



Revised Final

Scoping Survey Report Former Smelter Area

**Alameda Point
Alameda, California**

August 31, 2012

Prepared for:
**Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California**

Prepared by:
**ChaduxTt, a Joint Venture of St. George Chadux
Corp. and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101**

Prepared under:
**Naval Facilities Engineering Command Southwest
Contract Number: N62473-07-D-3213
Delivery Order: 0025**

REVISED FINAL

**SCOPING SURVEY REPORT
FORMER SMELTER AREA**

**ALAMEDA POINT
ALAMEDA, CALIFORNIA**

August 31, 2012

**Prepared for:
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310**

**Prepared by:
ChaduxTt,
a Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101**

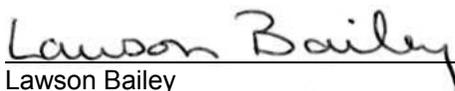
**Prepared under:
Naval Facilities Engineering Command Southwest
Contract Number N62473-07-D-3213
Delivery Order 0025
Document Control Number: CHAD-3213-0025-0067R1**

REVIEW AND APPROVAL



Mark Reisig, REA
Project Manager

August 31, 2012
Date



Lawson Bailey
Technical Lead

August 31, 2012
Date



Richard Dubiel, CHP
Site Program Manager

August 31, 2012
Date

N00236_004064
ALAMEDA POINT
SSIC NO. 5090.3

FINAL
SCOPING SURVEY
FORMER SMELTER AREA

DATED 04 MAY 2012

THIS RECORD IS ENTERED IN THE DATABASE AND FILED AS

RECORD NO. N00236_004001

TABLE OF CONTENTS

| | |
|---|------|
| REVIEW AND APPROVAL | i |
| ACRONYMS AND ABBREVIATIONS | vi |
| EXECUTIVE SUMMARY | ES-1 |
| 1.0 SITE DESCRIPTION | 1 |
| 1.1 SITE LOCATION AND DESCRIPTION | 1 |
| 1.2 PRIOR HISTORICAL USE | 1 |
| 1.3 CURRENT AND FUTURE BUILDING OR LAND USE..... | 1 |
| 1.4 REPORT OBJECTIVES..... | 2 |
| 1.5 ADDITIONAL SUPPORTING INFORMATION | 2 |
| 2.0 HISTORICAL RADIOLOGICAL ASSESSMENT | 2 |
| 2.1 OPERATING HISTORY | 2 |
| 2.2 MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL CLASSIFICATION | 3 |
| 2.3 RADIONUCLIDES OF CONCERN | 3 |
| 3.0 INVESTIGATION LEVELS..... | 3 |
| 3.1 INVESTIGATION LEVELS | 4 |
| 3.2 INVESTIGATION LEVELS FOR GAMMA WALK-OVER SURVEYS | 4 |
| 4.0 SURVEY DESIGN..... | 4 |
| 4.1 OBJECTIVE OF SURVEYS | 4 |
| 4.2 SURVEY UNITS..... | 4 |
| 4.3 REFERENCE AREAS | 5 |
| 4.4 STATISTICAL TESTS | 5 |
| 4.5 DETERMINING THE NUMBER OF DIRECT MEASUREMENTS..... | 6 |
| 5.0 FIELD ACTIVITIES | 6 |
| 5.1 MOBILIZATION..... | 7 |
| 5.2 INITIAL CLEARANCE WORK AND SURVEY MARK OUT..... | 7 |
| 5.3 SCOPING SURVEY ACTIVITIES..... | 7 |
| 6.0 SURVEY INSTRUMENTATION | 8 |
| 6.1 INSTRUMENT CALIBRATION AND QUALITY ASSURANCE PROCEDURES..... | 8 |
| 6.2 INSTRUMENT OPERATIONAL CHECKS | 8 |
| 6.3 INSTRUMENTS FOR THE MEASUREMENT OF ALPHA AND BETA SURFACE ACTIVITY | 8 |

TABLE OF CONTENTS (CONTINUED)

| | | |
|-------|---|----|
| 6.3.1 | Instruments for the Static Measurement of Alpha and Beta Surface Activity | 9 |
| 6.3.2 | Instruments for the Scan Measurement of Alpha and Beta Surface Activity | 9 |
| 6.3.3 | Determination of Instrument Efficiency for Alpha and Beta Surface Activity Measurements | 10 |
| 6.4 | INSTRUMENT FOR THE MEASUREMENT OF EXPOSURE RATES | 11 |
| 6.5 | INSTRUMENT FOR MEASURING SWIPE SAMPLES | 11 |
| 6.6 | INSTRUMENT FOR GAMMA WALK-OVER SURVEY | 11 |
| 6.7 | DETECTION SENSITIVITIES | 11 |
| 7.0 | SURVEY PROCEDURES..... | 12 |
| 7.1 | REVIEW OF DATA QUALITY OBJECTIVES..... | 12 |
| 7.2 | SCAN MEASUREMENT TECHNIQUE..... | 13 |
| 7.3 | DIRECT MEASUREMENT TECHNIQUE | 14 |
| 8.0 | RESULTS AND ANALYSIS..... | 14 |
| 8.1 | DIRECT MEASUREMENTS | 14 |
| 8.1.1 | Alpha Direct Measurements | 14 |
| 8.1.2 | Ambient Gamma Dose Rates..... | 16 |
| 8.1.3 | Removable Contamination (Smears) | 16 |
| 8.1.4 | Analysis of Direct Measurements | 17 |
| 8.2 | SCANNING MEASUREMENTS | 17 |
| 8.2.1 | Alpha Scans | 17 |
| 8.2.2 | Analysis of Alpha Scan Measurements | 17 |
| 8.2.3 | Beta Scan Measurements | 18 |
| 8.2.4 | Analysis of Beta Scan Measurements..... | 18 |
| 8.3 | GAMMA WALK-OVER SURVEY | 19 |
| 8.4 | SOIL SAMPLES | 19 |
| 8.5 | SEDIMENT SAMPLES..... | 20 |
| 9.0 | CONCLUSION..... | 20 |
| 10.0 | REFERENCES | 22 |

FIGURES

Figure 1 Alameda Point Site Locations.....24

Figure 2 Former Smelter Area CIRCA 200425

Figure 3 Classifications and Survey Units26

Figure 4 Photograph of Surface Contamination Monitor.....27

Figure 5 Photograph of Gamma Walk-over Survey in Survey Unit-3 looking South28

Figure 6 Former Smelter Area Survey Unit 4 Beta Survey Cumulative Frequency
Distribution Plot.....29

Figure 7 Screen Capture of Snoopers Results of Alpha Survey of Survey Unit 430

TABLES

Table 1 Former Smelter Area Classifications32

Table 2 Detection Sensitivities33

Table 3 Summary of Former Smelter Area Direct Survey Results.....34

Table 4 Survey Unit 4 Gamma and Smear Test Results.....35

Table 5 Former Smelter Area Gamma Walk-over Data Survey Units 1 and 236

APPENDICES

- A Task Specific Plan (on CD)
- B Instrument Information (on CD)
- C Direct Survey Data (on CD)
- D Alameda Point Radiological Survey Methods: Surface Contamination Monitor Surveys Supported by Hand-held Instrumentation (on CD)
- E Scan Survey Results (on CD)
- F Alameda Point Basewide Radiological Surveys Final Status Survey Reports Reference Area Survey Results (on CD)
- G Gamma Walk-Over Survey Results (on CD)
- H Soil Sample Results (on CD)

ATTACHMENTS

- 1 1949 Proposed Turbo Jet Overhaul Facility Drawing (on CD)
- 2 Aerial Photograph Overlay Current Buildings and the Footprint of the Former Smelter (on CD)

ACRONYMS AND ABBREVIATIONS

| | |
|------------------|---|
| α | Alpha |
| β | Beta |
| Δ/σ | Relative shift |
| σ | Sigma |
| ϵ_i | Instrument efficiency |
| $\mu\text{R/hr}$ | Microrentgens per hour |
| Bi-214 | Bismuth 214 |
| BRAC | Base realignment and closure |
| CFD | Cumulative frequency distribution |
| cm | Centimeter |
| cm^2 | Square centimeters |
| Co-60 | Cobalt 60 |
| cpm | Count per minute |
| Cs-137 | Cesium 137 |
| dpm | Disintegration per minute |
| DQO | Data quality objective |
| EPA | U.S. Environmental Protection Agency |
| ERG | Environmental Restoration Group |
| FSA | Former Smelter Area |
| FSS | Final status survey |
| HRA | Historical radiological assessment |
| MARSSIM | Multi-Agency Radiation Survey and Site Investigation Manual |
| MDA | Minimum detectable activity |
| MDC | Minimum detectable concentration |
| MDL | Minimum detection level |
| MSI | Millennium Services, Inc |
| N | Number of data points |
| NaI | Sodium iodide |
| NAS | Naval Air Station |
| NIST | National Institute of Standards and Technology |
| NRC | Nuclear Regulatory Commission |
| pCi/g | Picocuries per gram |

| | |
|-------------------------------|---|
| PSPC | Position sensitive proportional counter |
| Pu-239 | Plutonium 239 |
| RASO | Radiological Affairs Support Office |
| Ra-226 | Radium 226 |
| ROC | Radionuclide of concern |
| RSOR | Radiation Safety Officer Representative |
| <i>Sign ρ</i> | Random measurement probability |
| SCM | Surface contamination monitor |
| SIMS | Survey information management system |
| SOP | Standard operating procedure |
| Sr-90 | Strontium 90 |
| SU | Survey unit |
| TSP | Task specific plan |
| UO ₂ | Uranium oxide |
| VSP | Visual sample plan |
| Weston | Weston Solutions, Inc. |
| Z | Decision error level |

EXECUTIVE SUMMARY

The Former Smelter Area (FSA) is a 40,000-square-foot area east of Building 66 at the former Naval Air Station Alameda, California. Much of the area identified as the smelter area in early site drawings is now occupied by Buildings 398 and 399 and associated support equipment. A concrete pad west of Building 399 is identifiable in aerial photographs that show the smelter location in the late 1940s and in later photographs that show the site during the late 1950s. The Historical Radiological Assessment (HRA) Volume II ([Weston Solutions, Inc. \[Weston\] 2007](#)), notes the possibility that radium components were melted down at the smelter, along with other metal components. The primary isotope of concern is radium 226 (Ra-226), but other isotopes such as cobalt 60 (Co-60), strontium 90 (Sr-90), cesium 137 (Cs-137), plutonium 239 (Pu-239), and uranium oxide (UO₂) may be present ([Weston 2007](#)).

This scoping survey was performed to evaluate whether radionuclides of concern are present in accessible areas and to provide information to assist in assessing whether the site is impacted or non-impacted and identifying future actions if necessary. For naturally occurring Ra-226, soil concentrations were compared to background levels. A scoping survey of the area previously occupied by a smelter was performed to identify whether there is any indication of residual radioactivity that may be caused by direct smelter operations, dispersed materials from the smelter exhaust, or storage of staged materials. The survey included a gamma walk-over survey and soil sampling in areas exposed by removal of surface asphalt and concrete. The scoping survey also included sediment sampling in storm drains. Alpha and beta surface scanning measurements, direct measurements at defined and random locations of alpha, beta, and gamma radiations, and smear surveys were performed on the concrete pad adjacent to the smelter location.

The results of the FSA scoping surveys indicate that only background levels of Ra-226 that are indicative of non-impacted soil are present in the exposed soil. The data are indistinguishable from background. No evidence of residual radioactivity from historical Navy activities was found in the exposed soil. Concentrations of Cs-137 in sediment are consistent with levels found in the area and throughout the United States resulting from fallout from weapons testing and nuclear plant accidents ([Nuclear Regulatory Commission \[NRC\] 1998](#)). A concrete pad at the FSA has been identified as the only existing feature from the former smelter footprint. The concrete pad showed only background levels of alpha, beta and gamma activity and no removable radioactivity. All measurements were obtained in accordance with the task specific plan (TSP) and standard operating procedures (SOP) as presented in the work plan ([ChaduxTt 2010](#)). Quality assurance checks of all instruments were performed throughout the survey process in accordance with the TSP and SOPs. Only data that were validated by successful quality assurance checks were used to demonstrate compliance with the impacted or non-impacted conclusion of the scoping survey report.

The results of the scoping survey did not identify any radioactivity in soil or the concrete pad that can be associated with the Navy's former smelter operations; therefore, the site is considered non-impacted and no further actions are necessary.

1.0 SITE DESCRIPTION

Naval Air Station (NAS) Alameda was an active military installation from the 1930s to the 1990s, primarily providing facilities and support for fleet aviation activities. NAS Alameda was selected for closure by Congress in September 1993 and was officially closed in April 1997. NAS Alameda is now known as Alameda Point.

1.1 SITE LOCATION AND DESCRIPTION

A smelter operated at NAS Alameda during the 1940s and early 1950s and was removed before the mid-1950s. The Former Smelter Area (FSA) is a 40,000-square-foot area east of Building 66. Much of the area identified as the smelter is occupied by new Buildings 398 and 399 and support equipment. A 1949 drawing identifies a proposed Turbo Jet Overhaul facility to be constructed in the area occupied by the smelter and is presented in [Attachment 1](#). The Turbo Jet Overhaul facility was never built, however. By 1954, Buildings 398 and 399 were shown on the station map in the location where the proposed Turbo Jet Overhaul facility was to be constructed, with the smelter no longer present. [Attachment 2](#) presents an aerial photograph overlay that shows the current buildings and the footprint of the former smelter area. A concrete pad west of Building 399 is identifiable in photographs that show the smelter location and in later photographs that show the site during the late 1950s. The concrete pad appeared to be a storage location for metal bins. The concrete pad has been identified as the only existing feature from the former smelter footprint; it is currently fully exposed and present at the FSA site. The location of the FSA relative to existing site buildings is shown in [Figure 1](#). A more detailed drawing of the smelter area relative to Buildings 398 and 399 is shown in [Figure 2](#).

1.2 PRIOR HISTORICAL USE

The Historical Radiological Assessment (HRA) Volume II ([Weston Solutions, Inc. \[Weston\] 2007](#)) notes the possibility that radium components were melted down in this area along with other metal components. Slag from the smelter operation would likely have been disposed of in Installation Restoration Site 1. Metal bins were used to store feed materials for the smelter. Historical information about smelter operations involving material containing radiological components, most likely radium, is unknown. Since this information was not available to ascertain whether the site was considered radiologically “impacted”, the Navy conservatively assumed that radioactive contamination could be present as a result of similar smelter operations at other naval sites where the presence of contamination was identified. It was concluded that a scoping survey would be needed to define radiological conditions and determine if further actions are required.

1.3 CURRENT AND FUTURE BUILDING OR LAND USE

The FSA is currently occupied by Buildings 398 and 399 and support equipment. Building 398 is leased for commercial use, and Building 399 is vacant. Much of the area around the buildings

is asphalt paved, with concrete covering the rest of the ground. The support equipment consists primarily of coolers and associated piping. Future use of the FSA is unknown.

1.4 REPORT OBJECTIVES

This report details the results of the scoping survey performed to assess whether residual activity from smelter operations exists in accessible areas and to evaluate whether the site is impacted or non-impacted.

1.5 ADDITIONAL SUPPORTING INFORMATION

Additional supporting information for this report can be found in the following appendices:

[Appendix A](#) – Task Specific Plan

[Appendix B](#) – Instrument Information

[Appendix C](#) – Direct Survey Data

[Appendix D](#) – Alameda Point Radiological Survey Methods: Surface Contamination Monitor Surveys Supported by Hand-held Instrumentation

[Appendix E](#) – Scan Survey Results

[Appendix F](#) – Alameda Point Basewide Radiological Surveys Final Status Survey Reports Reference Area Survey Results

[Appendix G](#) – Gamma Walk-Over Survey Results

[Appendix H](#) – Soil Sample Results

2.0 HISTORICAL RADIOLOGICAL ASSESSMENT

The history of the FSA was obtained from the HRA performed by the Navy ([Weston 2007](#)). Additional information was reported in the task specific plan (TSP), attached as [Appendix A](#). These documents supplied most of the historical information presented in this report.

2.1 OPERATING HISTORY

As discussed above, the smelter may have been used to process metals containing radium 226 (Ra-226) or other radioactive materials. The area of the smelter is identified in the 1949 photograph shown in [Figure 2](#) and [Attachment 2](#). The smelter was removed in the early 1950s. Currently, the area is occupied by Building 399 and portions of Building 398. The area between the buildings and around Building 399 contains equipment, such as coolers and piping in support of Building 399 operations. The remainder of the area has been paved with asphalt. At present, there are three storm drains in the area to collect stormwater runoff. The storm drains empty to the Sea Plane Lagoon. A 12-foot-wide concrete pad extending several hundred feet west of Building 399 has been identified to be the pad identifiable in the 1949 photograph of the smelter

area. The pad is assumed to be a storage area for bins of metal staged for smelting or for slag from the smelter.

2.2 MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL CLASSIFICATION

Surveys were limited to areas where the pavement could be removed without affecting the building structures or the support equipment and their pedestals. The exposed areas of soil available for survey were divided into Class 1, Class 2, and Class 3 areas. Although a scoping survey was performed, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) survey unit classification was used in the design layout of the survey units. The survey was not designed to obtain a free release of the site, but instead to assess whether any contamination was present in the accessible surfaces of the site.

The Class 1 area is located on the east side of Building 399. A 10-foot Class 2 buffer area surrounded the Class 1 area. A Class 3 area was located west of Building 399. The surface of the concrete pad was surveyed as a Class 2 area. The classification and survey unit (SU) identifications are shown in [Figure 3](#).

Gamma walk-over surveys using a sodium-iodide (NaI) detector were performed in all classification areas with exposed soil. Gamma walk-over surveys are not quantitative, but establish relative values across the exposed soil areas. The gamma scan values were used to evaluate the presence of outliers. Outlier locations, if present, would be used to bias soil sampling. Gamma scan methods are further discussed in [Section 6.6](#).

Surface scans for alpha and beta emitting radionuclides were performed on the concrete pad. More than 50 percent of the Class 2 surface area was scanned. Soil samples were obtained in each Class 1, 2, and 3 area at systematic data collection points. Using a random start point, systematic data collection locations (N) were laid out in a triangular grid pattern for the SUs using the computer process provided by Visual Sample Plan (VSP) ([Gilbert and others 2001](#)). Locations for data collection for soil sampling and direct surface measurements on the concrete pad are provided in [Appendix A](#).

2.3 RADIONUCLIDES OF CONCERN

As identified in the HRA ([Weston 2007](#)), the isotopes of concern are Ra-226, cobalt 60 (Co-60), strontium 90 (Sr-90), cesium 137 (Cs-137), plutonium 239 (Pu-239), and uranium oxide (UO₂).

3.0 INVESTIGATION LEVELS

Limits on residual contamination for the radionuclides of concern (ROC) are discussed below. The investigation levels are identified to provide values to compare with survey instrument and laboratory analysis sensitivities are adequately low to provide meaningful information to

evaluate whether the FSA is impacted or non-impacted. For naturally occurring Ra-226, soil concentrations were compared to background levels.

3.1 INVESTIGATION LEVELS

The investigation levels for ROCs in soil are as follows: Ra-226, 1 picocurie per gram (pCi/g) above background; Co-60, 0.0361 pCi/g; Sr-90, 0.331 pCi/g; Cs-137, 0.113 pCi/g; Pu-239, 2.59 pCi/g; and UO₂, 0.398 pCi/g. FSA surface activity limits for ROCs are as follows: Ra-226 and Pu-239, 100 disintegrations per minute (dpm) per 100 square centimeters (cm²) total surface activity; Sr-90, 1,000 dpm/100 cm² total surface activity; UO₂, 488 dpm/100 cm² total surface activity; and Co-60 and Cs-137, 5,000 dpm/100cm² total surface activity (Navy 2006). The removable contamination investigation levels are one-fifth of the total activity limits (Navy 2006). The investigation levels are identified to provide values to compare with survey instrument and laboratory analysis sensitivities are adequately low to provide meaningful information to evaluate whether the FSA is impacted or non-impacted.

3.2 INVESTIGATION LEVELS FOR GAMMA WALK-OVER SURVEYS

Investigation levels for gamma walk-over surveys were set at the 3 sigma (σ) value for each data set, or if individual outliers were identified in the survey of the FSA.

4.0 SURVEY DESIGN

The scoping survey consisted of a gamma walk-over survey and soil sampling at specified locations in areas of exposed soil. Surveys of the concrete slab consist of alpha and beta scanning, direct measurements at defined and random locations of alpha, beta, and gamma radiations, and removable alpha and beta radioactivity. Survey methods are described in the TSP, attached as [Appendix A](#). There were no deviations from the TSP.

4.1 OBJECTIVE OF SURVEYS

The objective of the scoping surveys was to evaluate whether residual radioactivity levels from historical Navy activities in the accessible areas of the FSA are less than the predetermined investigation levels. Access to soil in the FSA was made possible by removing the asphalt and concrete surfaces that were not housing support equipment for Building 398 or 399. Neither Building 398 nor 399 was disturbed to gain additional access to soils. Survey results are used as input to assess whether further actions are needed.

4.2 SURVEY UNITS

A layout drawing indicating classification and SUs is provided as [Figure 3](#). SUs are listed in [Table 1](#). Detailed drawings of each SU are shown in [Appendix A](#).

4.3 REFERENCE AREAS

The reference area was selected in consultation with the Navy Radiological Affairs Support Office (RASO). Reference data for naturally occurring Ra-226 were obtained from the survey project report abstract ([Tetra Tech EC Inc. 2010](#)). Eighteen reference area samples from an area west of Building 3 and south of Building 4 were obtained, analyzed, and reported in the abstract. This area was not identified in the HRA as impacted. The analytical results for Ra-226 are summarized in Table 3-3 of the reference area document ([Tetra Tech EC Inc. 2010](#)). Mean background activity for Ra-226 was 0.5602 pCi/g, resulting in an investigation level of 1.5602 pCi/g as defining non-impacted. The analytical procedure used to measure Ra-226 activity may have introduced a small non-conservative factor. The non-conservative value was applied for this scoping survey. However, the results of soil samples discussed in [Section 8.4](#) indicate all values well below the investigation levels, such that the non-conservative value does not alter the conclusions.

Gamma walk-over surveys were performed in areas west of Building 3 and south of Building 4 to measure the relative response of the process in a known non-impacted area. The results of the walkover surveys in the reference area give an average of approximately 7,000 counts per minute. The reference area is open land, consisting of soil with a slight grass covering. The material under the asphalt removed at the FSA is soil with stone and gives an average of approximately 4,200 counts per minute. Therefore, the reference area was not used as a comparison to the survey areas at the FSA, but only to validate the data collection capability of the survey instrumentation.

Reference areas inside Building 112 were initially selected to define a “background” activity level associated with the concrete pad. Building 112 has no history of radioactive material use ([Weston 2007](#)). Reference survey methods are discussed in the reference document *Alameda Point Basewide Radiological Surveys Final Status Survey Reports Reference Area Survey Results* ([Millennium Services, Inc. \[MSI\] 2011a](#)). However, the concrete pad at the FSA has been exposed to weather for more than 60 years and more aggregate appeared to be exposed than in the finished concrete within Building 112. Measurements of alpha activity from direct surveys of the concrete pad indicated a higher than expected response. An outdoor concrete reference area was identified along the south side of Building 114, outside the fenced area identified as impacted. The concrete was also weathered, with aggregate appearing on the surface. The result of a long count in the reference area is used as the background value for the concrete pad. The reference area survey documentation is included in [Appendix C](#). Additional evaluations and survey points were identified to aid in evaluating the reasonableness of applying the reference area to the concrete pad. The evaluations are discussed [Section 8.1.1](#).

4.4 STATISTICAL TESTS

Gamma walk-over survey results were evaluated for average and standard deviation for each strip of data collected in the background area and the FSA SUs. Cumulative frequency distribution (CFD) plots of each data set were generated to identify the presence of outliers. More information on the CFDs is included in [Section 8.2.3](#). The maximum 100 cm² reading and

the area representing that reading are reported for scan data of the concrete if investigation levels have been exceeded. In addition, color-coded plots were generated for surveys obtained with the surface contamination monitor (SCM). The plots show count rates by location in the SU. More information on these plots is presented in [Section 8.2.1](#).

4.5 DETERMINING THE NUMBER OF DIRECT MEASUREMENTS

Although some of the ROCs are found in background, the majority are not. Therefore, the minimum number of soil samples was selected based on contaminants not present in background. Equation 4-2 of the work plan ([ChaduxTt 2010](#)) was used to select the number of direct measurements, N, to be taken per SU when the contaminant was not present in background:

Equation 4-2 from the work plan ([ChaduxTt 2010](#))

$$N = \left(\frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(\text{Sign } \rho - 0.5)^2} \right) (1.2)$$

Where:

N = Number of data points

$Z_{1-\alpha}$ = Type I decision error level, 1.645

$Z_{1-\beta}$ = Type II decision error level, 1.645

Sign ρ = random measurement probability, 0.945201

1.2 = 20 percent increase in number of samples over the minimum

The values used in the calculation were from MARSSIM guidance (Nuclear Regulatory Commission [[NRC 2000](#)]) and were based on a recommended value for the relative shift (Δ/σ) of 1.6. Type I and Type II decision errors were based on 0.05 false negative and 0.05 false positive rates. The associated Z values were obtained from MARSSIM Table 5.2 ([NRC 2000](#)). The random measurement probability, *Sign* ρ , is from MARSSIM Table 5.4 ([NRC 2000](#)).

The calculation resulted in a value of N = 16.38. Therefore, a minimum of 17 soil samples or direct measurements were obtained in each SU. The scanning minimum detectable concentrations (MDC), discussed in [Section 6.6](#) and presented in [Table 2](#), are below the investigation levels; therefore, recalculation of the value of N was not required in accordance with MARSSIM guidance, Chapter 5, Figure 5-3.

5.0 FIELD ACTIVITIES

Other field activities were carried out in addition to the radiological surveys. They include quality control and health and safety clearance. All activities are discussed in this section.

5.1 MOBILIZATION

Mobilization for the FSA scoping survey began in October 2010 by Millennium Services, Inc. (MSI), the survey contractor. The final TSP for the survey, provided in [Appendix A](#), was reviewed by survey staff during the initial training. Survey staff received training on the safety plans and a briefing by the project Radiation Safety Officer Representative (RSOR), who also provided dosimetry for project personnel.

5.2 INITIAL CLEARANCE WORK AND SURVEY MARK OUT

As noted previously, the smelter was removed in the early- to mid-1950s. Buildings 398 and 399 occupy a significant portion of the smelter area footprint. The area surrounding Building 399 consists of asphalt pavement and concrete. Asphalt within the boundary of the survey was removed to expose soil. The concrete areas are designed pedestals for large equipment or to control leakage from process piping. Concrete that was not serving as a pedestal for equipment was also removed. The asphalt and concrete surfaces have been installed in years after smelter operations concluded. No surveys were performed on the surface of the asphalt or concrete that was in contact with the exposed soil.

Using a random start point identified in the TSP, the systematic data collection fixed-point locations were laid out in a triangular grid pattern for the SUs, using the computer process provided by VSP software ([Gilbert and others 2001](#)). Soil sample locations were marked with flags; concrete pad locations were marked using indelible markers. The total number of soil sample locations exceed 17 in the following survey units:

- SU 2 19 locations
- SU 3 18 locations

5.3 SCOPING SURVEY ACTIVITIES

The scoping survey consisted of a gamma walk-over survey of soil exposed by the removal of asphalt and concrete in SU 1, SU 2, and SU 3. Soil samples were obtained at each of the predetermined locations in those three SUs. The scoping survey also consisted of alpha and beta scanning of SU 4. The SU 4 required survey was performed with scan coverage of 50 percent for a Class 2 area. Direct measurements were made at predetermined locations in SU 4 for:

- Alpha, beta, and gamma radiation
- Removable alpha and beta radioactivity
- Gamma exposure rate.

In addition, three storm drains in the vicinity of the FSA were evaluated for potential sediment sampling. The storm drains were not within any of the SUs. Two of the storm drains contained

sediment, one north of Building 399 and one south of Building 399. The third storm drain, east of SU 2, did not contain sufficient quantities of sediment for sampling.

6.0 SURVEY INSTRUMENTATION

Instruments selected for this survey were appropriate for the physical and environmental site conditions as discussed in the final TSP. The instruments and selected measurement methods used were able to detect the ROC or radiation type of interest and were, in relation to the survey or analytical technique, capable of measuring levels equal to or less than the investigation levels.

6.1 INSTRUMENT CALIBRATION AND QUALITY ASSURANCE PROCEDURES

Hand-held survey instruments were initially calibrated to National Institute of Standards and Technology (NIST)-traceable sources by the instrument vendor. Ludlum direct measurement instruments were calibrated by Ludlum within a year prior to this survey. In addition, MSI personnel performed ROC-specific efficiency determinations for each instrument after it arrived on site. The NaI system used for the gamma walk-over survey was calibrated by the Environmental Restoration Group, Inc. (ERG). The SCMs were also calibrated to NIST-traceable sources on site. The SCMs were calibrated at the start of the project using MSI's approved calibration procedures. Calibration records are shown in [Appendix B](#).

6.2 INSTRUMENT OPERATIONAL CHECKS

Radiation detection instruments used in the survey were maintained and calibrated to operate within manufacturer's specifications so that the required sensitivity and precision were maintained. Survey instruments were source-checked twice daily, before and after each survey. Procedures were followed for all field instrumentation to verify that the instruments were operating properly and that the data were valid with instrument calibrations that were NIST-traceable. These procedures included functional operational checks, routine maintenance, calibration procedures, and operational instructions.

The operational checks ensured that the instruments were within the ± 20 percent acceptance criterion established when the baseline information was established. If an instrument did not meet this specification, it was removed from service, tested, repaired or replaced and recalibrated. [Appendix B](#) shows a typical quality control chart for the SCM, demonstrating that the selected instrument has remained in calibration.

6.3 INSTRUMENTS FOR THE MEASUREMENT OF ALPHA AND BETA SURFACE ACTIVITY

Various gas-filled detectors were used to measure alpha and beta surface activities. Details are provided in the following sub-sections.

6.3.1 Instruments for the Static Measurement of Alpha and Beta Surface Activity

SU fixed-point locations were measured with the Ludlum 43-68 gas flow proportional detectors coupled to a Ludlum 2221 ratemeter. The counting gas used was P-10.

6.3.2 Instruments for the Scan Measurement of Alpha and Beta Surface Activity

SU 4 was scanned with the SCM. The SCM uses a gas flow position sensitive proportional counter (PSPC). The PSPC uses P-10 as the counting gas. As with any proportional counter, voltage plateaus are established for the detection of alpha or alpha-plus-beta particles. High voltage appropriate for the type of particles to be detected is applied to the single anode wire that runs the length of the detector. The SCM computer compares the pulse heights of pulses sensed at each end of the anode wire and establishes the location on the anode wire where the nuclear particle was sensed. Although the available resolution is greater than 2,000 locations on the anode wire, the SCM computer “bins” the data in 5-centimeter (cm)-wide increments along the length of the wire.

The SCM was operated in either a dynamic “rolling” mode or a static “corner” mode. In the dynamic mode, the system uses a direct current-powered drive motor affixed to a cart that contains the necessary electronics and computer hardware. The detector assembly is mounted to the front of the cart. The SCM is shown in [Figure 4](#). The SCM’s design focuses on eliminating human performance issues associated with surveys of large areas. The system is designed such that surveys are performed at constant speed, the detector is held at a fixed distance from the surface being surveyed, and survey data are recorded automatically. In the dynamic mode, a precision wheel encoder is mounted to the cart axle to measure distance traveled by the cart. The encoder can measure to a small fraction of a cm and is used to trigger the computer to capture data for every 5 cm of travel of the SCM cart. The result is count data (counts) for every 5 cm “bin” for every 5 cm of travel, or a matrix of 25 cm² “pixels” of data.

In the static mode, a preset time is applied to the collection of data from a stationary detector. Data are binned in a manner similar to the dynamic mode.

Data are transferred from the SCM to a processing station that contains the Survey Information Management Systems (SIMS) software via removable media. SIMS software is used to “stitch” the individual blocks of data to create a single survey of the entire area. The data collected in 25 cm² pixels are summed with adjacent pixels in a manner that results in an evaluation of every possible 100 cm² area. In measuring activity, each 25 cm² “pixel” is 25 percent of four overlapping 100 cm² areas. This process ensures that small areas of activity above limits are not missed through grid registration errors.

The SCM in the dynamic mode is operated with a recount detector for alpha surveys with low investigation levels. A second detector is hard mounted behind the first at a constant distance.

Both detectors perform complete surveys as discussed above. SIMS will generate a survey for each detector. The individual detector surveys will display activity from a source if present, but also counts that result from background activity. SIMS applies “coincidence logic” to the two surveys to avoid false positives caused by background radioactivity. The recount detector survey is superimposed on the primary detector survey. Each 100 cm² area is evaluated against a threshold number of counts. If both detectors are above the threshold value, the results are averaged and the activity is evaluated against the investigation levels. If either the primary or recount detector is below the threshold, the counts are considered to be from background, and a null value is incorporated in the coincidence logic report.

In the static mode, a second count is obtained at each static measurement location. The second count is considered the recount survey. The SIMS coincidence logic described above is applied to determine if activity is present or if the observed counts are caused by background. The coincidence logic applied within the SIMS software described in Appendix J of MARSSIM (NRC 2000) and is designed to reduce the large number of false positives typically obtained when the investigation levels are low, as in alpha surveys.

6.3.3 Determination of Instrument Efficiency for Alpha and Beta Surface Activity Measurements

Instrument efficiency (ϵ_i) is defined as the ratio between the net count rate (in counts per minute [cpm]) of the instrument and the surface emission rate of the calibration source for a specified geometry. Instrument efficiency was calculated by obtaining static counts from a detector positioned over a calibration source that features a NIST-traceable surface emission rate. The gamma walk-over survey is a qualitative assessment. Therefore, efficiency determination of the NaI-based data collection system was not required.

Additional considerations that control overall instrument efficiencies include the following:

- Calibration Sources: Selected calibration sources feature alpha and beta emission energies similar to those expected from contaminants in the field (same as or similar to ROCs). An adjustment for radiations per disintegration may be applied.
- Source Geometry Factors: Geometry factors may be applied based on a calibration source area greater than the area of the probe.
- Source-to-Detector Distances: Calibration is performed at a “source-to-detector” distance consistent with the “detector-to-surface” distance used in the field.
- Window Density Thickness: Calibration is performed using a detector window density thickness identical to that used in the field.

- **Detector-Related Factors:** The SCM is able to increase efficiency by using a 10-cm-deep detector to survey a 5-cm bin (see [Section 6.3.2](#) above). This detector geometry allows the 5-cm section to be passed over twice and increases the instrument efficiency by a factor of 2.

6.4 INSTRUMENT FOR THE MEASUREMENT OF EXPOSURE RATES

The Ludlum Model 19 instrument, which contains an NaI detector, was used to measure ambient gamma exposure rates. NaI scintillation detectors are sensitive to photon gamma radiation and are ideal for locating radiation levels above background when gamma scans and static measurements are collected.

6.5 INSTRUMENT FOR MEASURING SWIPE SAMPLES

Swipe samples were collected for the analysis of removable contaminants. Swipe samples, also referred to as smear samples, were obtained at the discrete surveillance points in the SUs. All samples were processed using a Ludlum Model 2929 low-background, alpha/beta counter. This counter uses a dual phosphor scintillation detector.

6.6 INSTRUMENT FOR GAMMA WALK-OVER SURVEY

Gamma walk-over surveys were conducted using a 2-inch-by-2-inch (diameter and thickness) NaI detector coupled to a ratemeter and data recorder. Data were recorded at timed intervals during the scan. The ratemeter was operated in the open window (no electronic discrimination) mode. The walk-over survey was conducted by walking the area in lanes of 1 meter width at approximately 0.5 meter per second with the detector approximately 10 cm (4 inches) from the soil surface while the detector is moved in a serpentine (S-shaped) fashion. Output from the ratemeter was recorded automatically on a hand-held personal digital assistant and later transferred to a processing computer. Output from the gamma scan was evaluated by analyzing the data in a CFD plot. Outliers identified as departures toward extreme values would be linked to the time of data collection, which in turn would be linked to location. Those areas would be used to bias the soil sampling. Since the walk-over gamma readings were used as relative values, system sensitivity and MDC values are not critical and are therefore not discussed. The walk-over gamma survey instrumentation and process are shown in [Figure 5](#).

6.7 DETECTION SENSITIVITIES

The final TSP ([Appendix A](#)) presents detection sensitivities of the detectors and discusses them in detail. [Table 2](#) summarizes the results of sensitivity calculations. Some have been recalculated where actual field parameters differ from the TSP assumptions. These recalculated values are noted in [Table 2](#). Resulting instrument sensitivities for the FSA scoping survey are more than sufficient to detect the ROCs at the applicable investigation levels. The gamma walk-over surveys were conducted with an NaI-based system to measure relative response while the

detector traverses the survey area, noting outliers. As such, system sensitivity was not critical to the process and therefore was not determined.

7.0 SURVEY PROCEDURES

This section provides a review of the survey procedure and how the procedure met data quality objectives (DQO). This section includes site-specific discussions of techniques for gamma walk-over surveys, scanning, direct radiation, and removable contamination surveys of the FSA. The general procedure for surface scanning surveys at the FSA, and other areas within the scope of the Alameda Point Basewide Radiological Survey program, is described in [Appendix D, Alameda Point Radiological Survey Methods: Surface Contamination Monitor \(SCM\) Surveys Supported by Hand-held Instrumentation \(MSI 2012a\)](#).

7.1 REVIEW OF DATA QUALITY OBJECTIVES

DQOs are qualitative and quantitative statements developed to define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data. These outputs are used to develop a data collection design that meets all performance criteria and other design requirements and constraints. The U.S. Environmental Protection Agency (EPA) has developed a seven-step process to develop DQOs.

Step One – State the Problem

The problem can be stated as, “Identify whether the FSA survey area is radiologically impacted or non-impacted and whether further action is required?”

Step Two – Identify the Goal of the Study

The primary use of the data from this survey is to provide input into requirements for further actions at the FSA. Therefore, the decision to be made can be stated as, “Do the results of the survey meet the investigation levels for the site-specific ROCs?”

Step Three – Inputs to the Decisions

Radiological surveys designed to support the scoping survey of the FSA include:

- Walk-over gamma survey of 100 percent of the exposed soil in Class 1, Class 2, and Class 3 areas.
- A minimum of 17 soil samples each from SU 1, SU 2, and SU 3 analyzed for the ROCs.
- Alpha and beta scan survey of 50 percent of the surface of the Class 2 concrete slab.

- A minimum of 17 alpha and beta direct measurements, smear surveys and gamma exposure measurements of the surface of the concrete slab, SU 4.
- Sediment samples from storm drains in the vicinity of the survey area.

Step Four – Identify the Boundaries of the Study

The lateral and vertical spatial boundaries for this survey effort are confined to the area specified as the FSA as shown in [Figure 3](#).

Step Five – Identify the Decision Rules

If the presence of the site-specific ROCs in soil samples or on the concrete slab surface or in swipe samples is less than the investigation levels, then no further measurements are required. If the results of the survey exceed the investigation levels, then the data will be used to identify further survey design and subsequent implementation of future remedial actions.

Step Six – Set Limits on Decision Errors

Limits on decision errors are set at 5 percent, as specified in the work plan ([ChaduxTt 2010](#)).

Step Seven – Optimize the Study Design

Operational details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines in MARSSIM ([NRC 2000](#)). Specific assumptions regarding types of radiation measurements, instrument detection capabilities, quantities and locations of data to be collected, and investigation levels are contained in the TSP and the work plan ([ChaduxTt 2010](#)). The TSP was reviewed and approved by the Navy, both Base Realignment and Closure (BRAC) and RASO staff.

7.2 SCAN MEASUREMENT TECHNIQUE

Scanning assessments were conducted using the SCM in conjunction with an automated information management system. This arrangement allowed computer analysis of large volumes of survey measurements acquired in relatively short time periods, resulting in easily interpretable graphical displays of survey results. The survey technology was employed for scanning measurements. The SCM is shown in operation in [Figure 4](#).

The SCM system uses a patented PSPC that is capable of establishing where along the detector a decay event occurs. This capability allows a long detector to be divided electronically into a continuous array of small, virtual detectors that are similar in efficiency to other counters, but that have backgrounds associated with small area detectors. This division results in improved sensitivity because of the low background and specific identification of the location of the radioactivity. In scanning mode, the SCM logged information in 25 cm² bins by logging data for each 5-cm width of the PSPC and for every 5 cm of forward travel. Scan speed is motor controlled, and the distance the SCM travels is measured by a precision wheel encoder. Data were recorded in 25 cm² pixels over the entire surface surveyed; thus, the SCM records

400 measurements for every square meter it traverses. Controlling the survey speed and automatically logging the location of the data obtained using a wheel encoder eliminate typical errors and uncertainties associated with hand-held detectors.

7.3 DIRECT MEASUREMENT TECHNIQUE

Direct measurement locations were first selected using VSP software. Locations generated by VSP are listed in [Appendix A](#). After these locations had been found and marked, the following measurements were performed:

- Two-minute alpha count with the Model 43-68 detector
- One-minute beta count with the Model 43-68 detector
- Gamma exposure rate measurement with the Model 19 detector
- Swipe measurement for removable contamination, analyzed with the Model 2929 counter.

8.0 RESULTS AND ANALYSIS

This section presents the results of the direct measurements at pre-determined locations and the scanning measurements.

8.1 DIRECT MEASUREMENTS

Direct measurement results at pre-determined, random locations are summarized in [Table 3](#), and the raw data are listed in [Appendix C](#).

8.1.1 Alpha Direct Measurements

The 17 direct measurements obtained on the concrete pad, SU 4, exhibit higher count rates than recognized in the reference area. The measurements ranged from 4 to 15 cpm, higher than the 1.1 cpm average alpha count rate in the concrete reference area within Building 112. The average count rate on SU 4 is 9.25 cpm with a standard deviation of 3.4 cpm. All direct measurements on SU 4 concrete are within 2 standard deviations of the average. SU 4 is a concrete pad that has been exposed to traffic and weather for at least 60 years. The application of the reference area background value obtained for the Building 112 concrete is not considered representative of the FSA concrete pad. A similar situation exists in the Building 114 Courtyard area. Concrete ramps in the Building 114 Courtyard have been exposed to weather for several decades and have a different appearance from the reference area concrete. Much of the finished concrete has been eroded, exposing more of the aggregate. A similar area of concrete on the south side of Building 114, outside any impacted area, was identified as a reference area for the concrete ramps within the Building 114 Courtyard. The reference area concrete has an

average alpha measurement of 9.9 cpm. Further investigation into the reasonable alpha background was conducted as described below.

First, re-survey alpha measurements at all 17 locations was performed. Elevated values, within statistical variability of the initial measurements, were again recorded. Comparing the original 17 locations measured with the re-survey at the identical locations shows the measurements obtained in each specific location vary greatly, but within the same range as the initial measurements. However, the locations of the highest readings during the initial survey produced some of the lower readings when they were re-surveyed. In addition to the 17 measurement locations, five measurements were obtained at the extreme southern end of the concrete pad, approximately 100 feet from the survey unit. Those measurements show values consistent with the values obtained in SU 4. The additional five locations at the south end of the concrete pad ranged from 5.5 to 9 cpm.

Second, the average alpha activity from SCM scans has been evaluated. The SCM scan, both primary and recount detectors, of the FSA concrete pad indicated randomly distributed low-level counts across the entire pad. The coincidence logic applied to the data indicates the pad to be free of activity in the range of the investigation levels. Two locations indicate activity slightly above the threshold values, with a maximum calculated value of 22 dpm/100 cm² as reported in [Section 8.2.1](#). The SCM records the counts in each 25 cm² area as the scan is conducted. The computer clock, measuring the time interval for the collection of each data point, converts the counts to cpm. The process for assessing surface activity and evaluating compliance with investigation levels for alpha activity is described in [Section 7.2](#) and in [Section 8.2.1](#). Processing the data collected by the SCM in the SIMS allows for determination of average activity in any selected region of interest for a specific scan using a sub-routine “Snooper.”

Snooper is a data processing subroutine investigation tool that allows the SIMS operator to evaluate statistical information for a selected region of the data set. Using the mouse, the operator can define a region of interest by “rubber banding” the area directly on the image. Once the region of interest is identified, a two-by-two summing filter is block-processed through the 25 cm² data, which results in 100 cm² data. The system then calculates the highest 100 cm² data point and average all 100 cm² data points within the region of interest. That data, along with the size and position of the region of interest, are reported to the operator in the Snooper window. The Snooper investigation tool was used on the entire image of both the primary and the recount detectors for the scan data obtained on the SU 4 concrete pad. The results of the investigation are an average value of 12.1 cpm from the primary detector and 10.7 cpm from the recount detector. The Snooper output images, obtained from screen capture, are shown in [Figure 7](#).

Finally, the investigation included a comparison of the data generated by a single SCM detector, the primary detector, from three separate surveys. The surveys include asphalt from the Building 114 Courtyard, concrete from the Building 66 interior, and the FSA concrete pad. The Building 114 Courtyard asphalt exhibited slightly higher background than the reference area, 5 cpm compared with 1.1 cpm in the reference area. The Building 66 alpha surveys were similar to the reference area surveys for both direct readings and SCM scan surveys. The FSA survey is from SU 4, the concrete pad.

A comparison of the three areas is reported in [Appendix C](#). The scale for activity is in dpm, adjusted for both the short count time, 8 seconds, and system efficiency, 50 percent with no background subtraction. The same parameters are applied to all three CFDs. The shape of the CFD plots for alpha surveys reflects the low number of counts in each 100 cm² area. A large number of areas have zero counts, and many have 1 count. As a point of comparison, the 90th percentile value for all three surveys is identified on the CFD plot. Both the Building 114 Courtyard asphalt and the concrete surfaces inside Building 66 show a 90th percentile value of approximately 40 dpm/100 cm². The concrete pad at the FSA value for 90th percentile is approximately 80 dpm/100 cm². The shape of the CFDs is consistent with no indication of outliers in any of the three areas. The values are provided to demonstrate a relative comparison between the surfaces.

Based on the investigation, the basis for the elevated measurements is a higher alpha background on the surface of the FSA concrete pad. Using the reference area background value from the area south of Building 114, outside the fenced area, a background of 9 cpm is a reasonable value to be applied to the concrete in SU 4. [Table 4](#) reflects the results of the SU 4 direct measurements with a background of 9 cpm applied.

8.1.2 Ambient Gamma Dose Rates

Gamma dose rates varied very little on the FSA concrete pad. They ranged from 4 to 5 microrentgens per hour ($\mu\text{R/hr}$), averaging 4.8 $\mu\text{R/hr}$, consistent with values found in the reference area, Building 112. Readings from specific monitoring points are shown in [Appendix C](#) and are consistent with values measured in area walk-over surveys discussed in [Section 5.2](#).

8.1.3 Removable Contamination (Smears)

Removable contamination surveys were performed in accordance with the TSP and the requirements of standard operating procedure (SOP)-006, Radiation and Contamination Surveys. Areas of 100 cm² were swiped and the location and swipe number recorded. Swipes were counted using a Ludlum Model 2929 instrument, which uses a dual phosphor detector, in accordance with RP-OP-017, Operation of the Ludlum Model 2929 Dual Scaler. When in use, a daily background and source check was performed on the instrument. A 20-minute background check was performed to ensure that contamination from swipes has not entered the chamber. NIST-traceable planchet sources were used to determine the efficiency of the Ludlum Model 2929. The system efficiency for alpha activity was 41 percent and beta activity 32 percent. Minimum Detectable Activity (MDA) was calculated daily using Equation 7-10 of the work plan ([ChaduxTt 2010](#)). The MDA values for the Ludlum Model 2929 ranged from 9 to 12 dpm for alpha activity and from 78 to 84 dpm for beta activity.

Seventeen smears were collected on the concrete in SU 4. The maximum activities were 4.9 (alpha) and 37.0 (beta) dpm/100cm² as reported in [Table 4](#). These maxima are less than the investigation levels for removable contamination. The removable contamination release criterion for surfaces is 1,000 beta dpm per 100 cm² for Cs-137 and Co-60. The criterion for

UO₂ is 98 dpm alpha/100 cm² (Navy 2006). The release criterion for Sr-90 is 200 dpm beta/100 cm² and for Ra-226 and Pu-239 is 20 dpm alpha/100 cm².

8.1.4 Analysis of Direct Measurements

Direct measurement results were compared with the investigation levels. All results were less than the applicable investigation levels. No further analysis is required, since no readings exceeded the investigation levels.

8.2 SCANNING MEASUREMENTS

Scanning measurement results are summarized in [Table 3](#) and presented in detail in [Appendix E](#). More than 50,000 measurements were made with the SCM using relatively short count times. The information available from the large number of measurements is presented in two-dimensional color graphic plots in [Appendix E](#).

8.2.1 Alpha Scans

The SCM was configured in the recount mode for alpha scans, using two detectors. The primary and recount detectors collect data independently in this mode. The offset between the detectors is constant because the detectors are in a rigid mount. Processing software then superimposes the recount detector data over the primary. The processor then applies “coincidence” logic to detect very low levels of radionuclides. This logic accepts events only where both detectors register a threshold number of counts exceeded in the same 100 cm² area — in this case, three counts or greater. This re-count approach allows for detection of low-level alpha contamination while suppressing false positives caused by background. Background activity will rarely register counts above the threshold in both detectors (less than 1.0×10^{-4} probability).

The maximum alpha activity detected in SU 4 was 22 dpm/100 cm². Alpha scan results are shown in [Appendix E](#). The three color-coded maps in the appendix show results from the primary detector, the recount detector, and points where the “coincidence” threshold is met. The activity shown on the third map is the average reading from the two detectors. Only two 100 cm² areas exceeded the “coincidence” threshold.

8.2.2 Analysis of Alpha Scan Measurements

Not all of the color-coded maps in [Appendix E](#) are true maps of the area. Data from multiple SCM surveys indicating “This survey is not position correlated” are posted in the figure at approximate locations. However, points of interest can be re-located by searching the raw data files and locating the individual SCM measurements. Those measurements are coded, and the codes are marked on the floor where the measurements occurred.

Scan measurement results were compared with the investigation level and investigation levels. All results were less than the applicable limit. No further analysis is required, since no readings exceeded the criteria.

8.2.3 Beta Scan Measurements

Beta scan results are shown as a CFD in [Figure 6](#). Corrected for background, the average readings (cumulative probability = 0.5) are close to zero, demonstrating that there was no net radioactive activity and that the reference area was appropriate for the SU. Straight-line CFDs demonstrate normally distributed data as found in areas without contamination. Normally distributed data are observed in the CFDs reported in the reference area survey results [Appendix F](#), (MSI 2012b). Areas that indicate radioactivity beyond that expected from normally distributed activity would appear as outliers at the high end of the CFD. To meet the sensitivity requirements of the survey, the SCM must show the high end of the normally distributed data to be less than the investigation levels. Then, areas that meet or exceed the investigation levels will be identifiable and can be investigated. Deviations from normally distributed, straight-line CFDs were not observed in the FSA SU 4 survey.

The maximum 100 cm² area is 3,532 dpm/100 cm² in SU 4, which is less than the release criterion for Co-60. Beta scan survey reports are presented in [Appendix E](#). [Appendix E](#) contains information regarding the survey name, technicians who performed the survey, background and efficiency values, and investigation levels. Both a color graphic two-dimensional plot and a CFD are included. The two-dimensional plots include a color bar indicating activity measured. The identification of hot spots or distributed activity indicated by patterns is apparent if activity beyond that of background distributions is present in the survey unit.

Background values are based on the type of material, type of detector, and data obtained from the reference area surveys [Appendix F](#) (MSI 2012b). Although background is a variable, defined by a Poisson distribution, a single value — the average — is applied. If the reference area is appropriate for the surface within the survey unit and the area is free of added radioactivity, the 50th percentile of the survey unit data with background subtracted will be near zero. The CFD for the beta survey of the concrete pad, SU 4, is presented in [Figure 6](#).

8.2.4 Analysis of Beta Scan Measurements

More than 24,000 scan measurements were obtained in SU 4 on the concrete pad in accordance with the TSP and SOPs. The quality of the field measurements was assured through quality checks performed in accordance with procedure, both before and after data were obtained with the SCM. Scan measurement results were compared with investigation levels. All results were less than the applicable limits. For beta scans, the CFD plots indicate that the 50th percentile is near zero when applying the average background value from the reference area, indicating the reference area to be reasonable for the materials of construction of the concrete pad. No further statistical analysis is required for SU 4, since no readings exceeded the criteria.

8.3 GAMMA WALK-OVER SURVEY

A description of the gamma walk-over survey is provided in [Section 6.6](#). The walk-over pattern covered both SUs because of the limited area in SUs 1 and 2. SU 3 was surveyed separately. The data were collected in 1-second intervals for each strip. The data for each strip and the composite data were analyzed for the presence of outliers that may indicate a localized high activity source. Data were compared to the 3σ value above the average for each strip. The data were also displayed as CFDs for each strip as well as the composite for the two areas. Although a few individual 1-second values slightly exceeded the 3σ value, no outliers were evident in the CFDs. Investigations in the areas of the highest readings did not identify any abnormalities. Concrete pedestals supporting building equipment may be the cause of the slightly higher readings. Only a single measurement was above the value in each strip with a data point exceeding the average + 3σ value. Other measurements before and after the lone value were within the range of the average + 3σ . The composite CFDs for both the SU 1/SU 2 and SU 3 areas do not identify any outliers. With the 17 required samples within relatively small areas, no additional samples were considered necessary.

The average NaI detector count rate, standard deviation, 3σ value, and maximum reading for all data strips and the two reference area strips are reported in [Table 5](#). The strip mapping and the CFDs are reported in [Appendix G](#).

8.4 SOIL SAMPLES

Seventeen or more soil samples were obtained from each of SUs 1, 2, and 3, for a total of 54 samples. Samples were collected for surface to 6 inches and were sent for analysis at an off-site laboratory, Test America, Inc. All samples were analyzed for gamma-emitting radionuclides. Duplicate analysis, part of the laboratory quality control program, was performed on every tenth sample, resulting in five additional analyses. Ra-226 concentrations were measured by allowing equilibrium to be established with Ra-226 progeny and determination of Ra-226 based on the ratio of gamma emitting progeny bismuth 214 (Bi-214). Analysis for Sr-90 and Pu-239 was to be performed if any soil samples indicated Cs-137 above the investigation levels.

Analysis results for Ra-226 in soil reported no sample greater than the release criterion. The maximum value reported was 0.75 pCi/g, within the range of activity of found in the reference area samples. The average Ra-226 concentration was 0.32 pCi/g, lower than the average of the reference area samples. Gamma-emitting radionuclides, Co-60 and Cs-137, are reported less than the investigation levels for all samples. Only two samples indicated results greater than the minimum detection level (MDL) for Cs-137. Both results were slightly above the MDL of the analytical method, and well below the release criterion. Soil sample results are reported in [Appendix H](#).

8.5 SEDIMENT SAMPLES

Two of the three storm drains in the vicinity of the FSA contained adequate amounts of sediment for sampling. Those drains are on the north and south sides of Building 399. The drain east of Building 399 did not contain sufficient sediment volume to sample. Laboratory analysis for gamma-emitting radionuclides was performed on each of the samples in a manner identical to the soil samples. Each of the sediment samples contained Ra-226 at 0.39 pCi/g, consistent with the soil sample data. Co-60 activity was less than the MDL. The Cs-137 concentration in each sample exceeded the release criterion. The results, reported in [Appendix H](#), are similar:

| | | |
|-------------|-------------|-------------|
| North Drain | SME-SED-055 | 0.222 pCi/g |
| South Drain | SME-SED-056 | 0.212 pCi/g |

The Cs-137 concentrations are consistent with typical background levels reported in most portions of the United States ([NRC 1998](#)). Concentrations are reported to be between 0.1 pCi/g and 1.0 pCi/g in non-drainage areas with higher concentrations typically found in drainage areas. The Cs-137 activity is a result of fallout from atmospheric testing in the United States and elsewhere throughout the 1950s, 1960s, and 1970s. Additional Cs-137 activity in soil is the result of the nuclear plant emergency at Chernobyl. Based on the low values in drains that will naturally concentrate sediment and the similarity to the reported background levels, no further radiological analysis have been performed.

9.0 CONCLUSION

This scoping survey was performed to evaluate whether radionuclides of concern are present in accessible areas and to provide information to assist in assessing whether the site is impacted or non-impacted and identifying future actions if necessary. A scoping survey of the area previously occupied by a smelter was performed to identify whether there is any indication of residual radioactivity that may be the result of direct smelter operations, dispersed materials from the smelter exhaust, or storage of staged materials. The survey included a gamma walk-over survey and soil sampling in areas exposed by removal of surface asphalt and concrete. The scoping survey also included sediment sampling in storm drains. Alpha and beta surface scanning measurements, direct measurements at defined and random locations of alpha, beta, and gamma radiations, and smear surveys were performed on the concrete pad adjacent to the smelter location.

For naturally occurring Ra-226, soil concentrations were compared to background levels. The results of the FSA scoping surveys indicate that only background levels of Ra-226 that are indicative of non-impacted soil are present in the exposed soil. The data are indistinguishable from background. No evidence of residual radioactivity from historical Navy activities was found in the exposed soil. Sediment Cs-137 concentrations are consistent with levels found in the area and throughout the United States resulting from fallout from weapons testing and nuclear plant accidents ([NRC 1998](#)). A concrete pad at the FSA has been identified as the only existing feature from the former smelter footprint. The concrete pad showed only background

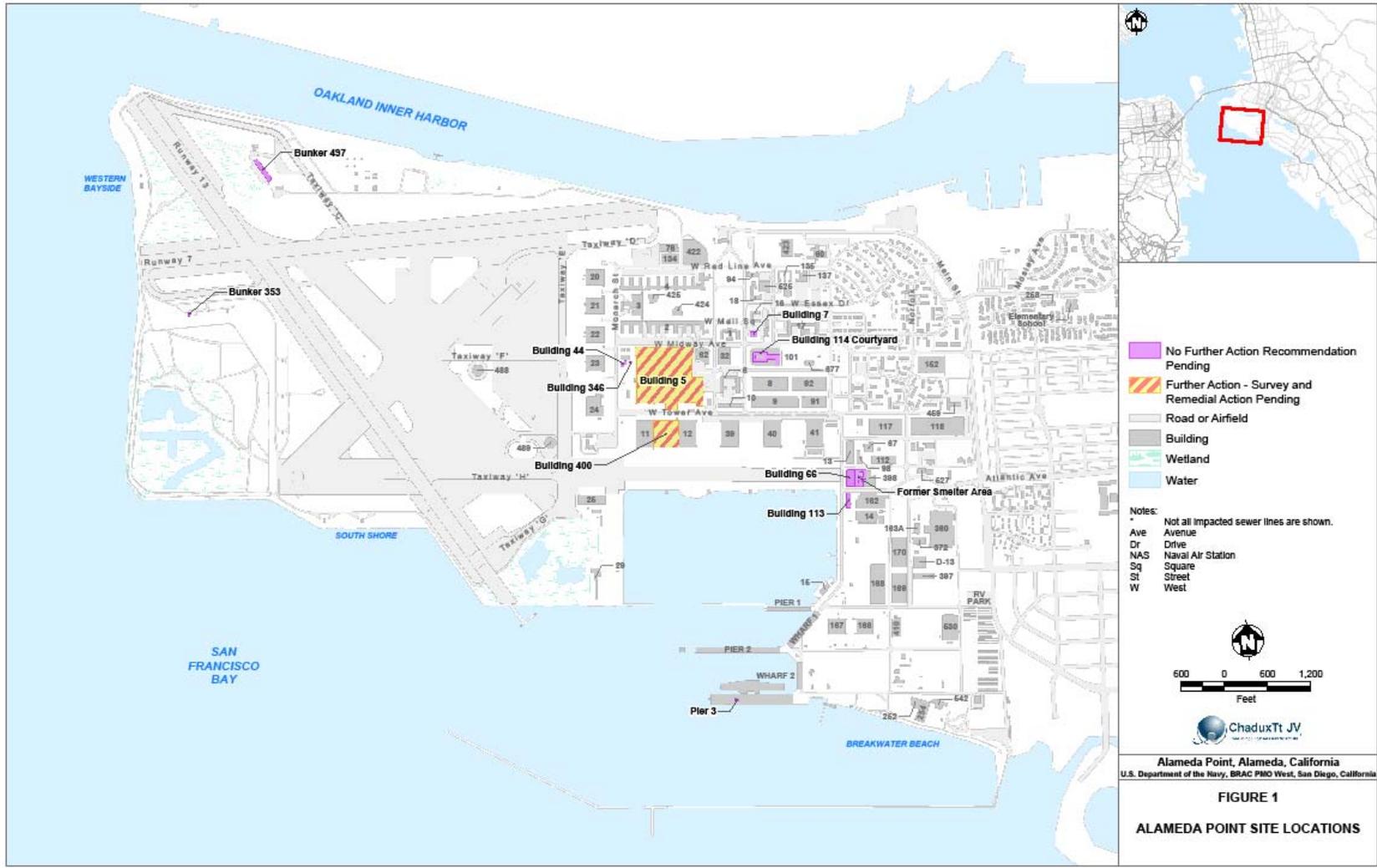
levels of alpha, beta and gamma activity and no removable radioactivity. All measurements were obtained in accordance with the TSP and SOPs as presented in the work plan ([ChaduxTt 2010](#)). Quality assurance checks of all instruments were performed throughout the survey process in accordance with the TSP and SOPs. Only data that were validated by successful quality assurance checks were used to demonstrate compliance with the impacted or non-impacted conclusion of the scoping survey report.

The results of the scoping survey did not identify any radioactivity in soil or the concrete pad that can be associated with the Navy's former smelter operations; therefore, the site is considered non-impacted and no further actions are necessary.

