TETRA TECH

January 22, 2014

Mr. Randy Schademann
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Lenexa, Kansas 66219

Subject: **Removal Action Report, Revision 01**
Radiation – Standard Products Site, Inc. (Former), Wichita, Kansas
CERCLIS ID KSN000705966
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01; Task Order No. 0299
Task Monitor: Randy Schademann, On-Scene Coordinator

Dear Mr. Schademann:

Tetra Tech, Inc. is submitting the attached revised Removal Action report regarding the Radiation - Standard Products, Inc. (Former) site in Wichita, Kansas. If you have any questions or comments, please contact the Project Manager at (816) 412-1775.

Sincerely,

Robert Monnig, PE
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosure

cc: Roy Crossland, START Project Officer (cover letter only)

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REMOVAL ACTION REPORT
REVISION 01

RADIATION – STANDARD PRODUCTS, INC. SITE (FORMER)
WICHITA, KANSAS

CERCLIS ID KSN000705966

Superfund Technical Assessment and Response Team (START) 3
Contract No. EP-S7-06-01, Task Order No. 0299

Prepared For:

U.S. Environmental Protection Agency
Region 7
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January 22, 2014

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1.0 INTRODUCTION

The Tetra Tech, Inc. Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to assist with a removal action (RA) at Radiation – Standard Products, Inc., (Standard Products) in Wichita, Sedgwick County, Kansas. The former Standard Products facility was the location of an aircraft instrument repair shop in the 1950s and 1960s (Kansas Department of Health and Environment [KDHE] 2006). An investigation at the site by KDHE, reported in March 2006, identified radium-226 impacted soil on the former Standard Products site (KDHE 2006). Followup removal assessments by EPA identified radium-226 contamination in soils and elevated gamma readings in the interior of the on-site building (Tetra Tech EM Inc. [Tetra Tech] 2009). Based on information obtained during those investigations, EPA determined that a hazardous substance was present at levels that posed an imminent threat to human populations, thereby warranting a time-critical RA.

START activities for this RA included:

- Guiding excavation of radium-impacted soil and materials.
- Conducting perimeter air monitoring for particulates and airborne radioactive material during soil excavation.
- Conducting a Final Status Survey (FSS) in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (EPA 2000), including acquisition of real-time monitoring data and collection of post-removal samples for laboratory analysis for radionuclides.
- Assessing FSS data, in accordance with MARSSIM, to determine if areas could be released for unrestricted use.
- Documenting the removal activities.

Robert Monnig was the START Project Manager for the RA, and Randy Schademann was the EPA On-Scene Coordinator (OSC) for the project.

2.0 SITE DESCRIPTION AND BACKGROUND

Section 2.0 describes the site, summarizes previous investigations, and cites the EPA-specified RA level for radium-226.

2.1 SITE DESCRIPTION

The Standard Products site is in Wichita, Kansas, in the northwest quarter of Section 28, Township 27 South, Range 1 East (see Appendix A, Figure 1). The several parcels that comprise the site include 650 East Gilbert Street, the location of the former Standard Products facility, and adjoining parcels where radiologically impacted soil has been identified (an alley, a private residence at 920 S. St. Francis Street, and the Guadalupe Clinic at 940 S. St. Francis Street) (see Attachment A, Figure 2). Radium-impacted soil at the 920 S. St. Francis Street residential parcel was addressed during a RA in July 2009. The approximate center of the 650 East Gilbert Street parcel is at the following coordinates: 37.674880 degrees north latitude and 97.330500 degrees west longitude. The 650 E. Gilbert Street parcel occupies approximately 2.67 acres and is the location of a single 11,000-square-foot warehouse currently occupied by Phillips Southern Electric. The 940 S. St. Francis Street parcel is a single-story brick building occupied by the Guadalupe Clinic, a community healthcare clinic.

2.2 PREVIOUS INVESTIGATIONS

KDHE performed a Unified Focus Assessment (UFA) at the Standard Products site in 2006. An initial screening survey of the property by KDHE identified several areas with total gamma radiation readings above background. The maximum screening result in this area was 17,000 microRoentgens per hour (μR/hr). Laboratory results indicated a maximum radium-226 detection of 81,800 picoCuries per gram (pCi/g) (KDHE 2006).

In February 2009, EPA tasked START to conduct a Removal Site Evaluation (RSE) to determine the extent of radium contamination (and associated radionuclides) in surface and subsurface soils at the former Standard Products facility. RSE activities at the site in March 2009 included a surface soil gamma survey and collection of surface and subsurface soil samples. During the RSE activities, areas with total gamma radiation readings above background were identified at several areas of the site (see Appendix A, Figure 3). Laboratory results indicated a maximum radium-226 detection of 302 pCi/g in a soil sample collected at the 650 East Gilbert Street parcel (Tetra Tech 2009).

Based on the results of investigations by KDHE and EPA/START, an RA was determined warranted to reduce the risk to occupants of the site. For the site, EPA established a time-critical RA level for

radium-226 of 6.87 pCi/g in soil (EPA 2012). This RA level is the health-based surface soil standard for radium-226 of 5 pCi/g developed under the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 (as specified in 40 *Code of Federal Regulations* [CFR] Part 192) plus the background radium-226 concentration at the site of 1.87 pCi/g established via previous KDHE and EPA sampling (EPA 2012).

3.0 REMOVAL ACTIVITIES

In July/August 2012 and June 2013, excavation of radiologically impacted material and site restoration for this RA proceeded under the EPA Region 7 Emergency Response and Removal Services (ERRS) contract. The EPA ERRS contractor was Environmental Restoration (ER). Photographic documentation of the removal activities is in Appendix B. Field activities for the RA are documented in a field logbook, in Appendix C. Radium-impacted soil at the 920 S. St. Francis Street parcel was addressed during a RA in July 2009 (see Tetra Tech 2010).

3.1 EXCAVATION AND ASSESSMENTS SUPPORTING REMOVAL ACTION

Excavation of radium-impacted soils at the site began in July 2012 and continued into August 2012. In addition, followup activities in June 2013 addressed a small area of radium-impacted soil that had not been removed during the July/August 2012 activities. During excavation activities, START re-surveyed previously identified areas of elevated gross gamma activity using a Ludlum digital survey meter paired with a Ludlum Model 44-10 or Ludlum Model 44-20 sodium iodide (NaI) scintillation detector. Real-time surveying occurred by scanning the surface soil in a serpentine pattern, moving at approximately 1 to 2 feet per second, with the detector held approximately 6 inches above ground surface. These scanning measurements were used to guide the excavation of impacted material. The ERRS contractor excavated impacted material using a track-mounted excavator and hand shovels. Excavation of contaminated areas generally proceeded until gross gamma activity readings using the Ludlum 44-10 or 44-20 detector suggested that the EPA-established action level for radium-226 of 6.87 pCi/g had been achieved. In addition, EPA measured soil samples in a shielded “well” composed of lead bricks which provided additional information used to guide the excavation. As described in Section 4.0, post-excavation soil samples were collected for laboratory analysis, and the data were compared to the RA level of 6.87 pCi/g and evaluated using statistical methods provided in MARSSIM.

Materials excavated in August and July 2012 were staged on site, and then loaded onto rail cars, and transported by rail to the EnergySolutions disposal facility near Clive, Utah. Materials excavated in June 2013 were loaded directly into trucks and transported to the U.S. Ecology disposal facility in Grandview, Idaho.

The cleanup resulted in excavation at several areas of the property (see Appendix A, Figure 4). Table 1 and the following text describe the removal areas.

TABLE 1

SUMMARY OF REMOVAL AREAS
RADIATION – STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Excavated Area	Area Description	Aerial Extent of Excavation	Approximate Depth
Area 1	Unpaved, outdoor area of 650 E. Gilbert St. where radium-impacted soils had been temporarily stockpiled before loading onto railcars.	10,500 ft^2 (975 m^2)	Up to 0.5 ft
Area 2	Unpaved, outdoor areas of 650 E. Gilbert St. with radium-impacted surface soil.	150 ft^2 (14 m^2)	1 – 2 ft
Area 3		2,200 ft^2 (204 m^2)	2 – 3 ft
Area 4		1,056 ft^2 (98 m^2)	1 – 2 ft
Area 5		2,600 ft^2 (242 m^2)	1 – 2 ft
Area 6	Area in alley between 920 St. Francis St. South residence and 650 E. Gilbert St. with radium-impacted surface soil.	260 ft^2 (24 m^2)	1 – 2 ft
Area 7	Unpaved, outdoor area of 650 E. Gilbert St. with radium-impacted surface soil.	1,200 ft^2 (111 m^2)	1 – 1.5 ft
Area 8	Asphalt-paved alley and parking area used by the Guadalupe Clinic (940 St. Francis St. South). Radium-impacted soils were identified beneath the asphalt pavement.	900 ft^2 (84 m^2)	0.5 – 2 ft
Area 9	Asphalt-paved alley near entrance to Guadalupe Clinic parking (940 St. Francis St. South). Radium-impacted soils were identified in a small discrete area beneath the asphalt pavement.	24 ft^2 (2 m^2)	1 – 2 ft
Area 10	Small discrete area of elevated gamma readings that was addressed by removing a small amount of debris from the surface of concrete pavement.	*Not applicable (small debris on concrete surface)*	
Area 11	Area of 650 E. Gilbert St. with radium-impacted shallow soil beneath paved concrete.	50 ft^2 (5 m^2)	1 – 2 ft
Area 12	Area of 650 E. Gilbert St. with radium-impacted soil beneath concrete paving. Impacted soil was encountered to a depth of approximately 14 feet below the surface.	300 ft^2 (28 m^2)	14 ft
Area 13	A small concrete vault associated with elevated gamma readings found beneath the finished concrete slab of the 650 E. Gilbert St. warehouse building.	9 ft^2 (1 m^2)	3 ft
Area 14	Area of 650 E. Gilbert St. with radium-impacted shallow soil beneath paved concrete.	160 ft^2 (15 m^2)	2 – 4 ft

Notes:

ft feet
ft^2 square feet
m^2 square meters

Areas of Shallow Surface Soil Excavation: Areas 1 through 9, 11, 13, and 14

These exterior areas exhibited elevated gamma activity and were associated with relatively shallow soils (up to 4 feet) impacted with radium-226. These areas were addressed by removing impacted-soil with a track-mounted excavator until gross gamma activity readings suggested the action level had been achieved, resulting in excavations ranging in depths from 0.5 to 4 feet.

Area of Small Debris Removal: Area 10

Area 10 was a small area on the concrete pavement at the south side of the 650 E. Gilbert Street warehouse building that exhibited elevated gamma readings. Upon removing some small debris from the surface of the pavement, gamma readings diminished to background. Because no elevated gamma readings remained and the ground surface consisted of concrete pavement, no soil samples were collected from this area.

Area of Deep Soil Excavation: Area 12

Area 12 is an approximately 15- by 20-foot rectangular area at the south side of the 650 E. Gilbert Street warehouse building that had exhibited elevated gamma readings at the ground surface. In addition, previous soil sampling had indicated that radium-impacted soil in this area extended to a depth of 5 feet or more. During the July/August 2012 removal, radium-impacted soil from this area was removed using a track-mounted excavator until gross gamma activity readings suggested that the action level had been achieved, resulting in a 14-foot-deep excavation.

Interior Area of Removal: Area 13

This interior area was identified during RSE activities as a small discrete area of elevated gamma readings at the approximate center of the current 650 E. Gilbert St. warehouse building in a hallway near unfinished office spaces. A maximum dose rate reading of 42 µR/hr had been measured with a Ludlum Model 192 microR placed on the surface of the concrete hallway floor. During the RA, an approximately 2.5- by 3-foot section of concrete flooring in the hallway over the area of elevated gamma activity was removed. Removal of the concrete floor revealed a small (approximately 1.5 by 1.5 by 1.5 feet deep), below-grade, abandoned concrete vault that possibly had been associated with the waste plumbing system of the razed building used by Standard Products, Inc. (see Appendix B, Photographs 3 and 4). A gray granular material, with a consistency similar to floor dry granular absorbent, was observed inside the vault, and an approximately 4-inch-diameter pipe penetrated one wall of the vault. Impacted material was removed by wetting surfaces with water (to avoid generating dust), breaking portions of the concrete using a hammer chisel, and removing portions of the vault in pieces. Also removed were an

approximately 2-foot section of the pipe that penetrated the concrete vault, and some surrounding soil. EPA monitored the progress of the excavation using a Ludlum Model 44-10 detector and a Ludlum Model 192 microR, and observed that the highest gamma readings appeared to be associated with the gray granular material, which was removed. Removal of the concrete vault and surrounding soils continued until it appeared additional removal would undermine the structural integrity of the concrete floor and nearby interior walls.

Before backfilling the excavation, EPA obtained field measurements and collected one soil sample from soil adjacent to the vault (sample INSIDE PIT 3') to characterize the final excavation. Real-time measurements recorded by EPA indicated that the cleanup had substantially reduced gross gamma activity. Following the excavation, EPA observed a maximum dose rate reading of approximately 100 µR/hr using a Ludlum Model 192 microR detector held on contact with remaining vault walls. The excavation was then filled with concrete and the concrete flooring was repaired. START obtained post-excavation dose rate readings of the area using a Ludlum Model 192 microR held at waist level. Waist-level dose rate readings over the excavated area ranged from approximately 6 to 9 µR/hr, and were consistent with a background reading of approximately 8 µR/hr obtained inside the warehouse building near the west pedestrian door.

3.2 AIR MONITORING

During the excavation activities, EPA and START conducted air monitoring to measure airborne concentrations of radioactive material using RADeCO® Model H-810 high-volume air samplers and a Ludlum® Model 3030 Alpha/Beta Sample Counter. Air samplers positioned near excavation and soil handling activities ran continuously during those activities. Paper filter samples were collected each day from the samplers and analyzed for radiological contamination by START and EPA using the Ludlum® Model 3030 Alpha/Beta Sample Counter. Based on the measurements obtained from the filter samples, airborne radium concentrations did not exceed 9.0E-13 milliCuries per millimeter (mCi/mL), a conservative action level EPA had selected for the site that would result in an annual dose well under the 100 mrem annual dose limit for members of the public. This airborne radium concentration of 9.0E-13 mCi/mL is listed in 10 CFR 20, Appendix B, Table 2, Column 1, and is equivalent to the radium-226 concentration which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 50 mrem.

3.3 SITE RESTORATION

Exterior excavated areas were backfilled with soil, and the surfaces of paved areas were repaired. START screened the backfill material for gross gamma activity with the Ludlum 44-10 NaI detector and obtained readings consistent with background activity. A sample was collected from the soil backfill and submitted to TestAmerica in Earth City, Missouri, for analyses for volatile organic compounds via EPA Method 8260B, semivolatile organic compounds via EPA Method 8270C, Resource Conservation and Recovery Act metals via EPA Methods 6010B and 7471A, and radionuclides via gamma spectroscopy. No analyte concentration in the soil sample exceeded an analyte's most stringent KDHE Tier 2 risk-based cleanup value for residential scenarios established in *Risk-Based Standards for Kansas RSK Manual – 5th Version* (KDHE 2010). A summary of the analytical data is in Appendix D – Table D-1. The complete analytical laboratory report is in Appendix F.

3.4 POST-EXCAVATION GAMMA SURVEY

On June 26, 2013, a post-excavation gamma survey occurred using a Ludlum Model 44-20 NaI scintillation detector and the Rapid Assessment Tool Software (RATS) system to obtain the survey data. RATS is a software program developed by the EPA Region 5 Field Environmental Decision Support (FIELDS) Team that integrates real-time data from global positioning system (GPS) software and environmental monitoring devices. RATS stores the sample data with the GPS locations in a file and plots the results on a dynamic, two-dimensional display in real time. To conduct the survey, the surveyor walked over the excavated areas in a forward direction at 1 to 2 feet per second while swinging the detector back and forth, and holding the detector approximately 6 inches above the ground, thus generally covering a serpentine pattern over the ground surface. Figure 5 in Appendix A presents the post-excavation gamma survey results.

The gamma survey provides data in units of counts per minute (cpm) that can indicate relative rates of gamma exposure. Although such data can be compared to similar types of exposure rate measurements (such as a background gross gamma exposure rates), the data cannot directly indicate a surface soil radionuclide concentration, and therefore are not directly compared to the site's radium-226 RA level (a soil concentration) of 6.87 pCi/g. (*Note: Analytical results from the post-excavation soil samples submitted for laboratory analysis are directly comparable to the RA level; these results are evaluated in Section 4.0*). The gamma survey data can, however, provide a general indication of the effectiveness of the RA, particularly with respect to reducing overall gamma exposure to occupants of the site. A comparison of the pre- and post-gamma survey results (presented in Appendix A, Figures 4 and 5,

respectively) indicates that the RA resulted in significant reductions in gamma exposure rates throughout the site. In contrast to what Figure 4 shows (pre-excavation gamma survey data), only a few of the post-excavation gamma survey measurements shown on Figure 5 exceed twice background. These post-excavation measurements of above-background gamma activity are restricted to small, isolated areas (less than a few square meters), and not expected to pose any significant health risk to occupants of the site. Overall, the post-excavation gamma survey indicates that the RA effectively reduced the previously identified areas of elevated gross gamma activity.

4.0 FINAL STATUS SURVEY

A final status survey (FSS) is performed to demonstrate that residual radioactivity in a specified area satisfies predetermined criteria for release for unrestricted use, or where appropriate, for use with designated limitations. EPA has established a time-critical RA level for radium-226 of 6.87 pCi/g (EPA 2012); criteria for release for unrestricted use are derived from this RA level.

4.1 DERIVED CONCENTRATION GUIDELINE LEVELS

The FSS provides data to compare to derived concentration guideline levels (DCGL). The DCGLs are radionuclide-specific concentrations derived from the criterion for release of the site for unrestricted use (referred throughout as "release criterion"). MARSSIM defines two categories of DCGLs based on the area of contamination. If the residual radioactivity is evenly distributed over a large area, MARSSIM looks at the average activity over the entire area. This DCGL—called the $DCGL_w$— is derived based on an average concentration over a large area (or "wide" area), and is used in the statistical tests described in MARSSIM. Conversely, if the residual radioactivity appears as small areas of elevated activity (i.e., hot spots) within a larger area, MARSSIM considers the results of individual measurements. This DCGL—called the $DCGL_{EMC}$—is defined as the DCGL used for the elevated measurement comparison (EMC). Typically, specific $DCGL_{EMC}$ values are derived using site-specific parameters for the specific area of concern. MARSSIM describes an elementary relationship between the DCGLs: the $DCGL_{EMC}$ equals the $DCGL_w$ times an area factor. The area factor is the magnitude by which the concentration within a small area of elevated activity (i.e., a hot spot) can exceed the $DCGL_W$ while maintaining compliance with the release criterion.

4.2 SURVEY DESIGN

This section summarizes the survey design parameters defined in the *Final Status Survey Sampling Design Plan* developed for the site and included in the Quality Assurance Project Plan (QAPP) (Tetra Tech 2012), and describes deviations from the QAPP.

Residual Radioactivity Limits

The survey was designed to provide post-excavation data to demonstrate that all radiological parameters do not exceed the established $DCGL_W$ plus background. The $DCGL_W$ at the site was 5 pCi/g for radium-226 in surface soil. Again, under MARSSIM, the $DCGL_W$ refers to the level of radioactivity above appropriate background levels; therefore, the numerical value of the $DCGL_W$ does not include background activity (EPA 2000). Although the survey was designed to provide data that could be compared directly to the $DCGL_W$, an alternative method of comparison—the "elevated measurement comparison" (which uses $DCGL_{EMC}$ values derived from $DCGL_W$ values)—was considered a more relevant method of comparison for some areas of the site where relatively small excavation areas resulted from the cleanup.

Survey Units

Based on the results of real-time surveying before and during the excavation activities, 12 discrete areas were classified and assessed as Class 1 survey units. These Class 1 survey units consist of those exterior areas where soil excavation occurred, and include:

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 11
- Area 12
- Area 14

The unexcavated surface immediately surrounding each of these Class 1 survey units was treated as a Class 3 survey unit. Two removal areas were not defined as survey units for purposes of a MARSSIM FSS—Area 10 and Area 13. Area 10 was not defined as a survey unit because no soil excavation occurred at this location (elevated gamma readings were addressed by removing a small amount of debris from the surface of a concrete-paved area). Because radiological contamination associated with Area 13 (interior vault area) was distributed irregularly and contamination was associated with materials other than soil (e.g., the uncovered concrete vault), the post-removal data of most relevance are dose rate measurements, which are not directly comparable to the 5 pCi/g surface soil benchmark. Therefore, data

pertaining to the interior areas of the building were not evaluated using a MARSSIM approach; these data are discussed in Section 5.0

Survey Instrumentation and Survey Techniques

Real-time monitoring of surface soils for gross gamma activity occurred using a Ludlum Model 2241-3 digital survey meter with a Ludlum Models 44-10 and 44-20 NaI scintillation detectors. Real-time surveys proceeded by scanning the surface soil in a serpentine pattern moving at approximately 1 to 2 feet per second, with the detector held approximately 6 inches above ground surface.

Reference Areas

Because radium-226 is naturally occurring, background concentrations were established by collecting background samples from a reference area. For this survey, seven background soil samples (REF-1 through REF-7) were used to determine background concentrations (see Appendix A, Figure 4).

Reference Coordinate System

Rectangular coordinate systems were established within Class 1 survey units to identify FSS survey locations. Temporary markers were used to establish the origin of the coordinate systems, and recognition of approximate cardinal directions established the north-south axis and east-west axes.

Per MARSSIM guidance, if the survey unit area is relatively small (less than 100 square meters), the statistical tests prescribed in MARSSIM may suggest obtaining a number of data points that would be unnecessarily large and not appropriate for the size of the survey unit (EPA 2000). For excavated areas of relatively small size, the number of samples collected was based on judgment, rather than on statistical techniques presented in MARSSIM; and therefore, a reference coordinate system was not needed to establish grid spacing. Descriptions of individual sample locations are documented in field notes (see Appendix C).

4.3 CONFIRMATION SAMPLING AND FINAL STATUS SURVEY

An FSS was conducted using MARSSIM guidance (EPA 2000) and the FSS sampling design plan developed in the QAPP (Tetra Tech 2012). The FSS included both a final real-time surface scanning survey and collection of soil samples for laboratory analysis. Because MARSSIM guidance largely pertains to surveys over wide areas (generally 100 square meters or larger), deviation from the design plan and statistical analysis of the data was necessary where survey units were of relatively small size.

Deviations from MARSSIM guidance and the FSS sampling design plan are described throughout this report.

The final surface scan verified that no unknown areas of elevated activity remained following excavation. MARSSIM requires a 100-percent scan of soils within Class 1 survey units and a "judgmental" scan within Class 3 survey units. For this site, a 100-percent surface scan of surface soils was conducted within the Class 1 survey units (i.e., the excavated areas) and within the Class 3 survey unit (the unexcavated area surrounding the Class 1 survey units). During the final surface soil scanning of outdoor areas, no measurements indicated significantly elevated activity remained.

Following the final surface scan, soil samples were collected for laboratory analysis. Because Areas 2, 4, 9, 11, 12, and 14 were relatively small (each area was less than 100 square meters), the number and locations of samples collected within these survey units were based on professional judgment, rather than on statistical techniques presented in MARSSIM. Descriptions of individual sample locations are documented in field notes (see Appendix C).

At each sampling location, a soil sample was collected, packaged in a labeled plastic jar, and placed in a cooler. The collected samples were shipped to TestAmerica in Earth City, Missouri, for analysis for radionuclides via gamma spectroscopy. Table D-2 in Appendix D presents results of analyses for all targeted radioactive elements, and Appendix E provides the laboratory analytical reports.

4.4 SURVEY RESULTS

The summary statistics of the radium-226 soil sample data from the Class 1 survey units are listed in Table 2. The average radium-226 concentration in the survey units ranged from 1.0 to 3.9 pCi/g. Review of the data shows that only two Class 1 survey units—Areas 1 and 8—are associated with individual sample concentrations exceeding the radium-226 RA level of 6.87 pCi/g. Therefore, further evaluation of the Area 1 and 8 data is necessary to determine if these survey units meet the release criteria. At each of the other Class 1 survey units (Areas 2-7 and 9-12), all soil samples yielded radium-226 concentrations less than the RA level of 6.87 pCi/g. Thus, no further evaluation of the data for Areas 2-7 and 9-12 is necessary to demonstrate that these survey units meet the release criteria.

TABLE 2

CLASS 1 SURVEY UNIT RESULTS COMPARED TO THE REMOVAL ACTION LEVEL RADIATION – STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Survey Unit	Number of Measurements	Radium-226 Measurements (pCi/g)		
		Minimum	Maximum	Average
Area 1	12	0.61	**17.3**	3.1
Area 2	4	1.43	1.66	1.5
Area 3	18	0.94	4.11	2.0
Area 4	12	1.15	3.27	1.8
Area 5	25	0.97	3.79	1.7
Area 6	4	1.76	6.31	3.8
Area 7	18	0.91	1.86	1.2
Area 8	12	1.11	**9.50**	3.9
Area 9	1	1.31	1.31	1.31
Area 11	1	1.19	1.19	1.19
Area 12	6	0.73	1.22	1.0
Area 14	5	0.92	3.46	1.8
Removal Action Level for Radium-226: 6.87 pCi/g				

Notes:

Shaded values exceed the site-specific radium-226 removal action level of 6.87pCi/g.

pCi/g picoCuries per gram

The individual radium-226 concentrations (in pCi/g) associated with Areas 1 and 8 are:

Area 1: 0.61, 0.62, 0.65, 0.71, 0.83, 0.88, 0.89, 0.89[1], 2.00, 2.44, 9.40, 17.3
Area 8: 1.11, 1.46, 1.46, 2.63, 2.67, 2.92, 3.67, 3.69, 3.81, 5.31, 8.30, 9.50[2]

Notes:

[1] This measurement is associated with a laboratory duplicate measurement of 0.85 pCi/g.
[2] This measurement is associated with a laboratory duplicate measurement of 9.40 pCi/g.

Areas 1 and 8 are associated with 12 sample concentrations each (not including laboratory duplicate measurements), and within each area, only two of the 12 sample concentrations exceed the RA level of 6.87 pCi/g. These individual sample concentrations exceeding the RA level indicate that small elevated areas of activity may remain within the survey units. In contrast, the mean radium-226 concentrations of both survey units (3.1 pCi/g for Area 1 and 3.9 pCi/g for Area 8) are less than the RA level, indicating that overall concentrations within the survey units could be characterized as meeting the release criteria. MARSSIM addresses concerns regarding both wide area concentrations (activity) and small areas of elevated activity. The following sections evaluate these considerations with respect to the Area 1 and 8 survey data.

4.5 STATISTICAL TESTS

MARSSIM describes use of the Wilcoxon Rank Sum (WRS) test for interpreting FSS data where the radionuclides of concern occur naturally in soil (such as radium-226). This statistical test is designed to detect whether or not activity in a survey unit exceeds the $DCGL_W$. For this site, the WRS test is used to assess data from the Area 1 and Area 8 Class 1 survey units. The WRS test compares measurements in the Class 1 survey units to those in the reference area and is designed to detect whether or not activity in a survey unit exceeds the activity of the reference area by more than the $DCGL_W$. The hypotheses tested by the WRS test were:

> Null Hypothesis: The median concentration in the survey unit exceeds that in the reference area by more than the $DCGL_W$.
>
> Alternative Hypothesis: The median concentration in the survey unit exceeds that in the reference area by less than the $DCGL_W$.

The null hypothesis is assumed true unless the statistical test indicates that it should be rejected in favor of the alternative. Some or all of the survey unit measurements may be larger than some reference area measurements, while still meeting the release criterion (EPA 2000).

MARSSIM provides the following outline for applying the WRS test (EPA 2000):

1. Obtain the adjusted reference area measurements, Z_i, by adding the $DCGL_W$ to each reference area measurement, X_i. $Z_i = X_i + DCGL_W$.
2. The m adjusted reference sample measurements, Z_i, and the n survey unit sample measurements, Y_i, are pooled and ranked in order of increasing size from 1 to N, where N is the total number of survey and reference area measurements.
3. If several measurements are tied (i.e., have the same value), they are all assigned the average rank of that group of tied measurements.
4. If there are t "less than" values, give all of these the average of the ranks from 1 to t. Therefore, assign all of them the rank $t(t+1)/(2t) = (t+1)/2$, which is the average of the first t integers. If there is more than one detection limit, all observations below the largest detection limit should be treated as "less than" values.
5. Sum the ranks of the adjusted measurements from the reference area, W_r. Note that because the sum of the first N integers is $N(N+1)/2$, one can equivalently sum the ranks of the measurements from the survey unit, W_s, and compute $W_r = N(N+1)/2 - W_s$.
6. Compare W_r with the critical value given in Table I.4 of MARSSIM for the appropriate values of n, m, and α (note that the value for α is established in the QAPP [Tetra Tech 2012]). If W_r is greater than the tabulated value, reject the hypothesis that the survey unit exceeds the release criterion.

The WRS analysis of the Area 1 and 8 Class 1 survey units proceeded as described in MARSSIM (see Appendix E). In Tables E-1 and E-2 in Appendix E, the "Area" columns denote if the measurement was from the survey unit or from the reference area. The "Adjusted Data" were obtained by adding the $DCGL_W$ (5 pCi/g) to the reference area measurements only, and leaving the survey measurements unchanged. The numeric ranks of the Adjusted Data appear in the "Ranks" column, and the sum of the ranks is determined. The "Reference Area Ranks" column contains only the ranks belonging to the reference area measurements, and the total of these ranks is determined. The sum of the reference area ranks is compared with the critical value listed in MARSSIM Table I.4 for corresponding power, α; the number of reference area samples, *m*; and the number of study area samples, *n* (EPA 2000). These values for these parameters for each of the Class 1 survey units are shown in Appendix E, Tables E-1 and E-2. To complete the WRS test, the sum of the reference area ranks is compared with the critical value. If the sum of the reference area ranks is less than the critical value, the null hypothesis is accepted; otherwise, the null hypothesis is rejected. As shown in Appendix E, Tables E-1 and E-2, the null hypothesis is rejected for the Area 1 and 8 Class 1 survey units; therefore, based on this WRS test, the median concentration in these survey units does not appear to exceed that in the reference area by more than the $DCGL_W$.

4.6 ELEVATED MEASUREMENT COMPARISON

MARSSIM addresses the concern for small areas of elevated activity by using the "elevated measurement comparison"—an alternative to statistical methods whereby each survey measurement is compared to an investigation level called the $DCGL_{EMC}$. Typically, elevated measurements (i.e., measurements that exceed the $DCGL_W$) are deemed acceptable provided that the $DCGL_{EMC}$ is not exceeded. The $DCGL_{EMC}$ is the $DCGL_W$ modified to account for the reduction in dose (or risk) of smaller areas and is mathematically determined by multiplying the $DCGL_W$ by a correction factor called the area factor. The area factor is equal to the magnitude by which the concentration within the small area of elevated activity can exceed the $DCGL_W$ while maintaining compliance with the release criterion. Thus, area factors are specific to (1) the size of the elevated area of activity under evaluation, and (2) the underlying exposure assumptions used to determine the $DCGL_W$. MARSSIM states that this approach "is a defensible modification because the exposure assumptions (e.g., exposure time and duration) are the same as those used to develop the $DCGL_W$" (EPA 2000).

