analysis. Statistical analysis was performed according to Chapter 9 of SW-846, using the mathematical model of Table 6-1. The calculated means, x, of all PCBs are less than 10 mg/kg ROD PCB cleanup standard for subsurface soils Additionally, a sufficient number of samples, n, were collected as required by the statistical test. Therefore, the applicable ROD cleanup standard of 10 mg/kg total PCBs has been met.

Please note that the calculated number of samples, $n = .012$, represents the minimum number of samples that must be obtained based upon the variability of the data population and their value

5.3.3 Chemical and Radiological Final Remedial Action Support Survey Information

The FRASS data support that the average concentrations of arsenic and lead would meet the DCGLs.

- FRASS locations are show in **Figure 2-6** and **Appendix F**
- Chemical FRASS Data is presented in **Table 5-16** and **8-17**.

6.0 Instrument Quality Assurance/Quality Control

6.1 Instruments

Table 6-1 provides a list of all field instruments. The field instruments used during the course of the survey were in current calibration, traceable to the NIST. Copies of all vendor instrument calibration certificates are provide in appendix E. All portable instruments used at the LTSS were in calibration.

6.2 Quality Control Tracking

Periodicity and QC requirement for instruments are provided in Appendix B *Environmental Chemical Corporation Radiological Operating Procedural Manual*. All QC requirements such as initial source checks and other checks were completed on all portable instruments used at LTSS

7.0 Data Quality Objectives (DQOs) and Li Tungsten Final Status Survey

7.1 Project Objective

The overall objective for the Final Status Survey (FSS) was to obtain and evaluate a sufficient amount of data to meet the DQOs and to confirm that the required site remediation had been accomplished. Specifically, that sufficient radionuclide and chemical data was generated to demonstrate that the DCGLs were met.

To determine the project DQOs, planning steps were used as specified in the EPA Guidance for Data Quality Objective Process QA/G-4 (EPA, 2000). The process was intended to be iterative, optimizing data collection to meet the applicable decision criteria. The following sections detail the seven steps as applied to the Site and how each data quality objective was met by the application of the FSS planned methodology.

7.1.1 Precision

7.1.1.1 Radionuclide Data

The basic activities performed in the assessment of precision for radionuclide concentrations are estimating the variability of the samples and estimating the measurement error attributable to the data collection process. If the required performance objective as specified in **Table 1-1** is not met, additional measurements will be collected. Variability of data is estimated using the results of multiple measurements (replicates).

For the Li Tungsten site radionuclide laboratory data precision is presented in **Table 7-1** of the calculated Normalized Absolute Difference (NAD). The normalized absolute difference between the sample and laboratory duplicate given by the relationship below is used in testing the null hypothesis that the results do not differ significantly when compared to their respective Total Propagated Uncertainty (TPU).

$$NAD = S - D / \sqrt{TPU_s + TPU_d}$$

Where:
S = Sample Result
D = Laboratory duplicate result
TPU_S = The Square of the Total Propagated Uncertainty of the Sample
TPU_D = The Square of the Total Propagated Uncertainty of the Duplicate

The NAD results for all radionuclides of concern indicates that there were no significant problems in the analysis of each radionuclide at the laboratory.

Table 7-2 presents the radionuclide sample replicate analysis for each of the Survey Units. There are multiple replicates presented in Table 7-2 because each radionuclide analyzed has a separate replicate result associated with it. The table shows that the sample replicate falls

within a range of values between ¼ the original sample value and 4 times the original sample value. In some cases, a replicate sample was used as a lab split sample where the replicate was sent to a different lab for analysis. In the case of the Site, the replicate samples were sent to Eberline Services in Oakridge, Tennessee where the replicate samples were analyzed by the same methods as the TestAmerica Laboratory in St Louis, Missouri. Sample and replicate variability may fall outside the acceptable range at low concentrations due to sample and replicate total counting uncertainty.

The calculated radionuclide replicate analysis indicates that the majority of replicate sample results fall within a range of values between ¼ the original sample value and 4 times the original sample value. Two results showed that the replicate Ra-228 analysis tallies outside the accepted NAD range. This could be due to heterogeneity in the sample resulting in the analysis of dissimilar aliquots. Due to the inherent properties of the Poisson Distribution the efficacy and power associated with NAD is limited as environmental cleanup levels approach background levels. The validity of the sample results for the survey units are not affected by the sampling anomalies since the majority of the samples met the required range and showed little variability as group.

7.1.1.2 Chemical Data

Precision measures the agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision describes the effects random errors have on analytical measurements. Precision is the degree to which the measurement is reproducible and is usually expressed in terms of Relative Percent Difference (RPD) or standard deviation. If the required performance objective as specified in **Table 1-1** is not met, additional samples were collected and analyzed. Variability of data is estimated using the results of multiple measurements (replicates).

The Li Tungsten precision evaluation is presented in the Quality Control Summary Report (QCSR). The QCSR covers precision in analytical method for metals, organic analysis (matrix spike/matrix spike duplicate agreement), and agreement of replicate analysis for metals. QCSR reported two lead results for samples 5601-FSS-PB-1008-1 and 5601-FSS-PB-1022-1 were rejected (R) due to high field duplicate RPDs (>120%) results. All other data are valid for use, as meeting all quality objectives.

7.1.2 Accuracy

7.1.2.1 Radionuclide Data

Accuracy is a measurement of the “over or under” estimation of reported radionuclide concentrations. The procedure for determining accuracy will vary according to differences in the number of measurements and the precision of the estimates.

The measurement of the accuracy of the Li Tungsten radionuclide data is presented in the data tables as 2 times the standard deviation of the total propagated uncertainty (2 σ) All the reported radionuclide data was within acceptable limits of uncertainty.

7.1.2.2 Chemical Data

Chemical accuracy results were evaluated using matrix spike (MS), laboratory control sample (LCS), and surrogate (organics only) results. Accuracy is the degree of agreement of a measurement with an accepted reference or true value. The accuracy of an analytical procedure is determined by the addition of a known amount of material (matrix spike) to a field sample matrix or a standard matrix. Accuracy is used to estimate the impact of systematic errors, or biases, on analytical measurements required to make programmatic decisions. If accuracy and precision goals are not attained, the reasons are investigated as a corrective action. Data that exhibits poor performance are qualitatively evaluated in quality control (QC) reports. The data is not removed from the project database but qualifiers are used to identify the data. The data quality evaluations are presented in the QCSR.

7.1.3 Representativeness

Representativeness expresses the degree to which sample data precisely and accurately represents a characteristic of a population, parameter variations at a sampling location, a process condition, or an environmental condition. Representativeness is a qualitative parameter most concerned with the proper design of the sampling program, proper sampling locations, implementing proper sampling protocols, and collecting a sufficient number of investigative samples, such that the analytical data generated is representative of actual site conditions.

The results of this evaluation indicated that the samples collected represented the soil conditions found at the site.

7.1.4 Completeness

Completeness measures all data necessary for the remediation of the Site. Completeness compares the number of samples required versus the total number of quality analytical results for samples. The completeness goal is 95%. Completeness for quality data will be 80% and is defined as the percentage of quality data out of the total amount of data generated.

For the Site completeness is 100% all required number of FSS Samples were taken.

7.1.5 Comparability

To evaluate the comparability of the data, sampling and analytical techniques were considered. This is a key quality indicator for data obtained from field screening methods, on-site lab analysis, and off-site laboratory analysis. The agreement within bounds of analytical data from the various analytical techniques is an indication of the validity and quality of the analytical data.

Table 7-3 found in the tables sections compares the on-site and off-site radionuclide sample results.

The average RPD for Ra-226 between on-site and off-site was 46.81%. This RPD may be due to the difference in analytical methods. The off-site lab utilizes gamma spectroscopy to analyze Ra-226 daughter in-growth (which gives more peaks with higher energy and yield—providing a much better signal) whereas the site lab analysis used a direct measurement only of the photopeak for Ra-226 by gamma spectroscopy. The site lab is a screening lab and the result is reasonable within a factor of 2 of the off-site lab. The off-site laboratory results were used in the FSS for confirming that the Site-Wide Cleanup Levels had been met because the methodology of the off-site laboratory has better precision.

A rough order of magnitude comparison was made of lead and arsenic final status survey soil sample results and screening XRF field readings. The average of the two final status soil samples collected in the vicinity of the XRF readings demonstrated high level of correlation between the aggregate of the XRF field readings presented in the Final Remedial Action Support Survey. This suggests The XRF field screening method provides a rough approximation of the level of lead and arsenic in the soil as collected in accordance with the requirements of SW-846. The results are presented in **Table 7-4**. The off-site laboratory results were used in the FSS for confirming that the Site-Wide Cleanup Levels had been met, because off-site laboratory analysis has better precision and accuracy than the XRF due to *in-situ* variability in bulk density and moisture of the site soils matrices.

7.1.6 Sensitivity

Sensitivity refers to the ability to detect a minimal amount of a substance, and is typically expressed as the method detection limit, Practical Quantitation Limit (PQL), or Reporting Limit (RL). Radiological analyses must indicate if the soils remaining at the site and building surveys have met the cleanup criteria. Therefore, the required off-site analytical laboratory minimum detectable level (MDL) was set at 1.77 pCi/g for Th-232 and 1.77 pCi/g for Ra-226, as detailed in Section 2.1.5 of the Sampling Analysis Plan (SAP). The TestAmerica, St Louis laboratory consistently achieved the required MDLs.

7.1.6.1 Scanning Minimal Detectable Concentration

In order for data collected during the RASS and the FSS to be valid, the scanning minimum detectable concentration (MDC_{scan}) must be less than the Site-Wide Cleanup Level for radionuclides. The MDC for the instruments and technique must be calculated and identified. The default MDC_{scan} for Ra-226, as listed in MARSSIM, is 2.8 pCi/g and will be used for the Site.

An evaluation of the class 1 survey units showed that radiation readings taken during the gamma walkovers ranged from 6 µR/hr to 9 µR/hr and corresponded to an average Ra-226 concentration of 0.92 pCi/g. A radiation reading of 6 µR/hr to 9 µR/hr is easily seen on the

Ludlum Model 2350 radiation meter coupled with the Ludlum Model 44-10 detector giving the health physics technician the ability to screen areas against the Site Clean Up Levels.

Chemical instrument sensitivity met the required MDLs to support clean up decisions. The DQSR reported that all analytical instruments met initial and continuing calibration. The XRF gun was self calibrating and could not be used unless it met calibration.

7.2 Boundaries of the Study

The spatial area of study includes the surface soils of the LTSS. The decision regarding whether the DCGLs have been met was the key study item and was based on the results of the radiological and chemical sampling activities. Boundaries for radiological release were based upon class designation, as determined by MARSSIM protocol. Boundaries for the chemical release of the site were set by SW-846 protocol.

The Li Tungsten site boundaries and Parcels are shown in **Figure 2-2** Site Layout and Radiological Areas.

7.3 Decision Rules

Scanning and analytical results were used to evaluate the effectiveness of remedial activities. Results were compared to DCGLs defined in the ROD. The Site Clean Up Levels are provided in **Table 1-1**. Scanning survey results were used to identify areas of elevated residual contamination. Chemical and radiological analytical results were used to verify radiological and chemical DCGLs. If the survey unit or area did not meet the DCGLs, additional soil was removed for off-site disposal. If the survey unit met the side-wide cleanup levels, no further remediation was required.

7.4 Acceptable Decision Errors

The combination of sampling design error and measurement error is termed as the total study error. Since it is impossible to eliminate error in measurement data, two types of decision errors can occur: Type I and Type II. A Type I or false positive error occurs when the Null Hypothesis (Ho, residual radioactive contamination above the site clean up levels) is true, but is mistakenly rejected. The probability of a Type I error is denoted by α (alpha). Alpha is sometimes referred to as the size of the test. A Type II or false negative error occurs when the Ho is false, but is not rejected. The probability of a Type II error is usually denoted by β (beta).

The probability of a Type I decision error that is tolerable falls under the 95% confidence level. This error rate is set at 0.05. The probability of a Type II error falls under a 90% confidence level, which equates to an error rate of 0.10.

Statistical tests were used to determine the disposition of survey and sample areas.

- The WRS Test was used to determine whether a degree of radiological contamination remains throughout the soils above the DCGLs.

- The WRS test is presented in depth for each radionuclide of concern of each survey unit later in this document in Section 5. and **Tables 5-1-1 to 5-10-3**.

7.5 Sampling Design

The variability of data can have an effect on the sampling design. The variability of the sample data at the Li Tungsten Site did not have an effect on the sampling design because most of the results did not exceed the DCGLs. In addition, no changes were required in the predetermined sample frequency outlined in the Li Tungsten Final Status Survey Plan and the analytical procedures were adequate so no changes were needed in each to optimize the sampling design. Changes did occur concurrently for several steps with the DQO process. The design options, such as survey unit designation and an increase in survey units was evaluated upon discovery of residual radionuclides of concern in several areas. The additional survey units were also evaluated based on cost and the ability to meet the DQOs.

The DQOs for the Li Tungsten project required the quantitative and qualitative verification of 10% of the sample results using rigorous methods of analysis and QA. The quality objective is intended to provide a level of confidence in the data enabling a decision to be made concerning demonstrating compliance with the DCGLs and surface contamination limits. These samples were the aforementioned replicates that were laboratory splits.

8.0 Conclusions

The remedial activities that were conducted at Parcel B and Upper Parcel C of the Li Tungsten Superfund Site (the Site) included the excavation of soils contaminated with radionuclides and metals to satisfy the Site-Wide Cleanup Levels specified in the Record of Decision (ROD), as revised by the May 2005 Explanation of Significant Difference (ESD). Compliance with Site-Wide Cleanup Levels for soil was demonstrated using the procedures in the Multi-Agency Radiological Site Survey and Investigation Manual (MARSSIM) (EPA 402-R-97-016) and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). A statistical analysis of the data obtained from the pre-excavation sampling provided the basis of the number of samples collected during the Final Status Survey. The Final Status Survey (FSS) demonstrated the compliance to DCGLs following the scoping, characterization and the remedial actions. Each of the radiological survey units average radionuclide concentrations met the DCGLs and the chemical contaminants lead, arsenic, and PCBs average concentrations met the DCGLs. Based on the site sample data and analysis, the remediated and sampled portions of Parcels B and C are in compliance with the clean up criteria and should be declared to have met the DCGLs specified in the ROD as revised.

The following areas require either institutional controls or showed elevated levels of contaminants:

PCB Area in Parcel B
The area denoted as the PCB dumping area in the middle of Parcel B was excavated and the PCBs removed. Samples were then collected and based upon the results (see Table 5-15 of the FSSR), it was determined that the alternative sitewide cleanup level of 10 mg/Kg for below 2-feet grade could be applied to the upper northern portion of the PCB area which did not meet the ROD clean up criteria for surface soils. The PCB remedial area as shown in Figure 2-5 of the FSSR was left with 2-feet of clean backfill over the upper northern portion and the lower southern half was not covered. The 2-feet of clean cover must be maintained over the upper northern portion in order to meet the ROD clean up standard. The maintenance of the 2-feet of clean cover is a deed restriction that should be communicated to future users of that section of Parcel B.

Side Wall West of the Dickson Warehouse Parcel C

In early May 2007 ECC completed excavation of the area West of the Dickson Warehouse specified by the URS Final Remedial Design Report. The FRD submitted by URS Corporation, January 3, 2002 details the plans for the completion of the prescribed Remedial Action for the Site. Utilizing the established grid system, the Side Wall Area West of the Dickson Warehouse Excavation was surveyed at the 10-meter grid nodes with a XRF unit. These survey results showed 12 locations with readings above the DCGL for Arsenic and 2 locations with readings above the DCGL for Lead. ECC obtained 4 Final Status Survey samples (5601-FSS-PC-10B3, 5601-FSS-PC-10B4, 5601-FSS-PC-10B5, and 5601-FSS-PC-10B6) from the Side Wall Area West of the Dickson Warehouse Excavation, in accordance with the Final Status Survey Plan. Sampling locations and sample results are provided in the Final Status Survey Report (ECC, 2008), after reviewing the data with the Performing Settling Defendant and the U.S. Environmental Protection Agency, it was determined further excavation of the Side Wall Area West of the Dickson Warehouse Excavation is

infeasible because of the existing utility and infrastructure present within the immediate area (< 2') beyond the fence line (2 storm drain systems, underground electric services, and private property security fencing). To ensure the Side Wall Area soil does not impact the West of the Dickson Excavation areas meeting the site release criteria, the Side Wall was physically separated by covering the exposed Side Wall with 15 mil puncture resistant poly sheeting. After the poly sheeting was installed, it was covered with clean fill. The poly sheeting and clean fill must be maintained in this area. The maintenance of the poly sheeting and clean fill is a deed restriction that should be communicated to future users of that area of Parcel C.

9.0 References

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(EPA 402-R-97-016), August 2000.

EPA, 2000b. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846). April 2000.

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List of Tables

Tables

Table 4-1 Summary of Decision Rule Implementation Radiological Samples

Parameter of Interest	Criteria	Action Taken
Gross Gamma Walkover Survey		
Presence of Contamination	Areas of elevated radiation levels	None Identified
Small Areas of Elevated Activity		
Identify Small Areas of Elevated Activity	The soil sample result exceeds the DCGLs	SU10 Performed elevated measurement comparison. The average corrected concentration of the elevated area met the DCGLs.
ROC Concentration		
WRS Test	The test statistic exceeds the critical value for the WRS Test,	The test statistic for Class 1 and Class 3 SUs, exceeds the applicable WRS Test critical values. Therefore, all survey unit average activity concentration were below the DCGLs.
	The test statistic is less than or equal to the critical value for the WRS Test,	None.
Elevated Measurement Comparison		
Identify Small Areas of Elevated Activity	Sample result exceeded the $DCGL_W$	SU10. Performed elevated measurement comparison. The average corrected concentration of the elevated area met the DCGLs.
Interpretation of Survey Results		
Compliance with the DCGLs	The survey area data pass the WRS Test and the EMC and small areas of elevated activity have been identified	All small areas of elevated contamination were evaluated and the areas contained in Parcel B and C meet the DCGLs.

Table 4-2 Summary of Decision Rule Implementation Metals Samples

Parameter of Interest	Criteria	Action Taken
XRF Survey Metals FRASS		
Presence of Contamination	See Section 6.4	Remove soil contaminated with residual arsenic and lead above the Site-Wide Clean Up Levels in lifts to ensure the area meets Site-Wide Cleanup Levels.
Small Areas of Elevated Metals Concentration		
Identify Small Areas of Elevated Activity	Parcel C along property line west of Dickson Warehouse	The area of higher As level were noted and reported. The area will be subject to an institutional control.
Chemical Metals Concentration		
SW-846 $n = \frac{t^2_{.20} S^2}{\Delta^2}$	The n value is less than the total number of samples taken	Yes, all areas in contained in Parcels B and C except a small area along property line west of Dickson Warehouse, which will be subject to an institutional control.
Interpretation of Sample and XRF Survey Results		
Compliance with the Release Criterion	The sample area data pass the SW-846 statistical tests	The areas contained in Parcels B and C met the Site-Wide Cleanup Levels for arsenic and lead, except a small area along property line west of Dickson Warehouse, which will be subject to an institutional control.

Table 4-3 Summary of Decision Rule Implementation PCB Samples

Parameter of Interest	Criteria	Action Taken
Small Areas of Elevated PCB Concentration		
Identify Small Areas of Elevated Activity	Parcel B PCB concentration 1 mg/kg from the surface to a depth of 2 feet of soil and 10 mg/kg for below 2 feet of soil	Small areas of PCBs concentrations between 1 mg/kg and 10 mg/kg were noted and reported. The PCB area was covered with 2 feet of cover.
Chemical PCB Concentration		
SW-846 $n = \frac{t^2_{.20} S^2}{\Delta^2}$	The n value exceeds the total number of samples taken	None. No re-excavation or resampling required
Interpretation of Sample Results		
Compliance with the Release Criterion	The sample area data pass the SW-846 statistical tests	The PCB area in Parcel B met the DCGLs. The location/area of clean cover is to subject to institutional controls.

TABLE 5-1-1

Survey Results For Survey Unit 1

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU1-1001	0.47	0.17	0.18	0.89	0.44	0.66	1.36	0.47	0.58	0.14	0.01	0.64	0.15	0.01	1.22	0.21
5601-FSS-SU1-1002	0.69	0.22	0.21	0.20	0.48	0.79	0.89	0.53	0.75	0.15	0.03	0.85	0.17	0.03	1.60	0.23
5601-FSS-SU1-1003	0.55	0.23	0.29	0.87	0.43	0.65	1.42	0.49	0.50	0.12	0.02	0.56	0.13	0.02	1.06	0.18
5601-FSS-SU1-1004	0.65	0.21	0.21	0.69	0.36	0.55	1.34	0.42	0.60	0.13	0.02	0.62	0.13	0.01	1.22	0.18
5601-FSS-SU1-1005	0.49	0.18	0.17	0.47	0.38	0.61	0.96	0.42	0.62	0.14	0.03	0.82	0.17	0.03	1.44	0.22
5601-FSS-SU1-1006	0.70	0.21	0.18	0.87	0.39	0.58	1.57	0.44	0.65	0.14	0.03	0.78	0.16	0.03	1.43	0.21
5601-FSS-SU1-1007	0.35	0.15	0.15	0.49	0.31	0.48	0.84	0.34	0.48	0.11	0.02	0.62	0.13	0.02	1.10	0.17
5601-FSS-SU1-1008	0.69	0.21	0.17	0.68	0.41	0.64	1.37	0.46	0.69	0.14	0.02	0.87	0.17	0.02	1.56	0.22
5601-FSS-SU1-1009	0.41	0.18	0.21	0.28	0.30	0.49	0.69	0.35	0.449	0.0999	0.022	0.51	0.11	0.02	0.96	0.15
5601-FSS-SU1-1010	0.60	0.17	0.13	0.73	0.33	0.50	1.33	0.37	0.58	0.13	0.02	0.75	0.15	0.02	1.33	0.20
5601-FSS-SU1-1011	0.85	0.24	0.22	0.90	0.38	0.57	1.75	0.45	0.90	0.19	0.03	0.87	0.18	0.03	1.77	0.26

TABLE 5-1-2
Ra-226 + Ra-228 WRS Test For Survey Unit 1

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 1

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2.00	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.70	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.80	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU1-1001	1.36	S	1.36	7	0
5601-FSS-SU1-1002	0.89	S	0.89	3	0
5601-FSS-SU1-1003	1.42	S	1.42	9	0
5601-FSS-SU1-1004	1.34	S	1.34	6	0
5601-FSS-SU1-1005	0.96	S	0.96	4	0
5601-FSS-SU1-1006	1.57	S	1.57	10	0
5601-FSS-SU1-1007	0.84	S	0.84	2	0
5601-FSS-SU1-1008	1.37	S	1.37	8	0
5601-FSS-SU1-1009	0.69	S	0.69	1	0
5601-FSS-SU1-1010	1.33	S	1.33	5	0
5601-FSS-SU1-1011	1.75	S	1.75	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.33	7.49

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-1-3
Th-230 + Th-232 WRS Test For Survey Unit 1

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 1

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU1-1001	1.22	S	1.22	4.5	0
5601-FSS-SU1-1002	1.60	S	1.6	10	0
5601-FSS-SU1-1003	1.06	S	1.06	2	0
5601-FSS-SU1-1004	1.22	S	1.22	4.5	0
5601-FSS-SU1-1005	1.44	S	1.44	8	0
5601-FSS-SU1-1006	1.43	S	1.43	7	0
5601-FSS-SU1-1007	1.10	S	1.10	3	0
5601-FSS-SU1-1008	1.56	S	1.56	9	0
5601-FSS-SU1-1009	0.96	S	0.96	1	0
5601-FSS-SU1-1010	1.33	S	1.33	6	0
5601-FSS-SU1-1011	1.77	S	1.77	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.25	9.97

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-2-1
Survey Results For Survey Unit 2

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU2-1001	0.97	0.25	0.18	1.18	0.46	0.67	2.15	0.52	0.82	0.16	0.01	0.80	0.16	0.01	1.62	0.23
5601-FSS-SU2-1002	1.36	0.30	0.17	0.08	0.44	0.74	1.44	0.53	0.80	0.16	0.02	0.92	0.18	0.02	1.72	0.24
5601-FSS-SU2-1003	1.48	0.32	0.19	1.55	0.49	0.69	3.03	0.59	0.57	0.12	0.02	0.83	0.16	0.01	1.40	0.20
5601-FSS-SU2-1004	1.62	0.35	0.24	1.38	0.48	0.68	3.00	0.59	0.78	0.16	0.02	0.95	0.18	0.03	1.73	0.24
5601-FSS-SU2-1005	1.02	0.28	0.24	0.88	0.44	0.67	1.90	0.52	0.64	0.13	0.02	0.93	0.18	0.02	1.57	0.22
5601-FSS-SU2-1006	1.00	0.26	0.21	0.94	0.37	0.54	1.94	0.45	0.57	0.12	0.02	0.78	0.15	0.02	1.35	0.19
5601-FSS-SU2-1007	0.75	0.26	0.30	1.03	0.40	0.58	1.78	0.48	0.52	0.11	0.02	0.70	0.14	0.02	1.22	0.18
5601-FSS-SU2-1008	1.16	0.27	0.20	1.26	0.44	0.63	2.42	0.52	0.78	0.16	0.02	1.10	0.21	0.02	1.88	0.26
5601-FSS-SU2-1009	1.10	0.27	0.20	1.18	0.39	0.55	2.28	0.47	0.740	0.15	0.020	0.95	0.18	0.02	1.69	0.23
5601-FSS-SU2-1010	0.53	0.18	0.17	0.53	0.31	0.48	1.06	0.36	0.50	0.11	0.02	0.63	0.13	0.01	1.13	0.17
5601-FSS-SU2-1011	1.44	0.31	0.19	1.20	0.42	0.60	2.64	0.52	0.89	0.17	0.02	1.10	0.20	0.03	1.99	0.26