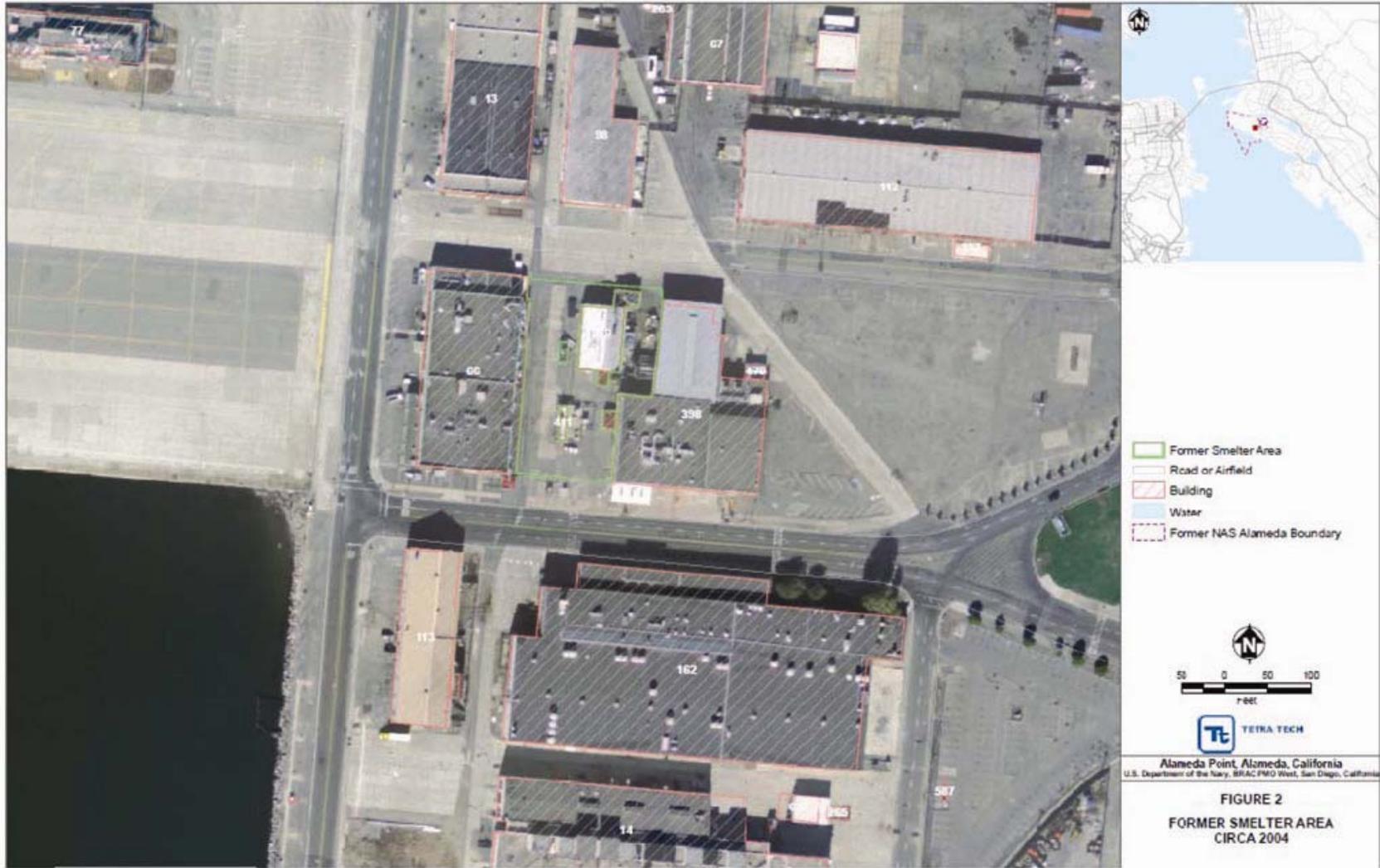
10.0 REFERENCES

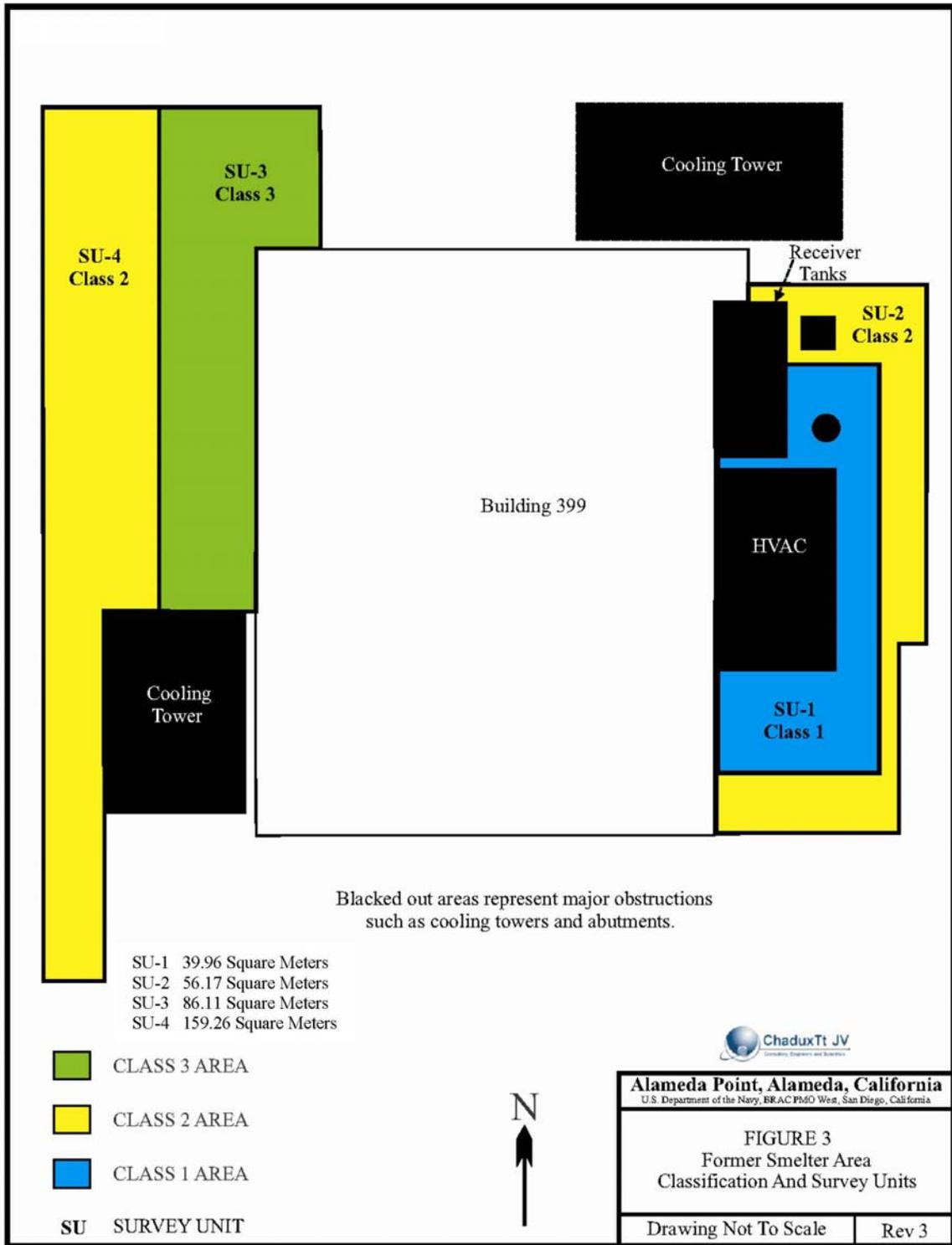
- ChaduxTt. 2010. Final Work Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. July 23.
- Department of the Navy (Navy). 2006. *Basewide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco, California*
- Gilbert, R., and others. 2001. *Visual Sample Plan*. Upgrade version 5.9 released October 29, 2009. Pacific Northwest National Laboratory. Principal authors of Version 5.9 Pulsipher, Wilson, and others.
- Millennium Services, Inc. (MSI). 2012a. *Alameda Point Radiation Survey Methods: Surface Contamination Monitor (SCM) Surveys Supported by Hand-held Instrumentation*. April.
- MSI. 2012b. *Alameda Point Basewide Radiological Surveys Final Status Survey Reports Reference Area Survey Results*. April.
- Nuclear Regulatory Commission (NRC). 1998. NUREG-1507, *Minimum Detectable Concentrations with Typical radiation Survey Instruments for Various Contaminants and Field Conditions*
- NRC. 2000. NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Rev. 1.
- Tetra Tech EC, Inc. 2010. *Survey Unit Project Reports Abstract Installation Restoration Sites 5 and 10, Buildings 5 and 400 Storm Drain Line, Time-Critical Removal Action, Former Naval Air Station Alameda, Alameda, California*.
- Weston Solutions, Inc. (Weston). 2007. *Historical Radiological Assessment, Volume II, Alameda Naval Air Station, Use of General Radioactive Materials, 1941-2005*. June.

FIGURES



2011-07-06 v:\alameda\project\05_her\barroad TEM-AI, siron, cardinal





Note: Static sample locations are presented on Figures 3, 4, 5, and 6 of the Task Specific Plan located in [Appendix A](#)

Figure 4. Photograph of Surface Contamination Monitor

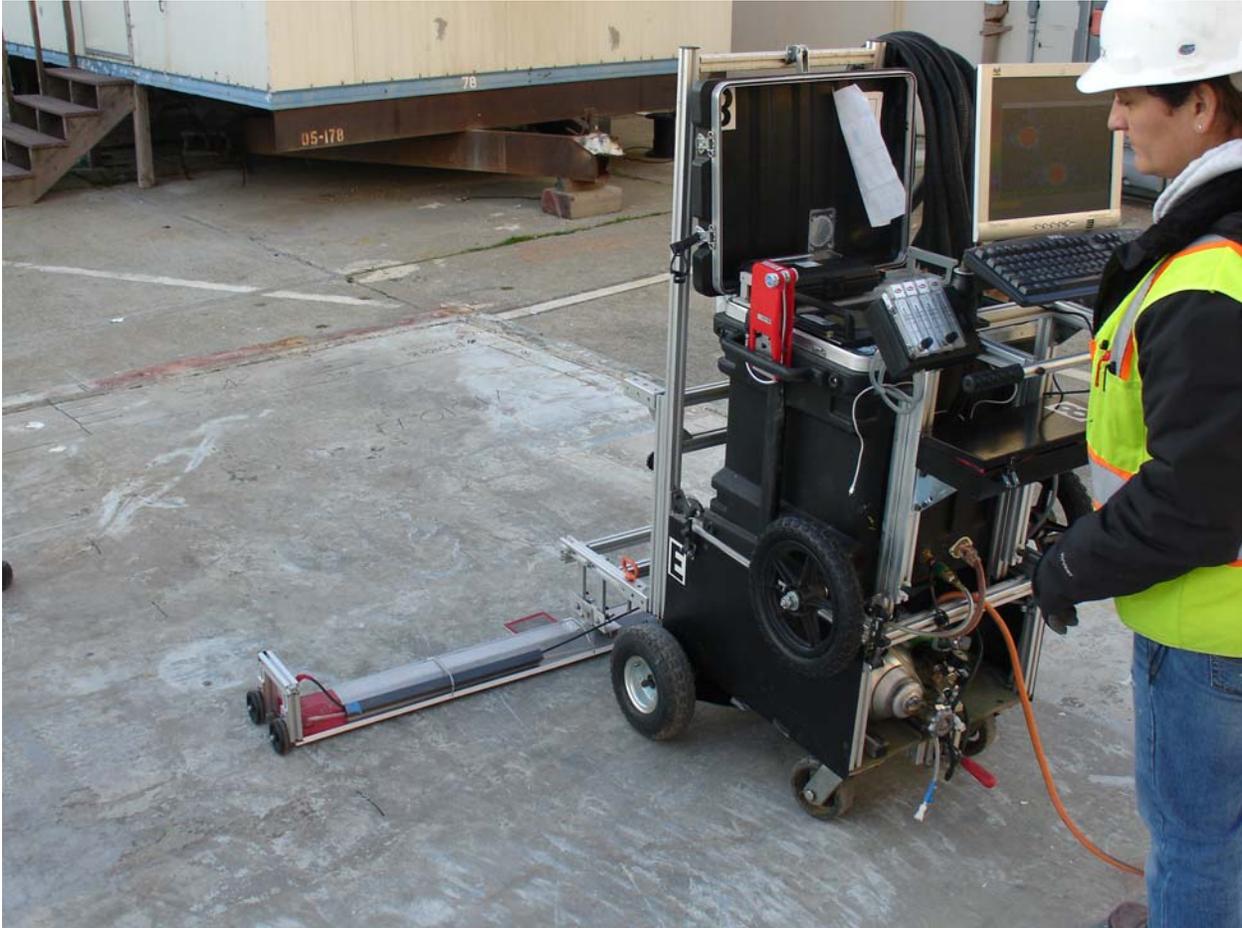
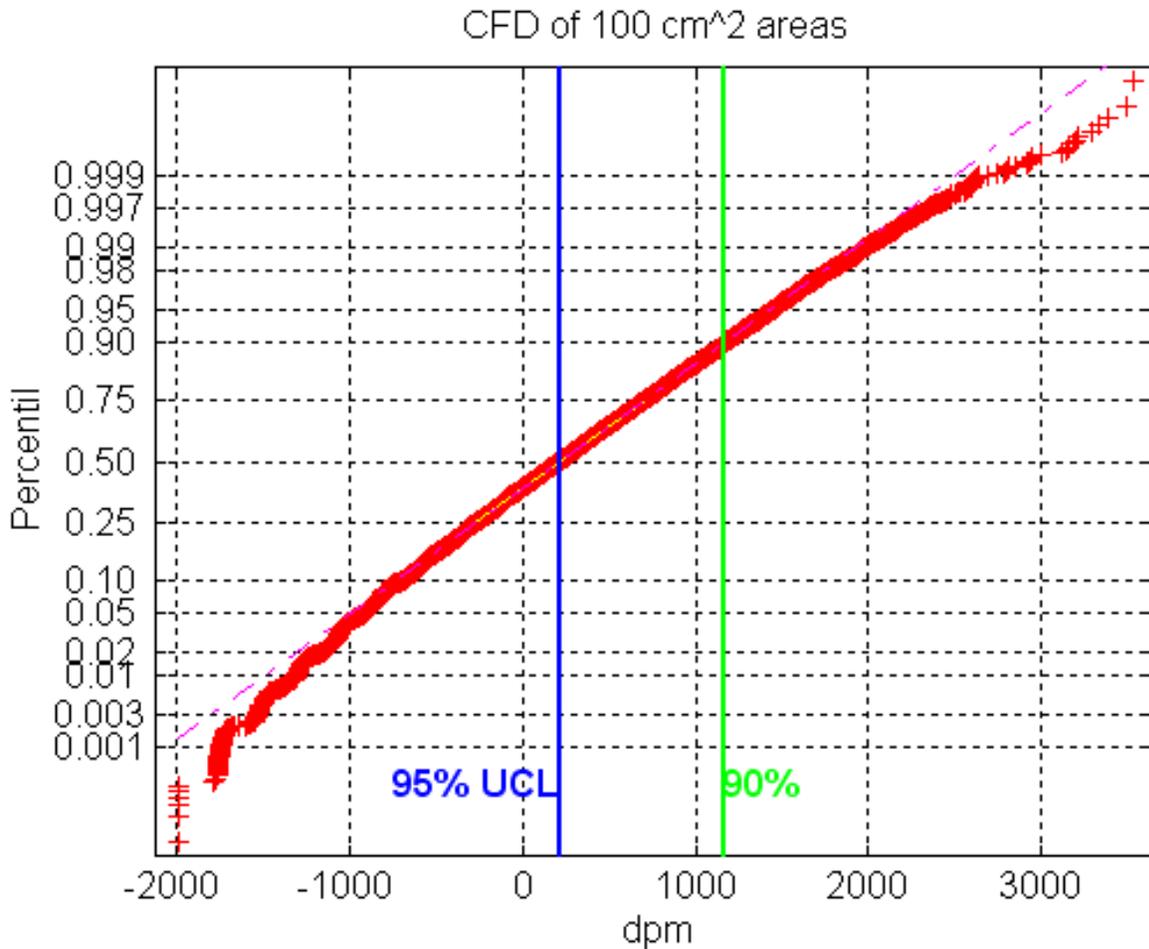


Figure 5. Photograph of Gamma Walk-over Survey in Survey Unit-3 looking South



**Figure 6. Former Smelter Area Survey Unit 4 Beta Survey
Cumulative Frequency Distribution Plot**

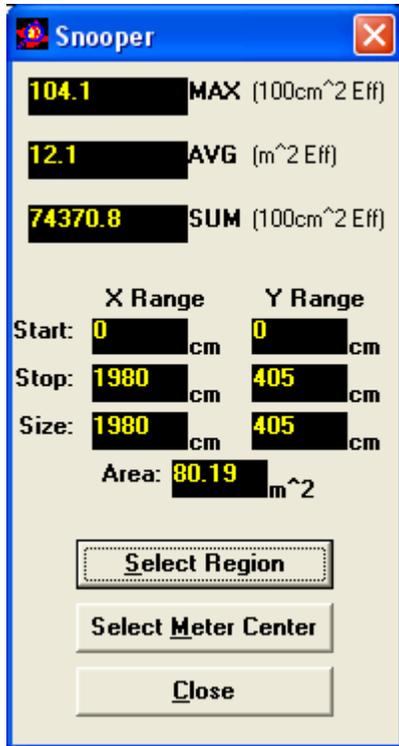


Cumulative Frequency Distribution (CFD) of surface activity in 100 cm² areas. The horizontal scale is in dpm per 100 cm².

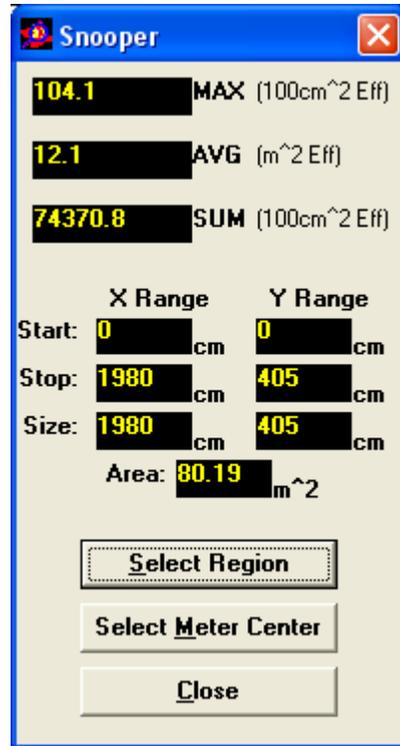
Notes:

- CFD Cumulative frequency distribution
- Cm² Centimeter squared
- Dpm Disintegrations per minute
- UCL Upper confidence level

Figure 7. Screen Capture of Snoop Results of Alpha Survey of Survey Unit 4



Snoop of Primary Detector



Snoop of Recount Detector

TABLES

TABLE 1: FORMER SMELTER AREA CLASSIFICATIONS

| Survey Unit | Area or Rooms | Class | Area | ROC |
|--------------------|----------------------|--------------|------------------|--------------------------------------|
| SU 1 | East of Building 399 | 1 | Soil | Ra-226, Gamma Emitting Radionuclides |
| SU 2 | Buffer Around SU 1 | 2 | Soil | Ra-226, Gamma Emitting Radionuclides |
| SU 3 | West of Building 399 | 3 | Soil | Ra-226, Gamma Emitting Radionuclides |
| SU 4 | Concrete Pad | 2 | Concrete Surface | Ra-226, Co-60, Cs-137, Sr-90 |

Notes:

Co-60 Cobalt 60
Cs-137 Cesium 137
Ra-226 Radium 226
ROC Radionuclide of concern
Sr-90 Strontium 90
SU Survey unit

TABLE 2: DETECTION SENSITIVITIES

| Survey Type | Detector | Sensitivity (dpm/100 cm ²) | TSP Section |
|--------------|----------|--|----------------|
| Alpha Scan | SCM | 99.47% probability of seeing at least 100 dpm/100 cm ² (Note 1) | 2.7 |
| Alpha Static | 43-68 | 76.5 (Note 2) | 2.8 |
| Beta Scan | SCM | 3700 (Note 3) | 2.7.2 |
| Beta Static | 43-68 | 1200 (Note 4) | 2.8.2 |

Notes:

1. Sensitivity is *a posteriori* for “coincidence” counting with a threshold of 3 counts or greater. Note that calculations were done for the investigation level (100 dpm). See [Section 8.2.1](#) for discussion.
2. Sensitivity is *a posteriori* for a higher actual instrument efficiency (39.4 percent), and a 1-minute count time.
3. Sensitivity is *a posteriori* based on the CFD. Note that background is higher than expected.
4. Sensitivity is *a posteriori* for a higher actual instrument efficiency (33 percent), and a 1-minute count time.

cm² Centimeter squared
dpm Disintegrations per minute
SCM Surface contamination monitor
TSP Task specific plan

TABLE 3: SUMMARY OF FORMER SMELTER AREA DIRECT SURVEY RESULTS

| | |
|---------------------------------|-----------------------------|
| Building | Former Smelter Area |
| Survey Unit | Concrete Pad SU4 |
| Class | 2 |
| Model 2221 | 190181 |
| Detector 43-68 | 149768 |
| Date | 3/3/2011 |
| Static Count Time (min) | 2.0 α 1.0 β |
| Background Count Time (min) | 10.0 |
| α Efficiency- Instrument | 0.370 |
| α Efficiency- Surface | 0.25 |
| β Efficiency- Instrument | 0.390 |
| β Efficiency- Surface | 0.5 |
| Area Correction Factor | 1.00 |

| Measurement Number. | Material | Reference Background (cpm) | | Static Counts (cpm) | | Static Results (dpm/100 cm ²) | |
|---------------------|----------|----------------------------|---------|---------------------|---------|---|---------|
| | | α | β | α | β | α | β |
| 1 | Concrete | 9 | 126.4 | 7.0 | 121.0 | -21.6 | -27.69 |
| 2 | Concrete | 9 | 126.4 | 9.0 | 148.0 | 0.0 | 110.77 |
| 3 | Concrete | 9 | 126.4 | 15.0 | 141.0 | 64.9 | 74.87 |
| 4 | Concrete | 9 | 126.4 | 7.0 | 136.0 | -21.6 | 49.23 |
| 5 | Concrete | 9 | 126.4 | 12.0 | 127.0 | 32.4 | 3.08 |
| 6 | Concrete | 9 | 126.4 | 8.0 | 133.0 | -10.8 | 33.85 |
| 7 | Concrete | 9 | 126.4 | 10.0 | 156.0 | 10.8 | 151.79 |
| 8 | Concrete | 9 | 126.4 | 11.0 | 135.0 | 21.6 | 44.10 |
| 9 | Concrete | 9 | 126.4 | 8.0 | 138.0 | -10.8 | 59.49 |
| 10 | Concrete | 9 | 126.4 | 9.0 | 137.0 | 0.0 | 54.36 |
| 11 | Concrete | 9 | 126.4 | 9.0 | 150.0 | 0.0 | 121.03 |
| 12 | Concrete | 9 | 126.4 | 8.0 | 159.0 | -10.8 | 167.18 |
| 13 | Concrete | 9 | 126.4 | 10.0 | 168.0 | 10.8 | 213.33 |
| 14 | Concrete | 9 | 126.4 | 6.0 | 137.0 | -32.4 | 54.36 |
| 15 | Concrete | 9 | 126.4 | 4.0 | 151.0 | -54.1 | 126.15 |
| 16 | Concrete | 9 | 126.4 | 6.0 | 127.0 | -32.4 | 3.08 |
| 17 | Concrete | 9 | 126.4 | 8.0 | 132.0 | -10.8 | 28.72 |

Notes:

- cm² Centimeter squared
- cpm Counts per minute
- dpm Disintegrations per minute

TABLE 4: SURVEY UNIT 4 GAMMA AND SMEAR TEST RESULTS

| Survey Unit 4 Concrete Slab Location | Gamma Dose Rate ($\mu\text{R/hr}$) | Smear Result ($\text{dpm}/100\text{cm}^2$) | |
|--------------------------------------|--------------------------------------|--|------|
| | | Alpha | Beta |
| 1 | 4 | 0 | 31 |
| 2 | 4 | 0 | -56 |
| 3 | 5 | 0 | -37 |
| 4 | 5 | 0 | 12 |
| 5 | 5 | 0 | -25 |
| 6 | 5 | 0 | 0 |
| 7 | 4 | 0 | 12 |
| 8 | 5 | 0 | -34 |
| 9 | 5 | 2 | -25 |
| 10 | 5 | 0 | 9 |
| 11 | 5 | 0 | 38 |
| 12 | 5 | 2 | 19 |
| 13 | 5 | 0 | 22 |
| 14 | 5 | 0 | 0 |
| 15 | 5 | 0 | -22 |
| 16 | 5 | 0 | 19 |
| 17 | 5 | 0 | -19 |

Notes:

$\mu\text{R/hr}$ Microrentgens per hour
 cm^2 Centimeter squared
 dpm Disintegrations per minute

TABLE 5: FORMER SMELTER AREA GAMMA WALK-OVER DATA SURVEY UNITS 1 AND 2

| Strip Number | Average | Standard Deviation σ | Average + 3σ | Maximum Value |
|---------------------|----------------|---|---------------------------------------|----------------------|
| FSA1-1 | 4,070.40 | 321.71 | 5,035.16 | 5,115 |
| FSA1-2 | 4,406.76 | 532.21 | 6,018.38 | 6,202 |
| FSA1-3 | 4,373.05 | 447.52 | 5,715.61 | 5,754 |
| FSA1-4 | 3,712.15 | 236.6 | 4,421.94 | 4,303 |
| FSA1-5 | 4,206.34 | 251.97 | 4,962.25 | 4,831 |
| FSA1-6 | 4,210.35 | 360.54 | 5,291.97 | 5,024 |
| FSA1-7 | 4,551.99 | 275.93 | 5,379.78 | 5,170 |

All values are in counts per minute

Former Smelter Area Gamma Walk-over Data Survey UNIT 3

| Strip Number | Average | Standard Deviation σ | Average + 3σ | Maximum Value |
|---------------------|----------------|---|---------------------------------------|----------------------|
| FSA3-1 | 4,565.67 | 435.27 | 5,871.48 | 5,671 |
| FSA3-2 | 4,744.44 | 322.50 | 5,711.93 | 5,503 |
| FSA3-3 | 4,065.20 | 339.36 | 5,083.27 | 5,095 |
| FSA3-4 | 4,019.29 | 475.78 | 5,449.64 | 5,225 |
| FSA3-5 | 3,872.80 | 289.56 | 4,741.49 | 4,511 |
| FSA3-6 | 4,469.86 | 578.51 | 6,205.38 | 5,655 |
| FSA3-7 | 3,842.57 | 491.10 | 5,315.88 | 4,904 |
| FSA3-8 | 3,908.12 | 381.68 | 5,053.17 | 4,543 |
| FSA3-9 | 4,374.48 | 508.57 | 5,900.10 | 5,806 |

All values are in counts per minute

APPENDIX A
TASK SPECIFIC PLAN



Final

Task Specific Plan Former Smelter Area Scoping Survey

**Alameda Point
Alameda, California**

February 18, 2011

Prepared for:

**Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California**

Prepared by:

**ChaduxTt, a Joint Venture of St. George Chadux
Corp. and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101**

Prepared under:

**Naval Facilities Engineering Command Southwest
Contract Number: N62473-07-D-3213
Delivery Order: 0025**

CHAD-3213-0025-0031

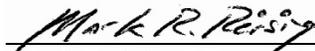
FINAL
TASK SPECIFIC PLAN
FORMER SMELTER AREA SCOPING SURVEY
ALAMEDA POINT
ALAMEDA CALIFORNIA
FEBRUARY 2011

Prepared for:
Department of the Navy
Base Realignment and Closure
Program Management Office West
Naval Facilities Engineering Command Southwest

Prepared by:
ChaduxTt,
a Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
San Diego, California 92101

Prepared under:
Naval Facilities Engineering Command
Contract Number N62473-07-D-3213
Delivery Order 0025
Document Control Number: CHAD-3213-0025-0031

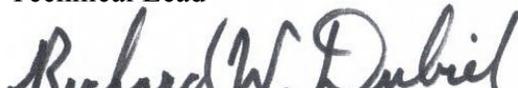
REVIEW AND APPROVAL



Mark Reisig, REA
Project Manager



Lawson Bailey
Technical Lead



Richard Dubiel, CHP
Site Project Manager

TABLE OF CONTENTS

| | |
|--|----|
| REVIEW AND APPROVAL | i |
| ACRONYMS AND ABBREVIATIONS | iv |
| 1.0 INTRODUCTION | 1 |
| 1.1 SITE DESCRIPTION AND HISTORICAL SUMMARY | 1 |
| 2.0 SURVEY DESCRIPTION..... | 1 |
| 2.1 SURVEY PREPARATION AND REMEDIATION ACTIVITIES..... | 2 |
| 2.2 RELEASE CRITERIA | 2 |
| 2.3 REFERENCE AREA | 2 |
| 2.4 INVESTIGATION LEVELS..... | 3 |
| 2.5 SURVEY UNITS AND CLASSIFICATION | 3 |
| 2.6 ESTABLISHING THE NUMBER OF MEASUREMENTS | 3 |
| 2.7 ALPHA AND BETA SCAN MEASUREMENTS | 4 |
| 2.7.1 Alpha Scan Measurements..... | 5 |
| 2.7.2 Beta Scan Measurements | 6 |
| 2.8 ALPHA AND BETA STATIC MEASUREMENTS | 8 |
| 2.8.1 Alpha Static Measurements | 9 |
| 2.8.2 Beta Static Measurements..... | 10 |
| 2.9 GAMMA WALK OVER SURVEY | 11 |
| 2.10 SOIL SAMPLING..... | 11 |
| 2.11 SEDIMENT SAMPLING..... | 11 |
| 3.0 SITE RESTORATION | 11 |
| 4.0 FORMER SMELTER AREA REPORT..... | 12 |
| 5.0 QUALITY CONTROL..... | 12 |
| 6.0 ENVIRONMENTAL PROTECTION..... | 12 |
| 7.0 REFERENCES | 12 |

LIST OF FIGURES

- 1 Former Smelter Area Photograph
- 2 Former Smelter Area Classification and Survey Units
- 3 Former Smelter Area Survey Unit 1 Sample Points
- 4 Former Smelter Area Survey Unit 2 Sample Points
- 5 Former Smelter Area Survey Unit 3 Sample Points
- 6 Former Smelter Area Survey Unit 4 Sample Points

LIST OF TABLES

- Table 1: Applicable Standard Operating Procedures
- Table 2: Primary Radiation Properties And Release Criteria For Radionuclides of Concern
- Table 3: Summary Of Data Quality Objectives
- Table 4: Definable Features Of Work For Radiological Surveys

ACRONYMS AND ABBREVIATIONS

| | |
|-------------------------|---|
| α | Alpha |
| β | Beta |
| ε_i | Instrument efficiency |
| ε_s | Contaminated surface efficiency |
| B | Background count rate |
| b_i | Number of background counts in scan time interval |
| d' | Index of sensitivity |
| E | Detector efficiency |
| G | Source activity |
| i | Scan or observation interval |
| ρ or P | Probability |
| p | Surveyor efficiency factor |
| R_B | Background count rate |
| t | Time interval of detector over source |
| T_B | Background counting time |
| T_{S+B} | Sample counting time |
| W_A | Area of the detector window |
| $Z_{1-\alpha}$ | Type I decision error level |
| $Z_{1-\beta}$ | Type II decision error level |
| APP | Accident prevention plan |
| cm | Centimeter |
| cm ² | Square centimeter |
| cm/sec | Centimeter per second |
| Co-60 | Cobalt 60 |
| cpm | Count per minute |
| Cs-137 | Cesium 137 |
| dpm | Disintegration per minute |
| dpm/100 cm ² | Disintegration per minute per 100 square centimeter |
| DFW | Definable features of work |
| inch/sec | Inch per second |
| MARSSIM | Multi-Agency Radiation Survey and Site Investigation Manual |
| MDC | Minimum detectable concentration |
| MDCR | Minimum detectable count rate |
| min | Minute |

ACRONYMS AND ABBREVIATIONS (CONTINUED)

| | |
|-----------------|---|
| N | Number of data points |
| NAS | Naval Air Station |
| NRC | Nuclear Regulatory Commission |
| pCi/g | Picocurie per gram |
| Pu-239 | Plutonium 239 |
| PSPC | Position sensitive proportional counter |
| Ra-226 | Radium 226 |
| RASO | Radiological Affairs Support Office |
| SCM | Surface contamination monitor |
| sec | Second |
| SIMS | Survey Information Management System |
| Sr-90 | Strontium 90 |
| SSHP | Site safety and health plan |
| SOP | Standard operating procedure |
| TSP | Task specific plan |
| UO ₂ | Uranium dioxide |

1.0 INTRODUCTION

This task specific plan (TSP) provides task-specific details for the scoping survey at the Former Smelter Area at the former Naval Air Station (NAS) Alameda, now known as Alameda Point. The survey will be conducted in accordance with the general approach and methodologies that are given in the work plan for Basewide Radiological Surveys at former NAS Alameda ([ChaduxTt 2010a](#)) and standard operating procedures (SOP). The surveys will conform to the requirements of the site safety and health plan (SSHP) ([ChaduxTt 2010b](#)) and accident prevention plan (APP) ([ChaduxTt 2010c](#)) prepared for the survey program. No exceptions to the work plan, SOPs, SSHP or APP are noted.

1.1 SITE DESCRIPTION AND HISTORICAL SUMMARY

According to the Site-specific Historical Radiological Assessment (Weston Solutions, Inc 2007), the smelter that existed in the 1940s and early 1950s was removed before the mid-1950s. Proposed construction of a new Turbo Jet facility in 1949 showed metal scrap bins identified as Building 44 and a smelter that was unnumbered. The Turbo Jet facility was not actually built. The smelter was located just east of Building 66 in 1949. The metal scrap bins, which were the feed for the smelter, were demolished in the early 1950s. It is likely the smelter was abandoned at the same time. By 1954, Buildings 398 and 399 were shown on the station map in the location where the proposed Turbo Jet Overhaul facility was to be constructed with the smelter no longer present. Much of the area identified as the smelter area in the 1949 drawing is presently occupied by Buildings 398 and 399 as well as support equipment to those buildings. A concrete pad, west of Building 399 is identifiable in the photos showing smelter location and in later photos showing the site during the late 1950s. The concrete pad appeared to be a storage location for metal bins. The concrete slab is currently fully exposed. It is possible that radium components were melted down along with other metal components at the smelter location. Slag from the smelter operation would likely have been disposed in Installation Restoration Site 1. The location of the former smelter area relative to existing buildings is shown in [Figure 1](#).

2.0 SURVEY DESCRIPTION

This scoping survey is being performed to assess if residual activity is above the established release criteria in accessible areas, as defined in Table 6-1 of the work plan ([ChaduxTt 2010a](#)) and to determine further actions that may need to be taken in the vicinity. Surveys will consist of gamma walkover surveys, soil sampling and sampling of drains in the area. The walkover surveys will be used to bias the sampling. Surveys will be performed within accessible areas immediately adjacent to the former smelter for the presence of Radium 226 (Ra-226), Cobalt 60 (Co-60), Cesium 137 (Cs-137), Strontium 90 (Sr-90), Plutonium 239 (Pu-239), and Uranium dioxide (UO₂). Scan surveys for both alpha (α) and beta (β) emitting radioisotopes will be performed on the concrete pad in the vicinity of Building 399. The areas to be surveyed, as well as indications of major obstructions such as cooling towers, receiver tanks and air handing equipment are shown in [Figure 2](#).

2.1 SURVEY PREPARATION AND REMEDIATION ACTIVITIES

The smelter has been removed. Buildings 398 and 399 occupy a significant portion of the smelter area footprint. The area surrounding Building 399 consists of asphalt pavement and concrete. The concrete areas are designed pedestals for large equipment or to control leakage from process piping. Asphalt within the boundary of the survey will be removed to expose soil. Concrete that is not serving as a pedestal for equipment will also be removed.

2.2 RELEASE CRITERIA

The following are the release criteria for radionuclides of concern in soil ([ChaduxTt 2010a](#)):

- Ra-226 = 1.0 picocuries per gram (pCi/g) above background
- Co-60 = 0.0361 pCi/g
- Cs-137 = 0.113 pCi/g
- Sr-90 = 0.331 pCi/g
- Pu-239 = 2.59 pCi/g
- UO₂ = 0.398 pCi/g

The limits for the specific radionuclides to be addressed for the former smelter area are provided in [Table 2](#).

2.3 REFERENCE AREA

The reference area will be selected with the concurrence of Navy Radiological Affairs Support Office. Reference data for the radionuclide of concern that exist in nature, Ra-226, were obtained from the abstract ([Tetra Tech ECI 2010](#)). Eighteen reference area samples from an area west of Building 3 and south of Building 4 were obtained and analyzed. This area was not identified in the HRA as being impacted. The analytical results for Ra-226 is summarized in Table 3-3 of the reference area document ([Tetra Tech ECI 2010](#)). Background activity for Ra-226 was determined to be 0.5602 pCi/g, resulting in a release criterion for Ra-226 of 1.5602 pCi/g. The analytical procedure used to determine Ra-226 may have introduced a small non-conservative factor. For purposes of this scoping survey, the non-conservative value will be applied. Further sampling may be required if sample activity challenges the release criteria.

Gamma walkover surveys will be performed in areas west of Building 3 or south of Building 4 to determine the relative response of the process in a known non-impacted area.

2.4 INVESTIGATION LEVELS

Investigation levels for the soil sample analytical results will be equal to the release criteria for the more restrictive isotope of concern in each area sampled.

2.5 SURVEY UNITS AND CLASSIFICATION

The Former Smelter Area is a 40,000 square foot area east of Building 66. Much of the area is occupied by new Buildings 398 and 399. There are several concrete pads that are pedestals for existing support equipment to Buildings 398 and 399. The area available for survey once the asphalt and concrete pavement is removed will be divided into a Class 1 area, Class 2 area and Class 3 area. The Class 1 area is located on the east side of Building 399. A 10 foot Class 2 buffer area will surround the Class 1 area. A Class 3 area is located west of Building 399. [Figure 1](#) also identifies obstructions that will not be removed due to their support functions to Buildings 398 and 399. Gamma walk over surveys using a sodium iodide detector will be performed in all classification areas with exposed soil. Gamma walkover surveys are not quantitative, but will establish relative values across the exposed soil areas. The gamma scan values will be evaluated to determine the presence of outliers. Outlier locations, if present, will be used to bias soil sampling. Gamma scan methods are further discussed in Section 2.9. Soils samples will be obtained in each area, Class 1, 2, and 3 at systematic data collection points as modified by data obtained from the walk over surveys. Using a random start point, systematic data collection locations (N) will be laid out in a triangular grid pattern for the survey units using the computer process provided by Visual Sample Plan ([Gilbert et al. 2001](#)). In some cases, the number of data collection locations may exceed N. Locations for data collection locations are provided in [Figures 3](#) through [6](#).

2.6 ESTABLISHING THE NUMBER OF MEASUREMENTS

Although some of the radionuclides of concern are found in background, the majority are not. Therefore determination of the number of soil samples will be based on contaminants not present in background. To determine the number of samples, N, to be taken per survey unit when the contaminant is not present in background, Equation 4-2 of the work plan ([ChaduxTt 2010a](#)) is used:

Equation 4-2 from the Work Plan ([ChaduxTt 2010a](#))

$$N = \left(\frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(\text{Sign } \rho - 0.5)^2} \right) (1.2)$$

Where:

N = Number of data points

$Z_{1-\alpha}$ = Type I decision error level, 1.645

$Z_{1-\beta}$ = Type II decision error level, 1.645

Sign ρ = random measurement probability, 0.945201

1.2 = 20 percent increase in number of samples over the minimum

The values used in the calculation are from Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance (Nuclear Regulatory Commission [NRC] 2000) and are based on a recommended value for the lower bound of the gray region of 1.6 as discussed in Section 4.2.1 of the work plan (ChaduxTt 2010a). Type I and Type II decision errors are based on 0.05 false negative and 0.05 false positive rates. The associated Z values are obtained from MARSSIM Table 5.2 (NRC 2000). The random measurement probability, Sign ρ , is from MARSSIM Table 5.4 (NRC 2000).

Using the defined values, the equation becomes:

$$N = \left(\frac{(1.645 + 1.645)^2}{4(0.945201 - 0.5)^2} \right) (1.2)$$

The calculation results in a value of $N = 16.38$. Therefore, a minimum of 17 soil samples will be obtained in each survey unit.

2.7 ALPHA AND BETA SCAN MEASUREMENTS

Scan measurements are performed to identify elevated areas of radioactivity within the survey unit. Alpha scans will be effective for identifying elevated concentrations of Ra-226, Pu-239 and UO₂. Beta scans will be effective in identifying elevated concentrations of Co-60, Cs-137 and Sr-90. Fifty percent of surfaces on the concrete pad Class 2 survey unit will be scanned with the surface contamination monitor (SCM) in the dynamic mode of operation.

The SCM utilizes a gas flow position sensitive proportional counter (PSPC). The PSPC functions as any gas flow proportional counter, using P-10 as the counting gas. As in any proportional counter, voltage plateaus are established for the detection of alpha or alpha plus beta particles. High voltage appropriate for the type of particles to be detected is applied to the single anode wire which runs the length of the detector. The SCM computer compares the pulse heights of pulses sensed at each end of the anode wire and establishes the location on the anode wire where the pulse was sensed. Although the available resolution is greater than 2,000 locations on the anode wire, the SCM computer will “bin” the data in 5 centimeters (cm) wide increments along length of the wire.

The SCM can be operated in both a dynamic or “rolling” mode or a static or “corner” mode. In the dynamic mode, the system uses a direct current powered drive motor affixed to a cart which contains all electronics and computer hardware, and a detector (or two) is mounted to the front of the cart. The SCM’s design focuses on the elimination of human issues associated with performing surveys of large areas. The system is designed such that surveys are performed at constant speed, the detector held at a set distance from the surface being surveyed, and survey

data recorded automatically. In the dynamic mode, a precision wheel encoder is mounted to the cart axle to determine distance traveled by the cart. The encoder can measure to a small fraction of a centimeter and is used to trigger the computer to capture data for every 5 cm of travel of the SCM cart. The result is count data (counts) for every 5 cm “bin” for every 5 cm of travel, or a matrix of 25 square centimeters (cm²) “pixels” of data. In the static mode, a preset time is applied to the collection of data from a stationary detector. Data is binned in a manner similar to the dynamic mode.

Data is transferred from the SCM to a processing station containing the Survey Information Management Systems (SIMS) software via removable media. SIMS software is used to “stitch” the individual strips of data to create a single survey of an entire area. The data collected in pixels is summed with adjacent pixels in a manner that will result in the evaluation of every possible 100 cm² area. When determining activity, each pixel is 25 percent of four overlapping 100 cm² areas. This process ensures that small areas of activity above limits are not missed through grid registration errors.

2.7.1 Alpha Scan Measurements

The SCM will be the primary instrument used to perform alpha surveys. The SCM will be used in the recount mode, using two detectors hard mounted to each other at a set distance. The system will be operated at a target speed of 0.5 inch per second (inch/sec) with detection probability of greater than 95 percent at the activity level of 100 disintegration per minute (dpm) per 100 cm² (dpm/100 cm²). Locations with positive indication of activity greater than 100 dpm/100 cm² will be further evaluated using the SCM or direct measurement using the Ludlum 43-68 detector with the Ludlum 2221 ratemeter. The probability of detecting two counts due to a source is given by Equation 7-5 from the work plan (ChaduxTt 2010a) below.

Equation 7-5 from the Work Plan (ChaduxTt 2010a)

$$P(n \geq 2) = 1 - \left(1 + \frac{(GE + B)t}{60} \right) e^{-\frac{(GE+B)t}{60}}$$

Where:

$P(n \geq 2)$ = probability of getting two or more counts during the time interval t

t = time interval of detector over source in seconds (sec)

G = source activity (dpm)

E = detector efficiency (4π)

B = background count rate (count per minute [cpm])

60 = conversion factor, seconds to minutes

Since the detectors associated with the SCM are manufactured to the same specifications, the efficiency of each detector is similar. Therefore, the probability of obtaining two or more counts

on each detector as they traverse the same 100 dpm source is the square of the probability for a single detector.

Typical background values observed with the SCM are less than 1 cpm/100 cm². Efficiency (4π) of the SCM for alpha emitters has been measured at 25 percent or greater. The efficiency for a point source would be 50 percent. The detector width is 12 cm. Survey speed for alpha emitters is 1.25 centimeter per second (cm/sec) (0.5 inch/sec). Using these parameters, equation 7-5 from the work plan (ChaduxTt 2010a) becomes:

$$P(n \geq 2) = 1 - \left(1 + \frac{(100 * 0.5 + 1)9.6}{60} \right) e^{-\frac{(100*0.5+1)9.6}{60}}$$

Where:

$P(n \geq 2)$ = probability of getting two or more counts during the time interval t

$t = 9.6$ sec

$G = 100$ dpm

$E = 0.5$

$B = 1$ cpm

Therefore:

$$P(n \geq 2) = 0.9974 \text{ or } 99.74\%$$

The probability of both detectors responding with two or more counts from a point source of 100 dpm at a speed of 1.25 cm/sec (0.5 inch/sec) would be the square of a single detector, or:

$$P(n \geq 2)_{2 \text{ det}} = 99.48\%$$

Therefore, the scan speed for the SCM for alpha emitting nuclides will be 1.25 cm/sec (0.5 inch/sec).

2.7.2 Beta Scan Measurements

For beta surveys, the SCM will also be the primary instrument. On the concrete pad Class 2 area, the SCM will be used in the single detector mode operated on the alpha plus beta plateau at a target speed of 2 inch/sec (5 cm/sec). The minimum detectable count rate (MDCR) in a scan interval can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in d') as shown in Equation 7-6 from the work plan (ChaduxTt 2010a) below:

Equation 7-6 from Work Plan (ChaduxTt 2010a)

$$MDCR = d' \sqrt{b_i} \left(\frac{60}{i} \right)$$

Where:

MDCR = minimum detectable number of net source counts in the scan interval (cpm)

d' = index of sensitivity (α and β errors [performance criteria])

b_i = number of background counts in scan time interval (count)

i = time interval of detector over source (sec)

60 = conversion factor, seconds to minutes

The required rate of true positives will be 95 percent, and the false positives will be 5 percent. From Table 6.5 of MARSSIM (NRC 2000), the value of d' , representing this performance goal, is 3.28.

The scan minimum detectable concentration (MDC) is determined from the MDCR by applying conversion factors that account for detector and surface characteristics and surveyor efficiency. As discussed above, the MDCR accounts for the background level, performance criteria (d'), and observation interval. The observation interval during scanning is the actual time that the detector can respond to the contamination source. This interval depends on the scan speed, detector size in the direction of the scan, and area of elevated activity.

The scan MDC for structure surfaces is calculated using Equation 7-8 from the work plan (ChaduxTt 2010a) below:

Equation 7-8 from Work Plan (ChaduxTt 2010a)

$$\text{Scan MDC} = \frac{MDCR}{\sqrt{p \varepsilon_i \varepsilon_s} \frac{W_A}{100 \text{cm}^2}}$$

Where:

MDCR = minimum detectable number of net source counts in the scan interval (cpm)

p = surveyor efficiency factor

ε_i = instrument efficiency (count per particle)

ε_s = contaminated surface efficiency (particle per disintegration)

W_A = active area of the detector window (cm^2)

In Equation 7-8, W_A is the size of the “active” area of the detector window. If the area of the detector window is less than 100 cm^2 , it is necessary to convert the detector response to units of $\text{dpm}/100 \text{ cm}^2$. For detectors with active areas greater than or equal to 100 cm^2 , no correction is made.

The isotopes of concern for the Class 2 concrete pad area are Cs-137, Co-60 and Sr-90. Sr-90 has the most limiting release criteria; however, due to the high SCM efficiency for Sr-90, Co-60 will be most limiting in survey speed. Although the release criteria for Co-60 and Cs-137 are identical, scan speeds will be based on the efficiency of the SCM for Co-60 due to the lower energy beta resulting in lower detector efficiency.

For SCM scans for Co-60 in the Class 2 area:

$$MDCR = 3.28\sqrt{6.67\left(\frac{60}{2}\right)} = 254 \text{ cpm}$$

Where:

$$d' = 3.28$$

$$b_i = 6.67 \text{ counts (based on a 200 cpm background)}$$

$$i = 2 \text{ sec (based on a scan speed of 5 cm/sec and detector width of 10 centimeters)}$$

And:

$$\text{Scan MDC} = \frac{254}{\sqrt{1} * 0.404 * 0.25 * \frac{100}{100 \text{ cm}^2}} = 2,515 \text{ dpm}$$

Where:

$$p = 1$$

$$\epsilon_i = 0.404$$

$$\epsilon_s = 0.25$$

$$W_A = 100 \text{ cm}^2$$

2.8 ALPHA AND BETA STATIC MEASUREMENTS

Alpha and beta static measurements will be obtained with the Ludlum 43-68 detector coupled to the Ludlum 2221 rate meter. The Ludlum 43-68 detector will be used to obtain fixed measurements at the number of locations identified in [Section 2.5](#) or to investigate areas of elevated alpha activity as identified by the SCM.

2.8.1 Alpha Static Measurements

Based on standard MDC formulas, static measurements for alpha emissions from Ra-226, will require a 2 minute count time for the Ludlum 43-68. The instrument efficiency for the Ludlum 43-68 is approximately 25 percent, based on a Thorium 230 source. The MDC calculation for the specified count time from equation 7-10 of the work plan (ChaduxTt 2010a):

Equation 7-10 from Work Plan (ChaduxTt 2010a)

$$MDC = \frac{3 + 3.29 \sqrt{R_B T_{S+B} \left(1 + \frac{T_{S+B}}{T_B}\right)}}{\varepsilon_i \varepsilon_s \frac{W_A}{100 \text{ cm}^2} T_{S+B}}$$

Where:

R_B = background count rate (cpm)

T_B = background counting time (minute [min])

T_{S+B} = sample counting time (min)

ε_i = instrument efficiency (count per particle)

ε_s = contaminated surface efficiency (particle per disintegration)

W_A = active area of the detector window (cm^2)

For the Ludlum 43-68 surveying for Ra-226, the equation becomes:

$$MDC = \frac{3 + 3.29 \sqrt{(1)(2) \left(1 + \frac{(2)}{(2)}\right)}}{(0.25)(0.25) \frac{100 \text{ cm}^2}{100 \text{ cm}^2} * (2)}$$

$$MDC = 76.64 \text{ dpm}$$

Where:

$R_B = 1 \text{ cpm}$

$T_B = 2 \text{ min}$

$T_{S+B} = 2 \text{ min}$

$\varepsilon_i = 0.25$

$\varepsilon_s = 0.25$

$W_A = 126 \text{ cm}^2$ (areas greater than 100 cm^2 default to 100 cm^2)

Therefore, the count time for Ra-226 with the Ludlum 43-68 will be 2 minutes.

The specified count times are based on the MDC formula, Equation 7-10 from the work plan (ChaduxTt 2010a). The count times are useful in determining an instruments ability to meet the required MDC. However, empirically derived values will provide a more accurate assessment of the MDC for a specified count time as recommended by MARSSIM (NRC 2000). Empirical values will be determined at Alameda Point in conjunction with reference area measurements. With concurrence of Radiological Affairs Support Office (RASO), count times determined based on empirical data will be used for static survey measurements.

2.8.2 Beta Static Measurements

Static measurement count times for the beta from Co-60 will be 30 seconds for the Ludlum 43-68 with the Ludlum 2221 rate meter.

For the Ludlum 43-68 surveying for Co-60, the MDC equation becomes:

$$MDC = \frac{3 + 3.29 \sqrt{200 * 0.5 * \left(1 + \frac{0.5}{0.5}\right)}}{0.202 * 0.25 * \frac{100}{100 \text{ cm}^2} * 0.5} = 1,961 \text{ dpm}$$

Where:

$$R_B = 200 \text{ cpm}$$

$$T_B = 30 \text{ sec or } 0.5 \text{ min}$$

$$T_{S+B} = 30 \text{ sec or } 0.5 \text{ min}$$

$$\epsilon_i = 0.202$$

$$\epsilon_s = 0.25$$

$$W_A = 126 \text{ cm}^2 \text{ (areas greater than } 100 \text{ cm}^2 \text{ default to } 100 \text{ cm}^2\text{)}$$

Therefore, the count time for Co-60 with the Ludlum 43-68 in the static mode will be 30 seconds.

The specified count times are based on the MDC formula, Equation 7-10 from the work plan (ChaduxTt 2010a). The count times are useful in determining an instruments ability to meet the required MDC. However, empirically derived values will provide a more accurate assessment of the MDC for a specified count time as recommended by MARSSIM (NRC 2000). Empirical values will be determined at Alameda Point in conjunction with reference area measurements. With concurrence of RASO, count times determined based on empirical data will be used for static survey measurements.

2.9 GAMMA WALK OVER SURVEY

Gamma walk over surveys will be performed in each survey area. 100 percent of exposed soil in the Class 1 area will be surveyed. At least 50 percent of the exposed soil in the Class 2 area and 25 percent of the exposed soil in the Class 3 area will be surveyed. Surveys will be conducted using a 2 inch by 2 inch (diameter and thickness) sodium iodide detector coupled to a ratemeter and data recorder. Data will be recorded at timed intervals during the scan. The ratemeter will be operated in the open window (no electronic discrimination) mode. The walk over survey will be conducted by walking the area in lanes of 1 meter width at approximately 0.5 meter per second with the detector approximately 10 cm (4 inches) from the soil surface while moving the detector in a serpentine (S-shaped) fashion. Output from the gamma scan will be evaluated by analyzing the data in a Cumulative Frequency Distribution plot. Outliers identified as departure toward extreme values be linked to the time of data collection, which will be linked to location. Those areas will be used to bias the soil sampling activities. Since the walkover gamma readings will be used as relative values, system sensitivity and MDC values are not critical and are therefore not discussed.

Gamma exposure readings using a calibrated microR meter, Ludlum Model 19, will be obtained at each of the soil sample locations in each area.

2.10 SOIL SAMPLING

Soil samples will be collected at each of the data collection locations identified in [Figures 3 through 6](#) and at any location determined by the gamma walk over survey. Additional samples will be collected from any area identified in the gamma walkover survey. Samples will be obtained from the top six inches of soil in accordance with SOP 009, *Sampling Procedures for Radiological Surveys* (see Appendix B of the work plan [[ChaduxTt 2010a](#)]), and submitted to an off-site laboratory for radiological analysis. Analysis of results will be evaluated against soil criteria identified in [Table 2](#).

2.11 SEDIMENT SAMPLING

Sediment samples will be collected from man holes that serve storm drains and sanitary drains in the vicinity of the Former Smelter Area. Samples will be collected in accordance with SOP-009, *Sampling Procedures for Radiological Surveys* (see Appendix B of the work plan [[ChaduxTt 2010a](#)]), and submitted to an off-site laboratory for radiological analysis. One sediment sample per drain will be collected if sediment is present. Analysis of results will be evaluated against soil criteria identified in [Table 2](#).

3.0 SITE RESTORATION

Site restoration work will not be performed at the conclusion of surveying of the Former Smelter Area.

4.0 FORMER SMELTER AREA REPORT

Results of the laboratory analysis of soil and sediment samples and the gamma walk over survey data will be presented in a Survey Report.

5.0 QUALITY CONTROL

The data quality objectives for the survey are provided in [Table 3](#).

Definable features of work (DFW) establish the measures required to verify both the quality of work performed and compliance with project requirements. The DFW for this task is radiological surveys. Description of this DFW and the associated phases of quality control are presented in [Table 4](#).

6.0 ENVIRONMENTAL PROTECTION

Environmental protection requirements are addressed in the work plan ([ChaduxTt 2010a](#)).

7.0 REFERENCES

ChaduxTt. 2010a. Final Work Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. July 23.

ChaduxTt. 2010b. Final Site Safety and Health Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. August 6.

ChaduxTt. 2010c. Final Accident Prevention Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. August 6.

Gilbert et al. 2001. *Virtual Sample Plan*. Upgrade version 5.9 released October 29, 2009. Pacific Northwest National Laboratory. Principal authors of Version 5.9 Pulsipher, Wilson, et.al.

Nuclear Regulatory Commission (NRC). 2000. NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Rev. 1.

Tetra Tech ECI. 2010. *Survey Unit Project Reports Abstract Installation Restoration Sites 5 and 10, Buildings 5 and 400 Storm Drain Line, Time-Critical Removal Action, Former Naval Air Station Alameda, Alameda, California*.

Weston Solutions, Inc. 2007. *Final Historical Radiological Assessment, Alameda Naval Air Station, Use of General Radioactive Materials, 1941 – 2005*.

FIGURES



**Aerial View
Former Smelter Area
Outlined in black**



Alameda Point, Alameda, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 1
Former Smelter Area
Photograph



Rev 1

Floor: 341.5 m²



Blacked out areas represent major obstructions such as cooling towers and abutments.

-  CLASS 3 AREA
-  CLASS 2 AREA
-  CLASS 1 AREA
- SU** SURVEY UNIT



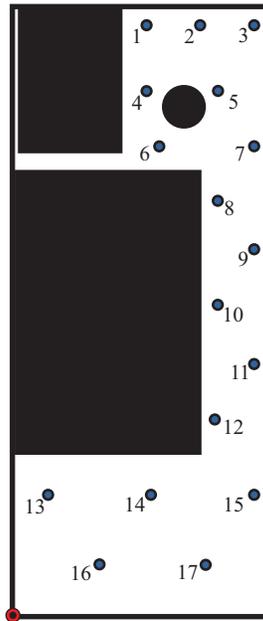
Alameda Point, Alameda, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 2
Former Smelter Area
Classification And Survey Units

Drawing Not To Scale

Rev 3

Floor: 39.96 m²



Class 1: Floor

 Sample Point

 South West Corner Reference



Alameda Point, Alameda, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 3
Former Smelter Area
Survey Unit 1
Sample Points

Drawing Not To Scale

Rev 3

Floor: 56.17 m²



Class 2: Floor

 **Sample Point**

 **South West Corner Reference**



Alameda Point, Alameda, California

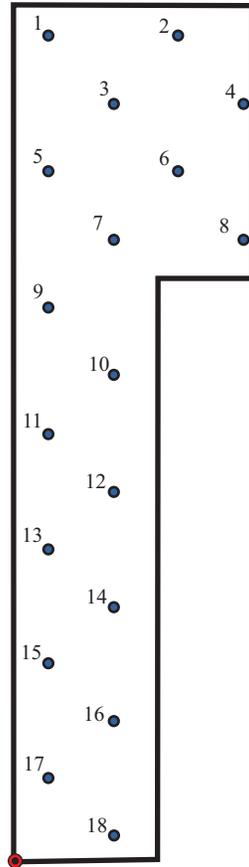
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 4
Former Smelter Area
Survey Unit 2
Sample Points

Drawing Not To Scale

Rev 3

Floor: 86.11 m²



Class 3: Floor

 **Sample Point**

 **South West Corner Reference**



Alameda Point, Alameda, California

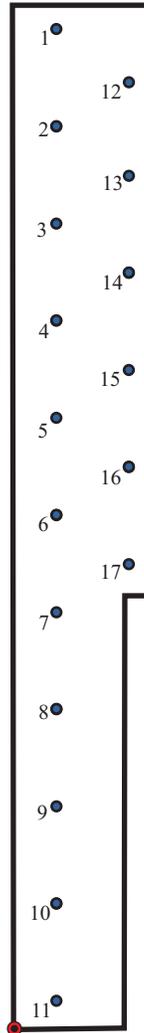
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 5
Former Smelter Area
Survey Unit 3
Sample Points

Drawing Not To Scale

Rev 2

Floor: 159.26 m²



Class 2: Floor

 Sample Point

 South West Corner Reference



Alameda Point, Alameda, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 6
Former Smelter Area
Survey Unit 4
Sample Points

Drawing Not To Scale

Rev 1

TABLES

TABLE 1: APPLICABLE STANDARD OPERATING PROCEDURES

Task Specific Plan for the Former Smelter Area Scoping Survey, Alameda Point, Alameda, California

| Procedure | Title | Rev |
|--------------|---|-----|
| SOP 002 | Radiation Work Permits | 0 |
| SOP 004 | Project Dosimetry | 0 |
| SOP 006 | Radiation and Contamination Surveys | 1 |
| SOP 007 | Preparation of Portable Radiation and Contamination Survey Meters for Field Use | 0 |
| SOP 008 | Air Sampling and Sample Analysis | 0 |
| SOP 009 | Sampling Procedures for Radiological Surveys | 2 |
| SOP 010 | RCA Posting and Access Control | 0 |
| SOP 011 | Control of Radioactive Materials | 1 |
| SOP 012 | Release of Materials and Equipment | 0 |
| SOP 016 | Decontamination of Equipment and Tools | 0 |
| SOP 022 | Radiological Clothing Selection, Monitoring and Decontamination | 0 |
| SOP 023 | Source Control | 0 |
| SOP 024 | Occurrence Reporting | 1 |
| RP-OP-017 | Operation of the Ludlum Model 2929 Dual Scaler | 1 |
| RP-OP-025 | Operation of the Ludlum Model 2221 | 0 |
| RP-OP-026 | Operation of the Ludlum Model 19 | 0 |
| SCM-OPS-01 | Position Sensitive Proportional Counters Purging | 0 |
| SCM-OPS-02 | Position Sensitive Proportional Counters Plateau Determination | 0 |
| SCM-OPS-03 | Position Sensitive Proportional Counters Position Calibration | 1 |
| SCM-OPS-04 | Encoder Calibration | 0 |
| SCM-OPS-05 | Position Sensitive Proportional Counters Efficiency Calibration | 0 |
| SCM-OPS-06 | Position Sensitive Proportional Counters Quality Assurance | 1 |
| SCM-SETUP-01 | Position Sensitive Proportional Counters Repair | 0 |
| SCM-SETUP-02 | Hardware Setup | 0 |
| SCM-SETUP-03 | Quality Assurance Testing of SCM | 0 |

TABLE 2: PRIMARY RADIATION PROPERTIES AND RELEASE CRITERIA FOR RADIONUCLIDES OF CONCERN

Task Specific Plan for Former Smelter Area Scoping Survey, Alameda Point, Alameda, California

| Radionuclide | Primary Radiation Properties | | Release Criteria ^a | | | | |
|-----------------|------------------------------|-----------------------------|-------------------------------|--------------------|------------------------|--------------------|------------------|
| | Half-Life | Type | Materials & Equipment | | Building Surfaces | | Soil |
| | | | Total Surface Activity | Removable Activity | Total Surface Activity | Removable Activity | Activity (pCi/g) |
| Co-60 | 5.26 years | Beta | 5,000 | 1,000 | 5,000 | 1,000 | 0.0361 |
| Cs-137 | 3.00E01 years | Beta | 5,000 | 1,000 | 5,000 | 1,000 | 0.113 |
| Pu-239 | 2.44E04 years | Alpha | 100 | 20 | 100 | 20 | 2.59 |
| Ra-226 | 1.6E03 years | Alpha Gamma ^c | 100 | 20 | 100 | 20 | 1 ^b |
| Sr-90 | 2.77E01 years | Beta | 1,000 | 200 | 1,000 | 200 | 0.331 |
| UO ₂ | 7.10E08 years | Alpha Beta | 5,000 | 1,000 | 488 | 98 | 0.398 |

Notes:

Cs-137 Cesium 137

Co-60 Cobalt 60

Pu-239 Plutonium 239

pCi/g picocurie per gram

Ra-226 Radium 226

Sr-90 Strontium 90

UO₂ Uranium Dioxide

a Units are disintegrations per minute per 100 square centimeters, unless otherwise specified.

b Goal is 1 pCi/g above background per agreement with U.S. Environmental Protection Agency.

c Ra-226 decays by alpha, but there are low abundance gammas from progeny. The primary means of decay is alpha, but surveying for Ra-226 in soil is done with a gamma sensitive detector.