MARSSIM provides an illustrative example for generating area factors for outdoor areas (see MARSSIM, Section 5.5.2.4). In the MARSSIM example, the guidance describes using modeling software to calculate dose rates for various smaller area sizes (e.g., 1, 3, 10, 30, 100, 300, 1,000, and 3,000 m^2) and then

dividing these resulting dose rates by the dose rate that corresponds to the "wide area" size used to calculated the $DCGL_W$ (10,000 m^2 in the example). These relative dose rates are the area factors. Thus, in this example, the area factor is equal the ratio of the smaller area dose rate to the dose rate of the larger area (the "wide area") used to determine the $DCGL_W$. Using this general approach, area factors were developed for the Standard Products site via the following steps:

1. The external gamma exposure pathway was selected as the modeled pathway for calculating the area factors for the site; this approach involves specification of the $DCGL_W$ as 5 pCi/g because that was the surface soil cleanup criterion for radium-226 developed for cleanup of radiation-contaminated soil under the UMTRCA of 1978, as found in 40 CFR Part 192. According to a 1998 EPA memorandum, the purpose of this criterion was to limit the risk from inhalation of radon decay products in houses built on mine tailings, and to limit gamma radiation exposure to people using contaminated land (EPA 1998). This memorandum further explains that the concentration criterion for surface soil (5 pCi/g of radium-226) is a health-based standard and is based on exposure to gamma radiation. Because the $DCGL_W$ is based on the UMTRCA cleanup criterion of 5 pCi/g of radium-226, and this criterion is based on gamma radiation exposure, the external gamma exposure pathway is evaluated for the purpose of determining area factors.

2. Data for evaluating risks from external gamma radiation within areas of various sizes is obtained from the document *Ratios of Dose Rates for Contaminated Slabs* (Eckerman 2007). This document presents calculated ratios of dose rates from various radionuclides, including radium-226, for external gamma exposure over contaminated slabs of various sizes relative to the dose rate over a contaminated slab of infinite size (an infinite ground plane source). Ratios for the radionuclide "Ra-226+D" specified in the document constitute the basis for calculating the area factors, and are shown in the first column of Table E-3 in Appendix E. The "+D" notation indicates that the calculated ratios account for exposure to progeny (daughters) of radium-226. The ratios of dose rates from Eckerman are plotted in Figure E-1 of Appendix E, and a best-fit-line to the data within a region of interest allows interpretation of additional ratios for other slab sizes from the data.

3. As shown in Table E-3 in Appendix E, ratios of dose rates expressed in terms relative to an infinite ground source are converted to ratios relative to a 10,000 m^2 ground plane source. This size ground plane source (10,000 m^2) represents the size of the "wide area"—it was selected in absence of any specific assumptions known to establish the UMTRCA cleanup criterion, and because this slab size is commonly used as a default slab size in risk-based calculations (this is the slab size used in the MARSSIM example and is the default slab size used in EPA's calculator for preliminary remediation goals [PRG] for radionuclides [EPA 2013]).

4. The inverse of the dose ratios (relative to a 10,000 m^2 ground place source) are calculated, and these values equal the area factors corresponding to the various slab sizes (see fourth column of Table E-3 in Appendix E).

5. $DCGL_{EMC}$ values are calculated for the various slab sizes by multiplying the associated area factor by the $DCGL_W$ of 5.0 pCi/g (see fifth column of Table E-3 in Appendix E).

Table 3 lists $DCGL_{EMC}$ values calculated using the preceding steps for slab sizes between 3 and 10,000 m^2.

TABLE 3

SITE-SPECIFIC AREA FACTORS AND $DCGL_{EMC}$ VALUES
RADIATION – STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Slab Size (m^2)	Area Factor (unitless)	$DCGL_{EMC}$ (pCi/g)
3	10.2	51
5	6.1	31
7	4.9	24
10	4.06	20
24	2.75	14
50	2.17	11
100	1.81	9.0
500	1.34	6.7
1,000	1.22	6.1
2,000	1.13	5.7
5,000	1.05	5.2
10,000	1.00	5.0

Notes:

$DCGL_{EMC}$	Derived concentration guideline level for elevated measurement comparison
m^2	Square meter
pCi/g	picoCuries per gram

To conduct the elevated measurement comparison, a relevant $DCGL_{EMC}$ among those determined for various areas of elevated activity (i.e., for the various slab sizes) must be selected and then compared to the specific elevated measurement under evaluation. Table 4 shows the elevated measurement comparisons for the Area 1 and 8 survey units (the surface soil survey units with measurements exceeding the $DCGL_W$ plus the average background), and identifies the basis for selection of the relevant $DCGL_{EMC}$.

TABLE 4

ELEVATED MEASUREMENT COMPARISONS
RADIATION – STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Survey Unit	Area of Elevated Activity and Basis of Estimation	Elevated Radium-226 Measurement(s) (pCi/g)	$DCGL_{EMC}$ Corresponding to Size of Elevated Area of Activity (pCi/g)	Result of Comparison to Relevant $DCGL_{EMC}$
Area 1 (outdoor area of 650 E. Gilbert St. where radium-impacted soils had been temporarily stockpiled)	No larger than the area bounded by scanning measurements. An upper-range estimate of this area is 5 m^2	9.4 17.3	31	Elevated measurements associated with small areas of activity do not exceed the relevant $DCGL_{EMC}$
Area 8 (area of excavation within paved alley adjacent to 940 St. Francis St. South)	No larger than the average area bounded by the Final Status Survey samples. This value is yielded by dividing the survey unit area, 84 m^2, by the number of survey unit samples, 12, to yield 7 m^2	9.5 8.3	24	Elevated measurements associated with small areas of activity do not exceed the relevant $DCGL_{EMC}$

Notes:

$DCGL_{EMC}$	Derived concentration guideline level for elevated measurement comparison
ft^2	Square feet
m^2	Square meter
pCi/g	picoCuries per gram

Based on the above elevated measurement comparison, no measurements in the survey units exceed relevant $DCGL_{EMC}$ values, indicating the site is in compliance with the release criterion.

5.0 EVALUATION OF INTERIOR SURVEY AND SAMPLING DATA

As described in Section 3.1, a discrete area of elevated gamma activity had been found during the RSE in the 650 E. Gilbert St. warehouse building; and during the July/August 2012 RA activities, concrete flooring was removed from the area and underlying materials were excavated. In the excavation, a small concrete vault was encountered. EPA observed that the highest gamma readings appeared to be associated with a gray granular material; this material was removed from the vault. In addition, material from around the vault and portions of the vault were removed until it appeared further removal would undermine the structural integrity of the building slab and nearby interior walls.

Before backfilling the excavation, EPA obtained field measurements and collected one soil sample to characterize the final excavation. Analysis of the soil sample collected adjacent to a vault wall (sample INSIDE PIT 3') indicated a radium-226 concentration of 1.56 pCi/g—less than the time-critical RA level of 6.87 pCi/g. Real-time measurements recorded by EPA indicated that the cleanup had substantially reduced gross gamma activity. Following the excavation, EPA observed a maximum dose rate reading of approximately 100 µR/hr using a Ludlum Model 192 microR detector held on contact with remaining vault walls. Based on the field measurements and the results of the soil sample collected from adjacent to the vault walls (which was less than the time-critical RA level of 6.87 pCi/g), the remaining elevated gamma activity appeared to be associated with contamination on the inside surface of the remnant concrete vault. To reduce the likelihood of contact with these surfaces, and to provide shielding of gross gamma activity, the excavation was backfilled with concrete.

Following restoration of the interior excavation, START obtained dose rate readings using a Ludlum Model 192 microR held at waist level. Dose rate readings over the excavated area ranged from approximately 6 to 9 µR/hr, and appeared to be consistent with background dose rate readings (a background reading of approximately 8 µR/hr was observed within an area inside the warehouse building near the west pedestrian door).

6.0 SUMMARY

START was tasked by EPA to conduct RA support activities at the Standard Products site in Wichita, Kansas. The former Standard Products facility was the location of an aircraft instrument repair shop in the 1950s and 1960s (KDHE 2006). Based on information obtained during previous investigations, EPA determined that radium-226 was present in soils at levels that posed an imminent threat to human populations, thereby warranting a time-critical RA. The several parcels that comprise the site include 650 East Gilbert Street, the location of the former Standard Products facility, and adjoining parcels where radiologically impacted soil has been identified (an alley, a private residence at 920 S. St. Francis Street, and the Guadalupe Clinic at 940 S. St. Francis Street) (see Attachment A, Figure 2). Radium-impacted soil at the 920 S. St. Francis Street parcel was addressed during a RA in July 2009 (see Tetra Tech 2010). The RA activities conducted in July/August 2012 and June 2013, described herein, addressed radium-226 impacted materials at 650 East Gilbert Street, 940 St. Francis Street South, and an adjoining alley.

RA activities included excavation and off-site disposal of radium-226 impacted material, acquisition of real-time monitoring data, and completion of an FSS in accordance with MARSSIM to determine if survey units could be released for unrestricted use. During the excavation, surface soils were continually scanned by START for gross gamma activity. Post-excavation soil samples were collected and submitted to TestAmerica for analysis via gamma spectroscopy. Laboratory analysis of the soil samples indicated several radium-226 measurements in surface soil that exceeded the RA level of 6.87 pCi/g. Therefore, further comparison of the data to the release criterion was necessary. The WRS test was used to compare measurements of survey units characterizing wide areas to measurements collected from a reference area. Elevated measurements were evaluated using the EMC test. Based on the results of the WRS test, the median radium-226 activity in the survey units characterizing wide areas did not appear to exceed that in the reference area by more than the $DCGL_W$, and the EMC test indicated that those survey measurements that exceeded the $DCGL_W$ plus background did not appear to indicate areas of significantly elevated activity. Therefore, the results of the FSS indicate that surface soils of the site, including the 12 Class 1 survey units that were established and sampled, should be released for unrestricted use.

A removal was also conducted within the 650 E. Gilbert warehouse building to address a small area in a hallway of the building exhibiting elevated gamma readings. Upon removing concrete flooring overlying the area, a small concrete vault was encountered and a gray granular material was observed inside the vault. This material appeared to be associated with the highest elevated gross gamma readings encountered during the excavation, and it was removed from the concrete vault, along with portions of the vault and some surrounding soil. Materials were removed until it appeared further removal would

undermine the structural integrity of the building slab and nearby interior walls. Although the removal substantially reduced gross gamma activity readings, elevated readings remained following the excavation (EPA observed a maximum dose rate reading of approximately 100 µR/hr using a Ludlum Model 192 microR detector held on contact with remaining vault walls). Based on field measurements and analysis of a soil sample collected adjacent to the vault, the remaining elevated gamma activity appeared to be associated with contamination on the inside surface of the remnant concrete vault. To reduce the likelihood of contact with these surfaces, and to provide shielding of gross gamma activity, the excavation was backfilled with concrete. Following restoration of the concrete floor, START obtained dose rate readings using a Ludlum Model 192 microR held at waist level and obtained readings that appeared to be consistent with background dose rate readings.

7.0 REFERENCES

Eckerman. 2007. Ratios of Dose Rates for Contaminated Slabs. K.F. Eckerman. September 20. Available online: http://epa-prgs.ornl.gov/radionuclides/ContaminatedSlabs.pdf

Kansas Department of Health and Environment (KDHE). 2006. Unified Focus Assessment Report, Standard Products, Inc. (Former), 650 East Gilbert, Wichita, Kansas. March.

KDHE. 2010. *Risk-Based Standards for Kansas RSK Manual – 5th Version*. October.

Tetra Tech EM Inc. (Tetra Tech). 2009. Removal Site Evaluation Trip Report, Revision 01, Radiation - Standard Products, Inc. (Former), Wichita, Kansas. August.

Tetra Tech. 2010. Removal Action Report, Radiation – Standard Products, Inc. (Former) – 920 S. St. Francis Street Parcel, Wichita, Kansas. March.

Tetra Tech. 2012. Quality Assurance Project Plan for Removal Action at Radiation – Standard Products, Inc. (Former), Wichita, Kansas. July 16.

U.S. Environmental Protection Agency (EPA). 1998. Interoffice Memorandum Regarding Use of Soil Cleanup Criteria in 40 *Code of Federal Regulations* (CFR) Part 192 as Remediation Goals for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Sites. From Stephen D. Luftig, Director of Office of Superfund Remediation Technology Innovation. To Distribution. February 12. Available online: http://www.epa.gov/superfund/health/conmedia/soil/cleanup.htm

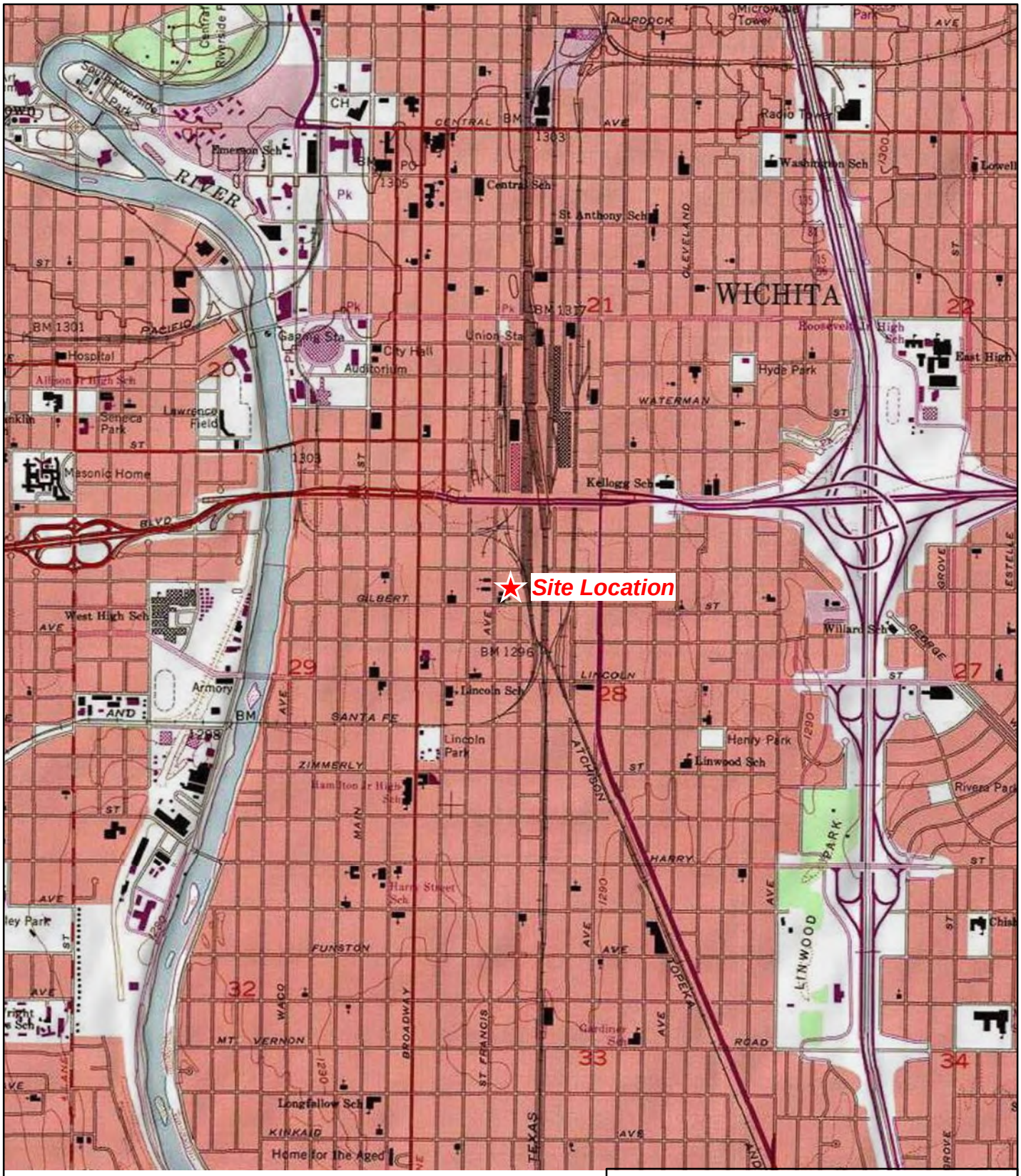
EPA. 2000. *Multi-Agency Radiation Survey and Site Inspection Manual* (MARSSIM), Revision 1. EPA 402-R-97-016, Rev. 1. August.

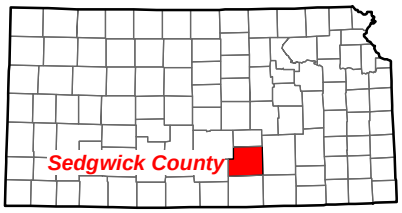
EPA. 2012. Action Memorandum Regarding Removal Action at the Radiation – Standard Products, Inc. (Former) Site, Wichita, Sedgwick County, Kansas. June 13.

EPA. 2013. Preliminary Remediation Goals for Radionuclides – PRG Calculator. Accessed September 6, 2013. Available online: http://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search

APPENDIX A

FIGURES





N

1,000 0 1,000

Feet

Source: USGS Wichita East, KS 7.5 Minute Topo Quad, 1982

Radiation - Standard Products, Inc. (Former)
Wichita, Kansas

Figure 1

Site Location Map

TETRA TECH

Date: 03/21/2013 Drawn By: Nick Wiederholt Project No: X9004.L.12.0299.000

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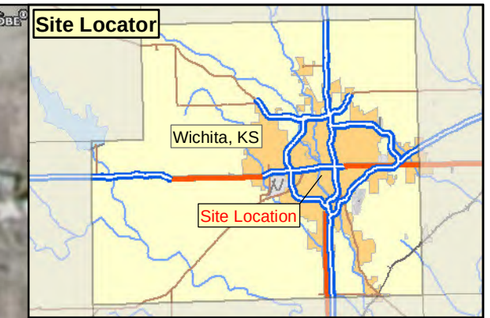


Legend

Local Road

N

30 0 30

Feet

Source: Image Connect, Globe Xplorer Premium Stack, 2008
ESRI Media Kit, 2007

Radiation - Standard Products, Inc. (Former)
Wichita, Kansas

Figure 2

Site Layout Map

TETRA TECH

Date: 03/21/2013 Drawn By: Nick Wiederholt Project No: X9004.L.12.0299.000

X:\G\9004\0299\000\Projects\mxd\Figure2.mxd

Legend

Gamma Survey Location

- < 17,659 cpm
  Below Investigation Level
- 17,659 - 31,794 cpm
  Investigation Level to 2x Background
- 31,794 - 47,691 cpm
  2x Background to 3x Background
- 47,691 - 63,588 cpm
  3x Background to 4x Background
- > 63, 588 cpm
  > 4x Background
- Local Road

cpm Counts Per Minute

Notes: Measurements were collected using a Ludlum 3x3 detector.

The Investigation Level is the mean of background readings plus 10 times the standard deviation of the background readings. Areas that exhibited gamma activity above the Investigation Level were subjected to additional investigation following the initial surface soil gamma survey.

N

30 0 30

Feet

Source: RAT System Survey, March 2009
Image Connect, Globe Xplorer Premium Stack, 2008
ESRI Media Kit, 2007

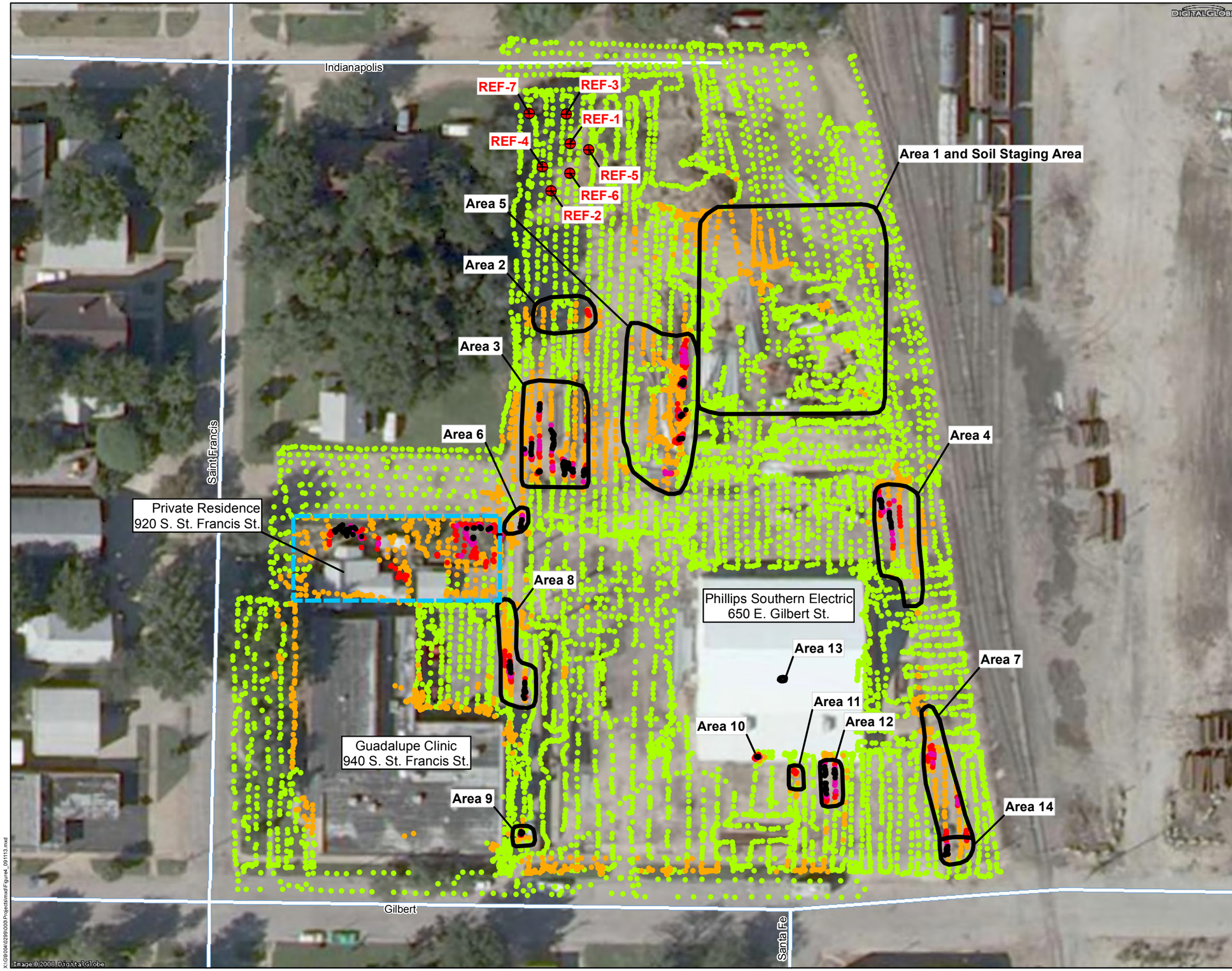
Radiation - Standard Products, Inc. (Former)
Wichita, Kansas

Figure 3
Pre-Removal (March 2009)
Gamma Survey Results Map

TETRA TECH

Date: 03/21/2013 Drawn By: Nick Wiederholt Project No: X9004.L.12.0299.000

X:\G9004\0299\000\Projects\mxd\Figure3.mxd



Legend

- Reference area soil sample

Gamma Survey Location

- < 17,659 cpm
  Below Investigation Level
- 17,659 - 31,794 cpm
  Investigation Level to 2x Background
- 31,794 - 47,691 cpm
  2x Background to 3x Background
- 47,691 - 63,588 cpm
  3x Background to 4x Background
- > 63, 588 cpm
  > 4x Background

Local Road

Area addressed during a previous Removal Action in 2009

Excavated area

cpm Counts Per Minute

Notes: Measurements were collected using a Ludlum 3x3 detector.

The Investigation Level is the mean of background readings plus 10 times the standard deviation of the background readings. Areas that exhibited gamma activity above the Investigation Level were subjected to additional investigation following the initial surface soil gamma survey.

N

30 0 30

Feet

Source: RAT System Survey, March 2009
Image Connect, Globe Xplorer Premium Stack, 2008
ESRI Media Kit, 2007

Radiation - Standard Products, Inc. (Former)
Wichita, Kansas

Figure 4
Excavation Areas, Reference Area
Soil Sample Locations,
and Pre-Removal (March 2009)
Gamma Survey Results Map

TETRA TECH

Date: 09/11/2013 Drawn By: Nick Wiederholt Project No: X9004.L.12.0299.000

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Legend

Gamma Survey Location

- < 37,925 cpm
  Below Investigation Level
- 37,925 - 44,898 cpm
  Investigation Level to 2x Background
- 44,898 - 67,347 cpm
  2x Background to 3x Background
- 67,347 - 89,796 cpm
  3x Background to 4x Background
- > 89,796 cpm
  > 4x Background

Local Road

cpm Counts Per Minute

Notes: Measurements were collected using a Ludlum 3x3 detector.

The Investigation Level is the mean of background readings plus 10 times the standard deviation of the background readings.

N

30 0 30

Feet

Source: RAT System Survey, June 2013
Image Connect, Globe Xplorer Premium Stack, 2008
ESRI Media Kit, 2007

Radiation - Standard Products, Inc. (Former)
Wichita, Kansas

Figure 5

Post-Removal June 2013
Gamma Survey Results Map

TETRA TECH

Date: 08/20/2013 Drawn By: Nick Wiederholt Project No: X9004.L.12.0299.000

X:\09\04\0299\000\Projects\mxd\Figure5_June2013Results.mxd

APPENDIX B

PHOTOGRAPHIC RECORD

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the Area 3 excavation at 650 E. Gilbert St. parcel.	1
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Southeast	PHOTOGRAPHER	Robert Monnig	7/19/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the Area 7 excavation at 650 E. Gilbert St. parcel.	2
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: South	PHOTOGRAPHER	Jason Heflin	7/21/12

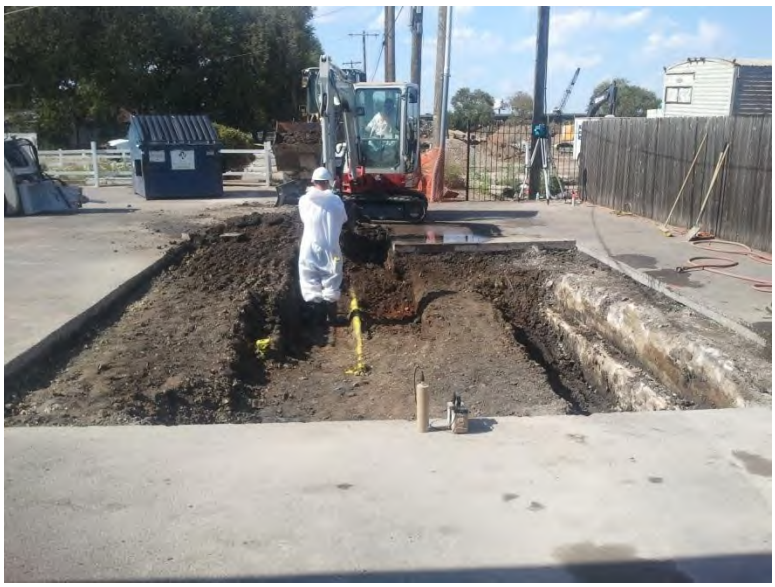
Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the Area 13 excavation where a small sub-grade vault that was encountered after removing a portion of the concrete slab where elevated gamma activity had been detected in the 650 E. Gilbert St. warehouse building.	3
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: South	PHOTOGRAPHER	Tom Mahler, EPA	7/26/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows another view of the small sub-grade vault in the 650 E. Gilbert St. warehouse building.	4
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: West	PHOTOGRAPHER	Tom Mahler, EPA	7/26/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows excavation in Area 8 near the Guadalupe Center (940 St. Francis St. South).	5
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Southwest	PHOTOGRAPHER	Robert Monnig	7/28/12



TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows another view of the excavation in Area 8 near the Guadalupe Center (940 St. Francis St. South).	6
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: North	PHOTOGRAPHER	Robert Monnig	7/28/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the final extent of the Area 8 excavation.	7
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Robert Monnig	7/28/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the final extent of the Area 9 excavation in the alley adjacent to the Guadalupe Center (940 St. Francis St. South).	8
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Southwest	PHOTOGRAPHER	Robert Monnig	7/29/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows railcars staged on a track adjacent to the 650 E. Gilbert St. parcel. Radium-impacted soil and material were loaded onto into the rail cars and transported to an EnergySolutions disposal facility near Clive, Utah.	9
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Robert Monnig	8/16/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows placarding of a railcar used to transport radium-impacted material to the EnergySolutions disposal facility near Clive, Utah.	10
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Southeast	PHOTOGRAPHER	Robert Monnig	8/16/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the restored condition of the Area 13 excavation in the 650 E. Gilbert St. warehouse building.	11
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: West	PHOTOGRAPHER	Robert Monnig	8/17/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the restored condition of the Area 8 excavation in the alley between 650 E. Gilbert St. and 940 St. Francis St. South.	12
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: South	PHOTOGRAPHER	Robert Monnig	11/7/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the restored condition of the Area 9 excavation near 940 St. Francis St. South.	13
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: North	PHOTOGRAPHER	Robert Monnig	11/7/12

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows the restored condition of the Area 11 and 12 excavations.	14
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Robert Monnig	11/7/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows Area 14 on the 650 E. Gilbert St. parcel being excavated.	15
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: North	PHOTOGRAPHER	Robert Monnig	6/25/13

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows Area 14 on the 650 E. Gilbert St. parcel being excavated.	16
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Robert Monnig	11/7/12

Radiation – Standard Products, Inc. (Former)
Wichita, Kansas

TETRA TECH PROJECT NO. X9004.12.0299.000	DESCRIPTION	This photograph shows additional limited excavation being conducted in Area 6.	17
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: North	PHOTOGRAPHER	Robert Monnig	6/25/13

APPENDIX C

FIELD NOTES

KS1282

Rite in the Rain.
ALL-WEATHER
LEVEL
No 311

Standard Products

Removal

07/19/12 Standard Products

0654 Rob Monnig and Jason Heflin arrive on site. The ERRS contractor is Environmental Restoration.

0705 ER conducts health and safety meeting.

0745 Calibration check of #1599 3x3 Meter with window out, no lead colimator, Unit Reads 565,927 cpm with 1 min scaler count. Accepted value is 573,777 cpm. Unit is ok.