TABLE 5-2-2
Ra-226 + Ra-228 WRS Test For Survey Unit 2

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 2

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.7	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU2-1001	2.15	S	2.15	6	0
5601-FSS-SU2-1002	1.44	S	1.44	2	0
5601-FSS-SU2-1003	3.03	S	3.03	11	0
5601-FSS-SU2-1004	3.00	S	3.00	10	0
5601-FSS-SU2-1005	1.90	S	1.90	4	0
5601-FSS-SU2-1006	1.94	S	1.94	5	0
5601-FSS-SU2-1007	1.78	S	1.78	3	0
5601-FSS-SU2-1008	2.42	S	2.42	8	0
5601-FSS-SU2-1009	2.28	S	2.28	7	0
5601-FSS-SU2-1010	1.06	S	1.06	1	0
5601-FSS-SU2-1011	2.64	S	2.64	9	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.61	4.08

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-2-3
Th-230 + Th-232 WRS Test For Survey Unit 2

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 2

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU2-1001	1.62	S	1.62	6	0
5601-FSS-SU2-1002	1.72	S	1.72	8	0
5601-FSS-SU2-1003	1.40	S	1.40	4	0
5601-FSS-SU2-1004	1.73	S	1.73	9	0
5601-FSS-SU2-1005	1.57	S	1.57	5	0
5601-FSS-SU2-1006	1.35	S	1.35	3	0
5601-FSS-SU2-1007	1.22	S	1.22	2	0
5601-FSS-SU2-1008	1.88	S	1.88	10	0
5601-FSS-SU2-1009	1.69	S	1.69	7	0
5601-FSS-SU2-1010	1.13	S	1.13	1	0
5601-FSS-SU2-1011	1.99	S	1.99	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.27	9.25

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-3-1
Survey Results For Survey Unit 3

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU3-1001	0.56	0.21	0.22	0.78	0.45	0.68	1.34	0.50	0.49	0.12	0.02	0.48	0.12	0.03	0.97	0.17
5601-FSS-SU3-1002	0.74	0.22	0.20	0.82	0.35	0.51	1.56	0.41	0.341	0.096	0.02	0.59	0.14	0.03	0.93	0.17
5601-FSS-SU3-1003	0.49	0.19	0.21	0.53	0.34	0.52	1.02	0.39	0.47	0.12	0.02	0.63	0.15	0.01	1.10	0.19
5601-FSS-SU3-1004	0.54	0.21	0.23	0.70	0.40	0.60	1.24	0.45	0.38	0.10	0.03	0.46	0.11	0.02	0.84	0.15
5601-FSS-SU3-1005	0.87	0.26	0.22	0.83	0.35	0.48	1.70	0.44	0.51	0.12	0.02	0.72	0.15	0.02	1.23	0.19
5601-FSS-SU3-1006	0.78	0.24	0.21	0.76	0.33	0.46	1.54	0.41	0.47	0.12	0.01	0.82	0.18	0.03	1.29	0.22
5601-FSS-SU3-1007	0.67	0.22	0.21	0.57	0.41	0.63	1.24	0.47	0.52	0.12	0.02	0.51	0.12	0.03	1.03	0.17
5601-FSS-SU3-1008	0.82	0.26	0.26	0.72	0.40	0.60	1.54	0.48	0.66	0.15	0.03	0.69	0.16	0.02	1.35	0.22
5601-FSS-SU3-1009	1.01	0.28	0.22	0.68	0.41	0.62	1.69	0.50	0.53	0.13	0.02	0.74	0.17	0.01	1.27	0.21
5601-FSS-SU3-1010	0.73	0.24	0.23	0.86	0.41	0.59	1.59	0.48	0.52	0.13	0.03	0.61	0.14	0.01	1.13	0.19
5601-FSS-SU3-1011	1.12	0.26	0.16	0.95	0.42	0.63	2.07	0.49	0.86	0.17	0.02	0.84	0.16	0.02	1.70	0.23

TABLE 5-3-2
Ra-226 + Ra-228 WRS Test For Survey Unit 3

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 3

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.7	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU3-1001	1.34	S	1.34	4	0
5601-FSS-SU3-1002	1.56	S	1.56	7	0
5601-FSS-SU3-1003	1.02	S	1.02	1	0
5601-FSS-SU3-1004	1.24	S	1.24	2.5	0
5601-FSS-SU3-1005	1.70	S	1.70	10	0
5601-FSS-SU3-1006	1.54	S	1.54	5.5	0
5601-FSS-SU3-1007	1.24	S	1.24	2.5	0
5601-FSS-SU3-1008	1.54	S	1.54	5.5	0
5601-FSS-SU3-1009	1.69	S	1.69	9	0
5601-FSS-SU3-1010	1.59	S	1.59	8	0
5601-FSS-SU3-1011	2.07	S	2.07	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.28	8.80

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-3-3
Th-230 + Th-232 WRS Test For Survey Unit 3

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 3

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU3-1001	0.97	S	0.97	3	0
5601-FSS-SU3-1002	0.93	S	0.931	2	0
5601-FSS-SU3-1003	1.10	S	1.10	5	0
5601-FSS-SU3-1004	0.84	S	0.84	1	0
5601-FSS-SU3-1005	1.23	S	1.23	7	0
5601-FSS-SU3-1006	1.29	S	1.29	9	0
5601-FSS-SU3-1007	1.03	S	1.03	4	0
5601-FSS-SU3-1008	1.35	S	1.35	10	0
5601-FSS-SU3-1009	1.27	S	1.27	8	0
5601-FSS-SU3-1010	1.13	S	1.13	6	0
5601-FSS-SU3-1011	1.70	S	1.70	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.24	10.44

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-4-1
Survey Results For Survey Unit 4

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU4-1001	1.04	0.25	0.18	0.89	0.54	0.84	1.93	0.60	0.66	0.12	0.02	0.77	0.13	0.02	1.43	0.18
5601-FSS-SU4-1002	0.40	0.16	0.017	0.05	0.47	0.80	0.45	0.50	0.25	0.06	0.012	0.275	0.060	0.015	0.53	0.08
5601-FSS-SU4-1003	0.22	0.14	0.19	0.19	0.37	0.62	0.41	0.40	0.13	0.04	0.019	0.130	0.038	0.014	0.26	0.05
5601-FSS-SU4-1004	1.33	0.30	0.19	0.97	0.53	0.82	2.30	0.61	1.01	0.16	0.01	1.10	0.18	0.01	2.11	0.24
5601-FSS-SU4-1005	0.93	0.26	0.21	0.71	0.60	0.96	1.64	0.65	0.64	0.12	0.02	0.86	0.10	0.02	1.50	0.16
5601-FSS-SU4-1006	1.40	0.30	0.17	0.83	0.50	0.77	2.23	0.58	0.93	0.15	0.02	0.89	0.15	0.01	1.82	0.21
5601-FSS-SU4-1007	0.33	0.14	0.15	-0.03	0.28	0.5	0.30	0.31	0.43	0.08	0.014	0.425	0.082	0.017	0.85	0.12
5601-FSS-SU4-1008	1.36	0.33	0.23	1.01	0.41	0.56	2.37	0.53	1.56	0.38	0.06	1.71	0.40	0.06	3.27	0.55
5601-FSS-SU4-1009	0.43	0.21	0.27	0.39	0.28	0.43	0.82	0.35	0.36	0.09	0.030	0.54	0.12	0.02	0.90	0.15
5601-FSS-SU4-1010	1.36	0.32	0.24	1.15	0.39	0.51	2.51	0.50	0.97	0.20	0.03	1.08	0.22	0.03	2.05	0.30
5601-FSS-SU4-1011	0.22	0.14	0.19	0.62	0.50	0.80	0.84	0.52	0.48	0.12	0.02	0.58	0.13	0.03	1.06	0.18
5601-FSS-SU4-1018	1.05	0.26	0.20	0.62	0.44	0.69	1.67	0.51	0.61	0.15	0.02	0.58	0.14	0.01	1.19	0.21
5601-FSS-SU4-1019	0.90	0.24	0.19	0.84	0.54	0.84	1.74	0.59	0.82	0.19	0.03	0.93	0.21	0.02	1.75	0.28

TABLE 5-4-2
Ra-226 + Ra-228 WRS Test For Survey Unit 4

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 4

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.7	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU4-1001	1.93	S	1.93	7	0
5601-FSS-SU4-1002	0.45	S	0.45	3	0
5601-FSS-SU4-1003	0.41	S	0.41	2	0
5601-FSS-SU4-1004	2.30	S	2.30	9	0
5601-FSS-SU4-1005	1.64	S	1.64	6	0
5601-FSS-SU4-1006	2.23	S	2.23	8	0
5601-FSS-SU4-1007	0.30	S	0.30	1	0
5601-FSS-SU4-1008	2.37	S	2.37	10	0
5601-FSS-SU4-1009	0.82	S	0.82	4	0
5601-FSS-SU4-1010	2.51	S	2.51	11	0
5601-FSS-SU4-1011	0.84	S	0.84	5	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.88	2.84

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-4-3
Th-230 + Th-232 WRS Test For Survey Unit 4

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 4

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU4-1001	1.43	S	1.43	6	0
5601-FSS-SU4-1002	0.53	S	0.525	2	0
5601-FSS-SU4-1003	0.26	S	0.26	1	0
5601-FSS-SU4-1004	2.11	S	2.11	10	0
5601-FSS-SU4-1005	1.50	S	1.50	7	0
5601-FSS-SU4-1006	1.82	S	1.82	8	0
5601-FSS-SU4-1007	0.85	S	0.85	3	0
5601-FSS-SU4-1008	3.27	S	3.27	11	0
5601-FSS-SU4-1009	0.90	S	0.90	4	0
5601-FSS-SU4-1010	2.05	S	2.05	9	0
5601-FSS-SU4-1011	1.06	S	1.06	5	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.86	2.92

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-5-1
Survey Results For Survey Unit 5

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU5-1001	0.87	0.23	0.20	0.42	0.48	0.79	1.29	0.53	0.82	0.17	0.06	0.98	0.20	0.07	1.80	0.26
5601-FSS-SU5-1002	0.99	0.26	0.23	0.31	0.34	0.56	1.30	0.43	0.84	0.17	0.05	1.02	0.20	0.06	1.86	0.26
5601-FSS-SU5-1003	0.81	0.22	0.18	0.4	0.38	0.62	1.21	0.44	0.61	0.14	0.05	0.80	0.16	0.058	1.41	0.21
5601-FSS-SU5-1004	0.73	0.24	0.27	0.52	0.4	0.64	1.25	0.47	0.79	0.17	0.06	0.92	0.19	0.069	1.71	0.25
5601-FSS-SU5-1005	1.30	0.35	0.29	0.65	0.62	0.99	1.95	0.71	1.01	0.21	0.04	1.17	0.23	0.064	2.18	0.31
5601-FSS-SU5-1006	0.11	0.18	0.31	-0.33	0.49	0.87	-0.22	0.52	0.87	0.18	0.06	0.74	0.16	0.04	1.61	0.24
5601-FSS-SU5-1007	0.78	0.24	0.25	1	0.55	0.85	1.78	0.60	0.61	0.14	0.09	0.72	0.16	0.079	1.33	0.21
5601-FSS-SU5-1008	0.49	0.22	0.27	0.08	0.52	0.89	0.57	0.56	0.85	0.18	0.05	0.91	0.18	0.064	1.76	0.25
5601-FSS-SU5-1009	0.04	0.16	0.29	-0.1	0.43	0.74	-0.06	0.46	0.89	0.18	0.07	0.91	0.18	0.078	1.80	0.25
5601-FSS-SU5-1010	1.04	0.26	0.22	0.73	0.37	0.56	1.77	0.45	0.63	0.14	0.07	0.75	0.15	0.079	1.38	0.21
5601-FSS-SU5-1011	0.74	0.22	0.17	0.61	0.37	0.57	1.35	0.43	0.40	0.10	0.08	0.48	0.11	0.039	0.88	0.15
5601-FSS-SU5-1012	1.40	0.28	0.15	0.92	0.46	0.70	2.32	0.54	0.60	0.14	0.09	0.63	0.15	0.043	1.23	0.21

TABLE 5-5-2
Ra-226 + Ra-228 WRS Test For Survey Unit 5

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226 + Ra-228

DCGL = 5 pCi/g Survey Unit # 5

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	21	21
5601-BKGD-1002	2.09	R	7.09	22	22
5601-BKGD-1003	1.87	R	6.87	19	19
5601-BKGD-1004	2.11	R	7.11	23	23
5601-BKGD-1005	1.71	R	6.71	16	16
5601-BKGD-1006	1.7	R	6.7	15	15
5601-BKGD-1007	1.61	R	6.61	14	14
5601-BKGD-1008	1.98	R	6.98	20	20
5601-BKGD-1009	1.8	R	6.8	17	17
5601-BKGD-1010	1.82	R	6.82	18	18
5601-BKGD-1011	1.59	R	6.59	13	13
5601-FSS-SU5-1001	1.29	S	1.29	6	0
5601-FSS-SU5-1002	1.30	S	1.3	7	0
5601-FSS-SU5-1003	1.21	S	1.21	4	0
5601-FSS-SU5-1004	1.25	S	1.25	5	0
5601-FSS-SU5-1005	1.95	S	1.95	11	0
5601-FSS-SU5-1006	-0.22	S	-0.22	1	0
5601-FSS-SU5-1007	1.78	S	1.78	10	0
5601-FSS-SU5-1008	0.57	S	0.57	3	0
5601-FSS-SU5-1009	-0.06	S	-0.06	2	0
5601-FSS-SU5-1010	1.77	S	1.77	9	0
5601-FSS-SU5-1011	1.35	S	1.35	8	0
5601-FSS-SU5-1012	2.32	S	2.32	12	0
			Sum =	276	198

Std Deviation	Delta/Sigma
0.77	3.25

* This spreadsheet is designed for a set of twenty-three measurements, 12 from the survey unit (S) and 11 from the background reference area (R). If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes if the null hypothesis is rejected.

TABLE 5-5-3
Th-230 + Th-232 WRS Test For Survey Unit 5

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Th-230 + Th-232

DCGL = 5 pCi/g Survey Unit # 5

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	22	22
5601-BKGD-1002	1.37	R	6.37	20	20
5601-BKGD-1003	1.21	R	6.21	17	17
5601-BKGD-1004	1.48	R	6.48	21	21
5601-BKGD-1005	1.23	R	6.23	18	18
5601-BKGD-1006	1.12	R	6.12	14	14
5601-BKGD-1007	1.17	R	6.17	16	16
5601-BKGD-1008	1.55	R	6.55	23	23
5601-BKGD-1009	1.25	R	6.25	19	19
5601-BKGD-1010	1.14	R	6.14	15	15
5601-BKGD-1011	0.97	R	5.97	13	13
5601-FSS-SU5-1001	1.80	S	1.8	9.5	0
5601-FSS-SU5-1002	1.86	S	1.86	11	0
5601-FSS-SU5-1003	1.41	S	1.41	5	0
5601-FSS-SU5-1004	1.71	S	1.71	7	0
5601-FSS-SU5-1005	2.18	S	2.18	12	0
5601-FSS-SU5-1006	1.61	S	1.61	6	0
5601-FSS-SU5-1007	1.33	S	1.33	3	0
5601-FSS-SU5-1008	1.76	S	1.76	8	0
5601-FSS-SU5-1009	1.80	S	1.80	9.5	0
5601-FSS-SU5-1010	1.38	S	1.38	4	0
5601-FSS-SU5-1011	0.88	S	0.88	1	0
5601-FSS-SU5-1012	1.23	S	1.23	2	0
			Sum =	276	198

Std Deviation	Delta/Sigma
0.35	7.19

* This spreadsheet is designed for a set of twenty-three measurements,
12 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-6-1
Survey Results For Survey Unit 6

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU6-1001	0.94	0.27	0.24	0.76	0.51	0.80	1.70	0.58	0.50	0.17	0.05	1.04	0.27	0.05	1.54	0.32
5601-FSS-SU6-1002	0.47	0.19	0.22	0.60	0.43	0.67	1.07	0.47	0.53	0.17	0.05	0.81	0.22	0.04	1.34	0.28
5601-FSS-SU6-1003	0.54	0.18	0.17	0.59	0.42	0.66	1.13	0.46	0.45	0.15	0.04	0.56	0.17	0.05	1.01	0.23
5601-FSS-SU6-1004	0.80	0.26	0.29	1.21	0.51	0.76	2.01	0.57	0.85	0.23	0.07	1.09	0.27	0.06	1.94	0.35
5601-FSS-SU6-1005	1.23	0.30	0.23	1.25	0.52	0.77	2.48	0.60	0.99	0.26	0.06	1.05	0.27	0.06	2.04	0.37
5601-FSS-SU6-1006	0.59	0.21	0.24	0.86	0.39	0.58	1.45	0.44	0.80	0.22	0.04	0.97	0.25	0.04	1.77	0.33
5601-FSS-SU6-1007	0.75	0.24	0.24	0.83	0.42	0.64	1.58	0.48	0.77	0.22	0.06	1.02	0.26	0.06	1.79	0.34
5601-FSS-SU6-1008	0.19	0.16	0.25	0.50	0.40	0.64	0.69	0.43	0.58	0.19	0.07	0.66	0.21	0.05	1.24	0.28
5601-FSS-SU6-1009	0.95	0.22	0.12	1.00	0.46	0.70	1.95	0.51	0.63	0.15	0.03	0.72	0.17	0.01	1.35	0.23
5601-FSS-SU6-1010	0.63	0.23	0.24	0.82	0.51	0.79	1.45	0.56	0.63	0.19	0.07	0.94	0.25	0.05	1.57	0.31
5601-FSS-SU6-1011	0.63	0.23	0.26	0.65	0.40	0.62	1.28	0.46	0.49	0.16	0.06	0.78	0.21	0.05	1.27	0.26
5601-FSS-SU6-1012	0.76	0.28	0.32	0.88	0.41	0.62	1.64	0.50	0.67	0.21	0.07	0.68	0.21	0.06	1.35	0.30

TABLE 5-6-2
Ra-226 +Ra228 WRS Test For Survey Unit -6

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226 + Ra-228

DCGL = 5 pCi/g Survey Unit # 6

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	21	21
5601-BKGD-1002	2.09	R	7.09	22	22
5601-BKGD-1003	1.87	R	6.87	19	19
5601-BKGD-1004	2.11	R	7.11	23	23
5601-BKGD-1005	1.71	R	6.71	16	16
5601-BKGD-1006	1.7	R	6.7	15	15
5601-BKGD-1007	1.61	R	6.61	14	14
5601-BKGD-1008	1.98	R	6.98	20	20
5601-BKGD-1009	1.8	R	6.8	17	17
5601-BKGD-1010	1.82	R	6.82	18	18
5601-BKGD-1011	1.59	R	6.59	13	13
5601-FSS-SU6-1001	1.70	S	1.7	9	0
5601-FSS-SU6-1002	1.07	S	1.07	2	0
5601-FSS-SU6-1003	1.13	S	1.13	3	0
5601-FSS-SU6-1004	2.01	S	2.01	11	0
5601-FSS-SU6-1005	2.48	S	2.48	12	0
5601-FSS-SU6-1006	1.45	S	1.45	5.5	0
5601-FSS-SU6-1007	1.58	S	1.58	7	0
5601-FSS-SU6-1008	0.69	S	0.69	1	0
5601-FSS-SU6-1009	1.95	S	1.95	10	0
5601-FSS-SU6-1010	1.45	S	1.45	5.5	0
5601-FSS-SU6-1011	1.28	S	1.28	4	0
5601-FSS-SU6-1012	1.64	S	1.64	8	0
			Sum =	276	198

Std Deviation	Delta/Sigma
0.48	5.24

* This spreadsheet is designed for a set of twenty-three measurements,
12 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-6-3
Th-230 + Th-232 WRS Test For Survey Unit -6

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Th-230 +Th-232

DCGL = 5 pCi/g Survey Unit # 6

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	22	22
5601-BKGD-1002	1.37	R	6.37	20	20
5601-BKGD-1003	1.21	R	6.21	17	17
5601-BKGD-1004	1.48	R	6.48	21	21
5601-BKGD-1005	1.23	R	6.23	18	18
5601-BKGD-1006	1.12	R	6.12	14	14
5601-BKGD-1007	1.17	R	6.17	16	16
5601-BKGD-1008	1.55	R	6.55	23	23
5601-BKGD-1009	1.25	R	6.25	19	19
5601-BKGD-1010	1.14	R	6.14	15	15
5601-BKGD-1011	0.97	R	5.97	13	13
5601-FSS-SU6-1001	1.54	S	1.54	7	0
5601-FSS-SU6-1002	1.34	S	1.34	4	0
5601-FSS-SU6-1003	1.01	S	1.01	1	0
5601-FSS-SU6-1004	1.94	S	1.94	11	0
5601-FSS-SU6-1005	2.04	S	2.04	12	0
5601-FSS-SU6-1006	1.77	S	1.77	9	0
5601-FSS-SU6-1007	1.79	S	1.79	10	0
5601-FSS-SU6-1008	1.24	S	1.24	2	0
5601-FSS-SU6-1009	1.35	S	1.35	5.5	0
5601-FSS-SU6-1010	1.57	S	1.57	8	0
5601-FSS-SU6-1011	1.27	S	1.27	3	0
5601-FSS-SU6-1012	1.35	S	1.35	5.5	0
			Sum =	276	198

Std Deviation	Delta/Sigma
0.31	7.99

* This spreadsheet is designed for a set of twenty-three measurements,
12 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-7-1
Survey Results For Survey Unit 7

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226 + Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230 + Th-232	Uncertainty (2 sigma)
5601-FSS-SU7-1001	0.90	0.24	0.18	0.99	0.45	0.67	1.89	0.51	0.86	0.17	0.03	0.89	0.18	0.03	1.75	0.25
5601-FSS-SU7-1002	1.08	0.25	0.15	0.99	0.42	0.63	2.07	0.49	0.70	0.15	0.04	0.76	0.16	0.03	1.46	0.22
5601-FSS-SU7-1003	1.21	0.27	0.18	0.76	0.34	0.50	1.97	0.43	0.92	0.21	0.04	1.08	0.23	0.03	2.00	0.31
5601-FSS-SU7-1004	1.12	0.24	0.16	1.00	0.35	0.50	2.12	0.42	0.89	0.18	0.03	1.00	0.19	0.03	1.89	0.26
5601-FSS-SU7-1005	1.31	0.28	0.14	0.51	0.31	0.47	1.82	0.42	0.67	0.15	0.03	0.67	0.15	0.03	1.34	0.21
5601-FSS-SU7-1006	1.02	0.24	0.17	0.33	0.27	0.42	1.35	0.36	0.76	0.22	0.03	1.10	0.28	0.06	1.86	0.36
5601-FSS-SU7-1007	0.46	0.17	0.14	0.32	0.36	0.59	0.78	0.40	0.36	0.09	0.02	0.35	0.09	0.02	0.70	0.13
5601-FSS-SU7-1008	1.21	0.28	0.16	1.23	0.45	0.64	2.44	0.53	0.60	0.13	0.02	0.65	0.14	0.01	1.25	0.19
5601-FSS-SU7-1009	1.08	0.28	0.19	1.15	0.61	0.94	2.23	0.67	0.82	0.17	0.02	1.04	0.21	0.03	1.86	0.27
5601-FSS-SU7-1010	1.01	0.28	0.20	0.74	0.60	0.96	1.75	0.66	0.73	0.15	0.02	0.89	0.17	0.02	1.62	0.23
5601-FSS-SU7-1011	0.97	0.26	0.18	0.81	0.51	0.80	1.78	0.57	0.78	0.16	0.02	1.03	0.19	0.02	1.81	0.25
5601-FSS-SU7-1012	0.44	0.18	0.17	0.56	0.60	0.98	1.00	0.63	0.56	0.12	0.02	0.50	0.12	0.03	1.06	0.17
5601-FSS-SU7-1019	1.01	0.26	0.20	0.99	0.59	0.92	2.00	0.64	0.76	0.15	0.02	0.84	0.16	0.02	1.60	0.22
5601-FSS-SU7-1020	1.04	0.25	0.15	0.79	0.46	0.71	1.83	0.52	0.87	0.17	0.03	1.06	0.20	0.03	1.93	0.26

TABLE 5-7-2
Ra-226 +Ra228 WRS Test For Survey Unit -7

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226 + Ra-228

DCGL = 5 pCi/g Survey Unit # 7

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	21	21
5601-BKGD-1002	2.09	R	7.09	22	22
5601-BKGD-1003	1.87	R	6.87	19	19
5601-BKGD-1004	2.11	R	7.11	23	23
5601-BKGD-1005	1.71	R	6.71	16	16
5601-BKGD-1006	1.7	R	6.7	15	15
5601-BKGD-1007	1.61	R	6.61	14	14
5601-BKGD-1008	1.98	R	6.98	20	20
5601-BKGD-1009	1.8	R	6.8	17	17
5601-BKGD-1010	1.82	R	6.82	18	18
5601-BKGD-1011	1.59	R	6.59	13	13
5601-FSS-SU7-1001	1.89	S	1.89	7	0
5601-FSS-SU7-1002	2.07	S	2.07	9	0
5601-FSS-SU7-1003	1.97	S	1.97	8	0
5601-FSS-SU7-1004	2.12	S	2.12	10	0
5601-FSS-SU7-1005	1.82	S	1.82	6	0
5601-FSS-SU7-1006	1.35	S	1.35	3	0
5601-FSS-SU7-1007	0.78	S	0.78	1	0
5601-FSS-SU7-1008	2.44	S	2.44	12	0
5601-FSS-SU7-1009	2.23	S	2.23	11	0
5601-FSS-SU7-1010	1.75	S	1.75	4	0
5601-FSS-SU7-1011	1.78	S	1.78	5	0
5601-FSS-SU7-1012	1.00	S	1.00	2	0
			Sum =	276	198