Source:

ChaduxTt. 2010a. Final Work Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. July 23.

TABLE 3: SUMMARY OF DATA QUALITY OBJECTIVES

Task Specific Plan for the Former Smelter Area Scoping Survey, Alameda Point, Alameda, California

| STEP 1 Statement of Problem | STEP 2 Decisions | STEP 3 Inputs to the Decisions | STEP 4 Boundaries of Study | STEP 5 Decision Rules | STEP 6 Limits on Decision Errors | STEP 7 Optimizing the Sampling Design |
|--|--|---|---|---|---|--|
| <p>The Former Smelter Area is listed in the Historical Radiological Assessment as an area impacted by radiological activities. The isotopes of concern are Cs-137, Co-60, Sr-90, UO₂, and Pu-239.</p> <p>It must be determined if the site-specific release criteria for these isotopes have been met or if remediation is warranted.</p> | <p>The primary use of the data expected to result from completion of this TSP is to determine if soil samples meet the release criteria and if further actions are needed in for future.</p> <p>Therefore the decision to be made can be stated as “Do the results of the survey meet the release criteria?”</p> | <p>Radiological surveys required to support the Scoping Survey of the Former Smelter Area will include:</p> <ul style="list-style-type: none"> • 100 percent gamma walk over survey of Class 1 area. • 50 percent gamma walk over survey of Class 2 areas. • 25 percent gamma walk over survey of Class 3 areas. • A minimum of 17 systematic soil samples will be obtained in the Class 1 area, Class 2 area and Class 3 area. • One sediment sample will be collected from each drain if available. • 50 percent scan surveys of Class 2 areas. • A minimum of 17 systematic static measurements will be performed in Class 2 concrete pad. • One swipe to be analyzed for alpha and beta emitting nuclides at each systematic sample location on the Class 2 concrete pad. | <p>The lateral and vertical spatial boundaries for this survey effort are confined to the area specified as the Smelter Area.</p> | <p>If the concentration of radioactivity in soil samples is less than the release criteria, and if further actions are needed.</p> <p>If the results of the survey exceed the release criteria, then the area will be investigated further.</p> | <p>Limits on decision errors are set at 5 percent as specified in the work plan (ChaduxTt 2010a).</p> | <p>Operational details for the radiological survey process have been developed. The theoretical assumptions are based on guidelines contained in MARSSIM (NRC 2000). Specific assumptions regarding types of radiation measurements, instrument detection capabilities, quantities and locations of data to be collected, and investigation levels are contained in this TSP and the work plan (ChaduxTt 2010a).</p> |

Notes:

Cs-137 Cesium 137
 Co-60 Cobalt 60
 MARSSIM Multi-Agency Radiation Survey and Site Investigation Manual
 NRC Nuclear Regulatory Commission
 Pu-239 Plutonium 239

Ra-226 Radium 226
 Sr-90 Strontium 90
 TSP Task specific plan
 UO₂ Uranium dioxide

TABLE 4: DEFINABLE FEATURES OF WORK FOR RADIOLOGICAL SURVEYS

Task Specific Plan for the Former Smelter Area Scoping Survey, Alameda Point, Alameda, California

| ACTIVITY | PREPARATORY (Prior to initiating survey activity) | DONE | INITIAL (At onset of survey activities) | DONE | FOLLOW-UP (Ongoing during survey activities) | DONE |
|----------------------|--|-------------|--|-------------|--|-------------|
| Radiological Surveys | <ul style="list-style-type: none"> • Verify that an approved TSP is in place. • Verify that the Remedial Project Manager and the Caretaker Site Office are notified about mobilization. • Verify that an approved Radiation Work Permit, if required, is available and has been read and signed by assigned personnel. • Verify that the work plan, SSHP, APP and TSP, have been reviewed. • Verify that personnel assigned are trained and qualified. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimeter have completed NRC Form 4. • Verify that relevant SOPs are available and have been reviewed for equipment to be used. • Verify that equipment is on site and in working order (initial daily check). | | <ul style="list-style-type: none"> • Verify that radiological instruments are as specified in the work plan (ChaduxTt 2010a) and TSP. • Inspect Training Records. • Verify that reference area measurements have been obtained in accordance with the work plan (ChaduxTt 2010a). • Verify that daily checks were performed on all survey instruments. • Verify that instrument calibration and setup are current. • Verify that required dosimeter is being worn. • Verify that field logbooks and proper forms are in use. • Verify that samples and measurements are being collected in accordance with the TSP, work plan and applicable SOPs. • Verify the sample handling is in accordance with the work plan (ChaduxTt 2010a) and applicable SOPs. | | <ul style="list-style-type: none"> • Verify that the site is properly posted and secured. • Conduct ongoing inspections of material and equipment. • Verify that daily instrument checks were obtained and documented. • Verify that survey results were documented. • Inspect chain-of-custody and survey logs for completeness. • Verify that survey activities conform to the TSP. • Verify that survey instruments are recalibrated after repairs or modifications. | |

Notes:

- APP Accident prevention plan
- NRC Nuclear Regulatory Commission
- SOP Standard operating procedure
- SSHP Site safety and health plan

TSP Task specific plan

APPENDIX B
INSTRUMENT INFORMATION

Appendix B – Instrument Calibrations

1. SCMs (B-1)
2. Hand-helds (B-11)
3. Smear Counter (B-15)
4. Dose rate meter (B-18)

ATTACHMENT A

PSPC EFFICIENCY WORKSHEET – SCM MODEL III

Equipment Configuration

| | | | |
|---|----------------------------------|--|---------------|
| SCM III S/N: | 9 | Computer S/N: | TLSYS81800167 |
| Electronics S/N: | SRA E008 | HV Pre-amp S/N: | 19 |
| LV Pre-amp S/N: | 20 | A/B LLD Settings (mV): | 23 / 23 |
| Operating Voltage (V): | 1275 | PSPC Type (e.g. T180): | T180 |
| Mylar Thickness (mg/cm²): | 0.8 | Speed (in./sec) or Count Time (msec): | 0.5 in/sec |
| Recount Method (circle): | Average / Gamma Subtraction / NA | | |

Calibration Source(s) Information

| | Serial Number | Isotope | Emission Type | Half Life (years) | Assay Date | q _{2π} Emission (particles/min) | Active Area (cm ²) | Decay Corrected q _{2π} Emission* |
|---|---------------|---------|---------------|-------------------|------------|--|--------------------------------|---|
| 1 | D7928 | Th230 | Alpha | 75380 | 12-01-06 | 37490 | 100 | 37489 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |

* To calculate the decay corrected q_{2π} emission rate in particle/sec/100 cm²:

$$\text{Decay Corrected } q_{2\pi} = \left[q_{2\pi} \cdot e^{\frac{-(\ln 2)t}{T_{1/2}}} \right] \cdot \left[\frac{100}{A} \right], \text{ where}$$

t = time, in years, between assay date and calibration date

T_{1/2} = half life, in years

A = active area (cm²)

NOTE: The 100/A factor is only used when the area of the calibration source is larger than the width of the PSPC.

Data File Information

| | Filename | Number of Strips |
|---|----------|------------------|
| 1 | P9TH230R | 2 |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

ATTACHMENT A (cont'd)

Efficiency Calculation

| | Average (cpm/100 cm ²) | Instrument Efficiency (ϵ_i) | Surface Efficiency (ϵ_s) | Fraction (f) | Subtotal Efficiency (ϵ_t) |
|--|---------------------------------------|---|--|--------------|---|
| 1 | 26060 | 0.70 | 0.25 | 1 | 0.17 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| Total Efficiency (ϵ_T): | | | | | 0.17 |

Data Review

| Data Review | Name | Date | Signature |
|-----------------|-------------|----------|-------------------------|
| Operator | David Eaton | 10-14-10 | Signed original on file |
| Operator | | | |
| Data Processor | Don DeBord | 10-14-10 | Signed original on file |
| Project Manager | Dick Dubiel | 11-3-10 | Signed original on file |

ATTACHMENT A
PSPC EFFICIENCY WORKSHEET SR-90 – SCM MODEL III

Equipment Configuration

| | | | |
|---|---|--|---------------|
| SCM III S/N: | 9 | Computer S/N: | TLSYS81800167 |
| Electronics S/N: | SRA E008 | HV Pre-amp S/N: | 19 |
| LV Pre-amp S/N: | 20 | A/B LLD Settings (mV): | 23 / 23 |
| Operating Voltage (V): | 1875 | PSPC Type (e.g. T180): | T180 |
| Mylar Thickness (mg/cm²): | 0.8 | Speed (in./sec) or Count Time (msec): | 2 in/sec |
| Recount Method (circle): | Average / Gamma Subtraction / <u>NA</u> | | |

Calibration Source(s) Information

| | Serial Number | Isotope | Emission Type | Half Life (years) | Assay Date | q _{2π} Emission (particles/min) | Active Area (cm ²) | Decay Corrected q _{2π} Emission* |
|---|---------------|---------|---------------|-------------------|------------|--|--------------------------------|---|
| 1 | FY-865 | Cs-137 | Beta | 30 | 3/26/1998 | 90000 | 100 | 67418 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |

* To calculate the decay corrected q_{2π} emission rate in particle/sec/100 cm²:

$$\text{Decay Corrected } q_{2\pi} = \left[q_{2\pi} \cdot e^{\frac{-(\ln 2)t}{T_{1/2}}} \right] \cdot \left[\frac{100}{A} \right], \text{ where}$$

t = time, in years, between assay date and calibration date

T_{1/2} = half life, in years

A = active area (cm²)

NOTE: The 100/A factor is only used when the area of the calibration source is larger than the width of the PSPC.

Data File Information

| | Filename | Number of Strips |
|---|----------|------------------|
| 1 | G9CS137B | 30 |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

ATTACHMENT A (cont'd)

Efficiency Calculation

| | Average (cpm/100 cm²) | Instrument Efficiency (ϵ_i) | Surface Efficiency (ϵ_s) | Fraction (f) | Subtotal Efficiency (ϵ_t) |
|--|---|--|---|---------------------|--|
| 1 | 43341 | .64 | .50 | 1 | .32 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| Total Efficiency (ϵ_T): | | | | | 0.32 |

Data Review

| Data Review | Name | Date | Signature |
|--------------------|-------------|-------------|-------------------------|
| Operator | Don DeBord | 3-1-11 | Signed original on file |
| Operator | | | |
| Data Processor | Don DeBord | 3-1-11 | Signed original on file |
| Project Manager | Dick Dubiel | 3-1-11 | Signed original on file |

ATTACHMENT A
PSPC EFFICIENCY WORKSHEET SR-90 – SCM MODEL III

Equipment Configuration

| | | | |
|---|---|--|---------------|
| SCM III S/N: | 8 | Computer S/N: | TLSYS81800063 |
| Electronics S/N: | SRA E009 | HV Pre-amp S/N: | 11 |
| LV Pre-amp S/N: | 12 | A/B LLD Settings (mV): | 20 / 20 |
| Operating Voltage (V): | 1875 | PSPC Type (e.g. T180): | C180 |
| Mylar Thickness (mg/cm²): | 0.8 | Speed (in./sec) or Count Time (msec): | 8000 msec |
| Recount Method (circle): | Average / Gamma Subtraction / <u>NA</u> | | |

Calibration Source(s) Information

| | Serial Number | Isotope | Emission Type | Half Life (years) | Assay Date | q _{2π} Emission (particles/ min) | Active Area (cm ²) | Decay Corrected q _{2π} Emission* |
|---|---------------|---------|---------------|-------------------|------------|---|--------------------------------|---|
| 1 | FY-865 | Cs-137 | Beta | 30 | 3/26/1998 | 90000 | 100 | 67418 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |

* To calculate the decay corrected q_{2π} emission rate in particle/sec/100 cm²:

$$\text{Decay Corrected } q_{2\pi} = \left[q_{2\pi} \cdot e^{\frac{-(\ln 2)t}{T_{1/2}}} \right] \cdot \left[\frac{100}{A} \right], \text{ where}$$

t = time, in years, between assay date and calibration date

T_{1/2} = half life, in years

A = active area (cm²)

NOTE: The 100/A factor is only used when the area of the calibration source is larger than the width of the PSPC.

Data File Information

| | Filename | Number of Strips |
|---|----------|------------------|
| 1 | G8CS137B | 30 |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

ATTACHMENT A (cont'd)

Efficiency Calculation

| | Average (cpm/100 cm²) | Instrument Efficiency (ϵ_i) | Surface Efficiency (ϵ_s) | Fraction (f) | Subtotal Efficiency (ϵ_t) |
|--|---|--|---|---------------------|--|
| 1 | 38340 | .57 | .5 | 1 | 0.28 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| Total Efficiency (ϵ_T): | | | | | 0.28 |

Data Review

| Data Review | Name | Date | Signature |
|--------------------|-------------|-------------|-------------------------|
| Operator | Don DeBord | 2-28-11 | Signed original on file |
| Operator | | | |
| Data Processor | Don DeBord | 2-28-11 | Signed original on file |
| Project Manager | Dick Dubiel | 2-28-11 | Signed original on file |

ATTACHMENT A
PSPC EFFICIENCY WORKSHEET SR-90 – SCM MODEL III

Equipment Configuration

| | | | |
|---|---|--|---------------|
| SCM III S/N: | 8 | Computer S/N: | TLSYS81800063 |
| Electronics S/N: | SRA E009 | HV Pre-amp S/N: | 11 |
| LV Pre-amp S/N: | 12 | A/B LLD Settings (mV): | 20 / 20 |
| Operating Voltage (V): | 1875 | PSPC Type (e.g. T180): | T180 |
| Mylar Thickness (mg/cm²): | 0.8 | Speed (in./sec) or Count Time (msec): | 2 in/sec |
| Recount Method (circle): | Average / Gamma Subtraction / <u>NA</u> | | |

Calibration Source(s) Information

| | Serial Number | Isotope | Emission Type | Half Life (years) | Assay Date | q_{2π} Emission (particles/ min) | Active Area (cm²) | Decay Corrected q_{2π} Emission* |
|---|----------------------|----------------|----------------------|--------------------------|-------------------|---|-------------------------------------|---|
| 1 | FY-865 | Cs-137 | Beta | 30 | 3/26/1998 | 90000 | 100 | 67418 |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |

* To calculate the decay corrected q_{2π} emission rate in particle/sec/100 cm²:

$$\text{Decay Corrected } q_{2\pi} = \left[q_{2\pi} \cdot e^{\frac{-(\ln 2)t}{T_{1/2}}} \right] \cdot \left[\frac{100}{A} \right], \text{ where}$$

t = time, in years, between assay date and calibration date

T_{1/2} = half life, in years

A = active area (cm²)

NOTE: The 100/A factor is only used when the area of the calibration source is larger than the width of the PSPC.

Data File Information

| | Filename | Number of Strips |
|---|-----------------|-------------------------|
| 1 | G8CS137B | 30 |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

ATTACHMENT A (cont'd)

Efficiency Calculation

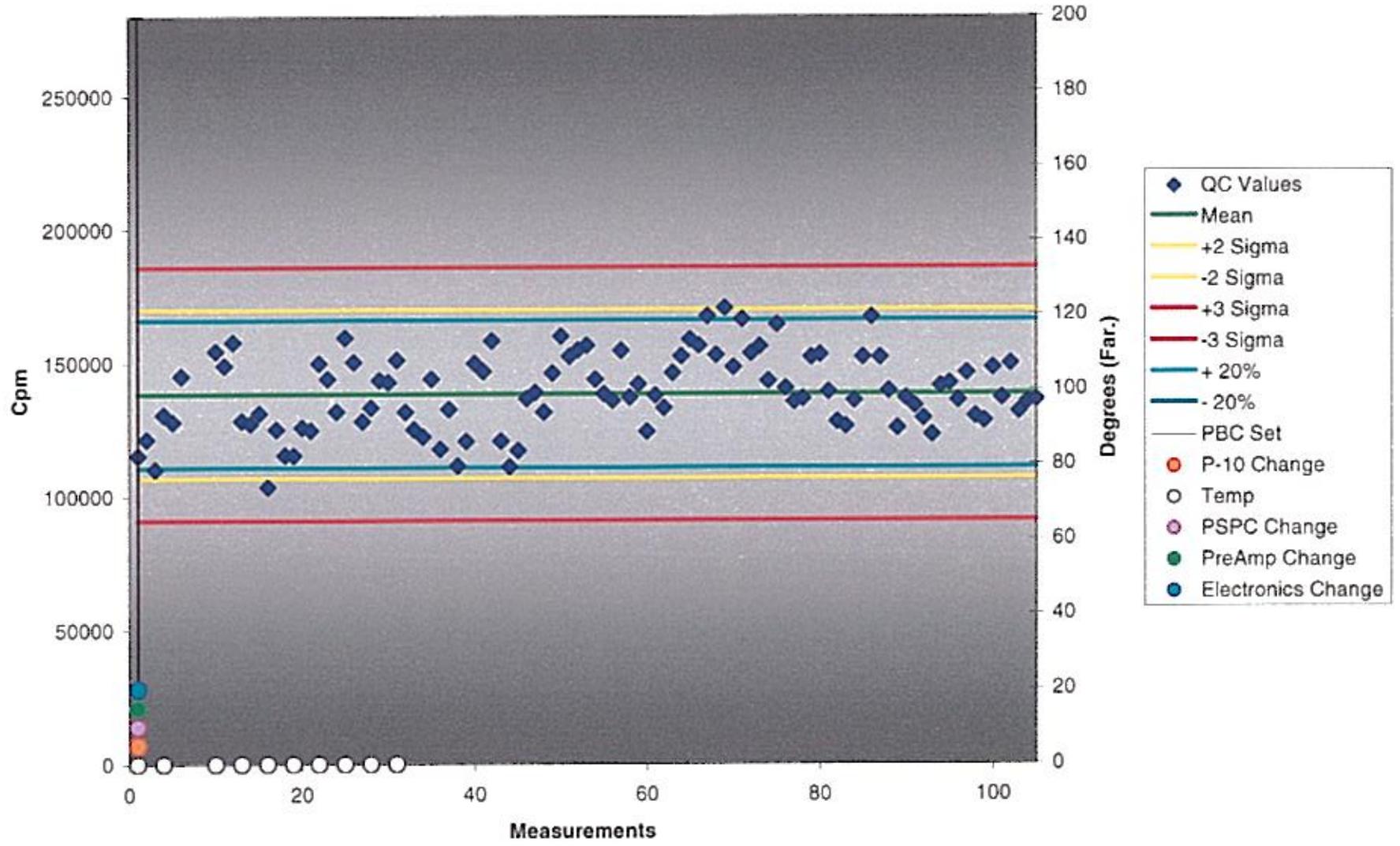
| | Average (cpm/100 cm²) | Instrument Efficiency (ϵ_i) | Surface Efficiency (ϵ_s) | Fraction (f) | Subtotal Efficiency (ϵ_t) |
|--|---|--|---|---------------------|--|
| 1 | 39860 | .59 | .5 | 1 | 0.30 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| Total Efficiency (ϵ_T): | | | | | 0.30 |

Data Review

| Data Review | Name | Date | Signature |
|--------------------|-------------|-------------|-------------------------|
| Operator | Don DeBord | 3-1-11 | Signed original on file |
| Operator | | | |
| Data Processor | Don DeBord | 3-1-11 | Signed original on file |
| Project Manager | Dick Dubiel | 3-1-11 | Signed original on file |

Typical QC Chart for SCMs

SCM4 T-180 Beta Performance Based Checks



Calibration Sheets

Hand-held detectors



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46,
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MILLENNIUM SERVICES INC

ORDER NO. 20147695/346446

Mfg. Ludlum Measurements, Inc. Model 2221 Serial No. 190181
Mfg. Ludlum Measurements, Inc. Model 44-9 Serial No. PR-169468
Cal. Date 15-Feb-10 Cal Due Date 15-Feb-11 Cal. Interval 1 Year Meterface 202-159

Check mark Applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 20 % Alt 698.8 mm Hg

- New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
- Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity
 F/S Resp. ck. Reset ck. Window Operation Geotropism
 Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 4.4 VDC
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper. Comments V at Comments mV Threshold Dial Ratio 100 = 10 mV
 HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2001 V

COMMENTS:

Probe: 44-9 43-68 (Alpha) 43-68 (Beta) instrument is currently set for 44-9 operation.
Highvoltage: 900v 1200v 1650v
Millivoltage: 600 (60mv) 50 (5mv) 50 (5mv)
window: 100 100 100
window position: off off off
Window @ 100 = 1.5 times threshold.
Calibrated with a 5' cable.
See attachment for efficiencies.
Firmware: 26 10 10

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source

| RANGE/MULTIPLIER | REFERENCE CAL. POINT | INSTRUMENT REC'D "AS FOUND READING" | INSTRUMENT METER READING* |
|------------------|----------------------|-------------------------------------|---------------------------|
| X 1K | 400kcpm | N/A | 400 |
| X 1K | 100kcpm | ⚡ | 100 |
| X 100 | 40kcpm | | 400 |
| X 100 | 10kcpm | | 100 |
| X 10 | 4kcpm | | 400 |
| X 10 | 1kcpm | | 100 |
| X 1 | 400cpm | | 400 |
| X 1 | 100cpm | | 100 |

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

| REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* | Log Scale | REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|----------------------|---------------------|---------------------------|-----------|----------------------|---------------------|---------------------------|
| 400kcpm | N/A | 39740 (0) | ⚡ | 500kcpm | N/A | 500K cpm |
| 40kcpm | ⚡ | 3974 | | 50kcpm | 50K | |
| 4kcpm | | 397 | | 5kcpm | 5K | |
| 400cpm | | 40 | | 500cpm | 500 | |
| 40cpm | | 4 | | 50cpm | 50 | |

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323-1978

State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E651 720 734 1616 Neutron Am-241 Be S/N T-304
 Alpha S/N Pu239sn 8744 Beta S/N Tc99sn:5280-04, Sr90y90sn. 4016 Other _____
 m 500 S/N 50800 Oscilloscope S/N _____ Multimeter S/N 83990502

Calibrated By: Charles disk Date 15 Feb 10
Reviewed By: Rhonda Hamin Date 15 Feb 10

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

AC Inst. Only Passed Dielectric (Hi-Pot) and Continuity Test Failed: _____



Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data

Detector 43-68 Serial No. PR-149768 Order # 20147695/346446
Customer MILLENNIUM SERVICES INC
Counter 2221 Serial No. 190181 Counter Input Sensitivity 5 ^{CS} ~~Comments~~ mV
Count Time 1 minute Distance Source to Detector Surface
Other Calibrated w/5' cable

| High Voltage | Background | Isotope Pu 239 Size | Isotope Tc 99 Size | Isotope Size | Isotope Size |
|--------------|------------|------------------------|-----------------------|-----------------|-----------------|
| 1100 | 0 | 84504 | | | |
| 1150 | 1 | 88213 | | | |
| - 1200 | 3 | 89848 | | | |
| 1250 | 2 | 90166 | | | |
| 1300 | 3 | 90274 | | | |
| 1350 | 2 | 90493 | | | |
| 1400 | 10 | 91252 | | | |
| 1600 | 152 | | 29757 | | |
| 1650 | 293 | | 34771 | | |
| 1700 | 365 | | 35574 | | |
| 1750 | 403 | | 36395 | | |

Gas proportional detector count rate decreased $\leq 10\%$ after 15 hour static test using 39" cable.

Signature Charles Dick Date 15 Feb 10

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1903

EFFICIENCY DETERMINATION

| | | | | | |
|---------------------------------|-----------|--|-------------------------------|-------------|-----------------------------------|
| Instrument Type | 2121 | | | | |
| Instrument Serial Number | 190181 | | | | |
| Probe Type | 43-68 | | | | |
| Probe Serial Number | 149768 | | | | |
| Operating Voltages (α/β) | 1200/1650 | | | | |
| Threshold | 50 | | | | |
| Date | 10/8/2010 | | | | |
| | Isotope | Instrument Efficiency (ϵ_i) | Surface Eff. (ϵ_s) | Fraction(f) | Total Efficiency (ϵ_t) |
| 1 | Th-230 | 37% | 0.25 | | 9% |
| 2 | C-14 | 41% | 0.25 | | 10% |
| 3 | Tc-99 | 33% | 0.25 | | 8% |
| 4 | Tl-204 | 43% | 0.5 | | 22% |
| 5 | Sr-90 | 39% | 0.5 | | 19% |

| | | | | | |
|---|-----------|-----------|-----------|----------|----------|
| Isotope | Th-230 | C-14 | Tc-99 | Tl-204 | Sr-90 |
| Serial Number | D7-928 | D7-934 | A7-132 | A7-134 | A7-135 |
| Emission Type | Alpha | Beta | Beta | Beta | Beta |
| Half Life | 75000 | 5730 | 213000 | 3.78 | 28.5 |
| Assay Date | 12/1/2006 | 12/1/2006 | 8/15/2002 | 8/7/2002 | 8/7/2002 |
| q_{2π} Emission Rate | 37490 | 52040 | 28170 | 24870 | 53150 |
| Decay Corrected q_{2π} Emission Rate | 37489 | 52016 | 28169 | 5554 | 43566 |
| Probe Coverage Percent | 88% | 88% | 88% | 88% | 88% |
| Adjusted Emission Rate | 32990 | 45774 | 24789 | 4888 | 38338 |
| Measurement 1 | 12060 | 18814 | 8320 | 2150 | 14770 |
| Measurement 2 | 12273 | 18710 | 8406 | 2081 | 14674 |
| Measurement 3 | 12382 | 18801 | 8452 | 2165 | 15057 |
| Measurement 4 | 12136 | 18807 | 8221 | 2047 | 14788 |
| Measurement 5 | 12323 | 18750 | 8096 | 2008 | 15019 |
| Measurement 6 | 12215 | 18677 | 8288 | 2190 | 15079 |
| Measurement 7 | 12249 | 18733 | 8531 | 2077 | 15230 |
| Measurement 8 | 12298 | 18727 | 8178 | 2096 | 14989 |
| Measurement 9 | 12323 | 18769 | 7920 | 2112 | 14705 |
| Measurement 10 | 12280 | 18752 | 8055 | 2141 | 14814 |
| Measurement 11 | 12229 | 18645 | 8271 | 2067 | 14909 |
| Measurement 12 | 12265 | 18654 | 8004 | 2100 | 15102 |
| Measurement 13 | 12263 | 18925 | 8279 | 2113 | 15015 |
| Measurement 14 | 12246 | 18757 | 7988 | 2160 | 14914 |
| Measurement 15 | 12300 | 18403 | 8041 | 2050 | 14814 |
| Measurement 16 | 12282 | 18830 | 8193 | 1996 | 14676 |
| Measurement 17 | 12063 | 18634 | 8080 | 2224 | 14943 |
| Measurement 18 | 12276 | 18749 | 8210 | 2124 | 14709 |
| Measurement 19 | 12324 | 19047 | 8102 | 2042 | 14829 |
| Measurement 20 | 12072 | 18906 | 7983 | 2089 | 14817 |
| Mean of Measurements | 12242.95 | 18754.5 | 8180.9 | 2101.6 | 14892.65 |
| Efficiency | 37% | 41% | 33% | 43% | 39% |

Calibration sheet

Smear counter



CERTIFICATE OF CALIBRATION

CUSTOMER MILLENNIUM SERVICES ORDER NO. 20147711/346456
Mfg. Ludlum Measurements, Inc. Model 2929 Serial No. 163817
Mfg. Ludlum Measurements, Inc. Model 43-10-1 Serial No. PR 167232
Cal. Date 3-Feb-10 Cal Due Date 3-Feb-11 Cal. Interval 1 Year Meterface 202-014

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 36 % Alt 698.8 mm Hg
 New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
 Mechanical ck. Window Operation
 Audio ck.
 Meter Zeroed Alpha Sensitivity 175 mV Beta Sensitivity 4 mV Beta Window 50 mV
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 750 V = 2.92 on High Voltage dial. High Voltage set with detector connected.
 HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1999 V

COMMENTS:

Po239 Size: 24600dpm counts: 10057cpm Cs137 Size: 6475dpm counts: 2153cpm
Bckgnd: 0cpm 4P: EFF: 40.88% Bckgnd: 77cpm 4P: EFF: 32.06%
Sr90 Size: 104607dpm counts: 48482cpm
Bckgnd: 77cpm 4P: EFF: 46.27%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

| Alpha Channel Digital Readout | REFERENCE CAL POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|-------------------------------|---------------------|---------------------|---------------------------|
| | <u>400K cpm</u> | <u>39962 (0)</u> | <u>39962 (0)</u> |
| | <u>40K cpm</u> | <u>3996</u> | <u>3996</u> |
| | <u>4K cpm</u> | <u>399</u> | <u>399</u> |
| | <u>400 cpm</u> | <u>40</u> | <u>40</u> |
| | <u>40 cpm</u> | <u>4</u> | <u>4</u> |

| Beta/Gamma Channel Digital Readout | REFERENCE CAL POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|------------------------------------|---------------------|---------------------|---------------------------|
| | <u>400K cpm</u> | <u>39962 (0)</u> | <u>39962 (0)</u> |
| | <u>40K cpm</u> | <u>3996</u> | <u>3996</u> |
| | <u>4K cpm</u> | <u>399</u> | <u>399</u> |
| | <u>400 cpm</u> | <u>40</u> | <u>40</u> |
| | <u>40 cpm</u> | <u>4</u> | <u>4</u> |

*Uncertainty within ± 10% C.F. within ± 20%

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
Cs-137 Gamma S/N 1162 G112 MS65 5105 11008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
 Alpha S/N Pu239 SN:5283 Beta S/N Sr90 SN:5281 Other Cs137 SN:158-112
 m 500 S/N 190566 Oscilloscope S/N Multimeter S/N 86250390

Calibrated By: Jason Flea Date 3-Feb-10
Reviewed By: Rhonda Harris Date 3 Feb 10



Bench Test Data For Detector

Detector 43-10-1 Serial No. PR167232 Order #. 20147711/346456
 Customer MILLENNIUM SERVICES Alpha Input Sensitivity 175 mV
 Counter 2929 Serial No. 163817 Beta Input Sensitivity 4 mV
 Count Time 1Minute Beta Window 50 mV
 Other _____ Distance Source to Detector TRAY

| High Voltage | Background | | Isotope <u>Po239</u> Size <u>24600dpm</u> | | Isotope <u>Sr90</u> Size <u>104607dpm</u> | | Isotope <u>Cs137</u> Size <u>6475dpm</u> | |
|--------------|------------|-----------|--|------------|--|--------------|---|-------------|
| | Alpha | Beta | Alpha | Beta | Alpha | Beta | Alpha | Beta |
| <u>700</u> | <u>0</u> | <u>73</u> | <u>9744</u> | <u>206</u> | <u>1</u> | <u>46804</u> | <u>0</u> | <u>1864</u> |
| <u>725</u> | <u>0</u> | <u>73</u> | <u>9858</u> | <u>218</u> | <u>2</u> | <u>48462</u> | <u>1</u> | <u>2005</u> |
| <u>750</u> | <u>0</u> | <u>77</u> | <u>10057</u> | <u>222</u> | <u>8</u> | <u>48482</u> | <u>1</u> | <u>2153</u> |
| <u>775</u> | <u>0</u> | <u>75</u> | <u>10136</u> | <u>235</u> | <u>33</u> | <u>47265</u> | <u>0</u> | <u>2126</u> |
| <u>800</u> | <u>6</u> | <u>77</u> | <u>10213</u> | <u>266</u> | <u>100</u> | <u>44954</u> | <u>0</u> | <u>2087</u> |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

- Gas Proportional detector count rate decreased \leq 10% after 15 hour static test using 39" cable.
- Gas proportional detector count rate decreased \leq 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature Jaron Fla Date 3-FEB-10

Calibration sheet

Dose rate meter



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MILLENNIUM SERVICES ORDER NO. 20147711/346456
Mfg. Ludlum Measurements, Inc. Model 19 Serial No. 142858
Mfg. _____ Model _____ Serial No. _____
Cal. Date 3-Feb-10 Cal Due Date 3-Feb-11 Cal. Interval 1 Year Meterface 202-016

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 36 % Alt 698.8 mm Hg
 New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
 Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity
 F/S Resp. ck. Reset ck. Window Operation Geotropism
 Audio ck. Alarm Settling ck. Batt. ck. (Min. Volt) 2.2 VDC
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.
 Instrument Volt Set 600 V Input Sens. 37 mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV
 HV Readout (2 points) Ref./Inst. _____ / _____ V Ref./Inst. _____ / _____ V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

| RANGE/MULTIPLIER | REFERENCE CAL. POINT | INSTRUMENT REC'D "AS FOUND READING" | INSTRUMENT METER READING* |
|------------------|-----------------------|-------------------------------------|---------------------------|
| 5000 | 4000 uR/hr | 3800 | 4000 |
| 5000 | 1000 uR/hr | 950 | 1000 |
| 500 | 400 uR/hr = 73000 cpm | 400 | 400 |
| 500 | 100 uR/hr | 100 | 100 |
| 250 | 200 uR/hr = 36000 cpm | 190 | 200 |
| 250 | 100 uR/hr | 95 | 100 |
| 50 | 7300 cpm | 40 | 40 |
| 50 | 1820 cpm | 10 | 10 |
| 25 | 3600 cpm | 20 | 20 |
| 25 | 900 cpm | 5 | 5 |

*Uncertainty within ± 10% C.F. within ± 20%

50, 25 Range(s) Calibrated Electronically

| REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* | Log Scale | REFERENCE CAL. POINT | INSTRUMENT RECEIVED | INSTRUMENT METER READING* |
|----------------------|---------------------|---------------------------|-----------|----------------------|---------------------|---------------------------|
| Digital Readout | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
 Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
 Alpha S/N _____ Beta S/N _____ Other _____
 m 500 S/N 190566 Oscilloscope S/N _____ Multimeter S/N 86250390

Calibrated By: [Signature] Date 3-Feb-10
 Reviewed By: [Signature] Date 3 Feb 10

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.
FORM C22A 10/15/2008

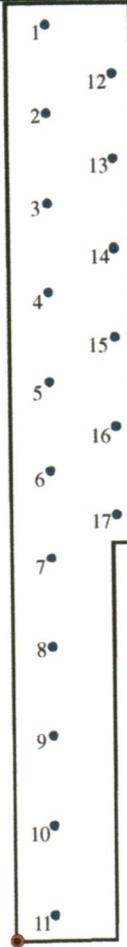
AC Inst. Passed Dielectric (Hi-Pot) and Continuity Test
Only Failed:

APPENDIX C
DIRECT SURVEY DATA

DIRECT SURVEY DATA
ALAMEDA HAND HELD SURVEY FORMS

Alameda Direct Survey Form

| | | | |
|----------------------------------|---|-----------------------|---------|
| Building: | Former Smelter Area | Survey Unit: | 4 Floor |
| Instrument Model Number: | 2221 | Serial Number: | 190181 |
| Probe Model Number: | 43-68 | Serial Number: | 149768 |
| Survey Type (Circle One): | <input checked="" type="radio"/> Alpha <input type="radio"/> Beta | | |



| # | Surface | Mat. Type | X (m) | Y (m) | Counts A (cpm) B | # | Surface | Mat. Type | X (m) | Y (m) | Counts A (cpm) B |
|---|---------|-----------|-------|-------|------------------|----|---------|-----------|-------|-------|------------------|
| 1 | Floor | 3 | 1.29 | 33.33 | 7 \ 121 | 10 | Floor | 3 | 1.29 | 4.21 | 9 \ 137 |
| 2 | Floor | ↓ | 1.29 | 30.09 | 9 \ 148 | 11 | Floor | ↓ | 1.29 | 0.97 | 9 \ 150 |
| 3 | Floor | ↓ | 1.29 | 26.86 | 15 \ 141 | 12 | Floor | ↓ | 3.50 | 31.71 | 8 \ 159 |
| 4 | Floor | ↓ | 1.29 | 23.62 | 7 \ 136 | 13 | Floor | ↓ | 3.50 | 28.47 | 10 \ 168 |
| 5 | Floor | ↓ | 1.29 | 20.39 | 12 \ 127 | 14 | Floor | ↓ | 3.50 | 25.24 | 6 \ 137 |
| 6 | Floor | ↓ | 1.29 | 17.15 | 8 \ 133 | 15 | Floor | ↓ | 3.50 | 22.00 | 4 \ 151 |
| 7 | Floor | ↓ | 1.29 | 13.91 | 10 \ 156 | 16 | Floor | ↓ | 3.50 | 18.77 | 6 \ 127 |
| 8 | Floor | ↓ | 1.29 | 10.68 | 11 \ 135 | 17 | Floor | 3 | 3.50 | 15.53 | 8 \ 132 |
| 9 | Floor | 3 | 1.29 | 7.44 | 8 \ 138 | | | | | | |

| Type | Material | Type | Material | Type | Material | Type | Material |
|------|----------|------|--------------|------|----------|------|----------|
| 1 | Asphalt | 2 | Cinder Block | 3 | Concrete | 4 | Drywall |
| 5 | Steel | 6 | Wood | 7 | Glass | | |

| Data Review | Name | Date | Signature |
|----------------|---------------|--------|--------------------|
| Operator | Larry Casey | 3-3-11 | <i>[Signature]</i> |
| Operator | | | |
| Data Processor | Joel I. Ch... | 3-7-11 | <i>[Signature]</i> |
| Project Mgr. | R.W. Dubiel | 3-7-11 | <i>[Signature]</i> |

Alameda Smear / Gamma Survey Form

| | | | |
|----------------------------------|---|-----------------------|---------|
| Building: | Former Smelter Area | Survey Unit: | 4 Floor |
| Instrument Model Number: | 2929 | Serial Number: | 163817 |
| Instrument Model Number: | 19 | Serial Number: | 87132 |
| Survey Type (Circle One): | <input checked="" type="radio"/> Alpha <input type="radio"/> Beta | | |



| # | Surface | Mat. Type | X (m) | Y (m) | uR/hr | Smear A (cpm) B | # | Surface | Mat. Type | X (m) | Y (m) | uR/hr | Smear A (cpm) B |
|---|---------|-----------|-------|-------|-------|-----------------|----|---------|-----------|-------|-------|-------|-----------------|
| 1 | Floor | 3 | 1.29 | 33.33 | 4 | 0 \ 53 | 10 | Floor | 3 | 1.29 | 4.21 | 5 | 0 \ 46 |
| 2 | Floor | | 1.29 | 30.09 | 4 | 0 \ 25 | 11 | Floor | | 1.29 | 0.97 | 5 | 0 \ 55 |
| 3 | Floor | | 1.29 | 26.86 | 5 | 0 \ 31 | 12 | Floor | | 3.50 | 31.71 | 5 | 1 \ 49 |
| 4 | Floor | | 1.29 | 23.62 | 5 | 0 \ 47 | 13 | Floor | | 3.50 | 28.47 | 5 | 0 \ 50 |
| 5 | Floor | | 1.29 | 20.39 | 5 | 0 \ 35 | 14 | Floor | | 3.50 | 25.24 | 5 | 0 \ 43 |
| 6 | Floor | | 1.29 | 17.15 | 5 | 0 \ 43 | 15 | Floor | | 3.50 | 22.00 | 5 | 0 \ 36 |
| 7 | Floor | | 1.29 | 13.91 | 4 | 0 \ 47 | 16 | Floor | ✓ | 3.50 | 18.77 | 5 | 0 \ 49 |
| 8 | Floor | ✓ | 1.29 | 10.68 | 5 | 0 \ 32 | 17 | Floor | 3 | 3.50 | 15.53 | 5 | 0 \ 37 |
| 9 | Floor | 3 | 1.29 | 7.44 | 5 | 1 \ 35 | | | | | | | |

| Type | Material | Type | Material | Type | Material | Type | Material |
|------|----------|------|--------------|------|----------|------|----------|
| 1 | Asphalt | 2 | Cinder Block | 3 | Concrete | 4 | Drywall |
| 5 | Steel | 6 | Wood | 7 | Glass | | |

| Data Review | Name | Date | Signature |
|----------------|--------------|--------|-----------|
| Operator | Larry Casey | 3-3-11 | |
| Operator | | | |
| Data Processor | Joel I. Lehn | 3-7-11 | |
| Project Mgr. | R.W. Dubiel | 3-7-11 | |

Figure 1 CFD of primary detector in Smelter Area survey FK0401A.

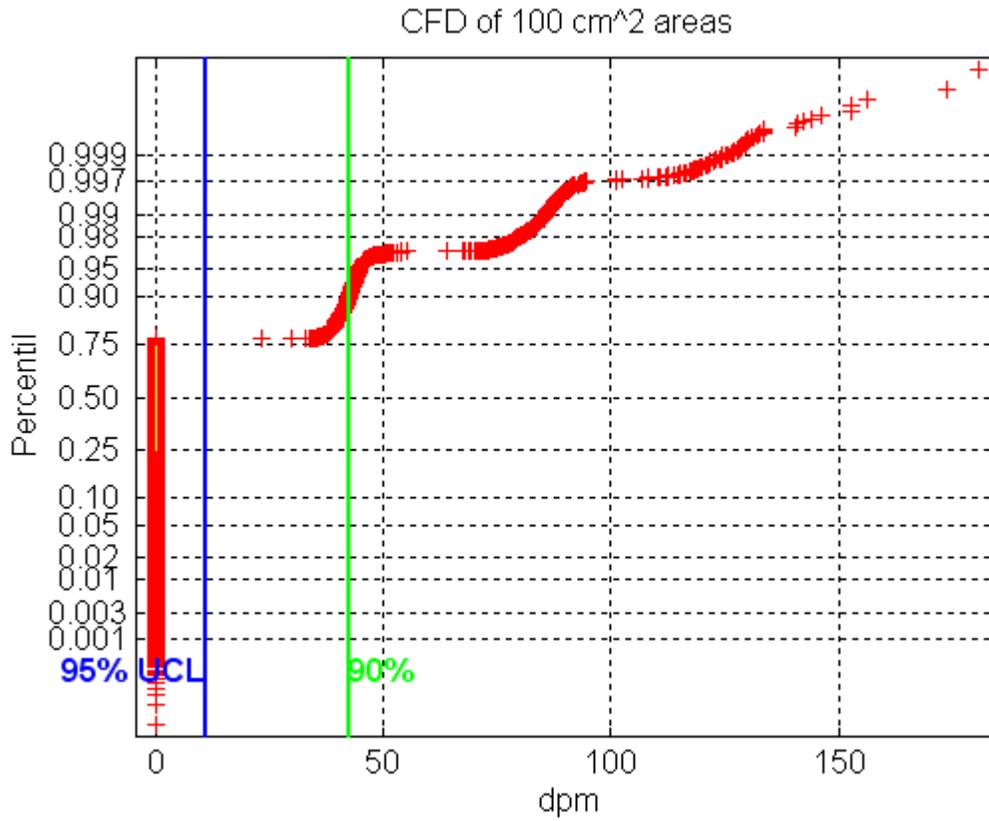


Figure 2 CFD of primary detector in Bldg 114 survey FE1001X.

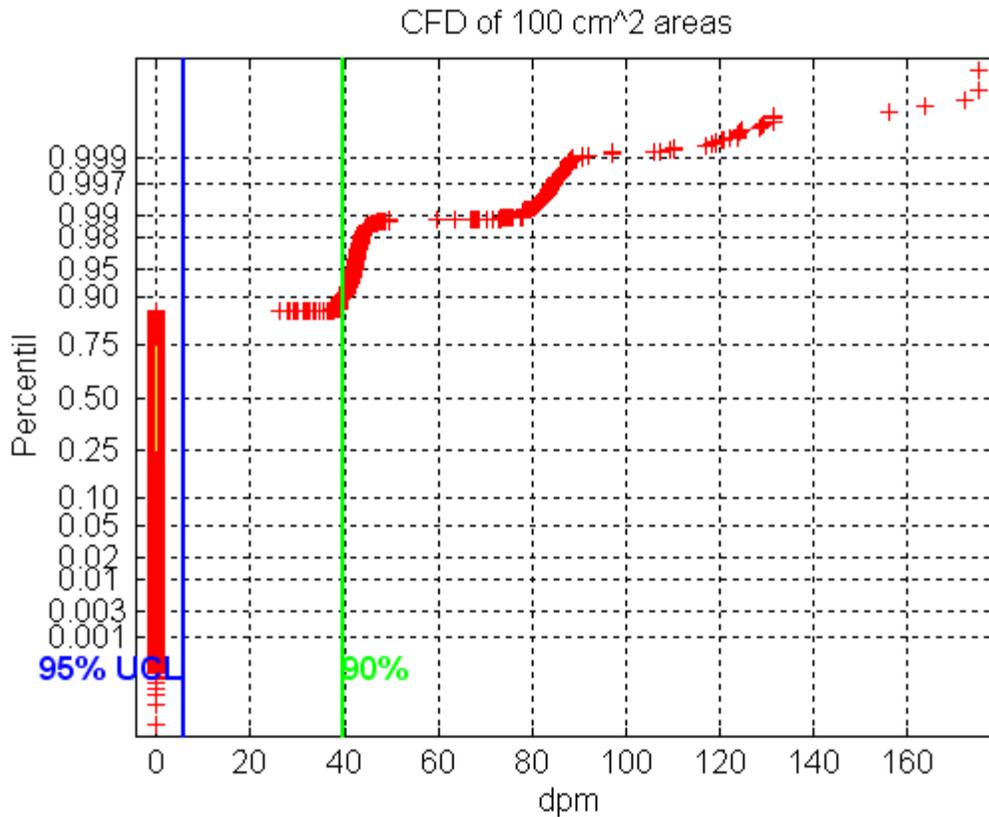
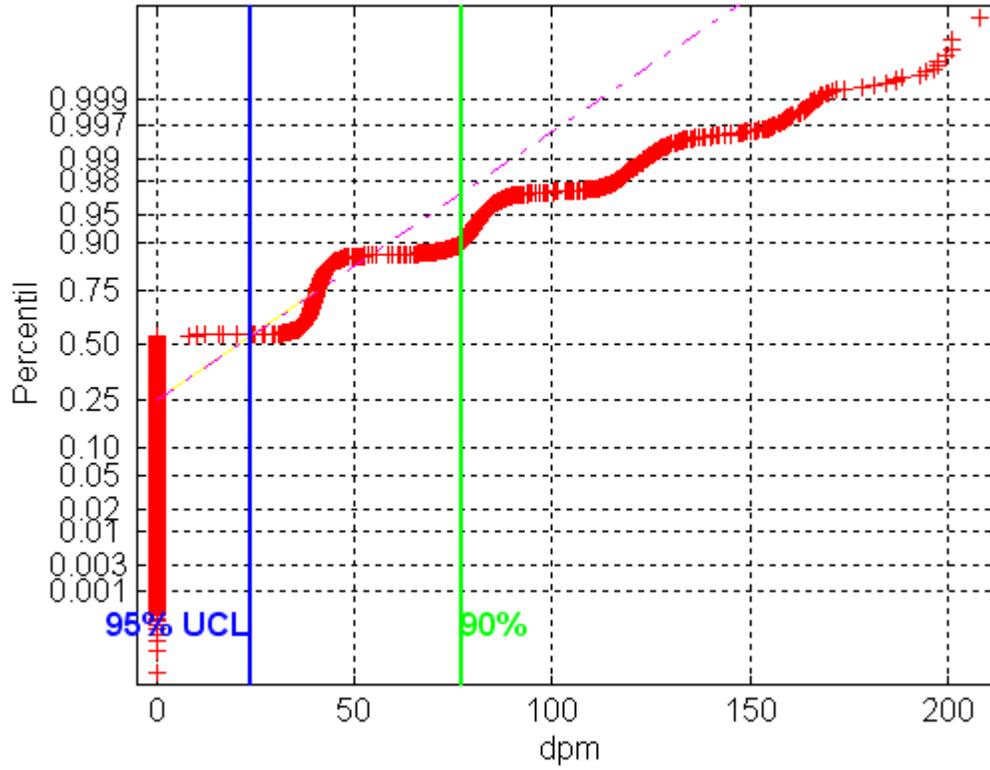


Figure 3 CFD of primary detector in Bldg 66 survey FC0101A.

CFD of 100 cm² areas





| | | | | | | | |
|--|----------------|----------------------|-------------------------|--------------|--|--|--|
| DATE: | TIME: | INSTRUMENTATION USED | | | | | |
| 2/25/11 | 1400 | | | | | | |
| SURVEY NUMBER: AP-069-11 | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | | | |
| SURVEYOR: R. Gault OK | L-2221 | 148451 | 12/28/11 | A - 0.11 | | | |
| Description or drawing: α Backgrounds on Material - 1 - 10 minute count | | | | | | | |
| <p>Serial # PR-177646</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">High Aggregate Concrete</p> <hr/> <p style="text-align: center;">9.9cpm</p> </div> | | | | | | | |

Reviewed by: R.W. Duhaill

**APPENDIX D
ALAMEDA POINT RADIOLOGICAL SURVEY METHODS: SURFACE
CONTAMINATION MONITOR SURVEYS SUPPORTED BY HAND-HELD
INSTRUMENTATION**

**ALAMEDA POINT
RADIOLOGICAL SURVEY METHODS:
SURFACE CONTAMINATION MONITOR SURVEYS
SUPPORTED BY HAND-HELD INSTRUMENTATION**

April 2012

Prepared By:

**Richard W. Dubiel, CHP
Millennium Services, Inc
222 Creekstone Ridge
Woodstock, GA 30188**

The Surface Contamination Monitor (SCM) provides an effective and efficient approach to surveys of surfaces, both building interiors and exterior hard surfaces. The multi-phased approach maximizes the attributes of the SCM in both the dynamic (rolling; see [photographs 1 through 5](#)) and static (stamp; see [photographs 6 and 7](#)) modes as supplemented by smaller hand-held detectors. To demonstrate the approach, the following describes a typical process used to maximize both the efficiency of the SCM and to optimize the quality of surveys performed by the SCM and hand-held instruments. An interior room containing some materials from operational activities that requires a Class 1 survey is used as an example. The requirements of a Class 1 survey are that 100 percent of the floor and walls up to 6 feet must be surveyed.

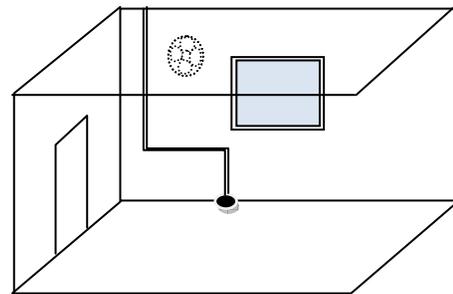
Initial Condition

Major equipment and materials are moved to allow surveying in the areas. Items and materials remain that cover the room surfaces while radioactive material was used. As shown in the drawing, a table, several small drums, and tile flooring must be removed before the survey begins. If possible, the pipe, window sill, and vent cover could be removed to provide a smooth survey surface. In many cases, the tile flooring and mastic will be asbestos-containing materials (ACM) and must be removed by an asbestos abatement contractor. Removal of systems such as piping, electrical conduit, lighting, and air vents must address the required “as left” condition and ensure that systems to be removed

are isolated and in a safe condition for removal. Consideration must be given to the potential for materials to be radioactively contaminated. Pre-removal surveys, including loose and fixed contamination surveys, may be required to establish worker protection requirements and appropriate disposal methods.

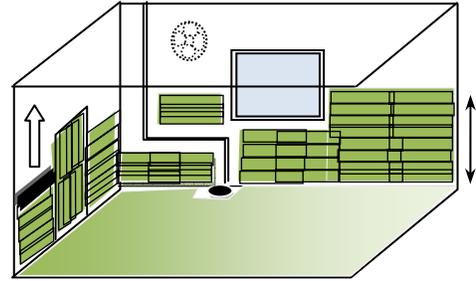
Conditions after Abatement

The goal of the equipment removal and ACM abatement process is to optimize the efficiency and effectiveness of the survey while maintaining the desired post-survey conditions. In the drawing, the table, small drums, and tile flooring have been removed. However, based on the expected reuse of the facility after free release, the drain piping, window sill, and vent fan remain. The room provides a reasonable facility for a final status survey on the original building surfaces.



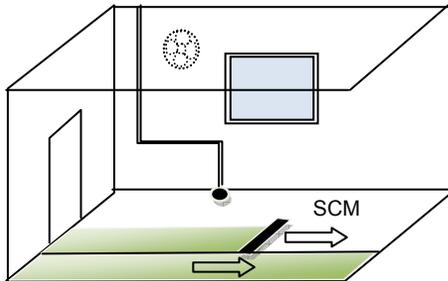
Measurement Survey of Floor Using SCM

The most productive mode of operation of the SCM is the dynamic mode. Initial surveys in any area will be performed on surfaces that are easily rolled. These surfaces must be flat and have little or no obstructions. Floors offer the best opportunity for dynamic mode. Before floor surveys are performed, chalk lines are snapped at detector width intervals to guide the SCM operator and ensure that survey strips are seamless ([Photograph 1](#)). Floors surveys with the SCM will typically scan a large portion of the floor, 90 or more. Obstacles like the drain pipe will limit surveying by the SCM and are marked for survey by other means. If flat, unrestricted wall or ceiling areas exist, the dynamic mode of the SCM can be used on those surfaces. [Photographs 2 through 5](#) show the operation of the SCM on other surfaces.



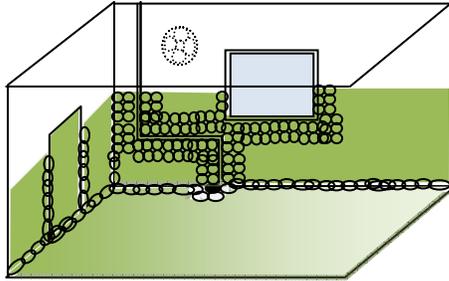
Static Measurement Survey of Walls

Areas that cannot be rolled with the SCM are evaluated for survey with the SCM in the static mode. The static mode of the SCM is the second most productive means of survey and maintains the same level of quality of data analysis as the dynamic mode. Some floor areas, such as the edge along the walls, and many wall surfaces not surveyed with the SCM in the dynamic mode are typically surveyed with static measurements; see diagram. As static measurements are taken on surfaces, the location of the detector is marked and the SCM strip number is logged on the surface, allowing for ease of location if elevated readings are discovered. The diagram provides an example of where static measurements are obtained on the walls of the example room. Areas that are not surveyed in dynamic or static mode with the large SCM detectors are marked for survey with small hand held detectors. [Photographs 6 and 7](#) show typical static surveys.



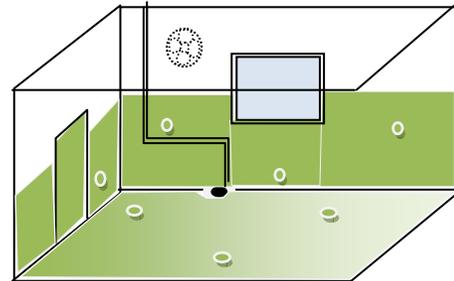
Hand-Held Instrument Probe Survey of Gaps

Hand-held instrument probes, 100 square centimeter (cm²) or 20 cm², present the least productive means of surveying surfaces but are necessary in small areas that are not surveyed by dynamic or static survey methods. A high-quality, hand-held survey can be maintained when surveys are conducted over small areas. Maintaining proper survey speed and source to detector distance is most achievable when the area to be surveyed is reasonably small. The overall survey approach has been to maximize the amount of surface surveyed with the SCM, leaving small areas where the small detector surveys are effective; see diagram. Hand-held detector surveys are used to complete the survey. Documentation of hand-held surveys is recorded on survey sheets separate from the computerized data files of the SCM.

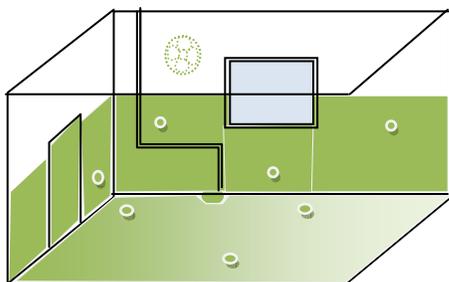


Fixed-Point Measurements

As required by the survey plan, fixed point measurements are taken on a certain number of exposed surfaces. Fixed point measurements are performed for alpha, beta and gamma isotopes and well as swipe surveys to evaluate compliance with removable activity criteria. The number of fixed-point locations is selected in accordance with guidance provided in the Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM – NUREG 1575). Specific fixed-point measurement locations are selected through use of computer codes that develop triangular grid patterns based on a random start location. The diagram above identifies typical fixed measurement locations on the Class 1 lower walls and floors. Additional fixed-point measurement locations would be identified on the Class 2 upper walls and ceilings. [Photograph 8 and 9](#) show technicians performing fixed measurements at identified fixed measurement locations.



Drain and Vent Survey/Sampling

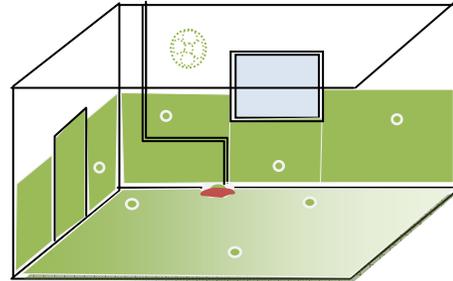


After surface surveys have been completed, potential pathways for the release of radioactive materials such as drains and vents are identified. Drains are inspected for the existence of

sediment. If available, sediment is collected and submitted for on- or off-site laboratory analysis. Swipe surveys of the drain piping are obtained to determine the existence of removable contamination. Vents or exhaust ducts are surveyed with both direct measurements and swipes surveys to evaluate the existence of removable contamination or if they represent a potential release path.

Dose Assessment, Analysis and Reporting

After all surveys and sampling have been completed, final analysis of the data is performed to evaluate compliance with the release criteria or identify areas that exceed release criteria. Areas in excess of release criteria are identified and marked in the field for ease of location for future remedial actions and resurvey. Data from all surveys and samples are compiled to perform calculations to assess dose consequences and generate characterization or final status reports. The diagram indicates an example of compliance with release criteria achieved on all surfaces but the drain. Area identified above the release criteria are posted as a radiologically controlled area.





Photograph 1
Floor chalk Lines



Photograph 2
SCM Floor Survey



Photograph 3
SCM Survey on Asphalt



Photograph 4
SCM Rolling Wall Survey



Photograph 5
SCM Rolling Ceiling Survey



Photograph 6
SCM Stamp on Wall



Photograph 7
SCM Stamp on Ceiling



Photograph 8
Fixed-Point Measurement on Wall



Photograph 9
Fixed-Point Measurement on Floor

APPENDIX E
SCAN SURVEY RESULTS

APPENDIX E
SCAN SURVEY DATA

| Section | Page |
|---|-------------|
| Surface Contamination Monitor Auto-Generated Survey Report Description | i |
| Survey Unit 4 – Alpha Scans | 1 |
| Survey Unit 4 – Beta Scans | 4 |

Surface Contamination Monitor Auto-Generated Survey Report Description

This Appendix contains the auto-generated reports for surveys performed with the Surface Contamination Monitor (SCM). The reports are generated using copyrighted software Survey Information Management System (SIMS). The basic design of the software is to eliminate human errors in the creation of survey reports. Errors such as transcription errors are eliminated by limiting inputs to the report to direct inputs from other computer processes or files within SIMS. The following is a description of the SCM Auto-Generated Reports that follow in this Appendix.

A separate report is generated for each SCM survey. There are many survey units (SU) within a building or area survey. Each SU may have multiple SCM surveys. As an example, a SU may have a floor survey, a lower wall survey, an upper wall and ceiling survey. Surveys are limited to 100 square meters if they are Class 1 area surveys. To control the data for a large project, an alpha-numeric survey file name, limited to 8 digits, is assigned to each SCM survey. File names for surveys performed at the former Naval Air Station Alameda contain 7 digits. The file nomenclature is as follows;

| Alpha Numeric Digit | Description | Example |
|---------------------|-------------------------------------|--|
| 1 | Type of Survey | F – Final Status, P – Performance Based Check T - Test |
| 2 | Building or Area | A – Building 5 B – Building 44 C – Building 66 D – Building 113 E – Building 114 Courtyard F – Building 346 Slab G – Bunker 353 H – Building 400 I – Bunker 497 K – Former Smelter Area J – Pier 3 |
| 3, 4 | Survey Unit Number. | 01 – SU 1 02 – SU 2 03 – SU 3, etc. |
| 5,6 | Building Surface and Type of Survey | 01 – Floor survey, alpha 02 – Floor survey, beta 11 – Lower walls, alpha 12 – Lower walls, beta 21 – Upper walls, alpha 22 – Upper walls, beta 31 – Ceilings, alpha 32 – Ceilings, beta |
| 7 | Incremental Survey Number. | A – First survey B – Second survey, etc. |

As an example, Survey File Name FC0101A, is the final status survey performed in Building 66, in survey unit SU 1, on the floor, surveying for alpha activity. It is the first survey at that surface location. There is no FC0101B, indication that the survey is the only SCM survey on that surface.