1005 Begin south Radeco air monitor 2.6 CFM. Wind direction/speed slight SW wind

1008 Begin North Radeco downwind of excavation. 2.2 CFM

1020 ER cannot begin excavating until scale is calibrated

1150 lunch

1229 Shut down South Radeco, possible rain coming 214.5 EFF3 632

1232 Shut down north Radeco 631 215.3 F3

1240 Rain delay

1330 Begin excavating ~~location #1~~ Area 3

7-19-12

1640 Start wrapping up site activities for the day.

1648 Collect Stockpile sample.

*1445 SM Monnig collected the backfill sample to verify that it's clean

1803 Depart site, end of day.

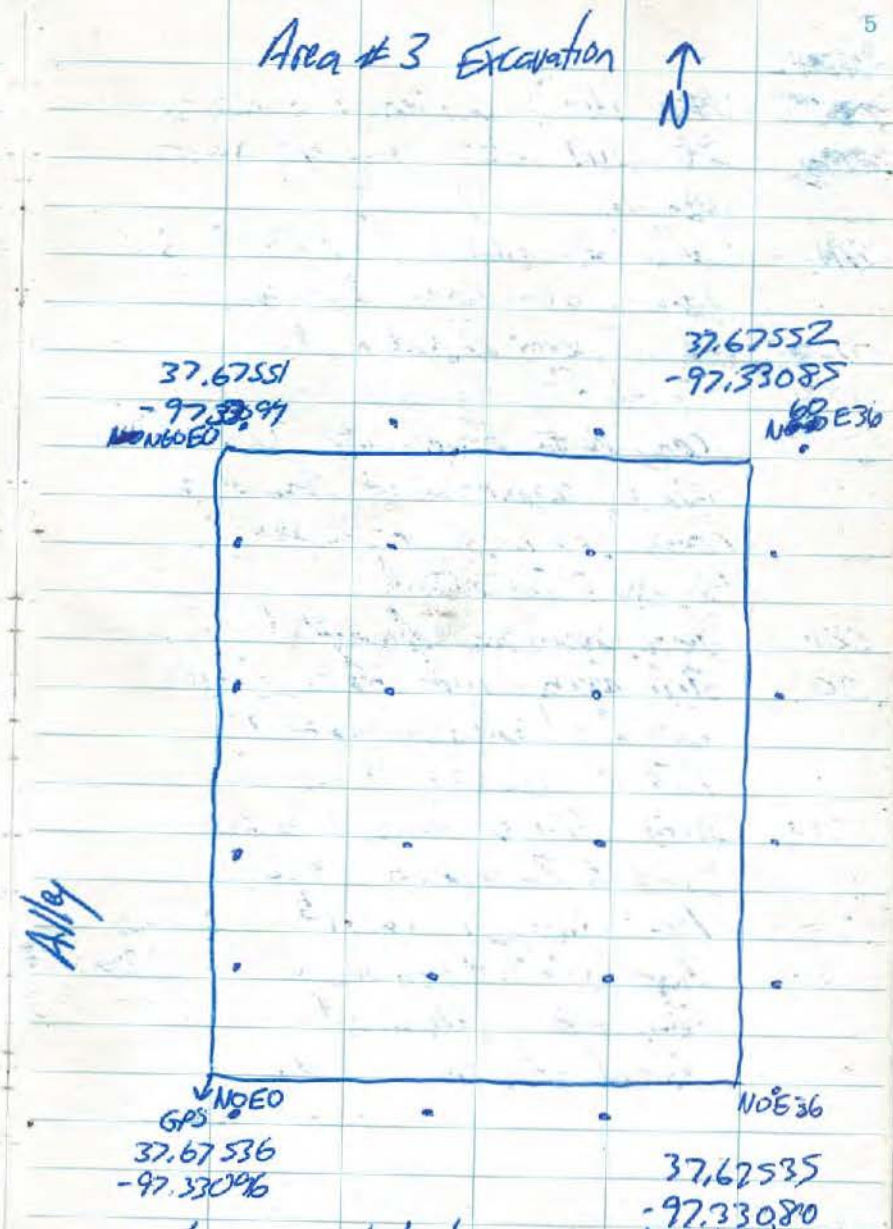
7-19-12

Rite in the Rain

7-20-12

0658 STM's Heflin & Manns arrive on site
0703 ER has daily tailgate safety meeting.
0716 Calibration check of #1599 3x3 meter. Unit reads 552,161.
0738 Begin north Radeco #632 2.2 ft^3
0738 Begin south Radeco #631 2.3 ft^3
1051 Finish excavation of Area #3
Begin collecting post-ex sample
See pg. 5 for Sketch
1240 Begin excavation Area # 4
1251 Move Radeco units to new location
631 has collected 772.6 ft^3
632 has collected 715.3 ft^3 480
1308 Start 631 on south of excavation
Start 632 on north of excavation.
1708 Begin wrapping up site activities
1710 Stop 632 volume pulled = 1,240.6 ft^3
1714 Stop 631, volume pulled = 1195.8 ft^3
1802 Depart site, end of day

Area #3 Excavation



• = clearance sample location. All samples collected 7-20-12

Rite in the Rain

7-21-12

0653 STM Heflin arrive on site.

0700 ER performs safety meeting
Weather today: Hot sunny Hi ≈ 108°F

0711 Calibration Check of #1599 3x3
Unit reads 565,617. Unit ok

0720 ER resumes excavation of Area #4

0756 Excavation of Area #4 complete.
Scan excavation area with 3x3, no readings above 20,000. Except NOE conduit, which was ≈ 32,000.
See sketch of excavation on next page.

0811 Start south Radeco, 2.6 ft.³ #632

0813 Start north Radeco #631 2.7 ft.³

0932 Begin excavating Area #7

1200 Lunch

1230 Resume excavation activities

1536 Stop south Radeco #632
total volume = 1,017 ft.³

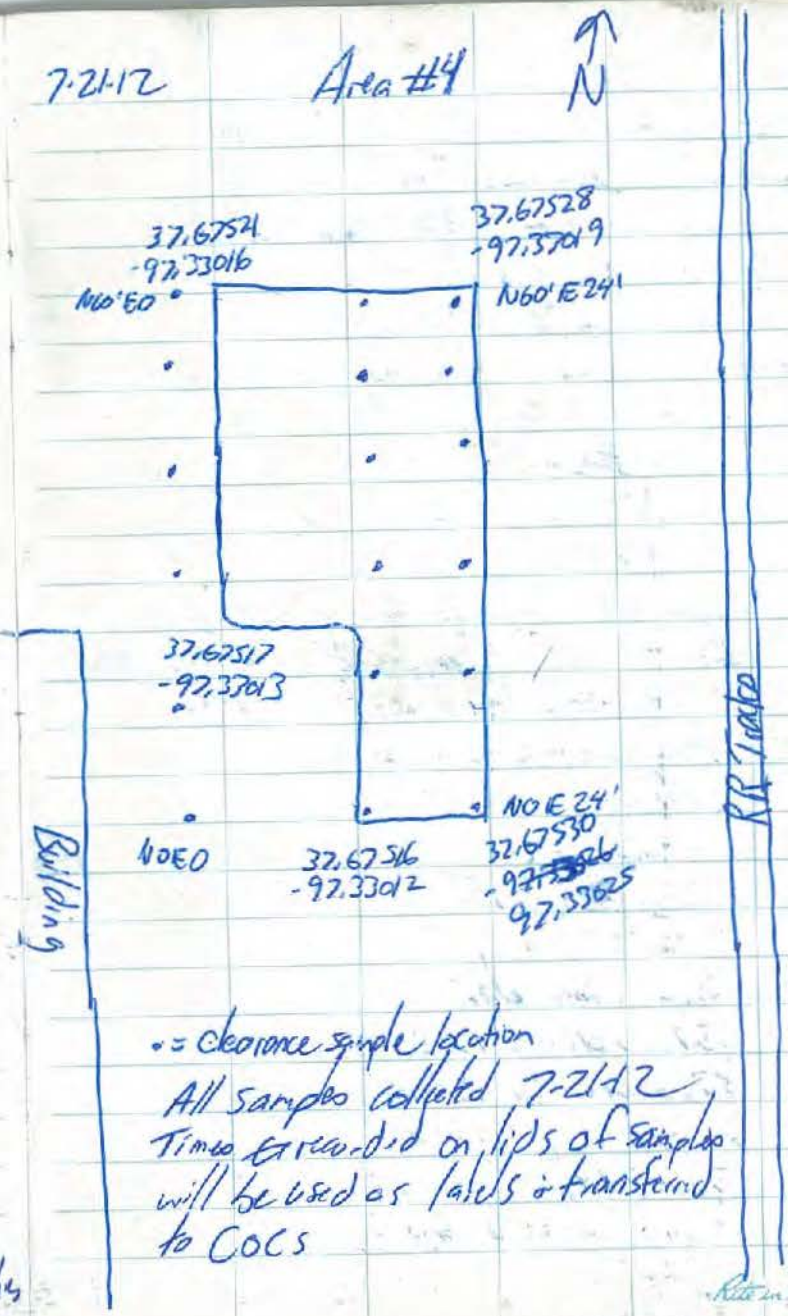
1540 Stop north Radeco #631
total volume 1102.5 ft.³
Excavation complete @ Area #7
Collect clearance samples See pg 8 for sketch

1630 Wrap up site activities

1700 Depart site en route to store to purchase supplies

1730 End of day

7-21-12 Area #4



•= clearance sample location
All samples collected 7-21-12
Times recorded on lids of samples will be used as labels & transferred to COCs

Rite in the Rain

7-21-12 Area #7

Corner GPS Coordinates:
NW: 37.67510, -97.33011
NE: 37.67512, -97.33006
SW: 37.67476, -97.33002
SE: 37.67479, -97.32999
• = clearance sample location

7-22-12

0830 STM Heflin arrives on-site. Will work with OSC's to delineate excavation areas in alley in preparation for site activities next week.

1030 Assist OSC Mahler with processing of clearance samples.

1121 Depart site en route to hotel to process COC's & paperwork for sample shipment tomorrow (7-23-12)

1130 lunch

1200 Arrive hotel, process paperwork.

1430 End of day.

7-21-12

Rite in the Rain

7-23-12

0650 STM Hiflin notices window, busted in Cargo Van #2. Multiple pieces of equipment stolen from Van. Call 911 & file police report

1100 Arrive on-site

1116 Start West Radeco #632 2.2 ft.^{3}

1120 Start east Radeco #631 2.2 ft.^{3} ER has been excavating Area #12

1312 Prep to move east Radeco to next location ER is complete with Area #12

1315 Stop east Radeco #631 volume pulled so far 250.2 ft.^{3}

1317 Stop west Radeco #632, volume pulled so far 253.4 ft.^{3}

1340 ER begins moving poles ~~out~~ with off of Area #5 to prep for excavation.

1506 Restart Radeco #631 on north side of excavation @ Area #5 2.3 ft.^{3}

1512 Start Radeco #632 on south of Area #5 2.5 ft.^{3}

1634 Stop Radeco #631 195.6 ft.^{3}

1637 Stop Radeco #632 209.5 ft.^{3}

7-23-12

1700 Begin wrapping up site activities

1732 Screen ER for contamination. Have been doing this since the 2nd day on site. No noteworthy exposures noted

1740 Depart site en route to hotel. Will process samples for shipment to lab.

1851 Arrive @ Fed Ex, drop off samples.

1900 End of day.

7-23-12

Rite in the Rain

7-24-12

0655 STM Heflin arrives on site.

0700 ER performs safety meeting.
Weather today: Hot, high ~ 104°F

0732 Start south Radeco #631 2.4 ft.³

0736 Start north Radeco #632 2.7 ft.³
ER will continue excavations Area #5

1200 lunch

1230 Resume monitoring of excavation activities at Area #5

~~1649~~

1649 Begin wrapping up site activities for the day. Will shut down Radecos.

1651 Shut down north Radeco #632
total volume = 1,264.5 ft.³

1655 Shut down south Radeco #631
total volume = 1,197.5

1747 Depart site, end of day.

7-24-12

7-25-12

0652 STM Heflin arrives on-site.

0700 ER performs daily safety meeting

0722 Begin excavating Area #5

0734 Start north Radeco #631 2.6 ft.³

0737 Start south Radeco #632 2.5 ft.³

1158 Complete excavation of Area #5
See sketch on next page

1200 lunch

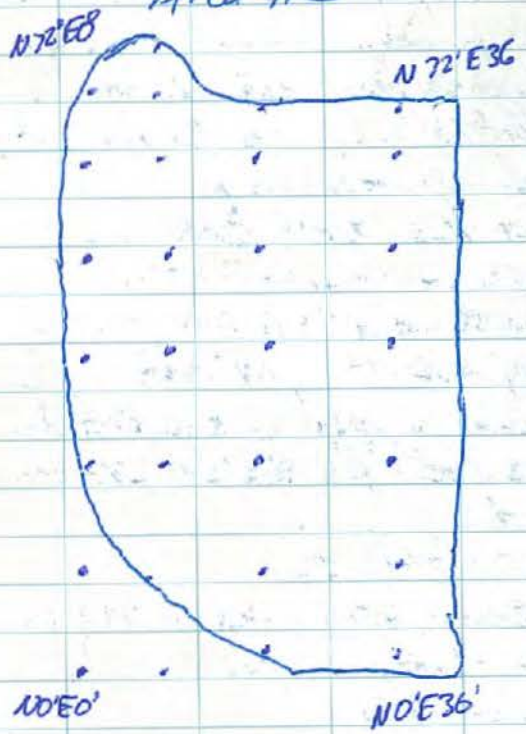
1230 Begin excavation of Area # 2

1338 Excavation complete @ Area #2
no readings above 1 mR/hr observed.

1400 Heflin off site to Precision.
OSC Schadermann using 2X2 NaI to screen Area 6.
Using excavator, ER's encountered a concrete slab <2" BGS. The large bucket cannot retrieve the soil from the alley to the pit. Excavation of this area will wait until this w/e where a smaller excavator will facilitate easier removal.

Rite in the Rain

Area #5



7.25.12

1600 EZs completes excavation of area 11. Excavation around 16' x 6'. One sample collected from bottom of excavation. Excavation appr. 1.5-feet deep.

1644 Shut down north Rodero #631 total volume 1,270.5 ft^3

1643 Shut down south Rodero #632 Total volume = 1,349.6 ft^3

1652 Begin wrapping up site activities. Screen ER for exposure, no issues found.

1717 Heflin off-site.

1730 Arrive hotel, process samples for delivery to lab.

1800 End of day.

7-25-12

Rite in the Rain

7-26-12

0657 SM Heflin arrives on-site.

0700 ER performs safety meeting with Heflin to Standard Products site.

0900 ERs begins cutting concrete over area identified inside building.

1400 ERs began excavating soil from area inside bldg. Readings of 1-2 cpm/hr. A steel plate (approx 2 x 2 feet) was encountered & removed. It covered a 2 x 2 foot concrete vault that contained a ≈ 2.5-inch diameter pipe. Readings appeared to be coming from that pipe. Pipe runs north. It terminates in a 90° angle pointing down. Removal & screening of the pipe indicated that the pipe was not the source of the high readings. The concrete vault contained a fine, grey material (several wheel barrows full). Screening indicated that that was the source of the readings. The concrete

7.26.12

appeared to be intact - thereby limiting migration. The grey material was scrapped from the sides & bottom & removed. Readings were somewhat elevated inside the vault, possibly due to migration into the concrete. No clearance sample was collected because it was concrete.

Rite in the Rain

7/27/12

Helping OSC Schuette @ Precision. ERS crew excavates additional material from area inside building. OSC Mehler had screened & found elevated levels in soil around the mini-vault. In the end, a soil sample was collected from the bottom of the excavated pit. ERS crew began sawing asphalt in alley.

7/28/12

0655	Rob Monnig onsite.
0715	Tailgate safety meeting. Today, ER will be excavating spots in the alley.
0756	Start Radeco # 631. 2.6 CFM.
0758	Start Radeco # 632. 2.5 CFM
	#631 is near Guadalupe Center Building and #632 is opposite.
0812	Response check Unit # 648 with 2x2 probe. Reading is 206 kcpm. Accepted value is 209 kcpm. Unit is ok.
1100	ER has been breaking asphalt in Area 8.
1110	Lunch
1210	Back from lunch. ER continues to break asphalt in Area 8.
1245	ER begins to excavate soil from Area 8. Rob Monnig is screening with a Ludlum 2243 with a 44-10 2x2 NaI probe.
1716	Stop Radeco #631 Volume = 476.0 ft^3.
1719	Stop Radeco #632 Volume = 406.9 ft^3.
1747	Leave site.

7/28/12

Rain in the Rain

7/29/12 Standard Products

0700 Arrive onsite. Safety tailgate meeting.

0730 Start Radeco #631 by Alex

0733 Start Radeco #632 by Guadalupe Health Center.

0738 Functional test of Unit 648 NaI 2x2 probe. Check source reads 205 kcpm, compared to calibrated value of 209 kcpm. Unit is ok.

0748 Today ER will continue excavating Area 8

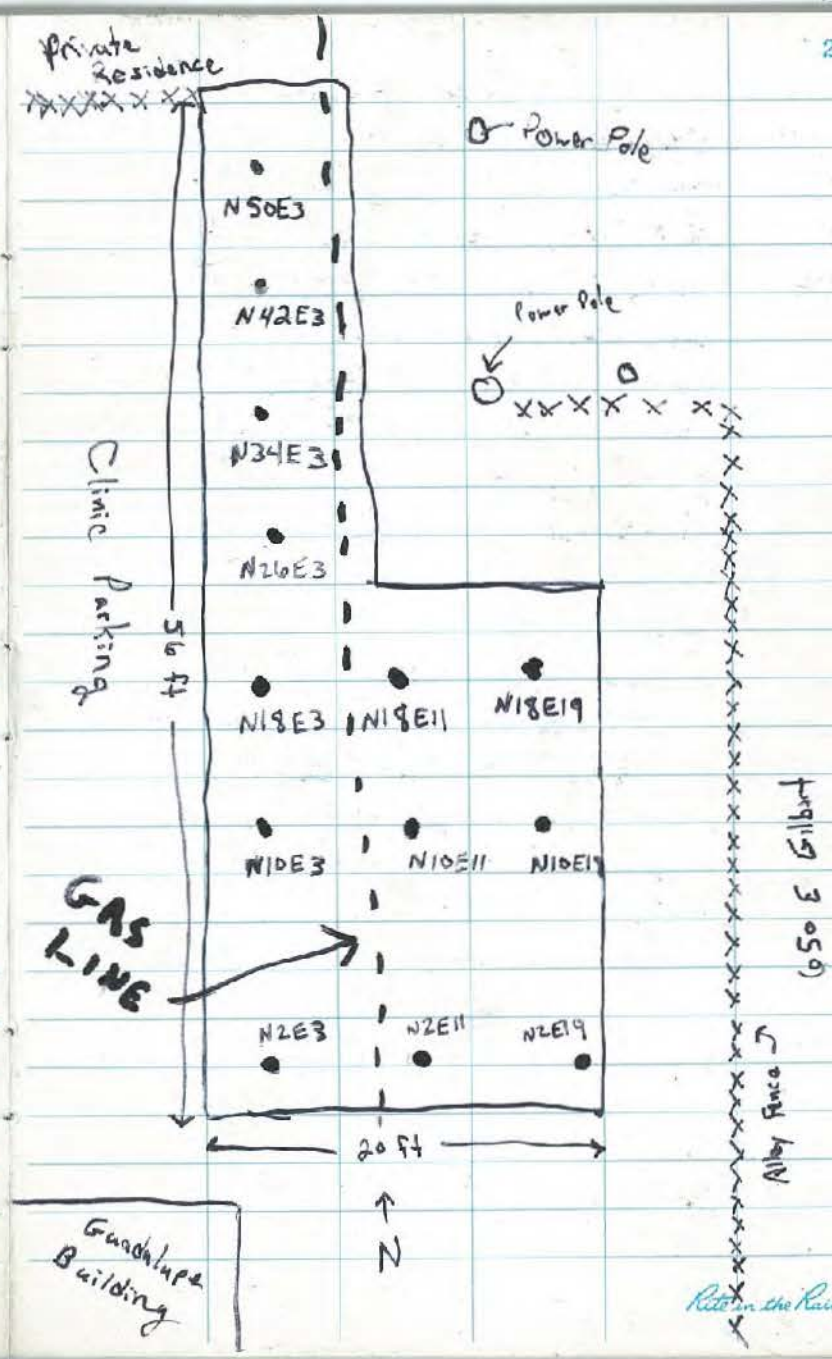
1114 ER is finishing are 8. Rob Manning screens the open excavation with the NaI 2x2 probe. Readings are generally around 15-20 kcpm, compared to background reading of 9-12 kcpm. The excavation is also scanned with a micro R Model 19. Waist height readings in the excavation is 15 μR/hr. Highest soil contract reading was 25 μR/hr near the gas line. Background with the Model 19 is 10-15 μR/hr.

1141 ER has excavated Area 9. NaI 2x2 reading are 15-20 kcpm.

1200 Lunch

1230 Return from lunch

1312 Stop Radecos. #631 = 903.6 ft³
#632 = 613.8 ft³



Rite in the Rain

7/29/12 Standard Products

1340 Area 8 and 9 are complete. ER will have the asphalt repaired tomorrow.

1410 Leave site.

7/29/12

7/30/12 Standard Products

0705 Arrive at site: Safety tailgate meeting. The ER crew will be picking up between Standard Products and Standard Precision.

0745 Rob Manning leaves for Standard Precision.

7/30/12

8-13-12 Standard Products

0817 STM Hoffin will setup a Radeco to monitor train car work.

0832 Start Radeco #1632 near rail car operation, 2.7 CFM

1630 Collect Radeco filter total volume = 1,039.8 ft.^{3}

8-15-12 Standard Products

0758 Start Radeco #1632 near train car operations 2.7 CFM

1620 Shutdown Radeco #1632 total volume = 1,326.8 ft.^{3}

Rite in the Rain

8/16/12 Standard Products

0804 Start Radeco # 632 near Rail Car activity 2.7 CFM
ER is also excavating Area #1 underneath staging area. Only necessary to scrape approximately 6" BGS.

1200 lunch

1300 Rob Monnig onsite. ER crew is scraping the staging area and loading rail cars.

1530 ER has stopped excavation work for the day. Collect Radeco filter. Vol = 1031.0 CF.

1635 Rob Monnig offsite

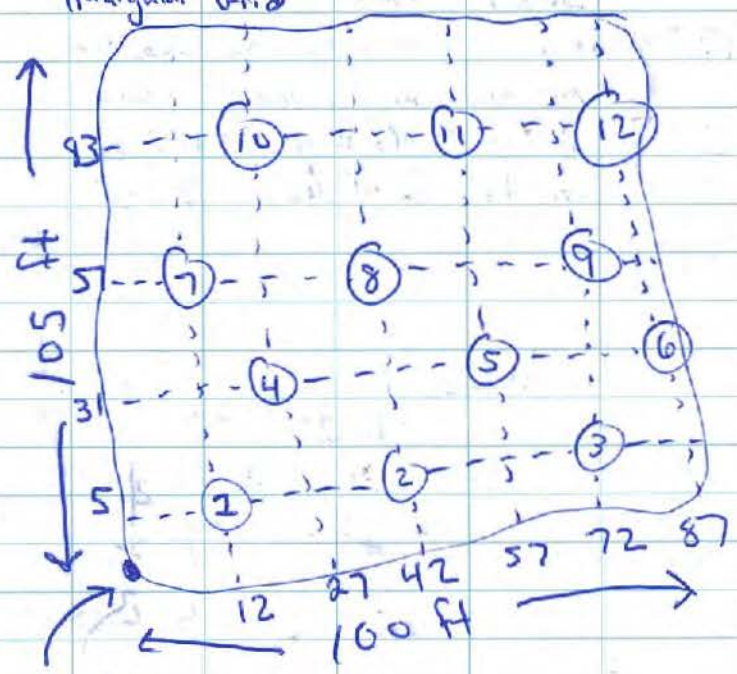
8/16/12

08/17/12 Standard Products

0800 Rob Monnig onsite from Garwin. ER is finishing loading the railcars. Rob Monnig reads swipe samples collected from Garwin.

1000 ER is finished loading rail cars. Rob Monnig sets up sampling grid for area 1.

Area 1 A = 10,500 ft
Triangular Grid nea = 13 L = 30 ft



Corner of Area 1 is NOEO
37.67562, -97.33058

Rite in the Rain

08/17/12

1115 Collect Reference samples

REF	Lat	Long
1	37.67593	-97.33086
2	___585	___090
3	___598	___087
4	___589	___092
5	___592	___082
6	___588	___086
7	___598	___095

1130 Lunch.

1220 Back. Form lunch. Collect microR measurement inside 650 E. Gilbert Building. Inside west door. 8 μR/hr. Readings at waist level over excavated area are 6-9 μR/hr. Measurements collected with Unit #33 Model 19. Check source read 2100 μR/hr vs calibrated reading of 2200 μR/hr. Unit is ok.

6/24/13 Standard Products

1230 R. Manning arrive onsite. Will mark spots for final excavation.

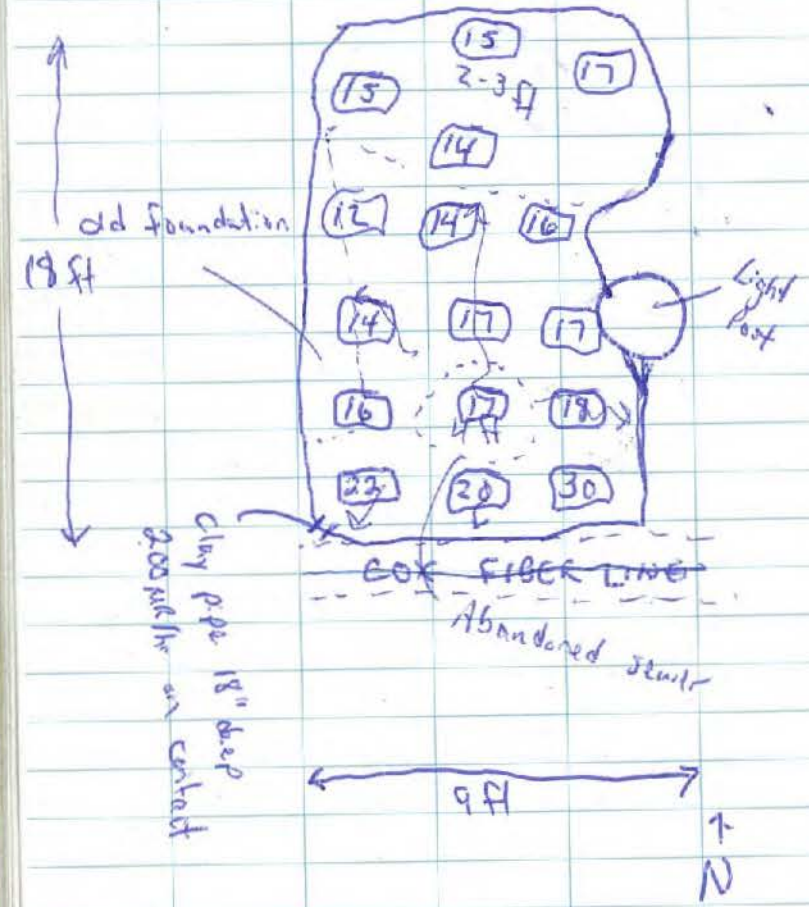
1600 R. Manning has marked areas south of the ~~Area~~ Area 7 excavation that needs additional removal. An Area near Area 6 was also marked; however, Area 6 is near a utility pole and ~~excavation~~ em access for excavation could be limited. R. Manning also discussed tommorrows excavation with Randy Schademann and Chuck Jackson (ER LLC). R. Manning leave site.

6/24/13

Rite in the Rain

6/25/13 Standard Products

[15] Reading with Ludlum 192 held at waist level standing in excavation.



6/25/13 Standard Products

0700 R. Monnig onsite. Today ER will conduct additional excavation at locations not addressed in July/August 2012.

0705 R. Monnig photographs the area at the southeast corner of 650 E. Gilbert St. that will be excavated.

0800 ER begins excavating at southeast corner. R. Monnig monitors progress with a Ludlum 44-20 ("3x3") detector and a Ludlum 192 MicroR meter.

1000 ER completes excavation. R. Monnig scrubbes excavation and characterizes with the MicroR. See previous page.

1027 R. Monnig collects 5 samples from excavation "South wall", "North Wall", "West wall", "East Wall", and "Floor".

1120 ER moves to Area 6 to conduct additional excavation.

1200 ER excavates a limited amount of material in Area 6 due to

Rite in the Rain

6/25/13 Standard Products

utility pole - Reads with the 44-20 detector indicate action level achieved. Readings are less than 2 x background (background is ≈ 22,000 cpm). Go to lunch.

1300 Back from lunch. ER. is finished excavating. Before lunch, ER. excavated a few small areas in Area 1 that exhibited readings above background (but not significantly elevated) in order to fill the ~~scans~~ second trench.