Std Deviation	Delta/Sigma
0.49	5.07

* This spreadsheet is designed for a set of twenty-three measurements,
12 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-7-3
Th-230 + Th-232 WRS Test For Survey Unit -7

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Th-230 + Th-232

DCGL = 5 pCi/g Survey Unit # 7

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	22	22
5601-BKGD-1002	1.37	R	6.37	20	20
5601-BKGD-1003	1.21	R	6.21	17	17
5601-BKGD-1004	1.48	R	6.48	21	21
5601-BKGD-1005	1.23	R	6.23	18	18
5601-BKGD-1006	1.12	R	6.12	14	14
5601-BKGD-1007	1.17	R	6.17	16	16
5601-BKGD-1008	1.55	R	6.55	23	23
5601-BKGD-1009	1.25	R	6.25	19	19
5601-BKGD-1010	1.14	R	6.14	15	15
5601-BKGD-1011	0.97	R	5.97	13	13
5601-FSS-SU7-1001	1.75	S	1.75	7	0
5601-FSS-SU7-1002	1.46	S	1.46	5	0
5601-FSS-SU7-1003	2.00	S	2	12	0
5601-FSS-SU7-1004	1.89	S	1.89	11	0
5601-FSS-SU7-1005	1.34	S	1.34	4	0
5601-FSS-SU7-1006	1.86	S	1.86	10.5	0
5601-FSS-SU7-1007	0.70	S	0.70	1	0
5601-FSS-SU7-1008	1.25	S	1.25	3	0
5601-FSS-SU7-1009	1.86	S	1.86	9.5	0
5601-FSS-SU7-1010	1.62	S	1.62	6	0
5601-FSS-SU7-1011	1.81	S	1.81	8	0
5601-FSS-SU7-1012	1.06	S	1.06	2	0
			Sum =	277	198

Std Deviation	Delta/Sigma
0.40	6.31

* This spreadsheet is designed for a set of twenty-three measurements,
12 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 12, Critical Value for WRS Test is 165

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-8-1
Survey Results For Survey Unit 8

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226+Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230+Th-232	Uncertainty (2 sigma)
5601-FSS-SU8-1001	0.83	0.23	0.20	1.11	0.47	0.70	1.94	0.52	0.59	0.13	0.03	0.80	0.17	0.02	0.80	0.21
5601-FSS-SU8-1002	1.64	0.32	0.19	1.59	0.47	0.65	3.23	0.57	0.97	0.18	0.02	1.25	0.22	0.02	1.25	0.28
5601-FSS-SU8-1003	1.31	0.30	0.17	0.96	0.48	0.72	2.27	0.57	0.65	0.16	0.04	0.66	0.16	0.03	0.66	0.23
5601-FSS-SU8-1004	1.10	0.26	0.16	0.80	0.46	0.72	1.90	0.53	0.69	0.15	0.03	0.84	0.17	0.02	0.84	0.23
5601-FSS-SU8-1005	1.32	0.30	0.20	0.63	0.44	0.69	1.95	0.53	1.09	0.20	0.03	1.14	0.21	0.02	1.14	0.29
5601-FSS-SU8-1006	0.99	0.26	0.20	1.43	0.50	0.71	2.42	0.56	0.79	0.16	0.02	1.06	0.20	0.02	1.06	0.26
5601-FSS-SU8-1007	0.93	0.27	0.24	0.42	0.46	0.75	1.35	0.53	0.48	0.11	0.03	0.63	0.14	0.02	0.63	0.18
5601-FSS-SU8-1008	1.55	0.34	0.22	1.17	0.55	0.82	2.72	0.65	1.50	0.27	0.02	1.54	0.27	0.02	1.54	0.38
5601-FSS-SU8-1009	1.24	0.29	0.17	1.30	0.43	0.59	2.54	0.52	0.96	0.20	0.02	1.39	0.26	0.03	1.39	0.33
5601-FSS-SU8-1010	1.12	0.29	0.21	0.47	0.59	0.96	1.59	0.66	0.81	0.17	0.02	0.90	0.18	0.02	0.90	0.25
5601-FSS-SU8-1011	1.12	0.27	0.18	0.35	0.40	0.65	1.47	0.48	0.53	0.12	0.02	0.85	0.17	0.02	0.85	0.21

TABLE 5-8-2
Ra-226 +Ra228 WRS Test For Survey Unit -8

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 8

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.7	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU8-1001	1.94	S	1.94	5	0
5601-FSS-SU8-1002	3.23	S	3.23	11	0
5601-FSS-SU8-1003	2.27	S	2.27	7	0
5601-FSS-SU8-1004	1.90	S	1.90	4	0
5601-FSS-SU8-1005	1.95	S	1.95	6	0
5601-FSS-SU8-1006	2.42	S	2.42	8	0
5601-FSS-SU8-1007	1.35	S	1.35	1	0
5601-FSS-SU8-1008	2.72	S	2.72	10	0
5601-FSS-SU8-1009	2.54	S	2.54	9	0
5601-FSS-SU8-1010	1.59	S	1.59	3	0
5601-FSS-SU8-1011	1.47	S	1.47	2	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.57	4.36

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-8-3
Th-230 + Th-232 WRS Test For Survey Unit -8

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 8

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU8-1001	0.80	S	0.8	3	0
5601-FSS-SU8-1002	1.25	S	1.25	9	0
5601-FSS-SU8-1003	0.66	S	0.66	2	0
5601-FSS-SU8-1004	0.84	S	0.84	4	0
5601-FSS-SU8-1005	1.14	S	1.14	8	0
5601-FSS-SU8-1006	1.06	S	1.06	7	0
5601-FSS-SU8-1007	0.63	S	0.63	1	0
5601-FSS-SU8-1008	1.54	S	1.54	11	0
5601-FSS-SU8-1009	1.39	S	1.39	10	0
5601-FSS-SU8-1010	0.90	S	0.90	6	0
5601-FSS-SU8-1011	0.85	S	0.85	5	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.30	8.43

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-9-1
Survey Results For Survey Unit 9

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226+Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230+Th-232	Uncertainty (2 sigma)
5601-FSS-SU9-1001	0.87	0.24	0.18	0.77	0.52	0.81	1.64	0.57	0.53	0.10	0.02	0.59	0.11	0.10	1.12	0.15
5601-FSS-SU9-1002	0.80	0.31	0.30	1.10	1.00	1.70	1.90	1.05	0.52	0.11	0.02	0.59	0.13	0.02	1.11	0.17
5601-FSS-SU9-1003	0.78	0.23	0.20	0.29	0.44	0.73	1.07	0.50	0.47	0.09	0.02	0.68	0.12	0.01	1.15	0.15
5601-FSS-SU9-1004	0.64	0.23	0.22	0.59	0.55	0.89	1.23	0.60	0.48	0.09	0.02	0.55	0.10	0.01	1.02	0.13
5601-FSS-SU9-1005	0.38	0.17	0.19	0.81	0.50	0.78	1.19	0.53	0.39	0.11	0.03	0.47	0.12	0.02	0.86	0.16
5601-FSS-SU9-1006	1.14	0.29	0.22	0.97	0.62	0.98	2.11	0.68	0.77	0.17	0.03	0.87	0.19	0.03	1.64	0.25
5601-FSS-SU9-1007	0.82	0.23	0.18	1.25	0.48	0.69	2.07	0.53	0.71	0.15	0.03	0.88	0.17	0.02	1.59	0.23
5601-FSS-SU9-1008	0.59	0.14	0.11	0.91	0.42	0.64	1.50	0.44	0.56	0.13	0.02	0.68	0.15	0.02	1.24	0.20
5601-FSS-SU9-1009	0.42	0.17	0.19	0.48	0.40	0.64	0.90	0.43	0.41	0.10	0.02	0.45	0.11	0.02	0.86	0.15
5601-FSS-SU9-1010	0.94	0.25	0.17	0.74	0.41	0.62	1.68	0.48	0.77	0.15	0.02	0.76	0.15	0.02	1.53	0.21
5601-FSS-SU9-1011	1.17	0.27	0.15	1.01	0.42	0.63	2.18	0.50	0.61	0.13	0.02	0.92	0.18	0.02	1.53	0.22

TABLE 5-9-2
Ra-226 +Ra228 WRS Test For Survey Unit -9

Ra-226 + Ra-228
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 9

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	15	15
5601-BKGD-1006	1.7	R	6.7	14	14
5601-BKGD-1007	1.61	R	6.61	13	13
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	16	16
5601-BKGD-1010	1.82	R	6.82	17	17
5601-BKGD-1011	1.59	R	6.59	12	12
5601-FSS-SU9-1001	1.64	S	1.64	6	0
5601-FSS-SU9-1002	1.90	S	1.9	8	0
5601-FSS-SU9-1003	1.07	S	1.07	2	0
5601-FSS-SU9-1004	1.23	S	1.23	4	0
5601-FSS-SU9-1005	1.19	S	1.19	3	0
5601-FSS-SU9-1006	2.11	S	2.11	10	0
5601-FSS-SU9-1007	2.07	S	2.07	9	0
5601-FSS-SU9-1008	1.50	S	1.50	5	0
5601-FSS-SU9-1009	0.90	S	0.90	1	0
5601-FSS-SU9-1010	1.68	S	1.68	7	0
5601-FSS-SU9-1011	2.18	S	2.18	11	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.45	5.59

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-9-3
Th-230 + Th-232 WRS Test For Survey Unit -9

Th-230+Th-232
Li Tungsten

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226

DCGL = 5 pCi/g Survey Unit # 9

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	21	21
5601-BKGD-1002	1.37	R	6.37	19	19
5601-BKGD-1003	1.21	R	6.21	16	16
5601-BKGD-1004	1.48	R	6.48	20	20
5601-BKGD-1005	1.23	R	6.23	17	17
5601-BKGD-1006	1.12	R	6.12	13	13
5601-BKGD-1007	1.17	R	6.17	15	15
5601-BKGD-1008	1.55	R	6.55	22	22
5601-BKGD-1009	1.25	R	6.25	18	18
5601-BKGD-1010	1.14	R	6.14	14	14
5601-BKGD-1011	0.97	R	5.97	12	12
5601-FSS-SU9-1001	1.12	S	1.118	5	0
5601-FSS-SU9-1002	1.11	S	1.11	4	0
5601-FSS-SU9-1003	1.15	S	1.153	6	0
5601-FSS-SU9-1004	1.02	S	1.02	3	0
5601-FSS-SU9-1005	0.86	S	0.86	1.5	0
5601-FSS-SU9-1006	1.64	S	1.64	11	0
5601-FSS-SU9-1007	1.59	S	1.59	10	0
5601-FSS-SU9-1008	1.24	S	1.24	7	0
5601-FSS-SU9-1009	0.86	S	0.86	1.5	0
5601-FSS-SU9-1010	1.53	S	1.53	8.5	0
5601-FSS-SU9-1011	1.53	S	1.53	8.5	0
			Sum =	253	187

Std Deviation	Delta/Sigma
0.29	8.70

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-10-1
Survey Results For Survey Unit 10

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	MDC	Ra-228 (pCi/g)*	Uncertainty (2 sigma)	MDC	Ra-226+Ra-228	Uncertainty (2 sigma)	Th-230	Uncertainty (2 sigma)	MDC	Th-232	Uncertainty (2 sigma)	MDC	Th-230+Th-232	Uncertainty (2 sigma)
5601-FSS-SU10-1001	0.82	0.23	0.19	1.07	0.34	0.44	1.89	0.41	0.73	0.15	0.01	1.01	0.19	0.01	1.74	0.24
5601-FSS-SU10-1002	0.76	0.22	0.18	0.67	0.27	0.38	1.43	0.35	0.72	0.15	0.02	0.84	0.17	0.02	1.56	0.23
5601-FSS-SU10-1003	1.06	0.26	0.16	0.53	0.31	0.46	1.59	0.40	1.19	0.22	0.02	1.16	0.22	0.01	2.35	0.31
5601-FSS-SU10-1004	1.19	0.31	0.22	0.94	0.41	0.58	2.13	0.51	0.94	0.19	0.03	1.58	0.29	0.03	2.52	0.35
5601-FSS-SU10-1005	0.98	0.26	0.22	0.71	0.27	0.38	1.69	0.37	0.68	0.14	0.02	0.71	0.14	0.02	1.39	0.20
5601-FSS-SU10-1006	1.01	0.24	0.15	0.49	0.24	0.35	1.50	0.34	0.74	0.15	0.02	0.87	0.17	0.02	1.61	0.23
5601-FSS-SU10-1007	1.11	0.29	0.25	0.71	0.34	0.50	1.82	0.45	0.72	0.15	0.02	0.77	0.15	0.02	1.49	0.21
5601-FSS-SU10-1008	1.50	0.32	0.20	2.71	0.50	0.45	4.21	0.59	2.72	0.43	0.02	2.68	0.43	0.02	5.40	0.61
5601-FSS-SU10-1009	1.02	0.30	0.31	0.79	0.35	0.50	1.81	0.46	0.78	0.17	0.03	1.19	0.23	0.03	1.97	0.29
5601-FSS-SU10-1010	2.16	0.40	0.22	4.66	0.67	0.43	6.82	0.78	2.48	0.43	0.03	6.60	1.00	0.03	9.08	1.09
5601-FSS-SU10-1011	1.16	0.25	0.16	0.61	0.35	0.54	1.77	0.43	0.63	0.13	0.01	0.82	0.16	0.01	1.45	0.21
5601-FSS-SU10-1010-N	3.63	0.52	0.15	16.80	1.90	0.80	20.43	1.97	5.30	1.20	0.20	17.90	3.00	0.20	23.20	3.23
5601-FSS-SU10-1010-S	1.04	0.24	0.14	1.73	0.57	0.80	2.77	0.62	0.93	0.19	0.02	1.57	0.29	0.02	2.50	0.35
5601-FSS-SU10-1010-E	0.85	0.21	0.14	0.89	0.38	0.56	1.74	0.43	0.87	0.18	0.02	1.17	0.23	0.02	2.04	0.29
5601-FSS-SU10-1010-W	0.98	0.23	0.18	0.62	0.37	0.58	1.60	0.44	0.82	0.17	0.02	1.05	0.20	0.02	1.87	0.26

TABLE 5-10-2
Ra-226 +Ra228 WRS Test For Survey Unit -10

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Ra-226 + Ra-228

DCGL = 5 pCi/g Survey Unit # 10

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	2	R	7	20	20
5601-BKGD-1002	2.09	R	7.09	21	21
5601-BKGD-1003	1.87	R	6.87	18	18
5601-BKGD-1004	2.11	R	7.11	22	22
5601-BKGD-1005	1.71	R	6.71	14	14
5601-BKGD-1006	1.7	R	6.7	13	13
5601-BKGD-1007	1.61	R	6.61	12	12
5601-BKGD-1008	1.98	R	6.98	19	19
5601-BKGD-1009	1.8	R	6.8	15	15
5601-BKGD-1010	1.82	R	6.82	16.5	16.5
5601-BKGD-1011	1.59	R	6.59	11	11
5601-FSS-SU10-1001	1.89	S	1.89	8	0
5601-FSS-SU10-1002	1.43	S	1.43	1	0
5601-FSS-SU10-1003	1.59	S	1.59	3	0
5601-FSS-SU10-1004	2.13	S	2.13	9	0
5601-FSS-SU10-1005	1.69	S	1.69	4	0
5601-FSS-SU10-1006	1.50	S	1.50	2	0
5601-FSS-SU10-1007	1.82	S	1.82	7	0
5601-FSS-SU10-1008	4.21	S	4.21	10	0
5601-FSS-SU10-1009	1.81	S	1.81	6	0
5601-FSS-SU10-1010	6.82	S	6.82	16.5	0
5601-FSS-SU10-1011	1.77	S	1.77	5	0
			Sum =	253	181.5

Std Deviation	Delta/Sigma
1.65	1.52

* This spreadsheet is designed for a set of twenty-two measurements,
11 from the survey unit (S) and 11 from the background reference area (R).
If a different number of measurements have been performed, it is necessary to
modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null
hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes
if the null hypothesis is rejected.

TABLE 5-10-3
Th-230 + Th-232 WRS Test For Survey Unit -10

Spreadsheet Formula for the Wilcoxon Rank Sum Test for Th-230+Th-232

DCGL = 5 pCi/g Survey Unit # 10

SAMPLE LOCATION	DATA	AREA	ADJUSTED DATA	RANKS	REFERENCE AREA RANKS
5601-BKGD-1001	1.52	R	6.52	20	20
5601-BKGD-1002	1.37	R	6.37	18	18
5601-BKGD-1003	1.21	R	6.21	15	15
5601-BKGD-1004	1.48	R	6.48	19	19
5601-BKGD-1005	1.23	R	6.23	16	16
5601-BKGD-1006	1.12	R	6.12	12	12
5601-BKGD-1007	1.17	R	6.17	14	14
5601-BKGD-1008	1.55	R	6.55	21	21
5601-BKGD-1009	1.25	R	6.25	17	17
5601-BKGD-1010	1.14	R	6.14	13	13
5601-BKGD-1011	0.97	R	5.97	11	11
5601-FSS-SU10-1001	1.74	S	1.74	6	0
5601-FSS-SU10-1002	1.56	S	1.56	4	0
5601-FSS-SU10-1003	2.35	S	2.35	8	0
5601-FSS-SU10-1004	2.52	S	2.52	9	0
5601-FSS-SU10-1005	1.39	S	1.39	1	0
5601-FSS-SU10-1006	1.61	S	1.61	5	0
5601-FSS-SU10-1007	1.49	S	1.49	3	0
5601-FSS-SU10-1008	5.40	S	5.40	10	0
5601-FSS-SU10-1009	1.97	S	1.97	7	0
5601-FSS-SU10-1010	9.08	S	9.08	22	0
5601-FSS-SU10-1011	1.45	S	1.45	2	0
			Sum =	253	176

Std Deviation	Delta/Sigma
2.38	1.05

* This spreadsheet is designed for a set of twenty-two measurements, 11 from the survey unit (S) and 11 from the background reference area (R). If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

For m = 11 and n = 11, Critical Value for WRS Test is 152

Reference area ranks must be greater than the critical value to reject the null hypothesis that the survey unit concentrations exceed the DCGL, and the Survey Unit Passes if the null hypothesis is rejected.

Table 5-11a Parcel B Metal Sample Results

Sample Number	#	Pb mg/kg	As mg/kg
5601-FSS-PB-1001-1	1	119	6.4
5601-FSS-PB-1002	2	88.2	15.3
5601-FSS-PB-1003-A	3	173	23.3
5601-FSS-PB-1003-B	4	221	68
5601-FSS-PB-1004	5	13.1	4.0
5601-FSS-PB-1005	6	9.2	3.3
5601-FSS-PB-1006	7	40.2	8.8
5601-FSS-PB-1007	8	13.5	6.2
5601-FSS-PB-1008-1	9	54.9	6.9
5601-FSS-PB-1009	10	9.3	5.6
5601-FSS-PB-1010	11	30.2	5.1
5601-FSS-PB-1011	12	8.4	1.4
5601-FSS-PB-1012-1	13	7	6.1
5601-FSS-PB-1013	14	13.8	4.6
5601-FSS-PB-1014	15	8.5	2.2
5601-FSS-PB-1015	16	6.8	0.95
5601-FSS-PB-1016	17	14.7	7.4
5601-FSS-PB-1017	18	4.7	3.5
5601-FSS-PB-1018	19	9.5	2.8
5601-FSS-PB-1019	20	9.1	3.9
5601-FSS-PB-1020	21	25.9	4.3

Table 5-11b Parcel C Metal Sample Results

		(mg/kg)	**MG/KG**
Sample Number	#	Lead	Arsenic
5601-FSS-PC-1001	1	72.3	2.3
5601-FSS-PC-1002	2	90	5.3
5601-FSS-PC-1003	3	22.6	1.6
5601-FSS-PC-1004	4	44.2	18
5601-FSS-PC-1005	5	94.6	11.7
5601-FSS-PC-1006	6	2.9	1.1
5601-FSS-PC-1007	7	15.3	7.5
5601-FSS-PC-1008	8	4.4	7.3
5601-FSS-PC-1009	9	13.5	6.4
5601-FSS-PC-1010	10	51.7	3.8
5601-FSS-PC-1011	11	21.4	8.5
5601-FSS-PC-1012-1	12	10.1	4
5601-FSS-PC-1013-1	13	5.4	1.1
5601-FSS-PC-1014	14	19.9	5.6
5601-FSS-PC-1015	15	16.2	2
5601-FSS-PC-1016	16	29.4	2.4
5601-FSS-PC-1017	17	23.5	3.6
5601-FSS-PC-1018	18	7	2.7
5601-FSS-PC-1019	19	14.4	1.2
5601-FSS-PC-1020	20	22	6.9
5601-FSS-PC-1021	21	9.9	10.3
5601-FSS-PC-1022	22	277	13.2
5601-FSS-PC-1023	23	92.5	7.3
5601-FSS-PC-1024	24	50.5	5.2
5601-FSS-PC-1025	25	4.3	1.2
5601-FSS-PC-1026	26	88.2	68.2
5601-FSS-PC-1027-1	27	42.1	7.2
5601-FSS-PC-1028	28	3.1	1.8
5601-FSS-PC-1029-1	29	93.8	9.5
5601-FSS-PC-1030	30	36	4.9
5601-FSS-PC-1031	31	41.6	7.2
5601-FSS-PC-1032	32	26.5	9.5

Table 5-12 Total PCB Sample Results

sample number	#	PCBs mg/kg
FSS-PCB1-001	1	0.93
FSS-PCB1-002-1	2	1.528
FSS-PCB1-003	3	1.146
FSS-PCB1-004	4	0.184
FSS-PCB1-005	5	0.711
FSS-PCB1-006	6	0.792
FSS-PCB1-007-1	7	0.693
FSS-PCB1-008-1	8	0.774
FSS-PCB1-009-1	9	0.876
FSS-PCB1-010	10	0.72
FSS-PCB1-011	11	3.18
FSS-PCB1-012	12	0.765
FSS-PCB1-013	13	0.693
FSS-PCB1-014	14	3.22
FSS-PCB1-015	15	0.684
FSS-PCB1-016	16	0.996
FSS-PCB1-017	17	0.684
FSS-PCB1-018	18	1.668
FSS-PCB1-019	19	0.754
FSS-PCB1-020	20	0.702
FSS-PCB1-021	21	1.824
FSS-PCB1-022	22	0.742
FSS-PCB1-023	23	0.858
FSS-PCB1-024	24	0.648

Table 5-13 Background Sample Results

Sample Number	Ra-226 Result (pCi/g)	Ra-228 Result (pCi/g)	Ra-226+Ra-228	Th-230	Th-232	Th-230+Th-232t (pCi/g)
5601-BKGD-1001	0.68	1.32	2	0.79	0.73	1.52
5601-BKGD-1002	1.1	0.99	2.09	0.65	0.72	1.37
5601-BKGD-1003	0.8	1.07	1.87	0.59	0.62	1.21
5601-BKGD-1004	1.16	0.95	2.11	0.64	0.84	1.48
5601-BKGD-1005	0.94	0.77	1.71	0.55	0.68	1.23
5601-BKGD-1006	0.97	0.73	1.7	0.52	0.6	1.12
5601-BKGD-1007	0.93	0.68	1.61	0.47	0.7	1.17
5601-BKGD-1008	1.18	0.8	1.98	0.83	0.72	1.55
5601-BKGD-1009	0.94	0.86	1.8	0.5	0.75	1.25
5601-BKGD-1010	1.09	0.73	1.82	0.42	0.72	1.14
5601-BKGD-1011	1.01	0.58	1.59	0.43	0.54	0.97
Average	0.98	0.86	1.84	0.58	0.69	1.27
Standard Deviation	0.15	0.21	0.18	0.14	0.08	0.18
95% Confidence Level	1.28	1.28	2.21	0.85	0.86	1.64

Table 5-14a SW-846 Statistical Analysis of Parcel B Metals

Final Status Survey

Metals Results and Statistical Evaluation

Survey Unit All **Number of Samples** 21

		(mg/kg)	MG/KG		
Sample Number	#	Lead	Arsenic	Lead^2	as^2
5601-FSS-PB-1001-1	1	119	6.4	14161	40.96
5601-FSS-PB-1002	2	88.2	15.3	7779.24	234.09
5601-FSS-PB-1003-A	3	173	23.3	29929	542.89
5601-FSS-PB-1003-B	4	221	68	48841	4624
5601-FSS-PB-1004	5	13.1	4.0	171.61	16
5601-FSS-PB-1005	6	9.2	3.3	84.64	10.89
5601-FSS-PB-1006	7	40.2	8.8	1616.04	77.44
5601-FSS-PB-1007	8	13.5	6.2	182.25	38.44
5601-FSS-PB-1008-1	9	54.9	6.9	3014.01	47.61
5601-FSS-PB-1009	10	9.3	5.6	86.49	31.36
5601-FSS-PB-1010	11	30.2	5.1	912.04	26.01
5601-FSS-PB-1011	12	8.4	1.4	70.56	1.96
5601-FSS-PB-1012-1	13	7	6.1	49	37.21
5601-FSS-PB-1013	14	13.8	4.6	190.44	21.16
5601-FSS-PB-1014	15	8.5	2.2	72.25	4.84
5601-FSS-PB-1015	16	6.8	0.95	46.24	0.9025
5601-FSS-PB-1016	17	14.7	7.4	216.09	54.76
5601-FSS-PB-1017	18	4.7	3.5	22.09	12.25
5601-FSS-PB-1018	19	9.5	2.8	90.25	7.84
5601-FSS-PB-1019	20	9.1	3.9	82.81	15.21
5601-FSS-PB-1020	21	25.9	4.3	670.81	18.49