Survey Report Table: The first 5 lines items of the table are drawn from the SCM performing the survey. The information is input into the on-board SCM computer by the SCM operator, or is known by the computer. The operator will input the survey file name, his/her name (multiple names if more than one operator involved), and select the type of survey configuration (dynamic mode, static mode, recount assembly or single detector and size of detector). A detector listing of R180 is a dynamic mode recount assembly with a 180 centimeter (cm) detector. A detector listing of C180 is a static mode with a 180 cm detector. The survey date and the SCM number are known by the on-board computer.

Each page of a survey report is date and time stamped at the time of processing and successively numbered..

The “Criteria” section, are drawn from information pre-established in the SIMS computer. Release criteria for each type of survey and radionuclide of concern (ROC) are input into the computer prior to SIMS processing. The SIMS processor simply selects the ROC. The survey report will use the appropriate criteria in evaluating the data. The release criteria will be listed on the first page.

The “System Information” section provides the computer system information. Two key parameters are input into SIMS prior to survey processing. They are background values associated with the various surface materials to be surveyed and SCM efficiency by radionuclide and system configuration. Alpha surveys are performed without background subtraction. Beta surveys will use a single value listed in counts per minute (cpm). That value will be subtracted for every 100 cm² value prior to calculating the disintegrations per minute (dpm) value. The SIMS and SCM versions are inherent in the two computers.

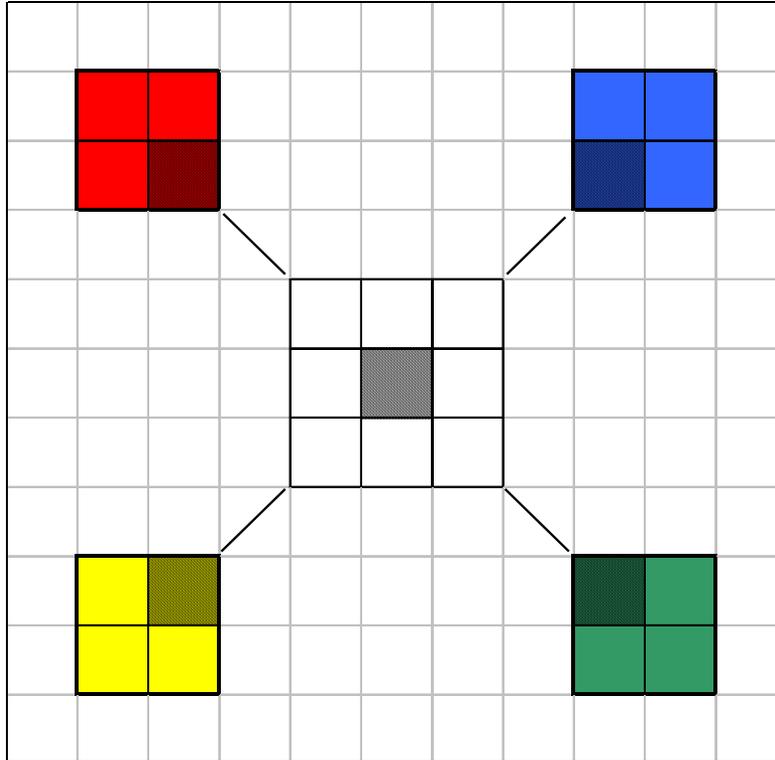
The “Survey Results” section is a result of the data processing. Within SIMS, the SIMS processor can select “Below Criteria” if no value exceeds the criteria stated above. Another option is to record the highest 100 cm² area value for the survey.

Below the survey report table, a statement is made to express whether the survey image is spatially correlated by the statement “The lower left corner of all images corresponds to the southwest corner of the survey”. Surveys that are not spatially correlated will have that statement below the table “This survey is not position correlated.”

Two-Dimensional Color Graphic Images: SCM systems collect data in 25 cm² “pixels of data. The survey data is “stitched” by the SIMS processor. During the stitching process, the operator does not see data, but rectangular blocks that can be aligned. The blocks coincide with data strips obtained by the SCM operator. For dynamic surveys, the data strip will have the dimensions of the detector width by the length of distance rolled. For static surveys the blocks will be 180 cm by 10 cm. Each strip is numbered by the SCM computer. To “stitch” the survey data, the processor aligns the strips as indicated

by maps drawn by the technicians while obtaining the data. For static surveys, the individual strips are aligned side by side. SIMS will then correlate all data in 25 cm² “pixels, then evaluate all possible combinations of 4 “pixels” or 100 cm². The following demonstrates the process.

Each 25 cm² “pixel” of data is combined with 4 combinations of adjacent “pixels”. The summed value is then placed in the lower left “pixel”, resulting in each new “pixel” representing activity in a 100 cm² area. Four hundred 100 cm² areas will result in a one square meter area.



The two-dimension display provides an image of the activity with increasing activity level being depicted by a more intense light image. Each two-dimensional display has a computer applied 1 square meter grid (blue lines) to provide the viewer with perspective on the size of the survey area and assist in locating any hot spots that may appear. The color scale can be adjusted but is typically set for a maximum “white” image of 3 times the release criteria.

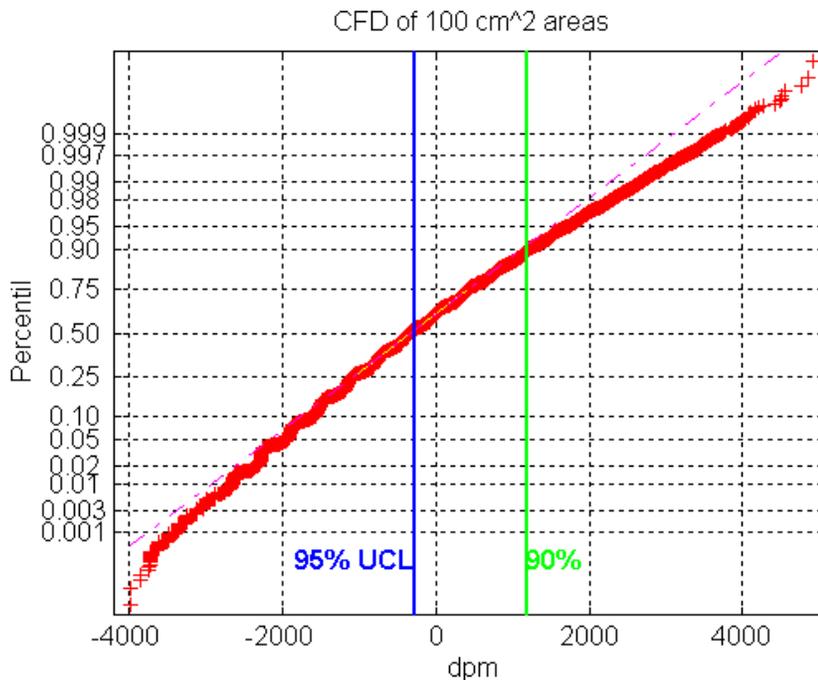
Alpha Surveys: Alpha surveys are conducted using a recount detector assembly. The survey process is described in the Work Plan and the Task Specific Plan for surveys performed at the former Naval Air Station Alameda and implements the process described in MARSSIM, Appendix J. The detectors are a fixed distance apart. SIMS software will process each of the detector data independently. The images from both the primary and recount detector are displayed in Figures 1 and 2 to demonstrate to the randomness of background and low level counting performed by the SCM. Since the critical issue in low level alpha counting is to minimize the impact of false positives due to background, a “coincidence logic” evaluation is performed by SIMS (Figure 3). The data from the recount detector is superimposed on the primary detector. Since the

detectors are hard mounted together in a recount assembly, the offset distance is a known constant. A threshold value is incorporated in the SIMS software. The threshold value is chosen to assure that a source at any location, equal to the release criteria, will be above the threshold on both detectors greater than 95% of the time. If either detector has a result less than the threshold value, a zero value is placed in that “pixel” on the coincidence display. Those areas will appear black, indicating no detectable activity above background. The process greatly reduces the number of false positives typically experienced in low level alpha surveys.

Beta Surveys: Beta background values are significantly higher than alpha background values, eliminating the “coincidence” counting approach used in alpha surveys. A single two-dimensional display is included in the beta survey reports. Within SIMS, the process for developing the data image is identical to that described above.

An additional feature of beta surveys is the inclusion of a cumulative frequency distribution (CFD) plot. The scale at the bottom of the plot is a linear scale in activity units, dpm/100 cm². The vertical scale the percentage of total measurements obtained. Each point on the curve represents the percent of total measurements at or below the value on the horizontal scale. The vertical scale is a statistical scale based the standard deviation of normally distributed data. A straight line would be indicative of normally distributed data. The slope of the line is related to the standard deviation. A more vertical line would indicate a small standard deviation. A lower slope, more horizontal line would represent a larger standard deviation. Contamination would be identified by data points that depart from the curve at the high end, i.e. outliers. Those data points would not fall within the normal distribution of background.

An example CFD plot is presented below:



The blue vertical line represents the 95% upper confidence level (UCL) of the data. With the large number of measurements obtained in each survey, the 95% UCL is close to the

mean of the data. The green vertical line represents the 90th percentile of the data. Ninety percent of the data fall at or below the green line. Since beta surveys have a background value subtracted, a non-contaminated area would have approximately 50% of the data as negative values and 50 % positive. A 50 % value at or near zero is indicative of a valid reference area for the area surveyed.

Exception Report: Surveys that include areas in excess of the release criteria will contain an addition survey report section that includes both a color-graphic display similar to those discussed above, with red spots indicating areas above the release criteria on a green background. An investigation table is also included that lists in order of descending activity, the activity level, location from the southwest corner of the survey (X,Y) coordinates, and the location from the SW of the strip (X,Y). Since strip numbers are marked in the field, the investigation allows for ease in locating the elevated activity.

Survey Report

| | |
|--|---------------------------------|
| Survey File Name: | FK0401A |
| Survey Date: | February 10, 2011 |
| Survey Equipment: | SCM9 |
| Detector(s): | R180 |
| Surveyor(s): | VASSETT |
| Criteria | |
| Any 100 cm² Measurement: | 100 net dpm/100 cm ² |
| Average Over Any 1 m²: | 100 net dpm/100 cm ² |
| System Information | |
| Background: | Background not Subtracted |
| Efficiency (100 cm²): | R180: 50.0% |
| SIMS Version: | V5.3m |
| SCM Version: | V3.4d |
| Survey Results | |
| Maximum 100 cm²: | Below Criteria |
| Area Exceeding 100 cm² Levels: | 0.00 m ² |

The lower left corner of all images corresponds to the south west corner of the survey.

Primary Detector:

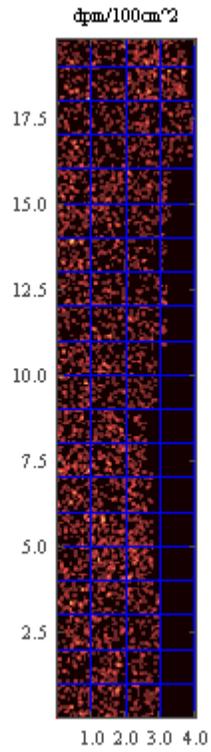


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas..

Recount Detector:

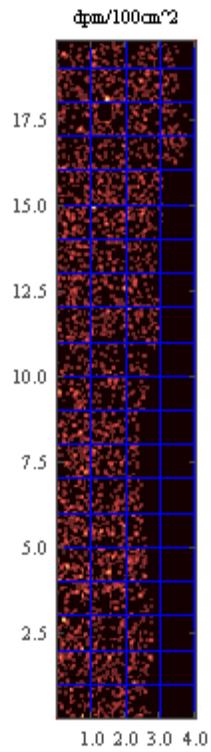


Figure 2: Meter Grid overlaid onto image plot of 100cm² areas..

Coincidence Logic:

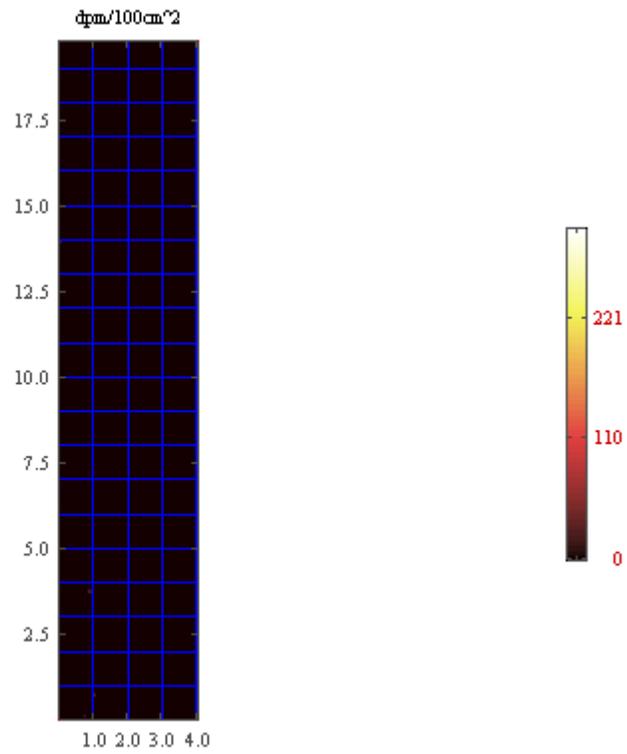


Figure 3: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm².

Survey Report

| | |
|--|-----------------------------------|
| Survey File Name: | FK0402A |
| Survey Date: | February 11, 2011 |
| Survey Equipment: | SCM9 |
| Detector(s): | T180 |
| Surveyor(s): | VASSETT |
| Criteria | |
| Any 100 cm² Measurement: | 5,000 net dpm/100 cm ² |
| Average Over Any 1 m²: | 5,000 net dpm/100 cm ² |
| System Information | |
| Background: | T180: 636 cpm |
| Efficiency (100 cm²): | T180: 32.0% |
| SIMS Version: | V5.3m |
| SCM Version: | V3.4d |
| Survey Results | |
| Maximum 100 cm²: | Below Criteria |
| Area Exceeding 100 cm² Levels: | 0.00 m ² |

The lower left corner of all images corresponds to the south west corner of the survey.

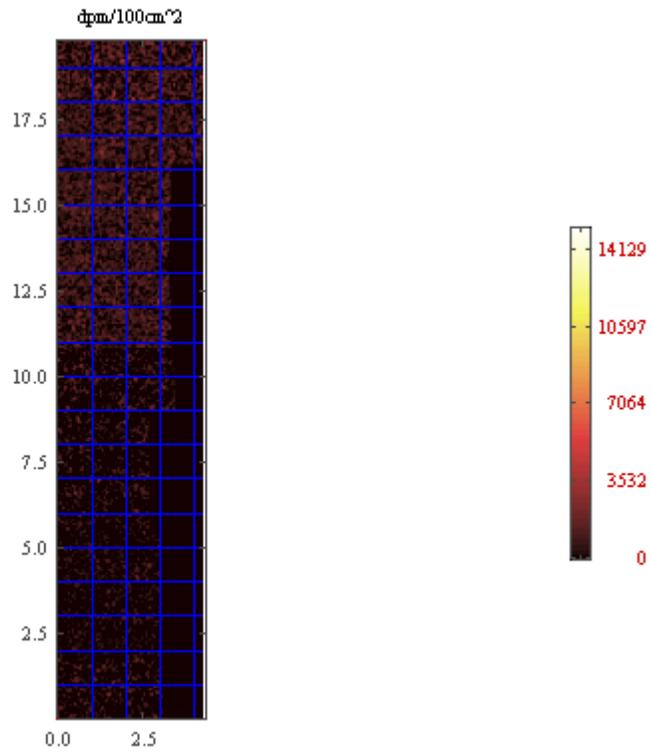


Figure 1: Meter Grid overlaid onto image plot of 100cm² areas. The color scale is in dpm per 100cm².

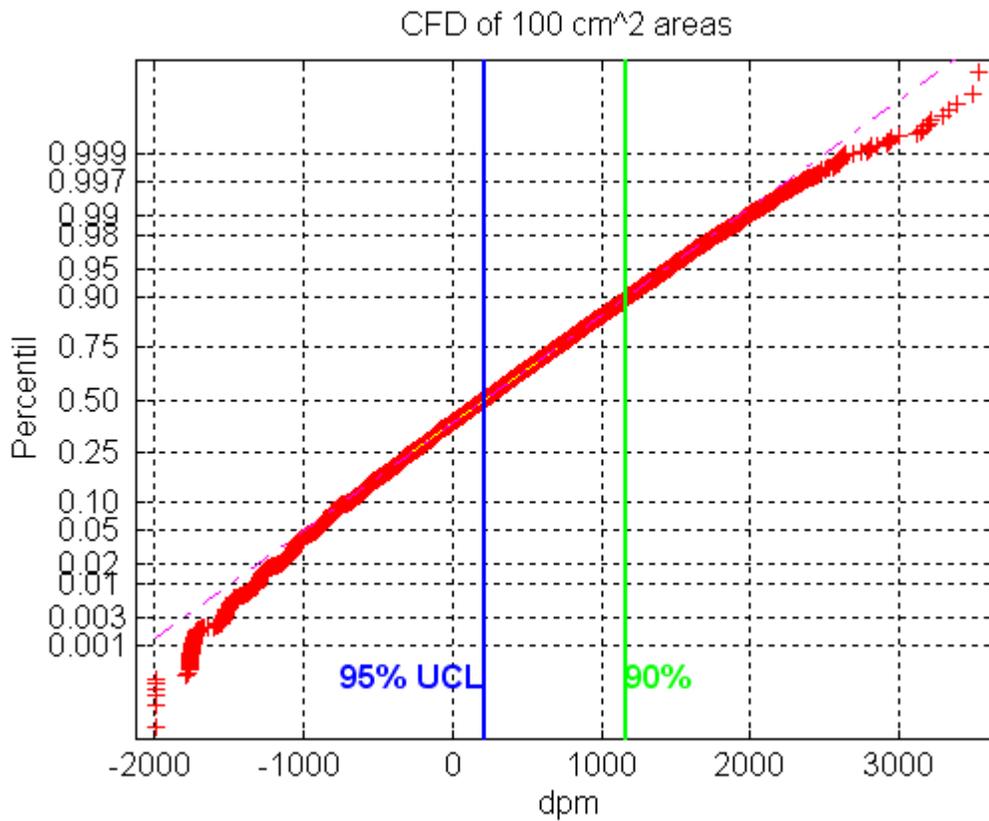


Figure 2: CFD of surface activity in 100cm² areas. The horizontal scale is in dpm per 100cm².

APPENDIX F
ALAMEDA POINT BASEWIDE RADIOLOGICAL SURVEYS FINAL STATUS SURVEY
REPORTS REFERENCE AREA SURVEY RESULTS

**Alameda Point Basewide Radiological Surveys
Final Status Survey Reports
Reference Area Survey Results**

April 2012

Prepared By:

**Richard W. Dubiel, CHP
Millennium Services, Inc
222 Creekstone Ridge
Woodstock, GA 30188**

1.0 Introduction

This report of reference area survey results (RASR) provides site- and material-specific details used to establish reference point survey values (background) for the final status survey (FSS) at each building surveyed at the former Naval Air Station (NAS) Alameda, now known as Alameda Point. The reference surveys were conducted in accordance with the general approach and methodologies that are given in the work plan for basewide radiological surveys at former NAS Alameda ([ChaduxTt 2010a](#)) and in the standard operating procedures (SOP). The surveys conformed to the requirements of the site safety and health plan (SSHP) ([ChaduxTt 2010b](#)) and accident prevention plan (APP) ([ChaduxTt 2010c](#)) prepared for the basewide survey program. No exceptions to the work plan, SOPs, SSHP, or APP are noted.

2.0 Discussion

Release criteria for the survey sites at Alameda Point are established in the approved work plan ([ChaduxTt 2010a](#)) and the individual task specific plans (TSP). Applicable release criteria for each site surveyed are applied to observations of radioactive activity levels to determine a site's acceptability for free release. Observed activity values are based on activity levels in excess of background radioactivity. To establish background values, a reference area must be identified that consists of construction materials similar to those in the facilities surveyed, but with no potential for contamination from use or storage of radioactive material.

Surveys at the former NAS Alameda consist of alpha and beta surveys. Surveys were performed using gas proportional counters, consisting of both the Surface Contamination Counter (SCM), which uses large Position Sensitive Proportional Counters (PSPC), and the Ludlum 43-68, 126 square-centimeter (cm²) probe attached to a Ludlum 2221 ratemeter.

Reference construction materials include concrete, painted cinder block, drywall, steel, glass, and asphalt and wood. Building 112 was identified as a suitable reference location since the building contained most of the targeted construction materials except for the painted cinder block. Building 398 was identified as a reference area location for painted cinder block. Asphalt surface background was measured in an area adjacent to the Building 114 courtyard, but outside the fenced area where radioactive material had been stored. Neither Building 112, Building 398, nor the area outside the fenced area of the Building 114 courtyard has been identified in the Historical Radiological Assessment ([Weston 2007](#)) with a history of use, or potential use, of radioactive materials. Therefore, Buildings 112, 398, and the area outside the fenced area of the Building 114 courtyard meet the criteria for reference areas. The Building 114 courtyard area is shown in [Figure 1](#). [Figure 1](#) also identifies Building 66 which is as part of the survey project as a geographical reference. [Figure 2](#) shows a close up view of the location of Buildings 112 and 398 relative to Building 66. All reference area locations within the buildings and on the asphalt surface outside the Building 114 courtyard fence have been marked.

Although material backgrounds may vary throughout the site based on the date of construction, specific material (for example concrete pour) and amount of surface wear or erosion, the areas chosen in Buildings 112 and 398 will be initially applied to all similar construction materials. Evaluations will be made to determine the reasonableness of the background values for each building survey performed during the project. For beta surveys, SCM surveys of the reference

area and survey areas generate thousands of measurements. Through the use of cumulative frequency distribution (CFD) plots, evaluations can be made regarding the distribution of the data sets, including mean and standard deviation. The large number of measurements produced by the SCM provides assurance that the mean values of each data set are well defined. The large number of measurements results in small standard errors (standard deviation divided by the square root of the number of measurements) indicating that subsequent surveys of the same area with similar numbers of measurements will result in mean values very close to the original calculated mean. Comparisons of the mean values from the reference area and the survey area will determine if the reference area is reasonable, conservative, or requires additional review.

Reference area results for alpha surveys are applicable only to hand held instrument measurements. Alpha surveys performed with the SCM do not subtract background. The process applied to SCM output data, including 2 detectors performing the same survey, and comparing the results for each 100 cm² area to a threshold value, is applied to determine if counts obtained are potentially due to actual activity on the surface or a result of random low level counts from background. The application of the logic, based on Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (Nuclear Regulatory Commission [NRC 2000]) Appendix J is described in the approved work plan (ChaduxTt 2010a). The small variability in alpha background values on typical materials of construction as measured with hand held instruments can introduce only a limited error in the data used to assess compliance with release criteria. If areas are observed to have higher than expected alpha background values during performance of hand held surveys, they will be addressed within the survey reports for those areas.

Alpha surveys are performed to assess compliance with criteria that are substantially lower than most beta emitting radionuclides. Alpha background is typically low and contributes little to the activity levels measured or observed and then compared with release criteria. Surveys performed with both the SCM and the Ludlum 43-68 use the particle detection theory discussed in Appendix J to MARSSIM (NRC 2000) to locate areas that may exceed the release criteria. As such, background is not subtracted from the SCM scan results; therefore, measuring or calculating alpha background in reference areas is not necessary. Long (1 or 2 minute) counts with the Ludlum 43-68 detector and 2221 ratemeter are performed for locations identified by the SCM with activities near the release criteria. Background count rates are based on 10-minute counts for static measurements performed with the Ludlum 43-68 and 2221 ratemeter.

Beta surveys are performed to assess compliance with criteria that are typically higher than that of alpha emitting radionuclides. Beta background is much higher than alpha background and will vary based on the material of construction. Even similar materials such as concrete can have substantially different background values based on the type of cement or aggregate used, whether the material is painted or otherwise treated, and the degree to which the cement is finished (lack of aggregate showing on the surface). Material surveys were performed with the SCM operating in both the dynamic (rolling) and the static (stamp) mode. Based on the large number of both dynamic and static measurements obtained with the SCM, reference area data are best displayed CFD plots, which are presented as Figures 3-12 in Appendix A.

Reference areas are expected to exhibit data with normal distribution since radioactive decay follows Poisson statistics relative to decay per unit time and the lack of bias in production of the construction materials. A straight line on a CFD indicates a normal distribution. The slope of

the line represents the standard deviation of the data. The 50 percent value, or location on the CFD line, indicates the average activity of the material and represents the value to be applied to an FSS for SCM surveys. Results of beta surveys performed in FSS areas include a CFD that allows determination of the adequacy of the application of reference area materials. Final status survey CFDs with the 50 percent value near zero indicate the construction materials are comparable to the construction materials in the reference area.

Reference area beta surveys in the same locations were performed with the Ludlum 43-68 and the Ludlum 43-9 detectors with the Ludlum 2221 ratemeter. The background value for one construction material, glass, was established for the hand-held detectors, but not the SCM. Background values were obtained by averaging 10 1-minute counts with each detector on each construction material.

Surveys performed to show compliance with release criteria are evaluated to assess the reasonableness of applied backgrounds. Results with considerably low net values — for example all values negative, indicating a lower background than the applied reference area — will be evaluated and discussed in the FSS for the individual building. Similarly, results with high but uniformly distributed values will be addressed in the FSS for the individual building.

3.0 Results

The results of reference area surveys for alpha emitting radionuclides measured with the Ludlum 43-68 detector and Ludlum 2221 rate meter are presented in [Table 1](#). All four Ludlum 43-68 detectors were used with a single 10-minute count taken on each material of construction except asphalt. A single detector was used to measure background for asphalt since it is anticipated to be the only hand-held detector used in the outdoor asphalt areas of the Building 114 courtyard.

Table 1
ALPHA REFERENCE AREA MATERIAL VALUES (IN CPM)
OBTAINED WITH LUDLUM 43-68 AND 2221 RATE METER

| Detector | Concrete | Wood | Glass | Drywall | Painted Cinder Block | Steel | Asphalt |
|----------|----------|------|-------|---------|----------------------|-------|---------|
| 149773 | 2.7 | 2.4 | 2.5 | 2.5 | 4.2 | 3.8 | |
| 149768 | 1.1 | 1.1 | 1.4 | 1 | 1 | 1 | |
| 177646 | 1.8 | 2.2 | 1.7 | 3 | 4.1 | 2.6 | 5 |
| 148835 | 2.4 | 3 | 2.5 | 3 | 3.5 | 3.2 | |

Reference area beta survey results with the SCM are presented in [Table 2](#). Each survey included several square meters of surface. The results of the dynamic (rolling) mode are presented in the first five rows. The second five rows represent the static (stamp) mode of operations. The survey name represents the identifier used by the SCM and the survey information management system (SIMS) used to process the data. Individual CFDs for each of surface material for both modes of SCM operation are contained in [Appendix A](#). The mean value is the value that is subtracted from measurements recorded and presented in the FSSs. The data are presented on the CFDs in red. The 95 percent upper confidence level is presented as a blue line and the 90th percentile value is presented as a green line. With the large number of data points, the 95 percent upper confidence level is essentially the 50th percentile, consistent with a normal distribution.

Table 2
BETA REFERENCE AREA MATERIAL VALUES (IN CPM)
OBTAINED WITH THE SCM

| Survey Name | Detector Type | Material Type | Mean (cpm) |
|-------------|---------------|----------------------|------------|
| B4B0102A | Dynamic | Painted Cinder Block | 848 |
| B4B0103A | Dynamic | Concrete | 636 |
| B4B0104A | Dynamic | Drywall | 382 |
| B4B0106A | Dynamic | Steel | 406 |
| B4B0107A | Dynamic | Wood | 389 |
| B4B0402A | Static | Painted Cinder Block | 741 |
| B4B0403A | Static | Concrete | 566 |
| B4B0404A | Static | Drywall | 352 |
| B4B0406A | Static | Steel | 346 |
| B4B0407A | Static | Wood | 360 |

Reference area values for the Ludlum 43-68 and 2221 rate meter were obtained in the same areas as were used for the SCM. The appropriateness of the surface material values are evaluated through the CFDs generated by the SCM. The evaluation validates the decision to use the same areas for hand-held instrumentation background counts. The values obtained with the four Ludlum 43-68 detectors are presented in [Table 3](#).

Table 3
BETA REFERENCE AREA MATERIAL VALUES (IN CPM)
OBTAINED WITH LUDLUM 43-68 DETECTORS

| Detector | Concrete | Wood | Glass | Drywall | Painted Cinder Block | Steel |
|----------|----------|-------|-------|---------|----------------------|-------|
| 148835 | 126.3 | 119.7 | 125.7 | 123.7 | 135.9 | 136.7 |
| 177646 | 147.1 | 106.3 | 112.2 | 110 | 200.8 | 111.3 |
| 149768 | 126.4 | 96 | 107.4 | 107.7 | 227.9 | 104.8 |
| 149773 | 203.1 | 147 | 137 | 164 | 267 | 145 |

The values obtained in the reference areas are subtracted from the measurements obtained in survey areas to determine activity levels, which are then compared with the release criteria. Individual detector reference values are used for surveys performed with individual detectors. Survey forms are presented in [Appendix B](#).

4.0 References

- ChaduxTt. 2010a. Final Work Plan for Basewide Radiological Surveys, Former Naval Air Station Alameda, Alameda, California. July 23.
- ChaduxTt. 2010b. Final Site Safety and Health Plan for Basewide Radiological Surveys Former Naval Air Station Alameda, Alameda, California. August 6.
- ChaduxTt. 2010c. Final Accident Prevention Plan for Basewide Radiological Surveys Former Naval Air Station Alameda, Alameda, California. August 6.
- Nuclear Regulatory Commission. 2000. NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Rev. 1.
- Weston Solutions, Inc. 2007. *Historical Radiological Assessment, Volume II, Alameda Naval Air Station, Use of General Radioactive Materials, 1941-2005*. June.

FIGURES

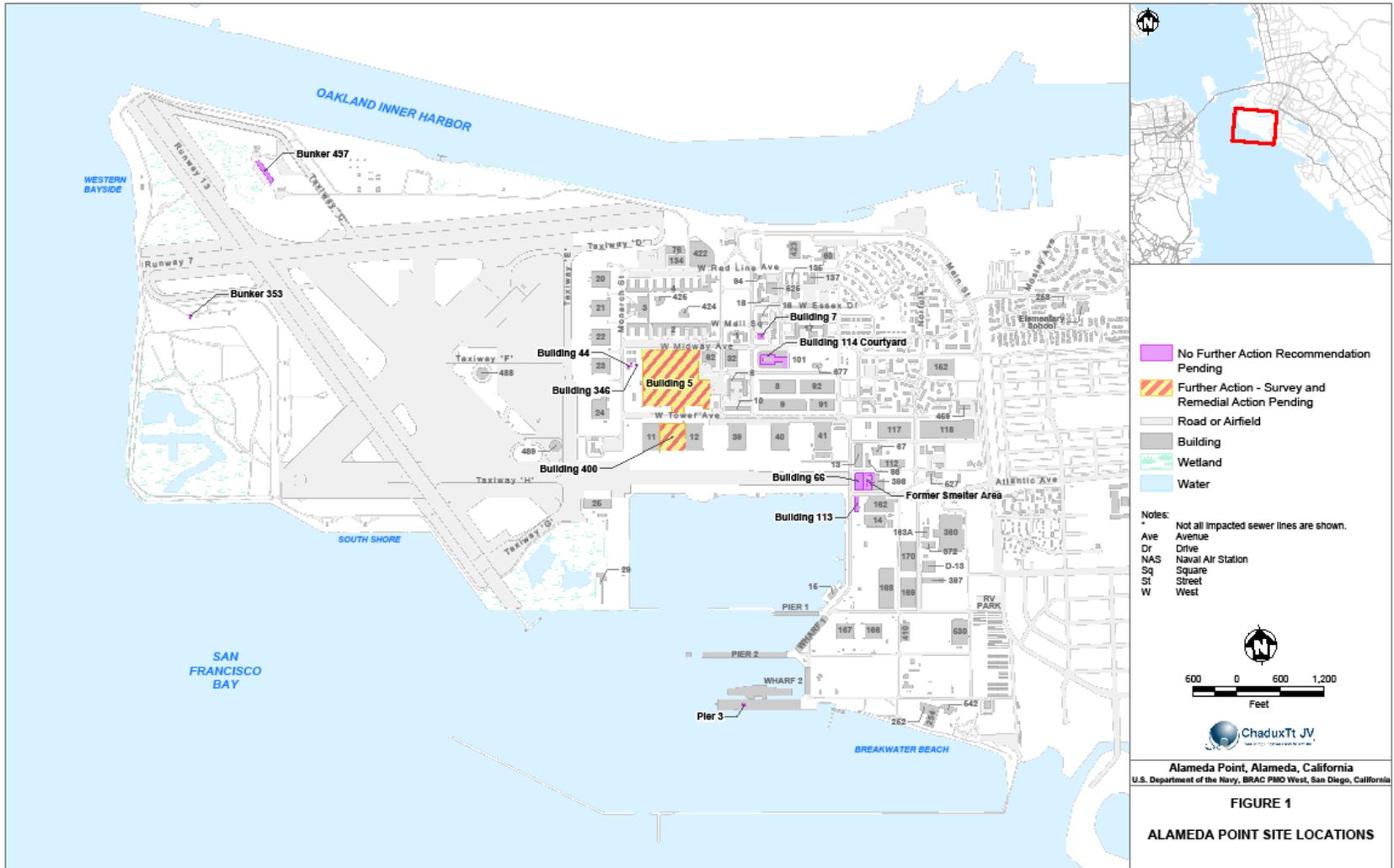


Figure 2 Reference Area Locations



APPENDIX A
REFERENCE AREA SURVEYS SURFACE CONTAMINATION MONITOR
CUMMULATIVE FREQUENCY DISTRIBUTION PLOTS

SCM Dynamic Mode Painted Cinder Block

| | |
|------------------------------|--|
| Survey File Name: | B4B0102A |
| Survey Date: | November 2, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | T180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4d |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99C002AB0012650B4B0102A |
| Mean Value | 848 cpm |

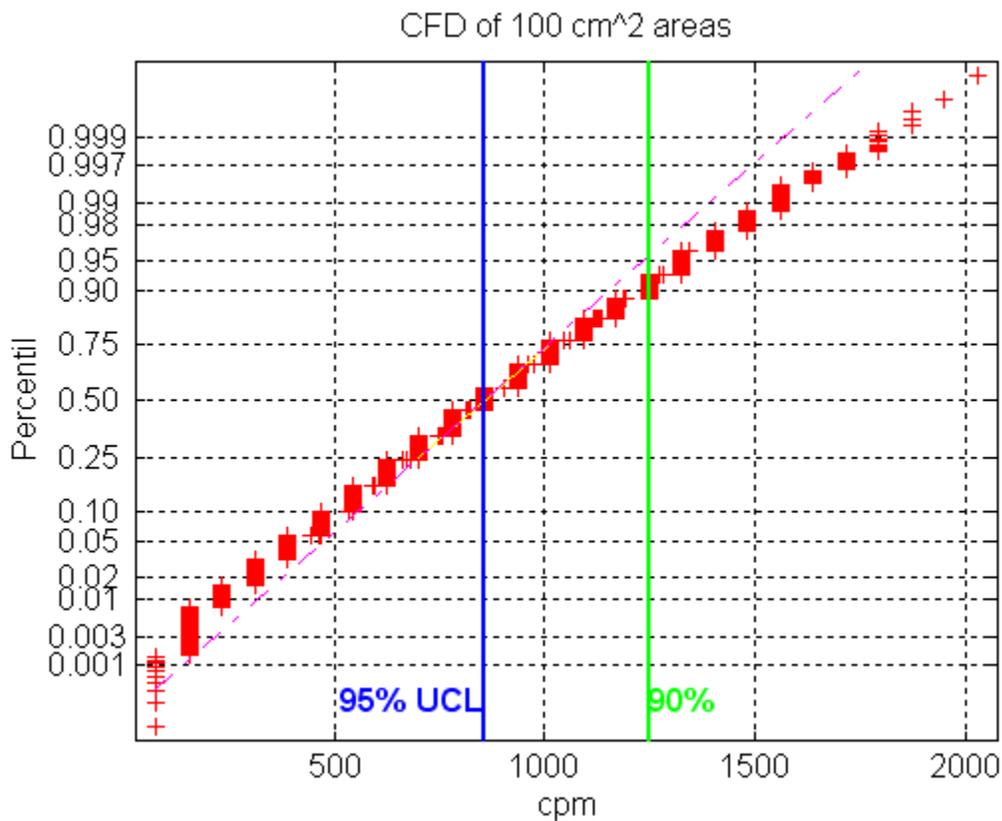


Figure 3: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Dynamic Mode Concrete

| | |
|------------------------------|--|
| Survey File Name: | B4B0103A |
| Survey Date: | November 2, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | T180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4d |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99C001AB0012650B4B0103A |
| Mean Value: | 636 |

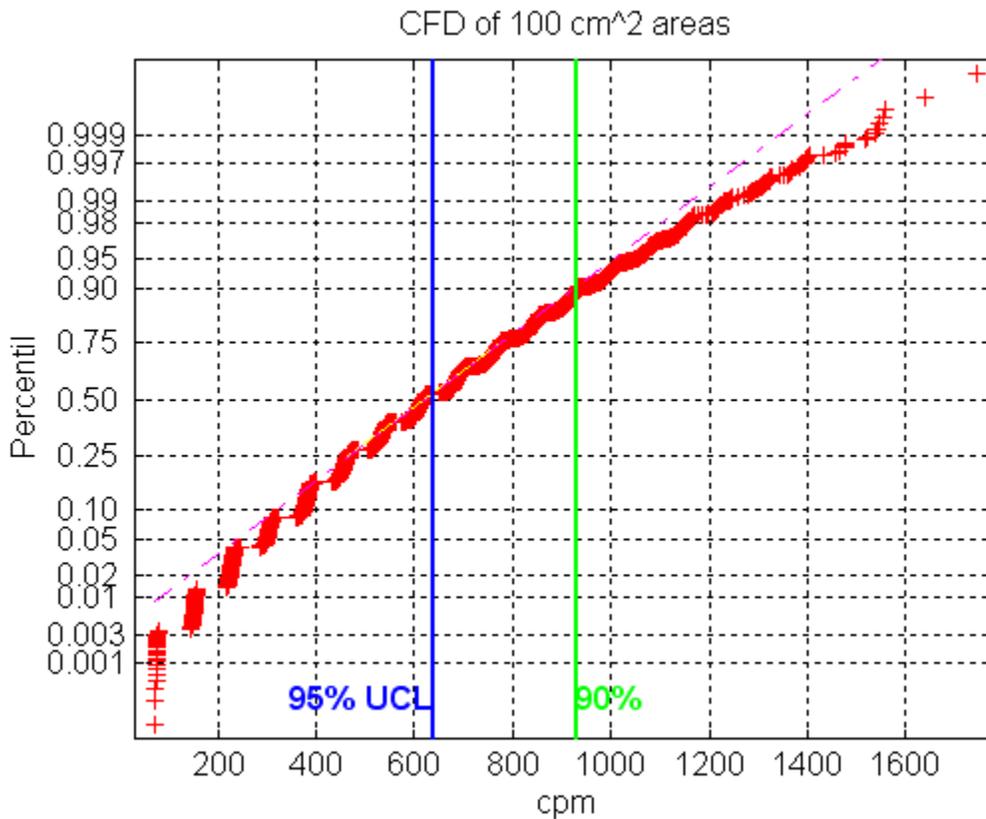


Figure 4: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Dynamic Mode Drywall

| | |
|------------------------------|--|
| Survey File Name: | B4B0104A |
| Survey Date: | November 2, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | T180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4d |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99D001AB0012650B4B0104A |
| Mean Value: | 382 |

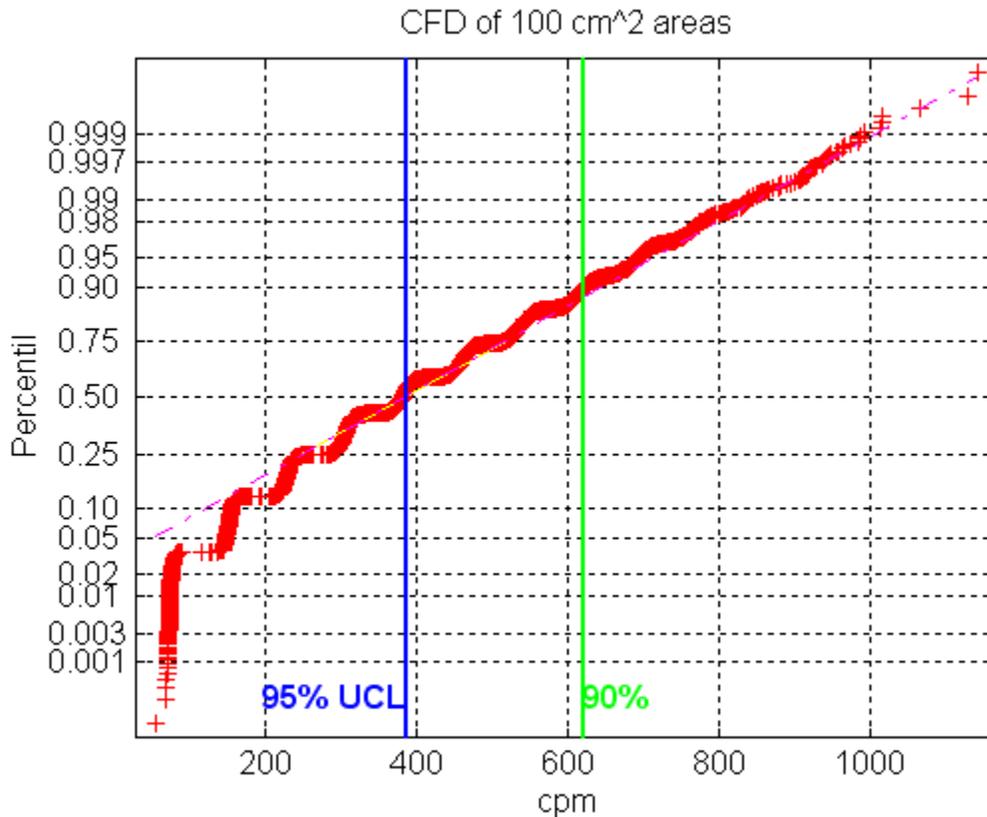


Figure 5: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Dynamic Mode Steel

| | |
|------------------------------|--|
| Survey File Name: | B4B0106A |
| Survey Date: | November 2, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | T180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4d |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99S001AB0012650B4B0106A |
| Mean Value: | 406 |

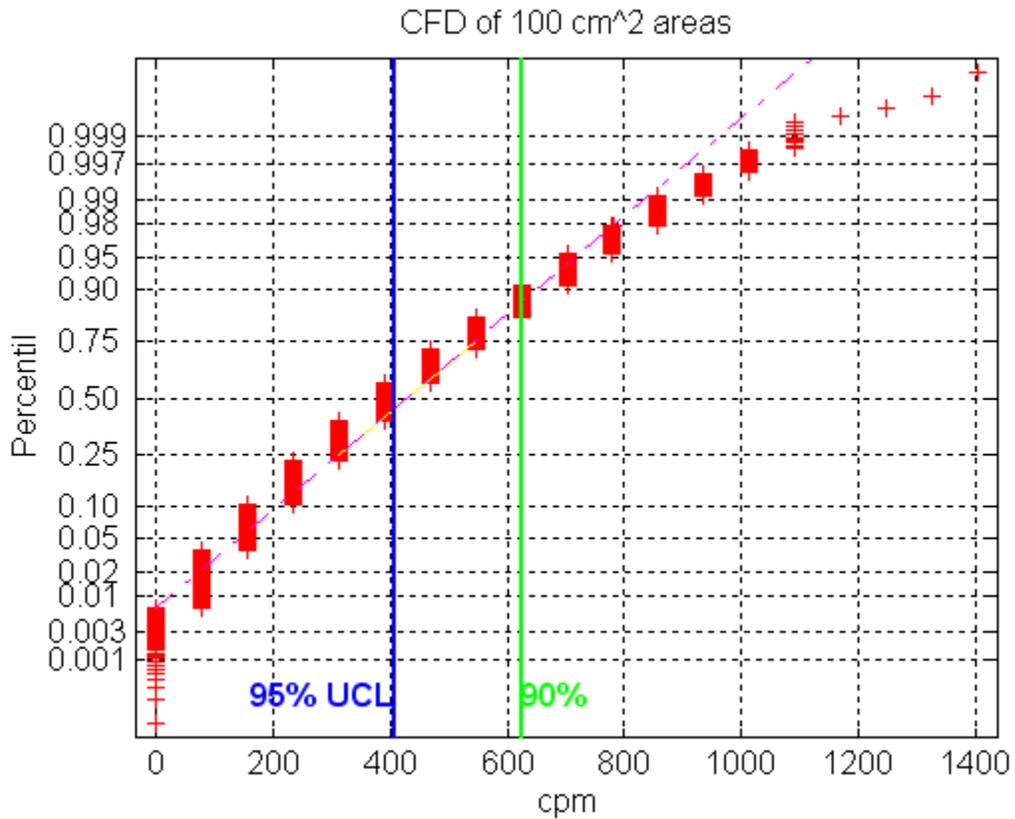


Figure 6: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Dynamic Mode Wood

| | |
|------------------------------|--|
| Survey File Name: | B4B0107A |
| Survey Date: | November 2, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | T180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4d |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012650B4B0107A |
| Mean Value: | 389 |

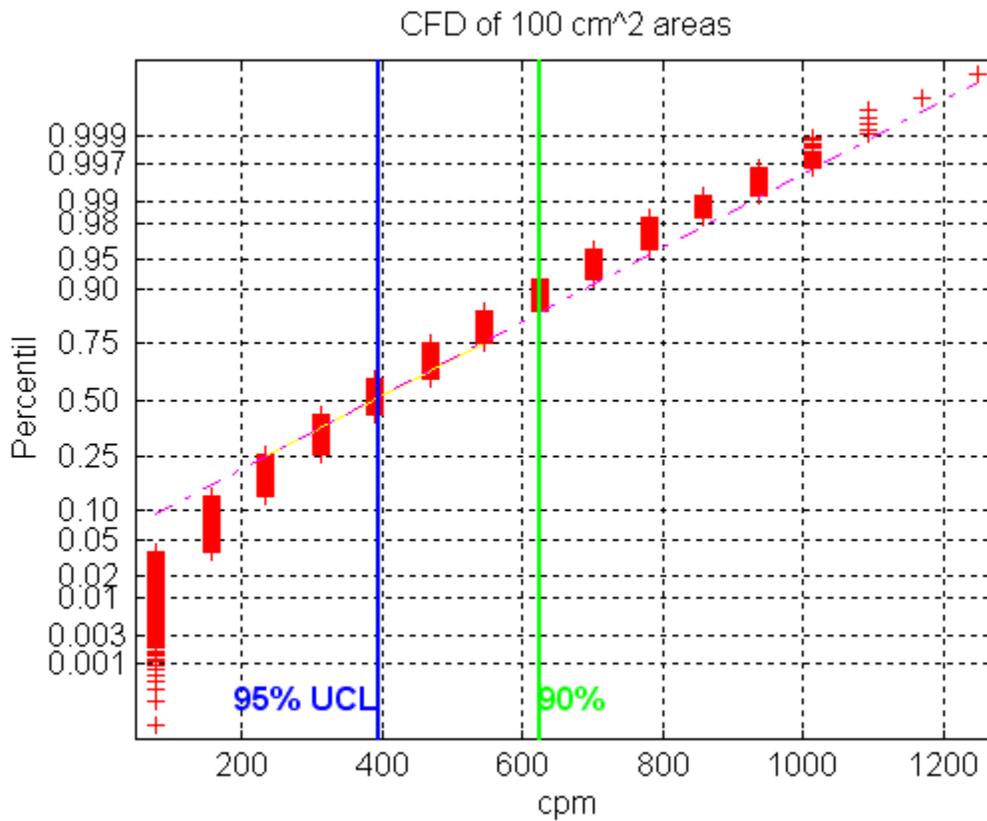


Figure 7: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Static Mode Painted Cinder Block

| | |
|------------------------------|--|
| Survey File Name: | B4B0402A |
| Survey Date: | November 4, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | C180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4a |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012630B4B0402A |
| Mean Value: | 741 |

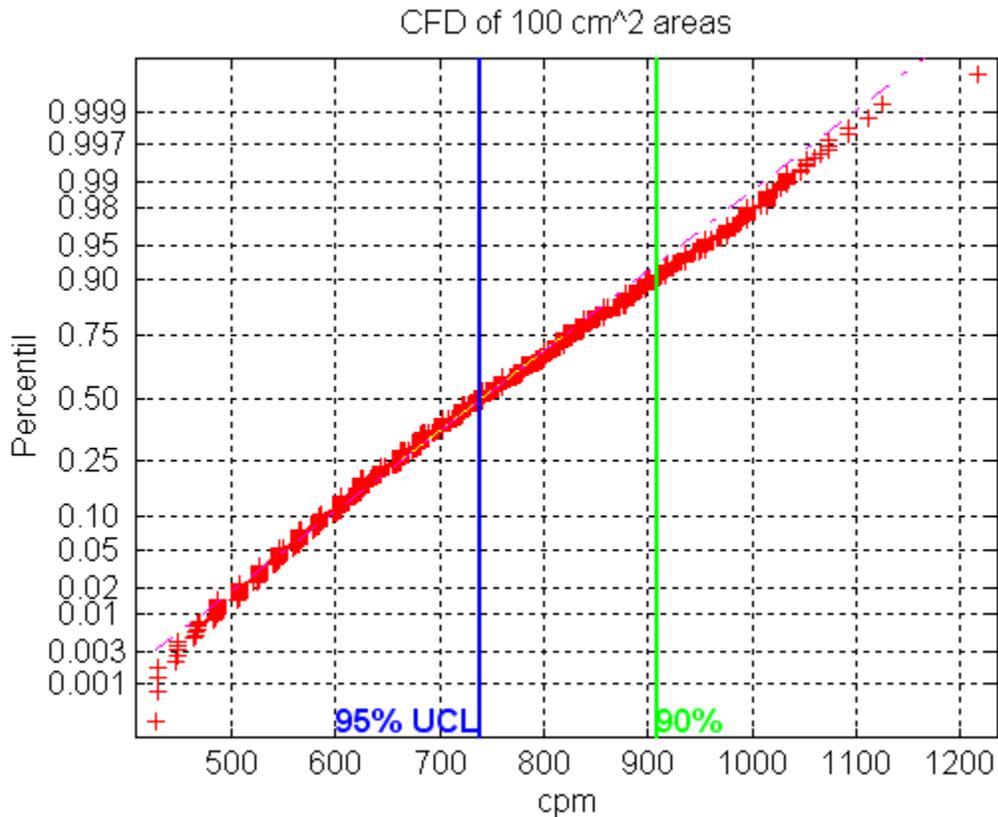


Figure 8: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Static Mode Concrete

| | |
|------------------------------|--|
| Survey File Name: | B4B0403A |
| Survey Date: | November 4, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | C180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4a |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012630B4B0403A |
| Mean Value: | 566 |

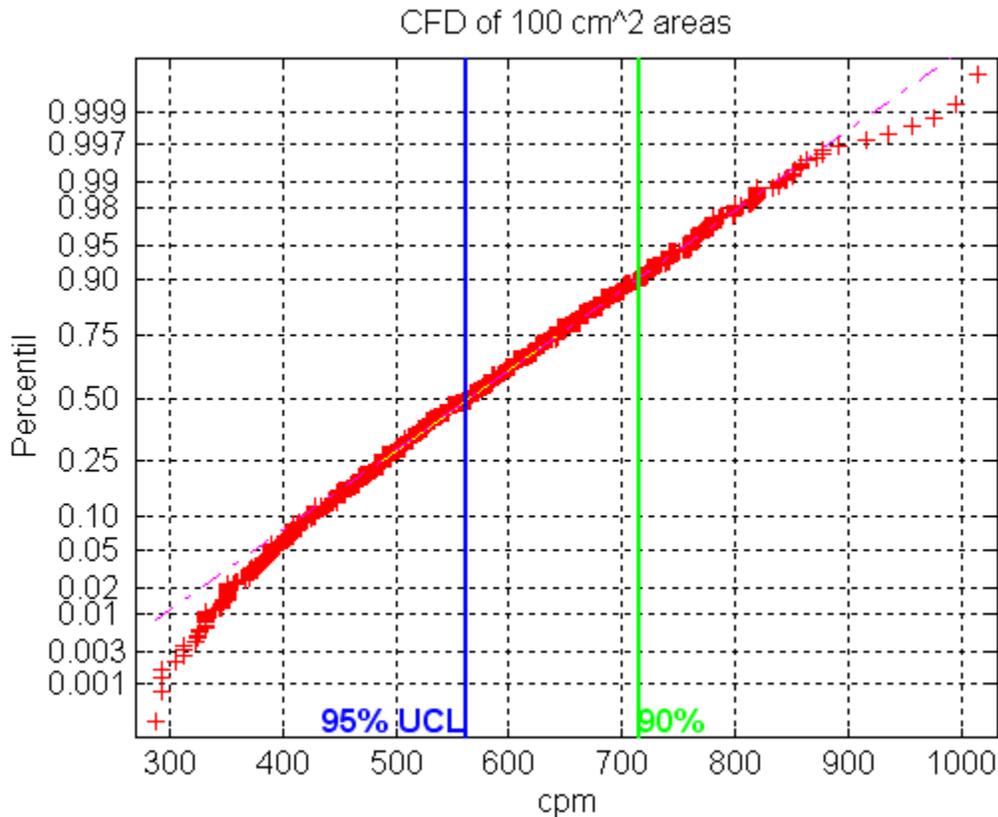


Figure 9: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Static Mode Drywall

| | |
|------------------------------|--|
| Survey File Name: | B4B0404A |
| Survey Date: | November 4, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | C180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4a |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012630B4B0404A |
| Mean Value: | 352 |

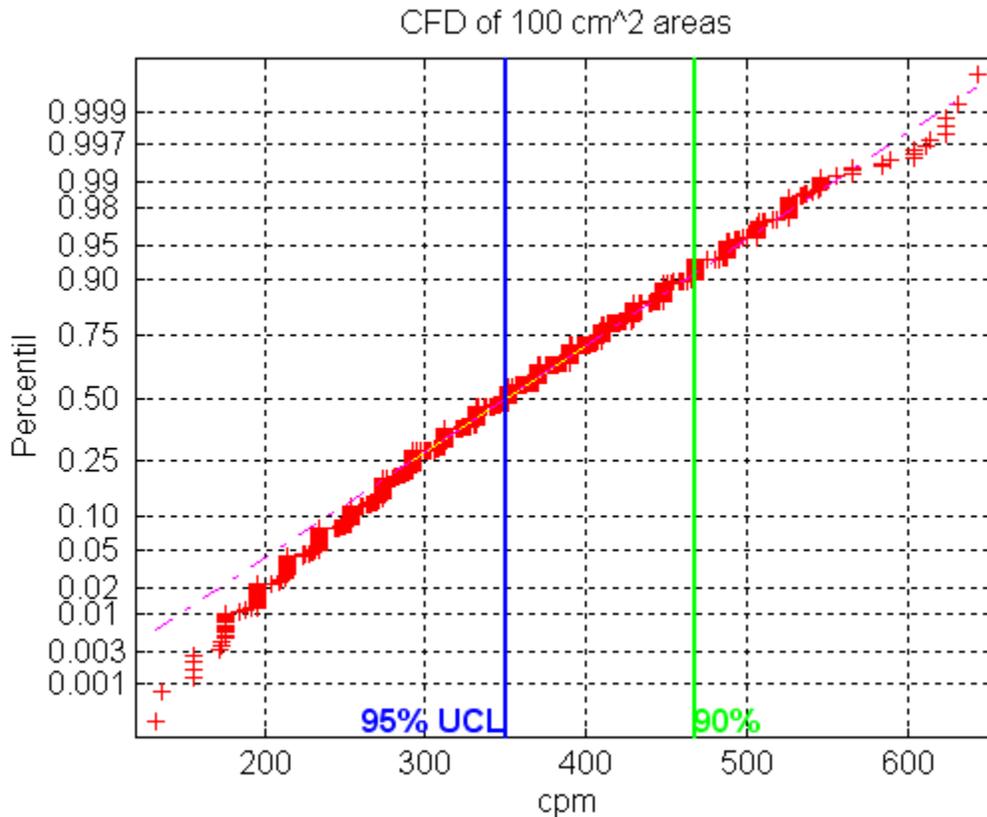


Figure 10: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Static Mode Steel

| | |
|------------------------------|--|
| Survey File Name: | B4B0406A |
| Survey Date: | November 4, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | C180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4a |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012630B4B0406A |
| Mean Value: | 346 |

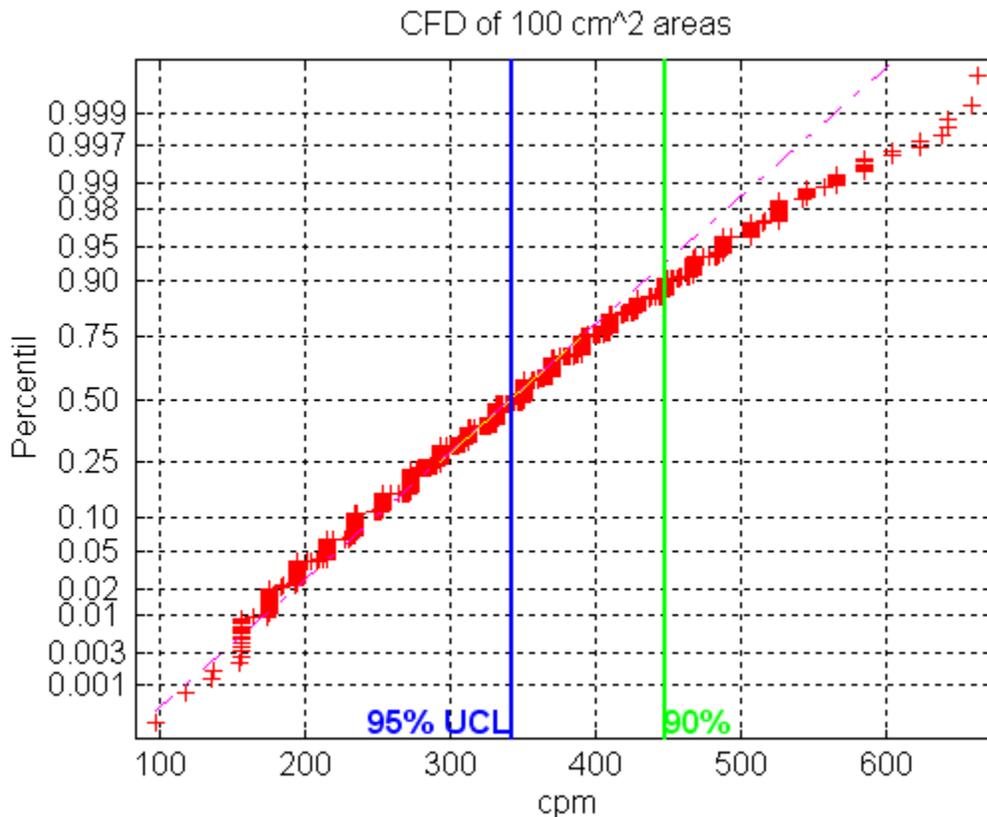


Figure 11: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

SCM Static Mode Wood

| | |
|------------------------------|--|
| Survey File Name: | B4B0407A |
| Survey Date: | November 4, 2010 |
| Survey Equipment: | SCM4 |
| Detector(s): | C180 |
| Surveyor(s): | PATRICKS |
| System Information | |
| SIMS Version: | V5.31 |
| SCM Version: | V3.4a |
| Survey Results | |
| Survey Location Code: | N0099X0000FZ0009Z99W001AB0012630B4B0407A |
| Mean Value: | 360 |

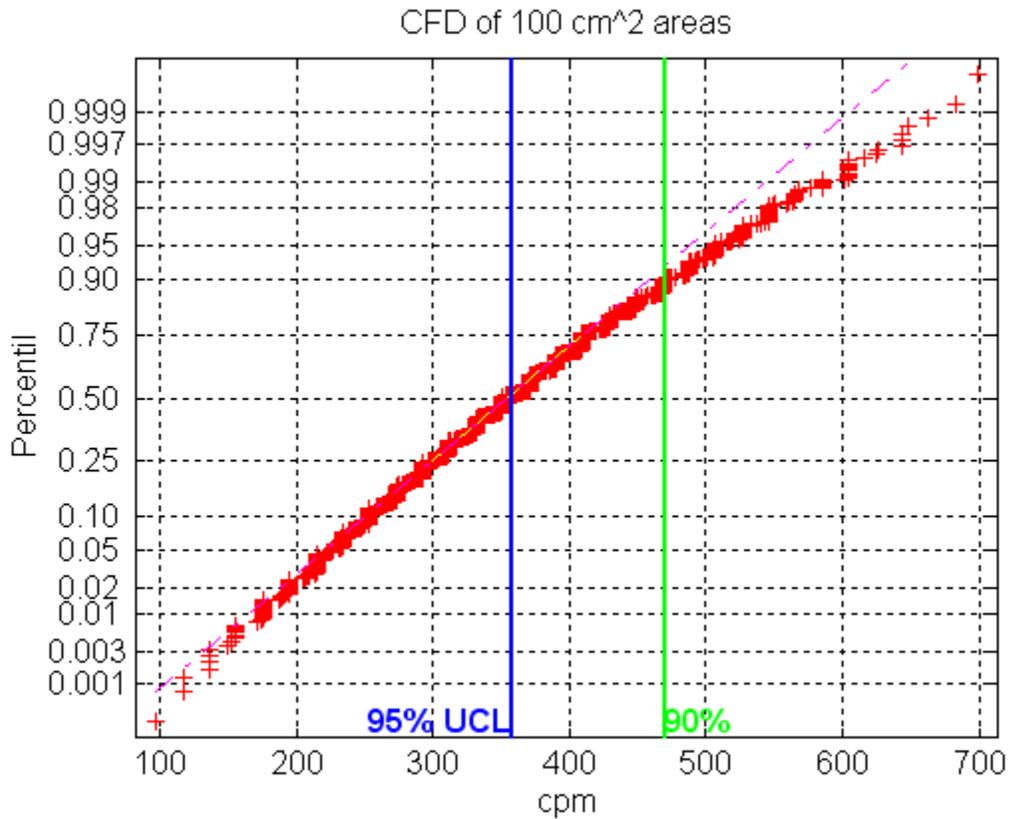
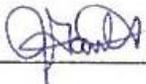


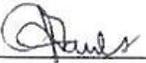
Figure 12: CFD of surface activity in 100cm² areas. The horizontal scale is in cpm per 100cm².