1330 R. Manning begins RAT survey.

1700 R. Manning stops surveying for the day. Will complete in the morning.

6/25/13

6/26/13 Standard Products

0700 R. Manning onsite to finish RAT survey.

0900 R. Manning completes RAT survey and leaves site for Kansas City.

6/26/13

Rite in the Rain

APPENDIX D

TABULATED LABORATORY DATA

TABLE D-1

LABORATORY RESULTS FOR BACKFILL MATERIAL
RADIATION - STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Analyte	Units	Backfill Sample	KDHE Tier 2 Risk-Based Cleanup Value for Residential Scenarios
Volatile Organic Compounds (VOC)	-	No VOCs detected at concentrations above laboratory detection limits	-
Semivolatile Organic Compounds (SVOC)	-	No SVOCs detected at concentrations above laboratory detection limits	-
Arsenic	mg/kg	3.4 B	11.3
Barium	mg/kg	116	15,300
Cadmium	mg/kg	< 1.1	39
Chromium	mg/kg	7.9	33.6
Lead	mg/kg	8.6 B, J	400
Mercury	mg/kg	< 0.035	2
Selenium	mg/kg	1.2 B	391
Silver	mg/kg	< 2.1	391
Radium-226	pCi/g	0.89	NE

Notes:

All units in milligrams per kilogram (mg/kg)

B	Laboratory qualifier indicating the analyte was also detected in the method blank
J	Laboratory qualifier indicated the result is less than the laboratory reporting limit and the result is estimated
KDHE	Kansas Department of Health and Environment
mg/kg	Milligrams per kilogram
NE	Not established
pCi/g	picoCuries per gram

TABLE D-2

LABORATORY RESULTS FOR SOIL SAMPLES
RADIATION - STANDARD PRODUCTS, INC. (FORMER) - WICHITA, KANSAS

Sample Information		U-238 Decay Series						U-235 Decay Series			Th-232 Decay Series				
Sample Name	**Date Collected**	**U-238**	**Th-234**	**Ra-226**	**Pb-214**	**Bi-214**	**Pb-210**	**U-235**	**Pa-231**	**Ac-227**	**Ra-228**	**Ac-228**	**Pb-212**	**Bi-212**	**Tl-208**
Area 1															
AREA 1-1	8/17/2012	< 1.5	< 1.5	0.89	0.75	0.89	< 1.5	< 0.34	< 1.6	< 0.73	0.53	0.53	0.59	< 0.47	0.274
AREA 1-1 (duplicate)[1]	8/17/2012	< 1.6	< 1.6	0.85	0.71	0.85	< 1.8	< 0.36	< 1.9	< 0.42	0.56	0.56	0.57	< 0.49	0.223
AREA 1-2	8/17/2012	< 1.7	< 1.7	0.71	0.59	0.71	< 2.0	< 0.36	< 1.8	< 1.0	0.71	0.71	0.55	< 0.54	0.19
AREA 1-3	8/17/2012	< 2.6	< 2.6	0.83	0.96	0.83	< 2.8	< 0.54	< 2.5	< 1.6	< 0.43	< 0.43	0.62	< 0.97	0.216
AREA 1-4	8/17/2012	< 2.1	< 2.1	0.89	1.09	0.89	2.1	< 0.48	< 2.0	< 0.46	0.63	0.63	0.70	0.68	0.214
AREA 1-5	8/17/2012	< 1.3	< 1.3	0.61	0.68	0.61	< 1.8	0.24	< 1.4	0.30	0.38	0.38	0.48	< 0.53	0.176
AREA 1-6	8/17/2012	< 2.0	< 2.0	0.62	0.70	0.62	< 2.4	< 0.43	< 1.8	< 0.85	0.69	0.69	0.58	< 0.59	0.249
AREA 1-7	8/17/2012	< 2.2	< 2.2	2.0	2.3	2.0	< 2.9	< 0.54	< 1.8	< 0.47	0.97	0.97	1.04	< 0.73	0.42
AREA 1-8	8/17/2012	< 4.1	< 4.1	9.4	10.2	9.4	5.0	< 0.67	< 4.0	< 0.99	1.01	1.01	0.95	< 0.83	0.36
AREA 1-9	8/17/2012	< 1.4	< 1.4	0.88	0.87	0.88	< 2.7	< 0.36	< 1.0	< 0.33	0.43	0.43	0.427	< 0.40	0.187
AREA 1-10	8/17/2012	< 4.6	< 4.6	17.3	18.1	17.3	8.9	< 1.0	< 5.1	< 1.3	1.25	1.25	0.80	< 1.1	0.39
AREA 1-11	8/17/2012	< 2.2	< 2.2	2.44	2.82	2.44	2.4	< 0.56	< 2.5	< 0.91	0.83	0.83	0.59	< 0.58	0.236
AREA 1-12	8/17/2012	< 1.5	< 1.5	0.65	0.63	0.65	< 1.9	< 0.38	< 1.8	< 0.52	0.64	0.64	0.41	< 0.52	0.159
			Minimum	0.61											
			Maximum	17.3											
			Mean	3.1											
Area 2															
AREA #2 N0' E0'	7/25/2012	< 2.7	< 2.7	1.43	1.62	1.43	< 2.7	< 0.54	< 3.1	< 2.0	1.41	1.41	1.51	1.48	0.55
AREA #2 N12' E0'	7/25/2012	< 3.7	< 3.7	1.66	1.70	1.66	< 4.0	< 0.87	< 4.2	< 1.5	1.55	1.55	1.71	< 1.1	0.65
AREA #2 N0' E12'	7/25/2012	2.2	2.2	1.44	1.34	1.44	2.6	< 0.55	< 3.0	< 2.0	1.40	1.40	1.47	< 1.2	0.55
AREA #2 N12' E12'	7/25/2012	< 3.1	< 3.1	1.51	1.54	1.51	< 3.3	< 0.57	< 2.6	< 0.94	1.32	1.32	1.46	1.32	0.50
			Minimum	1.43											
			Maximum	1.66											
			Mean	1.5											

TABLE D-2 (Continued)

LABORATORY RESULTS FOR SOIL SAMPLES
RADIATION - STANDARD PRODUCTS, INC. (FORMER) - WICHITA, KANSAS

Sample Information		U-238 Decay Series						U-235 Decay Series			Th-232 Decay Series				
Sample Name	**Date Collected**	**U-238**	**Th-234**	**Ra-226**	**Pb-214**	**Bi-214**	**Pb-210**	**U-235**	**Pa-231**	**Ac-227**	**Ra-228**	**Ac-228**	**Pb-212**	**Bi-212**	**Tl-208**
Areas 3															
AREA#3 N0'E0' (duplicate)[1]	7/20/2012	< 2.2	< 2.2	3.90	4.07	3.90	4.2	< 0.54	< 2.2	< 0.7	0.49	0.49	0.5	< 0.53	0.159
AREA#3 N0'E0'	7/20/2012	< 2.6	< 2.6	4.08	4.1	4.08	3.8	< 0.63	< 2.7	< 0.53	0.32	0.32	0.66	< 0.57	0.184
AREA#3 N12'E0'	7/20/2012	< 2.4	< 2.4	2.38	2.52	2.38	3.4	< 0.54	< 2.5	< 0.52	0.99	0.99	0.81	< 0.88	0.336
AREA#3 N24'E0'	7/20/2012	< 2.4	< 2.4	1.47	1.64	1.47	4.0	< 0.62	< 2.9	< 1.1	1.59	1.59	1.38	< 0.69	0.53
AREA#3 N36'E0'	7/20/2012	< 2.3	< 2.3	1.60	1.54	1.60	< 3.1	< 0.6	< 3.1	< 1.0	1.44	1.44	1.2	1.55	0.61
AREA#3 N48'E0'	7/20/2012	2.2	2.2	1.33	1.35	1.33	< 2.5	< 0.43	< 2.6	< 1.6	1.44	1.44	1.16	< 0.78	0.48
AREA#3 N60'E0'	7/20/2012	< 2.1	< 2.1	2.46	2.37	2.46	3.2	< 0.46	< 2.0	< 0.34	0.72	0.72	0.41	< 0.46	0.213
AREA#3 N0'E12'	7/20/2012	< 3.4	< 3.4	3.06	3.47	3.06	< 3.4	< 0.69	< 4.5	< 1.1	< 0.52	< 0.52	0.82	< 1.1	0.31
AREA#3 N12'E12'	7/20/2012	< 2.8	< 2.8	1.34	1.38	1.34	< 3.1	0.40	< 2.6	< 1.1	1.54	1.54	1.28	< 1.0	0.56
AREA#3 N24'E12'	7/20/2012	< 3.2	< 3.2	1.31	1.58	1.31	7.9	< 0.67	< 3.0	< 1.6	1.67	1.67	1.46	2.1	0.54
AREA#3 N36'E12'	7/20/2012	< 2.3	< 2.3	1.60	1.31	1.60	< 2.9	< 0.63	< 2.9	< 0.59	1.65	1.65	1.38	< 1.0	0.54
AREA#3 N48'E12'	7/20/2012	< 2.9	< 2.9	1.28	1.68	1.28	< 3.2	< 0.66	< 2.9	0.79	1.89	1.89	1.58	2.22	0.52
AREA#3 N60'E12'	7/20/2012	< 1.7	< 1.7	1.51	1.54	1.51	< 3.5	< 0.4	< 1.5	< 0.43	0.28	0.28	0.365	< 0.43	0.146
AREA#3 N0'E24'	7/20/2012	2.7	2.7	4.11	4.63	4.11	5.0	< 0.59	< 2.8	< 1.5	1.16	1.16	0.77	< 0.95	0.39
AREA#3 N0'E24' (duplicate)[1]	7/20/2012	< 2.6	< 2.6	4.06	4.07	4.06	4.9	< 0.61	< 2.9	< 0.43	1.04	1.04	0.73	< 0.85	0.269
AREA#3 N12'E24'	7/20/2012	< 2.2	< 2.2	1.37	1.45	1.37	< 2.4	< 0.5	< 2.1	< 0.86	0.63	0.63	1.27	< 0.78	0.49
AREA#3 N24'E24'	7/20/2012	< 2.0	< 2.0	1.41	1.61	1.41	< 2.6	< 0.36	< 2.6	< 1.3	0.97	0.97	1.19	0.92	0.47
AREA#3 N36'E24'	7/20/2012	< 2.1	< 2.1	1.07	1.30	1.07	< 2.5	< 0.52	< 2.1	< 1.7	1.34	1.34	1.24	< 0.71	0.38
AREA#3 N48'E24'	7/20/2012	< 3.6	< 3.6	0.94	1.32	0.94	< 3.3	< 0.52	< 3.5	< 2.2	< 0.68	< 0.68	0.83	< 1.5	< 0.19
AREA#3 N60'E24'	7/20/2012	< 3.0	< 3.0	2.91	3.57	2.91	3.9	< 0.63	< 2.5	< 1.7	1.11	1.11	1.07	< 0.74	0.311
			Minimum	0.94											
			Maximum	4.11											
			Mean	2.0											
Areas 4															
AREA#4 N0'E12'	7/21/2012	< 3.7	< 3.7	3.27	3.27	3.27	< 3.4	< 0.8	< 3.7	< 1.9	< 0.58	< 0.58	0.88	< 1.2	0.45
AREA#4 N12'E12'	7/21/2012	< 2.8	< 2.8	1.26	1.13	1.26	< 2.9	< 0.67	< 2.7	< 1.8	0.88	0.88	1.05	< 1.1	0.34
AREA#4 N24'E12'	7/21/2012	< 2.4	< 2.4	1.15	1.33	1.15	< 3.3	< 0.64	< 2.6	< 1.1	1.09	1.09	1.31	0.69	0.45
AREA#4 N36'E12'	7/21/2012	< 2.6	< 2.6	2.03	2.18	2.03	< 3.4	< 0.62	< 3.0	< 1.9	1.28	1.28	1.21	1.1	0.41
AREA#4 N48'E12'	7/21/2012	< 3.6	< 3.6	2.24	2.65	2.24	< 3.3	< 0.75	< 3.1	< 0.41	1.40	1.40	1.56	1.56	0.54
AREA#4 N48'E12' (duplicate)[1]	7/21/2012	< 2.4	< 2.4	2.02	2.52	2.02	3.3	< 0.44	< 3.1	< 0.59	0.80	0.80	1.28	1.06	0.48
AREA#4 N60'E12'	7/21/2012	< 2.5	< 2.5	1.41	1.45	1.41	< 2.5	< 0.53	< 2.4	< 1.3	1.21	1.21	1.43	1.1	0.54
AREA#4 N0'E24'	7/21/2012	< 2.0	< 2.0	1.28	1.52	1.28	< 2.2	< 0.42	< 2.1	< 1.6	0.98	0.98	0.92	< 0.7	0.343
AREA#4 N12'E24'	7/21/2012	4.8	4.8	2.07	2.43	2.07	3.7	< 0.43	< 2.7	< 1.2	1.18	1.18	0.98	< 0.77	0.282
AREA#4 N24'E24'	7/21/2012	< 2.5	< 2.5	1.70	1.96	1.70	< 3.1	< 0.59	< 2.9	< 1.7	1.30	1.30	1.09	< 0.64	0.45
AREA#4 N36'E24'	7/21/2012	< 2.1	< 2.1	1.29	1.32	1.29	< 2.4	< 0.46	< 2.4	0.45	0.79	0.79	1.08	1.05	0.297
AREA#4 N48'E24'	7/21/2012	< 3.6	< 3.6	1.67	1.61	1.67	4.3	< 0.72	< 3.5	< 0.75	1.45	1.45	1.04	< 1.4	0.36
AREA#4 N60'E24'	7/21/2012	< 3.1	< 3.1	2.6	2.91	2.60	3.4	< 0.70	< 3.2	< 0.49	1.34	1.34	1.24	< 1.2	0.41
			Minimum	1.15											
			Maximum	3.27											
			Mean	1.8											

TABLE D-2 (Continued)

LABORATORY RESULTS FOR SOIL SAMPLES
RADIATION - STANDARD PRODUCTS, INC. (FORMER) - WICHITA, KANSAS

Sample Information		U-238 Decay Series						U-235 Decay Series			Th-232 Decay Series				
Sample Name	**Date Collected**	**U-238**	**Th-234**	**Ra-226**	**Pb-214**	**Bi-214**	**Pb-210**	**U-235**	**Pa-231**	**Ac-227**	**Ra-228**	**Ac-228**	**Pb-212**	**Bi-212**	**Tl-208**
Areas 5															
AREA #5 N24' E0' (duplicate)[1]	7/24/2012	< 2.5	< 2.5	1.90	2.36	1.90	< 2.9	< 0.63	< 2.4	< 1.6	0.96	0.96	0.89	< 0.65	0.35
AREA #5 N24' E0'	7/24/2012	< 2.2	< 2.2	1.95	2.06	1.95	< 2.4	< 0.54	< 2.4	< 1.6	0.83	0.83	0.97	1.19	0.379
AREA #5 N36' E0'	7/24/2012	< 2.3	< 2.3	1.34	1.38	1.34	3.0	< 0.60	< 3.2	< 1.6	1.44	1.44	1.15	< 0.75	0.45
AREA #5 N48' E0'	7/24/2012	< 2.6	< 2.6	1.53	1.66	1.53	< 3.0	< 0.73	< 2.9	< 0.85	1.38	1.38	1.42	< 0.81	0.48
AREA #5 N60' E0'	7/24/2012	< 1.9	< 1.9	2.45	2.75	2.45	< 2.1	< 0.5	< 2.6	< 1.3	0.95	0.95	0.65	< 0.66	0.292
AREA #5 N72' E0'	7/24/2012	2.2	2.2	3.37	3.35	3.37	2.8	< 0.64	< 2.8	< 1.1	1.18	1.18	0.73	0.62	0.255
AREA #5 N24' E12'	7/24/2012	2.6	2.6	1.12	1.04	1.12	< 2.9	< 0.36	< 2.4	0.39	1.25	1.25	1.10	< 0.73	0.48
AREA #5 N36' E12'	7/24/2012	< 2.5	< 2.5	1.26	1.40	1.26	< 2.9	< 0.49	< 2.9	< 0.84	1.01	1.01	1.11	< 1.1	0.45
AREA #5 N48' E12'	7/24/2012	< 2.8	< 2.8	1.38	1.21	1.38	< 2.7	< 0.57	< 2.7	< 1.2	1.45	1.45	1.04	< 0.73	0.42
AREA #5 N60' E12'	7/24/2012	< 2.5	< 2.5	2.75	2.90	2.75	2.8	< 0.45	< 2.4	< 0.53	1.09	1.09	0.73	< 0.66	0.283
AREA #5 N72' E12'	7/24/2012	< 2.6	< 2.6	1.16	1.33	1.16	< 2.4	< 0.42	< 2.3	4.7	1.47	1.47	1.25	0.86	0.368
AREA #5 N84' E12'	7/24/2012	< 2.4	< 2.4	1.2	1.31	1.20	< 2.9	< 0.46	< 2.8	< 0.51	1.15	1.15	1.33	< 0.77	0.34
AREA #5 N0' E24'	7/25/2012	< 2.7	< 2.7	1.35	1.09	1.35	< 2.5	< 0.63	< 2.9	< 1.0	0.93	0.93	1.31	0.81	0.48
AREA #5 N72' E36'	7/25/2012	< 3.4	< 3.4	3.79	3.89	3.79	< 3.0	< 0.68	< 2.8	< 1.9	1.48	1.48	1.46	1.2	0.54
AREA #5 N12' E24'	7/25/2012	< 3.0	< 3.0	1.32	1.29	1.32	3.8	< 0.68	< 3.4	< 1.0	1.14	1.14	1.34	1.54	0.43
AREA #5 N24' E24'	7/25/2012	< 2.7	< 2.7	1.42	1.37	1.42	< 2.7	< 0.58	< 2.4	< 0.13	1.08	1.08	1.21	< 0.76	0.45
AREA #5 N24' E24' (duplicate)[1]	7/25/2012	< 2.9	< 2.9	1.37	1.48	1.37	< 2.9	< 0.67	< 2.5	< 1.1	1.07	1.07	1.20	< 0.87	0.42
AREA #5 N36' E24'	7/24/2012	3.4	3.4	1.31	1.31	1.31	< 4.1	< 0.74	< 3.5	< 1.0	1.45	1.45	1.21	< 1.4	0.36
AREA #5 N48' E24'	7/24/2012	3.1	3.1	0.97	1.43	0.97	< 2.6	< 0.58	< 2.3	< 2.1	1.49	1.49	1.27	< 1.0	0.35
AREA #5 N60' E24'	7/24/2012	< 2.7	< 2.7	1.36	1.52	1.36	< 2.6	< 0.60	< 3.0	< 1.2	1.38	1.38	1.28	< 0.97	0.48
AREA #5 N72' E24'	7/24/2012	< 2.2	< 2.2	1.46	1.47	1.46	7.2	< 0.61	< 3.0	< 0.51	1.44	1.44	1.46	< 0.77	0.48
AREA #5 N0' E36'	7/25/2012	< 1.9	< 1.9	1.17	1.28	1.17	< 3.1	< 0.64	< 2.6	< 0.98	1.14	1.14	1.30	0.93	0.46
AREA #5 N12' E36'	7/25/2012	< 3.0	< 3.0	1.45	1.69	1.45	< 3.3	< 0.40	< 0.47	< 0.64	1.28	1.28	1.78	1.41	0.62
AREA #5 N24' E36'	7/25/2012	< 2.4	< 2.4	1.65	1.87	1.65	< 2.6	< 0.61	< 3.1	< 2.2	1.86	1.86	1.67	1.83	0.6
AREA #5 N36' E36'	7/24/2012	< 2.5	< 2.5	1.76	2.12	1.76	< 2.6	< 0.54	< 3.0	< 1.2	1.61	1.61	1.58	< 0.85	0.57
AREA #5 N48' E36'	7/24/2012	< 2.6	< 2.6	1.03	1.07	1.03	< 2.5	< 0.50	< 2.4	< 1.6	0.97	0.97	1.03	< 0.65	0.274
AREA #5 N60' E36'	7/24/2012	< 2.0	< 2.0	1.91	1.83	1.91	< 2.8	< 0.56	< 2.3	0.44	1.37	1.37	1.46	< 0.73	0.48
			Minimum	0.97											
			Maximum	3.79											
			Mean	1.7											
Area 6															
ALLEYWAY MIDDLE NORTH END	8/1/2012	< 2.8	< 2.8	6.31	6.62	6.31	4.4	< 0.71	< 2.8	0.59	0.65	0.65	0.45	< 0.68	0.173
ALLEY SOUTH TO MIDDLE SECTION	8/1/2012	< 3.5	< 3.5	3.71	3.64	3.71	< 3.6	< 0.67	< 3.3	< 0.76	< 0.63	< 0.63	0.39	< 0.9	< 0.14
S END	7/31/2012	< 2.6	< 2.6	3.31	3.62	3.31	3.6	< 0.69	< 2.9	< 1	1.11	1.11	0.79	< 0.71	0.262
N END	7/31/2012	< 3.6	< 3.6	1.76	1.85	1.76	4.9	< 0.81	< 4.4	< 2.6	1.44	1.44	1.25	< 1.5	0.52
			Minimum	1.76											
			Maximum	6.31											
			Mean	3.8											

TABLE D-2 (Continued)

LABORATORY RESULTS FOR SOIL SAMPLES
RADIATION - STANDARD PRODUCTS, INC. (FORMER) - WICHITA, KANSAS

Sample Information		U-238 Decay Series						U-235 Decay Series			Th-232 Decay Series				
Sample Name	**Date Collected**	**U-238**	**Th-234**	**Ra-226**	**Pb-214**	**Bi-214**	**Pb-210**	**U-235**	**Pa-231**	**Ac-227**	**Ra-228**	**Ac-228**	**Pb-212**	**Bi-212**	**Tl-208**
Areas 7															
AREA#7 N0'E0'	7/21/2012	< 2.4	< 2.4	1.08	1.46	1.08	< 3.0	< 0.59	< 2.8	< 0.98	1.13	1.13	0.98	0.85	0.449
AREA#7 N12'E0'	7/21/2012	< 2.1	< 2.1	1.03	1.23	1.03	< 2.6	< 0.55	< 2.7	< 1.8	1.48	1.48	1.33	1.26	0.374
AREA#7 N24'E0'	7/21/2012	< 2.8	< 2.8	1.30	1.40	1.3	< 2.7	< 0.59	< 2.7	< 0.81	1.55	1.55	1.29	1.28	0.48
AREA#7 N36'E0'	7/21/2012	< 1.9	< 1.9	1.34	1.45	1.34	2.2	< 0.53	< 2.3	< 0.76	1.15	1.15	0.95	< 0.56	0.412
AREA#7 N48'E0'	7/21/2012	< 1.7	< 1.7	1.42	1.33	1.42	< 2.6	< 0.48	< 2.3	0.32	1.29	1.29	1.05	0.97	0.36
AREA#7 N60'E0'	7/21/2012	< 1.7	< 1.7	0.91	1.03	0.91	< 2.3	< 0.54	< 2.1	< 0.91	0.87	0.87	1.00	< 0.68	0.413
AREA#7 N72'E0'	7/21/2012	< 2.6	< 2.6	0.91	1.04	0.91	< 2.7	< 0.52	< 2.2	< 1.6	1.16	1.16	1.05	1.45	0.392
AREA#7 N84'E0'	7/21/2012	< 2.0	< 2.0	0.99	1.23	0.99	< 2.2	< 0.47	< 2.2	< 0.56	1.14	1.14	1.07	< 0.71	0.375
AREA#7 N96'E0'	7/21/2012	< 2.8	< 2.8	0.96	1.29	0.96	< 3.1	< 0.63	< 3.2	< 1.9	1.49	1.49	1.29	< 0.88	0.51
AREA#7 N0'E12'	7/21/2012	< 2.3	< 2.3	0.99	1.30	0.99	< 2.8	< 0.43	< 2.7	< 0.96	0.94	0.94	1.11	0.9	0.49
AREA#7 N12'E12'	7/21/2012	< 3.5	< 3.5	1.86	1.85	1.86	< 3.9	< 0.86	< 4.0	< 2.5	0.79	0.79	1.14	< 1.3	0.42
AREA#7 N24'E12'	7/21/2012	< 3.1	< 3.1	1.38	1.33	1.38	3.9	< 0.66	< 2.9	< 0.36	1.55	1.55	1.18	1.0	0.54
AREA#7 N36'E12'	7/21/2012	< 2.3	< 2.3	1.17	1.19	1.17	5.7	< 0.49	< 2.1	< 0.57	1.54	1.54	1.06	0.91	0.44
AREA#7 N48'E12'	7/21/2012	< 1.9	< 1.9	1.27	1.20	1.27	< 2.5	< 0.49	< 2.4	< 0.47	0.97	0.97	0.96	< 0.63	0.39
AREA#7 N60'E12'	7/21/2012	< 2.5	< 2.5	0.98	0.89	0.98	< 2.8	< 0.52	< 2.6	0.32	1.18	1.18	0.97	0.91	0.334
AREA#7 N72'E12'	7/21/2012	< 2.1	< 2.1	1.06	1.06	1.06	< 3.1	< 0.6	< 2.4	0.51	1.61	1.61	1.26	< 0.8	0.43
AREA#7 N84'E12'	7/21/2012	< 2.3	< 2.3	1.36	1.31	1.36	< 2.8	< 0.51	< 2.2	0.40	1.37	1.37	1.27	< 0.7	0.294
AREA#7 N96'E12'	7/21/2012	< 2.8	< 2.8	1.21	1.37	1.21	2.9	< 0.56	< 3.2	< 2.1	1.10	1.1	1.45	1.47	0.42
			Minimum	0.91											
			Maximum	1.86											
			Mean	1.2											
Areas 8															
AREA 8 N10E3	7/28/2012	< 3.9	< 3.9	9.50	9.8	9.5	7.1	< 0.69	< 3.7	< 0.92	0.62	0.62	0.54	< 0.85	0.26
AREA 8 N10E3 (duplicate)[1]	7/28/2012	< 3.0	< 3.0	9.40	9.5	9.4	5.2	< 0.83	< 3.7	< 1.3	0.46	0.46	0.6	< 0.88	0.229
AREA 8 N2E11	7/28/2012	4.2	4.2	2.92	3.27	2.92	< 2.2	< 0.55	< 1.9	< 0.61	0.58	0.58	0.69	< 0.58	0.29
AREA 8 N10E11	7/28/2012	2.2	2.2	1.46	1.72	1.46	< 2.4	< 0.41	< 2.5	< 1.0	1.13	1.13	0.84	< 0.72	0.41
AREA 8 N2E19	7/28/2012	2.2	2.2	1.46	1.7	1.46	2.4	< 0.49	< 2.2	< 1.4	0.68	0.68	0.83	0.91	0.297
AREA 8 N50E3	7/29/2012	< 3.3	< 3.3	1.11	1.3	1.11	< 3.2	< 0.79	< 3.4	< 2.3	0.77	0.77	1.23	< 1.2	0.43
AREA 8 N2E3	7/28/2012	3.3	3.3	2.67	2.81	2.67	2.8	< 0.59	< 2.5	< 1.2	0.55	0.55	0.58	< 0.82	0.155
AREA 8 N18E3	7/28/2012	< 4.2	< 4.2	8.30	8.5	8.3	8.1	< 0.95	< 3.8	< 0.99	0.51	0.51	0.69	< 0.99	0.126
AREA 8 N10E19	7/28/2012	< 3.0	< 3	5.31	5.73	5.31	4.0	< 0.63	< 2.9	< 0.67	0.44	0.44	0.39	< 0.62	0.102
AREA 8 N18E11	7/28/2012	< 2.2	< 2.2	3.69	3.67	3.69	< 2.8	< 0.66	< 2.8	< 1.5	1.07	1.07	0.79	< 0.69	0.29
AREA 8 N42E3	7/29/2012	3.5	3.5	3.81	4.24	3.81	< 3.3	< 0.48	< 3.0	< 0.69	1.16	1.16	1.16	< 0.68	0.5
AREA 8 N34E3	7/29/2012	< 2.3	< 2.3	2.63	2.28	2.63	2.8	< 0.63	< 3.6	< 1.7	1.17	1.17	1.03	1.12	0.385
AREA 8 N26E3	7/29/2012	< 2.9	< 2.9	3.67	3.85	3.67	< 3.9	< 0.82	< 3.9	< 1.1	0.94	0.94	1.42	< 1.2	0.55
			Minimum	1.11											
			Maximum	9.50											
			Mean	3.9											
Area 9															
AREA 9	7/29/2012	< 2.2	< 2.2	1.31	1.47	1.31	2.9	< 0.55	< 2.1	< 1.0	1.27	1.27	1.22	< 0.72	0.381
Area 11															
AREA #11 N0' E0'	7/25/2012	< 2.6	< 2.6	1.19	1.2	1.19	< 4.0	< 0.37	< 2.3	< 1.6	1.57	1.57	1.26	1.12	0.434

TABLE D-2 (Continued)

LABORATORY RESULTS FOR SOIL SAMPLES
RADIATION - STANDARD PRODUCTS, INC. (FORMER) - WICHITA, KANSAS

Sample Information		U-238 Decay Series						U-235 Decay Series			Th-232 Decay Series				
Sample Name	**Date Collected**	**U-238**	**Th-234**	**Ra-226**	**Pb-214**	**Bi-214**	**Pb-210**	**U-235**	**Pa-231**	**Ac-227**	**Ra-228**	**Ac-228**	**Pb-212**	**Bi-212**	**Tl-208**
Area 12															
AREA#12 N0'E0'	7/23/2012	< 1.9	< 1.9	0.73	0.51	0.73	3.1	< 0.5	< 2.4	< 0.82	< 0.47	< 0.47	0.38	< 0.98	0.175
AREA#12 N12'E0'	7/23/2012	< 2.5	< 2.5	1.04	1.07	1.04	< 2.5	< 0.54	< 2.6	< 0.35	0.70	0.70	0.98	< 0.79	0.329
AREA#12 N24'E0'	7/23/2012	< 2.6	< 2.6	1.22	1.36	1.22	< 3.1	< 0.44	< 2.6	< 1.3	0.87	0.87	1.11	< 0.77	0.38
AREA#12 N0'E12'	7/23/2012	< 2.6	< 2.6	0.91	1.01	0.91	< 3.0	< 0.55	< 2.3	0.37	0.72	0.72	1.11	1.02	0.44
AREA#12 N12'E12'	7/23/2012	< 1.7	< 1.7	0.96	1.06	0.96	< 2.1	< 0.47	< 2.0	< 0.37	1.22	1.22	0.94	< 0.62	0.344
AREA#12 N24'E12'	7/23/2012	< 2.4	< 2.4	0.92	1.05	0.92	< 2.8	< 0.51	< 2.4	< 1.6	1.32	1.32	0.95	< 0.68	0.44
			Minimum	0.73											
			Maximum	1.22											
			Mean	1.0											
Area 13															
INSIDE PIT 3'	7/27/2012	< 2.7	< 2.7	1.56	1.91	1.56	11.5	< 0.55	< 2	< 1.3	1.26	1.26	1.4	1.48	0.53
Area 14															
AREA 14-NORTH WALL	6/25/2013	< 2.64	< 2.64	2.27	2.34	2.27	3.35	< 0.637	< 2.65	< 1.08	1.26	1.26	1.21	1.84	0.418
AREA 14-SOUTH WALL	6/25/2013	< 2.27	< 2.27	1.28	1.36	1.28	< 2.80	< 0.499	< 2.42	< 1.15	0.915	0.915	0.828	1.11	0.301
AREA 14-SOUTH WALL (duplicate)[1]	6/25/2013	< 2.15	< 2.15	1.38	1.47	1.38	< 2.32	< 0.539	< 2.23	< 0.987	1.223	1.223	0.8851	< 1.04	0.3318
AREA 14-EAST WALL	6/25/2013	< 2.30	< 2.30	1.15	1.18	1.15	3.58	< 0.553	< 2.76	< 0.523	1.46	1.46	1.09	< 1.40	0.385
AREA 14-WEST WALL	6/25/2013	< 4.33	< 4.33	3.46	3.20	3.46	5.26	< 0.987	2.20	< 2.27	< 0.858	< 0.858	0.949	< 2.15	0.318
AREA 14-FLOOR	6/25/2013	< 2.23	< 2.23	0.92	0.917	0.916	2.87	< 0.434	< 2.09	< 1.41	0.733	0.733	0.771	< 0.941	0.232
			Minimum	0.92											
			Maximum	3.46											
			Mean	1.8											
Reference Area															
REF-1	8/17/2012	< 2.3	< 2.3	0.80	0.99	0.8	< 2.5	< 0.48	< 2.2	< 0.61	0.75	0.75	0.61	< 0.81	0.35
REF-2	8/17/2012	< 1.4	< 1.4	0.82	0.98	0.82	< 1.5	< 0.35	< 1.3	< 0.37	0.5	0.5	0.74	< 0.6	0.262
REF-3	8/17/2012	2.2	2.2	0.69	0.7	0.69	< 2.1	< 0.41	< 1.7	< 0.59	0.43	0.43	0.4	< 0.62	0.237
REF-4	8/17/2012	< 1.5	< 1.5	0.78	0.89	0.78	< 1.9	< 0.46	< 1.9	< 0.36	0.66	0.66	0.66	< 0.57	0.228
REF-5	8/17/2012	< 3.2	< 3.2	1.07	1.14	1.07	3.5	< 0.61	< 3.1	< 1.4	1.28	1.28	1.08	< 1.1	0.52
REF-6	8/17/2012	1.8	1.8	0.86	0.92	0.86	< 1.9	< 0.38	< 1.6	< 0.77	1.01	1.01	0.79	< 0.55	0.272
REF-7	8/17/2012	< 1.7	< 1.7	0.69	0.76	0.69	< 1.7	< 0.34	< 1.9	< 0.95	0.58	0.58	0.46	< 0.5	0.136
			Minimum	0.69											
			Maximum	1.07											
			Mean	0.8											

Notes:

All results in picoCuries per gram (pCi/g)

Shaded values indicate Ra-226 concentrations exceeding the removal action level of 6.87 pCi/g.