Cleanup Criteria (RL)	400	24	
x	41.90	9.05	
S^2	3570.58	207.22	
S	59.75	14.40	
S_x	13.04	3.14	
$t_{0.20}$	1.31	1.31	
CI	58.99	13.17	
n	4.78E-02	1.59E+00	number of samples required to confirm cl

Table 5-14b SW-846 Statistical Analysis of Parcel C Metals

Final Status Survey

Metals Results and Statistical Evaluation

Survey Unit All **Number of Samples** 32

		(mg/kg)	MG/KG		
Sample Number	#	Lead	Arsenic	Lead^2	as^2
5601-FSS-PC-1001	1	72.3	2.3	5227.29	5.29
5601-FSS-PC-1002	2	90	5.3	8100	28.09
5601-FSS-PC-1003	3	22.6	1.6	510.76	2.56
5601-FSS-PC-1004	4	44.2	18	1953.64	324
5601-FSS-PC-1005	5	94.6	11.7	8949.16	136.89
5601-FSS-PC-1006	6	2.9	1.1	8.41	1.21
5601-FSS-PC-1007	7	15.3	7.5	234.09	56.25
5601-FSS-PC-1008	8	4.4	7.3	19.36	53.29
5601-FSS-PC-1009	9	13.5	6.4	182.25	40.96
5601-FSS-PC-1010	10	51.7	3.8	2672.89	14.44
5601-FSS-PC-1011	11	21.4	8.5	457.96	72.25
5601-FSS-PC-1012-1	12	10.1	4	102.01	16
5601-FSS-PC-1013-1	13	5.4	1.1	29.16	1.21
5601-FSS-PC-1014	14	19.9	5.6	396.01	31.36
5601-FSS-PC-1015	15	16.2	2	262.44	4
5601-FSS-PC-1016	16	29.4	2.4	864.36	5.76
5601-FSS-PC-1017	17	23.5	3.6	552.25	12.96
5601-FSS-PC-1018	18	7	2.7	49	7.29
5601-FSS-PC-1019	19	14.4	1.2	207.36	1.44
5601-FSS-PC-1020	20	22	6.9	484	47.61
5601-FSS-PC-1021	21	9.9	10.3	98.01	106.09
5601-FSS-PC-1022	22	277	13.2	76729	174.24
5601-FSS-PC-1023	23	92.5	7.3	8556.25	53.29
5601-FSS-PC-1024	24	50.5	5.2	2550.25	27.04
5601-FSS-PC-1025	25	4.3	1.2	18.49	1.44
5601-FSS-PC-1026	26	88.2	68.2	7779.24	4651.24
5601-FSS-PC-1027-1	27	42.1	7.2	1772.41	51.84
5601-FSS-PC-1028	28	3.1	1.8	9.61	3.24
5601-FSS-PC-1029-1	29	93.8	9.5	8798.44	90.25
5601-FSS-PC-1030	30	36	4.9	1296	24.01
5601-FSS-PC-1031	31	41.6	7.2	1730.56	51.84
5601-FSS-PC-1032	32	26.5	9.5	702.25	90.25

Cleanup Criteria (RL)	400	24	
x	42.07	7.77	
S^2	2731.02	137.35	
S	52.26	11.72	
S_x	9.24	2.07	
$t_{0.20}$	1.31	1.31	
CI	54.17	10.48	
n	3.66E-02	8.94E-01	number of samples required to confirm cl

Table 5-15 SW-846 Statistical Analysis of PCBs in Parcel B

Final Status Survey

PCBs Results and Statistical Evaluation

Survey Unit All **Number of Samples** 24

		(mg/kg)		
Sample Number	#	PCBs		PCBs^2
FSS-PCB1-001	1	0.93		0.8649
FSS-PCB1-002-1	2	1.528		2.33478
FSS-PCB1-003	3	1.146		1.31332
FSS-PCB1-004	4	0.184		0.03386
FSS-PCB1-005	5	0.711		0.50552
FSS-PCB1-006	6	0.792		0.62726
FSS-PCB1-007-1	7	0.693		0.48025
FSS-PCB1-008-1	8	0.774		0.59908
FSS-PCB1-009-1	9	0.876		0.76738
FSS-PCB1-010	10	0.72		0.5184
FSS-PCB1-011	11	3.18		10.1124
FSS-PCB1-012	12	0.765		0.58523
FSS-PCB1-013	13	0.693		0.48025
FSS-PCB1-014	14	3.22		10.3684
FSS-PCB1-015	15	0.684		0.46786
FSS-PCB1-016	16	0.996		0.99202
FSS-PCB1-017	17	0.684		0.46786
FSS-PCB1-018	18	1.668		2.78222
FSS-PCB1-019	19	0.754		0.56852
FSS-PCB1-020	20	0.702		0.4928
FSS-PCB1-021	21	1.824		3.32698
FSS-PCB1-022	22	0.742		0.55056
FSS-PCB1-023	23	0.858		0.73616
FSS-PCB1-024	24	0.648		0.4199

Cleanup Criteria (RL)	10	
x	1.07	
S^2	0.55	
S	0.74	
S_x	0.15	
$t_{0.20}$	1.32	
CI	1.27	
n	1.21E-02	number of samples required to confirm cl

Table 5-16 Metals FRASS Information Parcel B (Northern Parcel B)

Location	As (mg/kg)	Pb (mg/kg)
1	7	20
2	8	24
3	17	97
4	16	111
5	65	163
6	27	284
7	9	23
8	49	182
9	9	29
10	8	19
11	8	19
12	9	34
13	22	108
14	10	36
15	8	33
16	11	46
17	9	27
18	18	259
19	16	75
20	12	75
21	7	12
22	15	17
23	54	184
24	90	260
25	9	39
26	10	41
27	9	26
28	9	33
29	23	96
30	7	21
31	34	127
32	14	87
33	57	239
34	39	11
35	11	<14
36	8	18
37	7	17
38	9	34
39	14	103
40	7	10
41	8	38
42	14	33
43	21	115
44	9	20
45	7	14
46	14	160
47	8	15
48	8	22
49	8	17
50	8	21
51	19	79
52	47	262
53	13	42
54	11	83
55	9	70
56	13	108
57	11	73
58	8	57
59	19	23
60	11	121
61	9	31
62	10	45
63	8	18
64	9	38
65	8	<11
66	8	14
67	8	<24
68	8	<10
69	18	38
70	15	32
71	17	114
72	8	<12
73	12	<18
74	8	30
75	9	19
76	7	<24
77	9	<13
78	11	25
79	9	14
80	23	138
81	7	15
82	15	80
83	17	66
84	8	21
85	26	116
86	22	157
87	10	69
88	60	210
89	15	68
90	10	45
91	24	109
92	16	44
93	12	38
94	13	38
95	13	70
96	7	14
97	6	<9
98	8	<10
99	15	62
100	9	24
101	17	45
102	11	77
103	18	121
104	49	131
105	17	210
106	18	209
107	24	171
108	19	62
109	12	54
110	11	41
111	16	84
112	24	56
113	9	16
114	16	114
115	15	31
116	13	66
117	8	26
118	21	68
119	14	51
120	20	18
121	15	11
122	19	27
123	10	17
124	10	15
125	13	21
126	11	29
127	16	49
128	20	41
129	14	42
130	22	72
131	12	37
132	21	86
133	14	63
134	17	110
135	21	63
136	22	120
137	15	71
138	20	149
139	23	74
140	21	15
141	20	25
142	13	14
143	24	64
144	11	<15
145	17	85
146	11	28
147	22	162
148	11	25
149	25	82
150	9	13
151	12	37
152	9	<13
153	23	16
154	18	12
155	22	38
156	21	25
157	8	<11
158	17	99
159	10	30
160	12	38
161	14	47
162	8	61
163	18	95
164	31	13
165	6	<8
166	23	58
167	9	<12
168	22	175
169	16	77
170	11	42
171	11	47
172	19	69
173	10	20
174	23	77
175	8	346
176	28	35
177	8	16
178	20	109
179	7	<10
180	7	11
181	24	267
182	22	155
183	9	16
184	8	28
185	9	14
186	9	13
187	15	44
188	20	45
189	32	131
190	31	68
191	11	35
192	10	16
193	30	96
194	14	53
195	14	63
196	9	<12
197	15	62
198	9	24
199	17	45
200	11	77
201	18	121
202	14	131
203	17	210
204	18	209
205	24	171
206	19	62
207	12	54
208	11	41
209	16	84
210	24	56
211	9	16
212	16	114
213	15	31
214	13	66
215	8	26
216	21	68
217	14	51
218	20	18
219	15	11
220	19	27
221	10	17
222	10	15
223	13	21
224	11	29
225	16	49
226	20	41
227	14	42
228	22	72
229	12	37
230	21	86
231	14	63
232	17	110
233	21	63
234	22	120
235	15	71
236	20	149
237	23	74
238	21	15
239	20	25
240	13	14
241	24	64
242	11	<15
243	17	85
244	11	28
245	22	162
246	11	25
247	25	82
248	9	13
249	12	37
250	9	<13
251	23	16
252	18	12
253	22	38
254	21	25
255	8	<11
256	17	99
257	10	30
258	12	38
259	14	47
260	8	61
261	18	95
262	31	13
263	6	<8
264	23	58
265	9	<12
266	22	175
267	16	77
268	11	42
269	11	47
270	19	69
271	10	20
272	23	77
273	8	346
274	28	35
275	8	16
276	20	109
277	7	<10
278	7	11
279	24	267
280	22	155
281	9	16
282	8	28
283	9	14
284	9	13
285	15	44

Above 24 mg/kg As and/or above 400 mg/kg Pb

Central Parcel B

Location	As (mg/kg)	Pb (mg/kg)
1	9	31
2	12	33
3	10	50
4	13	51
5	10	26
6	14	149
7	21	229
8	13	67
9	11	39
10	11	32
11	8	11
12	9	28
13	15	18
14	10	26
15	10	14
16	11	26
17	10	43
18	9	21
19	18	14
20	21	122
21	11	56
22	17	111
23	12	121
24	16	14
25	14	16
26	16	14
27	9	13
28	11	15
29	8	12
30	11	14
31	10	13
32	16	37
33	11	16
34	16	142
35	10	17
36	14	41
37	42	191
38	16	32
39	8	24
40	19	124
41	18	60
42	14	34
43	19	67
44	15	38
45	18	41
46	14	29
47	16	10
48	37	260
49	13	106
50	9	16
51	19	29
52	7	17
53	8	16
54	27	84
55	11	19
56	7	9
57	17	60
58	12	17
59	8	17
60	7	9
61	59	64
62	10	85
63	23	86
64	20	87
65	12	33
66	35	87
67	7	9
68	9	12
69	18	11
70	7	20
71	11	20
72	10	7
73	7	17
74	8	20
75	8	15
76	8	18
77	10	49
78	20	192
79	22	333
80	39	202
81	8	33
82	9	12
83	25	15
84	35	99
85	17	37
86	27	397
87	10	30
88	19	68
89	11	14
90	7	10
91	13	57
92	8	10
93	10	52
94	11	53
95	11	53
96	12	76
97	18	24
98	9	18
99	14	87
100	7	12
101	7	10
102	13	25
103	8	17
104	8	14
105	10	20
106	74	89
107	29	240
108	20	149
109	40	58
110	10	28
111	10	12
112	11	20
113	8	12
114	8	13
115	10	16
116	9	14
117	11	31
118	27	10
119	10	34
120	9	27
121	7	11
122	8	11
123	16	41
124	11	18
125	12	57
126	14	11
127	12	66
128	10	16
129	37	326
130	17	126
131	19	16
132	13	29
133	13	49
134	15	20
135	13	110
136	12	38
137	8	11
138	8	10
139	9	32
140	8	9
141	8	21
142	7	9
143	17	87
144	14	28
145	6	9
146	22	39
147	9	14
148	8	12
149	10	30
150	8	12
151	18	157
152	14	106
153	10	32
154	8	24
155	9	15
156	10	15
157	8	15
158	9	18
159	7	13
160	7	10
161	7	9
162	7	9
163	10	28
164	17	110
165	22	52
166	8	41
167	13	61
168	17	51
169	7	9
170	9	10
171	21	84
172	13	40
173	11	32
174	12	80
175	9	30
176	7	13
177	24	144
178	8	9
179	21	10
180	16	54
181	9	44
182	23	43
183	17	90
184	15	120
185	8	11
186	9	10
187	10	17
188	10	21
189	7	10
190	7	11
191	10	19
192	9	14
193	8	11
194	10	13
195	19	68
196	15	52
197	10	24
198	11	26
199	10	17
200	9	20
201	9	12
202	8	13
203	14	22
204	9	15
205	13	19
206	9	22
207	16	48
208	10	30
209	19	81
210	21	228
211	11	48
212	11	8
213	10	14
214	21	11
215	11	22
216	10	23
217	11	65
218	8	49
219	17	67
220	9	16
221	16	13
222	8	11
223	13	28
224	14	107
225	15	9
226	14	11
227	8	14
228	15	120
229	7	10
230	8	11
231	26	89
232	9	19
233	10	51
234	8	18
235	7	9
236	9	15
237	8	11
238	35	107
239	30	71
240	18	57
241	20	66
242	7	17
243	7	16
244	8	11
245	8	15
246	7	9
247	8	11
248	9	13
249	24	445
250	10	13
251	7	24
252	12	10
253	9	36
254	10	9
255	6	8
256	7	9
257	19	10
258	9	23
259	23	58
260	8	17
261	7	19
262	11	38
263	12	71
264	35	160
265	49	115
266	7	9
267	11	10
268	7	10
269	8	10
270	11	11
271	7	10
272	9	13
273	13	117
274	37	55
275	7	16

Central Parcel B Continued

Location	As (mg/kg)	Pb (mg/kg)
276	7	20
277	7	17
278	12	34
279	7	10
280	7	10
281	9	31
282	26	122
283	8	39
284	10	40
285	15	124
286	21	57
287	8	18
288	10	12
289	9	17
290	11	14
291	11	24
292	16	213
293	9	17
294	7	9
295	7	11
296	7	10
297	31	262
298	15	27
299	7	14
300	24	118
301	12	10
302	10	17
303	13	20
304	11	32
305	7	13
306	8	36
307	6	9
308	9	26
309	16	66
310	12	102
311	11	96
312	8	11
313	11	55
314	6	9
315	17	13
316	8	31
317	7	13
318	6	12
319	13	120
320	11	22
321	11	63
322	11	65
323	24	53
324	18	61
325	10	43
326	18	57
327	16	39
328	8	20
329	7	10
330	8	20

Location	As (mg/kg)	Pb (mg/kg)
331	23	394
332	12	48
333	7	16
334	7	10
335	10	13
336	11	30
337	10	21
338	8	18
339	8	11
340	40	387
341	16	52
342	3	29
343	19	100
344	19	25
345	23	51
346	12	64
347	12	85
348	2	109
349	5	7
350	9	27
351	10	15
352	5	99
353	20	54
354	30	77
355	10	25
356	12	39
357	26	17
358	8	27
359	16	93
360	12	39
361	7	19
362	9	12
363	7	10
364	11	36
365	8	22
366	13	38
367	13	40
368	20	23
369	9	23
370	15	76
371	17	133
372	19	71
373	7	14
374	15	43
375	24	14
376	8	11
377	10	43
378	11	28
379	8	11
380	11	20
381	12	20
382	9	13
383	9	17
384	14	19
385	17	38
386	18	42
387	10	37
388	9	20
389	9	33

Parcel B Lower Upper Readings

Location	As (mg/kg)	Pb (mg/kg)
1	11	70
2	15	71
3	10	33
4	10	21
5	16	23
6	9	18
7	8	11
8	7	12
9	8	12
10	10	14
11	8	11
12	8	39
13	10	21
14	22	78
15	10	12
16	18	42
17	25	25
18	7	21
19	12	56
20	13	17
21	21	24
22	7	14
23	5	11
24	19	40
25	15	19
26	10	133
27	8	11
28	8	16
29	46	442
30	22	50
31	12	24
32	12	16
33	12	14
34	12	13
35	7	24
36	13	18
37	11	43
38	23	102
39	22	73
40	12	18
41	10	39
42	13	24
43	12	22
44	22	144
45	13	36
46	15	21
47	19	25
48	16	31
49	12	36
50	27	55
51	28	97
52	16	38
53	14	16
54	19	66
55	12	38
56	10	13
57	10	18
58	12	40
59	25	57
60	12	16
61	12	19
62	13	13
63	16	20
64	14	20
65	12	21
66	25	67
67	19	26
68	25	69
69	15	19
70	11	33
71	12	16
72	15	24
73	14	23
74	13	32
75	20	12
76	12	25
77	14	28
78	13	26
79	16	21
80	10	18
81	21	45
82	23	60
83	20	26
84	17	35
85	19	53
86	11	46
87	8	13
88	10	19
89	23	150
90	10	78
91	12	15
92	24	101
93	20	75
94	12	64
95	12	54
96	21	101
97	22	52
98	13	29
99	16	55
100	19	67
101	11	22
102	12	44
103	10	13
104	8	20
105	13	50
106	10	65
107	11	20
108	18	29
109	9	20
110	10	22
111	9	11
112	9	12
113	9	18
114	10	15
115	15	20
116	25	27
117	20	30
118	11	25
119	10	23
120	33	104
121	20	70
122	11	55
123	10	60
124	12	42
125	37	308
126	15	20
127	15	19
128	14	17
129	15	23
130	11	33
131	10	24
132	8	16
133	27	36
134	13	15
135	13	17
136	11	15
137	21	59
138	25	57
139	27	101
140	16	22
141	15	22
142	11	25
143	13	19
144	20	67
145	10	13
146	12	18
147	10	31
148	12	26
149	12	23
150	7	12
151	10	42
152	12	30
153	30	110
154	15	46
155	27	51
156	22	215
157	13	21
158	16	24
159	17	20
160	22	42
161	14	17
162	11	17
163	7	7
164	7	12
165	10	13
166	12	25
167	16	23
168	16	21
169	18	30
170	17	18
171	10	23
172	11	23
173	10	29
174	7	18
175	9	23
176	11	18
177	15	29
178	13	25
179	14	18
180	13	17
181	20	56
182	16	32
183	11	39
184	8	29
185	25	51
186	7	11
187	11	12
188	11	29
189	8	14
190	21	22
191	17	28
192	9	11
193	8	17
194	12	42
195	10	38
196	25	98
197	9	29
198	7	11
199	9	50
200	17	74
201	25	88
202	17	51
203	14	32
204	18	47
205	20	27
206	16	47
207	23	29
208	25	36
209	16	33
210	14	49
211	9	12
212	8	23
213	11	39
214	13	53
215	17	107
216	24	101
217	8	25
218	11	14
219	8	11
220	7	23
221	21	23
222	6	20
223	14	25
224	10	14
225	8	24
226	10	18
227	11	25
228	15	17
229	25	50
230	19	33
231	15	18
232	14	29
233	18	19
234	45	46
235	12	19
236	9	21
237	7	12
238	13	17
239	30	131
240	24	43
241	14	65
242	12	33
243	11	31
244	16	48
245	15	33
246	13	30
247	29	110
248	13	36
249	21	26
250	14	33
251	16	19
252	20	11
253	28	27
254	13	21
255	11	15
256	12	20
257	14	47
258	14	20
259	11	45
260	14	20
261	7	10
262	29	49
263	32	188
264	14	63
265	11	31
266	13	36
267	15	25
268	13	27
269	11	18
270	65	208
271	39	97
272	18	36
273	57	77
274	20	19
275	16	16
276	13	14
277	10	14
278	39	62
279	11	19
280	13	19
281	12	16
282	12	19
283	12	16
284	15	20
285	9	18

Above 24 mg/kg As and/or above 400 mg/kg Pb

Parcel B Lower Upper Readings

Location	As (mg/kg)	Pb (mg/kg)
286	19	18
287	19	18
288	13	36
289	11	14
290	18	24
291	102	256
292	12	16
293	11	22
294	7	18
295	3	19
296	13	21
297	18	24
298	10	14
299	26	15
300	9	13
301	22	64
302	13	21
303	30	35
304	15	82
305	67	80
306	11	15
307	14	44
308	11	29
309	14	8
310	9	20
311	11	25
312	15	34
313	13	42
314	14	12
315	8	11
316	20	38
317	30	89
318	16	90
319	11	15
320	12	104
321	12	24
322	10	15
323	56	90
324	8	13
325	11	12
326	13	21
327	33	119
328	58	175
329	12	37
330	21	45

Location	As (mg/kg	Pb (mg/kg)
12	15	52
13	20	49
14	21	40
15	23	109
16	9	27
17	39	146
18	19	112

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East Wall Readings		
1	10	21
2	12	21
3	10	14
4	33	161
5	48	57
6	85	246
7	14	64
8	16	211
9	15	50
10	9	32
11	16	62

Parcel B Lower South Readings

Location	As (mg/kg)	Pb (mg/kg)	Location	As (mg/kg)	Pb (mg/kg)	Location	As (mg/kg)	Pb (mg/kg)	Location	As (mg/kg)	Pb (mg/kg)
1	20	114	52	13	17	103	11	18	154	8	11
2	13	23	53	20	15	104	15	19	155	7	20
3	19	34	54	12	24	105	14	55	156	13	88
4	15	18	55	17	17	106	10	16	157	8	26
5	14	19	56	10	14	107	10	18	158	7	12
6	14	16	57	13	34	108	8	12	159	8	18
7	15	12	58	9	12	109	11	15	160	8	11
8	13	16	59	12	16	110	12	17	161	7	9
9	8	12	60	13	36	111	11	12	162	47	125
10	10	14	61	9	12	112	38	20	163	24	36
11	17	46	62	9	12	113	14	36	164	9	12
12	10	12	63	18	89	114	10	13	165	11	30
13	11	15	64	15	39	115	11	14	166	12	31
14	9	13	65	12	33	116	35	130	167	7	18
15	8	12	66	22	29	117	11	13	168	16	18
16	7	10	67	9	21	118	12	31	169	68	147
17	9	12	68	9	12	119	11	17	170	24	32
18	9	16	69	9	14	120	12	22	171	42	90
19	9	13	70	43	38	121	13	14	172	60	142
20	10	20	71	10	13	122	33	64	173	18	26
21	10	13	72	19	33	123	11	13	174	29	50
22	14	19	73	11	38	124	22	65	175	18	24
23	16	32	74	10	19	125	11	13	176	23	32
24	14	19	75	12	18	126	11	14	177	16	21
25	20	58	76	13	20	127	17	52	178	19	23
26	10	24	77	20	41	128	17	35	179	19	26
27	9	11	78	16	49	129	32	55	180	18	23
28	13	15	79	22	52	130	16	20	181	15	23
29	10	12	80	27	54	131	37	45	182	19	27
30	12	15	81	19	49	132	27	75	183	13	19
31	10	13	82	11	14	133	15	21	184	35	57
32	12	15	83	16	37	134	16	21	185	26	37
33	10	16	84	36	68	135	19	25	186	15	22
34	14	16	85	22	79	136	21	26	187	15	18
35	16	28	86	31	65	137	22	31	188	21	29
36	14	19	87	10	12	138	13	27	189	33	38
37	15	15	88	12	14	139	10	12	190	18	26
38	12	17	89	21	29	140	21	15	191	20	24
39	11	12	90	11	13	141	15	15	192	16	22
40	14	17	91	12	14	142	8	24	193	14	21
41	16	18	92	11	21	143	10	18	194	25	42
42	14	22	93	11	22	144	7	13	195	15	34
43	21	34	94	11	13	145	9	11	196	17	25
44	13	16	95	10	12	146	10	12	197	17	22
45	14	16	96	23	63	147	14	20	198	19	36
46	38	46	97	16	30	148	49	97	199	12	18
47	19	52	98	12	15	149	12	17	200	28	72
48	25	18	99	20	37	150	7	14	201	9	21
49	20	59	100	18	76	151	9	29	202	8	20
50	15	25	101	20	37	152	8	14	203	13	17
51	13	15	102	12	27	153	8	13	204	10	13

	Above 24 mg/kg As and/or above 400 mg/kg Pb

Parcel B Lower South Readings

Location	As (mg/kg)	Pb (mg/kg)
205	13	16
206	12	31
207	12	24
208	8	22
209	7	10
210	15	18
211	23	29
212	7	15
213	8	20
214	17	13
215	8	13
216	8	15
217	7	9
218	7	11
219	6	8
220	11	14
221	10	15
222	12	19
223	27	37
224	12	29
225	17	48
226	9	27
227	19	25
228	11	15
229	10	13
230	21	77
231	21	29
232	8	15
233	9	13
234	68	108
235	12	30
236	13	37
237	15	61
238	17	26
239	9	14
240	10	13
241	12	14
242	14	12
243	11	14
244	12	15
245	23	32
246	12	14
247	10	33
248	9	14
249	17	21
250	19	29
251	16	54
252	15	43
253	22	61
254	25	44
255	30	67
256	10	12
257	11	16
258	8	24
259	14	38
260	14	102
261	8	11
262	7	10
263	52	142
264	72	222
265	8	11
266	23	24
267	20	23
268	9	11
269	15	34
270	9	19
271	99	186
272	14	13
273	11	17
274	14	49
275	39	55
276	67	127
277	20	14
278	11	13
279	12	24
280	10	12
281	10	13
282	46	118
283	25	62
284	10	12
285	16	20
286	12	27
287	13	13
288	22	28
289	12	14
290	84	249
291	21	74
292	14	35
293	8	10
294	17	34
295	13	41
296	27	77
297	23	19
298	12	28
299	9	13
300	13	28
301	33	89
302	9	12
303	11	15
304	167	156
305	13	44
306	31	64
307	20	50
308	11	16
309	9	12
310	21	15
311	15	27
312	10	14
313	15	35
314	20	16
315	33	72
316	26	61
317	17	48
318	13	67
319	12	19
320	51	122
321	11	12
322	26	30
323	18	45
324	11	13
325	11	12
326	13	7
327	11	13
328	9	17
329	12	20
330	13	17
331	13	17
332	16	19
333	12	15
334	17	73
335	18	14
336	10	13
337	10	14
338	8	11
339	20	71
340	29	35
341	23	27
342	8	28
343	9	18
344	19	32
345	30	73
346	81	137
347	16	19
348	27	39
349	12	13
350	22	28
351	23	111
352	12	30
353	19	72
354	16	36
355	19	38
356	16	31
357	42	61
358	19	60
359	15	31
360	51	106
361	21	42
362	17	31
363	14	19
364	14	27
365	35	40
366	29	32
367	16	57
368	13	29
369	18	24
370	14	19
371	45	93
372	44	99
373	64	180
374	24	23
375	20	26
376	30	44
377	19	56
378	18	52
379	27	49
380	35	115
381	20	117
382	24	49
383	13	17
384	26	29
385	17	61