APPENDIX B
REFERENCE AREA SURVEYS LUDLUM 43-68 DETECTOR with
LUDLUM 2221 RATEMETER

| | | | | | | |
|---|----------------|----------------------|-------------------------|-----------------------|-------------------|---------|
| DATE: 11-29-10 TIME: 1645 | | INSTRUMENTATION USED | | | | |
| SURVEY NUMBER: AP-097-10 | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | | |
| SURVEYOR: James Kirby | 2221 | 183194 | 2-15-10 | 10 67.7 | | |
| Description or drawing: Backgrounds on Material β - 10 - 1 minute counts / α 1 - 10 minute count | | | | | | |
| Detector | | | | | | |
| 43-68 Serial # PR 148835 | | | | | | |
| β | Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
| | 120 | 116 | 123 | 122 | 132 | 165 |
| | 141 | 110 | 112 | 117 | 137 | 129 |
| | 124 | 124 | 117 | 127 | 140 | 117 |
| | 127 | 110 | 131 | 117 | 139 | 141 |
| | 154 | 114 | 129 | 121 | 132 | 127 |
| | 110 | 118 | 130 | 128 | 147 | 134 |
| | 117 | 127 | 133 | 142 | 146 | 139 |
| | 111 | 140 | 125 | 119 | 133 | 140 |
| | 123 | 127 | 134 | 119 | 114 | 135 |
| | 136 | 111 | 123 | 125 | 139 | 140 |
| α | Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
| | 2.4cpm | 3 cpm | 2.5 cpm | 3 cpm | 3.5 cpm | 3.2 cpm |

Reviewed by: 

| | | | | | | |
|---|----------------------|----------------------|---------------|----------------------|-----------------------------|-------|
| DATE: 11/5/10 | TIME: 1:40 | INSTRUMENTATION USED | | | | |
| SURVEY NUMBER: APD 46-10 | APD 46-10 | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | |
| SURVEYOR: Lili Patrick | | 2221 | 148451 | 2/15/11 | α .09 / β .085 | |
| Description or drawing: Backgrounds on Material β - 10 - 1 minute counts / α 1 - 10 minute count | | | | | | |
| Detector | | | | | | |
| 43-68 Serial # <u>177646</u> | | | | | | |
| β | Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
| | 157 | 98 | 106 | 112 | 217 | 111 |
| | 162 | 94 | 108 | 105 | 218 | 108 |
| | 151 | 99 | 121 | 116 | 196 | 97 |
| | 151 | 117 | 102 | 103 | 218 | 103 |
| | 146 | 98 | 117 | 126 | 188 | 127 |
| | 145 | 126 | 112 | 103 | 191 | 118 |
| | 161 | 101 | 99 | 106 | 188 | 109 |
| | 123 | 118 | 116 | 127 | 196 | 92 |
| | 143 | 95 | 123 | 107 | 194 | 126 |
| | 131 | 117 | 118 | 95 | 202 | 122 |
| α | Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
| | 18 | 22 | 17 | 30 | 41 | 26 |

Reviewed by: 

| | | | | | | |
|---|----------------------|----------------------|----------------------|----------------|-------|--|
| DATE: <u>10/2/10</u> | TIME: <u>0800</u> | INSTRUMENTATION USED | | | | |
| SURVEY NUMBER: <u>AP01810</u> | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | | |
| SURVEYOR: <u>E. Patrick</u> | <u>2221</u> | <u>190181</u> | <u>2/15/10</u> | <u>.03</u> | | |
| Description or drawing: <u>Backgrounds on Material 10 - 1 minute counts</u> | | | | | | |
| Detector | | | | | | |
| 43-68 Serial # <u>149768</u> | | | | | | |
| Concrete | Wood | Glass | Drywall | Concrete Block | Steel | |
| 137 | 101 | 104 | 109 | 240 | 112 | |
| 137 | 83 | 123 | 105 | 243 | 98 | |
| 122 | 102 | 119 | 104 | 251 | 92 | |
| 126 | 105 | 110 | 104 | 225 | 104 | |
| 131 | 101 | 113 | 121 | 218 | 89 | |
| 125 | 86 | 88 | 120 | 210 | 119 | |
| 122 | 103 | 121 | 101 | 229 | 110 | |
| 142 | 98 | 98 | 104 | 229 | 112 | |
| 104 | 96 | 100 | 98 | 224 | 95 | |
| 118 | 85 | 98 | 111 | 210 | 117 | |
| [ALL RESULTS ARE CPM] | | | | | | |
| Detector | | | | | | |
| 44-9 Serial# <u>169468</u> | | | | | | |
| Concrete | Wood | Glass | Drywall | Concrete Block | Steel | |
| 451 | 337 | 304 | 448 | 605 | 408 | |
| 430 | 400 | 348 | 447 | 618 | 430 | |
| 533 | 351 | 409 | 431 | 578 | 500 | |
| 621 | 357 | 400 | 401 | 545 | 487 | |
| 613 | 408 | 452 | 531 | 586 | 472 | |
| 615 | 413 | 338 | 461 | 496 | 480 | |
| 563 | 422 | 375 | 412 | 488 | 489 | |
| 575 | 441 | 342 | 442 | 492 | 410 | |
| 520 | 293 | 333 | 412 | 462 | 440 | |
| 510 | 408 | 331 | 380 | 469 | 402 | |
| [ALL RESULTS ARE CPM] | | | | | | |

Reviewed by: 

| | | | | | |
|---------------------------|---------------|----------------------|----------------------|--------------|--|
| DATE: 10/12/10 | TIME: 0900 | INSTRUMENTATION USED | | | |
| SURVEY NUMBER: AP01910 | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | |
| SURVEYOR: E. PATRICK | 2221 | 148426 | 2/15/11 | .08 | |

Description or drawing: Backgrounds on Material 10 - 1 minute counts

Detector

43-68 Serial # 149773

| Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
|----------|------|-------|---------|----------------|-------|
| 199 | 147 | 137 | 164 | 267 | 145 |
| 195 | 164 | 155 | 166 | 318 | 140 |
| 188 | 153 | 165 | 150 | 248 | 131 |
| 193 | 147 | 159 | 150 | 273 | 134 |
| 206 | 147 | 159 | 183 | 275 | 154 |
| 213 | 136 | 173 | 167 | 279 | 152 |
| 214 | 152 | 157 | 150 | 291 | 141 |
| 206 | 165 | 151 | 142 | 291 | 151 |
| 233 | 163 | 178 | 181 | 270 | 148 |
| 184 | 191 | 155 | 169 | 268 | 131 |

[ALL RESULTS ARE CPM]

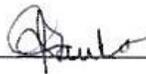
Detector

44-9 Serial# 147890

| Concrete | Wood | Glass | Drywall | Concrete Block | Steel |
|----------|------|-------|---------|----------------|-------|
| 313 | 287 | 189 | 320 | 328 | 383 |
| 385 | 186 | 204 | 292 | 423 | 333 |
| 377 | 250 | 211 | 317 | 387 | 371 |
| 401 | 251 | 176 | 331 | 468 | 247 |
| 406 | 215 | 256 | 276 | 369 | 311 |
| 264 | 296 | 213 | 295 | 485 | 283 |
| 426 | 204 | 199 | 313 | 304 | 341 |
| 349 | 247 | 183 | 321 | 417 | 270 |
| 436 | 237 | 201 | 281 | 432 | 267 |
| 420 | 265 | 226 | 269 | 427 | 334 |

[ALL RESULTS ARE CPM]

Reviewed by:



| | | | | | | |
|--|---------|----------------------|---------------|----------------------|--------------|--|
| DATE: | TIME: | INSTRUMENTATION USED | | | | |
| 11-8-10 | 1400 | | | | | |
| SURVEY NUMBER: | | Model Inst. | Serial Number | Calibration Due Date | % Efficiency | |
| AP-056-10 | | | | | | |
| SURVEYOR: | | | | | | |
| Larry Casey | | 2201 | 148451 | 2-15-11 | 9 | |
| Description or drawing: Backgrounds on Asphalt β - 10 - 1 minute counts / α 1 - 10 minute count | | | | | | |
| Detector | | | | | | |
| 43-68 Serial # 148451/177646 | | | | | | |
| β | Asphalt | | | | | |
| | NA | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| α | Asphalt | | | | | |
| | 50 | | | | | |

Reviewed by: 

APPENDIX G
GAMMA WALK-OVER SURVEY RESULTS

Introduction to Appendix G

A walkover survey of the exposed soil in the former smelter area was performed using a 2-inch by 2-inch sodium iodide (NaI) detector coupled to a ratemeter/scaler and a computer for data logging. The walkover survey process and instrumentation is described in [Sections 6.6 and 8.3](#) as well as in the task specific plan for the Former Smelter Area. The walk over survey was conducted by walking the area in lanes of 1 meter width at approximately 0.5 meter per second with the detector approximately 10 centimeters (4 inches) from the soil surface while moving the detector in a serpentine (S-shaped) fashion. The NaI detector was operated in an open window mode; no energy discrimination was applied. Data were recorded in 2-second increments as the surveyor traversed the survey units. The walkover pattern was documented with each traverse identified with a unique file name. There are three survey units (SU) in the former smelter area. Based on the small size and proximity of SU 1 and SU 2, the walkover data for these SUs are combined. Each SU contained several data strips. The data are recorded in counts per minute (CPM).

The purpose of the walkover survey was to identify any anomalies in the area that may result in additional soil samples or further investigation. The results are not quantitative, but are used to evaluate the potential existence of elevated areas (outliers). To better evaluate the data, cumulative frequency distribution (CFD) plots have been generated for the reference area survey data and for each of the data strips within the former smelter area. Additionally, composite CFDs of the strips within SU 1 and 2, and SU3 have been developed.

Appendix G consists of the following:

1. The walkover data file, consisting of the raw data from each strip from the SUs and the reference area. Data from SU-1 and SU-2 are combined and listed under SU-1. The reference area data is listed as BKG. Data highlighted in yellow are readings taken on pavement at the beginning or end of a strip while the computer was being turned on or off. These data are not soil survey data and have been redacted from the mean and standard deviation calculations and the CFDs.
2. A file containing the strip patterns at the former smelter area.
3. A file containing the CFDs for the reference area (BKG) survey strips, the SU-1 (includes SU-2) and SU-3 strips, and composites for SU-1 and SU-3.

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 12:39 | 5477 |
| 2/23/2011 12:39 | 5841 |
| 2/23/2011 12:39 | 5760 |
| 2/23/2011 12:39 | 5880 |
| 2/23/2011 12:39 | 6225 |
| 2/23/2011 12:39 | 5769 |
| 2/23/2011 12:39 | 5997 |
| 2/23/2011 12:39 | 5803 |
| 2/23/2011 12:39 | 5642 |
| 2/23/2011 12:39 | 5551 |
| 2/23/2011 12:39 | 5140 |
| 2/23/2011 12:39 | 5358 |
| 2/23/2011 12:39 | 5324 |
| 2/23/2011 12:39 | 5267 |
| 2/23/2011 12:39 | 5077 |
| 2/23/2011 12:39 | 5263 |
| 2/23/2011 12:39 | 5121 |
| 2/23/2011 12:39 | 5910 |
| 2/23/2011 12:39 | 5619 |
| 2/23/2011 12:39 | 5846 |
| 2/23/2011 12:40 | 5456 |
| 2/23/2011 12:40 | 5544 |
| 2/23/2011 12:40 | 5863 |
| 2/23/2011 12:40 | 5735 |
| 2/23/2011 12:40 | 5536 |
| 2/23/2011 12:40 | 5664 |
| 2/23/2011 12:40 | 5841 |
| 2/23/2011 12:40 | 5835 |
| 2/23/2011 12:40 | 5690 |
| 2/23/2011 12:40 | 5353 |
| 2/23/2011 12:40 | 5043 |
| 2/23/2011 12:40 | 5364 |
| 2/23/2011 12:40 | 5597 |
| 2/23/2011 12:40 | 5796 |
| 2/23/2011 12:40 | 5705 |
| 2/23/2011 12:40 | 5204 |
| 2/23/2011 12:40 | 5117 |
| 2/23/2011 12:40 | 5241 |
| 2/23/2011 12:40 | 5033 |
| 2/23/2011 12:40 | 5441 |
| 2/23/2011 12:40 | 5918 |
| 2/23/2011 12:40 | 5639 |
| 2/23/2011 12:40 | 5759 |
| 2/23/2011 12:40 | 6149 |
| 2/23/2011 12:40 | 6041 |
| 2/23/2011 12:40 | 5723 |
| 2/23/2011 12:40 | 5716 |
| 2/23/2011 12:40 | 5773 |
| 2/23/2011 12:40 | 5719 |
| 2/23/2011 12:40 | 6007 |
| 2/23/2011 12:40 | 5807 |

| | |
|-----------------|------|
| 2/23/2011 12:40 | 5726 |
| 2/23/2011 12:40 | 6198 |
| 2/23/2011 12:40 | 6289 |
| 2/23/2011 12:40 | 6522 |
| 2/23/2011 12:40 | 6400 |
| 2/23/2011 12:40 | 5715 |
| 2/23/2011 12:40 | 5187 |
| 2/23/2011 12:40 | 5280 |
| 2/23/2011 12:40 | 5475 |
| 2/23/2011 12:40 | 5524 |
| 2/23/2011 12:40 | 5530 |
| 2/23/2011 12:40 | 6013 |
| 2/23/2011 12:40 | 6337 |
| 2/23/2011 12:40 | 5676 |
| 2/23/2011 12:40 | 5210 |
| 2/23/2011 12:40 | 5998 |
| 2/23/2011 12:40 | 5706 |
| 2/23/2011 12:40 | 5647 |
| 2/23/2011 12:40 | 5687 |
| 2/23/2011 12:40 | 5284 |
| 2/23/2011 12:40 | 5537 |
| 2/23/2011 12:40 | 5912 |
| 2/23/2011 12:40 | 6318 |
| 2/23/2011 12:40 | 5744 |
| 2/23/2011 12:40 | 5473 |
| 2/23/2011 12:40 | 5778 |
| 2/23/2011 12:40 | 5628 |
| 2/23/2011 12:40 | 5700 |
| 2/23/2011 12:40 | 5846 |
| 2/23/2011 12:41 | 5553 |
| 2/23/2011 12:41 | 5689 |
| 2/23/2011 12:41 | 5892 |
| 2/23/2011 12:41 | 5827 |
| 2/23/2011 12:41 | 5910 |
| 2/23/2011 12:41 | 6009 |
| 2/23/2011 12:41 | 6528 |
| 2/23/2011 12:41 | 6522 |
| 2/23/2011 12:41 | 6490 |
| 2/23/2011 12:41 | 7892 |
| 2/23/2011 12:41 | 6023 |
| 2/23/2011 12:41 | 6073 |
| 2/23/2011 12:41 | 5172 |
| 2/23/2011 12:41 | 5707 |
| 2/23/2011 12:41 | 5895 |
| 2/23/2011 12:41 | 6380 |
| 2/23/2011 12:41 | 6725 |
| 2/23/2011 12:41 | 6151 |
| 2/23/2011 12:41 | 5576 |
| 2/23/2011 12:41 | 5919 |
| 2/23/2011 12:41 | 5804 |
| 2/23/2011 12:41 | 5882 |
| 2/23/2011 12:41 | 6384 |

| | |
|-----------------|------|
| 2/23/2011 12:41 | 5766 |
| 2/23/2011 12:41 | 5643 |
| 2/23/2011 12:41 | 5454 |
| 2/23/2011 12:41 | 5408 |
| 2/23/2011 12:41 | 5667 |
| 2/23/2011 12:41 | 5827 |
| 2/23/2011 12:41 | 6060 |
| 2/23/2011 12:41 | 5722 |
| 2/23/2011 12:41 | 5686 |
| 2/23/2011 12:41 | 5688 |
| 2/23/2011 12:41 | 5689 |
| 2/23/2011 12:41 | 5788 |
| 2/23/2011 12:41 | 5753 |
| 2/23/2011 12:41 | 6236 |
| 2/23/2011 12:41 | 5669 |
| 2/23/2011 12:41 | 5708 |
| 2/23/2011 12:41 | 5723 |
| 2/23/2011 12:41 | 5844 |
| 2/23/2011 12:41 | 6377 |
| 2/23/2011 12:41 | 6544 |
| 2/23/2011 12:41 | 6856 |
| 2/23/2011 12:41 | 5764 |
| 2/23/2011 12:41 | 5852 |
| 2/23/2011 12:41 | 6199 |
| 2/23/2011 12:41 | 5939 |
| 2/23/2011 12:41 | 6247 |
| 2/23/2011 12:41 | 6181 |
| 2/23/2011 12:41 | 6135 |
| 2/23/2011 12:41 | 6663 |
| 2/23/2011 12:41 | 6106 |
| 2/23/2011 12:41 | 6326 |
| 2/23/2011 12:41 | 5792 |
| 2/23/2011 12:41 | 5545 |
| 2/23/2011 12:41 | 5902 |
| 2/23/2011 12:41 | 5884 |
| 2/23/2011 12:41 | 5860 |
| 2/23/2011 12:41 | 5943 |
| 2/23/2011 12:42 | 5904 |
| 2/23/2011 12:42 | 5743 |
| 2/23/2011 12:42 | 5573 |
| 2/23/2011 12:42 | 5377 |
| 2/23/2011 12:42 | 5792 |
| 2/23/2011 12:42 | 5508 |
| 2/23/2011 12:42 | 5678 |
| 2/23/2011 12:42 | 6179 |
| 2/23/2011 12:42 | 4702 |
| 2/23/2011 12:42 | 5705 |
| 2/23/2011 12:42 | 5984 |
| 2/23/2011 12:42 | 5364 |
| 2/23/2011 12:42 | 5477 |
| 2/23/2011 12:42 | 5578 |
| 2/23/2011 12:42 | 5275 |

| | |
|-----------------|------|
| 2/23/2011 12:42 | 5382 |
| 2/23/2011 12:42 | 5630 |
| 2/23/2011 12:42 | 5004 |
| 2/23/2011 12:42 | 5252 |
| 2/23/2011 12:42 | 5219 |
| 2/23/2011 12:42 | 5546 |
| 2/23/2011 12:42 | 5894 |
| 2/23/2011 12:42 | 5543 |
| 2/23/2011 12:42 | 5255 |
| 2/23/2011 12:42 | 5836 |
| 2/23/2011 12:42 | 5435 |
| 2/23/2011 12:42 | 5254 |
| 2/23/2011 12:42 | 5130 |
| 2/23/2011 12:42 | 5676 |
| 2/23/2011 12:42 | 5675 |
| 2/23/2011 12:42 | 5704 |
| 2/23/2011 12:42 | 5211 |
| 2/23/2011 12:42 | 5631 |
| 2/23/2011 12:42 | 5567 |
| 2/23/2011 12:42 | 5561 |
| 2/23/2011 12:42 | 5866 |
| 2/23/2011 12:42 | 5774 |
| 2/23/2011 12:42 | 5813 |
| 2/23/2011 12:42 | 5820 |
| 2/23/2011 12:42 | 5411 |
| 2/23/2011 12:42 | 5451 |
| 2/23/2011 12:42 | 5669 |
| 2/23/2011 12:42 | 6263 |
| 2/23/2011 12:42 | 5316 |
| 2/23/2011 12:42 | 5405 |
| 2/23/2011 12:42 | 5710 |
| 2/23/2011 12:42 | 6197 |
| 2/23/2011 12:42 | 6589 |
| 2/23/2011 12:42 | 6597 |
| 2/23/2011 12:42 | 6389 |
| 2/23/2011 12:42 | 5516 |
| 2/23/2011 12:42 | 6222 |
| 2/23/2011 12:42 | 5978 |
| 2/23/2011 12:42 | 5823 |
| 2/23/2011 12:42 | 5847 |
| 2/23/2011 12:42 | 5966 |
| 2/23/2011 12:42 | 6131 |
| 2/23/2011 12:42 | 6633 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 12:43 | 5466 |
| 2/23/2011 12:43 | 5887 |
| 2/23/2011 12:43 | 5771 |
| 2/23/2011 12:43 | 6334 |
| 2/23/2011 12:43 | 6353 |
| 2/23/2011 12:43 | 5548 |
| 2/23/2011 12:44 | 5783 |
| 2/23/2011 12:44 | 5765 |
| 2/23/2011 12:44 | 5928 |
| 2/23/2011 12:44 | 5997 |
| 2/23/2011 12:44 | 5451 |
| 2/23/2011 12:44 | 5871 |
| 2/23/2011 12:44 | 5620 |
| 2/23/2011 12:44 | 5951 |
| 2/23/2011 12:44 | 6227 |
| 2/23/2011 12:44 | 6536 |
| 2/23/2011 12:44 | 6134 |
| 2/23/2011 12:44 | 6303 |
| 2/23/2011 12:44 | 5588 |
| 2/23/2011 12:44 | 5191 |
| 2/23/2011 12:44 | 5650 |
| 2/23/2011 12:44 | 5765 |
| 2/23/2011 12:44 | 5485 |
| 2/23/2011 12:44 | 5238 |
| 2/23/2011 12:44 | 5496 |
| 2/23/2011 12:44 | 5626 |
| 2/23/2011 12:44 | 5205 |
| 2/23/2011 12:44 | 5500 |
| 2/23/2011 12:44 | 5516 |
| 2/23/2011 12:44 | 5810 |
| 2/23/2011 12:44 | 5661 |
| 2/23/2011 12:44 | 5441 |
| 2/23/2011 12:44 | 5528 |
| 2/23/2011 12:44 | 5869 |
| 2/23/2011 12:44 | 5754 |
| 2/23/2011 12:44 | 6267 |
| 2/23/2011 12:44 | 6010 |
| 2/23/2011 12:44 | 5533 |
| 2/23/2011 12:44 | 5467 |
| 2/23/2011 12:44 | 5573 |
| 2/23/2011 12:44 | 5040 |
| 2/23/2011 12:44 | 5917 |
| 2/23/2011 12:44 | 6719 |
| 2/23/2011 12:44 | 6569 |
| 2/23/2011 12:44 | 6112 |
| 2/23/2011 12:44 | 6808 |
| 2/23/2011 12:44 | 6442 |
| 2/23/2011 12:44 | 5685 |
| 2/23/2011 12:44 | 5890 |
| 2/23/2011 12:44 | 5646 |
| 2/23/2011 12:44 | 5748 |

| | |
|-----------------|------|
| 2/23/2011 12:44 | 5701 |
| 2/23/2011 12:44 | 5449 |
| 2/23/2011 12:44 | 5795 |
| 2/23/2011 12:44 | 6553 |
| 2/23/2011 12:44 | 6738 |
| 2/23/2011 12:44 | 5074 |
| 2/23/2011 12:44 | 5749 |
| 2/23/2011 12:44 | 5769 |
| 2/23/2011 12:44 | 6813 |
| 2/23/2011 12:44 | 5843 |
| 2/23/2011 12:44 | 6009 |
| 2/23/2011 12:44 | 6513 |
| 2/23/2011 12:44 | 6668 |
| 2/23/2011 12:44 | 5357 |
| 2/23/2011 12:44 | 5915 |
| 2/23/2011 12:45 | 6065 |
| 2/23/2011 12:45 | 6226 |
| 2/23/2011 12:45 | 7166 |
| 2/23/2011 12:45 | 6711 |
| 2/23/2011 12:45 | 5728 |
| 2/23/2011 12:45 | 5741 |
| 2/23/2011 12:45 | 5509 |
| 2/23/2011 12:45 | 6541 |
| 2/23/2011 12:45 | 6255 |
| 2/23/2011 12:45 | 5943 |
| 2/23/2011 12:45 | 7914 |
| 2/23/2011 12:45 | 5668 |
| 2/23/2011 12:45 | 6893 |
| 2/23/2011 12:45 | 5833 |
| 2/23/2011 12:45 | 6086 |
| 2/23/2011 12:45 | 5852 |
| 2/23/2011 12:45 | 5504 |
| 2/23/2011 12:45 | 5983 |
| 2/23/2011 12:45 | 5533 |
| 2/23/2011 12:45 | 5595 |
| 2/23/2011 12:45 | 5509 |
| 2/23/2011 12:45 | 5949 |
| 2/23/2011 12:45 | 5723 |
| 2/23/2011 12:45 | 5844 |
| 2/23/2011 12:45 | 5200 |
| 2/23/2011 12:45 | 5347 |
| 2/23/2011 12:45 | 5340 |
| 2/23/2011 12:45 | 5891 |
| 2/23/2011 12:45 | 7384 |
| 2/23/2011 12:45 | 6024 |
| 2/23/2011 12:45 | 6204 |
| 2/23/2011 12:45 | 5991 |
| 2/23/2011 12:45 | 5665 |
| 2/23/2011 12:45 | 5271 |
| 2/23/2011 12:45 | 5305 |
| 2/23/2011 12:45 | 5466 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:42 | 3870 |
| 2/23/2011 13:42 | 3724 |
| 2/23/2011 13:42 | 3749 |
| 2/23/2011 13:42 | 4160 |
| 2/23/2011 13:42 | 3710 |
| 2/23/2011 13:42 | 3480 |
| 2/23/2011 13:42 | 3806 |
| 2/23/2011 13:42 | 4000 |
| 2/23/2011 13:42 | 3814 |
| 2/23/2011 13:42 | 3932 |
| 2/23/2011 13:42 | 3987 |
| 2/23/2011 13:42 | 4035 |
| 2/23/2011 13:42 | 3965 |
| 2/23/2011 13:42 | 4016 |
| 2/23/2011 13:42 | 3927 |
| 2/23/2011 13:42 | 4223 |
| 2/23/2011 13:42 | 4097 |
| 2/23/2011 13:42 | 4327 |
| 2/23/2011 13:42 | 4009 |
| 2/23/2011 13:42 | 3747 |
| 2/23/2011 13:42 | 4092 |
| 2/23/2011 13:42 | 3807 |
| 2/23/2011 13:42 | 3757 |
| 2/23/2011 13:42 | 3992 |
| 2/23/2011 13:42 | 4186 |
| 2/23/2011 13:42 | 4439 |
| 2/23/2011 13:42 | 4009 |
| 2/23/2011 13:42 | 3927 |
| 2/23/2011 13:42 | 3944 |
| 2/23/2011 13:42 | 3925 |
| 2/23/2011 13:42 | 3832 |
| 2/23/2011 13:42 | 4225 |
| 2/23/2011 13:42 | 3741 |
| 2/23/2011 13:43 | 3801 |
| 2/23/2011 13:43 | 3886 |
| 2/23/2011 13:43 | 3915 |
| 2/23/2011 13:43 | 3887 |
| 2/23/2011 13:43 | 3952 |
| 2/23/2011 13:43 | 4105 |
| 2/23/2011 13:43 | 4169 |
| 2/23/2011 13:43 | 4130 |
| 2/23/2011 13:43 | 3831 |
| 2/23/2011 13:43 | 3800 |
| 2/23/2011 13:43 | 4182 |
| 2/23/2011 13:43 | 4115 |
| 2/23/2011 13:43 | 4037 |
| 2/23/2011 13:43 | 4400 |
| 2/23/2011 13:43 | 4380 |
| 2/23/2011 13:43 | 4316 |
| 2/23/2011 13:43 | 4340 |
| 2/23/2011 13:43 | 4811 |

| | |
|-----------------|----------|
| 2/23/2011 13:43 | 4386 |
| 2/23/2011 13:43 | 5115 |
| 2/23/2011 13:43 | 4872 |
| 2/23/2011 13:43 | 4968 |
| Average | 4070.036 |
| Std. Dev | 321.7062 |
| Avg + 3 SD | 5035.155 |
| Max | 5115 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:44 | 4726 |
| 2/23/2011 13:44 | 4106 |
| 2/23/2011 13:44 | 4732 |
| 2/23/2011 13:44 | 4687 |
| 2/23/2011 13:44 | 4661 |
| 2/23/2011 13:44 | 4857 |
| 2/23/2011 13:44 | 4374 |
| 2/23/2011 13:44 | 4508 |
| 2/23/2011 13:44 | 4665 |
| 2/23/2011 13:44 | 4694 |
| 2/23/2011 13:44 | 4485 |
| 2/23/2011 13:44 | 4668 |
| 2/23/2011 13:44 | 4650 |
| 2/23/2011 13:44 | 4588 |
| 2/23/2011 13:44 | 4478 |
| 2/23/2011 13:45 | 4649 |
| 2/23/2011 13:45 | 4992 |
| 2/23/2011 13:45 | 4706 |
| 2/23/2011 13:45 | 4627 |
| 2/23/2011 13:45 | 4462 |
| 2/23/2011 13:45 | 5082 |
| 2/23/2011 13:45 | 4771 |
| 2/23/2011 13:45 | 4604 |
| 2/23/2011 13:45 | 4629 |
| 2/23/2011 13:45 | 4321 |
| 2/23/2011 13:45 | 4688 |
| 2/23/2011 13:45 | 4302 |
| 2/23/2011 13:45 | 3980 |
| 2/23/2011 13:45 | 4127 |
| 2/23/2011 13:45 | 4119 |
| 2/23/2011 13:45 | 4259 |
| 2/23/2011 13:45 | 4983 |
| 2/23/2011 13:45 | 4820 |
| 2/23/2011 13:45 | 5486 |
| 2/23/2011 13:45 | 5966 |
| 2/23/2011 13:45 | 5733 |
| 2/23/2011 13:45 | 6202 |
| 2/23/2011 13:45 | 5191 |
| 2/23/2011 13:45 | 5033 |
| 2/23/2011 13:45 | 4866 |
| 2/23/2011 13:45 | 4695 |
| 2/23/2011 13:45 | 5183 |
| 2/23/2011 13:45 | 4693 |
| 2/23/2011 13:45 | 4432 |
| 2/23/2011 13:45 | 4233 |
| 2/23/2011 13:45 | 3963 |
| 2/23/2011 13:45 | 4067 |
| 2/23/2011 13:45 | 4132 |
| 2/23/2011 13:45 | 4394 |
| 2/23/2011 13:45 | 4182 |
| 2/23/2011 13:45 | 4084 |

| | |
|-----------------|----------|
| 2/23/2011 13:45 | 4112 |
| 2/23/2011 13:45 | 4065 |
| 2/23/2011 13:45 | 4016 |
| 2/23/2011 13:45 | 3798 |
| 2/23/2011 13:45 | 3354 |
| 2/23/2011 13:45 | 3375 |
| 2/23/2011 13:45 | 3574 |
| 2/23/2011 13:45 | 4009 |
| 2/23/2011 13:45 | 3900 |
| 2/23/2011 13:45 | 4387 |
| 2/23/2011 13:45 | 4860 |
| 2/23/2011 13:45 | 4594 |
| 2/23/2011 13:45 | 4391 |
| 2/23/2011 13:45 | 4465 |
| 2/23/2011 13:45 | 3936 |
| 2/23/2011 13:45 | 4620 |
| 2/23/2011 13:45 | 4526 |
| 2/23/2011 13:45 | 3904 |
| 2/23/2011 13:45 | 3801 |
| 2/23/2011 13:45 | 3959 |
| 2/23/2011 13:45 | 3923 |
| 2/23/2011 13:45 | 3907 |
| 2/23/2011 13:45 | 3889 |
| 2/23/2011 13:45 | 3847 |
| 2/23/2011 13:46 | 4055 |
| 2/23/2011 13:46 | 3766 |
| 2/23/2011 13:46 | 3782 |
| 2/23/2011 13:46 | 3739 |
| 2/23/2011 13:46 | 3817 |
| 2/23/2011 13:46 | 3660 |
| 2/23/2011 13:46 | 3788 |
| Average | 4406.756 |
| Std Dev | 537.2067 |
| 3X Std Dev | 1611.62 |
| High Range | 6018.376 |
| Max | 6202 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:47 | 3799 |
| 2/23/2011 13:47 | 4038 |
| 2/23/2011 13:47 | 3993 |
| 2/23/2011 13:47 | 4701 |
| 2/23/2011 13:47 | 4515 |
| 2/23/2011 13:47 | 5263 |
| 2/23/2011 13:47 | 4790 |
| 2/23/2011 13:47 | 4554 |
| 2/23/2011 13:47 | 4414 |
| 2/23/2011 13:47 | 3818 |
| 2/23/2011 13:47 | 4128 |
| 2/23/2011 13:47 | 4182 |
| 2/23/2011 13:47 | 4062 |
| 2/23/2011 13:47 | 3924 |
| 2/23/2011 13:47 | 3768 |
| 2/23/2011 13:47 | 4023 |
| 2/23/2011 13:47 | 3954 |
| 2/23/2011 13:47 | 4931 |
| 2/23/2011 13:47 | 4716 |
| 2/23/2011 13:47 | 4700 |
| 2/23/2011 13:47 | 4781 |
| 2/23/2011 13:47 | 4437 |
| 2/23/2011 13:47 | 4558 |
| 2/23/2011 13:47 | 4296 |
| 2/23/2011 13:47 | 4059 |
| 2/23/2011 13:47 | 3812 |
| 2/23/2011 13:47 | 3650 |
| 2/23/2011 13:47 | 4635 |
| 2/23/2011 13:47 | 4459 |
| 2/23/2011 13:47 | 4241 |
| 2/23/2011 13:47 | 3875 |
| 2/23/2011 13:47 | 3848 |
| 2/23/2011 13:47 | 4552 |
| 2/23/2011 13:47 | 4503 |
| 2/23/2011 13:47 | 4168 |
| 2/23/2011 13:47 | 4091 |
| 2/23/2011 13:47 | 3932 |
| 2/23/2011 13:47 | 4031 |
| 2/23/2011 13:47 | 4099 |
| 2/23/2011 13:47 | 3992 |
| 2/23/2011 13:47 | 4445 |
| 2/23/2011 13:47 | 4232 |
| 2/23/2011 13:47 | 4796 |
| 2/23/2011 13:47 | 4730 |
| 2/23/2011 13:47 | 4168 |
| 2/23/2011 13:47 | 3882 |
| 2/23/2011 13:47 | 3922 |
| 2/23/2011 13:47 | 3944 |
| 2/23/2011 13:47 | 4145 |
| 2/23/2011 13:47 | 3770 |
| 2/23/2011 13:47 | 4038 |

| | |
|-----------------|----------|
| 2/23/2011 13:47 | 4484 |
| 2/23/2011 13:47 | 4622 |
| 2/23/2011 13:47 | 4430 |
| 2/23/2011 13:47 | 5754 |
| 2/23/2011 13:47 | 5299 |
| 2/23/2011 13:47 | 5636 |
| 2/23/2011 13:47 | 5487 |
| 2/23/2011 13:47 | 5179 |
| 2/23/2011 13:48 | 5066 |
| 2/23/2011 13:48 | 4544 |
| 2/23/2011 13:48 | 4656 |
| 2/23/2011 13:48 | 4426 |
| 2/23/2011 13:48 | 4162 |
| 2/23/2011 13:48 | 4148 |
| 2/23/2011 13:48 | 3913 |
| 2/23/2011 13:48 | 4030 |
| 2/23/2011 13:48 | 3872 |
| 2/23/2011 13:48 | 3648 |
| 2/23/2011 13:48 | 3957 |
| 2/23/2011 13:48 | 4123 |
| 2/23/2011 13:48 | 4374 |
| 2/23/2011 13:48 | 4913 |
| 2/23/2011 13:48 | 4623 |
| 2/23/2011 13:48 | 4625 |
| 2/23/2011 13:48 | 4664 |
| 2/23/2011 13:48 | 4566 |
| 2/23/2011 13:48 | 4788 |
| 2/23/2011 13:48 | 4471 |
| 2/23/2011 13:48 | 4720 |
| 2/23/2011 13:48 | 4267 |
| 2/23/2011 13:48 | 4147 |
| 2/23/2011 13:48 | 4425 |
| 2/23/2011 13:48 | 4717 |
| 2/23/2011 13:48 | 4505 |
| 2/23/2011 13:48 | 4477 |
| Average | 4373.047 |
| Std Dev | 447.5204 |
| Avg + 3 SD | 5715.608 |
| Max | 5754 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:49 | 3776 |
| 2/23/2011 13:49 | 3638 |
| 2/23/2011 13:49 | 3820 |
| 2/23/2011 13:49 | 3922 |
| 2/23/2011 13:49 | 3817 |
| 2/23/2011 13:49 | 4044 |
| 2/23/2011 13:49 | 4195 |
| 2/23/2011 13:49 | 3812 |
| 2/23/2011 13:49 | 3653 |
| 2/23/2011 13:49 | 3697 |
| 2/23/2011 13:49 | 3621 |
| 2/23/2011 13:49 | 3630 |
| 2/23/2011 13:49 | 3661 |
| 2/23/2011 13:49 | 3735 |
| 2/23/2011 13:49 | 3541 |
| 2/23/2011 13:49 | 3462 |
| 2/23/2011 13:49 | 3554 |
| 2/23/2011 13:49 | 3505 |
| 2/23/2011 13:49 | 3794 |
| 2/23/2011 13:49 | 3864 |
| 2/23/2011 13:49 | 3644 |
| 2/23/2011 13:49 | 3777 |
| 2/23/2011 13:49 | 3496 |
| 2/23/2011 13:49 | 3754 |
| 2/23/2011 13:49 | 4104 |
| 2/23/2011 13:49 | 4303 |
| 2/23/2011 13:49 | 4235 |
| 2/23/2011 13:49 | 3950 |
| 2/23/2011 13:49 | 4073 |
| 2/23/2011 13:49 | 3861 |
| 2/23/2011 13:49 | 3941 |
| 2/23/2011 13:49 | 4113 |
| 2/23/2011 13:49 | 3720 |
| 2/23/2011 13:49 | 3807 |
| 2/23/2011 13:49 | 3680 |
| 2/23/2011 13:49 | 3542 |
| 2/23/2011 13:49 | 3652 |
| 2/23/2011 13:49 | 3461 |
| 2/23/2011 13:49 | 3257 |
| 2/23/2011 13:49 | 3152 |
| 2/23/2011 13:49 | 3435 |
| 2/23/2011 13:49 | 3765 |
| 2/23/2011 13:49 | 3745 |
| 2/23/2011 13:49 | 3480 |
| 2/23/2011 13:49 | 3447 |
| 2/23/2011 13:49 | 3684 |
| 2/23/2011 13:49 | 3551 |
| 2/23/2011 13:49 | 3633 |
| 2/23/2011 13:49 | 3539 |
| 2/23/2011 13:49 | 3611 |
| 2/23/2011 13:49 | 3514 |

| | |
|-----------------|----------|
| 2/23/2011 13:49 | 3610 |
| 2/23/2011 13:49 | 3467 |
| Average | 3712.151 |
| Std.Dev | 236.5973 |
| 3X Std Dev | 709.7919 |
| High Range | 4421.943 |
| Max | 4303 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:51 | 4831 |
| 2/23/2011 13:51 | 4480 |
| 2/23/2011 13:51 | 4320 |
| 2/23/2011 13:51 | 4222 |
| 2/23/2011 13:51 | 4400 |
| 2/23/2011 13:51 | 4080 |
| 2/23/2011 13:51 | 4102 |
| 2/23/2011 13:51 | 4137 |
| 2/23/2011 13:51 | 4195 |
| 2/23/2011 13:51 | 4212 |
| 2/23/2011 13:51 | 4387 |
| 2/23/2011 13:51 | 4320 |
| 2/23/2011 13:51 | 4252 |
| 2/23/2011 13:51 | 4379 |
| 2/23/2011 13:51 | 4121 |
| 2/23/2011 13:51 | 4118 |
| 2/23/2011 13:51 | 4128 |
| 2/23/2011 13:51 | 4122 |
| 2/23/2011 13:51 | 4178 |
| 2/23/2011 13:51 | 4315 |
| 2/23/2011 13:51 | 3995 |
| 2/23/2011 13:51 | 3861 |
| 2/23/2011 13:51 | 3597 |
| 2/23/2011 13:51 | 3791 |
| 2/23/2011 13:51 | 3673 |
| 2/23/2011 13:51 | 3684 |
| 2/23/2011 13:51 | 3735 |
| 2/23/2011 13:51 | 3974 |
| 2/23/2011 13:51 | 4478 |
| 2/23/2011 13:51 | 4379 |
| 2/23/2011 13:51 | 4293 |
| 2/23/2011 13:51 | 4492 |
| 2/23/2011 13:51 | 4094 |
| 2/23/2011 13:51 | 4433 |
| 2/23/2011 13:51 | 4316 |
| 2/23/2011 13:51 | 4160 |
| 2/23/2011 13:51 | 4417 |
| 2/23/2011 13:51 | 4277 |
| 2/23/2011 13:51 | 4318 |
| 2/23/2011 13:51 | 4814 |
| 2/23/2011 13:51 | 4380 |
| Average | 4206.341 |
| Std. Dev. | 251.9701 |
| 3X Std. Dev | 755.9104 |
| High Range | 4962.252 |
| Max | 4831 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:52 | 4207 |
| 2/23/2011 13:52 | 4204 |
| 2/23/2011 13:52 | 4712 |
| 2/23/2011 13:52 | 4698 |
| 2/23/2011 13:52 | 4218 |
| 2/23/2011 13:52 | 4202 |
| 2/23/2011 13:52 | 4074 |
| 2/23/2011 13:52 | 3766 |
| 2/23/2011 13:52 | 3682 |
| 2/23/2011 13:52 | 3783 |
| 2/23/2011 13:52 | 4017 |
| 2/23/2011 13:52 | 3891 |
| 2/23/2011 13:52 | 3878 |
| 2/23/2011 13:52 | 3753 |
| 2/23/2011 13:52 | 3936 |
| 2/23/2011 13:52 | 3883 |
| 2/23/2011 13:52 | 4087 |
| 2/23/2011 13:52 | 4159 |
| 2/23/2011 13:52 | 4064 |
| 2/23/2011 13:52 | 4618 |
| 2/23/2011 13:52 | 4330 |
| 2/23/2011 13:52 | 4678 |
| 2/23/2011 13:52 | 5024 |
| 2/23/2011 13:52 | 4656 |
| 2/23/2011 13:52 | 4441 |
| 2/23/2011 13:52 | 4508 |
| Average | 4210.346 |
| Std. Dev. | 360.5419 |
| 3X Std. Dev | 1081.626 |
| High Range | 5291.972 |
| Max | 5024 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:53 | 4435 |
| 2/23/2011 13:53 | 4384 |
| 2/23/2011 13:53 | 4649 |
| 2/23/2011 13:53 | 5097 |
| 2/23/2011 13:53 | 5170 |
| 2/23/2011 13:53 | 4993 |
| 2/23/2011 13:53 | 4554 |
| 2/23/2011 13:53 | 4837 |
| 2/23/2011 13:53 | 4423 |
| 2/23/2011 13:53 | 4393 |
| 2/23/2011 13:53 | 4676 |
| 2/23/2011 13:53 | 4175 |
| 2/23/2011 13:53 | 4301 |
| 2/23/2011 13:53 | 3997 |
| 2/23/2011 13:53 | 4282 |
| 2/23/2011 13:53 | 4396 |
| 2/23/2011 13:53 | 5053 |
| 2/23/2011 13:53 | 4462 |
| 2/23/2011 13:53 | 4707 |
| 2/23/2011 13:53 | 4597 |
| 2/23/2011 13:53 | 4521 |
| 2/23/2011 13:53 | 4500 |
| 2/23/2011 13:53 | 4699 |
| 2/23/2011 13:53 | 4570 |
| 2/23/2011 13:53 | 4768 |
| 2/23/2011 13:53 | 4204 |
| 2/23/2011 13:53 | 4540 |
| 2/23/2011 13:53 | 4511 |
| 2/23/2011 13:53 | 4465 |
| 2/23/2011 13:53 | 4551 |
| 2/23/2011 13:53 | 4202 |
| Average | 4552 |
| Std. Dev. | 275.9272 |
| 3X Std Dev | 827.7815 |
| High Range | 5379.781 |
| Max | 5170 |

DateTime

| | |
|-----------------|------|
| 2/23/2011 13:21 | 5185 |
| 2/23/2011 13:21 | 5174 |
| 2/23/2011 13:21 | 5123 |
| 2/23/2011 13:21 | 5304 |
| 2/23/2011 13:21 | 5308 |
| 2/23/2011 13:21 | 5146 |
| 2/23/2011 13:21 | 4829 |
| 2/23/2011 13:21 | 4366 |
| 2/23/2011 13:21 | 4248 |
| 2/23/2011 13:21 | 4437 |
| 2/23/2011 13:21 | 4243 |
| 2/23/2011 13:21 | 3819 |
| 2/23/2011 13:22 | 4082 |
| 2/23/2011 13:22 | 4711 |
| 2/23/2011 13:22 | 4315 |
| 2/23/2011 13:22 | 4422 |
| 2/23/2011 13:22 | 4505 |
| 2/23/2011 13:22 | 4094 |
| 2/23/2011 13:22 | 4192 |
| 2/23/2011 13:22 | 4286 |
| 2/23/2011 13:22 | 4301 |
| 2/23/2011 13:22 | 4376 |
| 2/23/2011 13:22 | 4157 |
| 2/23/2011 13:22 | 4310 |
| 2/23/2011 13:22 | 3985 |
| 2/23/2011 13:22 | 3917 |
| 2/23/2011 13:22 | 4113 |
| 2/23/2011 13:22 | 4248 |
| 2/23/2011 13:22 | 4459 |
| 2/23/2011 13:22 | 3963 |
| 2/23/2011 13:22 | 4097 |
| 2/23/2011 13:22 | 4359 |
| 2/23/2011 13:22 | 4582 |
| 2/23/2011 13:22 | 4752 |
| 2/23/2011 13:22 | 4623 |
| 2/23/2011 13:22 | 4258 |
| 2/23/2011 13:22 | 4615 |
| 2/23/2011 13:22 | 4591 |
| 2/23/2011 13:22 | 4877 |
| 2/23/2011 13:22 | 4918 |
| 2/23/2011 13:22 | 4739 |
| 2/23/2011 13:22 | 4503 |
| 2/23/2011 13:22 | 4730 |
| 2/23/2011 13:22 | 4528 |
| 2/23/2011 13:22 | 4647 |
| 2/23/2011 13:22 | 4534 |
| 2/23/2011 13:22 | 4372 |
| 2/23/2011 13:22 | 5107 |
| 2/23/2011 13:22 | 5287 |
| 2/23/2011 13:22 | 5441 |
| 2/23/2011 13:22 | 5671 |

| | |
|------------|----------|
| Average | 4565.667 |
| Std. Dev | 435.2723 |
| 3X Std Dev | 1305.817 |
| High Range | 5871.484 |
| Max | 5671 |

| DateTime | Counts | |
|-----------------|--------|-------------|
| 2/23/2011 13:23 | 6078 | |
| 2/23/2011 13:23 | 6149 | On Pavement |
| 2/23/2011 13:23 | 6397 | |
| 2/23/2011 13:23 | 5234 | 5234 |
| 2/23/2011 13:23 | 5216 | 5216 |
| 2/23/2011 13:23 | 4921 | 4921 |
| 2/23/2011 13:23 | 4913 | 4913 |
| 2/23/2011 13:23 | 5006 | 5006 |
| 2/23/2011 13:23 | 4886 | 4886 |
| 2/23/2011 13:23 | 4638 | 4638 |
| 2/23/2011 13:23 | 4574 | 4574 |
| 2/23/2011 13:23 | 4642 | 4642 |
| 2/23/2011 13:23 | 5026 | 5026 |
| 2/23/2011 13:23 | 4612 | 4612 |
| 2/23/2011 13:23 | 4529 | 4529 |
| 2/23/2011 13:23 | 4955 | 4955 |
| 2/23/2011 13:23 | 4362 | 4362 |
| 2/23/2011 13:23 | 4651 | 4651 |
| 2/23/2011 13:24 | 4799 | 4799 |
| 2/23/2011 13:24 | 4192 | 4192 |
| 2/23/2011 13:24 | 4368 | 4368 |
| 2/23/2011 13:24 | 4391 | 4391 |
| 2/23/2011 13:24 | 4098 | 4098 |
| 2/23/2011 13:24 | 4603 | 4603 |
| 2/23/2011 13:24 | 4586 | 4586 |
| 2/23/2011 13:24 | 4942 | 4942 |
| 2/23/2011 13:24 | 4797 | 4797 |
| 2/23/2011 13:24 | 5301 | 5301 |
| 2/23/2011 13:24 | 5141 | 5141 |
| 2/23/2011 13:24 | 4857 | 4857 |
| 2/23/2011 13:24 | 4749 | 4749 |
| 2/23/2011 13:24 | 4704 | 4704 |
| 2/23/2011 13:24 | 5173 | 5173 |
| 2/23/2011 13:24 | 4860 | 4860 |
| 2/23/2011 13:24 | 5216 | 5216 |
| 2/23/2011 13:24 | 4996 | 4996 |
| 2/23/2011 13:24 | 5113 | 5113 |
| 2/23/2011 13:24 | 4616 | 4616 |
| 2/23/2011 13:24 | 4644 | 4644 |
| 2/23/2011 13:24 | 4757 | 4757 |
| 2/23/2011 13:24 | 4738 | 4738 |
| 2/23/2011 13:24 | 4998 | 4998 |
| 2/23/2011 13:24 | 5413 | 5413 |
| 2/23/2011 13:24 | 4792 | 4792 |
| 2/23/2011 13:24 | 5021 | 5021 |
| 2/23/2011 13:24 | 4774 | 4774 |
| 2/23/2011 13:24 | 4500 | 4500 |
| 2/23/2011 13:24 | 5081 | 5081 |
| 2/23/2011 13:24 | 4575 | 4575 |
| 2/23/2011 13:24 | 4171 | 4171 |
| 2/23/2011 13:24 | 4851 | 4851 |

| | | |
|-----------------|----------|----------|
| 2/23/2011 13:24 | 4506 | 4506 |
| 2/23/2011 13:24 | 4650 | 4650 |
| 2/23/2011 13:24 | 4918 | 4918 |
| 2/23/2011 13:24 | 4446 | 4446 |
| 2/23/2011 13:24 | 4788 | 4788 |
| 2/23/2011 13:24 | 4793 | 4793 |
| 2/23/2011 13:24 | 4743 | 4743 |
| 2/23/2011 13:24 | 5503 | 5503 |
| 2/23/2011 13:24 | 4843 | 4843 |
| 2/23/2011 13:24 | 5011 | 5011 |
| 2/23/2011 13:24 | 5054 | 5054 |
| 2/23/2011 13:24 | 4732 | 4732 |
| 2/23/2011 13:24 | 4912 | 4912 |
| 2/23/2011 13:24 | 4810 | 4810 |
| 2/23/2011 13:24 | 4746 | 4746 |
| 2/23/2011 13:24 | 4199 | 4199 |
| 2/23/2011 13:24 | 4560 | 4560 |
| 2/23/2011 13:24 | 4200 | 4200 |
| 2/23/2011 13:24 | 4335 | 4335 |
| 2/23/2011 13:24 | 4410 | 4410 |
| 2/23/2011 13:24 | 4198 | 4198 |
| 2/23/2011 13:24 | 4701 | 4701 |
| 2/23/2011 13:24 | 4159 | 4159 |
| 2/23/2011 13:24 | 3907 | 3907 |
| 2/23/2011 13:24 | 4332 | 4332 |
| 2/23/2011 13:24 | 4499 | 4499 |
| 2/23/2011 13:24 | 4788 | 4788 |
| 2/23/2011 13:25 | 5311 | 5311 |
| 2/23/2011 13:25 | 4660 | 4660 |
| 2/23/2011 13:25 | 4488 | 4488 |
| 2/23/2011 13:25 | 5052 | 5052 |
| 2/23/2011 13:25 | 4777 | 4777 |
| 2/23/2011 13:25 | 4929 | 4929 |
| 2/23/2011 13:25 | 5188 | 5188 |
| 2/23/2011 13:25 | 4658 | 4658 |
| Average | 4795.488 | 4744.434 |
| Std. Dev | 417.0812 | 322.4961 |
| 3X Std Dev | 1251.244 | 967.4884 |
| High Range | 6046.732 | 5711.922 |
| Max | 6397 | 5503 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:26 | 4222 |
| 2/23/2011 13:26 | 4467 |
| 2/23/2011 13:26 | 3870 |
| 2/23/2011 13:26 | 4104 |
| 2/23/2011 13:26 | 3965 |
| 2/23/2011 13:26 | 3847 |
| 2/23/2011 13:26 | 3928 |
| 2/23/2011 13:26 | 3985 |
| 2/23/2011 13:26 | 3990 |
| 2/23/2011 13:26 | 4294 |
| 2/23/2011 13:26 | 4102 |
| 2/23/2011 13:26 | 3905 |
| 2/23/2011 13:26 | 3868 |
| 2/23/2011 13:26 | 3780 |
| 2/23/2011 13:26 | 4028 |
| 2/23/2011 13:26 | 3832 |
| 2/23/2011 13:26 | 3748 |
| 2/23/2011 13:26 | 3589 |
| 2/23/2011 13:26 | 3719 |
| 2/23/2011 13:26 | 3423 |
| 2/23/2011 13:26 | 3507 |
| 2/23/2011 13:26 | 3672 |
| 2/23/2011 13:26 | 3633 |
| 2/23/2011 13:26 | 3593 |
| 2/23/2011 13:26 | 4412 |
| 2/23/2011 13:26 | 3861 |
| 2/23/2011 13:26 | 3755 |
| 2/23/2011 13:26 | 3834 |
| 2/23/2011 13:26 | 3699 |
| 2/23/2011 13:26 | 3829 |
| 2/23/2011 13:26 | 3979 |
| 2/23/2011 13:26 | 4286 |
| 2/23/2011 13:26 | 4188 |
| 2/23/2011 13:26 | 4078 |
| 2/23/2011 13:26 | 4258 |
| 2/23/2011 13:26 | 5095 |
| 2/23/2011 13:26 | 4471 |
| 2/23/2011 13:26 | 4555 |
| 2/23/2011 13:26 | 4369 |
| 2/23/2011 13:26 | 4318 |
| 2/23/2011 13:26 | 4161 |
| 2/23/2011 13:26 | 4160 |
| 2/23/2011 13:26 | 4748 |
| 2/23/2011 13:26 | 4673 |
| 2/23/2011 13:26 | 5081 |
| 2/23/2011 13:26 | 4410 |
| 2/23/2011 13:26 | 3943 |
| 2/23/2011 13:26 | 3829 |
| 2/23/2011 13:26 | 3832 |
| 2/23/2011 13:26 | 3751 |
| 2/23/2011 13:26 | 3712 |

| | |
|-----------------|----------|
| 2/23/2011 13:26 | 3967 |
| 2/23/2011 13:26 | 4066 |
| 2/23/2011 13:26 | 4017 |
| 2/23/2011 13:26 | 4070 |
| 2/23/2011 13:27 | 4149 |
| 2/23/2011 13:27 | 3838 |
| 2/23/2011 13:27 | 4019 |
| 2/23/2011 13:27 | 4236 |
| 2/23/2011 13:27 | 4258 |
| 2/23/2011 13:27 | 4457 |
| 2/23/2011 13:27 | 3940 |
| 2/23/2011 13:27 | 4307 |
| 2/23/2011 13:27 | 4170 |
| 2/23/2011 13:27 | 4386 |
| Average | 4065.2 |
| Std. Dev. | 339.3551 |
| 3X Std Dev | 1018.065 |
| High Range | 5083.265 |
| Max | 5095 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:31 | 4019 |
| 2/23/2011 13:31 | 4267 |
| 2/23/2011 13:31 | 4447 |
| 2/23/2011 13:31 | 4819 |
| 2/23/2011 13:31 | 4848 |
| 2/23/2011 13:31 | 4624 |
| 2/23/2011 13:31 | 4836 |
| 2/23/2011 13:31 | 5225 |
| 2/23/2011 13:31 | 4446 |
| 2/23/2011 13:31 | 4293 |
| 2/23/2011 13:31 | 4762 |
| 2/23/2011 13:31 | 4419 |
| 2/23/2011 13:31 | 5095 |
| 2/23/2011 13:31 | 4576 |
| 2/23/2011 13:31 | 4246 |
| 2/23/2011 13:31 | 4451 |
| 2/23/2011 13:31 | 4461 |
| 2/23/2011 13:31 | 4354 |
| 2/23/2011 13:31 | 4211 |
| 2/23/2011 13:31 | 4146 |
| 2/23/2011 13:31 | 4327 |
| 2/23/2011 13:31 | 4601 |
| 2/23/2011 13:31 | 4576 |
| 2/23/2011 13:31 | 4194 |
| 2/23/2011 13:31 | 4294 |
| 2/23/2011 13:31 | 3968 |
| 2/23/2011 13:31 | 3992 |
| 2/23/2011 13:31 | 3906 |
| 2/23/2011 13:31 | 3989 |
| 2/23/2011 13:31 | 4280 |
| 2/23/2011 13:31 | 4717 |
| 2/23/2011 13:31 | 4356 |
| 2/23/2011 13:31 | 4340 |
| 2/23/2011 13:31 | 4166 |
| 2/23/2011 13:31 | 3678 |
| 2/23/2011 13:31 | 3471 |
| 2/23/2011 13:31 | 3560 |
| 2/23/2011 13:31 | 3492 |
| 2/23/2011 13:31 | 3668 |
| 2/23/2011 13:31 | 3454 |
| 2/23/2011 13:31 | 3798 |
| 2/23/2011 13:31 | 3664 |
| 2/23/2011 13:31 | 3558 |
| 2/23/2011 13:31 | 3647 |
| 2/23/2011 13:31 | 3660 |
| 2/23/2011 13:31 | 3768 |
| 2/23/2011 13:31 | 4253 |
| 2/23/2011 13:31 | 4215 |
| 2/23/2011 13:31 | 3773 |
| 2/23/2011 13:31 | 3657 |
| 2/23/2011 13:31 | 3589 |

| | |
|-----------------|----------|
| 2/23/2011 13:31 | 3739 |
| 2/23/2011 13:31 | 3776 |
| 2/23/2011 13:31 | 3719 |
| 2/23/2011 13:31 | 3703 |
| 2/23/2011 13:31 | 3558 |
| 2/23/2011 13:32 | 3614 |
| 2/23/2011 13:32 | 3490 |
| 2/23/2011 13:32 | 3673 |
| 2/23/2011 13:32 | 3457 |
| 2/23/2011 13:32 | 3671 |
| 2/23/2011 13:32 | 3716 |
| 2/23/2011 13:32 | 3747 |
| 2/23/2011 13:32 | 3345 |
| 2/23/2011 13:32 | 3530 |
| 2/23/2011 13:32 | 3334 |
| 2/23/2011 13:32 | 3335 |
| 2/23/2011 13:32 | 3276 |
| 2/23/2011 13:32 | 3492 |
| Average | 4019.29 |
| Std. Dev. | 476.7819 |
| 3X Std Dev | 1430.346 |
| High Range | 5449.636 |
| Max | 5225 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:32 | 3705 |
| 2/23/2011 13:32 | 3489 |
| 2/23/2011 13:32 | 3183 |
| 2/23/2011 13:32 | 3387 |
| 2/23/2011 13:32 | 3369 |
| 2/23/2011 13:32 | 3396 |
| 2/23/2011 13:32 | 3515 |
| 2/23/2011 13:32 | 3447 |
| 2/23/2011 13:32 | 3484 |
| 2/23/2011 13:32 | 3779 |
| 2/23/2011 13:33 | 3631 |
| 2/23/2011 13:33 | 3512 |
| 2/23/2011 13:33 | 3548 |
| 2/23/2011 13:33 | 3858 |
| 2/23/2011 13:33 | 3549 |
| 2/23/2011 13:33 | 3558 |
| 2/23/2011 13:33 | 3817 |
| 2/23/2011 13:33 | 4197 |
| 2/23/2011 13:33 | 3666 |
| 2/23/2011 13:33 | 3462 |
| 2/23/2011 13:33 | 3441 |
| 2/23/2011 13:33 | 3536 |
| 2/23/2011 13:33 | 3932 |
| 2/23/2011 13:33 | 3972 |
| 2/23/2011 13:33 | 4013 |
| 2/23/2011 13:33 | 3883 |
| 2/23/2011 13:33 | 4117 |
| 2/23/2011 13:33 | 4248 |
| 2/23/2011 13:33 | 4511 |
| 2/23/2011 13:33 | 4480 |
| 2/23/2011 13:33 | 4275 |
| 2/23/2011 13:33 | 4069 |
| 2/23/2011 13:33 | 3894 |
| 2/23/2011 13:33 | 3861 |
| 2/23/2011 13:33 | 3948 |
| 2/23/2011 13:33 | 3925 |
| 2/23/2011 13:33 | 3862 |
| 2/23/2011 13:33 | 3988 |
| 2/23/2011 13:33 | 3910 |
| 2/23/2011 13:33 | 4012 |
| 2/23/2011 13:33 | 3917 |
| 2/23/2011 13:33 | 3860 |
| 2/23/2011 13:33 | 4077 |
| 2/23/2011 13:33 | 3758 |
| 2/23/2011 13:33 | 3967 |
| 2/23/2011 13:33 | 4294 |
| 2/23/2011 13:33 | 3802 |
| 2/23/2011 13:33 | 3904 |
| 2/23/2011 13:33 | 3811 |
| 2/23/2011 13:33 | 3747 |
| 2/23/2011 13:33 | 4042 |

| | |
|-----------------|----------|
| 2/23/2011 13:33 | 4066 |
| 2/23/2011 13:33 | 4156 |
| 2/23/2011 13:33 | 4272 |
| 2/23/2011 13:33 | 4061 |
| 2/23/2011 13:33 | 4136 |
| 2/23/2011 13:33 | 4164 |
| 2/23/2011 13:33 | 4105 |
| 2/23/2011 13:33 | 4274 |
| 2/23/2011 13:33 | 4091 |
| 2/23/2011 13:33 | 4019 |
| 2/23/2011 13:33 | 4192 |
| 2/23/2011 13:33 | 3933 |
| 2/23/2011 13:33 | 3817 |
| 2/23/2011 13:33 | 3838 |
| Average | 3872.8 |
| Std. Dev. | 289.5621 |
| 3X Std Dev | 868.6864 |
| High Range | 4741.486 |
| Max | 4511 |

| DateTime | Counts |
|-----------------|--------|
| 2/23/2011 13:34 | 3869 |
| 2/23/2011 13:34 | 4287 |
| 2/23/2011 13:34 | 4451 |
| 2/23/2011 13:34 | 4499 |
| 2/23/2011 13:34 | 4938 |
| 2/23/2011 13:34 | 4443 |
| 2/23/2011 13:34 | 4621 |
| 2/23/2011 13:34 | 4242 |
| 2/23/2011 13:34 | 4711 |
| 2/23/2011 13:34 | 4465 |
| 2/23/2011 13:34 | 4319 |
| 2/23/2011 13:34 | 4777 |
| 2/23/2011 13:34 | 4682 |
| 2/23/2011 13:34 | 5326 |
| 2/23/2011 13:34 | 5208 |
| 2/23/2011 13:34 | 4939 |
| 2/23/2011 13:34 | 5325 |
| 2/23/2011 13:34 | 5109 |
| 2/23/2011 13:34 | 4996 |
| 2/23/2011 13:34 | 4820 |
| 2/23/2011 13:34 | 4556 |
| 2/23/2011 13:34 | 5060 |
| 2/23/2011 13:34 | 5134 |
| 2/23/2011 13:34 | 4897 |
| 2/23/2011 13:34 | 4847 |
| 2/23/2011 13:34 | 4909 |
| 2/23/2011 13:34 | 4696 |
| 2/23/2011 13:34 | 4966 |
| 2/23/2011 13:34 | 4691 |
| 2/23/2011 13:34 | 4604 |
| 2/23/2011 13:34 | 4547 |
| 2/23/2011 13:34 | 5655 |
| 2/23/2011 13:34 | 5326 |
| 2/23/2011 13:34 | 5238 |
| 2/23/2011 13:34 | 4626 |
| 2/23/2011 13:34 | 4507 |
| 2/23/2011 13:34 | 4815 |
| 2/23/2011 13:34 | 4351 |
| 2/23/2011 13:34 | 4322 |
| 2/23/2011 13:34 | 4711 |
| 2/23/2011 13:35 | 4885 |
| 2/23/2011 13:35 | 4585 |
| 2/23/2011 13:35 | 4679 |
| 2/23/2011 13:35 | 4559 |
| 2/23/2011 13:35 | 4410 |
| 2/23/2011 13:35 | 4828 |
| 2/23/2011 13:35 | 4343 |
| 2/23/2011 13:35 | 4318 |
| 2/23/2011 13:35 | 4416 |
| 2/23/2011 13:35 | 4389 |
| 2/23/2011 13:35 | 4253 |

| | |
|-----------------|----------|
| 2/23/2011 13:35 | 4312 |
| 2/23/2011 13:35 | 5081 |
| 2/23/2011 13:35 | 5595 |
| 2/23/2011 13:35 | 4609 |
| 2/23/2011 13:35 | 3691 |
| 2/23/2011 13:35 | 3850 |
| 2/23/2011 13:35 | 3620 |
| 2/23/2011 13:35 | 3440 |
| 2/23/2011 13:35 | 3526 |
| 2/23/2011 13:35 | 3535 |
| 2/23/2011 13:35 | 3485 |
| 2/23/2011 13:35 | 3473 |
| 2/23/2011 13:35 | 3455 |
| 2/23/2011 13:35 | 3306 |
| 2/23/2011 13:35 | 3229 |
| 2/23/2011 13:35 | 3852 |
| 2/23/2011 13:35 | 3742 |
| 2/23/2011 13:35 | 3732 |
| 2/23/2011 13:35 | 3838 |
| 2/23/2011 13:35 | 3839 |
| Average | 4469.859 |
| Std. Dev. | 578.5062 |
| 3X Std Dev | 1735.519 |
| High Range | 6205.378 |
| Max | 5655 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:36 | 4757 |
| 2/23/2011 13:36 | 4296 |
| 2/23/2011 13:36 | 3946 |
| 2/23/2011 13:36 | 3584 |
| 2/23/2011 13:36 | 3368 |
| 2/23/2011 13:36 | 3162 |
| 2/23/2011 13:36 | 3196 |
| 2/23/2011 13:36 | 3386 |
| 2/23/2011 13:36 | 3248 |
| 2/23/2011 13:36 | 3689 |
| 2/23/2011 13:36 | 3712 |
| 2/23/2011 13:36 | 3684 |
| 2/23/2011 13:36 | 3595 |
| 2/23/2011 13:36 | 3366 |
| 2/23/2011 13:36 | 3418 |
| 2/23/2011 13:36 | 3497 |
| 2/23/2011 13:36 | 3598 |
| 2/23/2011 13:36 | 3638 |
| 2/23/2011 13:36 | 3627 |
| 2/23/2011 13:36 | 3608 |
| 2/23/2011 13:36 | 3509 |
| 2/23/2011 13:36 | 4270 |
| 2/23/2011 13:36 | 4412 |
| 2/23/2011 13:36 | 4214 |
| 2/23/2011 13:36 | 4215 |
| 2/23/2011 13:36 | 3924 |
| 2/23/2011 13:36 | 4282 |
| 2/23/2011 13:36 | 4479 |
| 2/23/2011 13:36 | 4904 |
| 2/23/2011 13:36 | 4693 |
| Average | 3842.567 |
| Std. Dev. | 491.1033 |
| 3X Std dev | 1473.31 |
| High Range | 5315.877 |
| Max | 4904 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:37 | 4332 |
| 2/23/2011 13:37 | 4244 |
| 2/23/2011 13:37 | 4390 |
| 2/23/2011 13:37 | 4037 |
| 2/23/2011 13:37 | 4543 |
| 2/23/2011 13:37 | 4475 |
| 2/23/2011 13:37 | 4400 |
| 2/23/2011 13:37 | 4162 |
| 2/23/2011 13:37 | 4209 |
| 2/23/2011 13:37 | 4047 |
| 2/23/2011 13:37 | 4309 |
| 2/23/2011 13:37 | 3903 |
| 2/23/2011 13:37 | 3644 |
| 2/23/2011 13:37 | 3824 |
| 2/23/2011 13:37 | 3575 |
| 2/23/2011 13:37 | 3493 |
| 2/23/2011 13:37 | 3489 |
| 2/23/2011 13:37 | 3462 |
| 2/23/2011 13:37 | 3588 |
| 2/23/2011 13:37 | 3541 |
| 2/23/2011 13:37 | 3489 |
| 2/23/2011 13:37 | 3630 |
| 2/23/2011 13:37 | 3317 |
| 2/23/2011 13:37 | 3633 |
| 2/23/2011 13:37 | 3967 |
| Average | 3908.12 |
| Std. Dev. | 381.6817 |
| 3X Std dev | 1145.045 |
| High Range | 5053.165 |
| Max | 4543 |

| DateTime | Counts |
|-----------------|----------|
| 2/23/2011 13:39 | 4100 |
| 2/23/2011 13:39 | 4466 |
| 2/23/2011 13:39 | 4515 |
| 2/23/2011 13:39 | 4602 |
| 2/23/2011 13:40 | 4246 |
| 2/23/2011 13:40 | 3963 |
| 2/23/2011 13:40 | 4292 |
| 2/23/2011 13:40 | 4162 |
| 2/23/2011 13:40 | 3876 |
| 2/23/2011 13:40 | 3681 |
| 2/23/2011 13:40 | 4156 |
| 2/23/2011 13:40 | 3897 |
| 2/23/2011 13:40 | 3626 |
| 2/23/2011 13:40 | 3752 |
| 2/23/2011 13:40 | 3522 |
| 2/23/2011 13:40 | 3939 |
| 2/23/2011 13:40 | 4102 |
| 2/23/2011 13:40 | 4775 |
| 2/23/2011 13:40 | 4215 |
| 2/23/2011 13:40 | 5806 |
| 2/23/2011 13:40 | 4953 |
| 2/23/2011 13:40 | 4683 |
| 2/23/2011 13:40 | 4449 |
| 2/23/2011 13:40 | 4400 |
| 2/23/2011 13:40 | 4365 |
| 2/23/2011 13:40 | 4120 |
| 2/23/2011 13:40 | 4380 |
| 2/23/2011 13:40 | 4781 |
| 2/23/2011 13:40 | 5014 |
| 2/23/2011 13:40 | 5138 |
| 2/23/2011 13:40 | 4982 |
| 2/23/2011 13:40 | 5022 |
| Average | 4374.375 |
| Std. Dev. | 508.5734 |
| 3X Std Dev | 1525.72 |
| High Range | 5900.095 |
| Max | 5806 |