[1] Laboratory duplicate not included in calculation of survey unit minimum, maximum, or average Ra-226 concentration. As a conservative measure, the duplicate pair with the highest Ra-226 concentration is used in calculations.

Elements:
Ac: Actinium Bi: Bismuth Pa: Protactinium Pb: Lead Ra: Radium Th: Thorium Tl: Thallium U: Uranium

APPENDIX E

DATA SUPPORTING WRS AND EMC TESTS

TABLE E-1

WILCOXON RANK SUM TEST FOR CLASS 1 SURVEY UNIT - AREA 1
RADIATION - STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Sample Name	Area	Radium-226 Measurement (pCi/g)	Adjusted Data (pCi/g)	Rank	Reference Area Rank
AREA 1-1	Survey	0.89	0.89	7	-
AREA 1-1	Survey	0.85	*Laboratory duplicate not used*		
AREA 1-2	Survey	0.71	0.71	4	-
AREA 1-3	Survey	0.83	0.83	5	-
AREA 1-4	Survey	0.89	0.89	7	-
AREA 1-5	Survey	0.61	0.61	1	-
AREA 1-6	Survey	0.62	0.62	2	-
AREA 1-7	Survey	2.0	2.0	9	-
AREA 1-8	Survey	9.4	9.4	18	-
AREA 1-9	Survey	0.88	0.88	6	-
AREA 1-10	Survey	17.3	17.3	19	-
AREA 1-11	Survey	2.44	2.44	10	-
AREA 1-12	Survey	0.65	0.65	3	-
REF-1	Reference	0.80	5.80	14	14
REF-2	Reference	0.82	5.82	15	15
REF-3	Reference	0.69	5.69	11	11
REF-4	Reference	0.78	5.78	13	13
REF-5	Reference	1.07	6.07	17	17
REF-6	Reference	0.86	5.86	16	16
REF-7	Reference	0.69	5.69	11	11
			Sum =	188	97

WRS Test Parameters

$DCGL_W$	5	pCi/g
Number of reference area samples, m	7	
Number of study area samples, n	12	
Average Radium-226 concentration of reference area samples	0.8	pCi/g
Average Radium-226 concentration of study area samples	3.1	pCi/g
α	0.05	
Critical Value (from MARSSIM Table I.4)	90	

WRS Test Conclusion

Because the sum of the reference area ranks is greater than the critical value, the null hypothesis is rejected and test indicates that the median concentration in the survey unit exceeds that in the reference area by less than the $DCGL_W$.

Notes

Shading identifies individual measurements that exceed the $DCGL_W$ plus the average reference area concentration

$DCGL_W$	Derived Concentration Guideline Level for average concentrations over a wide area
ft^2	square foot
m^2	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
pCi/g	picoCuries per gram
WRS	Wilcoxon Rank Sum

TABLE E-2

WILCOXON RANK SUM TEST FOR CLASS 1 SURVEY UNIT - AREA 8
RADIATION - STANDARD PRODUCTS, INC. (FORMER), WICHITA, KANSAS

Sample Name	Area	Radium-226 Measurement (pCi/g)	Adjusted Data (pCi/g)	Rank	Reference Area Rank
AREA 8 N10E3	Survey	9.5	9.50	19	-
AREA 8 N10E3	Survey	9.4	*Laboratory duplicate not used*		
AREA 8 N2E11	Survey	2.92	2.92	6	-
AREA 8 N10E11	Survey	1.46	1.46	2	-
AREA 8 N2E19	Survey	1.46	1.46	2	-
AREA 8 N50E3	Survey	1.11	1.11	1	-
AREA 8 N2E3	Survey	2.67	2.67	5	-
AREA 8 N18E3	Survey	8.3	8.30	18	-
AREA 8 N10E19	Survey	5.31	5.31	10	-
AREA 8 N18E11	Survey	3.69	3.69	8	-
AREA 8 N42E3	Survey	3.81	3.81	9	-
AREA 8 N34E3	Survey	2.63	2.63	4	-
AREA 8 N26E3	Survey	3.67	3.67	7	-
REF-1	Reference	0.80	5.80	14	14
REF-2	Reference	0.82	5.82	15	15
REF-3	Reference	0.69	5.69	11	11
REF-4	Reference	0.78	5.78	13	13
REF-5	Reference	1.07	6.07	17	17
REF-6	Reference	0.86	5.86	16	16
REF-7	Reference	0.69	5.69	11	11
			Sum =	188	97

WRS Test Parameters

$DCGL_W$	5	pCi/g
Number of reference area samples, m	7	
Number of study area samples, n	12	
Average Radium-226 concentration of reference area samples	0.82	pCi/g
Average Radium-226 concentration of study area samples	3.34	pCi/g
α	0.05	
Critical Value (from MARSSIM Table I.4)	90	

WRS Test Conclusion

Because the sum of the reference area ranks is greater than the critical value, the null hypothesis is rejected and test indicates that the median concentration in the survey unit exceeds that in the reference area by less than the $DCGL_W$.

Notes

Shading identifies individual measurements that exceed the $DCGL_W$ plus the average reference area concentration

$DCGL_{EMC}$	Derived Concentration Guideline Level for elevated measurement comparison
$DCGL_W$	Derived Concentration Guideline Level for average concentrations over a wide area
ft^2	square foot
m^2	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
pCi/g	picoCuries per gram
WRS	Wilcoxon Rank Sum

TABLE E-3

DETERMINATION OF AREA FACTORS AND $DCGL_{EMC}$ VALUES FOR GROUND PLANE SOURCES OF VARIOUS SIZE

Size of Ground Plane Source (Slab Size)	Ratio of Dose Rate Relative to Infinite Ground Plane Source (RDRRinf) for Ra-226+D [see Note 1]	Ratio of Dose Rate Relative to 10,000 m2 Ground Plane Source (RDRR10000) for Ra-226+D [see Note 2]	Area Factor (AF) Corresponding to $RDRR_{10000}$ [see Note 3]	$DCGL_{EMC}$ Corresponding to $RDRR_{10000}$ [see Note 4]
(m^2)	-	-	-	(pCi/g)
3	0.091	0.098	10.2	51
4	0.125	0.135	7.4	37
5	0.151	0.163	6.1	31
7	0.191	0.206	4.9	24
10	0.228	0.246	4.06	20
24	0.336	0.363	2.75	14
40	0.397	0.428	2.33	12
50	0.427	0.461	2.17	11
100	0.512	0.553	1.81	9.0
500	0.690	0.745	1.34	6.7
1000	0.757	0.817	1.22	6.1
2000	0.817	0.882	1.13	5.7
5000	0.885	0.956	1.05	5.2
10000	0.926	1.000	1.00	5.0

Notes:

1 Except for slab sizes of 3, 5, 7, and 24 m2, dose rate ratios are those specified in Ratios of Dose Rates for Contaminated Slabs, K.F. Eckerman, September 20, 2007 (see http://epa-prgs.ornl.gov/radionuclides/ContaminatedSlabs.pdf). Dose rate ratios for slab areas of 3 and 20 m2 are extrapolated/interpolated from Eckerman data (see Appendix E, Figure E-1).

2 Dose ratio relative to 10,000 m^2 ground plane source calculated by dividing the subject dose rate ratio (relative to infinite ground plane) by 0.926 (i.e, the dose rate ratio relative to infinite ground plane for a slab size of 10,000 m^2).

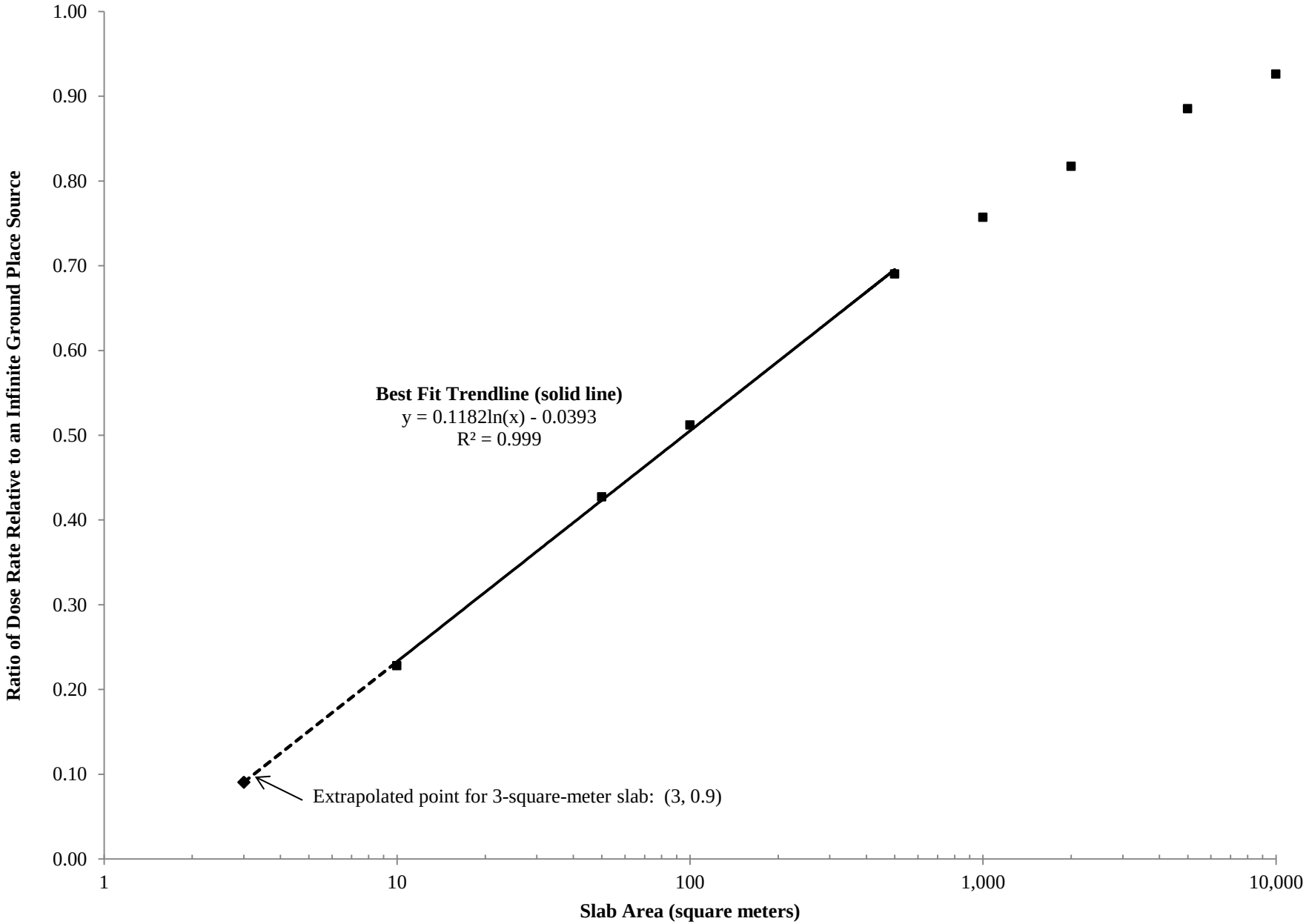
3 $AF = 1 / RDRR_{10000}$

4 $DCGL_{EMC} = DCGL_W$ x AF; for the Standard Precision, Inc. Site, $DCGL_W$ = 5.0 pCi/g

AF	Area factor
$DCGL_{EMC}$	Derived concentration guideline level for elevated measurement comparison
$DCGL_W$	Derived concentration guideline level for average concentrations over a wide area
m^2	Square meter
pCi/g	picoCuries per gram
Ra-226	Radium-226

Figure E-1

Ratio of Dose Rate Relative to an Infinite Ground Plane Source



APPENDIX F

LABORATORY DATA

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

Radiation - Standard Products

Lot #: F2G270459

Rob Monning

Tetra Tech, EMI ARRA
415 Oak Street
Kansas City, MO 64106

TESTAMERICA LABORATORIES, INC.

Erika Starman
Project Manager

August 24, 2012

13715 Rider Trail North Earth City, MO 63045 **tel** 314.298.8566 **fax** 314.298.8757 **www.testamericainc.com**

Case Narrative
LOT NUMBER: F2G270459

This report contains the analytical results for the 31 samples received under chain of custody by TestAmerica St. Louis on July 27, 2012. These samples are associated with your Radiation - Standard Products project.

The analytical results included in this report meet all applicable quality control procedure requirements.

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.

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

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

METHODS SUMMARY

F2G270459

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F2G270459

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MVVKP	001	AREA #5 N24' E0'	07/24/12	15:34
MVVKQ	002	AREA #5 N36' E0'	07/24/12	15:37
MVVKR	003	AREA #5 N48' E0'	07/24/12	15:39
MVVKT	004	AREA #5 N60' E0'	07/24/12	15:42
MVVKV	005	AREA #5 N72' E0'	07/24/12	15:45
MVVKW	006	AREA #5 N24' E12'	07/24/12	16:02
MVVKX	007	AREA #5 N36' E12'	07/24/12	16:05
MVVK0	008	AREA #5 N48' E12'	07/24/12	16:08
MVVK1	009	AREA #5 N60' E12'	07/24/12	16:09
MVVK2	010	AREA #5 N72' E12'	07/24/12	16:11
MVVK3	011	AREA #5 N84' E12'	07/24/12	16:15
MVVK4	012	AREA #5 N0' E24'	07/25/12	11:32
MVVK5	013	AREA #5 N72' E36'	07/25/12	11:50
MVVK6	014	AREA #2 N0' E0'	07/25/12	13:41
MVVK7	015	AREA #2 N12' E0'	07/25/12	13:44
MVVK8	016	AREA #2 N0' E12'	07/25/12	13:48
MVVK9	017	AREA #2 N12' E12'	07/25/12	13:52
MVVLA	018	BACKFILL	07/24/12	10:00
MVVLC	019	AREA #11 N0' E0'	07/25/12	16:05
MVVLD	020	AREA #5 N12' E24'	07/25/12	11:35
MVVLE	021	AREA #5 N24' E24'	07/25/12	08:40
MVVLF	022	AREA #5 N36' E24'	07/24/12	16:22
MVVLG	023	AREA #5 N48' E24'	07/24/12	16:20
MVVLH	024	AREA #5 N60' E24'	07/24/12	16:18
MVVLJ	025	AREA #5 N72' E24'	07/24/12	16:15
MVVLK	026	AREA #5 N0' E36'	07/25/12	11:27
MVVLL	027	AREA #5 N12' E36'	07/25/12	11:29
MVVLM	028	AREA #5 N24' E36'	07/25/12	08:32
MVVLN	029	AREA #5 N36' E36'	07/24/12	16:30
MVVLP	030	AREA #5 N48' E36'	07/24/12	16:26
MVVLQ	031	AREA #5 N60' E36'	07/24/12	11:26

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, EMI (ARRA)

Client Sample ID: AREA #5 N24' E0'

Radiochemistry

Lab Sample ID: F2G270459-001
Work Order: MVVKP
Matrix: SOLID

Date Collected: 07/24/12 1534
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213121**		**Yld %**
Actinium 227	0.17	U	0.96		1.6	07/31/12	08/21/12
Actinium 228	**0.96**		**0.29**		**0.33**	**07/31/12**	**08/21/12**
Bismuth 212	0.36	U	0.39		0.65	07/31/12	08/21/12
Bismuth 214	**1.90**		**0.31**		**0.21**	**07/31/12**	**08/21/12**
Lead 210	2.9	U	2.2		2.9	07/31/12	08/21/12
Lead 212	**0.89**		**0.19**		**0.18**	**07/31/12**	**08/21/12**
Lead 214	**2.36**		**0.34**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**18.3**		**2.8**		**0.7**	**07/31/12**	**08/21/12**
Protactinium 231	0.8	U	1.1		2.4	07/31/12	08/21/12
Radium (226)	**1.90**		**0.31**	1.00	**0.21**	**07/31/12**	**08/21/12**
Radium 228	**0.96**		**0.29**		**0.33**	**07/31/12**	**08/21/12**
Thallium 208	**0.35**		**0.10**		**0.09**	**07/31/12**	**08/21/12**
Thorium 234	1.42	U	0.96		2.5	07/31/12	08/21/12
Uranium 235	0.1	U	0.36		0.63	07/31/12	08/21/12
Uranium 238	1.42	U	0.96		2.5	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N24' E0' DUP

Radiochemistry

Lab Sample ID: F2G270459-001X
Work Order: MVVKP
Matrix: SOLID

Date Collected: 07/24/12 1534
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.06	U	0.30		1.6	07/31/12	08/21/12
Actinium 228	**0.83**		**0.26**		**0.37**	**07/31/12**	**08/21/12**
Bismuth 212	**1.19**		**0.43**		**0.30**	**07/31/12**	**08/21/12**
Bismuth 214	**1.95**		**0.31**		**0.19**	**07/31/12**	**08/21/12**
Lead 210	2.4	U	1.8		2.4	07/31/12	08/21/12
Lead 212	**0.97**		**0.19**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**2.06**		**0.31**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**16.4**		**2.5**		**0.4**	**07/31/12**	**08/21/12**
Protactinium 231	0.23	U	0.55		2.4	07/31/12	08/21/12
Radium (226)	**1.95**		**0.31**	1.00	**0.19**	**07/31/12**	**08/21/12**
Radium 228	**0.83**		**0.26**		**0.37**	**07/31/12**	**08/21/12**
Thallium 208	**0.379**		**0.094**		**0.076**	**07/31/12**	**08/21/12**
Thorium 234	1.76	U	0.79		2.2	07/31/12	08/21/12
Uranium 235	0.21	U	0.34		0.54	07/31/12	08/21/12
Uranium 238	1.76	U	0.79		2.2	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N36' E0'

Radiochemistry

Lab Sample ID: F2G270459-002
Work Order: MVVKQ
Matrix: SOLID

Date Collected: 07/24/12 1537
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	0.04	U	0.60		1.6	07/31/12	08/21/12
Actinium 228	**1.44**		**0.32**		**0.11**	**07/31/12**	**08/21/12**
Bismuth 212	0.73	U	0.51		0.75	07/31/12	08/21/12
Bismuth 214	**1.34**		**0.26**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	**3.0**		**2.2**		**2.8**	**07/31/12**	**08/21/12**
Lead 212	**1.15**		**0.22**		**0.18**	**07/31/12**	**08/21/12**
Lead 214	**1.38**		**0.25**		**0.19**	**07/31/12**	**08/21/12**
Potassium 40	**19.2**		**2.9**		**1.1**	**07/31/12**	**08/21/12**
Protactinium 231	0.66	U	0.46		3.2	07/31/12	08/21/12
Radium (226)	**1.34**		**0.26**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**1.44**		**0.32**		**0.11**	**07/31/12**	**08/21/12**
Thallium 208	**0.45**		**0.10**		**0.07**	**07/31/12**	**08/21/12**
Thorium 234	1.5	U	1.6		2.3	07/31/12	08/21/12
Uranium 235	0.14	U	0.36		0.60	07/31/12	08/21/12
Uranium 238	1.5	U	1.6		2.3	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N48' E0'

Radiochemistry

Lab Sample ID: F2G270459-003
Work Order: MVVKR
Matrix: SOLID

Date Collected: 07/24/12 1539
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213121**		**Yld %**
Actinium 227	-0.44	U	0.53		0.85	07/31/12	08/21/12
Actinium 228	**1.38**		**0.32**		**0.19**	**07/31/12**	**08/21/12**
Bismuth 212	0.43	U	0.50		0.81	07/31/12	08/21/12
Bismuth 214	**1.53**		**0.29**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	1.7	U	2.0		3.0	07/31/12	08/21/12
Lead 212	**1.42**		**0.35**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**1.66**		**0.30**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**22.5**		**3.3**		**0.8**	**07/31/12**	**08/21/12**
Protactinium 231	0.98	U	0.64		2.9	07/31/12	08/21/12
Radium (226)	**1.53**		**0.29**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**1.38**		**0.32**		**0.19**	**07/31/12**	**08/21/12**
Thallium 208	**0.48**		**0.12**		**0.1**	**07/31/12**	**08/21/12**
Thorium 234	1.8	U	2.0		2.6	07/31/12	08/21/12
Uranium 235	0.14	U	0.28		0.73	07/31/12	08/21/12
Uranium 238	1.8	U	2.0		2.6	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N60' E0'

Radiochemistry

Lab Sample ID: F2G270459-004
Work Order: MVVKT
Matrix: SOLID

Date Collected: 07/24/12 1542
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213121**		**Yld %**
Actinium 227	0.15	U	0.29		1.3	07/31/12	08/21/12
Actinium 228	**0.95**		**0.27**		**0.18**	**07/31/12**	**08/21/12**
Bismuth 212	0.25	U	0.39		0.66	07/31/12	08/21/12
Bismuth 214	**2.45**		**0.39**		**0.18**	**07/31/12**	**08/21/12**
Lead 210	2.0	U	1.5		2.1	07/31/12	08/21/12
Lead 212	**0.65**		**0.15**		**0.14**	**07/31/12**	**08/21/12**
Lead 214	**2.75**		**0.37**		**0.20**	**07/31/12**	**08/21/12**
Potassium 40	**14.0**		**2.3**		**0.6**	**07/31/12**	**08/21/12**
Protactinium 231	0.32	U	0.35		2.6	07/31/12	08/21/12
Radium (226)	**2.45**		**0.39**	1.00	**0.18**	**07/31/12**	**08/21/12**
Radium 228	**0.95**		**0.27**		**0.18**	**07/31/12**	**08/21/12**
Thallium 208	**0.292**		**0.096**		**0.081**	**07/31/12**	**08/21/12**
Thorium 234	1.32	U	0.66		1.9	07/31/12	08/21/12
Uranium 235	0.25	U	0.31		0.50	07/31/12	08/21/12
Uranium 238	1.32	U	0.66		1.9	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N72' E0'

Radiochemistry

Lab Sample ID: F2G270459-005
Work Order: MVVKV
Matrix: SOLID

Date Collected: 07/24/12 1545
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.12	U	0.16		1.1	07/31/12	08/21/12
Aotinium 228	**1.18**		0.28		0.14	07/31/12	08/21/12
Bismuth 212	**0.62**		0.37		0.52	07/31/12	08/21/12
Bismuth 214	**3.37**		0.46		0.15	07/31/12	08/21/12
Lead 210	**2.8**		2.2		2.8	07/31/12	08/21/12
Lead 212	**0.73**		0.16		0.15	07/31/12	08/21/12
Lead 214	**3.35**		0.43		0.20	07/31/12	08/21/12
Potassium 40	**16.2**		2.4		0.9	07/31/12	08/21/12
Protactinium 231	0.68	U	0.90		2.8	07/31/12	08/21/12
Radium (226)	**3.37**		0.46	1.00	0.15	07/31/12	08/21/12
Radium 228	**1.18**		0.28		0.14	07/31/12	08/21/12
Thallium 208	**0.255**		0.081		0.079	07/31/12	08/21/12
Thorium 234	**2.2**		1.7		2.1	07/31/12	08/21/12
Uranium 235	0.14	U	0.38		0.64	07/31/12	08/21/12
Uranium 238	**2.2**		1.7		2.1	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N24' E12'

Radiochemistry

Lab Sample ID: F2G270459-006
Work Order: MVVKW
Matrix: SOLID

Date Collected: 07/24/12 1602
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.39		0.23		0.33	07/31/12	08/21/12
Actinium 228	1.25		0.27		0.10	07/31/12	08/21/12
Bismuth 212	0.60	U	0.48		0.73	07/31/12	08/21/12
Bismuth 214	1.12		0.24		0.17	07/31/12	08/21/12
Lead 210	2.3	U	2.1		2.9	07/31/12	08/21/12
Lead 212	1.10		0.21		0.15	07/31/12	08/21/12
Lead 214	1.04		0.22		0.17	07/31/12	08/21/12
Potassium 40	20.1		3.0		0.8	07/31/12	08/21/12
Protactinium 231	-0.04	U	0.10		2.4	07/31/12	08/21/12
Radium (226)	1.12		0.24	1.00	0.17	07/31/12	08/21/12
Radium 228	1.25		0.27		0.10	07/31/12	08/21/12
Thallium 208	0.48		0.11		0.08	07/31/12	08/21/12
Thorium 234	2.6		1.8		2.3	07/31/12	08/21/12
Uranium 235	0.19	U	0.16		0.36	07/31/12	08/21/12
Uranium 238	2.6		1.8		2.3	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N36' E12'

Radiochemistry

Lab Sample ID: F2G270459-007
Work Order: MVVKX
Matrix: SOLID

Date Collected: 07/24/12 1605
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2213121**		**Yld %**
Actinium 227	-0.42	U	0.51		0.84	07/31/12	08/21/12
Actinium 228	**1.01**		**0.30**		**0.35**	**07/31/12**	**08/21/12**
Bismuth 212	0.39	U	0.67		1.1	07/31/12	08/21/12
Bismuth 214	**1.26**		**0.29**		**0.20**	**07/31/12**	**08/21/12**
Lead 210	1.1	U	1.7		2.9	07/31/12	08/21/12
Lead 212	**1.11**		**0.23**		**0.19**	**07/31/12**	**08/21/12**
Lead 214	**1.40**		**0.28**		**0.22**	**07/31/12**	**08/21/12**
Potassium 40	**21.0**		**3.5**		**0.9**	**07/31/12**	**08/21/12**
Protactinium 231	0.44	U	0.55		2.9	07/31/12	08/21/12
Radium (226)	**1.26**		**0.29**	1.00	**0.20**	**07/31/12**	**08/21/12**
Radium 228	**1.01**		**0.30**		**0.35**	**07/31/12**	**08/21/12**
Thallium 208	**0.45**		**0.11**		**0.06**	**07/31/12**	**08/21/12**
Thorium 234	2.14	U	0.97		2.5	07/31/12	08/21/12
Uranium 235	0.29	U	0.32		0.49	07/31/12	08/21/12
Uranium 238	2.14	U	0.97		2.5	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N48' E12'

Radiochemistry

Lab Sample ID: F2G270459-008
Work Order: MVVK0
Matrix: SOLID

Date Collected: 07/24/12 1608
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	0.11	U	0.14		1.2	07/31/12	08/21/12
Actinium 228	**1.45**		**0.33**		**0.21**	**07/31/12**	**08/21/12**
Bismuth 212	0.36	U	0.45		0.73	07/31/12	08/21/12
Bismuth 214	**1.38**		**0.29**		**0.19**	**07/31/12**	**08/21/12**
Lead 210	2.1	U	1.7		2.7	07/31/12	08/21/12
Lead 212	**1.04**		**0.20**		**0.15**	**07/31/12**	**08/21/12**
Lead 214	**1.21**		**0.25**		**0.21**	**07/31/12**	**08/21/12**
Potassium 40	**19.7**		**3.1**		**0.7**	**07/31/12**	**08/21/12**
Protactinium 231	0.25	U	0.31		2.7	07/31/12	08/21/12
Radium (226)	**1.38**		**0.29**	1.00	**0.19**	**07/31/12**	**08/21/12**
Radium 228	**1.45**		**0.33**		**0.21**	**07/31/12**	**08/21/12**
Thallium 208	**0.42**		**0.11**		**0.07**	**07/31/12**	**08/21/12**
Thorium 234	0.26	U	0.76		2.8	07/31/12	08/21/12
Uranium 235	0.30	U	0.36		0.57	07/31/12	08/21/12
Uranium 238	0.26	U	0.76		2.8	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N60' E12'

Radiochemistry

Lab Sample ID: F2G270459-009
Work Order: MVVK1
Matrix: SOLID

Date Collected: 07/24/12 1609
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2213121**		**Yld %**
Actinium 227	0.1	U	0.14		0.53	07/31/12	08/21/12
Actinium 228	**1.09**		**0.27**		**0.20**	**07/31/12**	**08/21/12**
Bismuth 212	0.34	U	0.40		0.66	07/31/12	08/21/12
Bismuth 214	**2.75**		**0.40**		**0.16**	**07/31/12**	**08/21/12**
Lead 210	**2.8**		**1.8**		**2.5**	**07/31/12**	**08/21/12**
Lead 212	**0.73**		**0.17**		**0.18**	**07/31/12**	**08/21/12**
Lead 214	**2.90**		**0.39**		**0.22**	**07/31/12**	**08/21/12**
Potassium 40	**15.1**		**2.4**		**0.8**	**07/31/12**	**08/21/12**
Protactinium 231	-0.2	U	1.4		2.4	07/31/12	08/21/12
Radium (226)	**2.75**		**0.40**	1.00	**0.16**	**07/31/12**	**08/21/12**
Radium 228	**1.09**		**0.27**		**0.20**	**07/31/12**	**08/21/12**
Thallium 208	**0.283**		**0.082**		**0.072**	**07/31/12**	**08/21/12**
Thorium 234	2.04	U	0.87		2.5	07/31/12	08/21/12
Uranium 235	0.32	U	0.35		0.45	07/31/12	08/21/12
Uranium 238	2.04	U	0.87		2.5	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N72' E12'

Radiochemistry

Lab Sample ID: F2G270459-010
Work Order: MVVK2
Matrix: SOLID

Date Collected: 07/24/12 1611
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	4.70		0.81		0.41	07/31/12	08/21/12
Actinium 228	1.47		0.32		0.16	07/31/12	08/21/12
Bismuth 212	0.86		0.45		0.46	07/31/12	08/21/12
Bismuth 214	1.16		0.26		0.19	07/31/12	08/21/12
Lead 210	2.2	U	1.7		2.4	07/31/12	08/21/12
Lead 212	1.25		0.22		0.15	07/31/12	08/21/12
Lead 214	1.33		0.24		0.18	07/31/12	08/21/12
Potassium 40	21.2		3.1		1	07/31/12	08/21/12
Protactinium 231	0.29	U	0.37		2.3	07/31/12	08/21/12
Radium (226)	1.16		0.26	1.00	0.19	07/31/12	08/21/12
Radium 228	1.47		0.32		0.16	07/31/12	08/21/12
Thallium 208	0.368		0.096		0.081	07/31/12	08/21/12
Thorium 234	1.00	U	0.76		2.6	07/31/12	08/21/12
Uranium 235	0.28	U	0.30		0.42	07/31/12	08/21/12
Uranium 238	1.00	U	0.76		2.6	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N84' E12'