East Wall Readings		
1	37	153
2	29	76
3	18	26
4	38	67
5	51	257
6	50	117
7	29	40
8	30	37
9	25	34
10	34	53
11	21	31
12	19	24
13	31	57

Table 5-17 Metals FRASS Information Parcel C (Between and Benbow and Dickson)

Location	As (mg/kg)	Pb (mg/kg)
A1	22	10
A2	14	13
A3	8	11
A4	8	14
A5	34	139
A6	15	81
A7	11	45
A8	7	17
A9	9	15
A10	10	22
A11	9	15
A12	8	18
A13	44	9
A14	146	9
A15	9	8
A16	8	12
A17	7	11
A18	13	124
A19	9	37
A20	24	34
A21	9	33
A22	21	15
A23	13	25
A24	7	10
A25	22	16
A26	19	15
A27	11	20
A28	11	30
A29	9	25
A30	13	14
A31	9	10
A32	21	23
A33	15	24
A34	9	24
A35	23	104
A36	10	66
A37	9	21
A38	7	19
A39	15	15
A40	7	15
A41	11	25
A42	23	19
A43	13	12
A44	27	63
A45	22	27

Location	As (mg/kg)	Pb (mg/kg)
A46	17	15
A47	22	17
A48	21	18
A49	8	15
A50	12	13
A51	8	18
A52	8	16
A53	41	40
A54	23	25
A55	11	15
A56	13	22
A57	8	10
A58	7	16
A59	33	34
A60	15	126
A61	18	16
A62	17	10
A63	8	13
A64	9	10
A65	7	10
A66	19	14
A67	16	28
A68	9	25
A69	28	15
A70	17	11
A71	11	12
A72	15	23
A73	19	16
A74	24	15
A75	9	12
A76	8	13
A77	26	14
A78	21	36
A79	19	28
A80	14	16
A81	10	22
A82	8	16
A83	10	23
A84	10	13
A85	7	32
A86	16	28
A87	12	11
A88	11	15
A89	10	13
A90	8	36

Location	As (mg/kg)	Pb (mg/kg)
A91	8	12
A92	20	12
A93	23	32

Above 24 mg/kg As and or above 400 mg/kg PB

FRASS NW Parcel C

Location	As (mg/kg)	Pb (mg/kg)
B1	7	12
B2	6	7
B3	24	11
B4	7	11
B5	7	8
B6	5	8
B7	13	34
B8	7	28
B9	9	34
B10	14	45
B11	6	8
B12	6	8
B13	8	14
B14	19	20
B15	6	9
B16	6	9
B17	6	8
B18	7	11
B19	7	11
B20	6	8
B21	6	8
B22	8	23
B23	8	15
B24	15	33
B25	11	24
B26	8	25
B27	5	8
B28	6	13
B29	25	35
B30	11	8
B31	20	20
B32	7	9
B33	8	13
B34	8	15
B35	6	9
B36	5	7
B37	13	14
B38	5	7
B39	5	7
B40	7	23
B41	7	10
B42	6	8
B43	25	38
B44	8	19
B45	11	10

Location	As (mg/kg)	Pb (mg/kg)
B46	6	8
B47	8	16
B48	13	11
B49	7	9
B50	5	7
B51	6	8
B52	7	10
B53	8	13
B54	8	11
B55	7	18
B56	11	43
B57	6	9
B58	6	8
B59	6	7
B60	7	10
B61	15	10
B62	9	13
B63	7	9
B64	8	5
B65	8	9
B66	7	13
B67	7	13
B68	6	26
B69	8	24
B70	6	8
B71	5	8
B72	7	13
B73	8	17
B74	7	12
B75	7	11
B76	10	9
B77	25	21
B78	8	16
B79	11	10
B80	7	12
B81	6	9
B82	6	12
B83	9	8
B84	42	11
B85	9	15
B86	11	9
B87	32	15
B88	9	10
B89	4	6
B90	7	11

Location	As (mg/kg)	Pb (mg/kg)
B91	7	9
B92	7	22
B93	8	8
B94	10	10
B95	9	7
B96	17	12
B97	6	8
B98	7	12
B99	8	22
B100	16	23
B101	6	8
B102	7	18
B103	9	8
B104	2	17
B105	9	12
B106	10	9
B107	11	10
B108	8	10
B109	9	24
B110	9	24
B111	6	9
B112	7	12
B113	14	14
B114	15	13
B115	22	12
B116	75	10
B117	7	9
B118	7	10
B119	12	9
B120	29	11
B121	5	7
B122	6	8
B123	7	15
B124	9	17
B125	5	7
B126	22	7
B127	13	9
B128	136	55
B129	8	13
B130	9	11
B131	11	9
B132	5	10
B133	17	11
B134	15	10
B135	7	3

Location	As (mg/kg)	Pb (mg/kg)
B136	7	14
B137	7	10
B138	6	10
B139	15	11
B140	17	9
B141	7	10
B142	20	32
B143	9	35
B144	11	23
B145	5	7
B146	6	8
B147	21	19
B148	7	12
B149	36	21
B150	7	10
B151	7	9
B152	21	17
B153	13	43
B154	9	27
B155	11	14
B156	12	19
B157	7	13
B158	8	14
B159	6	8
B160	5	7
Add on NW Corner		
C1	6	8
C2	6	8
C3	7	9
C4	6	8
C5	10	20
C6	7	9
C7	28	9
C8	37	9
C9	7	26
C10	11	20
C11	4	6
C12	45	44
C13	7	9
C14	7	9
C15	6	8
C16	5	8
C17	6	8
C18	6	8
C19	6	15

Location	As (mg/kg)	Pb (mg/kg)
Add on NW Corner Continue		
C20	5	6
C21	4	7
C22	26	8
C23	5	8
C24	11	8
C25	9	10
C26	6	8
C27	6	9
C28	36	7
C29	7	10
C30	6	8
C31	22	8
C32	7	9
C33	20	10
C34	8	8
C35	6	8
C36	7	9
C37	7	8
C38	6	8
C39	5	8
C40	5	8
C41	4	6
C42	4	6
C43	4	6
C44	5	8
C45	4	6
C46	4	5
C47	5	6
C48	24	6
C49	34	6
C50	3	5
C51	4	6
C52	4	6

Above 24 mg/kg As and or above 400 mg/kg PB

North of Benbow Building

Location	As (mg/kg)	Pb (mg/kg)
D1	22	65
D2	16	20
D3	28	33
D4	16	23
D5	12	16
D6	16	21
D7	12	16
D8	14	27
D9	12	19
D10	9	16
D11	14	21
D12	11	17
D13	14	19
D14	19	26
D15	19	21
D16	12	17
D17	11	15
D18	11	18
D19	11	21
D20	13	17
D21	11	15
D22	13	18
D23	16	23
D24	8	10
D25	13	17
D26	15	21
D27	7	38
D28	16	31
D29	12	16
D30	10	24
D31	13	33
D32	21	25
D33	13	18
D34	12	17
D35	12	18
D36	15	21
D37	10	18
D38	24	32
D39	18	27
D40	15	27
D41	17	23
D42	13	17
D43	16	25
D44	15	43
D45	11	63

Location	As (mg/kg)	Pb (mg/kg)
D46	19	36
D47	11	66
D48	20	37
D49	28	112
D50	10	37
D51	15	30
D52	39	77
D53	15	79
D54	25	97
D55	10	12
D56	18	29
D57	20	38
D58	18	32
D59	17	23
D60	17	20
D61	15	22
D62	18	27
D63	19	18
D64	19	23
D65	16	23
D66	14	19
D67	32	40
D68	9	14
D69	12	18
D70	13	17
D71	15	19
D72	17	22
D73	19	19
D74	24	22
D75	23	19
D76	24	31
D77	17	30
D78	22	26
D79	16	21
D80	20	22
D81	17	19
D82	13	16
D83	19	18
D84	22	28
D85	18	22
D86	27	36
D87	15	21
D88	18	24
D89	19	26
D90	11	14

Location	As (mg/kg)	Pb (mg/kg)
D91	16	16
D92	15	20
D93	16	18
D94	12	14
D95	13	16
D96	13	17
D97	12	15
D98	12	14
D99	21	20
D100	14	19
D101	29	38
D102	10	15
D103	12	15
D104	12	16
D105	13	18
D106	16	22
D107	14	17
D108	23	40
D109	15	20
D110	11	16
D111	15	20
D112	13	17
D113	14	20
D114	23	38
D115	12	15
D116	17	24
D117	18	22
D118	27	36
D119	15	21
D120	18	24
D121	19	26
D122	16	21
D123	18	20
D124	14	18
D125	13	14
D126	13	15
D127	17	23
D128	11	14
D129	9	12
D130	11	17
D131	20	26
D132	17	24
D133	15	19
D134	26	34
D135	18	21

Location	As (mg/kg)	Pb (mg/kg)
D136	13	18
D137	16	18
D138	15	20
D139	12	15
D140	18	21
D141	13	15
D142	14	15
D143	18	24
D144	11	12
D145	15	17
D146	17	21
D147	22	21
D148	20	22
D149	22	27
D150	36	25
D151	14	17
D152	23	31
D153	16	25
D154	18	23
D155	17	18
D156	16	20
D157	17	22
D158	14	18
D159	17	20
D160	18	21
D161	15	18
D162	17	21
D163	17	24
D164	14	20
D165	20	26
D166	21	23
D167	23	26
D168	16	19
D169	25	25
D170	19	24
D171	20	21
D172	15	19
D173	13	14
D174	24	37
D175	16	21
D176	15	21
D177	22	24
D178	13	15
D179	13	16
D180	10	12

Location	As (mg/kg)	Pb (mg/kg)
D181	18	15
D182	13	16
D183	10	12
D184	18	33
D185	11	17
D186	11	16
D187	9	12
D188	19	26
D189	13	18
D190	17	12
D191	18	21
D192	17	23

Above 24 mg/kg As and or above 400 mg/kg PB

West Side of Parcel C

Location	As (mg/kg)	Pb (mg/kg)
E1	5	8
E2	8	8
E3	7	9
E4	6	8
E5	5	7
E6	13	10
E7	7	9
E8	23	11
E9	19	12
E10	7	10
E11	7	10
E12	13	11
E13	2	9
E14	9	10
E15	4	6
E16	8	8
E17	17	16
E18	14	8
E19	16	13
E20	26	9
E21	10	8
E22	57	25
E23	25	26
E24	20	23
E25	6	9
E26	16	6
E27	43	17
E28	46	11
E29	24	10
E30	9	11
E31	8	12
E32	7	11
E33	9	8
E34	10	21
E35	19	11
E36	19	11
E37	10	11
E38	45	72
E39	15	15
E40	12	9
E41	8	10
E42	40	8
E43	9	13
E44	5	17
E45	7	8

Location	As (mg/kg)	Pb (mg/kg)
E46	7	8
E47	23	17
E48	11	12
E49	13	9
E50	11	26
E51	12	9
E52	9	20
E53	14	16
E54	11	22
E55	7	7
E56	6	8
E57	20	43
E58	9	27
E59	8	9
E60	26	36
E61	14	19
E62	12	13
E63	13	14
E64	9	19
E65	30	16
E66	5	7
E67	6	9
E68	5	7
E69	7	8
E70	6	17
E71	35	9
E72	9	15
E73	41	12
E74	5	8
E75	6	9
E76	10	8
E77	10	10
E78	7	9
E79	15	11
E80	15	11
E81	10	12
E82	5	7
E83	6	10
E84	39	26
E85	10	15
E86	11	24
E87	7	18
E88	9	19
E89	8	17
E90	10	8

Location	As (mg/kg)	Pb (mg/kg)
E91	7	9
E92	39	19
E93	10	10
E94	8	9
E95	8	5
E96	51	54
E97	17	9
E98	8	10
E99	12	13
E100	17	31
E101	13	9
E102	20	13
E103	8	13
E104	21	14
E105	66	8
E106	19	13
E107	25	12
E108	39	34
E109	22	23
E110	7	8
E111	32	15
E112	43	21
E113	7	28
E114	9	53
E115	8	38
E116	9	22
E117	10	39
E118	61	110
E119	24	20
E120	8	21
E121	14	8
E122	13	10
E123	23	12
E124	9	7
E125	14	6
E126	27	7
E127	19	18
E128	11	7
E129	26	8
E130	5	7
E131	16	18
E132	13	15
E133	11	43
E134	8	9
E135	9	9

Location	As (mg/kg)	Pb (mg/kg)
E136	88	24
E137	6	10
E138	8	8
E139	6	9
E140	6	12
E141	68	45
E142	9	41
E143	26	15
E144	7	18
E145	16	22
E146	20	13
E147	10	16
E148	10	10
E149	6	8
E150	8	7
E151	6	8
E152	7	8
E153	6	9
E154	6	7
E155	7	9
E156	21	41
E157	38	77
E158	53	34
E159	12	16
E160	25	27
E161	44	9
E162	6	7
E163	21	8
E164	8	11
E165	6	10
E166	6	8
E167	6	8
E168	12	16
E169	7	14
E170	10	90
E171	8	27
E172	8	34
E173	7	20
E174	8	14
E175	9	24
E176	10	37
E177	25	106
E178	43	12
E179	19	35
E180	16	93

Above 24 mg/kg As and or above 400 mg/kg PB

West Side of Parcel C Continued

Location	As (mg/kg)	Pb (mg/kg)
E181	58	58
E182	11	9
E183	6	18
E184	6	10
E185	16	8
E186	6	9
E187	5	7
E188	16	17
E189	7	10
E190	11	13
E191	9	8
E192	9	14
E193	9	20
E194	7	9
E195	17	8
E196	11	13
E197	13	20
E198	23	17
E199	30	24
E200	14	18
E201	14	15
E202	9	17
E203	7	15
E204	15	30
E205	31	34
E206	21	35
E207	15	27
E208	16	2
E209	32	19
E210	9	8
E211	20	9
E212	25	19
E213	11	10
E214	11	8
E215	17	8
E216	17	10
E217	39	15
E218	20	6
E219	13	27
E220	26	13
E221	7	15
E222	13	9
E223	13	15
E224	9	33
E225	22	33

Location	As (mg/kg)	Pb (mg/kg)
E226	8	10
E227	7	11
E228	57	229
E229	9	25
E230	6	18
E231	7	28
E232	8	28
E233	10	29
E234	13	39
E235	49	112
E236	11	14
E237	33	48
E238	8	11
E239	34	214
E240	10	50
E241	6	8
E242	14	42
E243	19	35
E244	27	43
E245	8	16
E246	7	18
E247	7	9
E248	8	18
E249	6	15
E250	13	11
E251	5	7
E252	134	262
E253	13	49
E254	7	13
E255	24	95
E256	3	8
E257	6	10
E258	7	22
E259	6	10
E260	8	24
E261	7	20
E262	11	11
E263	45	180
E264	14	23
E265	7	15
E266	36	165
E267	12	140
E268	13	14
E269	10	36
E270	5	9

Location	As (mg/kg)	Pb (mg/kg)
E271	6	16
E272	7	18
E273	7	22
E274	9	37
E275	11	38
E276	11	27
E277	11	56
E278	14	50
E279	13	92
E280	18	97
E281	38	120
E282	9	12
E283	9	8
E284	7	34
E285	8	16
E286	6	7
E287	30	21
E288	69	256
E289	15	24
E290	69	54
E291	7	15
E292	47	44
E293	17	18
E294	6	10
E295	6	9
E296	6	9
E297	6	8
E298		
E299	17	110
E300	10	14
E301	16	23
E302	9	49
E303	7	24
E304	15	53
E305	8	114
E306	9	67
E307	15	74
E308	8	52
E309	6	19
E310	19	41
E311	14	40
E312	27	244
E313	41	112
E314	11	16
E315	18	141

Location	As (mg/kg)	Pb (mg/kg)
E316	35	136
E317	7	36
E318	50	46
E319	7	31
E320	19	417
E321	12	76
E322	7	32
E323	16	110
E324	15	91
E325	10	12
E326	42	136
E327	24	101
E328	14	54
E329	31	50
E330	81	134
E331	8	48
E332	13	54
E333	26	245
E334	13	86
E335	19	205
E336	16	61
E337	23	64
E338	21	26
E339	18	37
E340	23	18
E341	13	84
E342	25	257
E343	17	159
E344	10	92
E345	13	76
E346	8	27
E347	14	166
E348	10	51

Location	As (mg/kg)	Pb (mg/kg)
F1	8	15
F2	9	20
F3	14	17
F4	6	8
F5	7	9
F6	7	9
F7	7	8
F8	8	9
F9	7	10
F10	7	13
F11	6	9
F12	7	15
F13	10	21
F14	8	19
F15	12	29
F16	7	9
F17	7	9
F18	7	11
F19	10	11
F20	6	8
F21	9	12
F22	12	4
F23	7	18
F24	7	12
F25	14	42
F26	13	33
F27	20	29
F28	23	23
F29	10	31
F30	12	30
F31	43	25
F32	11	15
F33	14	26
F34	35	24
F35	7	9
F36	12	14
F37	14	13
F38	16	13
F39	26	14
F40	9	14
F41	11	14
F42	9	25
F43	8	25
F44	9	20
F45	10	38

Location	As (mg/kg)	Pb (mg/kg)
F46	30	75
F47	10	25
F48	8	25
F49	10	48
F50	8	12
F51	14	26
F52	63	39
F53	131	576
F54	91	211
F55	13	43
F56	56	70
F57	7	14
F58	6	10
F59	81	47
F60	77	72
F61	8	10
F62	10	18
F63	9	14
F64	10	22
F65	8	11
F66	20	16
West Wall		
G1	254	309
G2	85	35
G3	243	453
G4	35	84
G5	79	332
G6	72	123
G7	11	19
G8	24	20
G9	14	49
G10	23	78
G11	143	928
G12	36	116
G13	42	177
G14	63	198
G15	47	134
G16	85	74
G17	15	46
G18	10	13
G19	15	35
G20	18	53
G21	68	43
G22	17	22

Above 24 mg/kg As and or above 400 mg/kg PB

Note: Water

Metals FRASS East Dickson

Location	As (mg/kg)	Pb (mg/kg)
H1	37	65
H2	8	27
H3	8	20
H4	8	19
H5	8	11
H6	9	23
H7	10	21
H8	7	13
H9	15	18
H10	11	22
H11	11	11
H12	11	10
H13	12	22
H14	23	20
H15	34	44
H16	75	161
H17	7	28
H18	8	10
H19	57	81
H20	9	16
H21	7	17
H22	10	18
H23	18	29
H24	28	11
H25	15	10
H26	9	19
H27	11	73
H28	26	43
H29	14	24
H30	9	12
H31	12	14
H32	10	25
H33	11	10
H34	10	19
H35	10	19
H36	44	38
H37	9	14
H38	8	16
H39	7	9
H40	8	17
H41	18	24
H42	16	55
H43	7	14
H44	7	10
H45	10	26

Location	As (mg/kg)	Pb (mg/kg)
H46	28	30
H47	14	17
H48	20	18
H49	24	39
H50	19	10
H51	17	25
H52	12	11
H53	8	12
H54	8	20
H55	7	22
H56	10	28
H57	11	10
H58	50	97
H59	8	20
H60	7	12
H61	71	193
H62	19	20
H63	17	29
H64	19	45
H65	13	58
H66	11	56
H67	9	31
H68	10	44
H69	12	38
H70	21	28
H71	9	15
H72	24	37
H73	7	18
H74	20	25
H75	14	14
H76	17	30
H77	8	21
H78	11	27
H79	13	27
H80	20	62
H81	10	32
H82	7	19
H83	19	84
H84	43	126
H85	15	66
H86	12	52
H87	12	58
H88	6	8
H89	50	125
H90	9	36

Above 24 mg/kg As and or above 400 mg/kg PB

Metals FRASS SW Side of Parcel C

Location	As (mg/kg)	Pb (mg/kg)
I1	38	74
I2	18	14
I3	24	30
I4	62	55
I5	8	19
I6	10	15
I7	8	19
I8	33	29
I9	19	22
I10	18	27
I11	15	11
I12	18	21
I13	34	52
I14	15	41
I15	24	30
I16	15	15
I17	11	6
I18	13	16
I19	11	42
I20	29	31
I21	17	24
I22	9	22
I23	17	13
I24	19	31
I25	16	21
I26	14	20
I27	11	14
I28	10	15
I29	10	13
I30	14	15
I31	11	15
I32	18	17
I33	14	14
I34	12	16
I35	36	32
I36	18	14
I37	23	18
I38	11	18
I39	44	61
I40	10	13
I41	10	16
I42	14	22
I43	11	20
I44	19	41
I45	33	229

Location	As (mg/kg)	Pb (mg/kg)
I46	9	12
I47	9	10
I48	10	20
I49	28	24
I50	17	24
I51	10	14
I52	38	43
I53	13	28
I54	11	13
I55	9	11
I56	41	62
I57	11	12
I58	11	14
I59	11	13
I60	8	9
I61	11	14
I62	12	22
I63	11	17
I64	10	11
I65	14	40
I66	16	41
I67	13	11
I68	9	79
I69	13	5
I70	15	16
I71	9	10
I72	16	16
I73	18	59
I74	10	12
I75	12	17
I76	10	14
I77	10	13
I78	12	13
I79	8	10
I80	16	60
I81	11	16
I82	12	13
I83	15	11
I84	18	10
I85	10	13
I86	11	13
I87	13	34
I88	18	25
I89	17	36
I90	14	17

Location	As (mg/kg)	Pb (mg/kg)
I91	42	128
I92	11	15
I93	19	42
I94	8	18
I95	13	14
I96	8	14
I97	11	20
I98	21	10
I99	13	23
I100	11	14
I101	17	83
I102	10	11
I103	13	49
I104	9	48
I105	42	76
I106	23	30
I107	12	18
I108	14	23
I109	12	29
I110	11	18
I111	16	19
I112	36	102
I113	37	82
I114	14	57
I115	19	16
I116	13	43
I117	10	19
I118	41	43
I119	14	22
I120	17	11
I121	12	14
I122	10	12
I123	20	41
I124	11	21
I125	10	36
I126	8	16
I127	30	39
I128	15	46
I129	19	44
I130	19	23
I131	31	17
I132	29	42
I133	20	27
I134	21	20
I135	24	34

Location	As (mg/kg)	Pb (mg/kg)
I136	24	107
I137	18	11
I138	24	107
I139	15	59
I140	18	29
I141	40	96
I142	11	96
I143	10	30
I144	11	20
I145	19	60
I146	11	13
I147	12	45
I148	14	25
I149	12	16
I150	13	14
I151	18	34
I152	33	24
I153	11	23
I154	11	20
I155	64	267
I156	12	20
I157	13	20
I158	11	14
I159	74	207
I160	8	20
I161	13	38
I162	11	26
I163	16	64
I164	12	31
I165	10	31
I166	18	32
I167	11	22
I168	64	243
I169	18	31
I170	12	21
I171	12	48
I172	33	58
I173	22	39
I174	15	32
I175	14	19
I176	32	124
I177	15	99
I178	9	20
I179	10	31
I180	67	107

Above 24 mg/kg As and or above 400 mg/kg PB

Metals FRASS SW Side of Parcel C Continued

Location	As (mg/kg)	Pb (mg/kg)
I181	13	37
I182	8	23
I183	14	19
I184	13	28
I185	13	99
I186	12	38
I187	18	50
I188	8	11
I189	13	35
I190	16	19
I191	11	15
I192	31	83
I193	7	16
I194	11	21
I195	23	40
I196	9	20
I197	9	23
I198	13	81
I199	13	86
I200	20	71
I201	9	30
I202	7	8
I203	12	38
I204	9	18
I205	11	14
I206	9	13
I207	63	210
I208	12	26
I209	15	24
I210	20	34
I211	16	37
I212	15	30
I213	19	41
I214	11	35
I215	8	27
I216	8	13
I217	17	46
I218	23	63
I219	12	34
I220	17	42
I221	11	25
I222	17	49
I223	25	45
I224	32	111
I225	7	37

Location	As (mg/kg)	Pb (mg/kg)
I226	11	25
I227	10	24
I228	48	191
I229	49	79
I230	14	95
I231	10	23
I232	18	63
I233	42	124
I234	17	43
I235	15	24
I236	11	33
I237	16	68
I238	20	50
I239	10	30
I240	14	56
I241	8	28
I242	19	70
I243	15	19
I244	14	69
I245	20	84
I246	12	19
I247	10	19
I248	9	31
I249	11	33
I250	8	21
I251	8	17
I252	15	39
I253	13	29
I254	37	128
I255	16	67
I256	10	15
I257	10	16
I258	23	18
I259	22	19
I260	14	56
I261	24	25
I262	33	102
I263	12	32
I264	7	25
I265	19	33
I266	37	60
I267	8	27
I268	7	16
I269	8	31
I270	10	18
I271	67	79