Radiation and Contamination Surveys

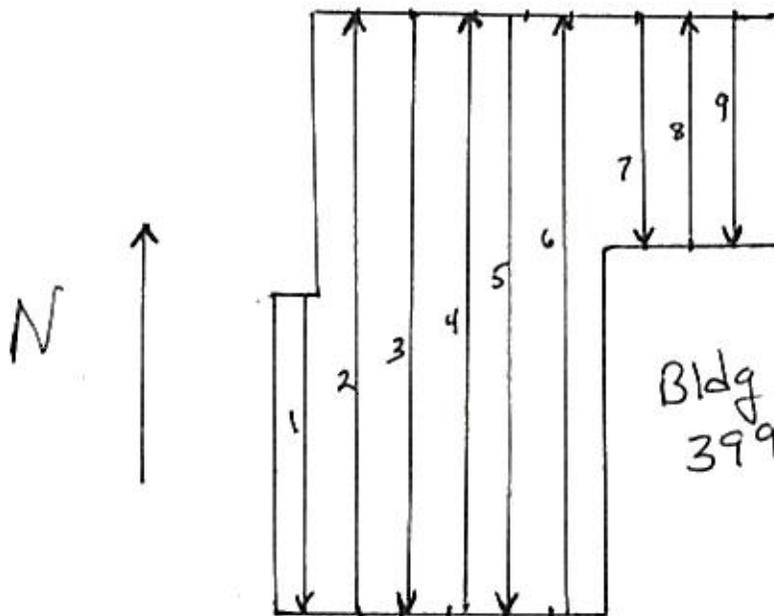
ATTACHMENT 1 – RADIATION/CONTAMINATION SURVEY FORM

| | | | | | | |
|-------------------------------|-----------------------------|-------------------------------------|---------------------------------|---------------------|--|---|
| DATE: 2-23-11 | TIME: | INSTRUMENTATION USED | | | | |
| SURVEY NUMBER: AP-061-11 | Model Inst/Det. NaI/2221 | Serial Number PR150851 202238 | Calibration Due Date 2-16-12 | % Efficiency N/A | MDC/MDA (dpm/100cm ²) N/A | Background (dpm/100cm ²) N/A |
| LOCATION: Former Smelter Area | | | | | | |
| SURVEYOR: | | | | | | |
| REVIEWED BY: | | | | | | |
| PHP/SPM: | | | | | | |

Isotopes of Concern:

Description or drawing: Class 3 (SU3) Gamma Walkover

Strip Pattern



In Accordance with TSP

Routine (Daily / Weekly / Monthly)

Non-routine

All radiation readings in $\mu\text{r/hr}$ unless otherwise noted.
 (#) ... denotes swipe location or fixed α/β readings.
 # denotes G/A radiation readings.
 # / # denotes contact / 1 meter radiation readings.
 * denotes highest radiation reading on contact.
 Δ denotes static location.

Radiation and Contamination Surveys

Revision 0 – Page 1 of 20

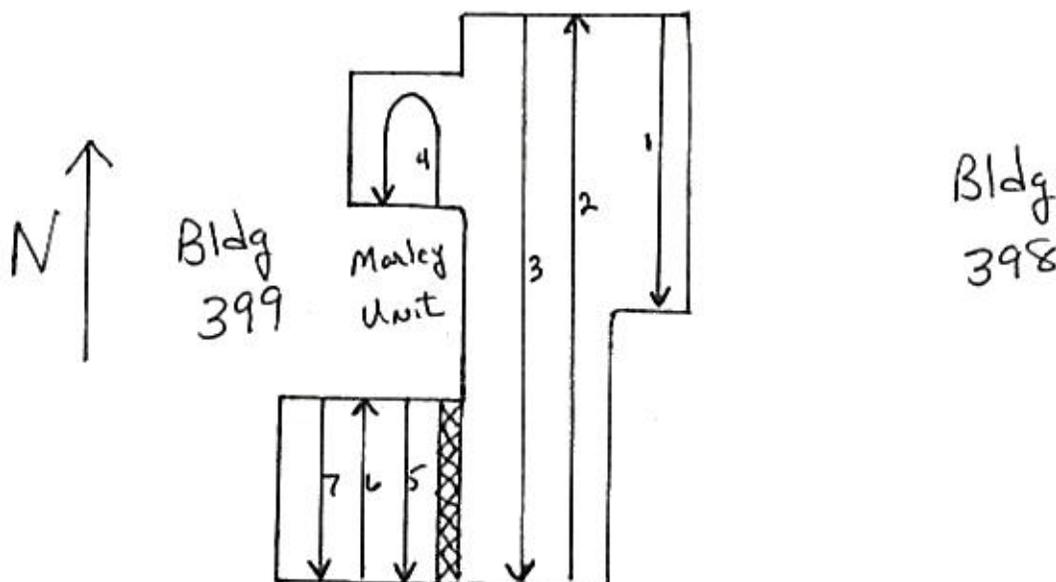
ATTACHMENT 1 – RADIATION/CONTAMINATION SURVEY FORM

| | | | | | | |
|-------------------------------|--------------------|----------------------|-------------------------|--------------|--------------------------------------|---|
| DATE: 2-23-11 | TIME: | INSTRUMENTATION USED | | | | |
| SURVEY NUMBER: AP-060-11 | Model Inst/Det. | Serial Number | Calibration Due Date | % Efficiency | MDC/MDA (dpm/100cm ²) | Background (dpm/100cm ²) |
| LOCATION: Former Smelter Area | NaI/2221 | PR150851 262238 | 2-16-12 | N/A | N/A | N/A |
| SURVEYOR: | | | | | | |
| REVIEWED BY: | | | | | | |
| PHP/SPM: | | | | | | |

Isotopes of Concern:

Description or drawing: Class 1 + 2 (SU1 + SU2) Gamma Walkover

Strip Pattern



In accordance
w/ TSP

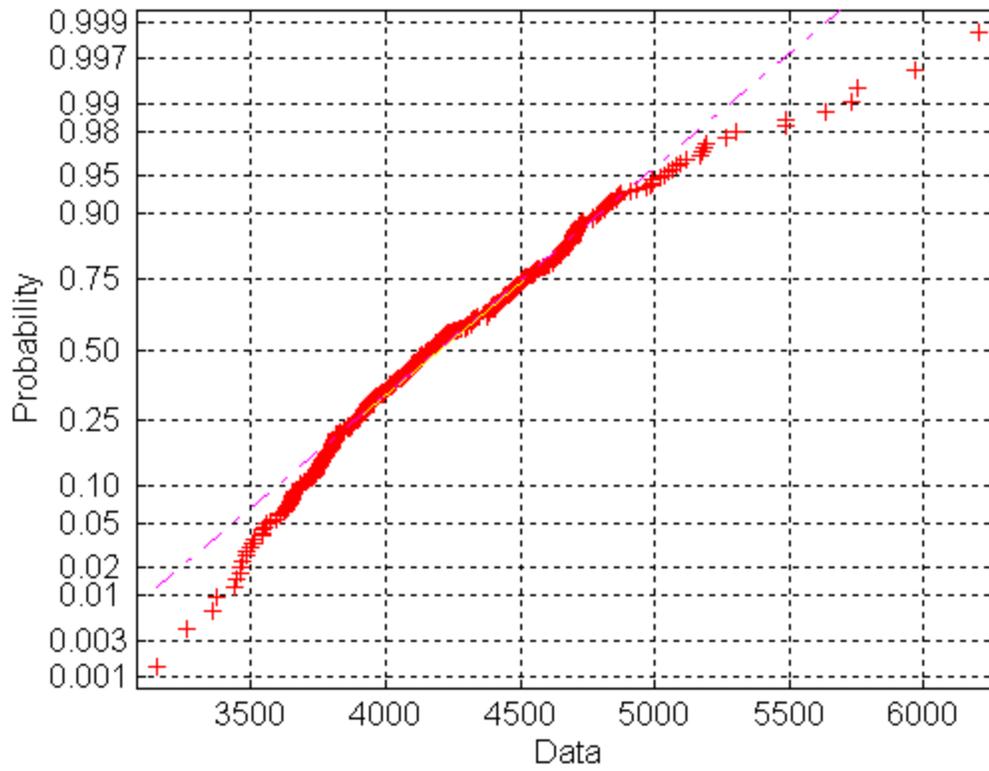
Routine (Daily / Weekly /
Monthly)

Non-routine

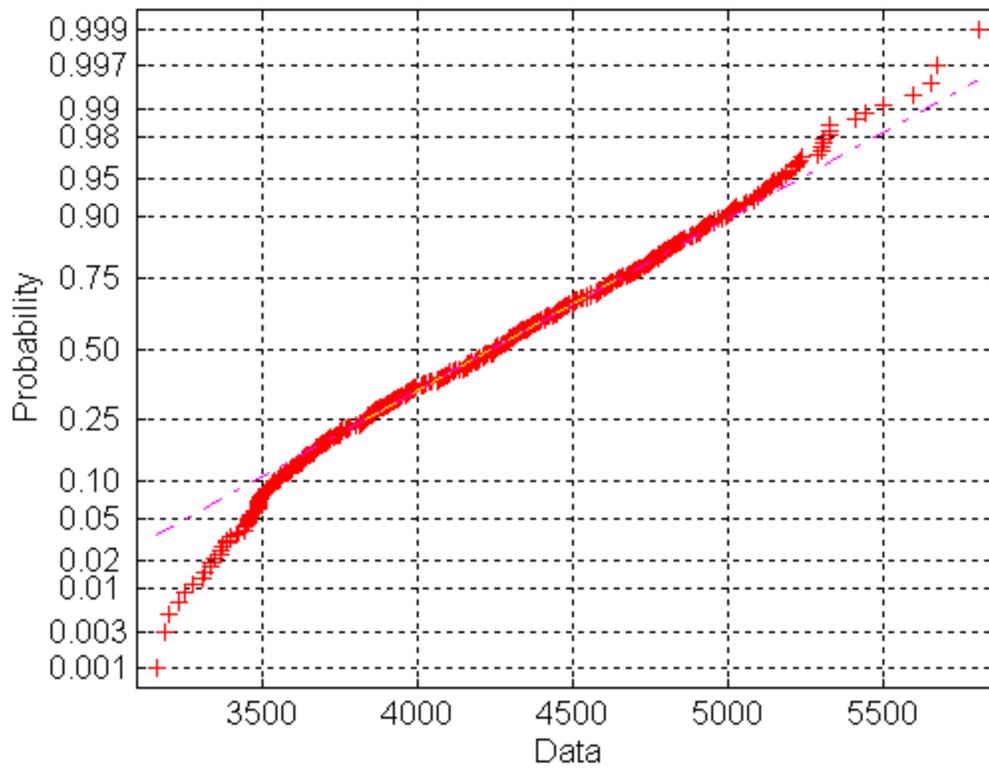
All radiation readings in $\mu\text{r/hr}$ unless otherwise noted.

- #denotes swipe location or fixed α/β readings.
- #denotes G/A radiation readings.
- #/#denotes contact / 1 meter radiation readings.
- *denotes highest radiation reading on contact.
- Δ denotes static location.

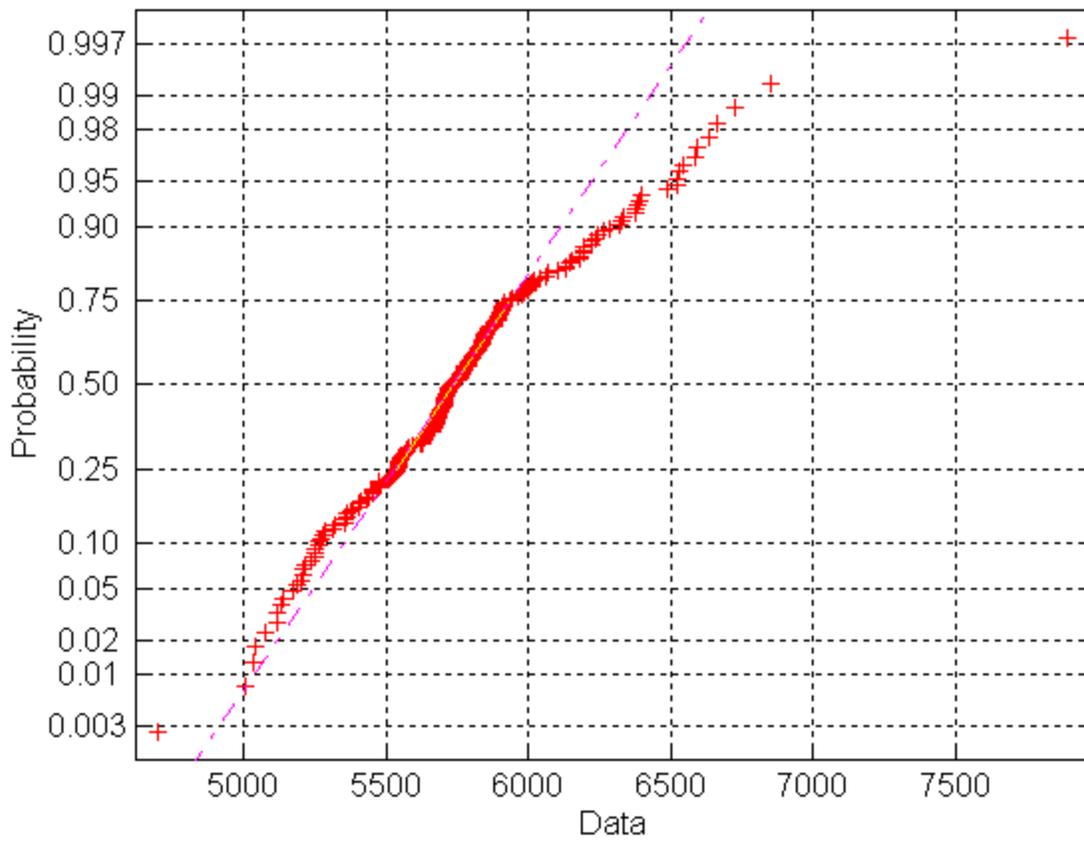
CFD of All NaI Measurements in Smelter Units 1 and 2



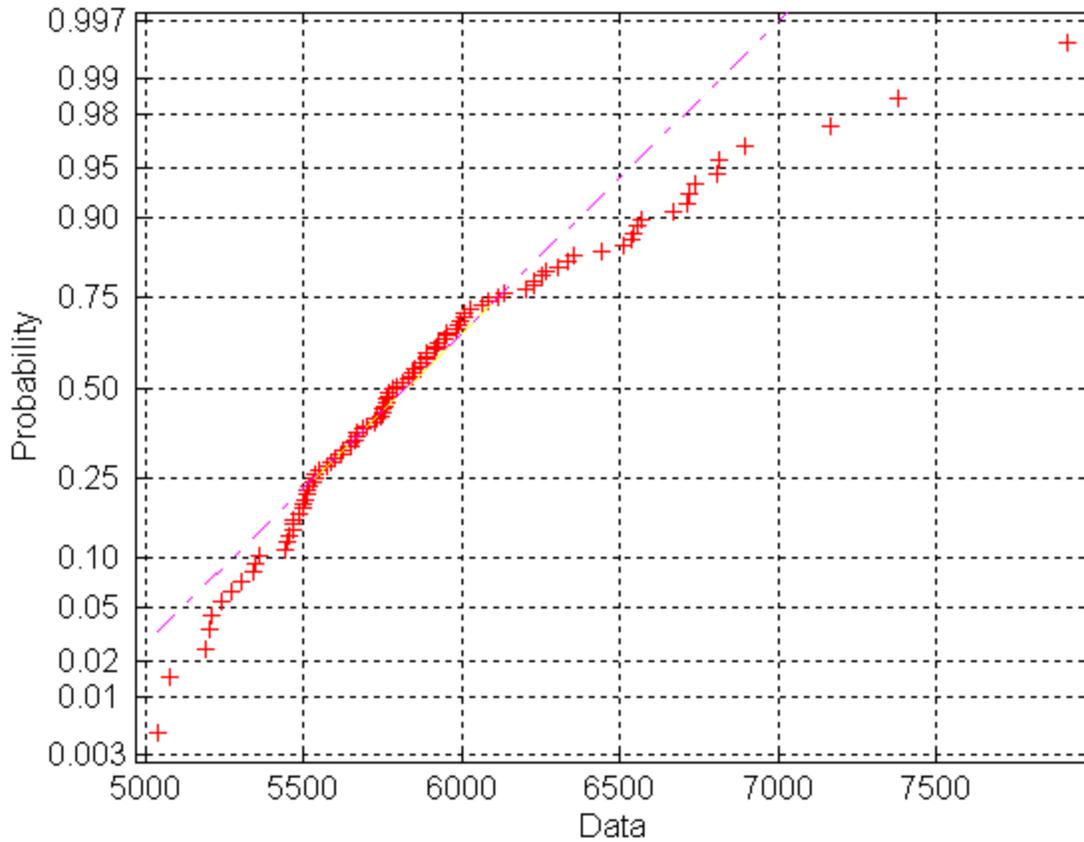
CFD of All NaI Measurements in Smelter Unit 3



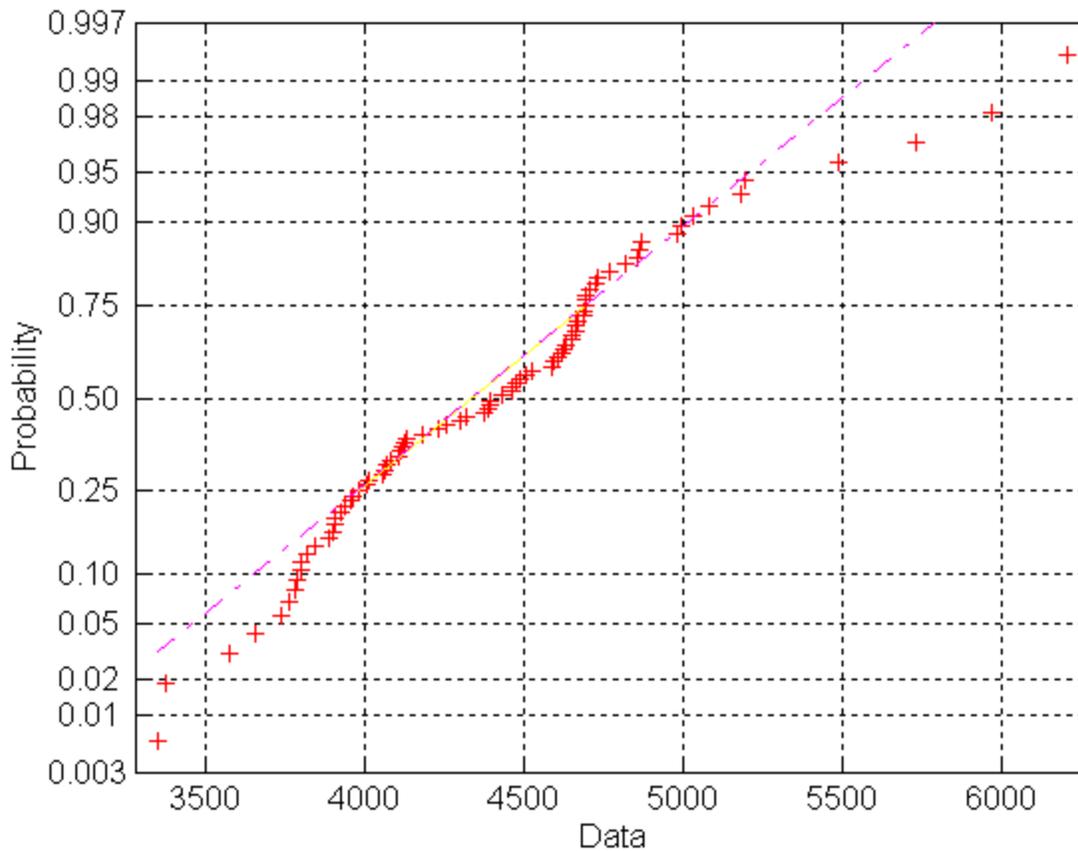
CFD of BKG1



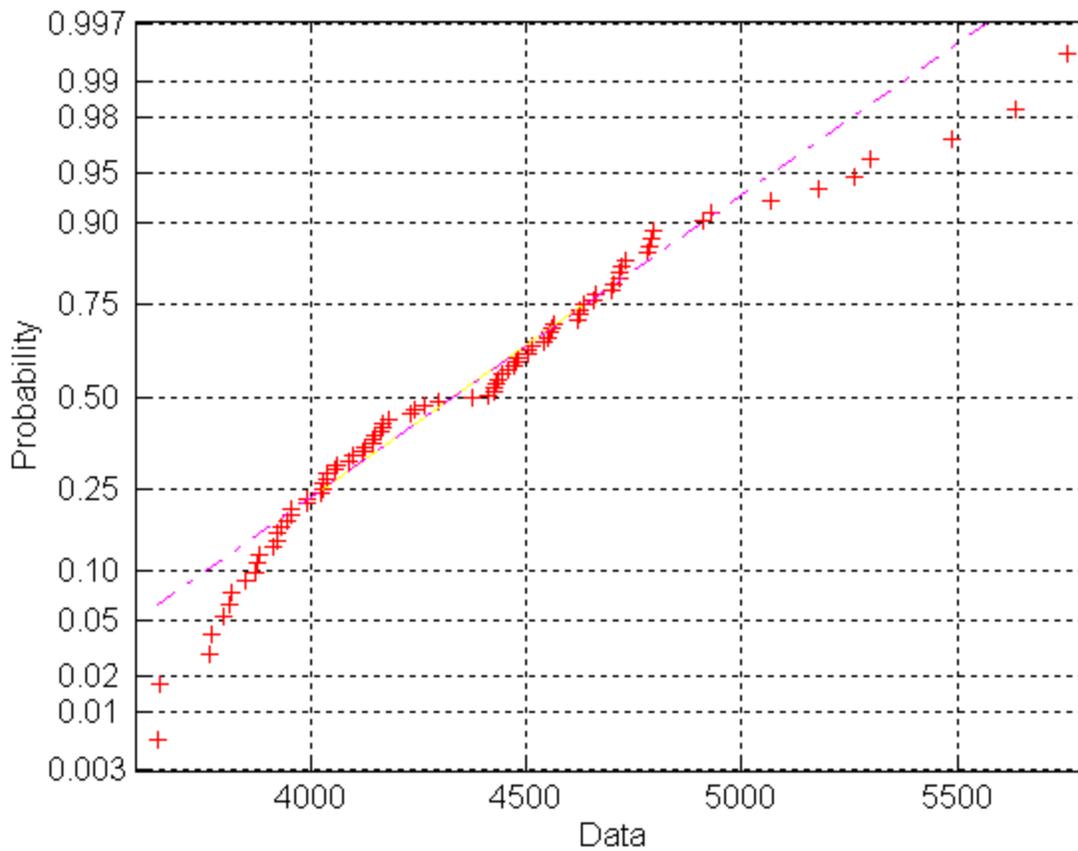
CFD of BKG2



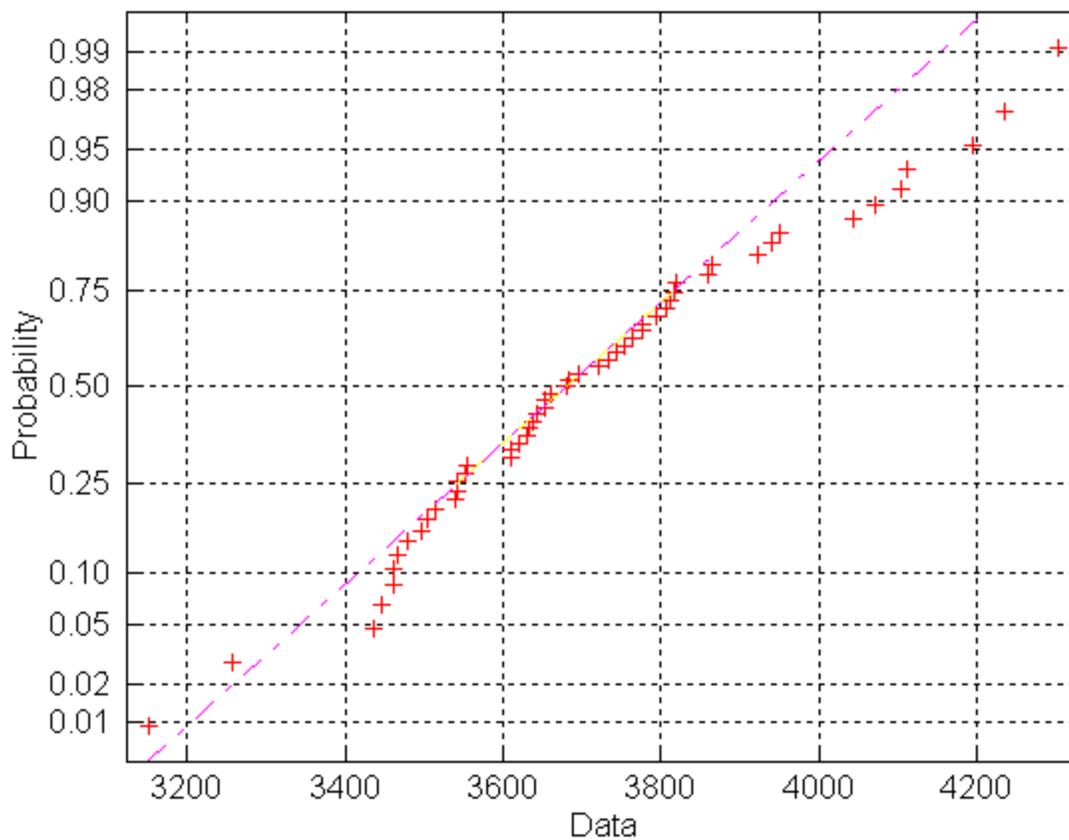
CFD of FSA1-2



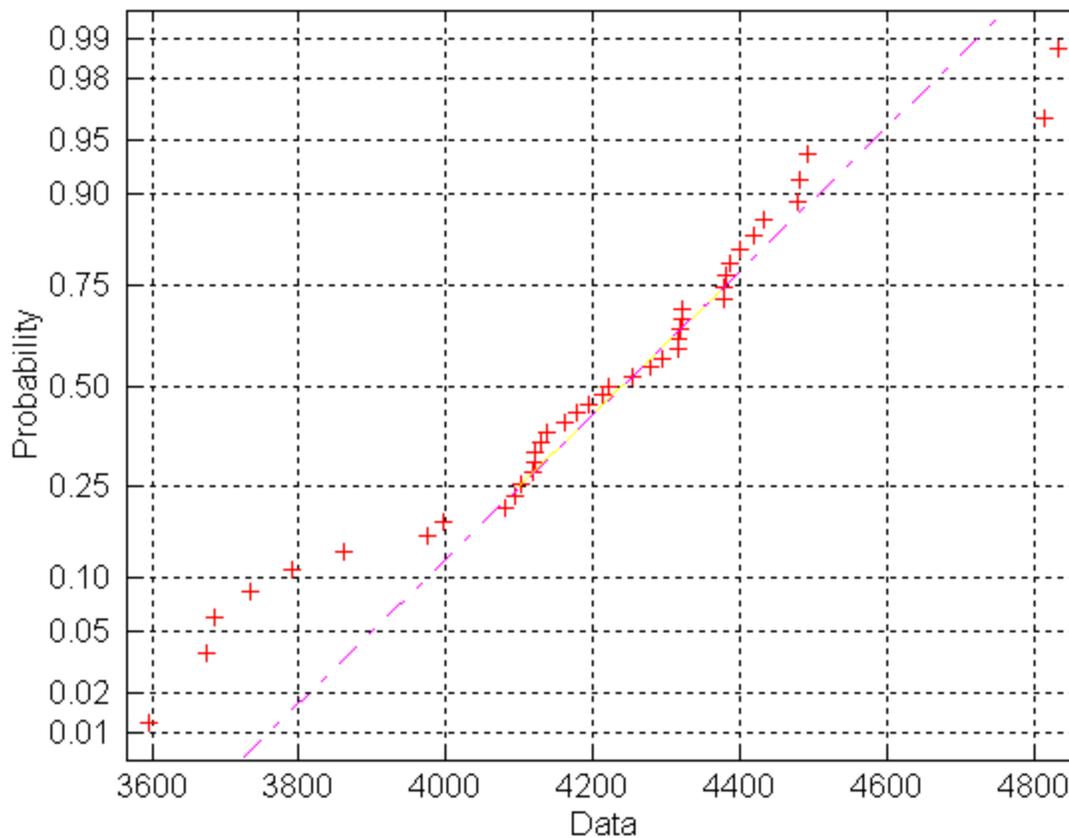
CFD of FSA1-3



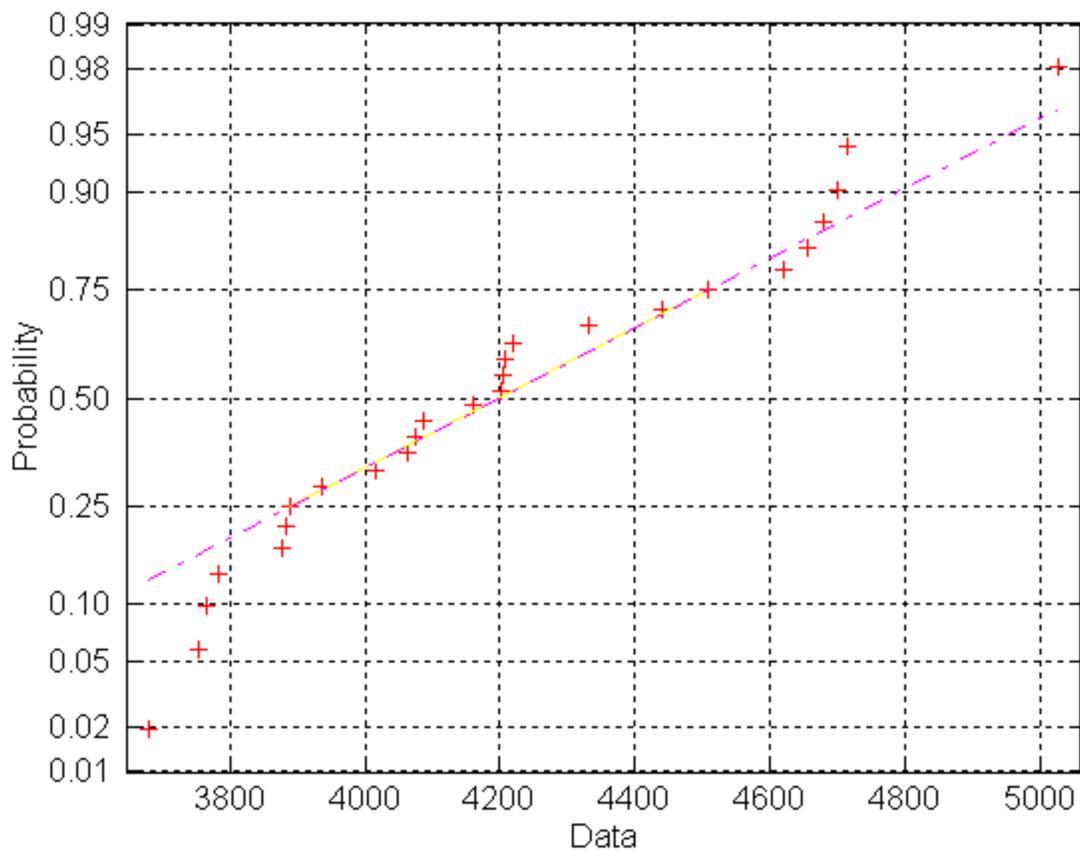
CFD of FSA1-4



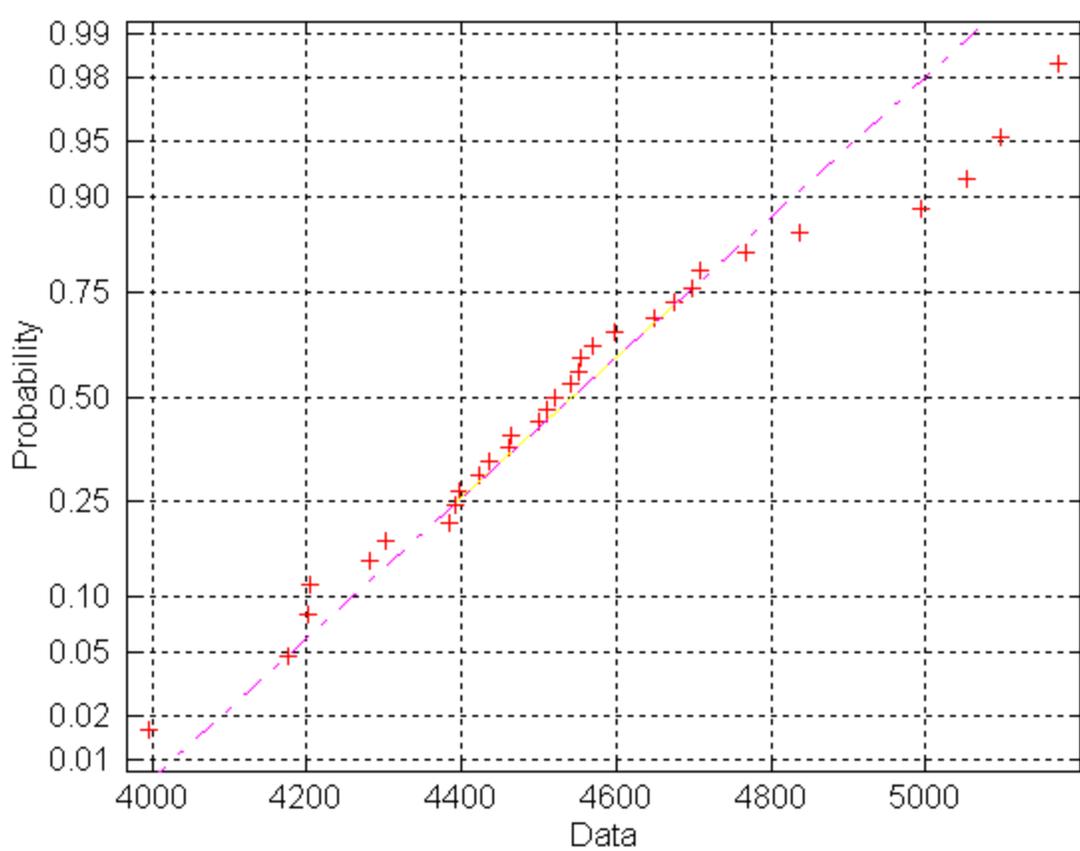
CFD of FSA1-5



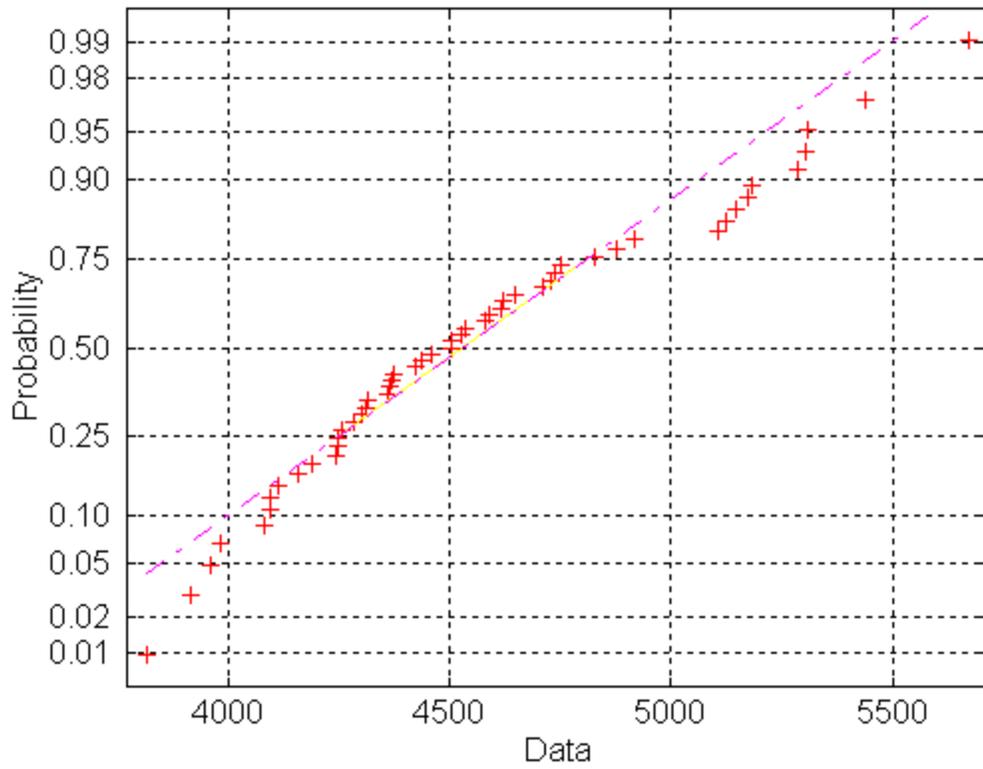
CFD of FSA1-6



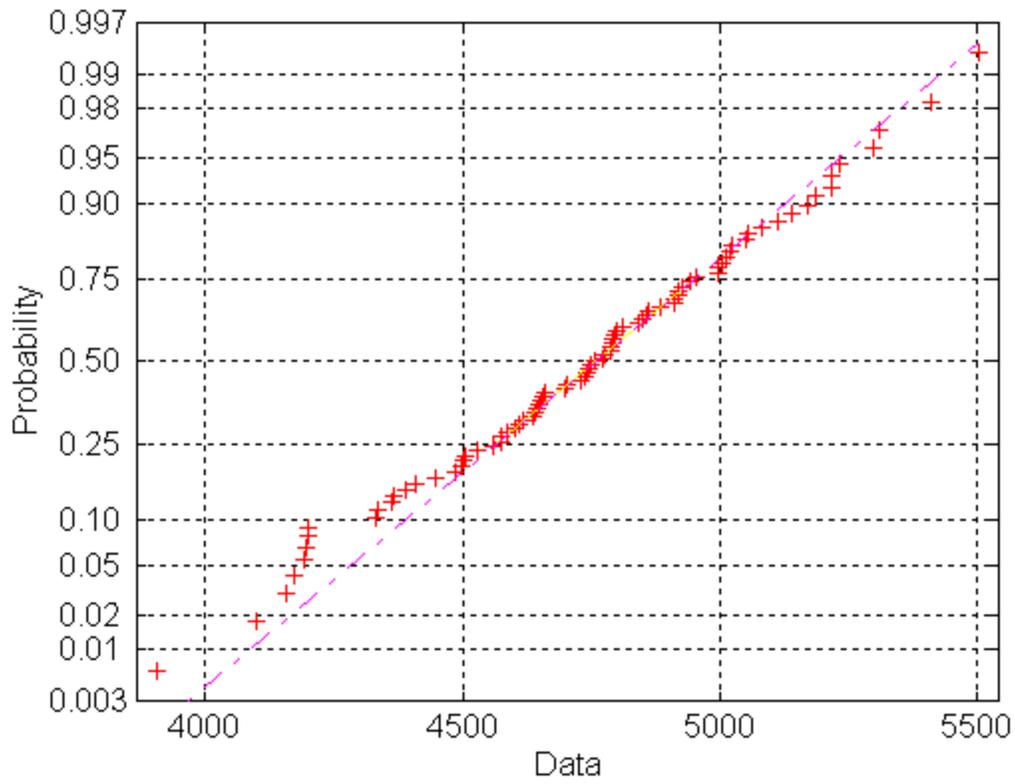
CFD of FSA1-7



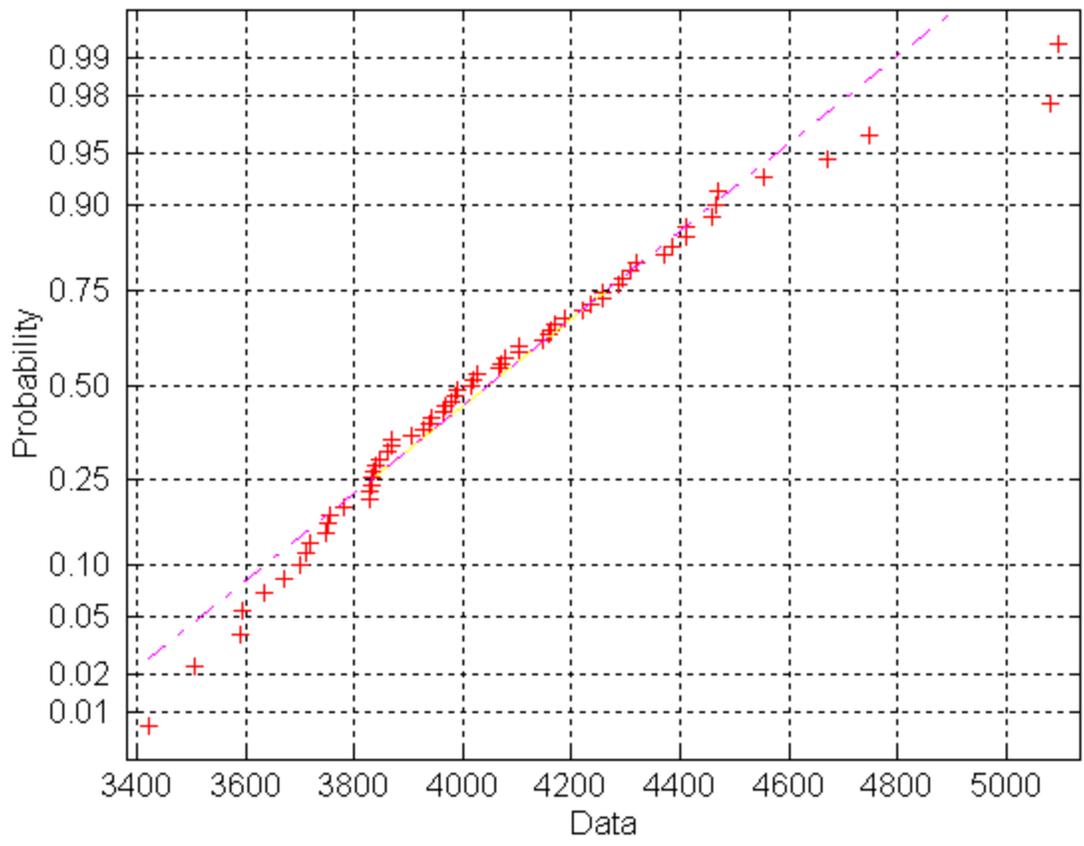
CFD of FSA3-1



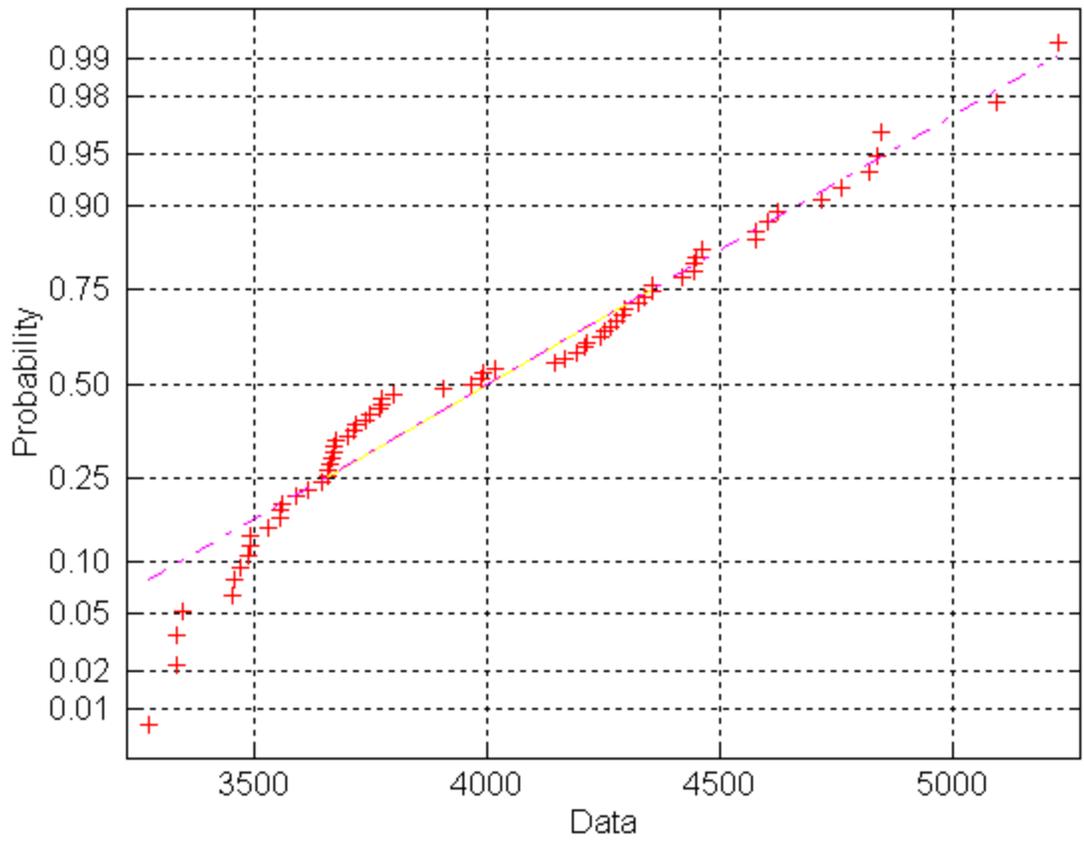
CFD of FSA3-2



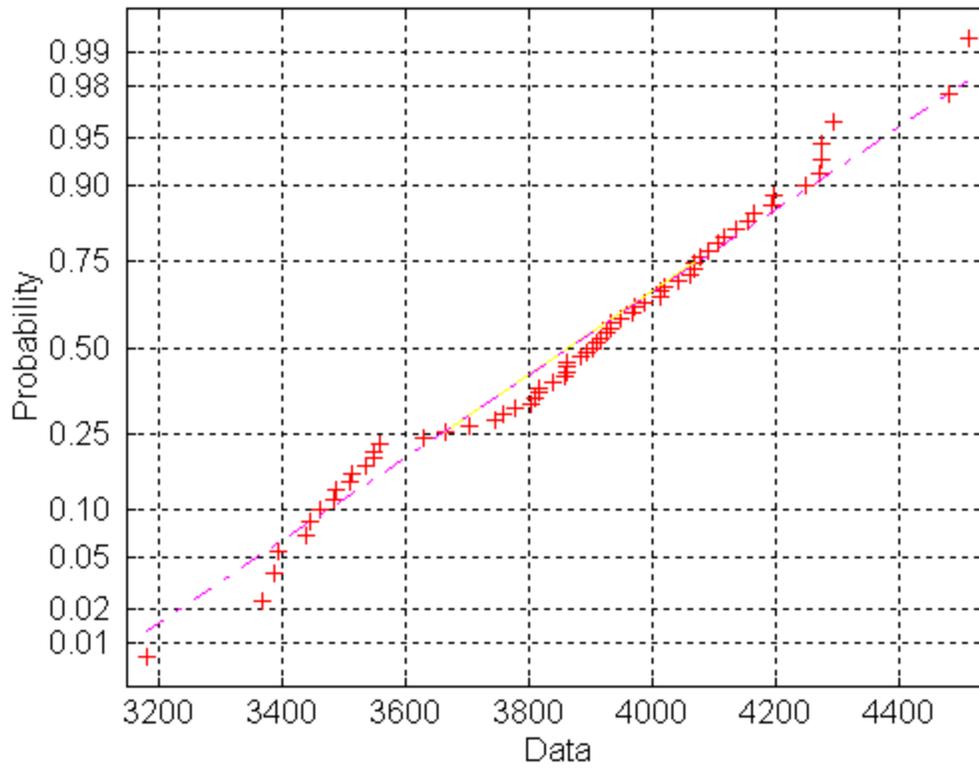
CFD of FSA3-3



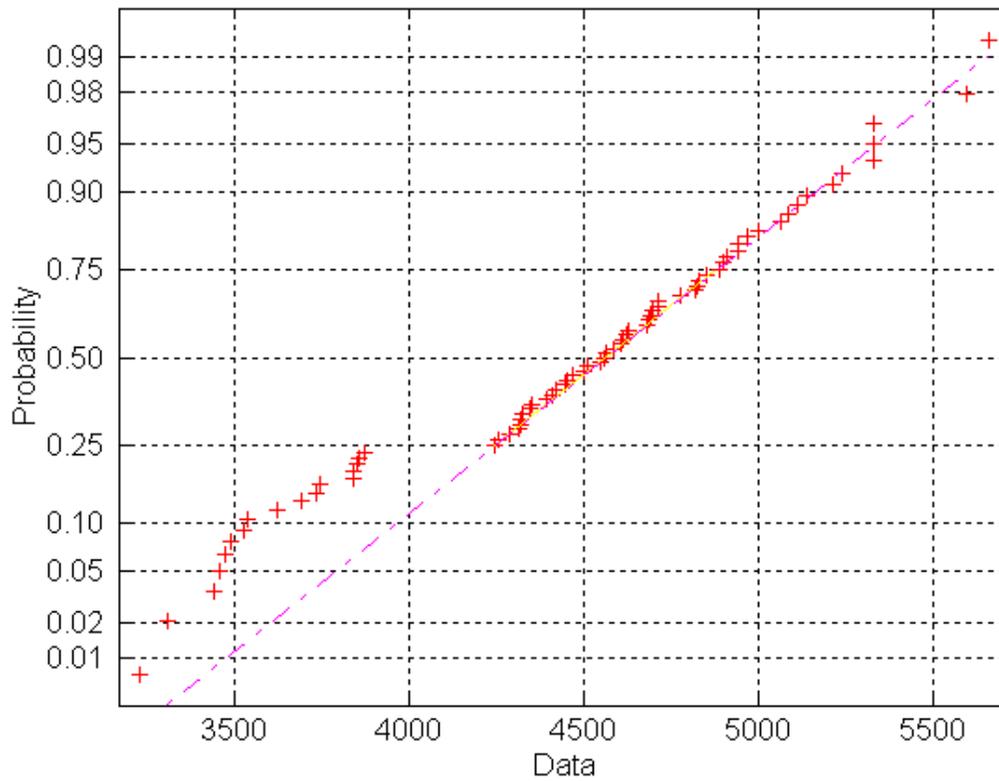
CFD of FSA3-4



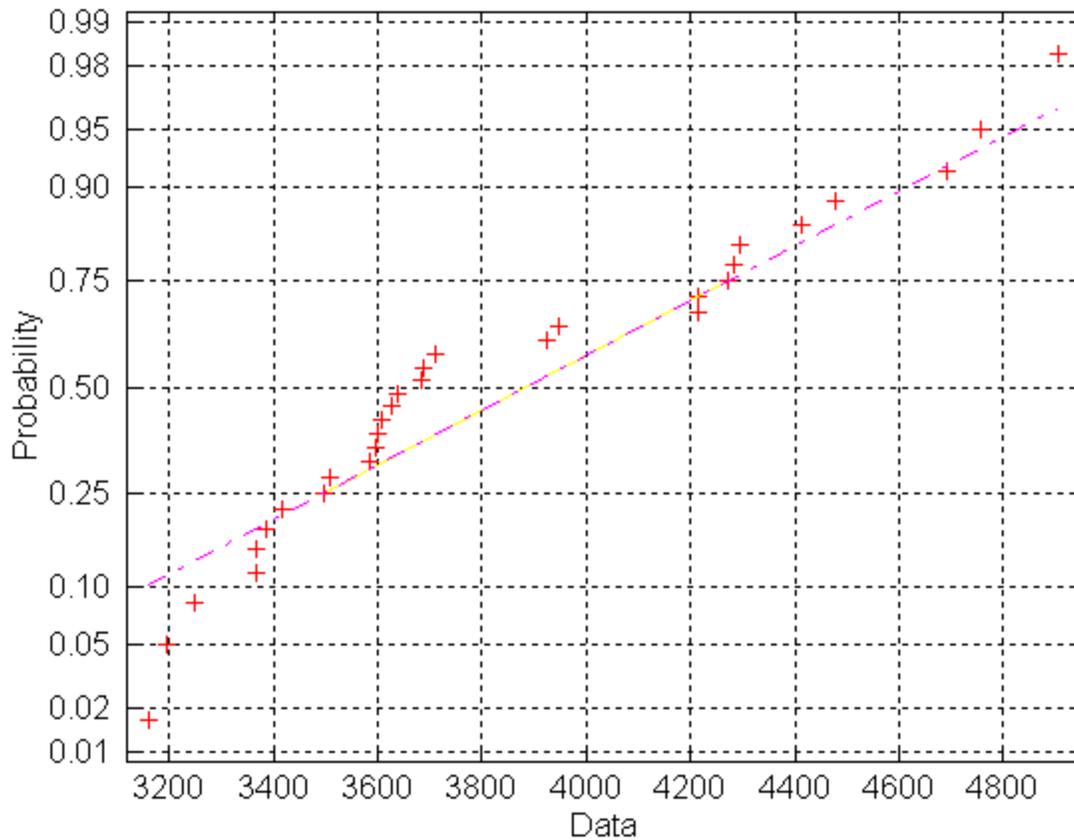
CFD of FSA3-5



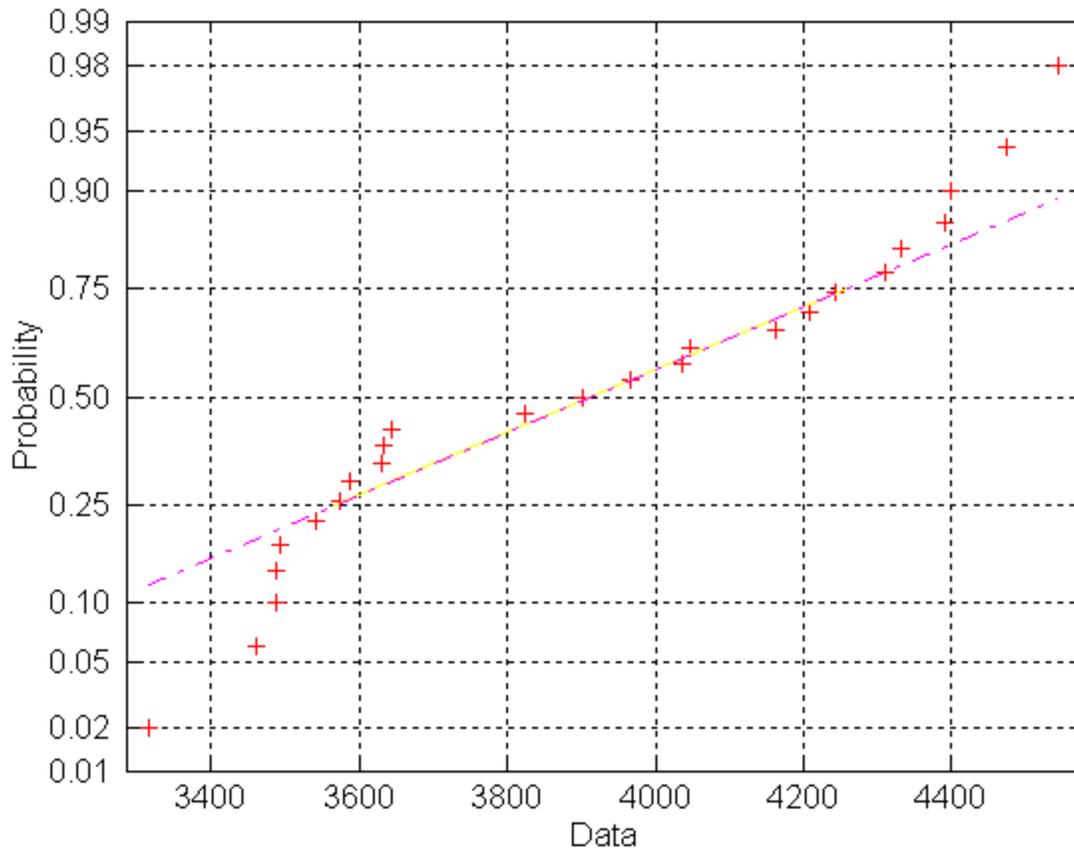
CFD of FSA3-6



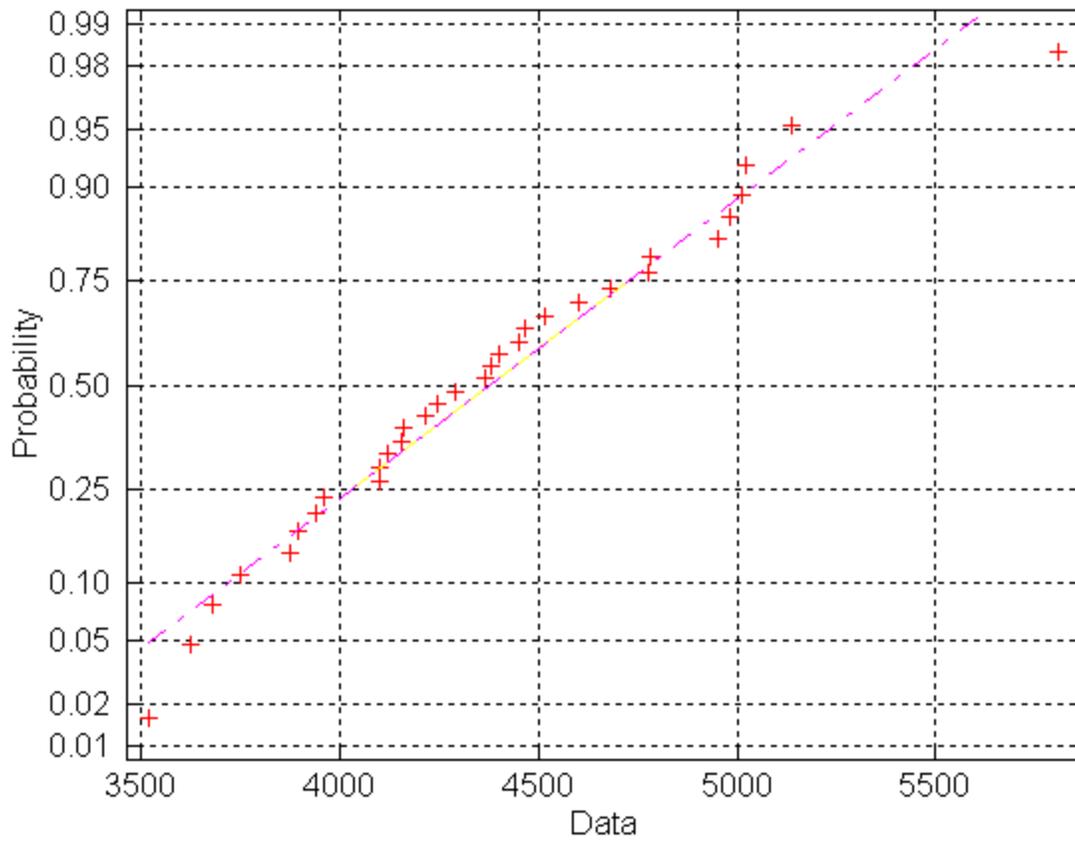
CFD of FSA3-7



CFD of FSA3-8



CFD of FSA3-9



APPENDIX H
SOIL SAMPLE RESULTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

PROJECT NO. CTO FZNO

Alameda

Lot #: F1C080492

Lawson Bailey

Tetra Tech NUS Inc
900 Trail Ridge Road
Aiken, SC 29803

TESTAMERICA LABORATORIES, INC.