Radiochemistry

Lab Sample ID: F2G270459-011
Work Order: MVVK3
Matrix: SOLID

Date Collected: 07/24/12 1615
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.053	U	0.078		0.51	07/31/12	08/21/12
Actinium 228	**1.15**		**0.28**		**0.40**	**07/31/12**	**08/21/12**
Bismuth 212	0.68	U	0.51		0.77	07/31/12	08/21/12
Bismuth 214	**1.20**		**0.25**		**0.15**	**07/31/12**	**08/21/12**
Lead 210	0.3	U	1.7		2.9	07/31/12	08/21/12
Lead 212	**1.33**		**0.23**		**0.14**	**07/31/12**	**08/21/12**
Lead 214	**1.31**		**0.23**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**19.5**		**3.0**		**0.8**	**07/31/12**	**08/21/12**
Protactinium 231	0.64	U	0.41		2.8	07/31/12	08/21/12
Radium (226)	**1.20**		**0.25**	1.00	**0.15**	**07/31/12**	**08/21/12**
Radium 228	**1.15**		**0.28**		**0.40**	**07/31/12**	**08/21/12**
Thallium 208	**0.340**		**0.096**		**0.10**	**07/31/12**	**08/21/12**
Thorium 234	1.7	U	1.5		2.4	07/31/12	08/21/12
Uranium 235	0.29	U	0.31		0.46	07/31/12	08/21/12
Uranium 238	1.7	U	1.5		2.4	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N0' E24'

Radiochemistry

Lab Sample ID: F2G270459-012
Work Order: MVVK4
Matrix: SOLID

Date Collected: 07/25/12 1132
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	-0.84	U	0.66		1.0	07/31/12	08/21/12
Actinium 228	**0.93**		**0.30**		**0.32**	**07/31/12**	**08/21/12**
Bismuth 212	**0.81**		**0.54**		**0.81**	**07/31/12**	**08/21/12**
Bismuth 214	**1.35**		**0.27**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	1.8	U	1.7		2.5	07/31/12	08/21/12
Lead 212	**1.31**		**0.23**		**0.16**	**07/31/12**	**08/21/12**
Lead 214	**1.09**		**0.26**		**0.21**	**07/31/12**	**08/21/12**
Potassium 40	**18.1**		**2.7**		**0.9**	**07/31/12**	**08/21/12**
Protactinium 231	0.41	U	0.46		2.9	07/31/12	08/21/12
Radium (226)	**1.35**		**0.27**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**0.93**		**0.30**		**0.32**	**07/31/12**	**08/21/12**
Thallium 208	**0.48**		**0.13**		**0.1**	**07/31/12**	**08/21/12**
Thorium 234	0.89	U	0.78		2.7	07/31/12	08/21/12
Uranium 235	-0.10	U	0.37		0.63	07/31/12	08/21/12
Uranium 238	0.89	U	0.78		2.7	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N72' E36'

Radiochemistry

Lab Sample ID: F2G270459-013
Work Order: MVVK5
Matrix: SOLID

Date Collected: 07/25/12 1150
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	0.08	U	0.28		1.9	07/31/12	08/21/12
Actinium 228	**1.48**		**0.34**		**0.28**	**07/31/12**	**08/21/12**
Bismuth 212	**1.20**		**0.65**		**0.62**	**07/31/12**	**08/21/12**
Bismuth 214	**3.79**		**0.52**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	2.2	U	2.1		3.0	07/31/12	08/21/12
Lead 212	**1.46**		**0.26**		**0.18**	**07/31/12**	**08/21/12**
Lead 214	**3.89**		**0.52**		**0.22**	**07/31/12**	**08/21/12**
Potassium 40	**19.6**		**2.9**		**0.8**	**07/31/12**	**08/21/12**
Protactinium 231	1.06	U	0.79		2.8	07/31/12	08/21/12
Radium (226)	**3.79**		**0.52**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**1.48**		**0.34**		**0.28**	**07/31/12**	**08/21/12**
Thallium 208	**0.54**		**0.12**		**0.09**	**07/31/12**	**08/21/12**
Thorium 234	0.41	U	0.95		3.4	07/31/12	08/21/12
Uranium 235	0.40	U	0.49		0.68	07/31/12	08/21/12
Uranium 238	0.41	U	0.95		3.4	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #2 N0' E0'

Radiochemistry

Lab Sample ID: F2G270459-014
Work Order: MVVK6
Matrix: SOLID

Date Collected: 07/25/12 1341
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.17	U	0.23		2.0	07/31/12	08/21/12
Actinium 228	**1.41**		**0.31**		**0.26**	**07/31/12**	**08/21/12**
Bismuth 212	**1.48**		**0.56**		**0.45**	**07/31/12**	**08/21/12**
Bismuth 214	**1.43**		**0.30**		**0.20**	**07/31/12**	**08/21/12**
Lead 210	1.6	U	1.9		2.7	07/31/12	08/21/12
Lead 212	**1.51**		**0.26**		**0.16**	**07/31/12**	**08/21/12**
Lead 214	**1.62**		**0.29**		**0.23**	**07/31/12**	**08/21/12**
Potassium 40	**19.7**		**2.9**		**0.4**	**07/31/12**	**08/21/12**
Protactinium 231	0.75	U	0.62		3.1	07/31/12	08/21/12
Radium (226)	**1.43**		**0.30**	1.00	**0.20**	**07/31/12**	**08/21/12**
Radium 228	**1.41**		**0.31**		**0.26**	**07/31/12**	**08/21/12**
Thallium 208	**0.55**		**0.13**		**0.10**	**07/31/12**	**08/21/12**
Thorium 234	0.85	U	0.78		2.7	07/31/12	08/21/12
Uranium 235	0.21	U	0.30		0.54	07/31/12	08/21/12
Uranium 238	0.85	U	0.78		2.7	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #2 N12' E0'

Radiochemistry

Lab Sample ID: F2G270459-015
Work Order: MVVK7
Matrix: SOLID

Date Collected: 07/25/12 1344
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213121**		**Yld %**
Actinium 227	-0.69	U	0.92		1.5	07/31/12	08/21/12
Actinium 228	**1.55**		**0.48**		**0.25**	**07/31/12**	**08/21/12**
Bismuth 212	0.44	U	0.67		1.1	07/31/12	08/21/12
Bismuth 214	**1.66**		**0.37**		**0.11**	**07/31/12**	**08/21/12**
Lead 210	3.3	U	2.8		4.0	07/31/12	08/21/12
Lead 212	**1.71**		**0.34**		**0.26**	**07/31/12**	**08/21/12**
Lead 214	**1.70**		**0.36**		**0.22**	**07/31/12**	**08/21/12**
Potassium 40	**21.4**		**4.1**		**1.7**	**07/31/12**	**08/21/12**
Protactinium 231	0.51	U	0.77		4.2	07/31/12	08/21/12
Radium (226)	**1.66**		**0.37**	1.00	**0.11**	**07/31/12**	**08/21/12**
Radium 228	**1.55**		**0.48**		**0.25**	**07/31/12**	**08/21/12**
Thallium 208	**0.65**		**0.19**		**0.15**	**07/31/12**	**08/21/12**
Thorium 234	1.6	U	1.3		3.7	07/31/12	08/21/12
Uranium 235	0.31	U	0.49		0.87	07/31/12	08/21/12
Uranium 238	1.6	U	1.3		3.7	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #2 N0' E12'

Radiochemistry

Lab Sample ID: F2G270459-016
Work Order: MVVK8
Matrix: SOLID

Date Collected: 07/25/12 1348
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.15	U	0.25		2.0	07/31/12	08/21/12
Actinium 228	**1.40**		**0.36**		**0.15**	**07/31/12**	**08/21/12**
Bismuth 212	1.08	U	0.78		1.2	07/31/12	08/21/12
Bismuth 214	**1.44**		**0.31**		**0.19**	**07/31/12**	**08/21/12**
Lead 210	**2.6**		**1.9**		**2.5**	**07/31/12**	**08/21/12**
Lead 212	**1.47**		**0.27**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**1.34**		**0.31**		**0.25**	**07/31/12**	**08/21/12**
Potassium 40	**18.5**		**3.1**		**0.9**	**07/31/12**	**08/21/12**
Protactinium 231	0.27	U	0.51		3.0	07/31/12	08/21/12
Radium (226)	**1.44**		**0.31**	1.00	**0.19**	**07/31/12**	**08/21/12**
Radium 228	**1.40**		**0.36**		**0.15**	**07/31/12**	**08/21/12**
Thallium 208	**0.55**		**0.14**		**0.09**	**07/31/12**	**08/21/12**
Thorium 234	**2.2**		**1.7**		**2.2**	**07/31/12**	**08/21/12**
Uranium 235	0.29	U	0.38		0.55	07/31/12	08/21/12
Uranium 238	**2.2**		**1.7**		**2.2**	**07/31/12**	**08/21/12**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #2 N12' E12'

Radiochemistry

Lab Sample ID: F2G270459-017
Work Order: MVVK9
Matrix: SOLID

Date Collected: 07/25/12 1352
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213121		Yld %
Actinium 227	0.08	U	0.20		0.94	07/31/12	08/21/12
Actinium 228	**1.32**		**0.31**		**0.21**	**07/31/12**	**08/21/12**
Bismuth 212	**1.32**		**0.50**		**0.35**	**07/31/12**	**08/21/12**
Bismuth 214	**1.51**		**0.30**		**0.18**	**07/31/12**	**08/21/12**
Lead 210	1.7	U	2.0		3.3	07/31/12	08/21/12
Lead 212	**1.46**		**0.28**		**0.19**	**07/31/12**	**08/21/12**
Lead 214	**1.54**		**0.30**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**20.4**		**3.2**		**0.7**	**07/31/12**	**08/21/12**
Protactinium 231	1.24	U	0.88		2.6	07/31/12	08/21/12
Radium (226)	**1.51**		**0.30**	1.00	**0.18**	**07/31/12**	**08/21/12**
Radium 228	**1.32**		**0.31**		**0.21**	**07/31/12**	**08/21/12**
Thallium 208	**0.50**		**0.14**		**0.1**	**07/31/12**	**08/21/12**
Thorium 234	0.55	U	0.57		3.1	07/31/12	08/21/12
Uranium 235	0.21	U	0.32		0.57	07/31/12	08/21/12
Uranium 238	0.55	U	0.57		3.1	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: BACKFILL

Radiochemistry

Lab Sample ID: F2G270459-018
Work Order: MVVLA
Matrix: SOLID

Date Collected: 07/24/12 1000
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	0.07	U	0.12		1.3	07/31/12	08/21/12
Actinium 228	**0.94**		**0.21**		**0.13**	**07/31/12**	**08/21/12**
Bismuth 212	0.30	U	0.39		0.66	07/31/12	08/21/12
Bismuth 214	**0.89**		**0.18**		**0.12**	**07/31/12**	**08/21/12**
Lead 210	1.4	U	1.7		2.4	07/31/12	08/21/12
Lead 212	**0.79**		**0.16**		**0.13**	**07/31/12**	**08/21/12**
Lead 214	**0.87**		**0.16**		**0.13**	**07/31/12**	**08/21/12**
Potassium 40	**18.1**		**2.6**		**0.5**	**07/31/12**	**08/21/12**
Protactinium 231	0.44	U	0.59		1.8	07/31/12	08/21/12
Radium (226)	**0.89**		**0.18**	1.00	**0.12**	**07/31/12**	**08/21/12**
Radium 228	**0.94**		**0.21**		**0.13**	**07/31/12**	**08/21/12**
Thallium 208	**0.325**		**0.079**		**0.057**	**07/31/12**	**08/21/12**
Thorium 234	0.53	U	0.68		2.2	07/31/12	08/21/12
Uranium 235	0.16	U	0.26		0.48	07/31/12	08/21/12
Uranium 238	0.53	U	0.68		2.2	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #11 N0' E0'

Radiochemistry

Lab Sample ID: F2G270459-019
Work Order: MVVLC
Matrix: SOLID

Date Collected: 07/25/12 1605
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	1.02	U	0.55		1.6	07/31/12	08/21/12
Actinium 228	**1.57**		0.36		0.25	07/31/12	08/21/12
Bismuth 212	**1.12**		0.56		0.52	07/31/12	08/21/12
Bismuth 214	**1.19**		0.26		0.19	07/31/12	08/21/12
Lead 210	3.2	U	3.0		4.0	07/31/12	08/21/12
Lead 212	**1.26**		0.23		0.16	07/31/12	08/21/12
Lead 214	**1.20**		0.23		0.21	07/31/12	08/21/12
Potassium 40	**21.0**		3.1		1	07/31/12	08/21/12
Protactinium 231	0.70	U	0.53		2.3	07/31/12	08/21/12
Radium (226)	**1.19**		0.26	1.00	0.19	07/31/12	08/21/12
Radium 228	**1.57**		0.36		0.25	07/31/12	08/21/12
Thallium 208	**0.434**		0.098		0.063	07/31/12	08/21/12
Thorium 234	0.69	U	0.49		2.6	07/31/12	08/21/12
Uranium 235	0.24	U	0.26		0.37	07/31/12	08/21/12
Uranium 238	0.69	U	0.49		2.6	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N12' E24'

Radiochemistry

Lab Sample ID: F2G270459-020
Work Order: MVVLD
Matrix: SOLID

Date Collected: 07/25/12 1135
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213121		Yld %
Actinium 227	-0.55	U	0.62		1.0	07/31/12	08/21/12
Actinium 228	**1.14**		**0.31**		**0.40**	**07/31/12**	**08/21/12**
Bismuth 212	**1.54**		**0.48**		**0.24**	**07/31/12**	**08/21/12**
Bismuth 214	**1.32**		**0.29**		**0.21**	**07/31/12**	**08/21/12**
Lead 210	**3.8**		**2.5**		**3.1**	**07/31/12**	**08/21/12**
Lead 212	**1.34**		**0.34**		**0.20**	**07/31/12**	**08/21/12**
Lead 214	**1.29**		**0.29**		**0.21**	**07/31/12**	**08/21/12**
Potassium 40	**21.4**		**3.2**		**0.9**	**07/31/12**	**08/21/12**
Protactinium 231	0.61	U	0.53		3.4	07/31/12	08/21/12
Radium (226)	**1.32**		**0.29**	1.00	**0.21**	**07/31/12**	**08/21/12**
Radium 228	**1.14**		**0.31**		**0.40**	**07/31/12**	**08/21/12**
Thallium 208	**0.43**		**0.11**		**0.1**	**07/31/12**	**08/21/12**
Thorium 234	1.9	U	1.8		3.0	07/31/12	08/21/12
Uranium 235	0.13	U	0.40		0.68	07/31/12	08/21/12
Uranium 238	1.9	U	1.8		3.0	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N24' E24'

Radiochemistry

Lab Sample ID: F2G270459-021
Work Order: MVVLE
Matrix: SOLID

Date Collected: 07/25/12 0840
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2213122**		**Yld %**
Actinium 227	-1.20	U	0.30		0.13	07/31/12	08/21/12
Actinium 228	**1.08**		**0.31**		**0.25**	**07/31/12**	**08/21/12**
Bismuth 212	0.46	U	0.48		0.76	07/31/12	08/21/12
Bismuth 214	**1.42**		**0.27**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	2.1	U	2.1		2.7	07/31/12	08/21/12
Lead 212	**1.21**		**0.22**		**0.15**	**07/31/12**	**08/21/12**
Lead 214	**1.37**		**0.24**		**0.19**	**07/31/12**	**08/21/12**
Potassium 40	**20.0**		**2.9**		**0.4**	**07/31/12**	**08/21/12**
Protactinium 231	0.84	U	0.53		2.4	07/31/12	08/21/12
Radium (226)	**1.42**		**0.27**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**1.08**		**0.31**		**0.25**	**07/31/12**	**08/21/12**
Thallium 208	**0.45**		**0.10**		**0.07**	**07/31/12**	**08/21/12**
Thorium 234	0.91	U	0.67		2.7	07/31/12	08/21/12
Uranium 235	0.07	U	0.34		0.58	07/31/12	08/21/12
Uranium 238	0.91	U	0.67		2.7	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N24' E24' DUP

Radiochemistry

Lab Sample ID: F2G270459-021X
Work Order: MVVLE
Matrix: SOLID

Date Collected: 07/25/12 0840
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213122**		**Yld %**
Actinium 227	-0.71	U	0.66		1.1	07/31/12	08/21/12
Actinium 228	**1.07**		**0.30**		**0.13**	**07/31/12**	**08/21/12**
Bismuth 212	0.64	U	0.56		0.87	07/31/12	08/21/12
Bismuth 214	**1.37**		**0.27**		**0.16**	**07/31/12**	**08/21/12**
Lead 210	2.0	U	1.8		2.9	07/31/12	08/21/12
Lead 212	**1.20**		**0.24**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**1.48**		**0.29**		**0.19**	**07/31/12**	**08/21/12**
Potassium 40	**16.3**		**2.8**		**0.8**	**07/31/12**	**08/21/12**
Protactinium 231	0.5	U	1.1		2.5	07/31/12	08/21/12
Radium (226)	**1.37**		**0.27**	1.00	**0.16**	**07/31/12**	**08/21/12**
Radium 228	**1.07**		**0.30**		**0.13**	**07/31/12**	**08/21/12**
Thallium 208	**0.42**		**0.11**		**0.08**	**07/31/12**	**08/21/12**
Thorium 234	2.1	U	1.7		2.9	07/31/12	08/21/12
Uranium 235	0.24	U	0.29		0.67	07/31/12	08/21/12
Uranium 238	2.1	U	1.7		2.9	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N36' E24'

Radiochemistry

Lab Sample ID: F2G270459-022
Work Order: MVVLF
Matrix: SOLID

Date Collected: 07/24/12 1622
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213122		Yld %
Actinium 227	-0.018	U	0.020		1.0	07/31/12	08/21/12
Actinium 228	**1.45**		**0.40**		**0.54**	**07/31/12**	**08/21/12**
Bismuth 212	0.18	U	0.78		1.4	07/31/12	08/21/12
Bismuth 214	**1.31**		**0.36**		**0.24**	**07/31/12**	**08/21/12**
Lead 210	-0.8	U	6.1		4.1	07/31/12	08/21/12
Lead 212	**1.21**		**0.30**		**0.25**	**07/31/12**	**08/21/12**
Lead 214	**1.31**		**0.31**		**0.21**	**07/31/12**	**08/21/12**
Potassium 40	**17.0**		**3.4**		**1.5**	**07/31/12**	**08/21/12**
Protactinium 231	0.25	U	0.60		3.5	07/31/12	08/21/12
Radium (226)	**1.31**		**0.36**	1.00	**0.24**	**07/31/12**	**08/21/12**
Radium 228	**1.45**		**0.40**		**0.54**	**07/31/12**	**08/21/12**
Thallium 208	**0.36**		**0.13**		**0.13**	**07/31/12**	**08/21/12**
Thorium 234	**3.4**		**2.5**		**3.1**	**07/31/12**	**08/21/12**
Uranium 235	0.10	U	0.45		0.74	07/31/12	08/21/12
Uranium 238	**3.4**		**2.5**		**3.1**	**07/31/12**	**08/21/12**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N48' E24'

Radiochemistry

Lab Sample ID: F2G270459-023
Work Order: MVVLG
Matrix: SOLID

Date Collected: 07/24/12 1620
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213122		Yld %
Actinium 227	0.05	U	0.20		2.1	07/31/12	08/21/12
Actinium 228	**1.49**		**0.39**		**0.26**	**07/31/12**	**08/21/12**
Bismuth 212	0.58	U	0.65		1.0	07/31/12	08/21/12
Bismuth 214	**0.97**		**0.27**		**0.24**	**07/31/12**	**08/21/12**
Lead 210	2.6	U	1.9		2.6	07/31/12	08/21/12
Lead 212	**1.27**		**0.25**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**1.43**		**0.27**		**0.27**	**07/31/12**	**08/21/12**
Potassium 40	**20.7**		**3.5**		**1.0**	**07/31/12**	**08/21/12**
Protactinium 231	1.7	U	1.2		2.3	07/31/12	08/21/12
Radium (226)	**0.97**		**0.27**	1.00	**0.24**	**07/31/12**	**08/21/12**
Radium 228	**1.49**		**0.39**		**0.26**	**07/31/12**	**08/21/12**
Thallium 208	**0.35**		**0.12**		**0.10**	**07/31/12**	**08/21/12**
Thorium 234	**3.1**		**1.9**		**2.5**	**07/31/12**	**08/21/12**
Uranium 235	0.22	U	0.35		0.58	07/31/12	08/21/12
Uranium 238	**3.1**		**1.9**		**2.5**	**07/31/12**	**08/21/12**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N60' E24'

Radiochemistry

Lab Sample ID: F2G270459-024
Work Order: MVVLH
Matrix: SOLID

Date Collected: 07/24/12 1618
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213122**		**Yld %**
Actinium 227	-0.98	U	0.74		1.2	07/31/12	08/21/12
Actinium 228	**1.38**		**0.34**		**0.14**	**07/31/12**	**08/21/12**
Bismuth 212	0.62	U	0.61		0.97	07/31/12	08/21/12
Bismuth 214	**1.36**		**0.31**		**0.21**	**07/31/12**	**08/21/12**
Lead 210	2.5	U	2.1		2.6	07/31/12	08/21/12
Lead 212	**1.28**		**0.23**		**0.15**	**07/31/12**	**08/21/12**
Lead 214	**1.52**		**0.26**		**0.15**	**07/31/12**	**08/21/12**
Potassium 40	**17.9**		**3.0**		**1.2**	**07/31/12**	**08/21/12**
Protactinium 231	0.35	U	0.36		3.0	07/31/12	08/21/12
Radium (226)	**1.36**		**0.31**	1.00	**0.21**	**07/31/12**	**08/21/12**
Radium 228	**1.38**		**0.34**		**0.14**	**07/31/12**	**08/21/12**
Thallium 208	**0.48**		**0.12**		**0.07**	**07/31/12**	**08/21/12**
Thorium 234	1.8	U	2.0		2.7	07/31/12	08/21/12
Uranium 235	0.14	U	0.16		0.60	07/31/12	08/21/12
Uranium 238	1.8	U	2.0		2.7	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N72' E24'

Radiochemistry

Lab Sample ID: F2G270459-025
Work Order: MVVLJ
Matrix: SOLID

Date Collected: 07/24/12 1615
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213122**		**Yld %**
Actinium 227	0.11	U	0.23		0.51	07/31/12	08/21/12
Actinium 228	**1.44**		**0.30**		**0.23**	**07/31/12**	**08/21/12**
Bismuth 212	0.35	U	0.46		0.77	07/31/12	08/21/12
Bismuth 214	**1.46**		**0.28**		**0.17**	**07/31/12**	**08/21/12**
Lead 210	**7.2**		**3.4**		**4.2**	**07/31/12**	**08/21/12**
Lead 212	**1.46**		**0.25**		**0.16**	**07/31/12**	**08/21/12**
Lead 214	**1.47**		**0.24**		**0.19**	**07/31/12**	**08/21/12**
Potassium 40	**17.5**		**2.7**		**0.7**	**07/31/12**	**08/21/12**
Protactinium 231	0.34	U	0.30		3.0	07/31/12	08/21/12
Radium (226)	**1.46**		**0.28**	1.00	**0.17**	**07/31/12**	**08/21/12**
Radium 228	**1.44**		**0.30**		**0.23**	**07/31/12**	**08/21/12**
Thallium 208	**0.48**		**0.11**		**0.09**	**07/31/12**	**08/21/12**
Thorium 234	1.8	U	1.6		2.2	07/31/12	08/21/12
Uranium 235	0.23	U	0.32		0.61	07/31/12	08/21/12
Uranium 238	1.8	U	1.6		2.2	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N0' E36'

Radiochemistry

Lab Sample ID: F2G270459-026
Work Order: MVVLK
Matrix: SOLID

Date Collected: 07/25/12 1127
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2213122**		**Yld %**
Actinium 227	-0.79	U	0.62		0.98	07/31/12	08/21/12
Actinium 228	**1.14**		**0.27**		**0.11**	**07/31/12**	**08/21/12**
Bismuth 212	**0.93**		**0.55**		**0.78**	**07/31/12**	**08/21/12**
Bismuth 214	**1.17**		**0.24**		**0.18**	**07/31/12**	**08/21/12**
Lead 210	-0.3	U	2.4		3.1	07/31/12	08/21/12
Lead 212	**1.30**		**0.23**		**0.14**	**07/31/12**	**08/21/12**
Lead 214	**1.28**		**0.23**		**0.20**	**07/31/12**	**08/21/12**
Potassium 40	**21.5**		**3.1**		**1.0**	**07/31/12**	**08/21/12**
Protactinium 231	0.25	U	0.34		2.6	07/31/12	08/21/12
Radium (226)	**1.17**		**0.24**	1.00	**0.18**	**07/31/12**	**08/21/12**
Radium 228	**1.14**		**0.27**		**0.11**	**07/31/12**	**08/21/12**
Thallium 208	**0.46**		**0.12**		**0.1**	**07/31/12**	**08/21/12**
Thorium 234	1.06	U	0.68		1.9	07/31/12	08/21/12
Uranium 235	0.08	U	0.21		0.64	07/31/12	08/21/12
Uranium 238	1.06	U	0.68		1.9	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N12' E36'

Radiochemistry

Lab Sample ID: F2G270459-027
Work Order: MVVLL
Matrix: SOLID

Date Collected: 07/25/12 1129
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2213122		Yld %
Actinium 227	0.20	U	0.38		0.64	07/31/12	08/21/12
Actinium 228	**1.28**		**0.34**		**0.29**	**07/31/12**	**08/21/12**
Bismuth 212	**1.41**		**0.57**		**0.50**	**07/31/12**	**08/21/12**
Bismuth 214	**1.45**		**0.30**		**0.21**	**07/31/12**	**08/21/12**
Lead 210	0.7	U	1.8		3.3	07/31/12	08/21/12
Lead 212	**1.78**		**0.43**		**0.18**	**07/31/12**	**08/21/12**
Lead 214	**1.69**		**0.32**		**0.18**	**07/31/12**	**08/21/12**
Potassium 40	**20.6**		**3.1**		**1**	**07/31/12**	**08/21/12**
Protactinium 231	0.024	U	0.086		0.47	07/31/12	08/21/12
Radium (226)	**1.45**		**0.30**	1.00	**0.21**	**07/31/12**	**08/21/12**
Radium 228	**1.28**		**0.34**		**0.29**	**07/31/12**	**08/21/12**
Thallium 208	**0.62**		**0.14**		**0.11**	**07/31/12**	**08/21/12**
Thorium 234	1.65	U	0.79		3.0	07/31/12	08/21/12
Uranium 235	0.30	U	0.29		0.40	07/31/12	08/21/12
Uranium 238	1.65	U	0.79		3.0	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N24' E36'

Radiochemistry

Lab Sample ID: F2G270459-028
Work Order: MVVLM
Matrix: SOLID

Date Collected: 07/25/12 0832
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213122		Yld %
Actinium 227	0.11	U	0.32		2.2	07/31/12	08/21/12
Actinium 228	**1.86**		0.37		0.13	07/31/12	08/21/12
Bismuth 212	**1.83**		0.65		0.45	07/31/12	08/21/12
Bismuth 214	**1.65**		0.31		0.16	07/31/12	08/21/12
Lead 210	1.5	U	1.5		2.6	07/31/12	08/21/12
Lead 212	**1.67**		0.29		0.18	07/31/12	08/21/12
Lead 214	**1.87**		0.29		0.19	07/31/12	08/21/12
Potassium 40	**18.5**		3.0		0.8	07/31/12	08/21/12
Protactinium 231	0.37	U	0.35		3.1	07/31/12	08/21/12
Radium (226)	**1.65**		0.31	1.00	0.16	07/31/12	08/21/12
Radium 228	**1.86**		0.37		0.13	07/31/12	08/21/12
Thallium 208	**0.60**		0.13		0.09	07/31/12	08/21/12
Thorium 234	1.50	U	0.84		2.4	07/31/12	08/21/12
Uranium 235	0.17	U	0.37		0.61	07/31/12	08/21/12
Uranium 238	1.50	U	0.84		2.4	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N36' E36'

Radiochemistry

Lab Sample ID: F2G270459-029
Work Order: MVVLN
Matrix: SOLID

Date Collected: 07/24/12 1630
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2213122**		**Yld %**
Actinium 227	-1.10	U	0.77		1.2	07/31/12	08/21/12
Actinium 228	**1.61**		**0.41**		**0.25**	**07/31/12**	**08/21/12**
Bismuth 212	0.46	U	0.52		0.85	07/31/12	08/21/12
Bismuth 214	**1.76**		**0.30**		**0.16**	**07/31/12**	**08/21/12**
Lead 210	0.9	U	1.6		2.6	07/31/12	08/21/12
Lead 212	**1.58**		**0.27**		**0.17**	**07/31/12**	**08/21/12**
Lead 214	**2.12**		**0.34**		**0.20**	**07/31/12**	**08/21/12**
Potassium 40	**18.4**		**2.8**		**1**	**07/31/12**	**08/21/12**
Protactinium 231	0.44	U	0.91		3.0	07/31/12	08/21/12
Radium (226)	**1.76**		**0.30**	1.00	**0.16**	**07/31/12**	**08/21/12**
Radium 228	**1.61**		**0.41**		**0.25**	**07/31/12**	**08/21/12**
Thallium 208	**0.57**		**0.12**		**0.09**	**07/31/12**	**08/21/12**
Thorium 234	1.83	U	0.91		2.5	07/31/12	08/21/12
Uranium 235	0.17	U	0.32		0.54	07/31/12	08/21/12
Uranium 238	1.83	U	0.91		2.5	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N48' E36'

Radiochemistry

Lab Sample ID: F2G270459-030
Work Order: MVVLP
Matrix: SOLID

Date Collected: 07/24/12 1626
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213122		Yld %
Actinium 227	0.08	U	0.30		1.6	07/31/12	08/21/12
Actinium 228	**0.97**		**0.22**		**0.16**	**07/31/12**	**08/21/12**
Bismuth 212	0.65	U	0.45		0.65	07/31/12	08/21/12
Bismuth 214	**1.03**		**0.25**		**0.19**	**07/31/12**	**08/21/12**
Lead 210	1.2	U	1.6		2.5	07/31/12	08/21/12
Lead 212	**1.03**		**0.20**		**0.15**	**07/31/12**	**08/21/12**
Lead 214	**1.07**		**0.21**		**0.17**	**07/31/12**	**08/21/12**
Potassium 40	**21.6**		**3.1**		**0.7**	**07/31/12**	**08/21/12**
Protactinium 231	0.58	U	0.70		2.4	07/31/12	08/21/12
Radium (226)	**1.03**		**0.25**	1.00	**0.19**	**07/31/12**	**08/21/12**
Radium 228	**0.97**		**0.22**		**0.16**	**07/31/12**	**08/21/12**
Thallium 208	**0.274**		**0.087**		**0.10**	**07/31/12**	**08/21/12**
Thorium 234	0.45	U	0.66		2.6	07/31/12	08/21/12
Uranium 235	0.12	U	0.30		0.50	07/31/12	08/21/12
Uranium 238	0.45	U	0.66		2.6	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA #5 N60' E36'