Table 6-1 Li Tungsten Instruments

Instruments for Li Tungsten					
Ludlum Model Numb	Serial #	Ludlum Detector Model	Serial #	Serial #	use
2929	137609		PR 142937		smear and air sample counting
	163823		PR 170302		smear and air sample counting
	157341		PR 157818		smear and air sample counting
2224-1	162427	43-89	PR 166742		direct alpha beta survey
	162418		PR 168765		direct alpha beta survey
	154947		RN 013295		direct alpha beta survey
	154932		RN 013389		direct alpha beta survey
2241-2	163589	43-5/44-9	PR 168913	PR 168958	direct alpha survey/ alpha beta gamma survey
	133332		PR 168911	PR 168957	direct alpha survey/ alpha beta gamma survey
	150620		PR 154416	PR 154488	direct alpha survey/ alpha beta gamma survey
2350-1	156578	44-10	PR 182336		gamma walkovers
	175842		PR 175842		gamma walkovers
	175865		PR 182332		gamma walkovers
C 828	1889				air flow calibration
Canberra HPGe Gamma Spectroscopy System					On-Site Gamma Spectroscopy
Trimbel DGPS with Ranger Hand Held					GPS
Innov-X System Inc. Alpha X-ray fluorescent gun					Chem Remedial Action Support Surveys
Niton XRF Gun					Chem Remedial Action Support Surveys

Table 7-1
Radionuclide Laboratory Data Precision
NON

Survey Unit	Sample #	Ra-226 pCi/g	2σ	Ra-228 pCi/g	2σ	Ra-226+ Ra-228 pCi/g	2σ	Th-230 pCi/g	2σ	Th-232 pCi/g	2σ	Th-230+ Th-232 pCi/g	2σ	Ra-226 NAD	Ra-228 NAD	Ra-226+ Ra-228 NAD	Th-230 NAD	Th-232 NAD
SU 1	5601-FSS-SU1-1001	0.47	0.17	0.89	0.44	1.46	0.46	0.58	0.14	0.64	0.15	1.22	0.21	0.93	0.25	0.15	0.34	0.41
	5601-FSS-SU1-1001 DUP	0.72	0.21	0.74	0.41	1.36	0.47	0.65	0.15	0.73	0.16	1.38	0.22					
SU2	5601-FSS-SU2-1001	0.97	0.25	1.18	0.44	2.15	0.52	0.82	0.16	0.80	0.16	1.62	0.23	0.93	0.16	0.63	0.00	0.43
	5601-FSS-SU2-1001 DUP	1.34	0.31	1.28	0.46	2.62	0.54	0.82	0.18	0.91	0.20	1.73	0.27					
SU3	5601-FSS-SU3-1001	0.56	0.21	0.78	0.45	1.34	0.50	0.49	0.12	0.48	0.12	0.97	0.17	0.33	0.61	0.38	0.18	0.58
	5601-FSS-SU3-1001 DUP	0.66	0.22	0.44	0.33	1.10	0.40	0.52	0.12	0.39	0.10	0.91	0.16					
SU4																		
SU5	5601-FSS-SU5-1001	0.87	0.23	0.42	0.48	1.29	0.53	0.82	0.17	0.98	0.20	1.80	0.26	0.36	0.65	0.75	0.12	0.04
	5601-FSS-SU5-1001 DUP	1.00	0.28	0.85	0.45	1.85	0.53	0.85	0.18	0.97	0.19	1.82	0.26					
SU6	5601-FSS-SU6-1001	0.94	0.27	0.76	0.51	1.70	0.58	0.50	0.17	1.04	0.27	1.54	0.32	0.03	No Result	No Result	0.94	0.11
	5601-FSS-SU6-1001 DUP	0.95	0.28	No Result		No Result		0.76	0.22	1.00	0.26	1.76	0.34					
SU7	5601-FSS-SU7-1007	0.46	0.17	0.32	0.36	0.78	0.40	0.36	0.09	0.35	0.09	0.70	0.13	0.26	0.02	0.09	0.04	0.10
	5601-FSS-SU7-1007 Dup	0.40	0.16	0.33	0.36	0.73	0.39	0.36	0.09	0.36	0.09	0.72	0.12					
SU8	5601-FSS-SU8-1001	0.83	0.23	1.11	0.47	1.94	0.52	0.59	0.13	0.80	0.17	0.80	0.21	0.06	0.38	0.36	0.16	0.50
	5601-FSS-SU8-1001 DUP	0.81	0.23	0.86	0.47	1.67	0.52	0.62	0.13	0.69	0.14	0.69	0.19					
SU9	5601-FSS-SU9-1001	0.87	0.24	0.77	0.52	1.64	0.57	0.53	0.10	0.59	0.11	1.12	0.15	0.33	0.35	0.18	0.06	0.13
	5601-FSS-SU9-1001 DUP	0.76	0.23	1.02	0.49	1.78	0.54	0.52	0.10	0.61	0.11	1.13	0.15					
SU10	5601-FSS-SU10-1001	0.82	0.23	1.07	0.34	1.89	0.41	0.73	0.15	1.01	0.19	1.74	0.24	1.13	0.31	0.47	0.53	0.88
	5601-FSS-SU10-1001 DUP	1.23	0.28	0.93	0.29	2.16	0.40	0.85	0.17	1.28	0.24	2.13	0.29					

LEGEND
pCi/g pico curies per gram
2σ 2 standard deviations
NAD normalized absolute difference

Note: In SU4, Field Replicates were prepared and analyzed. These replicates passed the NAD test. However, no separate laboratory replicate analysis was performed for SU4. The laboratory batched both SU4 and SU5 samples. The SU5 laboratory replicates passed the NAD. The SU5 replicate analysis should be used for the NAD test in SU5 as well.

Table 7-2 Radionuclide Data Replicate Analysis

Li Tungsten Survey
Unit 1

Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU1-1006	0.70	0.21	5601-FSS-SU1-1012	0.60	0.20	0.18	2.80	Pass
5601-FSS-SU1-1006	0.70	0.21	5601-FSS-SU1-1013	0.72	0.24	0.18	2.80	Pass
5601-FSS-SU1-1011	0.85	0.24	5601-FSS-SU1-1014	0.85	0.24	0.21	3.40	Pass
5601-FSS-SU1-1011	0.85	0.24	5601-FSS-SU1-1015	0.78	0.20	0.21	3.40	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU1-1006	0.87	0.39	5601-FSS-SU1-1012	0.61	0.37	0.22	3.48	Pass
5601-FSS-SU1-1006	0.87	0.39	5601-FSS-SU1-1013	0.60	0.40	0.22	3.48	Pass
5601-FSS-SU1-1011	0.90	0.38	5601-FSS-SU1-1014	1.06	0.38	0.23	3.60	Pass
5601-FSS-SU1-1011	0.90	0.38	5601-FSS-SU1-1015	0.96	0.32	0.23	3.60	Pass
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU1-1006	1.57	0.44	5601-FSS-SU1-1012	1.21	0.42	0.39	6.28	Pass
5601-FSS-SU1-1006	1.57	0.44	5601-FSS-SU1-1013	1.32	0.47	0.39	6.28	Pass
5601-FSS-SU1-1011	1.75	0.45	5601-FSS-SU1-1014	1.91	0.45	0.44	7.00	Pass
5601-FSS-SU1-1011	1.75	0.45	5601-FSS-SU1-1015	1.74	0.38	0.44	7.00	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU4-1002	0.25	0.06	5601-FSS-SU4-1012	0.21	0.05	0.06	1.00	Pass
5601-FSS-SU4-1002	0.25	0.06	5601-FSS-SU4-1013	0.21	0.05	0.06	1.00	Pass
5601-FSS-SU4-1009	0.36	0.09	5601-FSS-SU4-1014	0.61	0.11	0.09	1.43	Pass
5601-FSS-SU4-1009	0.36	0.09	5601-FSS-SU4-1015	0.72	0.13	0.09	1.43	Pass
5601-FSS-SU4-1005	0.64	0.12	5601-FSS-SU4-1016	0.67	0.12	0.16	2.56	Pass
5601-FSS-SU4-1005	0.64	0.12	5601-FSS-SU4-1017	0.58	0.11	0.16	2.56	Pass
Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU4-1002	0.28	0.06	5601-FSS-SU4-1012	0.30	0.06	0.07	1.10	Pass
5601-FSS-SU4-1002	0.28	0.06	5601-FSS-SU4-1013	0.29	0.07	0.07	1.10	Pass
5601-FSS-SU4-1009	0.54	0.12	5601-FSS-SU4-1014	0.76	0.13	0.14	2.16	Pass
5601-FSS-SU4-1009	0.54	0.12	5601-FSS-SU4-1015	0.99	0.16	0.14	2.16	Pass
5601-FSS-SU4-1005	0.86	0.10	5601-FSS-SU4-1016	0.88	0.15	0.22	3.44	Pass
5601-FSS-SU4-1005	0.86	0.10	5601-FSS-SU4-1017	0.65	0.12	0.22	3.44	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU4-1002	0.53	0.08	5601-FSS-SU4-1012	0.51	0.08	0.13	2.10	Pass
5601-FSS-SU4-1002	0.53	0.08	5601-FSS-SU4-1013	0.50	0.08	0.13	2.10	Pass
5601-FSS-SU4-1009	0.90	0.15	5601-FSS-SU4-1014	1.37	0.17	0.22	3.59	Pass
5601-FSS-SU4-1009	0.90	0.15	5601-FSS-SU4-1015	1.71	0.21	0.22	3.59	Pass
5601-FSS-SU4-1005	1.50	0.16	5601-FSS-SU4-1016	1.55	0.19	0.38	6.00	Pass
5601-FSS-SU4-1005	1.50	0.16	5601-FSS-SU4-1017	1.23	0.16	0.38	6.00	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 5 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	0.78	0.24	5601-FSS-SU5-1013	0.56	0.22	0.20	3.12	Pass
5601-FSS-SU5-1007	0.78	0.24	5601-FSS-SU5-1014	0.80	0.25	0.20	3.12	Pass
5601-FSS-SU5-1007	0.78	0.24	5601-FSS-SU5-1018	1.00	0.24	0.20	3.12	Pass
5601-FSS-SU5-1007	0.78	0.24	5601-FSS-SU5-1019	1.08	0.24	0.20	3.12	Pass
5601-FSS-SU5-1012	1.40	0.28	5601-FSS-SU5-1015	0.70	0.25	0.35	5.60	Pass
5601-FSS-SU5-1012	1.40	0.28	5601-FSS-SU5-1016	0.85	0.21	0.35	5.60	Pass
5601-FSS-SU5-1012	1.40	0.28	5601-FSS-SU5-1017	1.00	0.28	0.35	5.60	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	1.00	0.24	5601-FSS-SU5-1013	0.84	0.37	0.25	4.00	Pass
5601-FSS-SU5-1007	1.00	0.24	5601-FSS-SU5-1014	0.81	0.38	0.25	4.00	Pass
5601-FSS-SU5-1007	1.00	0.24	5601-FSS-SU5-1018	0.73	0.40	0.25	4.00	Pass
5601-FSS-SU5-1007	1.00	0.24	5601-FSS-SU5-1019	0.84	0.36	0.25	4.00	Pass
5601-FSS-SU5-1012	0.92	0.46	5601-FSS-SU5-1015	-0.08	0.32	0.23	3.68	Fail
5601-FSS-SU5-1012	0.92	0.46	5601-FSS-SU5-1016	1.28	0.39	0.23	3.68	Pass
5601-FSS-SU5-1012	0.92	0.46	5601-FSS-SU5-1017	0.79	0.49	0.23	3.68	Pass
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	1.78	0.60	5601-FSS-SU5-1013	1.40	0.43	0.45	7.12	Pass
5601-FSS-SU5-1007	1.78	0.60	5601-FSS-SU5-1014	1.61	0.45	0.45	7.12	Pass
5601-FSS-SU5-1007	1.78	0.60	5601-FSS-SU5-1018	1.73	0.47	0.45	7.12	Pass
5601-FSS-SU5-1007	1.78	0.60	5601-FSS-SU5-1019	1.92	0.43	0.45	7.12	Pass
5601-FSS-SU5-1012	2.32	0.54	5601-FSS-SU5-1015	0.62	0.41	0.58	9.28	Pass
5601-FSS-SU5-1012	2.32	0.54	5601-FSS-SU5-1016	2.13	0.44	0.58	9.28	Pass
5601-FSS-SU5-1012	2.32	0.54	5601-FSS-SU5-1017	1.79	0.56	0.58	9.28	Pass

Laboratory split in purple

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	0.61	0.14	5601-FSS-SU5-1013	0.85	0.17	0.15	2.44	Pass
5601-FSS-SU5-1007	0.61	0.14	5601-FSS-SU5-1014	0.64	0.14	0.15	2.44	Pass
5601-FSS-SU5-1007	0.61	0.14	5601-FSS-SU5-1018	1.73	0.47	0.15	2.44	Pass
5601-FSS-SU5-1007	0.61	0.14	5601-FSS-SU5-1019	0.67	0.16	0.15	2.44	Pass
5601-FSS-SU5-1012	0.60	0.14	5601-FSS-SU5-1015	1.20	0.36	0.15	2.40	Pass
5601-FSS-SU5-1012	0.60	0.14	5601-FSS-SU5-1016	1.03	0.21	0.15	2.40	Pass
5601-FSS-SU5-1012	0.60	0.14	5601-FSS-SU5-1017	0.98	0.20	0.15	2.40	Pass
Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	0.72	0.16	5601-FSS-SU5-1013	0.84	0.17	0.18	2.88	Pass
5601-FSS-SU5-1007	0.72	0.16	5601-FSS-SU5-1014	0.97	0.19	0.18	2.88	Pass
5601-FSS-SU5-1007	0.72	0.16	5601-FSS-SU5-1018	0.85	0.18	0.18	2.88	Pass
5601-FSS-SU5-1007	0.72	0.16	5601-FSS-SU5-1019	0.91	0.20	0.18	2.88	Pass
5601-FSS-SU5-1012	0.63	0.15	5601-FSS-SU5-1015	1.12	0.34	0.16	2.52	Pass
5601-FSS-SU5-1012	0.63	0.15	5601-FSS-SU5-1016	1.20	0.23	0.16	2.52	Pass
5601-FSS-SU5-1012	0.63	0.15	5601-FSS-SU5-1017	1.18	0.23	0.16	2.52	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU5-1007	1.33	0.21	5601-FSS-SU5-1013	1.69	0.24	0.33	5.32	Pass
5601-FSS-SU5-1007	1.33	0.21	5601-FSS-SU5-1014	1.61	0.24	0.33	5.32	Pass
5601-FSS-SU5-1007	1.33	0.21	5601-FSS-SU5-1018	1.51	0.23	0.33	5.32	Pass
5601-FSS-SU5-1007	1.33	0.21	5601-FSS-SU5-1019	1.58	0.26	0.33	5.32	Pass
5601-FSS-SU5-1012	1.23	0.21	5601-FSS-SU5-1015	2.32	0.49	0.31	4.92	Pass
5601-FSS-SU5-1012	1.23	0.21	5601-FSS-SU5-1016	2.23	0.31	0.31	4.92	Pass
5601-FSS-SU5-1012	1.23	0.21	5601-FSS-SU5-1017	2.16	0.30	0.31	4.92	Pass

Laboratory split in purple

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 6 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	0.63	0.23	5601-FSS-SU6-1013	0.60	0.23	0.16	2.52	Pass
5601-FSS-SU6-1010	0.63	0.23	5601-FSS-SU6-1014	0.65	0.20	0.16	2.52	Pass
5601-FSS-SU6-1011	0.63	0.23	5601-FSS-SU6-1015	0.50	0.18	0.16	2.52	Pass
5601-FSS-SU6-1011	0.63	0.23	5601-FSS-SU6-1016	0.54	0.19	0.16	2.52	Pass
5601-FSS-SU6-1009	0.95	0.22	5601-FSS-SU6-1017	1.04	0.24	0.24	3.80	Pass
5601-FSS-SU6-1009	0.95	0.22	5601-FSS-SU6-1018	0.97	0.22	0.24	3.80	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	0.82	0.51	5601-FSS-SU6-1013	0.66	0.41	0.21	3.28	Pass
5601-FSS-SU6-1010	0.82	0.51	5601-FSS-SU6-1014	0.56	0.39	0.21	3.28	Pass
5601-FSS-SU6-1011	0.65	0.40	5601-FSS-SU6-1015	0.59	0.32	0.16	2.60	Pass
5601-FSS-SU6-1011	0.65	0.40	5601-FSS-SU6-1016	0.31	0.29	0.16	2.60	Pass
5601-FSS-SU6-1009	1.00	0.46	5601-FSS-SU6-1017	0.71	0.37	0.25	4.00	Pass
5601-FSS-SU6-1009	1.00	0.46	5601-FSS-SU6-1018	0.85	0.49	0.25	4.00	Pass
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	1.45	0.56	5601-FSS-SU6-1013	1.26	0.47	0.36	5.80	Pass
5601-FSS-SU6-1010	1.45	0.56	5601-FSS-SU6-1014	1.21	0.44	0.36	5.80	Pass
5601-FSS-SU6-1011	1.28	0.46	5601-FSS-SU6-1015	1.09	0.37	0.32	5.12	Pass
5601-FSS-SU6-1011	1.28	0.46	5601-FSS-SU6-1016	0.85	0.35	0.32	5.12	Pass
5601-FSS-SU6-1009	1.95	0.51	5601-FSS-SU6-1017	1.75	0.44	0.49	7.80	Pass
5601-FSS-SU6-1009	1.95	0.51	5601-FSS-SU6-1018	1.82	0.54	0.49	7.80	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	0.63	0.19	5601-FSS-SU6-1013	0.97	0.26	0.16	2.52	Pass
5601-FSS-SU6-1010	0.63	0.19	5601-FSS-SU6-1014	0.80	0.24	0.16	2.52	Pass
5601-FSS-SU6-1011	0.49	0.16	5601-FSS-SU6-1015	0.90	0.23	0.12	1.96	Pass
5601-FSS-SU6-1011	0.49	0.16	5601-FSS-SU6-1016	0.43	0.15	0.12	1.96	Pass
5601-FSS-SU6-1009	0.63	0.15	5601-FSS-SU6-1017	0.47	0.12	0.16	2.52	Pass
5601-FSS-SU6-1009	0.63	0.15	5601-FSS-SU6-1018	0.50	0.12	0.16	2.52	Pass
Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	0.94	0.25	5601-FSS-SU6-1013	1.17	0.30	0.24	3.76	Pass
5601-FSS-SU6-1010	0.94	0.25	5601-FSS-SU6-1014	0.99	0.28	0.24	3.76	Pass
5601-FSS-SU6-1011	0.78	0.21	5601-FSS-SU6-1015	0.77	0.21	0.20	3.12	Pass
5601-FSS-SU6-1011	0.78	0.21	5601-FSS-SU6-1016	0.75	0.21	0.20	3.12	Pass
5601-FSS-SU6-1009	0.72	0.17	5601-FSS-SU6-1017	0.72	0.16	0.18	2.88	Pass
5601-FSS-SU6-1009	0.72	0.17	5601-FSS-SU6-1018	0.51	0.12	0.18	2.88	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU6-1010	1.57	0.31	5601-FSS-SU6-1013	2.14	0.40	0.39	6.28	Pass
5601-FSS-SU6-1010	1.57	0.31	5601-FSS-SU6-1014	1.79	0.37	0.39	6.28	Pass
5601-FSS-SU6-1011	1.27	0.26	5601-FSS-SU6-1015	1.67	0.31	0.32	5.08	Pass
5601-FSS-SU6-1011	1.27	0.26	5601-FSS-SU6-1016	1.18	0.26	0.32	5.08	Pass
5601-FSS-SU6-1009	1.35	0.23	5601-FSS-SU6-1017	1.19	0.20	0.34	5.40	Pass
5601-FSS-SU6-1009	1.35	0.23	5601-FSS-SU6-1018	1.01	0.17	0.34	5.40	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 7 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	1.02	0.24	5601-FSS-SU7-1013	0.81	0.19	0.26	4.08	Pass
5601-FSS-SU7-1006	1.02	0.24	5601-FSS-SU7-1014	0.72	0.31	0.26	4.08	Pass
5601-FSS-SU7-1008	1.21	0.28	5601-FSS-SU7-1015	1.15	0.28	0.30	4.84	Pass
5601-FSS-SU7-1008	1.21	0.28	5601-FSS-SU7-1016	1.17	0.28	0.30	4.84	Pass
5601-FSS-SU7-1003	1.21	0.27	5601-FSS-SU7-1017	0.96	0.23	0.30	4.84	Pass
5601-FSS-SU7-1003	1.21	0.27	5601-FSS-SU7-1018	1.20	0.26	0.30	4.84	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	0.33	0.27	5601-FSS-SU7-1013	0.42	0.21	0.08	1.32	Pass
5601-FSS-SU7-1006	0.33	0.27	5601-FSS-SU7-1014	0.54	0.45	0.08	1.32	Pass
5601-FSS-SU7-1008	1.23	0.45	5601-FSS-SU7-1015	1.44	0.48	0.31	4.92	Pass
5601-FSS-SU7-1008	1.23	0.45	5601-FSS-SU7-1016	1.20	0.47	0.31	4.92	Pass
5601-FSS-SU7-1003	0.76	0.34	5601-FSS-SU7-1017	0.64	0.34	0.19	3.04	Pass
5601-FSS-SU7-1003	0.76	0.34	5601-FSS-SU7-1018	0.18	0.30	0.19	3.04	Fail
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra-226 + Ra-228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	1.35	0.36	5601-FSS-SU7-1013	1.23	0.28	0.34	5.40	Pass
5601-FSS-SU7-1006	1.35	0.36	5601-FSS-SU7-1014	1.26	0.55	0.34	5.40	Pass
5601-FSS-SU7-1008	2.44	0.53	5601-FSS-SU7-1015	2.59	0.56	0.61	9.76	Pass
5601-FSS-SU7-1008	2.44	0.53	5601-FSS-SU7-1016	2.37	0.55	0.61	9.76	Pass
5601-FSS-SU7-1003	1.97	0.43	5601-FSS-SU7-1017	1.60	0.41	0.49	7.88	Pass
5601-FSS-SU7-1003	1.97	0.43	5601-FSS-SU7-1018	1.38	0.40	0.49	7.88	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	0.76	0.22	5601-FSS-SU7-1013	0.98	0.28	0.19	3.04	Pass
5601-FSS-SU7-1006	0.76	0.22	5601-FSS-SU7-1014	0.80	0.23	0.19	3.04	Pass
5601-FSS-SU7-1008	0.60	0.13	5601-FSS-SU7-1015	0.61	0.13	0.15	2.40	Pass
5601-FSS-SU7-1008	0.60	0.13	5601-FSS-SU7-1016	0.63	0.14	0.15	2.40	Pass
5601-FSS-SU7-1003	0.92	0.21	5601-FSS-SU7-1017	0.68	0.16	0.23	3.68	Pass
5601-FSS-SU7-1003	0.92	0.21	5601-FSS-SU7-1018	0.66	0.15	0.23	3.68	Pass
Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	1.10	0.28	5601-FSS-SU7-1013	1.08	0.29	0.28	4.40	Pass
5601-FSS-SU7-1006	1.10	0.28	5601-FSS-SU7-1014	1.03	0.27	0.28	4.40	Pass
5601-FSS-SU7-1008	0.65	0.14	5601-FSS-SU7-1015	0.60	0.13	0.16	2.60	Pass
5601-FSS-SU7-1008	0.65	0.14	5601-FSS-SU7-1016	0.74	0.16	0.16	2.60	Pass
5601-FSS-SU7-1003	1.08	0.23	5601-FSS-SU7-1017	0.88	0.19	0.27	4.32	Pass
5601-FSS-SU7-1003	1.08	0.23	5601-FSS-SU7-1018	0.89	0.19	0.27	4.32	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU7-1006	1.86	0.36	5601-FSS-SU7-1013	2.06	0.40	0.47	7.44	Pass
5601-FSS-SU7-1006	1.86	0.36	5601-FSS-SU7-1014	1.83	0.35	0.47	7.44	Pass
5601-FSS-SU7-1008	1.25	0.19	5601-FSS-SU7-1015	1.21	0.18	0.31	5.00	Pass
5601-FSS-SU7-1008	1.25	0.19	5601-FSS-SU7-1016	1.37	0.21	0.31	5.00	Pass
5601-FSS-SU7-1003	2.00	0.31	5601-FSS-SU7-1017	1.56	0.25	0.50	8.00	Pass
5601-FSS-SU7-1003	2.00	0.31	5601-FSS-SU7-1018	1.55	0.24	0.50	8.00	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 8 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU8-1005	1.32	0.30	5601-FSS-SU8-1012	1.76	0.33	0.33	5.28	Pass
5601-FSS-SU8-1005	1.32	0.30	5601-FSS-SU8-1013	1.20	0.27	0.33	5.28	Pass
5601-FSS-SU8-1005	1.32	0.30	5601-FSS-SU8-1016	1.32	0.28	0.33	5.28	Pass
5601-FSS-SU8-1009	1.24	0.29	5601-FSS-SU8-1014	1.11	0.26	0.31	4.96	Pass
5601-FSS-SU8-1009	1.24	0.29	5601-FSS-SU8-1015	1.44	0.30	0.31	4.96	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU8-1005	0.63	0.44	5601-FSS-SU8-1012	1.02	0.34	0.16	2.52	Pass
5601-FSS-SU8-1005	0.63	0.44	5601-FSS-SU8-1013	0.85	0.34	0.16	2.52	Pass
5601-FSS-SU8-1005	0.63	0.44	5601-FSS-SU8-1016	0.90	0.31	0.16	2.52	Pass
5601-FSS-SU8-1009	1.30	0.43	5601-FSS-SU8-1014	0.79	0.30	0.33	5.20	Pass
5601-FSS-SU8-1009	1.30	0.43	5601-FSS-SU8-1015	0.57	0.23	0.33	5.20	Pass
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra-226 + Ra-228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU8-1005	1.95	0.53	5601-FSS-SU8-1012	2.78	0.47	0.49	7.80	Pass
5601-FSS-SU8-1005	1.95	0.53	5601-FSS-SU8-1013	2.05	0.43	0.49	7.80	Pass
5601-FSS-SU8-1005	1.95	0.53	5601-FSS-SU8-1016	2.22	0.42	0.49	7.80	Pass
5601-FSS-SU8-1009	2.54	0.52	5601-FSS-SU8-1014	1.90	0.40	0.64	10.16	Pass
5601-FSS-SU8-1009	2.54	0.52	5601-FSS-SU8-1015	2.01	0.38	0.64	10.16	Pass