Erika Starman
Project Manager

April 1, 2011

Case Narrative
LOT NUMBER: F1C080492

This report contains the analytical results for the 61 samples received under chain of custody by TestAmerica St. Louis on March 8, 2011. These samples are associated with your Alameda project.

The analytical results included in this report meet all applicable quality control procedure requirements except as noted on the following page.

The test results in this report meet all NELAP requirements for parameters in which accreditations are held by TestAmerica St. Louis. Any exceptions to NELAP requirements are noted in the case narrative. **TestAmerica St. Louis' Florida certification number is E87689.** The case narrative is an integral part of this report.

This report shall not be reproduced, except in full, without the written approval of the laboratory.

All chemical analysis results are based upon sample as received, wet weight, unless noted otherwise. All radiochemistry results are based upon sample as dried and ground with the exception of tritium, unless requested wet weight by the client.

Due to limitations of the number of test codes available for use in the LIMS system there is only one code assigned for CWET analyses. All analyses in this report labeled with the SPLP designation refer to CA WET/STLC analyses.

Observations/Nonconformances

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

Gamma Spectroscopy - Ra-226 & Hits (EPA 901.1 MOD)

The Method Blank has activity for Radium 226 above the MLcC but the activity is less than the MDA and CRDL. The sample results will be reported with this narrative.

Affected Samples:

F1C080492 (41): SME-SOI-038
F1C080492 (42): SME-SOI-039
F1C080492 (43): SME-SOI-040
F1C080492 (44): SME-SOI-040A
F1C080492 (45): SME-SOI-041
F1C080492 (46): SME-SOI-042
F1C080492 (47): SME-SOI-043
F1C080492 (48): SME-SOI-044
F1C080492 (49): SME-SOI-045
F1C080492 (50): SME-SOI-046
F1C080492 (51): SME-SOI-047
F1C080492 (52): SME-SOI-048
F1C080492 (53): SME-SOI-049
F1C080492 (54): SME-SOI-050
F1C080492 (55): SME-SOI-050A
F1C080492 (56): SME-SOI-051
F1C080492 (57): SME-SOI-052
F1C080492 (58): SME-SOI-053
F1C080492 (59): SME-SOI-054
F1C080492 (60): SME-SED-055

The Method Blank has activity for Cobalt 60 and Radium 226 above the MLcC but the activity is less than the MDA and CRDL. The sample results will be reported with this narrative.

Affected Samples:

F1C080492 (21): SME-SOI-020
F1C080492 (22): SME-SOI-020A
F1C080492 (23): SME-SOI-021
F1C080492 (24): SME-SOI-022
F1C080492 (25): SME-SOI-023
F1C080492 (26): SME-SOI-024
F1C080492 (27): SME-SOI-025
F1C080492 (28): SME-SOI-026
F1C080492 (29): SME-SOI-027
F1C080492 (30): SME-SOI-028
F1C080492 (31): SME-SOI-029
F1C080492 (32): SME-SOI-030
F1C080492 (33): SME-SOI-030A
F1C080492 (34): SME-SOI-031
F1C080492 (35): SME-SOI-032
F1C080492 (36): SME-SOI-033
F1C080492 (37): SME-SOI-034
F1C080492 (38): SME-SOI-035
F1C080492 (39): SME-SOI-036
F1C080492 (40): SME-SOI-037

There were no other nonconformances or observations noted with any analysis on this lot.

METHODS SUMMARY

F1C080492

| <u>PARAMETER</u> | <u>ANALYTICAL METHOD</u> | <u>PREPARATION METHOD</u> |
|------------------------------------|------------------------------|-------------------------------|
| Gamma Spectroscopy - Ra-226 & Hits | EPA 901.1 MOD | |

References:

EPA "EASTERN ENVIRONMENTAL RADIATION FACILITY RADIOCHEMISTRY PROCEDURES MANUAL" US EPA EPA 520/5-84-006 AUGUST 1984

SAMPLE SUMMARY**F1C080492**

| <u>WO #</u> | <u>SAMPLE#</u> | <u>CLIENT SAMPLE ID</u> | <u>SAMPLED DATE</u> | <u>SAMP TIME</u> |
|-------------|----------------|-------------------------|---------------------|------------------|
| MFCJ3 | 001 | SME-SOI-001 | 02/28/11 | 10:25 |
| MFCJ4 | 002 | SME-SOI-002 | 02/28/11 | 10:30 |
| MFCJ5 | 003 | SME-SOI-003 | 02/28/11 | 10:35 |
| MFCJ7 | 004 | SME-SOI-004 | 02/28/11 | 10:40 |
| MFCJ8 | 005 | SME-SOI-005 | 02/28/11 | 10:45 |
| MFCJ9 | 006 | SME-SOI-006 | 02/28/11 | 10:50 |
| MFCKA | 007 | SME-SOI-007 | 02/28/11 | 10:55 |
| MFCKC | 008 | SME-SOI-008 | 02/28/11 | 11:00 |
| MFCKE | 009 | SME-SOI-009 | 02/28/11 | 11:05 |
| MFCKH | 010 | SME-SOI-010 | 02/28/11 | 11:15 |
| MFCKK | 011 | SME-SOI-010A | 02/28/11 | 11:15 |
| MFCKM | 012 | SME-SOI-011 | 02/28/11 | 11:20 |
| MFCKQ | 013 | SME-SOI-012 | 02/28/11 | 11:25 |
| MFCKV | 014 | SME-SOI-013 | 02/28/11 | 11:30 |
| MFCK0 | 015 | SME-SOI-014 | 02/28/11 | 11:35 |
| MFCK2 | 016 | SME-SOI-015 | 02/28/11 | 11:40 |
| MFCK3 | 017 | SME-SOI-016 | 02/28/11 | 11:45 |
| MFCK5 | 018 | SME-SOI-017 | 02/28/11 | 11:50 |
| MFCK7 | 019 | SME-SOI-018 | 02/28/11 | 13:55 |
| MFCLA | 020 | SME-SOI-019 | 02/28/11 | 14:00 |
| MFCLD | 021 | SME-SOI-020 | 02/28/11 | 14:05 |
| MFCLE | 022 | SME-SOI-020A | 02/28/11 | 14:05 |
| MFCLJ | 023 | SME-SOI-021 | 02/28/11 | 14:10 |
| MFCLL | 024 | SME-SOI-022 | 02/28/11 | 14:15 |
| MFCLM | 025 | SME-SOI-023 | 02/28/11 | 14:20 |
| MFCLN | 026 | SME-SOI-024 | 02/28/11 | 14:25 |
| MFCLP | 027 | SME-SOI-025 | 02/28/11 | 14:30 |
| MFCLQ | 028 | SME-SOI-026 | 02/28/11 | 14:35 |
| MFCLR | 029 | SME-SOI-027 | 02/28/11 | 14:40 |
| MFCLV | 030 | SME-SOI-028 | 02/28/11 | 14:45 |
| MFCLW | 031 | SME-SOI-029 | 02/28/11 | 14:50 |
| MFCL1 | 032 | SME-SOI-030 | 02/28/11 | 14:55 |
| MFCL2 | 033 | SME-SOI-030A | 02/28/11 | 14:55 |
| MFCL3 | 034 | SME-SOI-031 | 02/28/11 | 15:00 |
| MFCL4 | 035 | SME-SOI-032 | 02/28/11 | 15:05 |
| MFCL5 | 036 | SME-SOI-033 | 02/28/11 | 15:10 |

(Continued on next page)

SAMPLE SUMMARY**F1C080492**

| <u>WO #</u> | <u>SAMPLE#</u> | <u>CLIENT SAMPLE ID</u> | <u>SAMPLED DATE</u> | <u>SAMP TIME</u> |
|-------------|----------------|-------------------------|---------------------|------------------|
| MFCL6 | 037 | SME-SOI-034 | 02/28/11 | 15:15 |
| MFCL8 | 038 | SME-SOI-035 | 02/28/11 | 15:20 |
| MFCL9 | 039 | SME-SOI-036 | 02/28/11 | 15:25 |
| MFCMA | 040 | SME-SOI-037 | 03/01/11 | 08:30 |
| MFCMC | 041 | SME-SOI-038 | 03/01/11 | 08:35 |
| MFCMH | 042 | SME-SOI-039 | 03/01/11 | 08:40 |
| MFCML | 043 | SME-SOI-040 | 03/01/11 | 08:45 |
| MFCMP | 044 | SME-SOI-040A | 03/01/11 | 08:45 |
| MFCMR | 045 | SME-SOI-041 | 03/01/11 | 08:50 |
| MFCMW | 046 | SME-SOI-042 | 03/01/11 | 08:55 |
| MFCM0 | 047 | SME-SOI-043 | 03/01/11 | 09:00 |
| MFCM3 | 048 | SME-SOI-044 | 03/01/11 | 09:05 |
| MFCM5 | 049 | SME-SOI-045 | 03/01/11 | 09:10 |
| MFCM8 | 050 | SME-SOI-046 | 03/01/11 | 09:15 |
| MFCNC | 051 | SME-SOI-047 | 03/01/11 | 09:17 |
| MFCNE | 052 | SME-SOI-048 | 03/01/11 | 09:20 |
| MFCNG | 053 | SME-SOI-049 | 03/01/11 | 09:22 |
| MFCNK | 054 | SME-SOI-050 | 03/01/11 | 09:25 |
| MFCNL | 055 | SME-SOI-050A | 03/01/11 | 09:25 |
| MFCNP | 056 | SME-SOI-051 | 03/01/11 | 09:30 |
| MFCNT | 057 | SME-SOI-052 | 03/01/11 | 09:35 |
| MFCNV | 058 | SME-SOI-053 | 03/01/11 | 09:37 |
| MFCNX | 059 | SME-SOI-054 | 03/01/11 | 09:40 |
| MFCN2 | 060 | SME-SED-055 | 03/01/11 | 10:45 |
| MFCN4 | 061 | SME-SED-056 | 03/01/11 | 10:50 |

NOTE (S) :

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-001

Radiochemistry

Lab Sample ID: F1C080492-001
 Work Order: MFCJ3
 Matrix: SOLID

Date Collected: 02/28/11 1025
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | -0.26 | U | 0.21 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.09 | U | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.11 | U | 0.41 | | 0.32 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.39 | | 0.14 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.029 | U | 0.042 | 0.100 | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.056 | 0.360 | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.5 | U | 1.3 | | 1.0 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.23 | | 0.10 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.38 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.9 | | 1.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.2 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.39 | J | 0.14 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.09 | U | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.044 | | 0.050 | | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.43 | U | 0.89 | | 0.75 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.07 | U | 0.73 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.43 | U | 0.89 | | 0.75 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-001 DUP

Radiochemistry

Lab Sample ID: F1C080492-001X
 Work Order: MFCJ3
 Matrix: SOLID

Date Collected: 02/28/11 1025
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | -0.02 | U | 0.38 | | 0.31 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.36 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.25 | | 0.26 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.288 | | 0.099 | | 0.048 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.008 | U | 0.040 | 0.100 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.0097 | 0.360 | 0.011 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.59 | U | 0.85 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.237 | | 0.087 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.36 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.5 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.008 | U | 0.82 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.288 | J | 0.099 | 1.00 | 0.048 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.36 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.130 | | 0.042 | | 0.015 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.51 | U | 0.77 | | 0.59 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.01 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.51 | U | 0.77 | | 0.59 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-002

Radiochemistry

Lab Sample ID: F1C080492-002
 Work Order: MFCJ4
 Matrix: SOLID

Date Collected: 02/28/11 1030
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | -0.1 | U | 0.22 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.17 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.08 | U | 0.32 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.39 | | 0.11 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.004 | U | 0.039 | 0.100 | 0.031 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.011 | U | 0.042 | 0.360 | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.18 | U | 0.88 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.194 | | 0.076 | | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.344 | | 0.091 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 10.7 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.52 | U | 0.91 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.39 | J | 0.11 | 1.00 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.17 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.069 | | 0.038 | | 0.018 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.20 | U | 0.74 | | 0.59 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.24 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.20 | U | 0.74 | | 0.59 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-003

Radiochemistry

Lab Sample ID: F1C080492-003
 Work Order: MFCJ5
 Matrix: SOLID

Date Collected: 02/28/11 1035
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.25 | U | 0.33 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.18 | | 0.13 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.07 | U | 36 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.41 | | 0.10 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.005 | U | 0.043 | 0.100 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.012 | U | 0.055 | 0.360 | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.2 | U | 1.1 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.195 | | 0.077 | | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.25 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.7 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.22 | U | 0.92 | | 0.74 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.41 | J | 0.10 | 1.00 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.18 | | 0.13 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.022 | U | 0.040 | | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.2 | U | 1.3 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.08 | U | 0.17 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.2 | U | 1.3 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-004

Radiochemistry

Lab Sample ID: F1C080492-004
 Work Order: MFCJ7
 Matrix: SOLID

Date Collected: 02/28/11 1040
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | 0.03 | U | 0.35 | | 0.29 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.20 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.11 | U | 0.23 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.23 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.0 | U | 0.049 | 0.100 | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.070 | 0.360 | 0.058 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.21 | U | 0.90 | | 0.80 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.129 | | 0.072 | | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.31 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.4 | | 1.3 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.23 | U | 0.93 | | 0.74 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.23 | J | 0.12 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.20 | | 0.15 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.025 | U | 0.045 | | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.71 | | 0.79 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.26 | | 0.17 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.71 | | 0.79 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundance 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-005

Radiochemistry

Lab Sample ID: F1C080492-005
 Work Order: MFCJ8
 Matrix: SOLID

Date Collected: 02/28/11 1045
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.06 | U | 0.26 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | -0.03 | U | 0.44 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.003 | U | 0.31 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.22 | | 0.11 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.033 | U | 0.048 | 0.100 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.002 | U | 0.047 | 0.360 | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.5 | U | 1.2 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.30 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.380 | | 0.094 | | 0.063 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.5 | | 1.5 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.3 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.22 | J | 0.11 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | -0.03 | U | 0.44 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.125 | | 0.045 | | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.3 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.002 | U | 0.23 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.3 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant ^{609.31}KeV line of Bi-214. ^{13.0195}F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-006

Radiochemistry

Lab Sample ID: F1C080492-006
 Work Order: MFCJ9
 Matrix: SOLID

Date Collected: 02/28/11 1050
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.12 | U | 0.29 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.20 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.26 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.148 | | 0.087 | | 0.061 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.008 | U | 0.034 | 0.100 | 0.027 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.013 | U | 0.051 | 0.360 | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.34 | U | 0.85 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.192 | | 0.088 | | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.296 | | 0.080 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.5 | | 1.4 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.65 | U | 0.90 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.148 | J | 0.087 | 1.00 | 0.061 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.20 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.058 | | 0.038 | | 0.025 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.41 | U | 0.75 | | 0.59 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.41 | U | 0.75 | | 0.59 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 689.46 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-007

Radiochemistry

Lab Sample ID: F1C080492-007
 Work Order: MFCKA
 Matrix: SOLID

Date Collected: 02/28/11 1055
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|----------|--------------------------------------|--------------|-------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | -0.17 | U | 0.33 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.07 | U | 0.19 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.071 | | 0.083 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.29 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.01 | U | 0.59 | 0.10 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.014 | 0.360 | 0.016 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.1 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.22 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.42 | | 0.11 | | 0.02 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.6 | | 1.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.016 | U | 0.997 | | 0.82 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.29 | J | 0.12 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.07 | U | 0.19 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.022 | U | 0.049 | | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.49 | U | 0.90 | | 0.77 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.05 | U | 0.20 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.49 | U | 0.90 | | 0.77 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-008

Radiochemistry

Lab Sample ID: F1C080492-008
 Work Order: MFCKC
 Matrix: SOLID

Date Collected: 02/28/11 1100
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.18 | U | 0.29 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.27 | | 0.16 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.07 | U | 2.9 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.33 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.019 | U | 0.031 | 0.100 | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.015 | U | 0.054 | 0.360 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1 | | 1.2 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.177 | | 0.089 | | 0.053 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.36 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 6.6 | | 1.3 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.07 | U | 0.74 | | 0.61 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.33 | J | 0.10 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.27 | | 0.16 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.035 | | 0.038 | | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.6 | U | 23 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.03 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.6 | U | 23 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-009

Radiochemistry

Lab Sample ID: F1C080492-009
 Work Order: MFCCKE
 Matrix: SOLID

Date Collected: 02/28/11 1105
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.07 | U | 0.26 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.14 | | 0.15 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.35 | | 0.34 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.30 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.012 | U | 0.038 | 0.100 | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.073 | 0.360 | 0.060 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.5 | U | 1.2 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.184 | | 0.093 | | 0.059 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.5 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.31 | U | 0.77 | | 0.60 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.30 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.14 | | 0.15 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.048 | | 0.049 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.23 | U | 0.94 | | 0.80 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.001 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.23 | U | 0.94 | | 0.80 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-010

Radiochemistry

Lab Sample ID: F1C080492-010
 Work Order: MFCKH
 Matrix: SOLID

Date Collected: 02/28/11 1115
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.23 | U | 0.32 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.22 | | 0.16 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.01 | U | 0.30 | | 0.24 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.29 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.0 | U | 0.050 | 0.100 | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.01 | U | 0.046 | 0.360 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.04 | U | 0.77 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.283 | | 0.093 | | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.42 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 10.1 | | 1.4 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.009 | U | 0.64 | | 0.53 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.29 | J | 0.10 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.22 | | 0.16 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.130 | | 0.047 | | 0.018 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.30 | U | 0.69 | | 0.54 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.30 | U | 0.69 | | 0.54 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 18 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-010A

Radiochemistry

Lab Sample ID: F1C080492-011
 Work Order: MFCKK
 Matrix: SOLID

Date Collected: 02/28/11 1115
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.02 | U | 0.50 | | 0.41 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.17 | | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.19 | U | 0.31 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.28 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.016 | U | 0.035 | 0.100 | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.0097 | 0.360 | 0.011 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.04 | U | 1.3 | | 1.1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.289 | | 0.096 | | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.31 | | 0.13 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.6 | | 1.5 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.03 | U | 0.87 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.28 | J | 0.14 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.17 | | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.115 | | 0.048 | | 0.024 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.2 | U | 1.3 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.06 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.2 | U | 1.3 | | 0.8 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 608.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-011

Radiochemistry

Lab Sample ID: F1C080492-012
 Work Order: MFCKM
 Matrix: SOLID

Date Collected: 02/28/11 1120
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.10 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.09 | U | 0.17 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.06 | U | 0.40 | | 0.32 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.27 | | 0.11 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.038 | U | 0.092 | 0.100 | 0.075 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0003 | U | 0.055 | 0.360 | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.5 | | 1.1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.141 | | 0.093 | | 0.055 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.34 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.8 | | 1.7 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.13 | U | 0.85 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.27 | J | 0.11 | 1.00 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.09 | U | 0.17 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.022 | U | 0.051 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.08 | U | 0.99 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.05 | U | 0.12 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.08 | U | 0.99 | | 0.70 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-012

Radiochemistry

Lab Sample ID: F1C080492-013
 Work Order: MFCKQ
 Matrix: SOLID

Date Collected: 02/28/11 1125
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.04 | U | 0.28 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.27 | | 0.17 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.10 | U | 0.37 | | 0.29 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.342 | | 0.099 | | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.012 | U | 0.042 | 0.100 | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0003 | U | 0.041 | 0.360 | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.41 | U | 0.97 | | 0.85 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.240 | | 0.083 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.401 | | 0.097 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.2 | | 1.4 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.22 | U | 0.99 | | 0.79 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.342 | J | 0.099 | 1.00 | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.27 | | 0.17 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.047 | | 0.053 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.69 | | 0.82 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.20 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.69 | | 0.82 | | 0.67 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-013

Radiochemistry

Lab Sample ID: F1C080492-014
 Work Order: MFCKV
 Matrix: SOLID

Date Collected: 02/28/11 1130
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | -0.16 | U | 0.35 | | 0.27 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.25 | | 0.21 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.35 | | 0.29 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.06 | U | 0.12 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.0004 | U | 0.063 | 0.100 | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.019 | 0.360 | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.09 | U | 1.5 | | 1.1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.093 | | 0.087 | | 0.066 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.44 | | 0.16 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.9 | | 2.1 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.3 | U | 1.5 | | 1.2 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.06 | U | 0.12 | 1.00 | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.25 | | 0.21 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.122 | | 0.057 | | 0.027 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.2 | U | 1.8 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.27 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.2 | U | 1.8 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-014

Radiochemistry

Lab Sample ID: F1C080492-015
 Work Order: MFCK0
 Matrix: SOLID

Date Collected: 02/28/11 1135
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | 0.001 | U | 0.13 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.15 | | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.30 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.29 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.03 | U | 0.72 | 0.10 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.03 | U | 0.23 | 0.36 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.9 | U | 1.2 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.245 | | 0.074 | | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.12 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 6.2 | | 1.6 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.3 | U | 1.2 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.29 | J | 0.14 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.15 | | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.042 | | 0.050 | | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.18 | U | 0.73 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.17 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.18 | U | 0.73 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-015

Radiochemistry

Lab Sample ID: F1C080492-016
 Work Order: MFCK2
 Matrix: SOLID

Date Collected: 02/28/11 1140
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | 0.0 | U | 0.30 | | 0.24 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.05 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.10 | U | 0.35 | | 0.27 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.18 | | 0.11 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.01 | U | 0.047 | 0.100 | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.070 | 0.360 | 0.057 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.4 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.25 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.298 | | 0.094 | | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.9 | | 1.7 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.04 | U | 0.94 | | 0.77 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.18 | J | 0.11 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.05 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.066 | | 0.049 | | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.61 | U | 0.88 | | 0.74 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.61 | U | 0.88 | | 0.74 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-016

Radiochemistry

Lab Sample ID: F1C080492-017
 Work Order: MFCK3
 Matrix: SOLID

Date Collected: 02/28/11 1145
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.13 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.11 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.09 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.230 | | 0.092 | | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.013 | U | 0.044 | 0.100 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.014 | U | 0.037 | 0.360 | 0.027 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.08 | U | 0.97 | | 0.82 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.178 | | 0.078 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.46 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.8 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.001 | U | 0.86 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.230 | J | 0.092 | 1.00 | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.11 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.079 | | 0.046 | | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.37 | U | 0.63 | | 0.48 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.1 | U | 0.20 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.37 | U | 0.63 | | 0.48 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-017

Radiochemistry

Lab Sample ID: F1C080492-018
 Work Order: MFCK5
 Matrix: SOLID

Date Collected: 02/28/11 1150
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Y1d % | |
| Actinium 227 | -0.02 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.34 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.02 | U | 0.52 | | 0.30 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.20 | | 0.10 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.021 | U | 0.040 | 0.100 | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.011 | U | 0.056 | 0.360 | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.6 | | 1.1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.149 | | 0.081 | | 0.054 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.43 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.8 | | 1.4 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.16 | U | 0.90 | | 0.73 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.20 | J | 0.10 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.34 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.157 | | 0.051 | | 0.024 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.77 | | 0.84 | | 0.61 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.08 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.77 | | 0.84 | | 0.61 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-018

Radiochemistry

Lab Sample ID: F1C080492-019
 Work Order: MFCK7
 Matrix: SOLID

Date Collected: 02/28/11 1355
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068232 | Yld % | |
| Actinium 227 | 0.03 | U | 0.60 | | 0.49 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.57 | | 0.17 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.16 | U | 0.30 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.60 | | 0.14 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.009 | U | 0.042 | 0.100 | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.004 | U | 0.041 | 0.360 | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.5 | U | 2.5 | | 1.2 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.60 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.65 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 12.2 | | 1.7 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.2 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.60 | J | 0.14 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.57 | | 0.17 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.281 | | 0.072 | | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.005 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.11 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.005 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-019

Radiochemistry

Lab Sample ID: F1C080492-020
 Work Order: MFCLA
 Matrix: SOLID

Date Collected: 02/28/11 1400
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068232 | Yld % |
| Actinium 227 | -0.17 | U | 0.25 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.02 | U | 0.13 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.02 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.220 | | 0.092 | | 0.059 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.01 | U | 0.032 | 0.100 | 0.025 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.009 | U | 0.028 | 0.360 | 0.021 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.33 | U | 0.79 | | 0.62 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.217 | | 0.073 | | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.403 | | 0.089 | | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.0 | | 1.2 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.05 | U | 0.65 | | 0.53 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.220 | J | 0.092 | 1.00 | 0.059 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.02 | U | 0.13 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.10 | | 0.033 | | 0.011 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.51 | U | 0.74 | | 0.58 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0006 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.51 | U | 0.74 | | 0.58 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 28 of 95 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-020

Radiochemistry

Lab Sample ID: F1C080492-021
 Work Order: MFCLD
 Matrix: SOLID

Date Collected: 02/28/11 1405
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | 0.02 | U | 0.48 | | 0.40 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.29 | | 0.12 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.1 | U | 0.26 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.180 | | 0.089 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.008 | U | 0.046 | 0.100 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.011 | U | 0.042 | 0.360 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.59 | U | 0.94 | | 0.77 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.236 | | 0.081 | | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.212 | | 0.090 | | 0.050 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.9 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.16 | U | 0.87 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.180 | J | 0.089 | 1.00 | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.29 | | 0.12 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.035 | | 0.039 | | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.46 | U | 0.71 | | 0.59 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.06 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.46 | U | 0.71 | | 0.59 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-020 DUP

Radiochemistry

Lab Sample ID: F1C080492-021X
 Work Order: MFCLD
 Matrix: SOLID

Date Collected: 02/28/11 1405
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.06 | U | 0.27 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.08 | U | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.27 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.171 | | 0.092 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.012 | U | 0.051 | 0.100 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.002 | U | 0.071 | 0.360 | 0.058 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.5 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.178 | | 0.079 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.37 | | 0.11 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.0 | | 1.7 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.06 | U | 0.88 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.171 | J | 0.092 | 1.00 | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.08 | U | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.036 | U | 0.049 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.42 | U | 0.82 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.04 | U | 0.19 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.42 | U | 0.82 | | 0.71 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-020A

Radiochemistry

Lab Sample ID: F1C080492-022
 Work Order: MFCLE
 Matrix: SOLID

Date Collected: 02/28/11 1405
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|----------|--------------------------------------|--------------|-------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.13 | U | 0.29 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.12 | U | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.22 | U | 0.33 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.12 | | 0.11 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.01 | U | 0.052 | 0.100 | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.022 | U | 0.076 | 0.360 | 0.058 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.1 | U | 1.1 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.27 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.32 | | 0.13 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 4.8 | | 1.5 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.05 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.12 | J | 0.11 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.12 | U | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.001 | U | 0.054 | | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.38 | U | 0.81 | | 0.68 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.38 | U | 0.81 | | 0.68 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-021

Radiochemistry

Lab Sample ID: F1C080492-023
 Work Order: MFCLJ
 Matrix: SOLID

Date Collected: 02/28/11 1410
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|----------|--------------------------------------|-------|-------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.12 | U | 0.29 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.15 | U | 0.24 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.16 | U | 0.44 | | 0.33 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.52 | | 0.17 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.020 | U | 0.057 | 0.100 | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0005 | U | 0.046 | 0.360 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.30 | | 0.10 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.44 | | 0.12 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.3 | | 1.8 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.01 | U | 0.97 | | 0.79 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.52 | J | 0.17 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.15 | U | 0.24 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.037 | U | 0.057 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.39 | U | 0.87 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.13 | | 0.16 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.39 | U | 0.87 | | 0.72 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-022

Radiochemistry

Lab Sample ID: F1C080492-024
 Work Order: MFCLL
 Matrix: SOLID

Date Collected: 02/28/11 1415
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | pCi/g | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.06 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.06 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.08 | U | 0.30 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.33 | | 0.11 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.01 | U | 0.59 | 0.10 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.004 | U | 0.060 | 0.360 | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1.0 | U | 1.6 | | 1.3 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.168 | | 0.099 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.38 | | 0.11 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.8 | | 1.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.4 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.33 | J | 0.11 | 1.00 | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.06 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.039 | | 0.048 | | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.8 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.08 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.8 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 33 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-023

Radiochemistry

Lab Sample ID: F1C080492-025
 Work Order: MFCLM
 Matrix: SOLID

Date Collected: 02/28/11 1420
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.18 | U | 0.30 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.27 | | 0.13 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.14 | U | 0.25 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.34 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.010 | U | 0.036 | 0.100 | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.013 | U | 0.035 | 0.360 | 0.025 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -1.9 | U | 3.0 | | 1.7 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.229 | | 0.091 | | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.332 | | 0.099 | | 0.059 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.8 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.01 | U | 0.94 | | 0.78 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.34 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.27 | | 0.13 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.104 | | 0.037 | | 0.014 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.0003 | U | 0.85 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.0003 | U | 0.85 | | 0.70 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 468.492 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-024

Radiochemistry

Lab Sample ID: F1C080492-026
 Work Order: MFCLN
 Matrix: SOLID

Date Collected: 02/28/11 1425
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | pCi/g | | Batch # 1068233 | Yld % |
| Actinium 227 | 0.02 | U | 0.46 | | 0.38 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.19 | | 0.15 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.007 | U | 0.36 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.36 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.004 | U | 0.025 | 0.100 | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.004 | U | 0.044 | 0.360 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.2 | U | 1.1 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.165 | | 0.080 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.224 | | 0.092 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 10.3 | | 1.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.25 | U | 0.85 | | 0.68 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.36 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.19 | | 0.15 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.076 | | 0.044 | | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.60 | U | 0.80 | | 0.66 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.04 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.60 | U | 0.80 | | 0.66 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-025

Radiochemistry

Lab Sample ID: F1C080492-027
 Work Order: MFCLP
 Matrix: SOLID

Date Collected: 02/28/11 1430
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.28 | U | 0.33 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.21 | | 0.15 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.05 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.287 | | 0.099 | | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.001 | U | 0.043 | 0.100 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.007 | U | 0.038 | -0.360 | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.8 | U | 1.2 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.217 | | 0.080 | | 0.050 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.480 | | 0.099 | | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.9 | | 1.4 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.03 | U | 0.57 | | 0.47 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.287 | J | 0.099 | 1.00 | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.21 | | 0.15 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.061 | | 0.046 | | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.18 | U | 0.90 | | 0.76 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.11 | U | 0.41 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.18 | U | 0.90 | | 0.76 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-026

Radiochemistry

Lab Sample ID: F1C080492-028
 Work Order: MFCLQ
 Matrix: SOLID

Date Collected: 02/28/11 1435
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068233 | Yld % | |
| Actinium 227 | -0.29 | U | 0.34 | | 0.27 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.24 | | 0.17 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.001 | U | 0.28 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.37 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.011 | U | 0.036 | 0.100 | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.008 | U | 0.040 | 0.360 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 3.7 | | 2.0 | | 1.5 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.321 | | 0.087 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.52 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.8 | | 1.4 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.14 | U | 0.89 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.37 | J | 0.12 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.24 | | 0.17 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.151 | | 0.055 | | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.55 | U | 0.84 | | 0.66 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.01 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.55 | U | 0.84 | | 0.66 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-027

Radiochemistry

Lab Sample ID: F1C080492-029
 Work Order: MFCLR
 Matrix: SOLID

Date Collected: 02/28/11 1440
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068233 | | Yld % |
| Actinium 227 | 0.03 | U | 0.46 | | 0.38 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.157 | | 0.053 | | 0.097 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.12 | U | 0.30 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.39 | | 0.13 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.0009 | U | 0.044 | 0.100 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.022 | U | 0.056 | 0.360 | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.4 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.215 | | 0.078 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.305 | | 0.087 | | 0.054 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.9 | | 1.3 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.14 | U | 0.80 | | 0.64 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.39 | J | 0.13 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.157 | | 0.053 | | 0.097 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.020 | U | 0.043 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.009 | U | 0.85 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.13 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.009 | U | 0.85 | | 0.71 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-028

Radiochemistry

Lab Sample ID: F1C080492-030
 Work Order: MFCLV
 Matrix: SOLID

Date Collected: 02/28/11 1445
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | 0.09 | U | 0.20 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.11 | U | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.63 | | 0.52 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.28 | | 0.13 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.017 | U | 0.053 | 0.100 | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.021 | U | 0.053 | 0.360 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.5 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.218 | | 0.080 | | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.35 | | 0.12 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.5 | | 1.9 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.0 | U | 0.72 | | 0.60 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.28 | J | 0.13 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.11 | U | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.073 | | 0.050 | | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.12 | U | 0.79 | | 0.68 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.12 | U | 0.79 | | 0.68 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-029

Radiochemistry

Lab Sample ID: F1C080492-031
 Work Order: MFCLW
 Matrix: SOLID

Date Collected: 02/28/11 1450
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.22 | U | 0.34 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.15 | | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.25 | U | 0.37 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.18 | | 0.11 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.02 | U | 0.36 | 0.10 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.015 | U | 0.067 | 0.360 | 0.056 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.03 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.291 | | 0.092 | | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.44 | | 0.13 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.6 | | 1.8 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.117 | U | 0.995 | | 0.80 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.18 | J | 0.11 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.15 | | 0.18 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.040 | | 0.053 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.25 | U | 0.74 | | 0.64 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.25 | U | 0.74 | | 0.64 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.^{40 of 95}
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-030

Radiochemistry

Lab Sample ID: F1C080492-032
 Work Order: MFCL1
 Matrix: SOLID

Date Collected: 02/28/11 1455
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------|------|--------------------------------------|--------------|-------|------------------------|--------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068233 | Yld % | |
| Actinium 227 | -0.07 | U | 0.26 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.51 | | 0.16 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.24 | | 0.28 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.52 | | 0.11 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.031 | J | 0.039 | 0.100 | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0001 | U | 0.046 | 0.360 | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.61 | U | 0.96 | | 0.77 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.66 | | 0.13 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.55 | | 0.13 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 11.7 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.20 | U | 0.90 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.52 | J | 0.11 | 1.00 | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.51 | | 0.16 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.205 | | 0.061 | | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.43 | U | 0.86 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.43 | U | 0.86 | | 0.69 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-030A

Radiochemistry

Lab Sample ID: F1C080492-033
 Work Order: MFCL2
 Matrix: SOLID

Date Collected: 02/28/11 1455
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068233 | | Yld % |
| Actinium 227 | -0.01 | U | 0.52 | | 0.43 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.27 | | 0.15 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.18 | U | 0.26 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.52 | | 0.12 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.006 | U | 0.037 | 0.100 | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.007 | U | 0.039 | 0.360 | 0.031 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1.9 | | 1.3 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.46 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.55 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 10.8 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.0 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.52 | J | 0.12 | 1.00 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.27 | | 0.15 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.238 | | 0.062 | | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.67 | U | 0.99 | | 0.81 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.12 | U | 0.20 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.67 | U | 0.99 | | 0.81 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-031

Radiochemistry

Lab Sample ID: F1C080492-034
 Work Order: MFCL3
 Matrix: SOLID

Date Collected: 02/28/11 1500
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.02 | U | 0.46 | | 0.38 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.20 | | 0.12 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.14 | U | 0.26 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.36 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.018 | U | 0.038 | 0.100 | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.014 | U | 0.042 | 0.360 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1.09 | | 0.997 | | 0.80 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.231 | | 0.086 | | 0.052 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.12 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.2 | | 1.3 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.04 | U | 0.83 | | 0.68 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.36 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.20 | | 0.12 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.030 | U | 0.043 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.56 | U | 0.86 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.04 | U | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.56 | U | 0.86 | | 0.71 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 Kev line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-032

Radiochemistry

Lab Sample ID: F1C080492-035
 Work Order: MFCL4
 Matrix: SOLID

Date Collected: 02/28/11 1505
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|------|--------------------------------------|-------|-------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.18 | U | 0.29 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.11 | | 0.13 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.07 | U | 0.31 | | 0.24 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.44 | | 0.16 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.008 | U | 0.041 | 0.100 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.0006 | U | 0.047 | 0.360 | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.37 | U | 0.87 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.199 | | 0.077 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.3 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.05 | U | 0.79 | | 0.64 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.44 | J | 0.16 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.11 | | 0.13 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.030 | | 0.037 | | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.04 | U | 0.76 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.26 | | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.04 | U | 0.76 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-033

Radiochemistry

Lab Sample ID: F1C080492-036
 Work Order: MFCL5
 Matrix: SOLID

Date Collected: 02/28/11 1510
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.12 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.07 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.29 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.28 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.008 | U | 0.043 | 0.100 | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.012 | U | 0.049 | 0.360 | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.5 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.201 | | 0.096 | | 0.053 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.8 | | 1.5 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.20 | U | 0.78 | | 0.62 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.28 | J | 0.11 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.07 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.027 | U | 0.046 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.39 | U | 0.87 | | 0.73 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.05 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.39 | U | 0.87 | | 0.73 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.⁹⁵
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-034

Radiochemistry

Lab Sample ID: F1C080492-037
 Work Order: MFCL6
 Matrix: SOLID

Date Collected: 02/28/11 1515
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.01 | U | 0.27 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.11 | U | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.17 | U | 0.41 | | 0.30 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.30 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.017 | U | 0.058 | 0.100 | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.023 | U | 0.078 | 0.360 | 0.060 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.9 | | 1.2 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.192 | | 0.083 | | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.48 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.5 | | 1.9 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.8 | U | 1.3 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.30 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.11 | U | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.076 | | 0.057 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.53 | U | 0.88 | | 0.73 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.09 | U | 0.18 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.53 | U | 0.88 | | 0.73 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi²¹⁴₄₆ 95 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-035

Radiochemistry

Lab Sample ID: F1C080492-038
 Work Order: MFCL8
 Matrix: SOLID

Date Collected: 02/28/11 1520
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|------|--------------------------------------|-------|-------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.06 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.23 | | 0.23 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.14 | U | 0.29 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.17 | | 0.13 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.005 | U | 0.074 | 0.100 | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.02 | U | 0.65 | 0.36 | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.26 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.40 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.9 | | 1.9 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.1 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.17 | J | 0.13 | 1.00 | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.23 | | 0.23 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.027 | U | 0.054 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.04 | U | 0.87 | | 0.66 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.14 | U | 0.19 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.04 | U | 0.87 | | 0.66 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-036

Radiochemistry

Lab Sample ID: F1C080492-039
 Work Order: MFCL9
 Matrix: SOLID

Date Collected: 02/28/11 1525
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|-------------|------|--------------------------------------|--------------|-------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068233 | Yld % | |
| Actinium 227 | -0.07 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.1 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.42 | | 0.33 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.21 | | 0.12 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.01 | U | 0.56 | 0.10 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.015 | U | 0.062 | 0.360 | 0.048 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.1 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.28 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.35 | | 0.10 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.6 | | 1.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.3 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.21 | J | 0.12 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.1 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.123 | | 0.048 | | 0.016 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 1 | | 1.0 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.008 | U | 0.26 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 1 | | 1.0 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-037

Radiochemistry

Lab Sample ID: F1C080492-040
 Work Order: MFCMA
 Matrix: SOLID

Date Collected: 03/01/11 0830
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------|------|--------------------------------------|-------|-------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068233 | Yld % |
| Actinium 227 | -0.13 | U | 0.23 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.13 | | 0.12 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.23 | | 0.30 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.248 | | 0.095 | | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.086 | J | 0.046 | 0.100 | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.002 | U | 0.045 | 0.360 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.3 | U | 23 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.215 | | 0.069 | | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.212 | | 0.086 | | 0.045 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 6.1 | | 1.1 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.20 | U | 0.84 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.248 | J | 0.095 | 1.00 | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.13 | | 0.12 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.042 | | 0.031 | | 0.021 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.42 | U | 0.62 | | 0.47 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.05 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.42 | U | 0.62 | | 0.47 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 49 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-038

Radiochemistry

Lab Sample ID: F1C080492-041
 Work Order: MFCCM
 Matrix: SOLID

Date Collected: 03/01/11 0835
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | pCi/g | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.18 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.09 | U | 0.13 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.23 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.233 | | 0.074 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.0 | U | 0.020 | 0.100 | 0.016 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.002 | U | 0.029 | 0.360 | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.2 | U | 1.2 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.233 | | 0.073 | | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.186 | | 0.061 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 4.72 | | 0.94 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.08 | U | 0.67 | | 0.55 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.233 | J | 0.074 | 1.00 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.09 | U | 0.13 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.037 | | 0.041 | | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.19 | U | 0.59 | | 0.51 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.06 | U | 0.14 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.19 | U | 0.59 | | 0.51 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.^{50 of 95}
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-038 DUP

Radiochemistry

Lab Sample ID: F1C080492-041X
 Work Order: MFCMC
 Matrix: SOLID

Date Collected: 03/01/11 0835
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.11 | U | 0.22 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.09 | U | 0.14 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.006 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.40 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.008 | U | 0.036 | 0.100 | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.0082 | 0.360 | 0.009 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.13 | U | 0.82 | | 0.74 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.242 | | 0.081 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.142 | | 0.079 | | 0.056 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 5.7 | | 1.0 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.15 | U | 0.80 | | 0.65 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.40 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.09 | U | 0.14 | | 0.10 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.117 | | 0.044 | | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.04 | U | 0.55 | | 0.48 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.04 | U | 0.55 | | 0.48 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-039

Radiochemistry

Lab Sample ID: F1C080492-042
 Work Order: MFCMH
 Matrix: SOLID

Date Collected: 03/01/11 0840
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.007 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.061 | U | 0.095 | | 0.066 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.002 | U | 0.24 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | -0.05 | U | 2.7 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.002 | U | 0.035 | 0.100 | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.046 | 0.360 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.17 | U | 0.80 | | 0.73 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.091 | | 0.062 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.008 | U | 0.052 | | 0.047 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 2.04 | | 0.71 | | 0.36 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.0 | U | 0.91 | | 0.75 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | -0.05 | U | 2.7 | 1.0 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.061 | U | 0.095 | | 0.066 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.002 | U | 0.029 | | 0.027 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.03 | U | 0.61 | | 0.54 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.06 | U | 0.12 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.03 | U | 0.61 | | 0.54 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 52 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-040

Radiochemistry

Lab Sample ID: F1C080492-043
 Work Order: MFCML
 Matrix: SOLID

Date Collected: 03/01/11 0845
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068236 | Yld % | |
| Actinium 227 | -0.20 | U | 0.27 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.17 | | 0.13 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.19 | U | 0.27 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.149 | | 0.086 | | 0.060 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.0 | U | 0.028 | 0.100 | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.008 | U | 0.037 | 0.360 | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.08 | U | 0.67 | | 0.54 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.298 | | 0.082 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.315 | | 0.094 | | 0.053 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 7.3 | | 1.2 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.20 | U | 0.90 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.149 | J | 0.086 | 1.00 | 0.060 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.17 | | 0.13 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.140 | | 0.039 | | 0.012 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.28 | U | 0.57 | | 0.45 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.12 | U | 0.17 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.28 | U | 0.57 | | 0.45 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 53 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-040A

Radiochemistry

Lab Sample ID: F1C080492-044
 Work Order: MFCMP
 Matrix: SOLID

Date Collected: 03/01/11 0845
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.13 | U | 0.22 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.12 | | 0.16 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.20 | U | 0.34 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.34 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.059 | U | 0.063 | 0.100 | 0.064 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.013 | 0.360 | 0.015 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.2 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.237 | | 0.075 | | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.35 | | 0.10 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 6.8 | | 1.4 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.27 | U | 0.88 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.34 | J | 0.12 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.12 | | 0.16 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.044 | | 0.051 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.35 | U | 0.74 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.003 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.35 | U | 0.74 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 54 of 95 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-041

Radiochemistry

Lab Sample ID: F1C080492-045
 Work Order: MFCMR
 Matrix: SOLID

Date Collected: 03/01/11 0850
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.06 | U | 0.21 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.217 | | 0.097 | | 0.093 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.28 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.25 | | 0.10 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.012 | U | 0.042 | 0.100 | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0008 | U | 0.044 | 0.360 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.1 | U | 0.87 | | 0.79 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.147 | | 0.084 | | 0.050 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.301 | | 0.099 | | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 6.8 | | 1.2 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.15 | U | 0.84 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.25 | J | 0.10 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.217 | | 0.097 | | 0.093 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.041 | | 0.043 | | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.1 | U | 1.1 | | 0.6 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.002 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.1 | U | 1.1 | | 0.6 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-042

Radiochemistry

Lab Sample ID: F1C080492-046
 Work Order: MFCMW
 Matrix: SOLID

Date Collected: 03/01/11 0855
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.08 | U | 0.24 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.13 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.09 | U | 0.42 | | 0.33 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.208 | | 0.093 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.006 | U | 0.052 | 0.100 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.003 | U | 0.052 | 0.360 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.02 | U | 0.99 | | 0.90 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.133 | | 0.081 | | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.246 | | 0.083 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 5.6 | | 1.4 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.24 | U | 0.95 | | 0.75 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.208 | J | 0.093 | 1.00 | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.13 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.024 | U | 0.047 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.70 | | 0.63 | | 0.44 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.03 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.70 | | 0.63 | | 0.44 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-043

Radiochemistry

Lab Sample ID: F1C080492-047
 Work Order: MFCMO
 Matrix: SOLID

Date Collected: 03/01/11 0900
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | 0.0 | U | 0.42 | | 0.34 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.15 | U | 0.24 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.22 | U | 0.41 | | 0.30 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.27 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.007 | U | 0.093 | 0.100 | 0.049 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.02 | U | 0.32 | 0.36 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.69 | | 0.88 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.108 | | 0.085 | | 0.061 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.17 | | 0.10 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.1 | | 1.7 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.005 | U | 0.86 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.27 | J | 0.12 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.15 | U | 0.24 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.062 | | 0.060 | | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.1 | U | 1.3 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.03 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.1 | U | 1.3 | | 0.8 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi²¹⁴ ⁵⁷⁰⁴⁹⁵ F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-044

Radiochemistry

Lab Sample ID: F1C080492-048
 Work Order: MF3M3
 Matrix: SOLID

Date Collected: 03/01/11 0905
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | pCi/g | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.28 | U | 0.37 | | 0.28 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.12 | U | 0.18 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.02 | U | 0.51 | | 0.42 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.16 | | 0.12 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.03 | U | 1.6 | 0.1 | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.02 | U | 1.6 | 0.4 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.07 | U | 1.1 | | 1.0 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.263 | | 0.086 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.42 | | 0.12 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.7 | | 1.8 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.06 | U | 0.86 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.16 | J | 0.12 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.12 | U | 0.18 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.043 | | 0.044 | | 0.028 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.71 | | 0.86 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.08 | U | 0.18 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.71 | | 0.86 | | 0.69 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.^{58 of 95}
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-045

Radiochemistry

Lab Sample ID: F1C080492-049
 Work Order: MFCM5
 Matrix: SOLID

Date Collected: 03/01/11 0910
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | pCi/g | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.18 | U | 0.33 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.36 | | 0.13 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.32 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.381 | | 0.098 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.018 | U | 0.039 | 0.100 | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.0088 | 0.360 | 0.010 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1.07 | | 0.68 | | 0.42 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.312 | | 0.091 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.327 | | 0.094 | | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 5.8 | | 1.1 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.27 | U | 0.89 | | 0.71 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.381 | J | 0.098 | 1.00 | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.36 | | 0.13 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.100 | | 0.043 | | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.75 | | 0.68 | | 0.50 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.06 | U | 0.17 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.75 | | 0.68 | | 0.50 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi²¹⁴ 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-046

Radiochemistry

Lab Sample ID: F1C080492-050
 Work Order: MFCM8
 Matrix: SOLID

Date Collected: 03/01/11 0915
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.15 | U | 0.28 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.15 | | 0.14 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.06 | U | 0.33 | | 0.27 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.40 | | 0.12 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.014 | U | 0.043 | 0.100 | 0.034 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.055 | 0.360 | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.6 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.123 | | 0.086 | | 0.056 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.27 | | 0.11 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.3 | | 1.4 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.12 | U | 0.78 | | 0.62 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.40 | J | 0.12 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.15 | | 0.14 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.090 | | 0.039 | | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.09 | U | 0.79 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.07 | U | 0.18 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.09 | U | 0.79 | | 0.69 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.
 60 of 95
 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-047

Radiochemistry

Lab Sample ID: F1C080492-051
 Work Order: MFCNC
 Matrix: SOLID

Date Collected: 03/01/11 0917
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|---------|------|--------------------------------------|-------|-------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | 0.06 | U | 0.71 | | 0.58 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.98 | | 0.23 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.84 | | 0.35 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.67 | | 0.17 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.012 | U | 0.046 | 0.100 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.0006 | U | 0.047 | 0.360 | 0.039 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.4 | U | 1.2 | | 1.0 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.69 | | 0.13 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.57 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 14.5 | | 1.8 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.6 | U | 1.2 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.67 | J | 0.17 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.98 | | 0.23 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.275 | | 0.085 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 1.5 | | 1.2 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.03 | U | 210 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 1.5 | | 1.2 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant ^{609.31}KeV line of Bi-214. ^{61.01}95 F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-048

Radiochemistry

Lab Sample ID: F1C080492-052
 Work Order: MFCNE
 Matrix: SOLID

Date Collected: 03/01/11 0920
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.004 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.19 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.11 | U | 0.26 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.333 | | 0.091 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.013 | U | 0.037 | 0.100 | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.003 | U | 0.043 | 0.360 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.90 | | 0.84 | | 0.62 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.260 | | 0.094 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.352 | | 0.089 | | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 11.1 | | 1.5 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.33 | U | 0.62 | | 0.46 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.333 | J | 0.091 | 1.00 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.19 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.066 | | 0.040 | | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.09 | U | 0.74 | | 0.60 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.08 | U | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.09 | U | 0.74 | | 0.60 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant ^{609.31}KeV line of Bi-214. ^{62 of 95} F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-049

Radiochemistry

Lab Sample ID: F1C080492-053
 Work Order: MFCNG
 Matrix: SOLID

Date Collected: 03/01/11 0922
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------|------|--------------------------------------|-------|-------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.63 | U | 0.49 | | 0.38 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.67 | | 0.18 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.37 | | 0.33 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.34 | | 0.13 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.044 | J | 0.042 | 0.100 | 0.029 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.007 | U | 0.052 | 0.360 | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 2.6 | | 1.6 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.53 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.49 | | 0.11 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 11.6 | | 1.6 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.321 | U | 0.996 | | 0.79 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.34 | J | 0.13 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.67 | | 0.18 | | 0.1 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.154 | | 0.058 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 1.2 | | 1.0 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.04 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 1.2 | | 1.0 | | 0.7 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-050

Radiochemistry

Lab Sample ID: F1C080492-054
 Work Order: MFCNK
 Matrix: SOLID

Date Collected: 03/01/11 0925
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068236 | Yld % | |
| Actinium 227 | 0.06 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.0 | U | 0.27 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.03 | U | 0.36 | | 0.29 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.31 | | 0.15 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.030 | U | 0.067 | 0.100 | 0.073 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.023 | J | 0.026 | 0.360 | 0.017 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.9 | U | 1.6 | | 1.2 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.233 | | 0.083 | | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.268 | | 0.097 | | 0.044 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.7 | | 1.8 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.01 | U | 0.99 | | 0.81 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.31 | J | 0.15 | 1.00 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.0 | U | 0.27 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.031 | U | 0.046 | | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.21 | U | 0.80 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.21 | U | 0.80 | | 0.69 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-050A

Radiochemistry

Lab Sample ID: F1C080492-055
 Work Order: MFCNL
 Matrix: SOLID

Date Collected: 03/01/11 0925
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068236 | Yld % | |
| Actinium 227 | -0.01 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.43 | | 0.15 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.05 | U | 0.33 | | 0.27 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.45 | | 0.14 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.003 | U | 0.046 | 0.100 | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.006 | U | 0.034 | 0.360 | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.7 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.215 | | 0.076 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.51 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 8.4 | | 1.4 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.02 | U | 0.81 | | 0.67 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.45 | J | 0.14 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.43 | | 0.15 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.052 | | 0.042 | | 0.030 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.28 | U | 0.84 | | 0.70 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.14 | | 0.16 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.28 | U | 0.84 | | 0.70 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-051

Radiochemistry

Lab Sample ID: F1C080492-056
 Work Order: MFCNP
 Matrix: SOLID

Date Collected: 03/01/11 0930
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.35 | U | 0.42 | | 0.33 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 1.33 | | 0.30 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.45 | | 0.35 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.57 | | 0.14 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.009 | U | 0.041 | 0.100 | 0.032 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.005 | U | 0.057 | 0.360 | 0.046 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.4 | U | 1.4 | | 1.2 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.86 | | 0.15 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.65 | | 0.16 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 16.1 | | 2.3 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.0 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.57 | J | 0.14 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 1.33 | | 0.30 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.368 | | 0.093 | | 0.031 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 1.0 | | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.09 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 1.0 | | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-052

Radiochemistry

Lab Sample ID: F1C080492-057
 Work Order: MFCNT
 Matrix: SOLID

Date Collected: 03/01/11 0935
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.0007 | U | 0.18 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.23 | | 0.13 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.12 | U | 0.38 | | 0.29 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.45 | | 0.15 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.02 | U | 39 | 0.1 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.01 | U | 0.57 | 0.36 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.25 | U | 0.91 | | 0.79 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.36 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.32 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.6 | | 1.8 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.2 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.45 | J | 0.15 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.23 | | 0.13 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.159 | | 0.061 | | 0.018 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.51 | U | 0.91 | | 0.75 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.12 | U | 0.19 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.51 | U | 0.91 | | 0.75 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-053

Radiochemistry

Lab Sample ID: F1C080492-058
 Work Order: MFCNV
 Matrix: SOLID

Date Collected: 03/01/11 0937
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068236 | Yld % | |
| Actinium 227 | 0.02 | U | 0.53 | | 0.44 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.48 | | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.43 | | 0.46 | | 0.33 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.53 | | 0.14 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.002 | U | 0.047 | 0.100 | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0007 | U | 0.059 | 0.360 | 0.048 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | -0.05 | U | 1.0 | | 0.8 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.91 | | 0.15 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.80 | | 0.15 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 15.1 | | 2.1 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.07 | U | 1.1 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.53 | J | 0.14 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.48 | | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.422 | | 0.088 | | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 1.28 | | 0.70 | | 1.0 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.04 | U | 2.6 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 1.28 | | 0.70 | | 1.0 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SOI-054

Radiochemistry

Lab Sample ID: F1C080492-059
 Work Order: MFCNX
 Matrix: SOLID

Date Collected: 03/01/11 0940
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068236 | Yld % |
| Actinium 227 | -0.43 | U | 0.24 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.58 | | 0.17 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.21 | U | 0.34 | | 0.26 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.75 | | 0.15 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.005 | U | 0.043 | 0.100 | 0.035 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.0005 | U | 0.052 | 0.360 | 0.043 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.55 | U | 0.97 | | 0.78 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.77 | | 0.14 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.79 | | 0.16 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 14.4 | | 1.8 | | 0.2 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.5 | U | 1.2 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.75 | J | 0.15 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.58 | | 0.17 | | 0.14 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.286 | | 0.075 | | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.24 | U | 0.85 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.16 | U | 0.25 | | 0.20 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.24 | U | 0.85 | | 0.69 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 Kev line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SED-055

Radiochemistry

Lab Sample ID: F1C080492-060
 Work Order: MFCN2
 Matrix: SOLID

Date Collected: 03/01/11 1045
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|-------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | | | Batch # 1068236 | | Yld % |
| Actinium 227 | 0.02 | U | 0.26 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.0 | U | 0.26 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | -0.08 | U | 2.3 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.39 | | 0.13 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.222 | | 0.083 | 0.100 | 0.024 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.015 | 0.360 | 0.017 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 9.2 | | 2.5 | | 1.3 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.42 | | 0.12 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.41 | | 0.14 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 9.8 | | 1.8 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.45 | U | 0.95 | | 0.72 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.39 | J | 0.13 | 1.00 | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.0 | U | 0.26 | | 0.22 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.174 | | 0.064 | | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.2 | U | 1.3 | | 1.1 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.17 | | 0.22 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.2 | U | 1.3 | | 1.1 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SED-056

Radiochemistry

Lab Sample ID: F1C080492-061
 Work Order: MFCN4
 Matrix: SOLID

Date Collected: 03/01/11 1050
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|------------------------|-----------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | Batch # 1068238 | Yld % | |
| Actinium 227 | -0.17 | U | 0.29 | | 0.23 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.17 | | 0.14 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.13 | U | 0.32 | | 0.25 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.39 | | 0.11 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.212 | | 0.066 | 0.100 | 0.020 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.015 | U | 0.049 | 0.360 | 0.038 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 4.0 | | 1.3 | | 0.7 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.208 | | 0.089 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.271 | | 0.097 | | 0.048 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 4.9 | | 1.0 | | 0.3 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.03 | U | 0.84 | | 0.69 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.39 | J | 0.11 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.17 | | 0.14 | | 0.09 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.111 | | 0.045 | | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.03 | U | 0.72 | | 0.62 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.0 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.03 | U | 0.72 | | 0.62 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

Tetra Tech NUS, Inc

Client Sample ID: SME-SED-056 DUP

Radiochemistry

Lab Sample ID: F1C080492-061X
 Work Order: MFCN4
 Matrix: SOLID

Date Collected: 03/01/11 1050
 Date Received: 03/08/11 0915

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Analysis Date |
|---|--------------|----------|--------------------------------------|--------------|--------------|---------------|------------------------|------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | | | Batch # 1068238 | Yld % |
| Actinium 227 | 0.003 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.13 | U | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.15 | U | 0.44 | | 0.34 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.35 | | 0.13 | | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.289 | | 0.080 | 0.100 | 0.024 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.02 | U | 0.61 | 0.36 | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 2.3 | | 1.5 | | 1 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.239 | | 0.080 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.34 | | 0.10 | | 0.03 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | 3.6 | | 1.1 | | 0.4 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.04 | U | 1.0 | | 0.9 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.35 | J | 0.13 | 1.00 | 0.05 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.13 | U | 0.19 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.042 | | 0.057 | | 0.041 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.34 | U | 0.75 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.06 | U | 0.19 | | 0.15 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.34 | U | 0.75 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE (S)

Data are incomplete without the case narrative.
 Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.
 U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214. F1C080492

METHOD BLANK REPORT

Radiochemistry

Client Lot ID: F1C080492
 Matrix: SOLID

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Lab Sample ID Analysis Date |
|---|--------------|------|--------------------------------------|-------|------------------------|---------------|-----------------|-----------------------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | | Batch # 1068238 | Yld % | | F1C090000-238B |
| Actinium 227 | -0.09 | U | 0.22 | | 0.18 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | -0.04 | U | 0.28 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.07 | U | 0.25 | | 0.19 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | -0.01 | U | 0.10 | | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.015 | U | 0.047 | 0.100 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.006 | U | 0.030 | 0.360 | 0.023 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.03 | U | 0.85 | | 0.81 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | -0.05 | U | 7.1 | | 0.06 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.020 | U | 0.057 | | 0.053 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | -0.4 | U | 2.0 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.25 | U | 0.75 | | 0.58 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | -0.01 | U | 0.10 | 1.00 | 0.08 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | -0.04 | U | 0.28 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.014 | U | 0.042 | | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | -0.09 | U | 0.67 | | 0.58 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.03 | U | 0.16 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | -0.09 | U | 0.67 | | 0.58 | 30 | 03/09/11 | 03/31/11 |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | | Batch # 1068232 | Yld % | | F1C090000-232B |
| Actinium 227 | -0.06 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | -0.02 | U | 0.20 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.04 | U | 0.21 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | -0.0002 | U | 0.093 | | 0.086 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | -0.005 | U | 0.041 | 0.100 | 0.033 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | -0.006 | U | 0.045 | 0.360 | 0.036 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 1.38 | | 0.99 | | 0.73 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.040 | U | 0.063 | | 0.053 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.104 | | 0.076 | | 0.054 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | -0.3 | U | 1.2 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.0 | U | 0.95 | | 0.78 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | -0.0002 | U | 0.093 | 1.00 | 0.086 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | -0.02 | U | 0.20 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | -0.01 | U | 0.13 | | 0.04 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.87 | | 0.94 | | 0.66 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.02 | U | 0.48 | | 0.13 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.87 | | 0.94 | | 0.66 | 30 | 03/09/11 | 03/31/11 |

METHOD BLANK REPORT

Radiochemistry

Client Lot ID: F1C080492
 Matrix: SOLID

| Parameter | Result | Qual | Total Uncert. (2 σ +/-) | RL | MDL | Count Time | Prep Date | Lab Sample ID Analysis Date |
|---|--------------|----------|--------------------------------------|-------|------------------------|---------------|-----------------|-----------------------------------|
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | | Batch # 1068233 | Yld % | | F1C090000-233B |
| Actinium 227 | -0.006 | U | 0.15 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | 0.13 | | 0.13 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.26 | | 0.21 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.062 | | 0.073 | | 0.054 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.021 | U | 0.065 | 0.100 | 0.072 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.017 | J | 0.026 | 0.360 | 0.016 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.39 | U | 0.86 | | 0.84 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.035 | U | 0.048 | | 0.040 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.025 | U | 0.062 | | 0.051 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | -0.1 | U | 1.2 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | -0.11 | U | 0.74 | | 0.59 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.062 | J | 0.073 | 1.00 | 0.054 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | 0.13 | | 0.13 | | 0.07 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.012 | U | 0.031 | | 0.026 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.06 | U | 0.56 | | 0.52 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | 0.05 | U | 0.14 | | 0.11 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.06 | U | 0.56 | | 0.52 | 30 | 03/09/11 | 03/31/11 |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | | Batch # 1068236 | Yld % | | F1C090000-236B |
| Actinium 227 | -0.08 | U | 0.22 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Actinium 228 | -0.02 | U | 0.21 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 212 | 0.0 | U | 0.21 | | 0.17 | 30 | 03/09/11 | 03/31/11 |
| Bismuth 214 | 0.121 | | 0.087 | | 0.062 | 30 | 03/09/11 | 03/31/11 |
| Cesium 137 | 0.0 | U | 0.026 | 0.100 | 0.022 | 30 | 03/09/11 | 03/31/11 |
| Cobalt 60 | 0.0 | U | 0.0099 | 0.360 | 0.012 | 30 | 03/09/11 | 03/31/11 |
| Lead 210 | 0.50 | U | 0.96 | | 0.76 | 30 | 03/09/11 | 03/31/11 |
| Lead 212 | 0.090 | | 0.063 | | 0.042 | 30 | 03/09/11 | 03/31/11 |
| Lead 214 | 0.036 | U | 0.090 | | 0.079 | 30 | 03/09/11 | 03/31/11 |
| Potassium 40 | -0.3 | U | 1.0 | | 0.5 | 30 | 03/09/11 | 03/31/11 |
| Protactinium 231 | 0.21 | U | 0.71 | | 0.56 | 30 | 03/09/11 | 03/31/11 |
| Radium (226) | 0.121 | J | 0.087 | 1.00 | 0.062 | 30 | 03/09/11 | 03/31/11 |
| Radium 228 | -0.02 | U | 0.21 | | 0.12 | 30 | 03/09/11 | 03/31/11 |
| Thallium 208 | 0.0008 | U | 0.042 | | 0.037 | 30 | 03/09/11 | 03/31/11 |
| Thorium 234 | 0.68 | | 0.84 | | 0.63 | 30 | 03/09/11 | 03/31/11 |
| Uranium 235 | -0.07 | U | 0.91 | | 0.16 | 30 | 03/09/11 | 03/31/11 |
| Uranium 238 | 0.68 | | 0.84 | | 0.63 | 30 | 03/09/11 | 03/31/11 |

NOTE(S)

Data are incomplete without the case narrative.