Radiochemistry

Lab Sample ID: F2G270459-031
Work Order: MVVLQ
Matrix: SOLID

Date Collected: 07/24/12 1126
Date Received: 07/27/12 0920

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				pCi/g	Batch # 2213122		Yld %
Actinium 227	0.44		0.23		0.31	07/31/12	08/21/12
Actinium 228	1.37		0.26		0.29	07/31/12	08/21/12
Bismuth 212	0.60	U	0.48		0.73	07/31/12	08/21/12
Bismuth 214	1.91		0.33		0.19	07/31/12	08/21/12
Lead 210	0.8	U	1.6		2.8	07/31/12	08/21/12
Lead 212	1.46		0.25		0.14	07/31/12	08/21/12
Lead 214	1.83		0.29		0.20	07/31/12	08/21/12
Potassium 40	17.3		2.6		0.4	07/31/12	08/21/12
Protactinium 231	0.92	U	0.52		2.3	07/31/12	08/21/12
Radium (226)	1.91		0.33	1.00	0.19	07/31/12	08/21/12
Radium 228	1.37		0.26		0.29	07/31/12	08/21/12
Thallium 208	0.48		0.12		0.09	07/31/12	08/21/12
Thorium 234	1.20	U	0.69		2.0	07/31/12	08/21/12
Uranium 235	0.28	U	0.25		0.56	07/31/12	08/21/12
Uranium 238	1.20	U	0.69		2.0	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

METHOD BLANK REPORT

Radiochemistry

Client Lot ID: F2G270459
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC	Prep Date	Lab Sample ID Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**	**Batch # 2213121**	**Yld %**		**F2G310000-121B**
Actinium 227	0.05	U	0.13		0.24	07/31/12	08/21/12
Actinium 228	0.051	U	0.064		0.25	07/31/12	08/21/12
Bismuth 212	0.08	U	0.24		0.45	07/31/12	08/21/12
Bismuth 214	0.036	U	0.083		0.16	07/31/12	08/21/12
Lead 210	0.11	U	0.87		1.8	07/31/12	08/21/12
Lead 212	-0.05	U	2.2		0.1	07/31/12	08/21/12
Lead 214	0.0013	U	0.0019		0.16	07/31/12	08/21/12
Potassium 40	-0.3	U	11		0.8	07/31/12	08/21/12
Protactinium 231	0.14	U	0.49		1.7	07/31/12	08/21/12
Radium (226)	0.036	U	0.083	1.00	0.16	07/31/12	08/21/12
Radium 228	0.051	U	0.064		0.25	07/31/12	08/21/12
Thallium 208	0.012	U	0.035		0.072	07/31/12	08/21/12
Thorium 234	-0.16	U	0.88		1.3	07/31/12	08/21/12
Uranium 235	0.14	U	0.17		0.28	07/31/12	08/21/12
Uranium 238	-0.16	U	0.88		1.3	07/31/12	08/21/12
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**	**Batch # 2213122**	**Yld %**		**F2G310000-122B**
Actinium 227	0.07	U	0.23		0.58	07/31/12	08/21/12
Actinium 228	0.0	U	0.069		0.91	07/31/12	08/21/12
Bismuth 212	0.0	U	0.14		1.4	07/31/12	08/21/12
Bismuth 214	0.02	U	0.14		0.27	07/31/12	08/21/12
Lead 210	1.4	U	1.5		2.6	07/31/12	08/21/12
Lead 212	-0.03	U	0.21		0.18	07/31/12	08/21/12
Lead 214	0.025	U	0.086		0.22	07/31/12	08/21/12
Potassium 40	-0.6	U	22		2	07/31/12	08/21/12
Protactinium 231	0.028	U	0.071		2.3	07/31/12	08/21/12
Radium (226)	0.02	U	0.14	1.00	0.27	07/31/12	08/21/12
Radium 228	0.0	U	0.069		0.91	07/31/12	08/21/12
Thallium 208	0.016	U	0.023		0.16	07/31/12	08/21/12
Thorium 234	-0.8	U	33		2	07/31/12	08/21/12
Uranium 235	0.11	U	0.26		0.40	07/31/12	08/21/12
Uranium 238	-0.8	U	33		2	07/31/12	08/21/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Laboratory Control Sample Report

Radiochemistry

Client Lot ID: F2G270459
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID / QC Control Limits
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**	**GA-01-R MOD**			**F2G310000-121C**
Radium (226)	12.2	10.6	1.3	0.4		87	(73 - 107)
Thorium 232	9.50	9.5	1.2	0.6		100	(82 - 126)
	Batch #:	2213121		**Analysis Date:**	08/21/12		
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**	**GA-01-R MOD**			**F2G310000-122C**
Radium (226)	12.2	10.4	1.4	0.6		86	(73 - 107)
Thorium 232	9.50	9.0	1.3	0.8		94	(82 - 126)
	Batch #:	2213122		**Analysis Date:**	08/21/12		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Radiochemistry

Client Lot ID: F2G270459 Date Sampled: 07/24/12
Matrix: SOLID Date Received: 07/27/12

Parameter	SAMPLE Result		Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result		Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**GA-01-R MOD**				**F2G270459-001**	
Actinium 227	0.17	U	0.96		0.06	U	0.30		93	%RPD
Actinium 228	0.96		0.29		0.83		0.26		14	%RPD
Bismuth 212	0.36	U	0.39		1.19		0.43		107	%RPD
Bismuth 214	1.90		0.31		1.95		0.31		3	%RPD
Lead 210	2.9	U	2.2		2.4	U	1.8		18	%RPD
Lead 212	0.89		0.19		0.97		0.19		8	%RPD
Lead 214	2.36		0.34		2.06		0.31		13	%RPD
Potassium 40	18.3		2.8		16.4		2.5		11	%RPD
Protactinium 231	0.8	U	1.1		0.23	U	0.55		110	%RPD
Radium (226)	1.90		0.31		1.95		0.31		3	%RPD
Radium 228	0.96		0.29		0.83		0.26		14	%RPD
Thallium 208	0.35		0.10		0.379		0.094		9	%RPD
Thorium 234	1.42	U	0.96		1.76	U	0.79		21	%RPD
Uranium 235	0.1	U	0.36		0.21	U	0.34		73	%RPD
Uranium 238	1.42	U	0.96		1.76	U	0.79		21	%RPD
	Batch #:		2213121	(Sample)	2213121	(Duplicate)				
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**GA-01-R MOD**				**F2G270459-021**	
Actinium 227	-1.20	U	0.30		-0.71	U	0.66		52	%RPD
Actinium 228	1.08		0.31		1.07		0.30		0.2	%RPD
Bismuth 212	0.46	U	0.48		0.64	U	0.56		32	%RPD
Bismuth 214	1.42		0.27		1.37		0.27		3	%RPD
Lead 210	2.1	U	2.1		2.0	U	1.8		4	%RPD
Lead 212	1.21		0.22		1.20		0.24		0.3	%RPD
Lead 214	1.37		0.24		1.48		0.29		8	%RPD
Potassium 40	20.0		2.9		16.3		2.8		20	%RPD
Protactinium 231	0.84	U	0.53		0.5	U	1.1		42	%RPD
Radium (226)	1.42		0.27		1.37		0.27		3	%RPD
Radium 228	1.08		0.31		1.07		0.30		0.2	%RPD
Thallium 208	0.45		0.10		0.42		0.11		9	%RPD
Thorium 234	0.91	U	0.67		2.1	U	1.7		78	%RPD
Uranium 235	0.07	U	0.34		0.24	U	0.29		114	%RPD
Uranium 238	0.91	U	0.67		2.1	U	1.7		78	%RPD
	Batch #:		2213122	(Sample)	2213122	(Duplicate)				

NOTE(S)

Data are incomplete without the case narrative.
Caloulations are performed before rounding to avoid round-off error in calculated results

U Result is less than the sample detection limit.

F2G270459

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis
Storage Loc: **RAD**

Project Manager: EKS
Quote #: 90680
SDG:
Project:
Radiation - Standard Precision
PO#:
Report to: Emily Fisher
Client: 3333030 Tetra Tech, EMI (ARRA)
#SMPS In LOT: 31

Date Received: 2012-07-27
Analytical Due Date: 2012-08-23
Report Due Date: 2012-08-24
Report Type: B Standard Report
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	AREA #5 N24' E0'			2012-07-24 / 1534	MVVKP	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	AREA #5 N36' E0'			2012-07-24 / 1537	MVVKQ	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	AREA #5 N48' E0'			2012-07-24 / 1539	MVVKR	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	AREA #5 N60' E0'			2012-07-24 / 1542	MVVKT	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	AREA #5 N72' E0'			2012-07-24 / 1545	MVVKV	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	AREA #5 N24' E12'			2012-07-24 / 1602	MVVKW	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	AREA #5 N36' E12'			2012-07-24 / 1605	MVVKX	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

F2G270459

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis
Storage Loc: RAD

Project Manager: EKS
Quote #: 90680
SDG:
Project:
Radiation - Standard Precision
PO#:
Report to: Emily Fisher
Client: 3333030 Tetra Tech, EMI (ARRA)
#SMPS In LOT: 31

Date Received: 2012-07-27
Analytical Due Date: 2012-08-23
Report Due Date: 2012-08-24
Report Type: B Standard Report
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	AREA #5 N48' E12'			2012-07-24 / 1608	MVVK0	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	AREA #5 N60' E12'			2012-07-24 / 1609	MVVK1	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	AREA #5 N72' E12'			2012-07-24 / 1611	MVVK2	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	AREA #5 N84' E12'			2012-07-24 / 1615	MVVK3	SOLID

SAMPLE COMMENTS: 4 EMS Solution

XX	ZV		RAD SCREEN	SOLID, RAD SCREEN	RA	IN-HOUSE RAD SCREEN	01	STANDARD TEST SET	PROT: A	WRK LOC	06
XX	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	AREA #5 N0' E24'			2012-07-25 / 1132	MVVK4	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	AREA #5 N72' E36'			2012-07-25 / 1150	MVVK5	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	AREA #2 N0' E0'			2012-07-25 / 1341	MVVK6	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F2G270459

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis
Storage Loc: RAD

Project Manager: EKS
Quote #: 90680 SDG:
Project:
Radiation - Standard Precision
PO#:
Report to: Emily Fisher
Client: 3333030 Tetra Tech, EMI (ARRA)
#SMPS In LOT: 31

Date Received: 2012-07-27
Analytical Due Date: 2012-08-23
Report Due Date: 2012-08-24
Report Type: B Standard Report
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
15	AREA #2 N12' E0'			2012-07-25 / 1344	MVVK7	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
16	AREA #2 N0' E12'			2012-07-25 / 1348	MVVK8	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
17	AREA #2 N12' E12'			2012-07-25 / 1352	MVVK9	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
18	BACKFILL			2012-07-24 / 1000	MVVLA	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
19	AREA #11 N0' E0'			2012-07-25 / 1605	MVVLC	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
20	AREA #5 N12' E24'			2012-07-25 / 1135	MVVLD	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
21	AREA #5 N24' E24'			2012-07-25 / 8~~10~~ 4	MVVLE	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F2G270459

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis
Storage Loc: RAD

Project Manager: EKS
Quote #: 90680
SDG:
Project:
Radiation - Standard Precision
PO#:
Report to: Emily Fisher
Client: 3333030 Tetra Tech, EMI (ARRA)
#SMPS In LOT: 31

Date Received: 2012-07-27
Analytical Due Date: 2012-08-23
Report Due Date: 2012-08-24
Report Type: B Standard Report
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
22	AREA #5 N36' E24'			2012-07-24 / 1622	MVVLF	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
23	AREA #5 N48' E24'			2012-07-24 / 1620	MVVLG	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
24	AREA #5 N60' E24'			2012-07-24 / 1618	MVVLH	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
25	AREA #5 N72' E24'			2012-07-24 / 1615	MVVLJ	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
26	AREA #5 N0' E36'			2012-07-25 / 1129 7 EKS 7/30/12	MVVLK	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
27	AREA #5 N12' E36'			2012-07-25 / 1129	MVVLL	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
28	AREA #5 N24' E36'			2012-07-25 / 832	MVVLM	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F2G270459

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis
Storage Loc: RAD

Project Manager: EKS
Quote #: 90680
SDG:
Project:
Radiation - Standard Precision
PO#:
Report to: Emily Fisher
Client: 3333030 Tetra Tech, EMI (ARRA)
#SMPS in LOT: 31

Date Received: 2012-07-27
Analytical Due Date: 2012-08-23
Report Due Date: 2012-08-24
Report Type: B Standard Report
EDD Code: 00

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
29	AREA #5 N36' E36'			2012-07-24 / 1630	MVVLN	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
30	AREA #5 N48' E36'			2012-07-24 / 1626	MVVLP	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
31	AREA #5 N60' E36'			2012-07-24 / 1126	MVVLQ	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

CVL 094

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date:	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	1 of 3 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name:	☐ 1 week			
Site:	☐ 2 days			
P O #	☐ 1 day			Sampler:

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Scan w/ 21 day in-growth for Ra-226	Sample Specific Notes:
Area#5 N24' E0'	7-24-12	1534	Grab	Soil	1		X	
Area#5 N36' E0'	1	1537	1	1	1		X	
Area#5 N48' E0'	1	1539	1	1	1		X	
Area #5 N60 E0'	1	1542	1	1	1		X	
Area#5 N72' E0'	1	1546	1	1	1		X	
Area#5 N24' E12'	1	1602	1	1	1		X	
Area#5 N36' E12'	1	1605	1	1	1		X	
Area#5 N48' E12'	1	1608	1	1	1		X	
Area#5 N60' E12'	1	1609	1	1	1		X	
Area#5 N72' E12'	1	1611	1	1	1		X	
Area#5 N84' E12'	7-24-12	1615	1	1	1		X	
Area#5 N0' E24'	7-25-12	1132	1	1	1		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	7-26-12 2000	FedEx		
Relinquished by:	Company:	Date/Time:	Received by: [signature]	Company: TA	Date/Time: 7/27/12 9:20AM
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis

F2G270449

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date:	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	3 of 3 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name:	☐ 1 week			
Site:	☐ 2 days			
P O #	☐ 1 day			Sampler:

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Scan w/21 day in-growth for Ra226	Sample Specific Notes:
Area #5 N72' E36'	7-25-12	1150	Grab	Sol	1		X	
Area #2 N0' E0'	↑	1341	↓	↓	↓		X	
Area #2 N12' E0'	↓	1344	↓	↓	↓		X	
Area #2 N0' E12'	↓	1348	↓	↓	↓		X	
Area #2 N12' E12'	↓	1352	↓	↓	↓		X	
Backfill	7-24-12	1000	↓	↓	↓		X	
Area #11 ~~N0' E0'~~	7-25-12	1605	↓	↓	↓		X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	7-25-12 2100	Fed-Ex		
Relinquished by:	Company:	Date/Time:	Received by: [signature]	Company: TA	Date/Time: 7/27/12 9:20AM
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis

F2G270429

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date:	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	2 of 5 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name:	☐ 1 week			
Site:	☐ 2 days			
P O #	☐ 1 day			Sampler:

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample: Gamma Spec w/21 day in-growth for Ra-226	Sample Specific Notes:
Area #5 N12' E24'	7-25-12	1135	Grab	Soil	1	X	
Area #5 N24' E24'	7-25-12	0840				X	
Area #5 N36' E24'	7-24-12	1622				X	
Area #5 N48' E24'		1620				X	
Area #5 N60' E24'		1618				X	
Area #5 N72' E24'	7-24-12	1615				X	
Area #5 N0' E36'	7-25-12	1127				X	
Area #5 N12' E36'		1129				X	
Area #5 N24' E36'	7-25-12	0832				X	
Area #5 N36' E36'	7-24-12	1630				X	
Area #5 N48' E36'		1626				X	
Area #5 N60' E36'	7-24-12	1126				X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	7-26-12 2000	Fed-Ex		
Relinquished by:	Company:	Date/Time:	Received by: [signature]	Company: TA	Date/Time: 7/27/12 9:20
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

TestAmerica St. Louis

F2G270409

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Lot #(s): F2G270459

TestAmerica St. Louis

CUR Form #: 0 9 4

CONDITION UPON RECEIPT FORM

Client: Tetra Tech

Quote No: 90680

COC/RFA No: N/A

Initiated By: [illegible] Date: 7/27/12 Time: 0920

Shipping Information

Shipper: (FedEx) UPS DHL Courier Client Other: _____ Multiple Packages: Y (N)

Shipping # (s):*		Sample Temperature (s):**	
1. 8771 1544 3907	6.	1. Ambient	6.
2.	7.	2.	7.
3.	8.	3.	8.
4.	9.	4.	9.
5.	10.	5.	10.

*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; Rad tests- Liquid or Solids; Perchlorate

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y (N)	Are there custody seals present on the cooler?	8.	Y (N)	Are there custody seals present on bottles?
2.	Y N (N/A)	Do custody seals on cooler appear to be tampered with?	9.	Y N (N/A)	Do custody seals on bottles appear to be tampered with?
3.	(Y) N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N (N/A)	Was sample received with proper pH[1]? (If not, make note below)
4.	(Y) N	Sample received with Chain of Custody?	11.	Y N (N/A)	Containers for C-14, H-3 & I-129/131 marked with "Do Not Preserve" label?
5.	(Y) N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	(Y) N	Sample received in proper containers?
6.	Y (N)	Was sample received broken?	13.	Y N (N/A)	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	(Y) N	Is sample volume sufficient for analysis?	14.	Y N (N/A)	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX, Oil & Grease and soils.

Notes:

Corrective Action:

☐ Client Contact Name: _____ Informed by: _____

☐ Sample(s) processed "as is"

☐ Sample(s) on hold until: _____ If released, notify: _____

Project Management Review: [illegible] Date: 7/30/12

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.

ADMIN-0004 rev13, REVISED 05/27/11 \\Slsvr01\QA\FORMS\ST-LOUIS\ADMIN\Admin-0004 CUR.doc

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

Radiation - Standard Products

Lot #: F2H230456

Rob Monning

Tetra Tech, EMI ARRA
415 Oak Street
Kansas City, MO 64106

TESTAMERICA LABORATORIES, INC.

Erika Starman
Project Manager

September 20, 2012

13715 Rider Trail North Earth City, MO 63045 **tel** 314.298.8566 **fax** 314.298.8757 **www.testamericainc.com**

Case Narrative
LOT NUMBER: F2H230456

This report contains the analytical results for the 19 samples received under chain of custody by TestAmerica St. Louis on August 23, 2012. These samples are associated with your Radiation - Standard Products 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.

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 - Radium-226 & ODRs (EML GA-01-R MOD)

The sample and duplicate results are both less than the achieved MDAs for Ac-227, making relative percent difference (RPD) results statistically invalid. Non-detect results were duplicated.

Affected Samples:
F2H230456 (1): AREA 1-1

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

METHODS SUMMARY

F2H230456

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Gamma Spectroscopy - Radium-226 & Hits	EML GA-01-R MOD	

References:

EML "ENVIRONMENTAL MEASUREMENTS LABORATORY PROCEDURES MANUAL"
HASL-300 28TH EDITION, VOLUME I and II DEPARTMENT OF ENERGY

SAMPLE SUMMARY

F2H230456

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MV94Q	001	AREA 1-1	08/17/12	10:14
MV95G	002	AREA 1-2	08/17/12	10:16
MV95H	003	AREA 1-3	08/17/12	10:17
MV95J	004	AREA 1-4	08/17/12	10:19
MV95K	005	AREA 1-5	08/17/12	10:20
MV95L	006	AREA 1-6	08/17/12	10:22
MV95M	007	AREA 1-7	08/17/12	10:23
MV95N	008	AREA 1-8	08/17/12	10:24
MV95P	009	AREA 1-9	08/17/12	10:26
MV95Q	010	AREA 1-10	08/17/12	10:27
MV95R	011	AREA 1-11	08/17/12	10:30
MV95T	012	AREA 1-12	08/17/12	10:32
MV95V	013	REF-1	08/17/12	11:00
MV95W	014	REF-2	08/17/12	11:02
MV95X	015	REF-3	08/17/12	11:03
MV950	016	REF-4	08/17/12	11:05
MV951	017	REF-5	08/17/12	11:07
MV952	018	REF-6	08/17/12	11:08
MV953	019	REF-7	08/17/12	11:09

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, EMI (ARRA)

Client Sample ID: AREA 1-1

Radiochemistry

Lab Sample ID: F2H230456-001
Work Order: MV94Q
Matrix: SOLID

Date Collected: 08/17/12 1014
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2241112**		**Yld %**
Actinium 227	-0.70	U	0.47		0.73	08/28/12	09/18/12
Actinium 228	**0.53**		**0.19**		**0.23**	**08/28/12**	**09/18/12**
Bismuth 212	0.15	U	0.28		0.47	08/28/12	09/18/12
Bismuth 214	**0.89**		**0.18**		**0.13**	**08/28/12**	**09/18/12**
Lead 210	0.90	U	0.90		1.5	08/28/12	09/18/12
Lead 212	**0.59**		**0.13**		**0.11**	**08/28/12**	**09/18/12**
Lead 214	**0.75**		**0.15**		**0.13**	**08/28/12**	**09/18/12**
Potassium 40	**17.5**		**2.4**		**0.7**	**08/28/12**	**09/18/12**
Protactinium 231	0.38	U	0.39		1.6	08/28/12	09/18/12
Radium (226)	**0.89**		**0.18**	1.00	**0.13**	**08/28/12**	**09/18/12**
Radium 228	**0.53**		**0.19**		**0.23**	**08/28/12**	**09/18/12**
Thallium 208	**0.274**		**0.079**		**0.064**	**08/28/12**	**09/18/12**
Thorium 234	1.0	U	1.1		1.5	08/28/12	09/18/12
Uranium 235	0.18	U	0.21		0.34	08/28/12	09/18/12
Uranium 238	1.0	U	1.1		1.5	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-1 DUP

Radiochemistry

Lab Sample ID: F2H230456-001X
Work Order: MV94Q
Matrix: SOLID

Date Collected: 08/17/12 1014
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2241112**		**Yld %**
Actinium 227	-0.011	U	0.043		0.42	08/28/12	09/18/12
Actinium 228	**0.56**		**0.14**		**0.21**	**08/28/12**	**09/18/12**
Bismuth 212	0.35	U	0.32		0.49	08/28/12	09/18/12
Bismuth 214	**0.85**		**0.19**		**0.13**	**08/28/12**	**09/18/12**
Lead 210	1.7	U	1.3		1.8	08/28/12	09/18/12
Lead 212	**0.57**		**0.12**		**0.09**	**08/28/12**	**09/18/12**
Lead 214	**0.71**		**0.18**		**0.15**	**08/28/12**	**09/18/12**
Potassium 40	**18.4**		**2.6**		**0.8**	**08/28/12**	**09/18/12**
Protactinium 231	0.36	U	0.28		1.9	08/28/12	09/18/12
Radium (226)	**0.85**		**0.19**	1.00	**0.13**	**08/28/12**	**09/18/12**
Radium 228	**0.56**		**0.14**		**0.21**	**08/28/12**	**09/18/12**
Thallium 208	**0.223**		**0.066**		**0.055**	**08/28/12**	**09/18/12**
Thorium 234	0.42	U	0.50		1.6	08/28/12	09/18/12
Uranium 235	0.11	U	0.22		0.36	08/28/12	09/18/12
Uranium 238	0.42	U	0.50		1.6	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-2

Radiochemistry

Lab Sample ID: F2H230456-002
Work Order: MV95G
Matrix: SOLID

Date Collected: 08/17/12 1016
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.07	U	0.16		1.0	08/28/12	09/18/12
Actinium 228	**0.71**		**0.18**		**0.12**	**08/28/12**	**09/18/12**
Bismuth 212	0.23	U	0.33		0.54	08/28/12	09/18/12
Bismuth 214	**0.71**		**0.16**		**0.11**	**08/28/12**	**09/18/12**
Lead 210	0.2	U	1.1		2.0	08/28/12	09/18/12
Lead 212	**0.55**		**0.11**		**0.09**	**08/28/12**	**09/18/12**
Lead 214	**0.59**		**0.15**		**0.13**	**08/28/12**	**09/18/12**
Potassium 40	**16.0**		**2.3**		**0.8**	**08/28/12**	**09/18/12**
Protactinium 231	0.13	U	0.16		1.8	08/28/12	09/18/12
Radium (226)	**0.71**		**0.16**	1.00	**0.11**	**08/28/12**	**09/18/12**
Radium 228	**0.71**		**0.18**		**0.12**	**08/28/12**	**09/18/12**
Thallium 208	**0.190**		**0.064**		**0.057**	**08/28/12**	**09/18/12**
Thorium 234	0.43	U	0.40		1.7	08/28/12	09/18/12
Uranium 235	0.12	U	0.19		0.36	08/28/12	09/18/12
Uranium 238	0.43	U	0.40		1.7	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-3

Radiochemistry

Lab Sample ID: F2H230456-003
Work Order: MV95H
Matrix: SOLID

Date Collected: 08/17/12 1017
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.11	U	0.50		1.6	08/28/12	09/18/12
Actinium 228	0.29	U	0.24		0.43	08/28/12	09/18/12
Bismuth 212	0.26	U	0.56		0.97	08/28/12	09/18/12
Bismuth 214	**0.83**		**0.23**		**0.16**	**08/28/12**	**09/18/12**
Lead 210	1.4	U	1.9		2.8	08/28/12	09/18/12
Lead 212	**0.62**		**0.17**		**0.16**	**08/28/12**	**09/18/12**
Lead 214	**0.96**		**0.22**		**0.12**	**08/28/12**	**09/18/12**
Potassium 40	**17.1**		**3.2**		**1.1**	**08/28/12**	**09/18/12**
Protactinium 231	0.1	U	1.4		2.5	08/28/12	09/18/12
Radium (226)	**0.83**		**0.23**	1.00	**0.16**	**08/28/12**	**09/18/12**
Radium 228	0.29	U	0.24		0.43	08/28/12	09/18/12
Thallium 208	**0.216**		**0.076**		**0.069**	**08/28/12**	**09/18/12**
Thorium 234	0.56	U	0.75		2.6	08/28/12	09/18/12
Uranium 235	0.25	U	0.29		0.54	08/28/12	09/18/12
Uranium 238	0.56	U	0.75		2.6	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-4

Radiochemistry

Lab Sample ID: F2H230456-004
Work Order: MV95J
Matrix: SOLID

Date Collected: 08/17/12 1019
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2241112**		**Yld %**
Actinium 227	0.023	U	0.043		0.46	08/28/12	09/18/12
Actinium 228	**0.63**		**0.26**		0.29	08/28/12	09/18/12
Bismuth 212	**0.68**		**0.37**		0.34	08/28/12	09/18/12
Bismuth 214	**0.89**		**0.25**		0.21	08/28/12	09/18/12
Lead 210	**2.1**		**1.5**		2.0	08/28/12	09/18/12
Lead 212	**0.70**		**0.15**		0.11	08/28/12	09/18/12
Lead 214	**1.09**		**0.22**		0.15	08/28/12	09/18/12
Potassium 40	**13.1**		**2.4**		1.0	08/28/12	09/18/12
Protactinium 231	0.24	U	0.46		2.0	08/28/12	09/18/12
Radium (226)	**0.89**		**0.25**	1.00	0.21	08/28/12	09/18/12
Radium 228	**0.63**		**0.26**		0.29	08/28/12	09/18/12
Thallium 208	**0.214**		**0.075**		0.062	08/28/12	09/18/12
Thorium 234	0.73	U	0.67		2.1	08/28/12	09/18/12
Uranium 235	0.12	U	0.17		0.48	08/28/12	09/18/12
Uranium 238	0.73	U	0.67		2.1	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-5

Radiochemistry

Lab Sample ID: F2H230456-005
Work Order: MV95K
Matrix: SOLID

Date Collected: 08/17/12 1020
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.30		0.12		0.12	08/28/12	09/18/12
Actinium 228	0.38		0.20		0.27	08/28/12	09/18/12
Bismuth 212	0.13	U	0.30		0.53	08/28/12	09/18/12
Bismuth 214	0.61		0.14		0.07	08/28/12	09/18/12
Lead 210	-0.2	U	1.8		1.8	08/28/12	09/18/12
Lead 212	0.48		0.10		0.09	08/28/12	09/18/12
Lead 214	0.68		0.13		0.09	08/28/12	09/18/12
Potassium 40	21.0		2.9		0.5	08/28/12	09/18/12
Protactinium 231	0.40	U	0.39		1.4	08/28/12	09/18/12
Radium (226)	0.61		0.14	1.00	0.07	08/28/12	09/18/12
Radium 228	0.38		0.20		0.27	08/28/12	09/18/12
Thallium 208	0.176		0.055		0.046	08/28/12	09/18/12
Thorium 234	1.15	U	0.97		1.3	08/28/12	09/18/12
Uranium 235	0.24		0.16		0.20	08/28/12	09/18/12
Uranium 238	1.15	U	0.97		1.3	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-6

Radiochemistry

Lab Sample ID: F2H230456-006
Work Order: MV95L
Matrix: SOLID

Date Collected: 08/17/12 1022
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2241112**		**Yld %**
Actinium 227	-0.59	U	0.53		0.85	08/28/12	09/18/12
Actinium 228	**0.69**		**0.21**		**0.11**	**08/28/12**	**09/18/12**
Bismuth 212	0.25	U	0.35		0.59	08/28/12	09/18/12
Bismuth 214	**0.62**		**0.16**		**0.08**	**08/28/12**	**09/18/12**
Lead 210	0.6	U	1.4		2.4	08/28/12	09/18/12
Lead 212	**0.58**		**0.13**		**0.12**	**08/28/12**	**09/18/12**
Lead 214	**0.70**		**0.16**		**0.13**	**08/28/12**	**09/18/12**
Potassium 40	**23.3**		**3.3**		**0.7**	**08/28/12**	**09/18/12**
Protactinium 231	0.32	U	0.73		1.8	08/28/12	09/18/12
Radium (226)	**0.62**		**0.16**	1.00	**0.08**	**08/28/12**	**09/18/12**
Radium 228	**0.69**		**0.21**		**0.11**	**08/28/12**	**09/18/12**
Thallium 208	**0.249**		**0.077**		**0.054**	**08/28/12**	**09/18/12**
Thorium 234	0.22	U	0.58		2.0	08/28/12	09/18/12
Uranium 235	0.10	U	0.25		0.43	08/28/12	09/18/12
Uranium 238	0.22	U	0.58		2.0	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-7