Laboratory split in purple

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 9 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	0.78	0.23	5601-FSS-SU9-1012	0.73	0.45	0.20	3.12	Pass
5601-FSS-SU9-1003	0.78	0.23	5601-FSS-SU9-1013	0.83	0.22	0.20	3.12	Pass
5601-FSS-SU9-1004	0.64	0.23	5601-FSS-SU9-1014	0.61	0.19	0.16	2.56	Pass
5601-FSS-SU9-1003	0.78	0.23	5601-FSS-SU9-1015	0.58	0.19	0.20	3.12	Pass
5601-FSS-SU9-1002	0.80	0.31	5601-FSS-SU9-1016	0.71	0.22	0.20	3.20	Pass
5601-FSS-SU9-1002	0.80	0.31	5601-FSS-SU9-1017	0.65	0.22	0.20	3.20	Pass
5601-FSS-SU9-1005	0.38	0.17	5601-FSS-SU9-1018	0.48	0.18	0.10	1.52	Pass
5601-FSS-SU9-1005	0.38	0.17	5601-FSS-SU9-1019	0.42	0.16	0.10	1.52	Pass
5601-FSS-SU9-1010	0.94	0.25	5601-FSS-SU9-1020	1.19	0.29	0.24	3.76	Pass
5601-FSS-SU9-1010	0.94	0.25	5601-FSS-SU9-1021	0.74	0.22	0.24	3.76	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	0.29	0.44	5601-FSS-SU9-1012	0.34	0.45	0.07	1.16	Pass
5601-FSS-SU9-1003	0.29	0.44	5601-FSS-SU9-1013	0.83	0.46	0.07	1.16	Pass
5601-FSS-SU9-1004	0.59	0.55	5601-FSS-SU9-1014	0.70	0.46	0.15	2.36	Pass
5601-FSS-SU9-1003	0.29	0.44	5601-FSS-SU9-1015	0.24	0.47	0.07	1.16	Pass
5601-FSS-SU9-1002	1.10	1.00	5601-FSS-SU9-1016	0.87	0.50	0.28	4.40	Pass
5601-FSS-SU9-1002	1.10	1.00	5601-FSS-SU9-1017	0.64	0.64	0.28	4.40	Pass
5601-FSS-SU9-1005	0.81	0.50	5601-FSS-SU9-1018	0.36	0.42	0.20	3.24	Pass
5601-FSS-SU9-1005	0.81	0.5	5601-FSS-SU9-1019	0.64	0.32	0.20	3.24	Pass
5601-FSS-SU9-1010	0.74	0.41	5601-FSS-SU9-1020	1.04	0.44	0.19	2.96	Pass
5601-FSS-SU9-1010	0.74	0.41	5601-FSS-SU9-1021	1.16	0.40	0.19	2.96	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra-226 + Ra-228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	1.07	0.50	5601-FSS-SU9-1012	1.07	0.64	0.27	4.28	Pass
5601-FSS-SU9-1003	1.07	0.50	5601-FSS-SU9-1013	1.66	0.51	0.27	4.28	Pass
5601-FSS-SU9-1004	1.23	0.60	5601-FSS-SU9-1014	1.31	0.50	0.31	4.92	Pass
5601-FSS-SU9-1003	1.07	0.50	5601-FSS-SU9-1015	0.82	0.51	0.27	4.28	Pass
5601-FSS-SU9-1002	1.90	1.05	5601-FSS-SU9-1016	1.58	0.55	0.48	7.60	Pass
5601-FSS-SU9-1002	1.90	1.05	5601-FSS-SU9-1017	1.29	0.68	0.48	7.60	Pass
5601-FSS-SU9-1005	1.19	0.53	5601-FSS-SU9-1018	0.84	0.46	0.30	4.76	Pass
5601-FSS-SU9-1005	1.19	0.53	5601-FSS-SU9-1019	1.06	0.36	0.30	4.76	Pass
5601-FSS-SU9-1010	1.68	0.48	5601-FSS-SU9-1020	2.23	0.53	0.42	6.72	Pass
5601-FSS-SU9-1010	1.68	0.48	5601-FSS-SU9-1021	1.90	0.46	0.42	6.72	Pass
Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	0.47	0.09	5601-FSS-SU9-1012	0.68	0.12	0.12	1.89	Pass
5601-FSS-SU9-1003	0.47	0.09	5601-FSS-SU9-1013	0.81	0.13	0.12	1.89	Pass
5601-FSS-SU9-1004	0.48	0.09	5601-FSS-SU9-1014	0.38	0.08	0.12	1.91	Pass
5601-FSS-SU9-1003	0.47	0.09	5601-FSS-SU9-1015	0.40	0.08	0.12	1.89	Pass
5601-FSS-SU9-1002	0.52	0.11	5601-FSS-SU9-1016	0.71	0.15	0.13	2.08	Pass
5601-FSS-SU9-1002	0.52	0.11	5601-FSS-SU9-1017	0.45	0.11	0.13	2.08	Pass
5601-FSS-SU9-1005	0.39	0.11	5601-FSS-SU9-1018	0.47	0.12	0.10	1.56	Pass
5601-FSS-SU9-1005	0.39	0.11	5601-FSS-SU9-1019	0.40	0.11	0.10	1.56	Pass
5601-FSS-SU9-1010	0.77	0.15	5601-FSS-SU9-1020	0.76	0.15	0.19	3.08	Pass
5601-FSS-SU9-1010	0.77	0.15	5601-FSS-SU9-1021	0.72	0.15	0.19	3.08	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	0.68	0.12	5601-FSS-SU9-1012	0.99	0.16	0.17	2.72	Pass
5601-FSS-SU9-1003	0.68	0.12	5601-FSS-SU9-1013	0.81	0.13	0.17	2.72	Pass
5601-FSS-SU9-1004	0.55	0.10	5601-FSS-SU9-1014	0.50	0.10	0.14	2.19	Pass
5601-FSS-SU9-1003	0.68	0.12	5601-FSS-SU9-1015	0.46	0.09	0.17	2.72	Pass
5601-FSS-SU9-1002	0.59	0.13	5601-FSS-SU9-1016	0.78	0.16	0.15	2.36	Pass
5601-FSS-SU9-1002	0.59	0.13	5601-FSS-SU9-1017	0.61	0.13	0.15	2.36	Pass
5601-FSS-SU9-1005	0.47	0.12	5601-FSS-SU9-1018	0.46	0.12	0.12	1.88	Pass
5601-FSS-SU9-1005	0.47	0.12	5601-FSS-SU9-1019	0.48	0.12	0.12	1.88	Pass
5601-FSS-SU9-1010	0.76	0.15	5601-FSS-SU9-1020	0.89	0.17	0.19	3.04	Pass
5601-FSS-SU9-1010	0.76	0.15	5601-FSS-SU9-1021	0.69	0.15	0.19	3.04	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU9-1003	1.15	0.15	5601-FSS-SU9-1012	1.67	0.20	0.29	4.61	Pass
5601-FSS-SU9-1003	1.15	0.15	5601-FSS-SU9-1013	1.62	0.18	0.29	4.61	Pass
5601-FSS-SU9-1004	1.02	0.13	5601-FSS-SU9-1014	0.88	0.13	0.26	4.10	Pass
5601-FSS-SU9-1003	1.15	0.15	5601-FSS-SU9-1015	0.85	0.12	0.29	4.61	Pass
5601-FSS-SU9-1002	1.11	0.17	5601-FSS-SU9-1016	1.49	0.22	0.28	4.44	Pass
5601-FSS-SU9-1002	1.11	0.17	5601-FSS-SU9-1017	1.06	0.17	0.28	4.44	Pass
5601-FSS-SU9-1005	0.86	0.16	5601-FSS-SU9-1018	0.93	0.17	0.22	3.44	Pass
5601-FSS-SU9-1005	0.86	0.16	5601-FSS-SU9-1019	0.88	0.16	0.22	3.44	Pass
5601-FSS-SU9-1010	1.53	0.21	5601-FSS-SU9-1020	1.65	0.23	0.38	6.12	Pass
5601-FSS-SU9-1010	1.53	0.21	5601-FSS-SU9-1021	1.41	0.21	0.38	6.12	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Survey Unit 10 Replicates

Sample Number	Ra-226 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-226 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	1.06	0.26	5601-FSS-SU10-1012	1.19	0.27	0.27	4.24	Pass
5601-FSS-SU10-1003	1.06	0.26	5601-FSS-SU10-1013	0.95	0.28	0.27	4.24	Pass
5601-FSS-SU10-1010	2.16	0.40	5601-FSS-SU10-1014	1.92	0.34	0.54	8.64	Pass
5601-FSS-SU10-1010	2.16	0.40	5601-FSS-SU10-1015	2.13	0.37	0.54	8.64	Pass
Sample Number	Ra-228 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Ra-228 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	0.53	0.31	5601-FSS-SU10-1012	0.95	0.60	0.13	2.12	Pass
5601-FSS-SU10-1003	0.53	0.31	5601-FSS-SU10-1013	1.40	0.72	0.13	2.12	Pass
5601-FSS-SU10-1010	4.66	0.67	5601-FSS-SU10-1014	5.81	0.87	1.17	18.64	Pass
5601-FSS-SU10-1010	4.66	0.67	5601-FSS-SU10-1015	3.93	0.79	1.17	18.64	Pass
Sample Number	Ra226 + Ra228	Uncertainty (2 sigma)	Sample Number	Ra-226 + Ra-228	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	1.59	0.40	5601-FSS-SU10-1012	2.14	0.66	0.40	6.36	Pass
5601-FSS-SU10-1003	1.59	0.40	5601-FSS-SU10-1013	2.35	0.77	0.40	6.36	Pass
5601-FSS-SU10-1010	6.82	0.78	5601-FSS-SU10-1014	7.73	0.93	1.71	27.28	Pass
5601-FSS-SU10-1010	6.82	0.78	5601-FSS-SU10-1015	6.06	0.87	1.71	27.28	Pass

Table 7-2 Radionuclide Data Replicate Analysis (Continued)

Sample Number	Th-230 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-230 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	1.19	0.22	5601-FSS-SU10-1012	0.90	0.18	0.30	4.76	Pass
5601-FSS-SU10-1003	1.19	0.22	5601-FSS-SU10-1013	0.91	0.18	0.30	4.76	Pass
5601-FSS-SU10-1010	2.48	0.43	5601-FSS-SU10-1014	2.55	0.43	0.62	9.92	Pass
5601-FSS-SU10-1010	2.48	0.43	5601-FSS-SU10-1015	2.22	0.38	0.62	9.92	Pass
Sample Number	Th-232 (pCi/g)	Uncertainty (2 sigma)	Sample Number	QC Th-232 (pCi/g)	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	1.16	0.22	5601-FSS-SU10-1012	0.81	0.17	0.29	4.64	Pass
5601-FSS-SU10-1003	1.16	0.22	5601-FSS-SU10-1013	0.92	0.18	0.29	4.64	Pass
5601-FSS-SU10-1010	6.60	1.00	5601-FSS-SU10-1014	6.37	1.00	1.65	26.40	Pass
5601-FSS-SU10-1010	6.60	1.00	5601-FSS-SU10-1015	6.14	0.94	1.65	26.40	Pass
Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Sample Number	Th230 + Th232	Uncertainty (2 sigma)	Acceptable Range		Pass/Fail
5601-FSS-SU10-1003	2.35	0.31	5601-FSS-SU10-1012	1.71	0.25	0.59	9.40	Pass
5601-FSS-SU10-1003	2.35	0.31	5601-FSS-SU10-1013	1.83	0.25	0.59	9.40	Pass
5601-FSS-SU10-1010	9.08	1.09	5601-FSS-SU10-1014	8.92	1.09	2.27	36.32	Pass
5601-FSS-SU10-1010	9.08	1.09	5601-FSS-SU10-1015	8.36	1.01	2.27	36.32	Pass

Table 7-3 Comparison of On-site and Off-Site Gamma Spectroscopy Analysis

Sample Number	site pCi/g	site pCi/g	RPD	RPD %	site pCi/g	site pCi/g	RPD	RPD %
5601-FSS-SU1-1001	0.74	0.47	0.45	44.74	0.79	0.64	0.20	20.41
5601-FSS-SU1-1002	0.45	0.69	0.42	41.98	0.58	0.85	0.38	38.41
5601-FSS-SU1-1003	0.52	0.55	0.05	5.44	0.54	0.56	0.04	4.31
5601-FSS-SU1-1004	0.63	0.65	0.03	3.29	0.76	0.62	0.20	19.93
5601-FSS-SU1-1005	0.54	0.49	0.09	9.13	0.63	0.82	0.27	26.97
5601-FSS-SU1-1006	0.59	0.70	0.18	17.79	0.71	0.78	0.10	9.67
5601-FSS-SU1-1007	0.49	0.35	0.33	33.47	0.58	0.62	0.07	6.92
5601-FSS-SU1-1008	0.67	0.69	0.03	3.10	0.93	0.87	0.06	6.35
5601-FSS-SU1-1009	0.36	0.41	0.13	13.28	0.50	0.51	0.03	2.63
5601-FSS-SU1-1010	0.48	0.60	0.22	21.94	0.73	0.75	0.02	2.22
5601-FSS-SU1-1011	0.58	0.85	0.37	37.48	0.79	0.87	0.09	9.36
5601-FSS-SU2-1001	0.67	0.97	0.37	36.99	1.01	0.80	0.23	22.77
5601-FSS-SU2-1002	0.54	1.36	0.86	86.40	0.74	0.92	0.21	21.12
5601-FSS-SU2-1003	0.54	1.48	0.93	93.20	0.67	0.83	0.22	22.00
5601-FSS-SU2-1004	0.57	1.62	0.96	96.38	0.81	0.95	0.16	16.15
5601-FSS-SU2-1005	0.55	1.02	0.61	60.58	0.72	0.93	0.25	24.98
5601-FSS-SU2-1006	0.54	1.00	0.60	60.28	0.61	0.78	0.25	24.89
5601-FSS-SU2-1007	0.40	0.75	0.60	60.20	0.56	0.70	0.23	22.71
5601-FSS-SU2-1008	0.73	1.16	0.45	45.29	0.82	1.10	0.29	29.18
5601-FSS-SU2-1009	0.81	1.10	0.30	30.44	0.98	0.95	0.03	3.40
5601-FSS-SU2-1010	0.36	0.53	0.39	39.27	0.47	0.63	0.29	29.16
5601-FSS-SU2-1011	0.64	1.44	0.78	77.52	0.79	1.10	0.33	33.17
5601-FSS-SU3-1001	0.30	0.56	0.59	59.18	0.33	0.48	0.36	35.96
5601-FSS-SU3-1002	0.61	0.74	0.19	18.58	0.72	0.59	0.20	20.46
5601-FSS-SU3-1003	0.36	0.49	0.31	31.39	0.50	0.63	0.22	22.19
5601-FSS-SU3-1004	0.35	0.54	0.43	42.53	0.42	0.46	0.10	9.68
5601-FSS-SU3-1005	0.38	0.87	0.79	78.71	0.56	0.72	0.25	25.41
5601-FSS-SU3-1006	0.52	0.78	0.41	40.73	0.92	0.82	0.12	11.68
5601-FSS-SU3-1007	0.48	0.67	0.33	32.54	0.60	0.51	0.16	16.17
5601-FSS-SU3-1008	0.48	0.82	0.52	51.98	0.82	0.69	0.17	17.23
5601-FSS-SU3-1009	0.42	1.01	0.82	82.25	0.74	0.74	0.00	0.26
5601-FSS-SU3-1010	0.41	0.73	0.56	56.24	0.64	0.61	0.05	4.74
5601-FSS-SU3-1011	0.71	1.12	0.44	44.29	0.85	0.84	0.01	1.27
5601-FSS-SU10-1001	0.71	0.82	0.14	13.77	1.19	1.01	0.17	16.68
5601-FSS-SU10-1002	0.53	0.76	0.35	35.01	0.62	0.84	0.30	29.96
5601-FSS-SU10-1003	1.00	1.06	0.06	6.25	1.12	1.16	0.04	3.87
5601-FSS-SU10-1004	0.72	1.19	0.50	49.74	1.50	1.58	0.05	5.39
5601-FSS-SU10-1005	0.57	0.98	0.53	53.24	0.73	0.71	0.02	2.11
5601-FSS-SU10-1006	0.54	1.01	0.61	61.45	0.65	0.87	0.30	29.51
5601-FSS-SU10-1007	0.55	1.11	0.67	66.94	0.69	0.77	0.10	10.45
5601-FSS-SU10-1008	0.56	1.50	0.91	91.19	2.29	2.68	0.16	15.75
5601-FSS-SU10-1009	0.60	1.02	0.51	51.40	0.80	1.19	0.39	38.96
5601-FSS-SU10-1010	0.64	2.16	1.09	108.86	5.47	6.60	0.19	18.80
5601-FSS-SU10-1011	0.59	1.16	0.65	65.26	0.75	0.82	0.09	8.59

Average RPD % Ra-226 46.81
Average RPD % Th-232 16.86

Legend
RPD-relative percent difference
RPD%- relative percent difference expressed as percent
pCi/g-pico curies per gram

Table 7-4 Lead and Arsenic Soil Sample Results and Average XRF Readings

Sample #	Pb mg/kg	As mg/kg	XRF Pb mg/kg	XRF As mg/kg
5601-FSS-PC-1006	2.9	1.1		
5601-FSS-PC-1007	15.3	7.5		
average	9.1	4.3	11	14
std deviation	8.8	4.5	12.7	8.6

Sample #	Pb mg/kg	As mg/kg	XRF Pb mg/kg	XRF As mg/kg
5601-FSS-PC-1008	4.4	7.3		
5601-FSS-PC-1009	13.5	6.4		
average	8.95	6.85	16.4	24
std deviation	6.4	0.63	5	13

Legend
As- Arsenic
Pb- Lead
mg/kg- milligrams per kilogram
XRF- X-Ray Fluorescence

FIGURES

Figure 2-1
Radiological Site Layout of Class I & Class III Survey Units

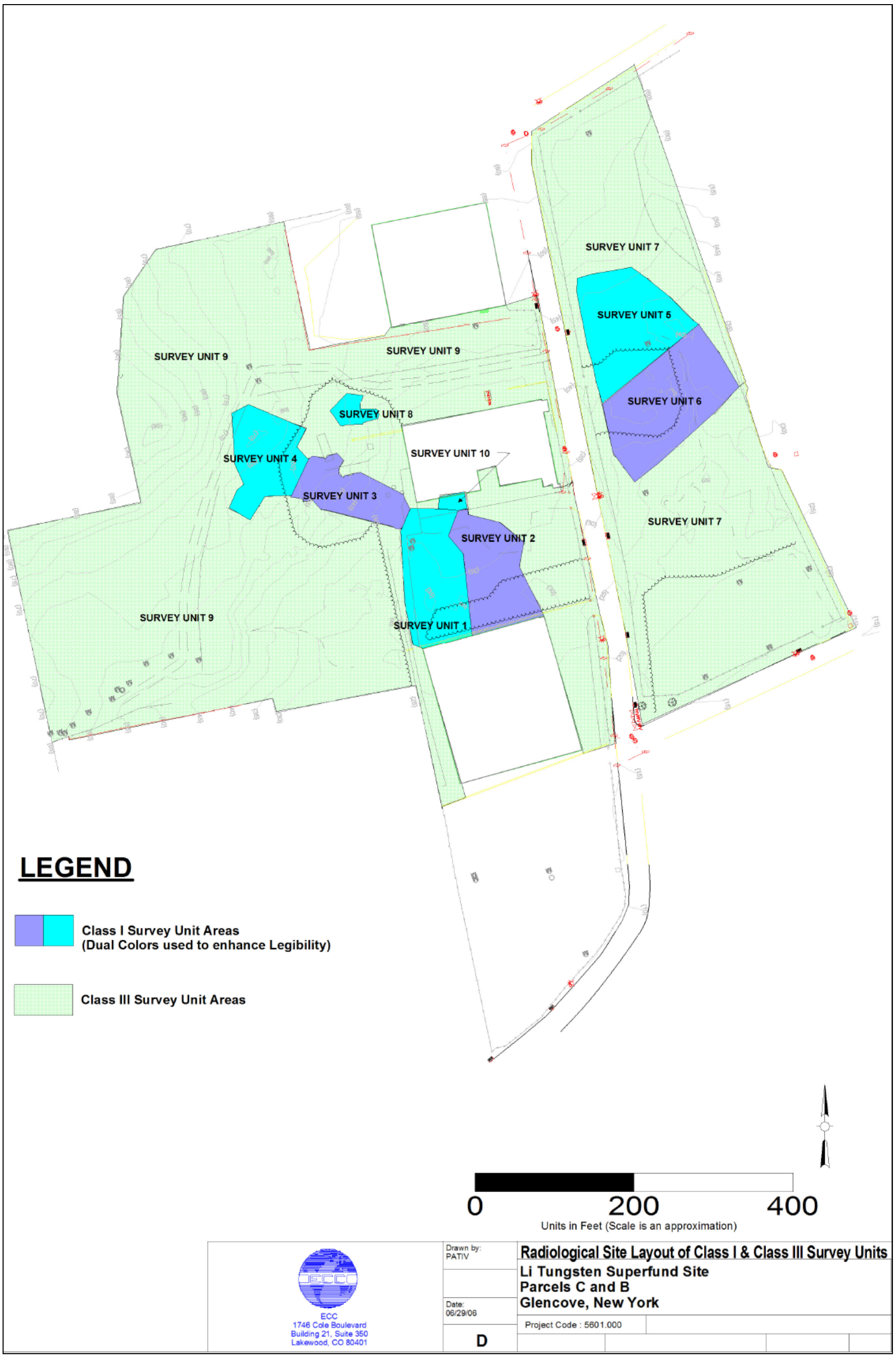
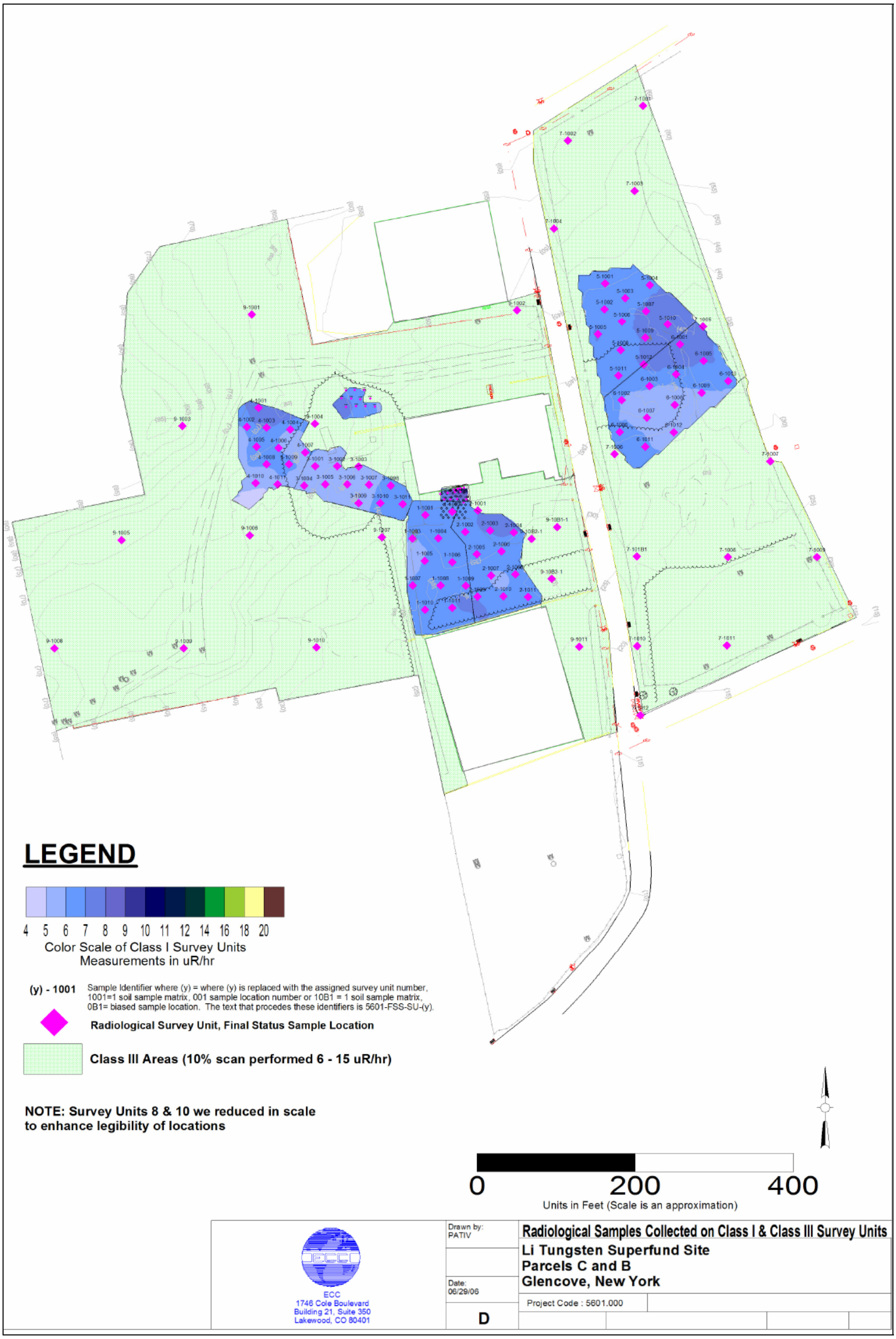
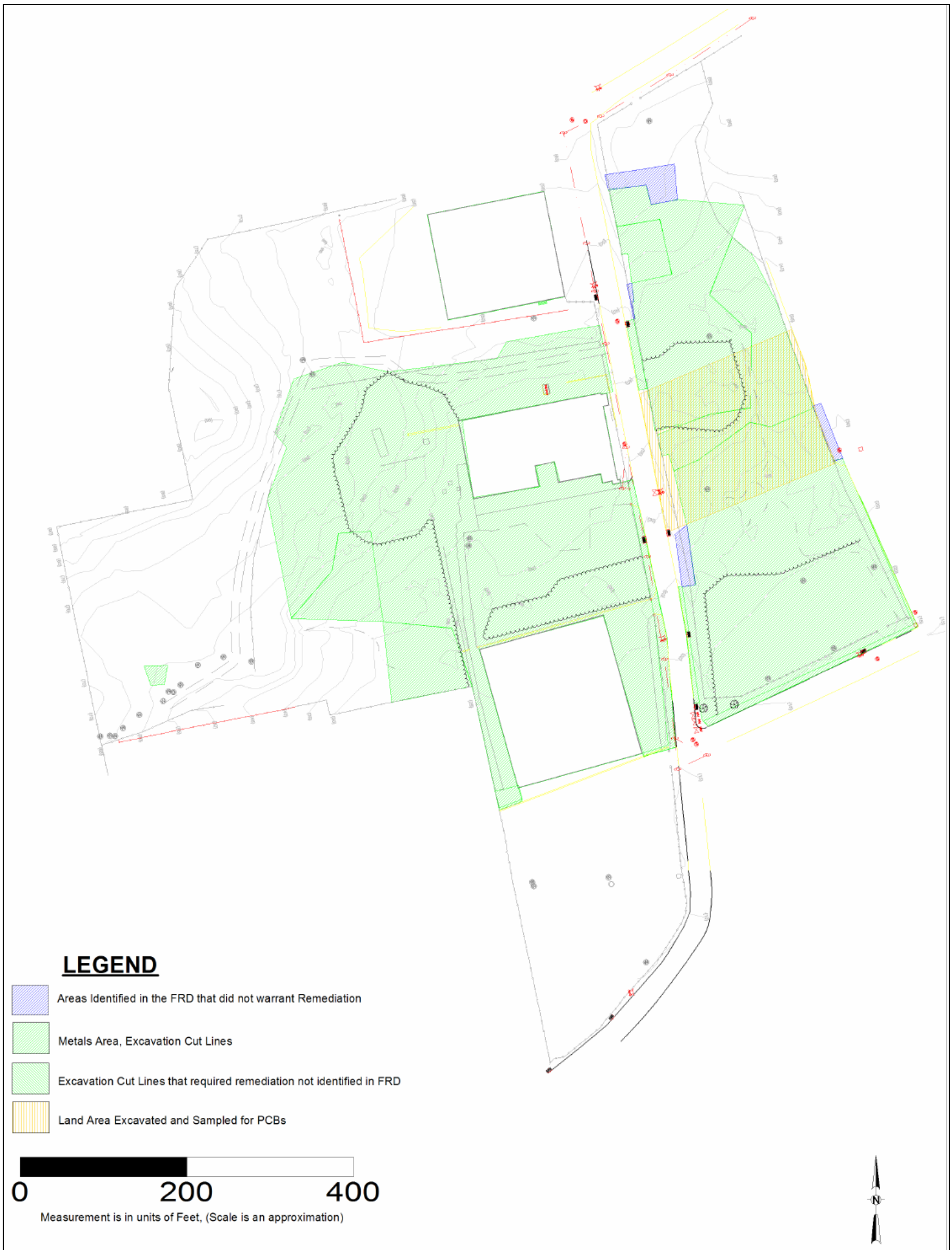