Bold results are greater than the MDL.

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analyte is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

Laboratory Control Sample Report

Radiochemistry

Client Lot ID: F1C080492

Matrix: SOLID

| Parameter | Spike Amount | Result | Total Uncert. (2 σ +/-) | MDL | Lab Sample ID | | QC Control Limits |
|---|--------------|---------|--------------------------------------|------------------|-----------------------|-------|----------------------|
| | | | | | % Yld | % Rec | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | 901.1 MOD | F1C090000-232C | | |
| Radium (226) | 12.2 | 11.4 | 1.1 | 0.3 | 94 | | (81 - 103) |
| Thorium 232 | 9.50 | 11.2 | 1.2 | 0.3 | 117 | | (90 - 123) |
| Batch #: | | 1068232 | Analysis Date: | | 03/31/11 | | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | 901.1 MOD | F1C090000-233C | | |
| Radium (226) | 12.2 | 11.4 | 1.1 | 0.2 | 94 | | (81 - 103) |
| Thorium 232 | 9.50 | 9.7 | 1.2 | 0.3 | 102 | | (90 - 123) |
| Batch #: | | 1068233 | Analysis Date: | | 03/31/11 | | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | 901.1 MOD | F1C090000-236C | | |
| Radium (226) | 12.2 | 11.3 | 1.1 | 0.2 | 93 | | (81 - 103) |
| Thorium 232 | 9.50 | 10.9 | 1.2 | 0.4 | 115 | | (90 - 123) |
| Batch #: | | 1068236 | Analysis Date: | | 03/31/11 | | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | pCi/g | 901.1 MOD | F1C090000-238C | | |
| Radium (226) | 12.2 | 11.0 | 1.1 | 0.2 | 90 | | (81 - 103) |
| Thorium 232 | 9.50 | 10.3 | 1.2 | 0.3 | 108 | | (90 - 123) |
| Batch #: | | 1068238 | Analysis Date: | | 03/31/11 | | |

NOTE(S)

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

The MDL is an estimate of the measured concentration at which there is a 99% confidence that a given analysis is given sample matrix. This is functionally analogous to the "critical value" or the "limit of detection".

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV

DUPLICATE EVALUATION REPORT

Radiochemistry

Client Lot ID: F1C080492
 Matrix: SOLID

Date Sampled: 02/28/11
 Date Received: 03/08/11

| Parameter | SAMPLE Result | | Total Uncert. (2σ+/-) | % Yld | DUPLICATE Result | Total Uncert. (2σ+/-) | % Yld | QC Sample ID | | |
|---|------------------|------------------|-----------------------------|--------------|---------------------|-----------------------------|----------------------|--------------|-----------|--|
| | | | | | | | | | Precision | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | 901.1 MOD | | F1C080492-001 | | | |
| Actinium 227 | -0.26 | U | 0.21 | | -0.02 | U | 0.38 | 173 | %RPD | |
| Actinium 228 | 0.09 | U | 0.16 | | 0.36 | U | 0.15 | 122 | %RPD | |
| Bismuth 212 | 0.11 | U | 0.41 | | 0.25 | U | 0.26 | 74 | %RPD | |
| Bismuth 214 | 0.39 | | 0.14 | | 0.288 | | 0.099 | 31 | %RPD | |
| Cesium 137 | 0.029 | U | 0.042 | | 0.008 | U | 0.040 | 112 | %RPD | |
| Cobalt 60 | 0.0 | U | 0.056 | | 0.0 | U | 0.0097 | 0 | %RPD | |
| Lead 210 | 0.5 | U | 1.3 | | 0.59 | U | 0.85 | 18 | %RPD | |
| Lead 212 | 0.23 | | 0.10 | | 0.237 | | 0.087 | 2 | %RPD | |
| Lead 214 | 0.38 | | 0.12 | | 0.36 | | 0.10 | 4 | %RPD | |
| Potassium 40 | 9.9 | | 1.6 | | 9.5 | | 1.5 | 4 | %RPD | |
| Protactinium 231 | -0.2 | U | 1.0 | | 0.008 | U | 0.82 | 215 | %RPD | |
| Radium (226) | 0.39 | J | 0.14 | | 0.288 | J | 0.099 | 31 | %RPD | |
| Radium 228 | 0.09 | U | 0.16 | | 0.36 | U | 0.15 | 122 | %RPD | |
| Thallium 208 | 0.044 | | 0.050 | | 0.130 | | 0.042 | 99 | %RPD | |
| Thorium 234 | 0.43 | U | 0.89 | | 0.51 | U | 0.77 | 17 | %RPD | |
| Uranium 235 | -0.07 | U | 0.73 | | -0.01 | U | 0.19 | 150 | %RPD | |
| Uranium 238 | 0.43 | U | 0.89 | | 0.51 | U | 0.77 | 17 | %RPD | |
| Batch #: | | 1068232 (Sample) | | | 1068232 (Duplicate) | | | | | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | 901.1 MOD | | F1C080492-021 | | | |
| Actinium 227 | 0.02 | U | 0.48 | | -0.06 | U | 0.27 | 360 | %RPD | |
| Actinium 228 | 0.29 | | 0.12 | | 0.08 | U | 0.16 | 113 | %RPD | |
| Bismuth 212 | 0.1 | U | 0.26 | | 0.13 | U | 0.27 | 26 | %RPD | |
| Bismuth 214 | 0.180 | | 0.089 | | 0.171 | | 0.092 | 5 | %RPD | |
| Cesium 137 | 0.008 | U | 0.046 | | 0.012 | U | 0.051 | 35 | %RPD | |
| Cobalt 60 | -0.011 | U | 0.042 | | -0.002 | U | 0.071 | 127 | %RPD | |
| Lead 210 | 0.59 | U | 0.94 | | 0.5 | U | 1.1 | 18 | %RPD | |
| Lead 212 | 0.236 | | 0.081 | | 0.178 | | 0.079 | 28 | %RPD | |
| Lead 214 | 0.212 | | 0.090 | | 0.37 | | 0.11 | 54 | %RPD | |
| Potassium 40 | 8.9 | | 1.5 | | 9.0 | | 1.7 | 1 | %RPD | |
| Protactinium 231 | 0.16 | U | 0.87 | | 0.06 | U | 0.88 | 92 | %RPD | |
| Radium (226) | 0.180 | J | 0.089 | | 0.171 | J | 0.092 | 5 | %RPD | |
| Radium 228 | 0.29 | | 0.12 | | 0.08 | U | 0.16 | 113 | %RPD | |
| Thallium 208 | 0.035 | | 0.039 | | 0.036 | U | 0.049 | 2 | %RPD | |
| Thorium 234 | 0.46 | U | 0.71 | | 0.42 | U | 0.82 | 9 | %RPD | |
| Uranium 235 | -0.06 | U | 0.19 | | 0.04 | U | 0.19 | 772 | %RPD | |
| Uranium 238 | 0.46 | U | 0.71 | | 0.42 | U | 0.82 | 9 | %RPD | |
| Batch #: | | 1068233 (Sample) | | | 1068233 (Duplicate) | | | | | |

DUPLICATE EVALUATION REPORT

Radiochemistry

Client Lot ID: F1C080492
 Matrix: SOLID

Date Sampled: 03/01/11
 Date Received: 03/08/11

| Parameter | SAMPLE Result | | Total Uncert. (2σ+/-) | % Yld | DUPLICATE Result | Total Uncert. (2σ+/-) | % Yld | QC Sample ID | |
|---|------------------|---|-----------------------------|--------------|---------------------|-----------------------------|----------------------|--------------|------|
| | | | | | | | | Precision | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | 901.1 MOD | | F1C080492-041 | | |
| Actinium 227 | -0.18 | U | 0.25 | | -0.11 | U | 0.22 | 48 | %RPD |
| Actinium 228 | 0.09 | U | 0.13 | | 0.09 | U | 0.14 | 2 | %RPD |
| Bismuth 212 | 0.13 | U | 0.23 | | 0.006 | U | 0.16 | 182 | %RPD |
| Bismuth 214 | 0.233 | | 0.074 | | 0.40 | | 0.11 | 53 | %RPD |
| Cesium 137 | 0.0 | U | 0.020 | | 0.008 | U | 0.036 | 200 | %RPD |
| Cobalt 60 | 0.002 | U | 0.029 | | 0.0 | U | 0.0082 | 200 | %RPD |
| Lead 210 | -0.2 | U | 1.2 | | 0.13 | U | 0.82 | 677 | %RPD |
| Lead 212 | 0.233 | | 0.073 | | 0.242 | | 0.081 | 4 | %RPD |
| Lead 214 | 0.186 | | 0.061 | | 0.142 | | 0.079 | 26 | %RPD |
| Potassium 40 | 4.72 | | 0.94 | | 5.7 | | 1.0 | 18 | %RPD |
| Protactinium 231 | 0.08 | U | 0.67 | | -0.15 | U | 0.80 | 717 | %RPD |
| Radium (226) | 0.233 | J | 0.074 | | 0.40 | J | 0.11 | 53 | %RPD |
| Radium 228 | 0.09 | U | 0.13 | | 0.09 | U | 0.14 | 2 | %RPD |
| Thallium 208 | 0.037 | | 0.041 | | 0.117 | | 0.044 | 104 | %RPD |
| Thorium 234 | 0.19 | U | 0.59 | | 0.04 | U | 0.55 | 123 | %RPD |
| Uranium 235 | 0.06 | U | 0.14 | | 0.0 | U | 0.18 | 200 | %RPD |
| Uranium 238 | 0.19 | U | 0.59 | | 0.04 | U | 0.55 | 123 | %RPD |
| Batch #: | | | 1068236 (Sample) | | 1068236 (Duplicate) | | | | |
| Gamma Ra-226 & hits by EPA 901.1 MOD | | | | pCi/g | 901.1 MOD | | F1C080492-061 | | |
| Actinium 227 | -0.17 | U | 0.29 | | 0.003 | U | 0.15 | 208 | %RPD |
| Actinium 228 | 0.17 | | 0.14 | | 0.13 | U | 0.19 | 24 | %RPD |
| Bismuth 212 | 0.13 | U | 0.32 | | 0.15 | U | 0.44 | 12 | %RPD |
| Bismuth 214 | 0.39 | | 0.11 | | 0.35 | | 0.13 | 10 | %RPD |
| Cesium 137 | 0.212 | | 0.066 | | 0.289 | | 0.080 | 30 | %RPD |
| Cobalt 60 | -0.015 | U | 0.049 | | -0.02 | U | 0.61 | 3 | %RPD |
| Lead 210 | 4.0 | | 1.3 | | 2.3 | | 1.5 | 54 | %RPD |
| Lead 212 | 0.208 | | 0.089 | | 0.239 | | 0.080 | 14 | %RPD |
| Lead 214 | 0.271 | | 0.097 | | 0.34 | | 0.10 | 23 | %RPD |
| Potassium 40 | 4.9 | | 1.0 | | 3.6 | | 1.1 | 31 | %RPD |
| Protactinium 231 | -0.03 | U | 0.84 | | -0.04 | U | 1.0 | 40 | %RPD |
| Radium (226) | 0.39 | J | 0.11 | | 0.35 | J | 0.13 | 10 | %RPD |
| Radium 228 | 0.17 | | 0.14 | | 0.13 | U | 0.19 | 24 | %RPD |
| Thallium 208 | 0.111 | | 0.045 | | 0.042 | | 0.057 | 89 | %RPD |
| Thorium 234 | 0.03 | U | 0.72 | | 0.34 | U | 0.75 | 172 | %RPD |
| Uranium 235 | 0.0 | U | 0.21 | | 0.06 | U | 0.19 | 200 | %RPD |
| Uranium 238 | 0.03 | U | 0.72 | | 0.34 | U | 0.75 | 172 | %RPD |
| Batch #: | | | 1068238 (Sample) | | 1068238 (Duplicate) | | | | |

NOTE (S)

Data are incomplete without the case narrative.

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

J Result is greater than sample detection limit but less than stated reporting limit.

U Result is less than the sample detection limit.

F1C080492

Ra-226 results analyzed by EPA 901.1 MOD were calculated and reported from the 46.09 percent abundant 609.31 KeV line of Bi-214.

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO ~~XXXX~~ **FZAD** Alameda
 PO#: 1068373 *at W/In* Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |
|-------------------------|------------------|--|--|----------------------|-----------|------------|
| 1 | SME-SOI-001 | | | 2011-02-28 / 1025 | MFCJ3 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 2 | SME-SOI-002 | | | 2011-02-28 / 1030 | MFCJ4 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 3 | SME-SOI-003 | | | 2011-02-28 / 1035 | MFCJ5 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 4 | SME-SOI-004 | | | 2011-02-28 / 1040 | MFCJ7 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 5 | SME-SOI-005 | | | 2011-02-28 / 1045 | MFCJ8 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 6 | SME-SOI-006 | | | 2011-02-28 / 1050 | MFCJ9 | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 7 | SME-SOI-007 | | | 2011-02-28 / 1055 | MFCKA | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

#SMPS in LOT: 61

Follow DOD QSM 4.1

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |
|-------------------------|-------------------------|--|--|--------------------------|------------------|------------|
| 8 | SME-SOI-008 | | | 2011-02-28 / 1100 | MFCKC | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 9 | SME-SOI-009 | | | 2011-02-28 / 1105 | MFCKE | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 10 | SME-SOI-010 | | | 2011-02-28 / 1115 | MFCKH | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 11 | SME-SOI-010A | | | 2011-02-28 / 1115 | MFCKK | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 12 | SME-SOI-011 | | | 2011-02-28 / 1120 | MFCKM | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 13 | SME-SOI-012 | | | 2011-02-28 / 1125 | MFCKQ | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| 14 | SME-SOI-013 | | | 2011-02-28 / 1130 | MFCKV | SOLID |
| SAMPLE COMMENTS: | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA IN-HOUSE RAD SCREEN | 01 STANDARD TEST SET | PROT: A | WRK LOC 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X SPECIAL PROJECTS | PROT: A | WRK LOC 06 |
| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

#SMPS in LOT: 61

Follow DOD QSM 4.1

15 SME-SOI-014 2011-02-28 / 1135 MFCK0 SOLID

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 16 | SME-SOI-015 | | | 2011-02-28 / 1140 | MFCK2 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 17 | SME-SOI-016 | | | 2011-02-28 / 1145 | MFCK3 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 18 | SME-SOI-017 | | | 2011-02-28 / 1150 | MFCK5 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 19 | SME-SOI-018 | | | 2011-02-28 / 1355 | MFCK7 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 20 | SME-SOI-019 | | | 2011-02-28 / 1400 | MFCLA | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 21 | SME-SOI-020 | | | 2011-02-28 / 1405 | MFCLD | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

| | | | | | | | | | |
|-------------------------|---------------|--|----|---|-------|-------------------|---------|---------|----|
| 22 | SME-SOI-020A | | | 2011-02-28 / 1405 | MFCLE | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 23 | SME-SOI-021 | | | 2011-02-28 / 1410 | MFCLJ | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 24 | SME-SOI-022 | | | 2011-02-28 / 1415 | MFCLL | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 25 | SME-SOI-023 | | | 2011-02-28 / 1420 | MFCLM | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 26 | SME-SOI-024 | | | 2011-02-28 / 1425 | MFCLN | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 27 | SME-SOI-025 | | | 2011-02-28 / 1430 | MFCLP | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 28 | SME-SOI-026 | | | 2011-02-28 / 1435 | MFCLQ | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |
|----------|------------------|---------|---------------|-------------------|-----------|---|
|----------|------------------|---------|---------------|-------------------|-----------|---|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

| | | | | | | | | | |
|-------------------------|---------------|--|----|---|-------|-------------------|---------|---------|----|
| 29 | SME-SOI-027 | | | 2011-02-28 / 1440 | MFCLR | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 30 | SME-SOI-028 | | | 2011-02-28 / 1445 | MFCLV | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 31 | SME-SOI-029 | | | 2011-02-28 / 1450 | MFCLW | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 32 | SME-SOI-030 | | | 2011-02-28 / 1455 | MFCL1 | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 33 | SME-SOI-030A | | | 2011-02-28 / 1455 | MFCL2 | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 34 | SME-SOI-031 | | | 2011-02-28 / 1500 | MFCL3 | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 35 | SME-SOI-032 | | | 2011-02-28 / 1505 | MFCL4 | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |
|----------|------------------|---------|---------------|-------------------|-----------|---|
|----------|------------------|---------|---------------|-------------------|-----------|---|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc:

RAD

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

#SMPS in LOT: 61

Follow DOD QSM 4.1

36 SME-SOI-033 2011-02-28 / 1510 MFCL5 SOLID

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 37 | SME-SOI-034 | | | 2011-02-28 / 1515 | MFCL6 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 38 | SME-SOI-035 | | | 2011-02-28 / 1520 | MFCL8 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 39 | SME-SOI-036 | | | 2011-02-28 / 1525 | MFCL9 | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 40 | SME-SOI-037 | | | 2011-03-01 / 830 | MFCMA | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 41 | SME-SOI-038 | | | 2011-03-01 / 835 | MFCMC | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
| 42 | SME-SOI-039 | | | 2011-03-01 / 840 | MFCMH | SOLID |

SAMPLE COMMENTS:

| | | | | | | | | | |
|-------|---------------|--|----|---|----|-------------------|---------|---------|----|
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| | | | | | | |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: RAD
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

| | | | | | | | | | |
|-------------------------|---------------|--|----|---|-------|-------------------|---------|---------|----|
| 43 | SME-SOI-040 | | | 2011-03-01 / 845 | MFCML | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 44 | SME-SOI-040A | | | 2011-03-01 / 845 | MFCMP | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 45 | SME-SOI-041 | | | 2011-03-01 / 850 | MFCMR | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 46 | SME-SOI-042 | | | 2011-03-01 / 855 | MFCMW | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 47 | SME-SOI-043 | | | 2011-03-01 / 900 | MFCM0 | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 48 | SME-SOI-044 | | | 2011-03-01 / 905 | MFCM3 | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> | | | |
|-------------------------|-------------------------|--|----------------------|---|------------------|-------------------|---------|---------|----|
| 49 | SME-SOI-045 | | | 2011-03-01 / 910 | MFCM5 | SOLID | | | |
| <u>SAMPLE COMMENTS:</u> | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day in-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| <u>SAMPLE #</u> | <u>CLIENT SAMPLE ID</u> | <u>Site ID</u> | <u>Client Matrix</u> | <u>DATE/TIME SAMPLED</u> | <u>WORKORDER</u> | <u>A</u> |
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|
|-----------------|-------------------------|----------------|----------------------|--------------------------|------------------|----------|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

| | | | | | | | | | |
|-------------------------|---------------|--|----|---|-------|-------------------|---------|---------|----|
| 50 | SME-SOI-046 | | | 2011-03-01 / 915 | MFCM8 | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 51 | SME-SOI-047 | | | 2011-03-01 / 917 | MFCNC | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 52 | SME-SOI-048 | | | 2011-03-01 / 920 | MFCNE | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 53 | SME-SOI-049 | | | 2011-03-01 / 922 | MFCNG | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 54 | SME-SOI-050 | | | 2011-03-01 / 925 | MFCNK | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 55 | SME-SOI-050A | | | 2011-03-01 / 925 | MFCNL | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A | | | |
|-------------------------|------------------|--|---------------|---|-----------|-------------------|---------|---------|----|
| 56 | SME-SOI-051 | | | 2011-03-01 / 930 | MFCNP | SOLID | | | |
| SAMPLE COMMENTS: | | | | | | | | | |
| XX ZV | RAD SCREEN | SOLID, RAD SCREEN | RA | IN-HOUSE RAD SCREEN | 01 | STANDARD TEST SET | PROT: A | WRK LOC | 06 |
| XX 11 | EPA 901.1 MOD | SOLID, 901.1 MOD, Gamma Ra-226 & hits by | J9 | Dry, Grind, and Fill Geometry -> 21 day In-growth | 2X | SPECIAL PROJECTS | PROT: A | WRK LOC | 06 |

| SAMPLE # | CLIENT SAMPLE ID | Site ID | Client Matrix | DATE/TIME SAMPLED | WORKORDER | A |
|----------|------------------|---------|---------------|-------------------|-----------|---|
|----------|------------------|---------|---------------|-------------------|-----------|---|

F1C080492

CLIENT ANALYSIS SUMMARY

Storage Loc: **RAD**
 Date Received: 2011-03-08
 Analytical Due Date: 2011-04-01
 Report Due Date: 2011-04-04
 Report Type: X
 EDD Code: 00

Project Manager: EKS Quote #: 87968 SDG:
 Project: CTO XXXX Alameda
 PO#: 1068373 Report to: Lawson Bailey
 Client: 375241 Tetra Tech NUS, Inc

#SMPS in LOT: 61

Follow DOD QSM 4.1

57 SME-SOI-052 2011-03-01 / 935 MFCNT SOLID
SAMPLE COMMENTS:
 XX ZV RAD SOLID, RAD RA IN-HOUSE RAD 01 STANDARD TEST SET PROT: A WRK 06
 SCREEN SCREEN SCREEN SCREEN
 XX 11 EPA 901.1 SOLID, 901.1 MOD, Gamma Ra- J9 Dry, Grind, and Fill Geometry -> 21 2X SPECIAL PROJECTS PROT: A WRK 06
 MOD 226 & hits by day in-growth day in-growth day in-growth day in-growth

SAMPLE # CLIENT SAMPLE ID Site ID Client Matrix DATE/TIME SAMPLED WORKORDER A
 58 SME-SOI-053 2011-03-01 / 937 MFCNV SOLID
SAMPLE COMMENTS:
 XX ZV RAD SOLID, RAD RA IN-HOUSE RAD 01 STANDARD TEST SET PROT: A WRK 06
 SCREEN SCREEN SCREEN SCREEN
 XX 11 EPA 901.1 SOLID, 901.1 MOD, Gamma Ra- J9 Dry, Grind, and Fill Geometry -> 21 2X SPECIAL PROJECTS PROT: A WRK 06
 MOD 226 & hits by day in-growth day in-growth

SAMPLE # CLIENT SAMPLE ID Site ID Client Matrix DATE/TIME SAMPLED WORKORDER A
 59 SME-SOI-054 2011-03-01 / 940 MFCNX SOLID
SAMPLE COMMENTS:
 XX ZV RAD SOLID, RAD RA IN-HOUSE RAD 01 STANDARD TEST SET PROT: A WRK 06
 SCREEN SCREEN SCREEN SCREEN
 XX 11 EPA 901.1 SOLID, 901.1 MOD, Gamma Ra- J9 Dry, Grind, and Fill Geometry -> 21 2X SPECIAL PROJECTS PROT: A WRK 06
 MOD 226 & hits by day in-growth day in-growth

SAMPLE # CLIENT SAMPLE ID Site ID Client Matrix DATE/TIME SAMPLED WORKORDER A
 60 SME-SED-055 2011-03-01 / 1045 MFCN2 SOLID
SAMPLE COMMENTS:
 XX ZV RAD SOLID, RAD RA IN-HOUSE RAD 01 STANDARD TEST SET PROT: A WRK 06
 SCREEN SCREEN SCREEN SCREEN
 XX 11 EPA 901.1 SOLID, 901.1 MOD, Gamma Ra- J9 Dry, Grind, and Fill Geometry -> 21 2X SPECIAL PROJECTS PROT: A WRK 06
 MOD 226 & hits by day in-growth day in-growth

SAMPLE # CLIENT SAMPLE ID Site ID Client Matrix DATE/TIME SAMPLED WORKORDER A
 61 SME-SED-056 2011-03-01 / 1050 MFCN4 SOLID
SAMPLE COMMENTS:
 XX ZV RAD SOLID, RAD RA IN-HOUSE RAD 01 STANDARD TEST SET PROT: A WRK 06
 SCREEN SCREEN SCREEN SCREEN
 XX 11 EPA 901.1 SOLID, 901.1 MOD, Gamma Ra- J9 Dry, Grind, and Fill Geometry -> 21 2X SPECIAL PROJECTS PROT: A WRK 06
 MOD 226 & hits by day in-growth day in-growth

TestAmerica St. Louis Chain-of-Custody Record

cul 1/07

13715 Rider Trial North
Earth City, MO 63045
Phone: 314-298-8566 Fax: 314-298-8757

| Customer Information | | | | Project Information | | | | Analyses / Method Requested | | | | | | | | | | | |
|----------------------|--------------------|--------------------|-------------|---------------------|----------------|--------------|----------------|---|---|---|---|---|---|---|---|---|----------|--|--|
| Project Name | | Alameda Point | | Purchase Order | | 1068373 | | A. Gamma spec Ra-226 (21 day ingrowth), Cs137, Co60 | | | | | | | | | | | |
| PM/Quote# | | | | Work Order | | | | B. | | | | | | | | | | | |
| Company | | Tetrattech | | Bill To | | | | C. | | | | | | | | | | | |
| Send Report To: | | Lawson Bally | | Invoice Attn | | | | D. | | | | | | | | | | | |
| Address: | | 900 Trail Ridge Rd | | Address: | | | | E. | | | | | | | | | | | |
| City/State/Zip | | Aiken, SC 29803 | | City/State/Zip | | | | F. | | | | | | | | | | | |
| Phone | | 803-641-6326 | | Phone | | | | G. | | | | | | | | | | | |
| Fax | | | | Fax | | | | H. | | | | | | | | | | | |
| | | | | | | | | I. | | | | | | | | | | | |
| Sx No. | Sample Description | Sample Date | Sample Time | Sample Matrix | Container Type | Preservative | No. of Bottles | A | B | C | D | E | F | G | H | I | Comments | | |
| 1 | SME-SOI-001 | 2/28/2011 | 1025 | Soil | 250ml | | | X | | | | | | | | | 1X 500 P | | |
| 2 | SME-SOI-002 | 2/28/2011 | 1030 | Soil | 250ml | | | X | | | | | | | | | | | |
| 3 | SME-SOI-003 | 2/28/2011 | 1035 | Soil | 250ml | | | X | | | | | | | | | | | |
| 4 | SME-SOI-004 | 2/28/2011 | 1040 | Soil | 250ml | | | X | | | | | | | | | | | |
| 5 | SME-SOI-005 | 2/28/2011 | 1045 | Soil | 250ml | | | X | | | | | | | | | | | |
| 6 | SME-SOI-006 | 2/28/2011 | 1050 | Soil | 250ml | | | X | | | | | | | | | | | |
| 7 | SME-SOI-007 | 2/28/2011 | 1055 | Soil | 250ml | | | X | | | | | | | | | | | |
| 8 | SME-SOI-008 | 2/28/2011 | 1100 | Soil | 250ml | | | X | | | | | | | | | | | |
| 9 | SME-SOI-009 | 2/28/2011 | 1105 | Soil | 250ml | | | X | | | | | | | | | | | |
| 10 | SME-SOI-010 | 2/28/2011 | 1115 | Soil | 250ml | | | X | | | | | | | | | | | |
| 11 | SME-SOI-010A | 2/28/2011 | 1115 | Soil | 250ml | | | X | | | | | | | | | | | |
| 12 | SME-SOI-011 | 2/28/2011 | 1120 | Soil | 250ml | | | X | | | | | | | | | | | |

| | | | | | | | | | | |
|-------------------------------------|--|------|---------|------------------|--|------|--|----------------------|--|----------------|
| Relinquished by: <i>[Signature]</i> | | Date | 3/13/11 | Relinquished by: | | Date | | Required Turnaround: | | 21 days |
| Company Name: MSI | | Time | 0830 | Company Name: | | Time | | Airbill No.: | | 8746 1477 0570 |
| Received by: <i>[Signature]</i> | | Date | 3/14/11 | Received by: | | Date | | Date | | |
| Company Name: TASTK | | Time | 0915 | Company Name: | | Time | | Date | | |
| | | | | Company Name: | | | | Date | | |
| | | | | Company Name: | | | | Time | | |

TestAmerica St. Louis Chain-of-Custody Record

13715 Rider Trial North
 Earth City, MO 63045
 Phone: 314-298-8566 Fax: 314-298-8757

| Customer Information | | | Project Information | | | Analyses / Method Requested | | | | | | | | | | | |
|----------------------|--------------------|----------------|---------------------|---------------|--|-----------------------------|----------------|---|---|---|---|---|---|---|---|---|----------|
| Project Name | Alameda Point | Purchase Order | 1068373 | A. | Gamma spec Ra-226 (21 day ingrowth), Cs137, Co60 | | | | | | | | | | | | |
| PM/Quote# | | Work Order | | B. | | | | | | | | | | | | | |
| Company | Tetrattech | Bill To | | C. | | | | | | | | | | | | | |
| Send Report To: | Lawson Bally | Invoice Attn | | D. | | | | | | | | | | | | | |
| Address: | 900 Trail Ridge Rd | Address: | | E. | | | | | | | | | | | | | |
| City/State/Zip | Alken, SC 29803 | City/State/Zip | | F. | | | | | | | | | | | | | |
| Phone | 803-641-6326 | Phone | | G. | | | | | | | | | | | | | |
| Fax | | Fax | | H. | | | | | | | | | | | | | |
| | | | | I. | | | | | | | | | | | | | |
| Sx No. | Sample Description | Sample Date | Sample Time | Sample Matrix | Container Type | Preservative | No. of Bottles | A | B | C | D | E | F | G | H | I | Comments |
| 1 | SME-SOI-012 | 2/28/2011 | 1125 | Soil | 250ml | | | X | | | | | | | | | 1x 500 P |
| 2 | SME-SOI-013 | 2/28/2011 | 1130 | Soil | 250ml | | | X | | | | | | | | | |
| 3 | SME-SOI-014 | 2/28/2011 | 1135 | Soil | 250ml | | | X | | | | | | | | | |
| 4 | SME-SOI-015 | 2/28/2011 | 1140 | Soil | 250ml | | | X | | | | | | | | | |
| 5 | SME-SOI-016 | 2/28/2011 | 1145 | Soil | 250ml | | | X | | | | | | | | | |
| 6 | SME-SOI-017 | 2/28/2011 | 1150 | Soil | 250ml | | | X | | | | | | | | | |
| 7 | SME-SOI-018 | 2/28/2011 | 1355 | Soil | 250ml | | | X | | | | | | | | | |
| 8 | SME-SOI-019 | 2/28/2011 | 1400 | Soil | 250ml | | | X | | | | | | | | | |
| 9 | SME-SOI-020 | 2/28/2011 | 1405 | Soil | 250ml | | | X | | | | | | | | | |
| 10 | SME-SOI-020A | 2/28/2011 | 1405 | Soil | 250ml | | | X | | | | | | | | | |
| 11 | SME-SOI-021 | 2/28/2011 | 1410 | Soil | 250ml | | | X | | | | | | | | | |
| 12 | SME-SOI-022 | 2/28/2011 | 1415 | Soil | 250ml | | | X | | | | | | | | | |

| | | | | | | | |
|-----------------|--------------------|-------|--------|-----------------|--|-------|--|
| Reinquished by: | <i>[Signature]</i> | Date: | 3/3/11 | Reinquished by: | | Date: | |
| Company Name: | C MSI | Time: | 0830 | Company Name: | | Time: | |
| Received by: | <i>[Signature]</i> | Date: | 3/2/11 | Received by: | | Date: | |
| Company Name: | THSIT | Time: | 0915 | Company Name: | | Time: | |

Shipment Method: **FED EX** Airbill No.: **8746-1477-2570** Required Turnaround: 21 days

TestAmerica St. Louis Chain-of-Custody Record

13715 Rider Trail North
Earth City, MO 63045
Phone: 314-298-8566 Fax: 314-298-8757

| Customer Information | | | | Project Information | | | | Analyses / Method Requested | | | | | | | | | | | |
|------------------------------------|--------------------|----------------|-------------|---------------------|--|--------------|----------------|-----------------------------|---|---|---|------------------------------|---|---|---|---|----------|--|--|
| Project Name | Alameda Point | Purchase Order | 1068373 | A. | Gamma spec Ra-226 (21 day ingrowth), Cs137, Co60 | | | | | | | | | | | | | | |
| PIM/ Quote# | | Work Order | | B. | | | | | | | | | | | | | | | |
| Company | Tetrattech | Bill To | | C. | | | | | | | | | | | | | | | |
| Send Report To: | Lawson Bailly | Invoice Attn | | D. | | | | | | | | | | | | | | | |
| Address: | 900 Trail Ridge Rd | Address: | | E. | | | | | | | | | | | | | | | |
| City/State/Zip | Alken, SC 29803 | City/State/Zip | | F. | | | | | | | | | | | | | | | |
| Phone | 803-641-6326 | Phone | | G. | | | | | | | | | | | | | | | |
| Fax | | Fax | | H. | | | | | | | | | | | | | | | |
| | | | | I. | | | | | | | | | | | | | | | |
| Sx No. | Sample Description | Sample Date | Sample Time | Sample Matrix | Container Type | Preservative | No. of Bottles | A | B | C | D | E | F | G | H | I | Comments | | |
| 1 | SME-SOI-034 | 2/28/2011 | 1515 | Soil | 250ml | | | X | | | | | | | | | 1X500P | | |
| 2 | SME-SOI-035 | 2/28/2011 | 1520 | Soil | 250ml | | | X | | | | | | | | | | | |
| 3 | SME-SOI-036 | 2/28/2011 | 1525 | Soil | 250ml | | | X | | | | | | | | | | | |
| 4 | SME-SOI-037 | 3/1/2011 | 0830 | Soil | 250ml | | | X | | | | | | | | | | | |
| 5 | SME-SOI-038 | 3/1/2011 | 0835 | Soil | 250ml | | | X | | | | | | | | | | | |
| 6 | SME-SOI-039 | 3/1/2011 | 0840 | Soil | 250ml | | | X | | | | | | | | | | | |
| 7 | SME-SOI-040 | 3/1/2011 | 0845 | Soil | 250ml | | | X | | | | | | | | | | | |
| 8 | SME-SOI-040A | 3/1/2011 | 0845 | Soil | 250ml | | | X | | | | | | | | | | | |
| 9 | SME-SOI-041 | 3/1/2011 | 0850 | Soil | 250ml | | | X | | | | | | | | | | | |
| 10 | SME-SOI-042 | 3/1/2011 | 0855 | Soil | 250ml | | | X | | | | | | | | | | | |
| 11 | SME-SOI-043 | 3/1/2011 | 0900 | Soil | 250ml | | | X | | | | | | | | | | | |
| 12 | SME-SOI-044 | 3/1/2011 | 0905 | Soil | 250ml | | | X | | | | | | | | | | | |
| Reinquished by: <i>[Signature]</i> | | | | Date: 3/3/11 | | | | Airbill No.: 8746 1477 2570 | | | | Required Turnaround: 21 days | | | | | | | |
| Company Name: MSI | | | | Time: 0830 | | | | Date: [Blank] | | | | Reinquished by: [Blank] | | | | | | | |
| Received by: <i>[Signature]</i> | | | | Date: 03/03/11 | | | | Date: [Blank] | | | | Company Name: [Blank] | | | | | | | |
| Company Name: <i>[Signature]</i> | | | | Time: 0915 | | | | Date: [Blank] | | | | Received by: [Blank] | | | | | | | |
| Company Name: <i>[Signature]</i> | | | | Time: [Blank] | | | | Date: [Blank] | | | | Company Name: [Blank] | | | | | | | |

TestAmerica St. Louis Chain-of-Custody Record

13715 Rider Trail North
 Earth City, MO 63045
 Phone: 314-298-8566 Fax: 314-298-8757

| Customer Information | | | Project Information | | | | Analyses / Method Requested | | | | | | | | | | | |
|----------------------|--------------------|----------------|---------------------|--|----------------|------------------|-----------------------------|-----------|---|------|---|----------------------|---|---------|---|------|----------|--|
| Project Name | Alameda Point | Purchase Order | 1068373 | A. Gamma spec Ra-226 (21 day ingrowth), Cs-137, Co60 | | | | | | | | | | | | | | |
| PM/Quote# | | Work Order | | B. | | | | | | | | | | | | | | |
| Company | Tetrattech | Bill To | | C. | | | | | | | | | | | | | | |
| Send Report To: | Lawson Bailly | Invoice Attn | | D. | | | | | | | | | | | | | | |
| Address: | 900 Trail Ridge Rd | Address: | | E. | | | | | | | | | | | | | | |
| City/State/Zip | Aiken, SC 29803 | City/State/Zip | | F. | | | | | | | | | | | | | | |
| Phone | 803-641-6326 | Phone | | G. | | | | | | | | | | | | | | |
| Fax | | Fax | | H. | | | | | | | | | | | | | | |
| | | | | I. | | | | | | | | | | | | | | |
| Sx No. | Sample Description | Sample Date | Sample Time | Sample Matrix | Container Type | Preservative | No. of Bottles | A | B | C | D | E | F | G | H | I | Comments | |
| 1 | SME-SOI-045 | 3/1/2011 | 0910 | Soil | 250ml | | | X | | | | | | | | | 1X500P | |
| 2 | SME-SOI-046 | 3/1/2011 | 0915 | Soil | 250ml | | | X | | | | | | | | | | |
| 3 | SME-SOI-047 | 3/1/2011 | 0917 | Soil | 250ml | | | X | | | | | | | | | | |
| 4 | SME-SOI-048 | 3/1/2011 | 0920 | Soil | 250ml | | | X | | | | | | | | | | |
| 5 | SME-SOI-049 | 3/1/2011 | 0922 | Soil | 250ml | | | X | | | | | | | | | | |
| 6 | SME-SOI-050 | 3/1/2011 | 0925 | Soil | 250ml | | | X | | | | | | | | | | |
| 7 | SME-SOI-050A | 3/1/2011 | 0925 | Soil | 250ml | | | X | | | | | | | | | | |
| 8 | SME-SOI-051 | 3/1/2011 | 0930 | Soil | 250ml | | | X | | | | | | | | | | |
| 9 | SME-SOI-052 | 3/1/2011 | 0935 | Soil | 250ml | | | X | | | | | | | | | | |
| 10 | SME-SOI-053 | 3/1/2011 | 0937 | Soil | 250ml | | | X | | | | | | | | | | |
| 11 | SME-SOI-054 | 3/1/2011 | 0940 | Soil | 250ml | | | X | | | | | | | | | | |
| 12 | N/A | | | | | | | | | | | | | | | | | |
| Relinquished by: | | Date | | Time | | Airbill No.: | | 8746 1477 | | 2570 | | Required Turnaround: | | 21 days | | | | |
| Company Name: | | Date | | Time | | Relinquished by: | | | | | | Date | | Time | | | | |
| Received by: | | Date | | Time | | Company Name: | | | | | | Received by: | | Date | | Time | | |
| Company Name: | | Date | | Time | | Received by: | | | | | | Company Name: | | Date | | Time | | |

TestAmerica St. Louis Chain-of-Custody Record

13715 Rider Trial North
 Earth City, MO 63045
 Phone: 314-298-8566 Fax: 314-298-8757

| Customer Information | | | Project Information | | | Analyses / Method Requested | | | | | | | | | | | |
|-------------------------------------|--------------------|----------------|---------------------|---|----------------|-----------------------------|----------------|---|------------------------------|---|---|------------------|---|---|------|---|----------|
| Project Name | Alameda Point | Purchase Order | 1068373 | A. Gamma spec Ra-226 (21 day ingrowth), Cs137, Co60 | | | | | | | | | | | | | |
| PM/ Quote# | | Work Order | | B. | | | | | | | | | | | | | |
| Company | Tetratech | Bill To | | C. | | | | | | | | | | | | | |
| Send Report To: | Lawson Baily | Invoice Attn | | D. | | | | | | | | | | | | | |
| Address: | 900 Trail Ridge Rd | Address: | | E. | | | | | | | | | | | | | |
| City/State/Zip | Aiken, SC 29803 | City/State/Zip | | F. | | | | | | | | | | | | | |
| Phone | 803-641-6326 | Phone | | G. | | | | | | | | | | | | | |
| Fax | | Fax | | H. | | | | | | | | | | | | | |
| | | | | I. | | | | | | | | | | | | | |
| Sr No. | Sample Description | Sample Date | Sample Time | Sample Matrix | Container Type | Preservative | No. of Bottles | A | B | C | D | E | F | G | H | I | Comments |
| 1 | SME-SED-055 | 3/1/2011 | 1045 | Sediment | 250ml | | | X | | | | | | | | | 1X500 P |
| 2 | SME-SED-056 | 3/1/2011 | 1050 | Sediment | 250ml | | | X | | | | | | | | | ↓ |
| 3 | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | |
| Relinquished by: <i>[Signature]</i> | | | Date: 3/3/11 | | | Airbill No.: 8746 1477 2110 | | | Required Turnaround: 21 days | | | Relinquished by: | | | Date | | |
| Company Name: <i>[Signature]</i> | | | Time: 0830 | | | FED EX | | | Relinquished by: | | | Company Name: | | | Time | | |
| Received by: <i>[Signature]</i> | | | Date: 3/3/11 | | | MSI | | | Received by: | | | Date | | | Time | | |
| Company Name: <i>[Signature]</i> | | | Time: 0915 | | | TH-57 | | | Company Name: | | | Date | | | Time | | |



Lot #(s): FIC080492

CONDITION UPON RECEIPT FORM

Client: TETRA TECH

Quote No: 87968

COC/RFA No: N/A

Initiated By: NVD

404

Date: 3/8/11 Time: 0915

Shipping Information

Shipper: FedEx UPS DHL Courier Client Other: _____ Multiple Packages: Y N

| Shipping # (s):* | Sample Temperature (s):** |
|--------------------------|---------------------------|
| 1. <u>7957 5523 5347</u> | 1. <u>AMBIENT</u> |
| 2. <u>7957 5523 5336</u> | 2. <u>AMBIENT</u> |
| 3. <u>8746 1477 2510</u> | 3. <u>AMBIENT</u> |
| 4. _____ | 4. _____ |
| 5. _____ | 5. _____ |

*Numbered shipping lines correspond to Numbered Sample Temp lines

**Sample must be received at 4°C ± 2°C. If not, note contents below. Temperature variance does NOT affect the following: Metals-Liquid or Rad tests- Liquid or Solids

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

| | | | |
|--|--|---|--|
| 1. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | Are there custody seals present on the cooler? | 8. <input type="checkbox"/> Y <input checked="" type="checkbox"/> N | Are there custody seals present on bottles? |
| 2. <input type="checkbox"/> Y <input checked="" type="checkbox"/> N <input type="checkbox"/> N/A | Do custody seals on cooler appear to be tampered with? | 9. <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A | Do custody seals on bottles appear to be tampered with? |
| 3. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | Were contents of cooler frisked after opening, but before unpacking? | 10. <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A | Was sample received with proper pH? (If not, make note below) |
| 4. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | Sample received with Chain of Custody? | 11. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | Sample received in proper containers? |
| 5. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> N/A | Does the Chain of Custody match sample ID's on the container(s)? | 12. <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A | Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below) |
| 6. <input type="checkbox"/> Y <input checked="" type="checkbox"/> N | Was sample received broken? | 13. <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A | Was Internal COC/Workshare received? |
| 7. <input checked="" type="checkbox"/> Y <input type="checkbox"/> N | Is sample volume sufficient for analysis? | 14. <input type="checkbox"/> Y <input type="checkbox"/> N <input checked="" type="checkbox"/> N/A | Was pH taken by original TestAmerica lab? |

¹ For DOE-AL (Pantox, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX and soils.

Notes:

Corrective Action:

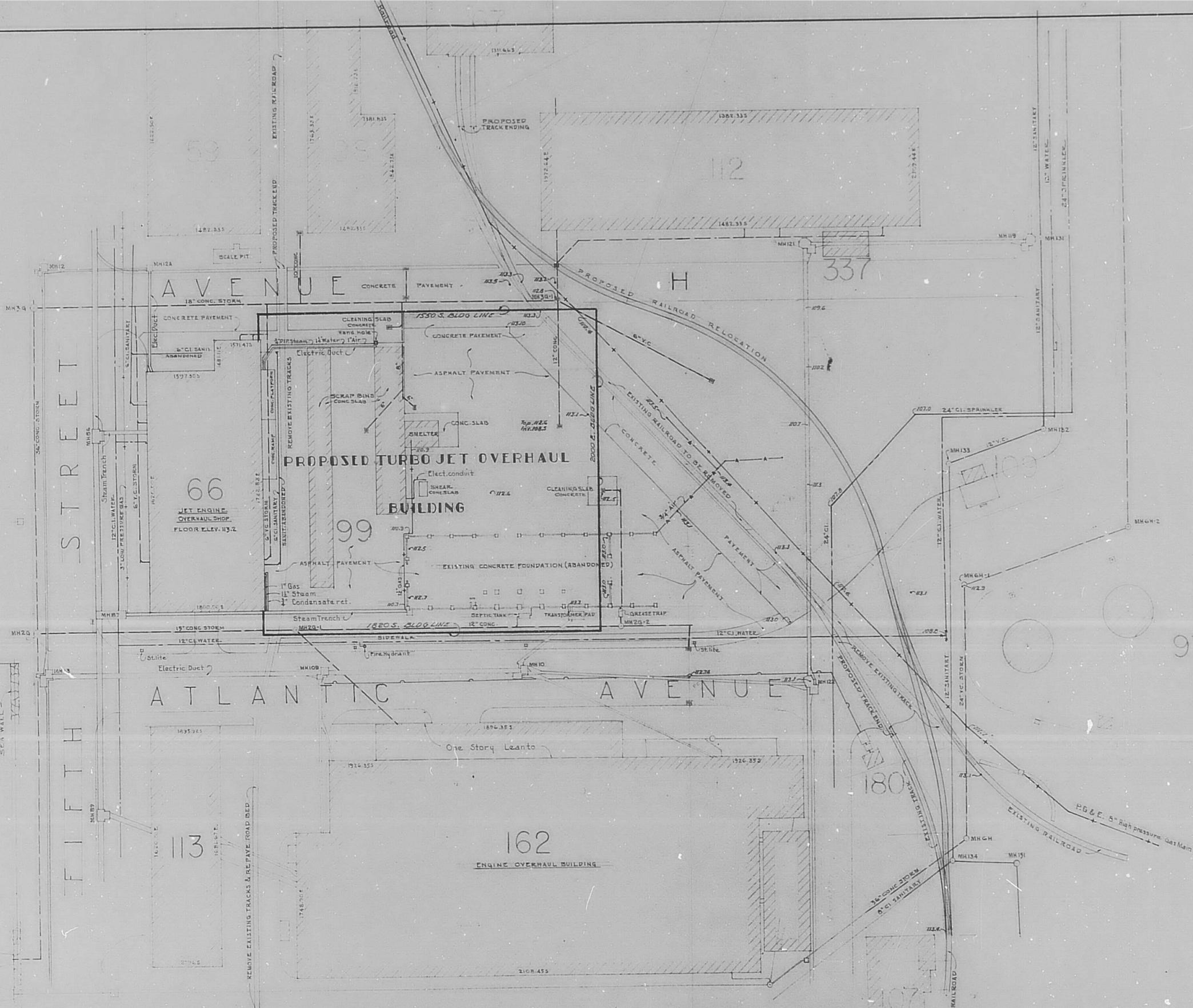
Client Contact Name: _____
 Sample(s) processed "as is"
 Sample(s) on hold until:
 Project Management Review:

Informed by: _____

If released, notify: _____
 Date: 3/16/11

THIS FORM MUST BE COMPLETED AT THE TIME THE ITEMS ARE BEING CHECKED IN. IF ANY ITEM IS COMPLETED BY SOMEONE OTHER THAN THE INITIATOR, THEN THAT PERSON IS REQUIRED TO APPLY THEIR INITIAL AND THE DATE NEXT TO THAT ITEM.

ATTACHMENT 1
1949 PROPOSED TURBO JET OVERHAUL FACILITY DRAWING



SYMBOLS

- A — AIR
- S — STORM DRAIN
- SS — SANITARY SEWER
- F — FRESH WATER
- S — SPRINKLER SYSTEM
- G — GAS
- B — GASOLINE
- S — STEAM TRENCH
- E — ELECTRIC DUCT

NOTE: Elevations for utilities are at top of pipes, ducts, etc. and all others are at the surface.

LIST OF STRUCTURES

| No. | Use |
|-----|--------------------------------------|
| 59 | PAINT AND OIL STOREHOUSE |
| 66 | JET ENGINE OVERHAUL SHOP |
| 67 | LOCOMOTIVE AND CRANE SHED |
| 97 | A, B, C, D GASOLINE STORAGE TANKS |
| 98 | BARREL SHED |
| 99 | SCRAP BINS |
| 107 | CAFETERIA |
| 109 | GASOLINE TRUCK LOADING STAND |
| 112 | TRANSIT SALVAGE SHED |
| 113 | JET ENGINE OVERHAUL SHOP |
| 162 | ENGINE OVERHAUL BUILDING |
| 175 | TRANSFORMER HOUSE (GASOLINE STORAGE) |
| 180 | GASOLINE BOOSTER PUMP STATION |
| 337 | STORAGE (ARMCO HUT) |

AUG 13 1949

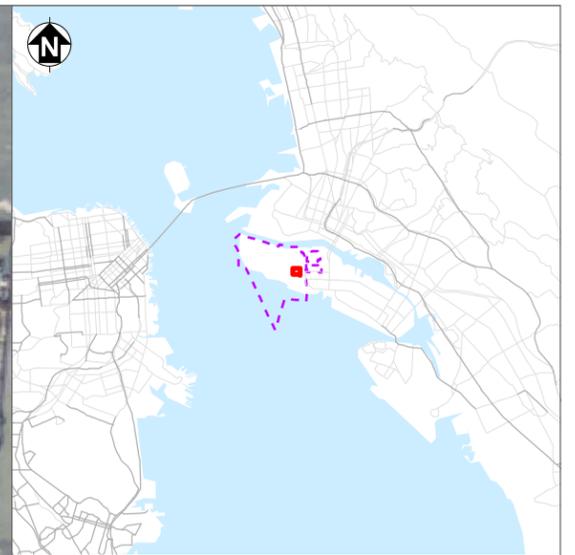
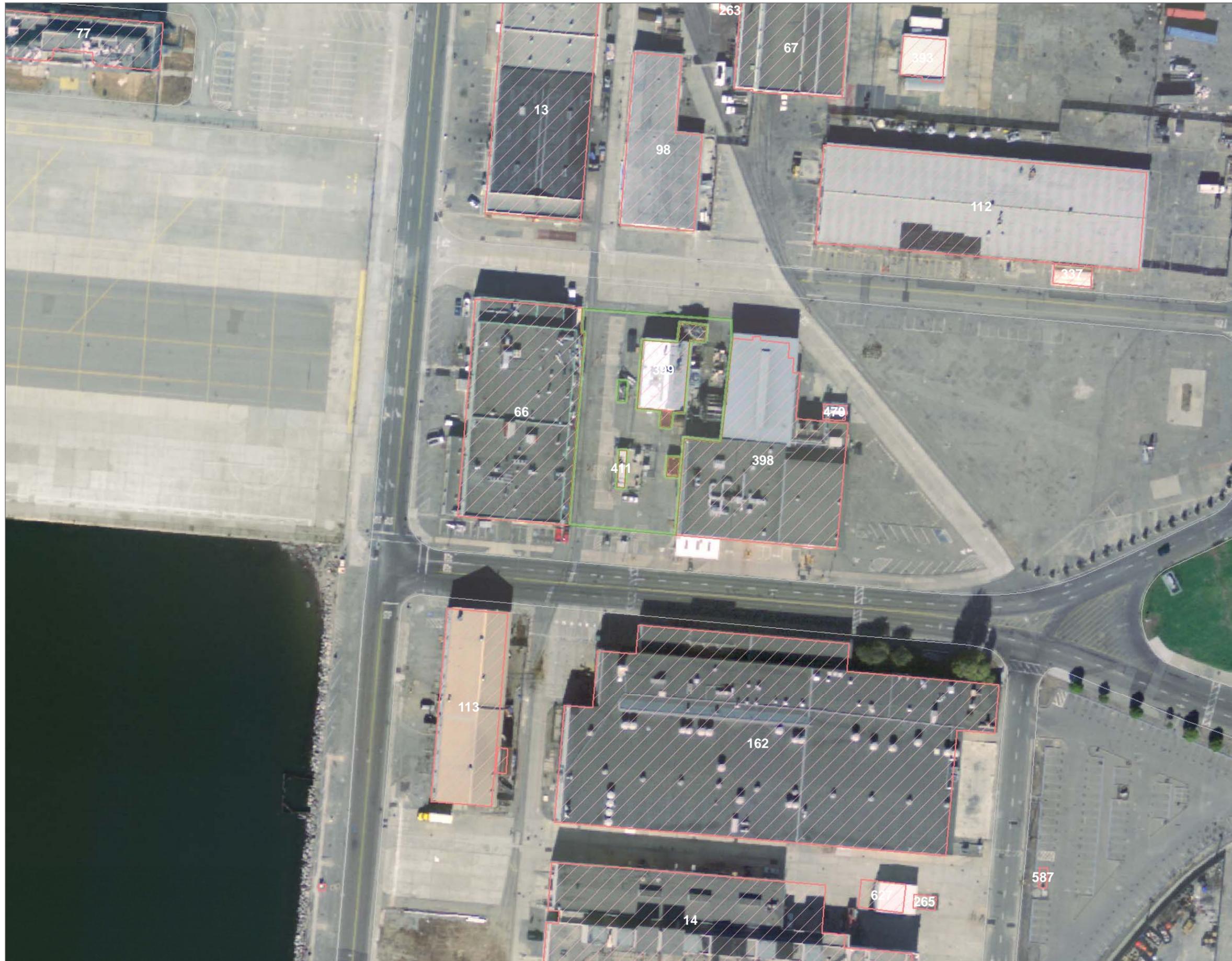
PWC 63494

| | | | |
|-----------------------------------|------|--|----|
| REVISION | DATE | BRIEF | BY |
| DRAWN BY <i>R. W. [unclear]</i> | | | |
| TRACED BY | | | |
| CHECKED BY <i>S. A. [unclear]</i> | | | |
| CHIEF DFMM | | | |
| IN CHARGE <i>[unclear]</i> | | | |
| P. W. DRAWING No. | | APPROVED <i>11 April 1949</i> | |
| 5090 | | <i>[Signature]</i> PUBLIC WORKS OFFICER | |

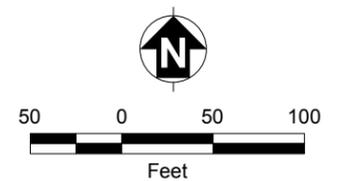
SCALE 1" = 40'

Encl. (A)

**ATTACHMENT 2
AERIAL PHOTOGRAPH OVERLAY CURRENT BUILDINGS AND THE FOOTPRINT
OF THE FORMER SMELTER**



- Former Smelter Area
- Road or Airfield
- Building
- Water
- Former NAS Alameda Boundary



Alameda Point, Alameda, California
 U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 2
FORMER SMELTER AREA
CIRCA 2004