Figure 2-2
Radiological Samples Collected on Class I & Class III Survey Units



ECC 1746 Cole Boulevard Building 21, Suite 350 Lakewood, CO 80401	Drawn by: PATIV	Radiological Samples Collected on Class I & Class III Survey Units
		Li Tungsten Superfund Site Parcels C and B Glencove, New York
	Date: 06/29/06	Project Code : 5601.000
	D	

Figure 2-3
Map of Metals & PCB Excavation Areas



NOTE: The areal layout is an approximation and is not intended to provide precise coordinates of the area surveyed

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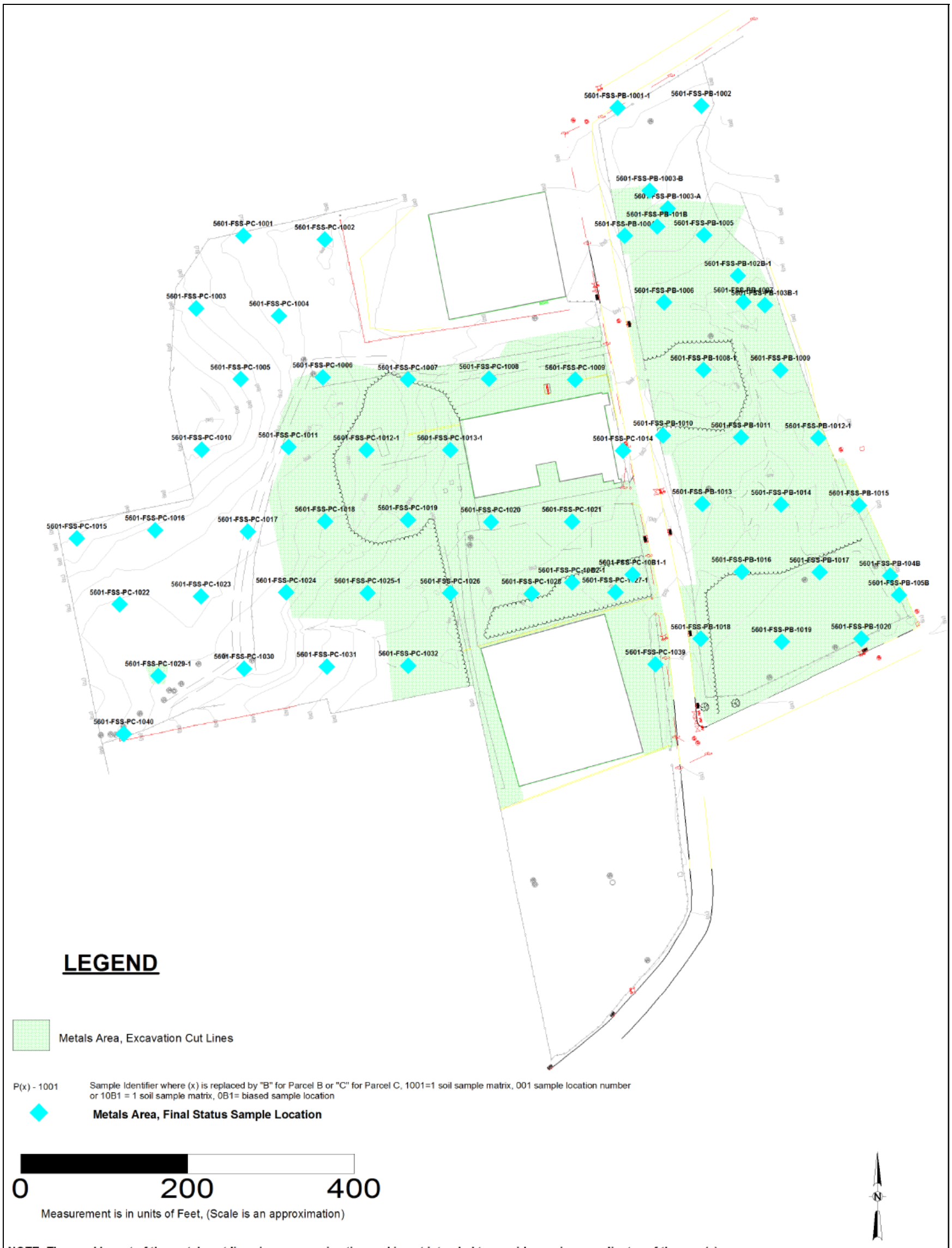
Building 21, Suite 350
Lakewood, CO 80401

Drawn by: PATIV
Revised 4/10/07
Date: 06/29/06
SIZE: D

Map of Metals & PCB Excavation Areas
Li Tungsten Superfund Site
Parcels C and B
Glencove, New York
Project Code : 5601.000
REV: 0

Figure 2-4
Map of FSS Metals Samples Collected on Parcel B and Parcel C



NOTE: The areal layout of the metals cut lines is an approximation and is not intended to provide precise coordinates of the area(s)

ECC 1746 Cole Boulevard Building 21, Suite 350 Lakewood, CO 80401	Drawn by: PATIV Revised 4/10/07 Date: 06/29/06 SIZE: D	**Map of FSS Metals Samples Collected on Parcel B and Parcel C** **Li Tungsten Superfund Site** **Parcels C and B** **Glencove, New York** Project Code : 5601.000 REV: 0

Figure 2-5
Map of FSS XRF Measurements (RASS) Collected on Parcel B and Parcel C

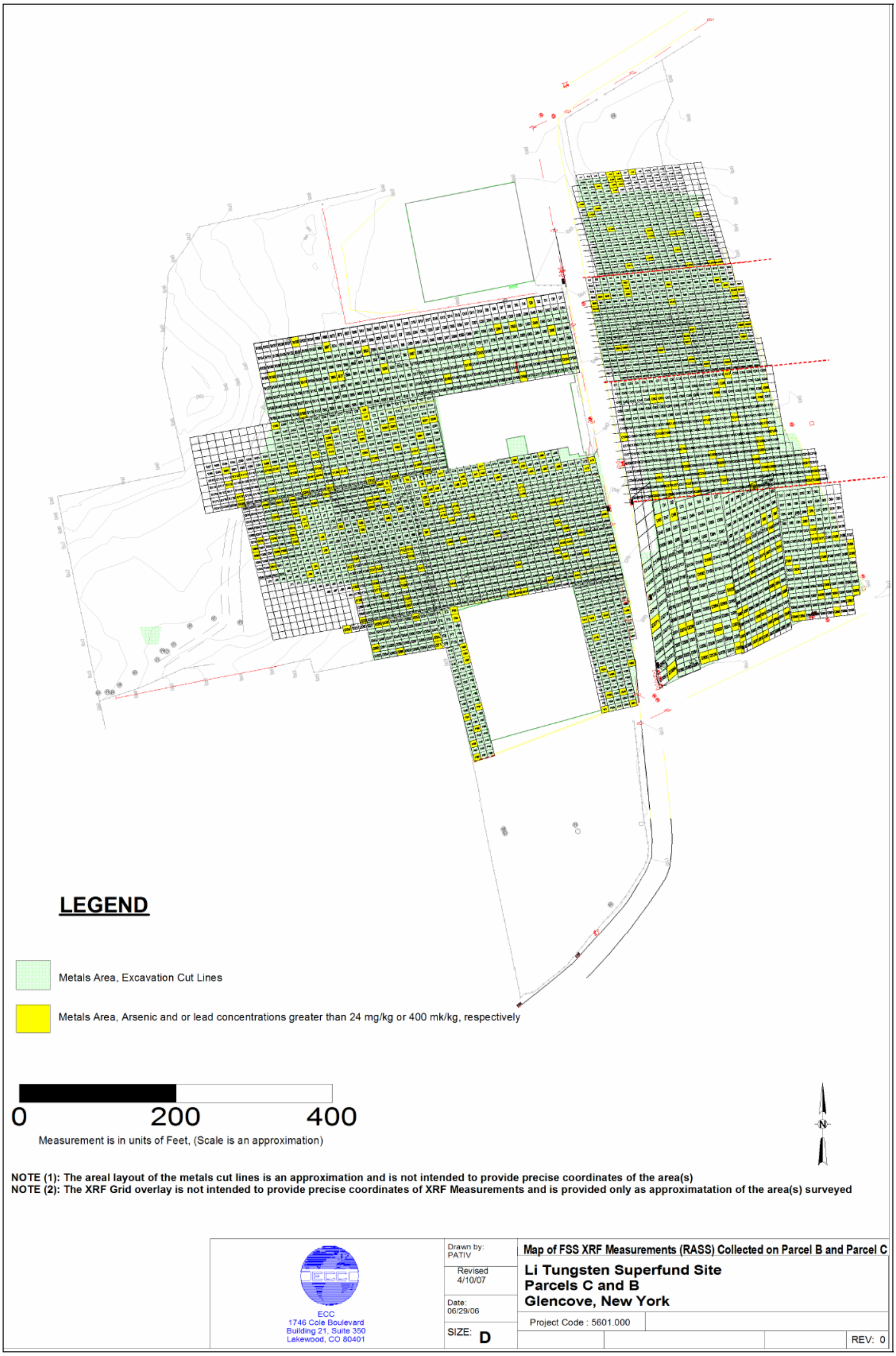
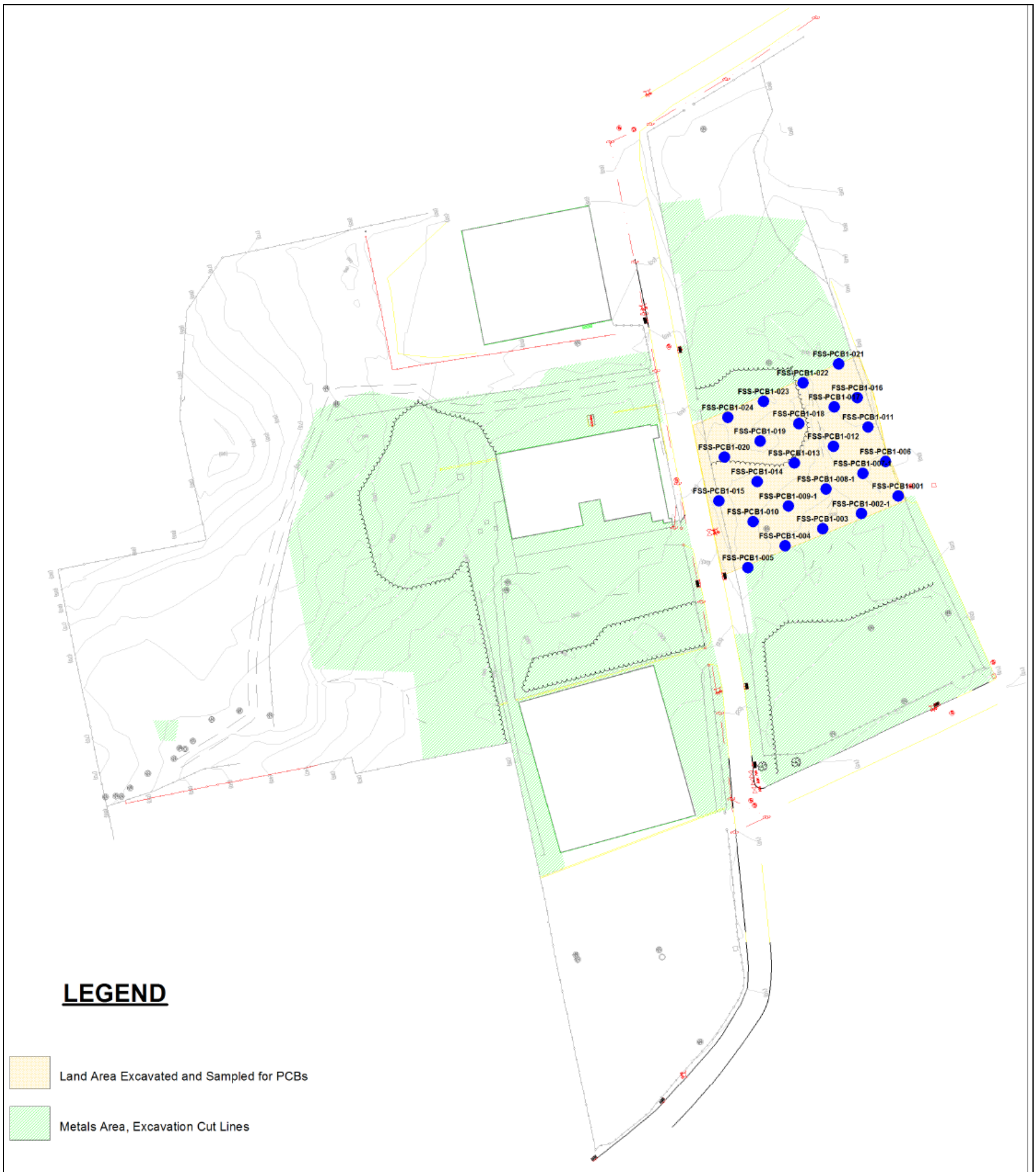


Figure 2-6
Map of FSS PCB Samples Collected on Parcel B

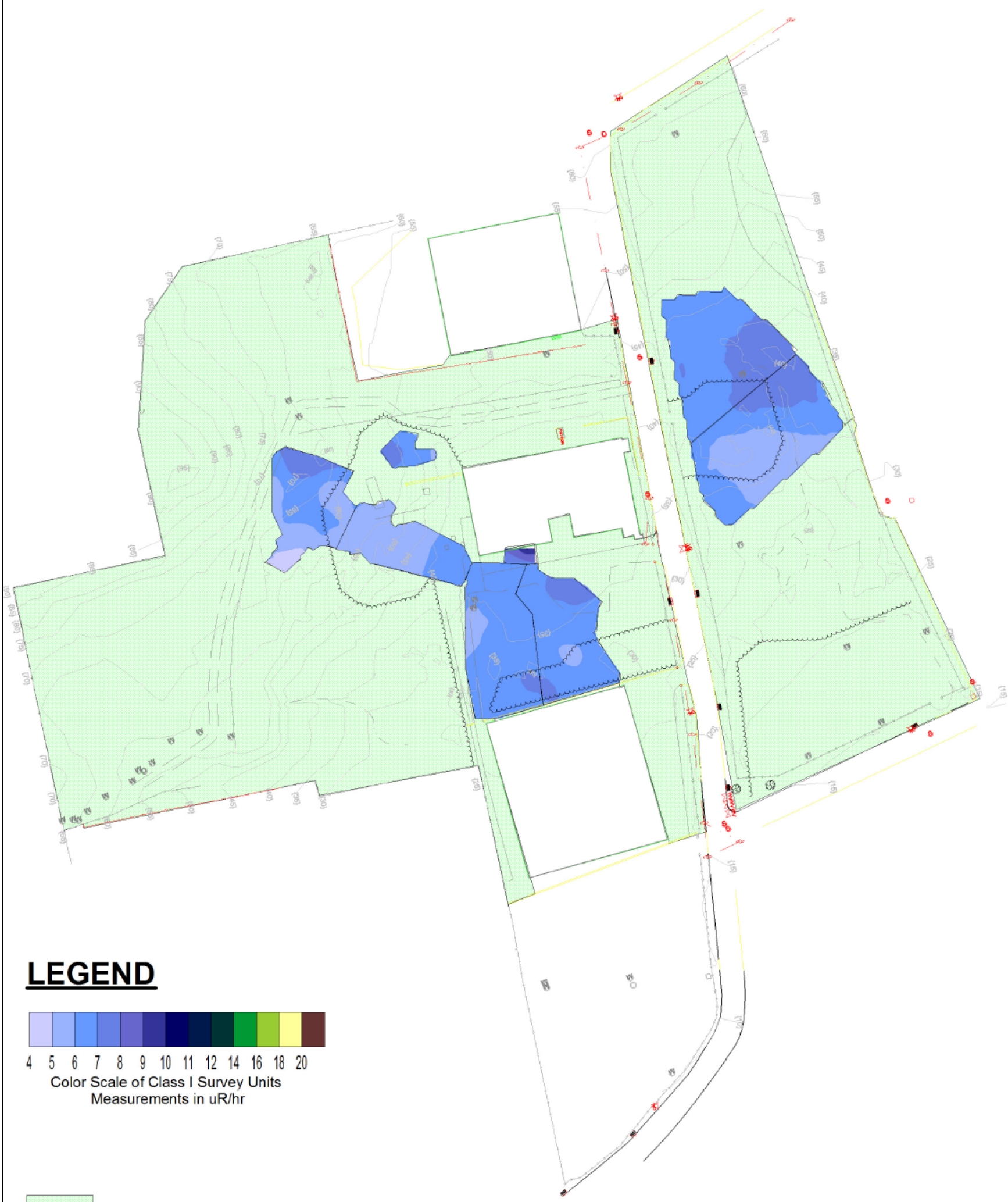


NOTE: The areal layout of the metals cut lines is an approximation and is not intended to provide precise coordinates of the area(s)

ECC 1746 Cole Boulevard Building 21, Suite 350 Lakewood, CO 80401	Drawn by: PATIV Revised 4/10/07 Date: 06/29/06 SIZE: D	**Map of FSS PCB Samples Collected on Parcel B** **Li Tungsten Superfund Site** **Parcels C and B** **Glencove, New York** Project Code : 5601.000 REV: 0

APPENDIX F

Gamma Walkover Collected on Class I Survey Units



LEGEND

4 5 6 7 8 9 10 11 12 14 16 18 20

Color Scale of Class I Survey Units
Measurements in uR/hr

Class III Areas (10% scan performed 6 - 15 uR/hr)

NOTE: Survey Units 8 & 10 we reduced in scale to enhance legibility of locations

0 200 400

Units in Feet (Scale is an approximation)

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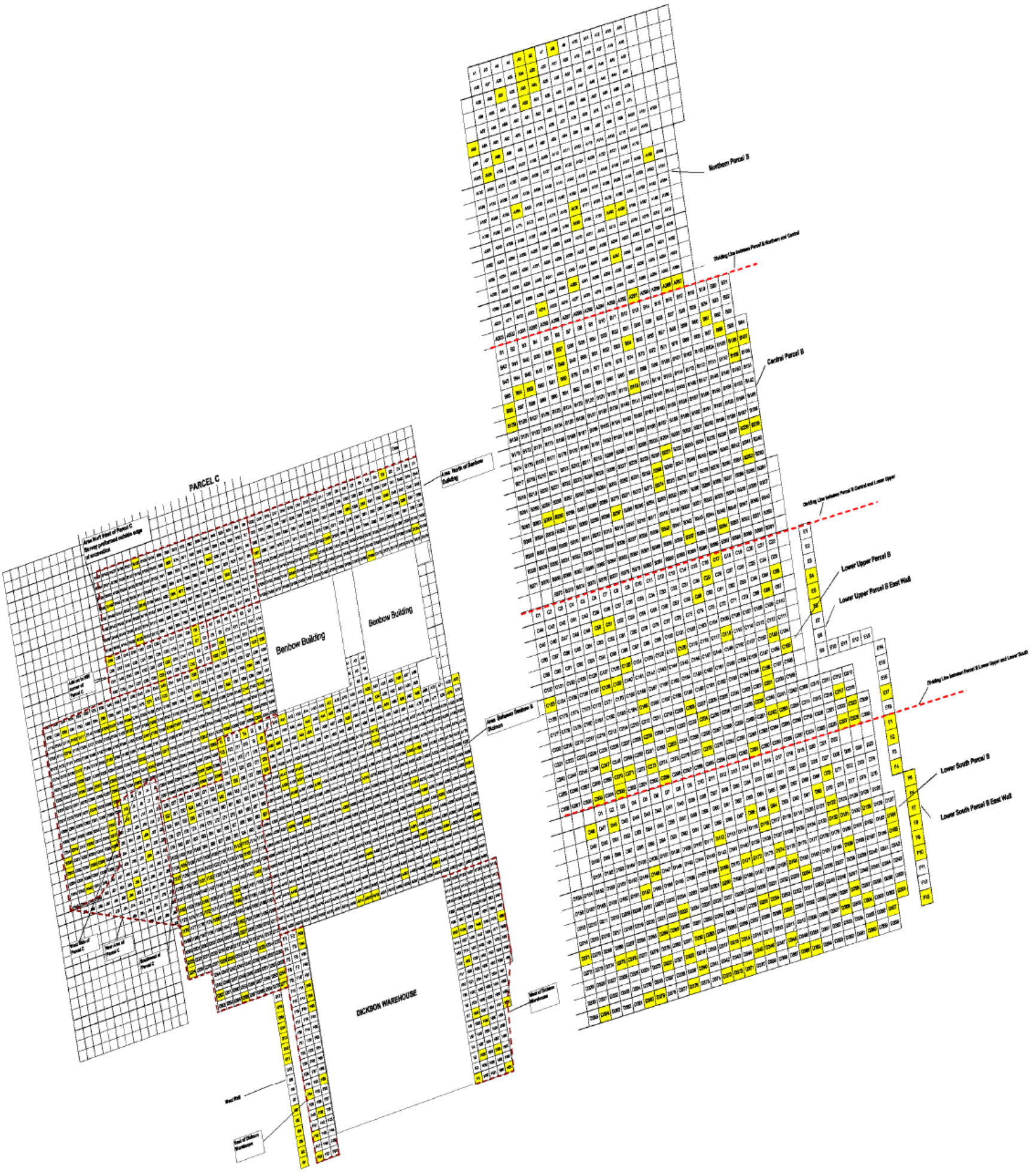
Gamma Walkover Collected on Class I Survey Units

Li Tungsten Superfund Site
Parcels C and B
Glencove, New York

Project Code : 5601.000

APPENDIX G

Map of FSS XRF Measurements (RASS) Collected on Parcel B and Parcel C



LEGEND

Metals Area, Arsenic and or lead concentrations greater than 24 mg/kg or 400 mk/kg, respectively

N

NOTE : The XRF Grid overlay is not intended to provide precise coordinates of XRF Measurements and is provided only as approximatation of the area(s) surveyed

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Map of FSS XRF Measurements (RASS) Collected on Parcel B and Parcel C

Li Tungsten Superfund Site
Parcels C and B
Glencove, New York

Project Code : 5601.000

REV: 0