Radiochemistry

Lab Sample ID: F2H230456-007
Work Order: MV95M
Matrix: SOLID

Date Collected: 08/17/12 1023
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Unoert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2241112**		**Yld %**
Actinium 227	0.17	U	0.25		0.47	08/28/12	09/18/12
Actinium 228	**0.97**		**0.28**		**0.19**	**08/28/12**	**09/18/12**
Bismuth 212	0.36	U	0.44		0.73	08/28/12	09/18/12
Bismuth 214	**2.00**		**0.34**		**0.18**	**08/28/12**	**09/18/12**
Lead 210	1.3	U	1.6		2.9	08/28/12	09/18/12
Lead 212	**1.04**		**0.19**		**0.14**	**08/28/12**	**09/18/12**
Lead 214	**2.30**		**0.34**		**0.20**	**08/28/12**	**09/18/12**
Potassium 40	**18.8**		**2.8**		**0.5**	**08/28/12**	**09/18/12**
Protactinium 231	0.62	U	0.91		1.8	08/28/12	09/18/12
Radium (226)	**2.00**		**0.34**	1.00	**0.18**	**08/28/12**	**09/18/12**
Radium 228	**0.97**		**0.28**		**0.19**	**08/28/12**	**09/18/12**
Thallium 208	**0.42**		**0.10**		**0.08**	**08/28/12**	**09/18/12**
Thorium 234	0.80	U	0.62		2.2	08/28/12	09/18/12
Uranium 235	0.00005	U	0.00041		0.54	08/28/12	09/18/12
Uranium 238	0.80	U	0.62		2.2	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-8

Radiochemistry

Lab Sample ID: F2H230456-008
Work Order: MV95N
Matrix: SOLID

Date Collected: 08/17/12 1024
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2241112**		**Yld %**
Actinium 227	0.11	U	0.55		0.99	08/28/12	09/18/12
Actinium 228	**1.01**		**0.34**		**0.30**	**08/28/12**	**09/18/12**
Bismuth 212	0.76	U	0.54		0.83	08/28/12	09/18/12
Bismuth 214	**9.4**		**1.1**		**0.3**	**08/28/12**	**09/18/12**
Lead 210	**5.0**		**3.0**		**3.8**	**08/28/12**	**09/18/12**
Lead 212	**0.95**		**0.27**		**0.24**	**08/28/12**	**09/18/12**
Lead 214	**10.2**		**1.4**		**0.3**	**08/28/12**	**09/18/12**
Potassium 40	**21.0**		**3.1**		**1.1**	**08/28/12**	**09/18/12**
Protactinium 231	0.24	U	0.41		4.0	08/28/12	09/18/12
Radium (226)	**9.4**		**1.1**	1.0	**0.3**	**08/28/12**	**09/18/12**
Radium 228	**1.01**		**0.34**		**0.30**	**08/28/12**	**09/18/12**
Thallium 208	**0.36**		**0.16**		**0.16**	**08/28/12**	**09/18/12**
Thorium 234	-1.6	U	5.9		4.1	08/28/12	09/18/12
Uranium 235	0.08	U	0.40		0.67	08/28/12	09/18/12
Uranium 238	-1.6	U	5.9		4.1	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-9

Radiochemistry

Lab Sample ID: F2H230456-009
Work Order: MV95P
Matrix: SOLID

Date Collected: 08/17/12 1026
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.14	U	0.27		0.33	08/28/12	09/18/12
Actinium 228	**0.43**		0.13		0.22	08/28/12	09/18/12
Bismuth 212	0.16	U	0.24		0.40	08/28/12	09/18/12
Bismuth 214	**0.88**		0.16		0.1	08/28/12	09/18/12
Lead 210	-0.7	U	1.6		2.7	08/28/12	09/18/12
Lead 212	**0.427**		0.098		0.097	08/28/12	09/18/12
Lead 214	**0.87**		0.17		0.11	08/28/12	09/18/12
Potassium 40	**17.2**		2.3		0.4	08/28/12	09/18/12
Protactinium 231	0.88	U	0.68		1.0	08/28/12	09/18/12
Radium (226)	**0.88**		0.16	1.00	0.1	08/28/12	09/18/12
Radium 228	**0.43**		0.13		0.22	08/28/12	09/18/12
Thallium 208	**0.187**		0.058		0.044	08/28/12	09/18/12
Thorium 234	0.42	U	0.47		1.4	08/28/12	09/18/12
Uranium 235	0.15	U	0.22		0.36	08/28/12	09/18/12
Uranium 238	0.42	U	0.47		1.4	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-10

Radiochemistry

Lab Sample ID: F2H230456-010
Work Order: MV95Q
Matrix: SOLID

Date Collected: 08/17/12 1027
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	-1.08	U	0.82		1.3	08/28/12	09/18/12
Actinium 228	**1.25**		**0.52**		**0.54**	**08/28/12**	**09/18/12**
Bismuth 212	0.74	U	0.68		1.1	08/28/12	09/18/12
Bismuth 214	**17.3**		**1.9**		**0.3**	**08/28/12**	**09/18/12**
Lead 210	**8.9**		**3.1**		**3.9**	**08/28/12**	**09/18/12**
Lead 212	**0.80**		**0.21**		**0.26**	**08/28/12**	**09/18/12**
Lead 214	**18.1**		**2.0**		**0.4**	**08/28/12**	**09/18/12**
Potassium 40	**19.1**		**2.9**		**0.9**	**08/28/12**	**09/18/12**
Protactinium 231	1.4	U	1.1		5.1	08/28/12	09/18/12
Radium (226)	**17.3**		**1.9**	1.0	**0.3**	**08/28/12**	**09/18/12**
Radium 228	**1.25**		**0.52**		**0.54**	**08/28/12**	**09/18/12**
Thallium 208	**0.39**		**0.19**		**0.18**	**08/28/12**	**09/18/12**
Thorium 234	1.2	U	1.0		4.6	08/28/12	09/18/12
Uranium 235	0.25	U	0.65		1.0	08/28/12	09/18/12
Uranium 238	1.2	U	1.0		4.6	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-11

Radiochemistry

Lab Sample ID: F2H230456-011
Work Order: MV95R
Matrix: SOLID

Date Collected: 08/17/12 1030
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**Batch # 2241112**		**Yld %**
Actinium 227	0.08	U	0.22		0.91	08/28/12	09/18/12
Actinium 228	**0.83**		**0.24**		**0.17**	**08/28/12**	**09/18/12**
Bismuth 212	0.49	U	0.38		0.58	08/28/12	09/18/12
Bismuth 214	**2.44**		**0.36**		**0.16**	**08/28/12**	**09/18/12**
Lead 210	**2.4**		**1.8**		**2.3**	**08/28/12**	**09/18/12**
Lead 212	**0.59**		**0.14**		**0.14**	**08/28/12**	**09/18/12**
Lead 214	**2.82**		**0.39**		**0.17**	**08/28/12**	**09/18/12**
Potassium 40	**19.4**		**2.7**		**0.8**	**08/28/12**	**09/18/12**
Protactinium 231	0.26	U	0.34		2.5	08/28/12	09/18/12
Radium (226)	**2.44**		**0.36**	1.00	**0.16**	**08/28/12**	**09/18/12**
Radium 228	**0.83**		**0.24**		**0.17**	**08/28/12**	**09/18/12**
Thallium 208	**0.236**		**0.091**		**0.083**	**08/28/12**	**09/18/12**
Thorium 234	2.0	U	1.8		2.2	08/28/12	09/18/12
Uranium 235	0.07	U	0.33		0.56	08/28/12	09/18/12
Uranium 238	2.0	U	1.8		2.2	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: AREA 1-12

Radiochemistry

Lab Sample ID: F2H230456-012
Work Order: MV95T
Matrix: SOLID

Date Collected: 08/17/12 1032
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			**pCi/g**		**Batch # 2241112**		**Yld %**
Actinium 227	-0.23	U	0.32		0.52	08/28/12	09/18/12
Actinium 228	**0.64**		**0.18**		**0.08**	**08/28/12**	**09/18/12**
Bismuth 212	0.32	U	0.33		0.52	08/28/12	09/18/12
Bismuth 214	**0.65**		**0.18**		**0.15**	**08/28/12**	**09/18/12**
Lead 210	1.0	U	1.2		1.9	08/28/12	09/18/12
Lead 212	**0.41**		**0.10**		**0.11**	**08/28/12**	**09/18/12**
Lead 214	**0.63**		**0.14**		**0.13**	**08/28/12**	**09/18/12**
Potassium 40	**16.6**		**2.5**		**0.8**	**08/28/12**	**09/18/12**
Protactinium 231	0.28	U	0.29		1.8	08/28/12	09/18/12
Radium (226)	**0.65**		**0.18**	1.00	**0.15**	**08/28/12**	**09/18/12**
Radium 228	**0.64**		**0.18**		**0.08**	**08/28/12**	**09/18/12**
Thallium 208	**0.159**		**0.058**		**0.061**	**08/28/12**	**09/18/12**
Thorium 234	0.77	U	0.97		1.5	08/28/12	09/18/12
Uranium 235	0.15	U	0.17		0.38	08/28/12	09/18/12
Uranium 238	0.77	U	0.97		1.5	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-1

Radiochemistry

Lab Sample ID: F2H230456-013
Work Order: MV95V
Matrix: SOLID

Date Collected: 08/17/12 1100
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.032	U	0.055		0.61	08/28/12	09/18/12
Actinium 228	**0.75**		**0.24**		**0.21**	**08/28/12**	**09/18/12**
Bismuth 212	0.39	U	0.49		0.81	08/28/12	09/18/12
Bismuth 214	**0.80**		**0.22**		**0.18**	**08/28/12**	**09/18/12**
Lead 210	0.6	U	1.4		2.5	08/28/12	09/18/12
Lead 212	**0.61**		**0.17**		**0.16**	**08/28/12**	**09/18/12**
Lead 214	**0.99**		**0.21**		**0.13**	**08/28/12**	**09/18/12**
Potassium 40	**13.7**		**2.5**		**0.8**	**08/28/12**	**09/18/12**
Protactinium 231	0.36	U	0.57		2.2	08/28/12	09/18/12
Radium (226)	**0.80**		**0.22**	1.00	**0.18**	**08/28/12**	**09/18/12**
Radium 228	**0.75**		**0.24**		**0.21**	**08/28/12**	**09/18/12**
Thallium 208	**0.350**		**0.086**		**0.032**	**08/28/12**	**09/18/12**
Thorium 234	0.70	U	0.49		2.3	08/28/12	09/18/12
Uranium 235	0.09	U	0.17		0.48	08/28/12	09/18/12
Uranium 238	0.70	U	0.49		2.3	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-2

Radiochemistry

Lab Sample ID: F2H230456-014
Work Order: MV95W
Matrix: SOLID

Date Collected: 08/17/12 1102
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.17	U	0.23		0.37	08/28/12	09/18/12
Actinium 228	**0.50**		**0.17**		**0.27**	**08/28/12**	**09/18/12**
Bismuth 212	0.45	U	0.38		0.60	08/28/12	09/18/12
Bismuth 214	**0.82**		**0.16**		**0.06**	**08/28/12**	**09/18/12**
Lead 210	1.2	U	1.1		1.5	08/28/12	09/18/12
Lead 212	**0.74**		**0.14**		**0.08**	**08/28/12**	**09/18/12**
Lead 214	**0.98**		**0.18**		**0.1**	**08/28/12**	**09/18/12**
Potassium 40	**15.3**		**2.3**		**0.5**	**08/28/12**	**09/18/12**
Protactinium 231	0.42	U	0.75		1.3	08/28/12	09/18/12
Radium (226)	**0.82**		**0.16**	1.00	**0.06**	**08/28/12**	**09/18/12**
Radium 228	**0.50**		**0.17**		**0.27**	**08/28/12**	**09/18/12**
Thallium 208	**0.262**		**0.065**		**0.042**	**08/28/12**	**09/18/12**
Thorium 234	1.39	U	0.58		1.4	08/28/12	09/18/12
Uranium 235	0.093	U	0.099		0.35	08/28/12	09/18/12
Uranium 238	1.39	U	0.58		1.4	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-3

Radiochemistry

Lab Sample ID: F2H230456-015
Work Order: MV95X
Matrix: SOLID

Date Collected: 08/17/12 1103
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	-0.27	U	0.36		0.59	08/28/12	09/18/12
Actinium 228	**0.43**		**0.18**		**0.27**	**08/28/12**	**09/18/12**
Bismuth 212	0.23	U	0.37		0.62	08/28/12	09/18/12
Bismuth 214	**0.69**		**0.16**		**0.1**	**08/28/12**	**09/18/12**
Lead 210	0.05	U	1.2		2.1	08/28/12	09/18/12
Lead 212	**0.40**		**0.10**		**0.11**	**08/28/12**	**09/18/12**
Lead 214	**0.70**		**0.15**		**0.12**	**08/28/12**	**09/18/12**
Potassium 40	**16.2**		**2.4**		**0.6**	**08/28/12**	**09/18/12**
Protactinium 231	-0.39	U	0.96		1.7	08/28/12	09/18/12
Radium (226)	**0.69**		**0.16**	1.00	**0.1**	**08/28/12**	**09/18/12**
Radium 228	**0.43**		**0.18**		**0.27**	**08/28/12**	**09/18/12**
Thallium 208	**0.237**		**0.057**		**0.021**	**08/28/12**	**09/18/12**
Thorium 234	**2.2**		**1.4**		**1.6**	**08/28/12**	**09/18/12**
Uranium 235	0.07	U	0.20		0.41	08/28/12	09/18/12
Uranium 238	**2.2**		**1.4**		**1.6**	**08/28/12**	**09/18/12**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-4

Radiochemistry

Lab Sample ID: F2H230456-016
Work Order: MV950
Matrix: SOLID

Date Collected: 08/17/12 1105
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.07	U	0.18		0.36	08/28/12	09/18/12
Actinium 228	**0.66**		**0.18**		**0.22**	**08/28/12**	**09/18/12**
Bismuth 212	0.28	U	0.35		0.57	08/28/12	09/18/12
Bismuth 214	**0.78**		**0.18**		**0.18**	**08/28/12**	**09/18/12**
Lead 210	1.0	U	1.2		1.9	08/28/12	09/18/12
Lead 212	**0.66**		**0.15**		**0.12**	**08/28/12**	**09/18/12**
Lead 214	**0.89**		**0.18**		**0.17**	**08/28/12**	**09/18/12**
Potassium 40	**16.4**		**2.4**		**1**	**08/28/12**	**09/18/12**
Protactinium 231	0.30	U	0.32		1.9	08/28/12	09/18/12
Radium (226)	**0.78**		**0.18**	1.00	**0.18**	**08/28/12**	**09/18/12**
Radium 228	**0.66**		**0.18**		**0.22**	**08/28/12**	**09/18/12**
Thallium 208	**0.228**		**0.069**		**0.060**	**08/28/12**	**09/18/12**
Thorium 234	1.31	U	0.94		1.5	08/28/12	09/18/12
Uranium 235	0.09	U	0.20		0.46	08/28/12	09/18/12
Uranium 238	1.31	U	0.94		1.5	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-5

Radiochemistry

Lab Sample ID: F2H230456-017
Work Order: MV951
Matrix: SOLID

Date Collected: 08/17/12 1107
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	-0.42	U	0.85		1.4	08/28/12	09/18/12
Actinium 228	1.28		0.39		0.36	08/28/12	09/18/12
Bismuth 212	0.09	U	0.62		1.1	08/28/12	09/18/12
Bismuth 214	1.07		0.29		0.19	08/28/12	09/18/12
Lead 210	3.5		2.2		3.1	08/28/12	09/18/12
Lead 212	1.08		0.27		0.22	08/28/12	09/18/12
Lead 214	1.14		0.26		0.17	08/28/12	09/18/12
Potassium 40	16.1		3.3		1.4	08/28/12	09/18/12
Protactinium 231	0.5	U	1.4		3.1	08/28/12	09/18/12
Radium (226)	1.07		0.29	1.00	0.19	08/28/12	09/18/12
Radium 228	1.28		0.39		0.36	08/28/12	09/18/12
Thallium 208	0.52		0.18		0.15	08/28/12	09/18/12
Thorium 234	0.48	U	0.94		3.2	08/28/12	09/18/12
Uranium 235	0.16	U	0.35		0.61	08/28/12	09/18/12
Uranium 238	0.48	U	0.94		3.2	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-6

Radiochemistry

Lab Sample ID: F2H230456-018
Work Order: MV952
Matrix: SOLID

Date Collected: 08/17/12 1108
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	-0.33	U	0.47		0.77	08/28/12	09/18/12
Actinium 228	**1.01**		**0.18**		**0.07**	**08/28/12**	**09/18/12**
Bismuth 212	0.44	U	0.36		0.55	08/28/12	09/18/12
Bismuth 214	**0.86**		**0.18**		**0.12**	**08/28/12**	**09/18/12**
Lead 210	0.7	U	1.1		1.9	08/28/12	09/18/12
Lead 212	**0.79**		**0.15**		**0.11**	**08/28/12**	**09/18/12**
Lead 214	**0.92**		**0.17**		**0.10**	**08/28/12**	**09/18/12**
Potassium 40	**16.4**		**2.3**		**0.5**	**08/28/12**	**09/18/12**
Protactinium 231	0.25	U	0.47		1.6	08/28/12	09/18/12
Radium (226)	**0.86**		**0.18**	1.00	**0.12**	**08/28/12**	**09/18/12**
Radium 228	**1.01**		**0.18**		**0.07**	**08/28/12**	**09/18/12**
Thallium 208	**0.272**		**0.076**		**0.059**	**08/28/12**	**09/18/12**
Thorium 234	**1.8**		**1.2**		**1.5**	**08/28/12**	**09/18/12**
Uranium 235	0.15	U	0.23		0.38	08/28/12	09/18/12
Uranium 238	**1.8**		**1.2**		**1.5**	**08/28/12**	**09/18/12**

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Tetra Tech, EMI (ARRA)

Client Sample ID: REF-7

Radiochemistry

Lab Sample ID: F2H230456-019
Work Order: MV953
Matrix: SOLID

Date Collected: 08/17/12 1109
Date Received: 08/23/12 0915

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	mdc	Prep Date	Analysis Date
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g		Batch # 2241112		Yld %
Actinium 227	0.05	U	0.14		0.95	08/28/12	09/18/12
Actinium 228	**0.58**		**0.18**		**0.17**	**08/28/12**	**09/18/12**
Bismuth 212	0.27	U	0.31		0.50	08/28/12	09/18/12
Bismuth 214	**0.69**		**0.15**		**0.10**	**08/28/12**	**09/18/12**
Lead 210	0.88	U	0.96		1.7	08/28/12	09/18/12
Lead 212	**0.46**		**0.11**		**0.1**	**08/28/12**	**09/18/12**
Lead 214	**0.76**		**0.16**		**0.11**	**08/28/12**	**09/18/12**
Potassium 40	**17.1**		**2.5**		**0.6**	**08/28/12**	**09/18/12**
Protactinium 231	0.0024	U	0.0044		1.9	08/28/12	09/18/12
Radium (226)	**0.69**		**0.15**	1.00	**0.10**	**08/28/12**	**09/18/12**
Radium 228	**0.58**		**0.18**		**0.17**	**08/28/12**	**09/18/12**
Thallium 208	**0.136**		**0.056**		**0.060**	**08/28/12**	**09/18/12**
Thorium 234	0.43	U	0.52		1.7	08/28/12	09/18/12
Uranium 235	0.12	U	0.21		0.34	08/28/12	09/18/12
Uranium 238	0.43	U	0.52		1.7	08/28/12	09/18/12

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined by instrument performance only.
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

METHOD BLANK REPORT

Radiochemistry

Client Lot ID: F2H230456
Matrix: SOLID

Parameter	Result	Qual	Total Uncert. (2 σ+/-)	RL	MDC		Prep Date	Analysis Date	Lab Sample ID
Gamma Ra-226 & Hits By EML GA-01-R MOD			pCi/g	Batch #	2241112	Yld %			F2H280000-112B
Actinium 227	0.03	U	0.13		0.48		08/28/12	09/18/12	
Actinium 228	0.03	U	0.11		0.27		08/28/12	09/18/12	
Bismuth 212	0.11	U	0.20		0.36		08/28/12	09/18/12	
Bismuth 214	0.091	U	0.090		0.16		08/28/12	09/18/12	
Lead 210	0.9	U	1.2		2.1		08/28/12	09/18/12	
Lead 212	-0.02	U	0.10		0.15		08/28/12	09/18/12	
Lead 214	0.101	U	0.077		0.14		08/28/12	09/18/12	
Potassium 40	-0.20	U	0.83		1.3		08/28/12	09/18/12	
Protactinium 231	0.06	U	0.40		2.0		08/28/12	09/18/12	
Radium (226)	0.091	U	0.090	1.00	0.16		08/28/12	09/18/12	
Radium 228	0.03	U	0.11		0.27		08/28/12	09/18/12	
Thallium 208	0.005	U	0.025		0.090		08/28/12	09/18/12	
Thorium 234	0.12	U	0.81		1.6		08/28/12	09/18/12	
Uranium 235	-0.009	U	0.15		0.27		08/28/12	09/18/12	
Uranium 238	0.12	U	0.81		1.6		08/28/12	09/18/12	

NOTE(S)

Data are incomplete without the case narrative.

MDC is determined using instrument performance only
Bold results are greater than the MDC.

U Result is less than the sample detection limit.

Laboratory Control Sample Report

Radiochemistry

Client Lot ID: F2H230456
Matrix: SOLID

Parameter	Spike Amount	Result	Total Uncert. (2 σ+/-)	MDC	% Yld	% Rec	Lab Sample ID / QC Control Limits
Gamma Ra-226 & Hits By EML GA-01-R MOD		**pCi/g**		**GA-01-R MOD**			**F2H280000-112C**
Radium (226)	12.2	10.2	1.3	0.4		84	(73 - 107)
Thorium 232	9.50	8.7	1.3	0.6		92	(82 - 126)
	Batch #:	2241112		Analysis Date:	09/18/12		

NOTE(S)

MDC is determined by instrument performance only
Calculations are performed before rounding to avoid round-off error in calculated results

DUPLICATE EVALUATION REPORT

Radiochemistry

Client Lot ID: F2H230456 Date Sampled: 08/17/12
Matrix: SOLID Date Received: 08/23/12

Parameter	SAMPLE Result		Total Uncert. (2σ+/-)	% Yld	DUPLICATE Result		Total Uncert. (2 σ+/-)	% Yld	QC Sample ID Precision	
Gamma Ra-226 & Hits By EML GA-01-R MOD				**pCi/g**	**GA-01-R MOD**				**F2H230456-001**	
Actinium 227	-0.70	U	0.47		-0.011	U	0.043		194	%RPD
Actinium 228	0.53		0.19		0.56		0.14		6	%RPD
Bismuth 212	0.15	U	0.28		0.35	U	0.32		81	%RPD
Bismuth 214	0.89		0.18		0.85		0.19		5	%RPD
Lead 210	0.90	U	0.90		1.7	U	1.3		63	%RPD
Lead 212	0.59		0.13		0.57		0.12		3	%RPD
Lead 214	0.75		0.15		0.71		0.18		6	%RPD
Potassium 40	17.5		2.4		18.4		2.6		5	%RPD
Protactinium 231	0.38	U	0.39		0.36	U	0.28		6	%RPD
Radium (226)	0.89		0.18		0.85		0.19		5	%RPD
Radium 228	0.53		0.19		0.56		0.14		6	%RPD
Thallium 208	0.274		0.079		0.223		0.066		20	%RPD
Thorium 234	1.0	U	1.1		0.42	U	0.50		84	%RPD
Uranium 235	0.18	U	0.21		0.11	U	0.22		51	%RPD
Uranium 238	1.0	U	1.1		0.42	U	0.50		84	%RPD
		Batch #:	2241112	(Sample)	2241112		(Duplicate)			

NOTE(S)

Data are incomplete without the case narrative.
Calculations are performed before rounding to avoid round-off error in calculated results

U Result is less than the sample detection limit.

F2H230456

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis

Storage Loc: RAD

Date Received: 2012-08-23

Analytical Due Date: 2012-09-19

Report Due Date: 2012-09-20

Report Type: B Standard Report

EDD Code: 00

Project Manager: EKS

Quote #: 90680 SDG:

Project:

Radiation - Standard Products

PO#:

Report to: Emily Fisher

Client: 3333030 Tetra Tech, EMI (ARRA)

#SMPS In LOT: 0

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
1	AREA 1-1			2012-08-17 / 1014	MV94Q	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
2	AREA 1-2			2012-08-17 / 1016	MV95G	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
3	AREA 1-3			2012-08-17 / 1017	MV95H	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
4	AREA 1-4			2012-08-17 / 1019	MV95J	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
5	AREA 1-5			2012-08-17 / 1020	MV95K	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
6	AREA 1-6			2012-08-17 / 1022	MV95L	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
7	AREA 1-7			2012-08-17 / 1023	MV95M	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

TestAmerica St. Louis

F2H230456 CLIENT ANALYSIS SUMMARY

Storage Loc: RAD

Date Received: 2012-08-23

Analytical Due Date: 2012-09-19

Report Due Date: 2012-09-20

Report Type: B Standard Report

EDD Code: 00

Project Manager: EKS Quote #: 90680 SDG:

Project: Radiation - Standard Products

PO#: Report to: Emily Fisher

Client: 3333030 Tetra Tech, EMI (ARRA) #SMPS In LOT: 0

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
8	AREA 1-8			2012-08-17 / 1024	MV95N	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
9	AREA 1-9			2012-08-17 / 1026	MV95P	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
10	AREA 1-10			2012-08-17 / 1027	MV95Q	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
11	AREA 1-11			2012-08-17 / 1030	MV95R	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
12	AREA 1-12			2012-08-17 / 1032	MV95T	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
13	REF-1			2012-08-17 / 1100	MV95V	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
14	REF-2			2012-08-17 / 1102	MV95W	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A

F2H230456

CLIENT ANALYSIS SUMMARY

TestAmerica St. Louis

Storage Loc: RAD

Date Received: 2012-08-23

Analytical Due Date: 2012-09-19

Report Due Date: 2012-09-20

Report Type: B Standard Report

EDD Code: 00

Project Manager: EKS

Quote #: 90680 SDG:

Project:

Radiation - Standard Products

PO#:

Report to: Emily Fisher

Client: 3333030 Tetra Tech, EMI (ARRA)

#SMPS In LOT: 0

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
15	REF-3			2012-08-17 / 1103	MV95X	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
16	REF-4			2012-08-17 / 1105	MV950	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
17	REF-5			2012-08-17 / 1107	MV951	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
18	REF-6			2012-08-17 / 1108	MV952	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

SAMPLE #	CLIENT SAMPLE ID	Site ID	Client Matrix	DATE/TIME SAMPLED	WORKORDER	A
19	REF-7			2012-08-17 / 1109	MV953	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	0B	EML	GA-01-R MOD	SOLID, GA-01-R MOD, Gamma Ra-226 & Hits	J9	Dry, Grind, and Fill Geometry -> 21 day In-growth	01	STANDARD TEST SET	PROT: R	WRK LOC	06

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

CUR#140

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date: 8/22/12	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	1 of 2 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Standard Products	☐ 1 week			
Site:	☐ 2 days			
PO# 10816243	☐ 1 day			Sampler: Robert Monnig

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Scan	Ra-226 by 21-day ingrowth	Sample Specific Notes:
Area 1-1	8/21/12	1014			1		X	X	
Area 1-2		1016					X	X	
Area 1-3		1017					X	X	
Area 1-4		1019					X	X	
Area 1-5		1020					X	X	
Area 1-6		1022					X	X	
Area 1-7		1023					X	X	
Area 1-8		1024					X	X	
Area 1-9		1026					X	X	
Area 1-10		1027					X	X	
Area 1-11		1030					X	X	
Area 1-12		1032					X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	8/22/12 1600	FedEx		
Relinquished by:	Company:	Date/Time:	Received by: Shannon Clarkson	Company: TA	Date/Time: 8/23/12 0915
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

F2H230406

TestAmerica St. Louis

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

CUR#140

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date: 8/22/12	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	2 of 2 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Standard Products	☐ 1 week			
Site:	☐ 2 days			
PO# 1086243	☐ 1 day			Sampler: Robert Monnig

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Scan	Ra-226 by In-Growth	Sample Specific Notes:
REF-1	8/17/12	1100			1		X	X	
REF-2	↓	1102			1		X	X	
REF-3	↓	1103			1		X	X	
REF-4	↓	1105			1		X	X	
REF-5	↓	1107			1		X	X	
REF-6	↓	1108			1		X	X	
REF-7	↓	1109			1		X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	8/22/12 1000	FedEx		
			Steven Clarkson	TA	8/23/12 0915

F2H230456

TestAmerica St. Louis

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Lot #(s): F2H230456

TestAmerica St. Louis

CUR Form #: 1 4 0

CONDITION UPON RECEIPT FORM

Client: Tetra Tech

Quote No: 90680

COC/RFA No:

Initiated By: SC Date: 8/23/12 Time: 0915

Shipping Information

Shipper: FedEx UPS DHL Courier Client Other: _____ Multiple Packages: Y N

Shipping # (s):*

1. 4465 1405 9370
2. 4465 1405 9380
3.
4.
5.
6.
7.
8.
9.
10.

Sample Temperature (s):**

1. Ambient
2. Ambient
3.
4.
5.
6.
7.
8.
9.
10.

*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; Rad tests- Liquid or Solids; Perchlorate

Condition (Circle "Y" for yes, "N" for no and "N/A" for not applicable):

1.	Y N	Are there custody seals present on the cooler?	8.	Y N	Are there custody seals present on bottles?
2.	Y N N/A	Do custody seals on cooler appear to be tampered with?	9.	Y N N/A	Do custody seals on bottles appear to be tampered with?
3.	Y N	Were contents of cooler frisked after opening, but before unpacking?	10.	Y N N/A	Was sample received with proper pH[1]? (If not, make note below)
4.	Y N	Sample received with Chain of Custody?	11.	Y N N/A	Containers for C-14, H-3 & I-129/131 marked with "Do Not Preserve" label?
5.	Y N N/A	Does the Chain of Custody match sample ID's on the container(s)?	12.	Y N	Sample received in proper containers?
6.	Y N	Was sample received broken?	13.	Y N N/A	Headspace in VOA or TOX liquid samples? (If Yes, note sample ID's below)
7.	Y N	Is sample volume sufficient for analysis?	14.	Y N N/A	Was Internal COC/Workshare received?

[1] For DOE-AL (Pantex, LANL, Sandia) sites, pH of ALL containers received must be verified, EXCEPT VOA, TOX, Oil & Grease and soils.

Notes:

Container "UH Resample" was cracked, with minor spilling inside cooler. Container's sample was put into new container.

Container "Area 1-7"'s lid was removed ~~when cool~~ 8/23/12 SC before cooler was opened. Roughly 1/5 of the sample was spilled in the cooler.

Corrective Action:

- ☐ Client Contact Name: _____ Informed by: _____
- ☐ Sample(s) processed "as is"
- ☐ Sample(s) on hold until: _____ If released, notify: _____

Project Management Review: EJS Date: 8/24/12

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.

ADMIN-0004 rev13, REVISED 05/27/11 \\Slsvr01\QA\FORMS\ST-LOUIS\ADMIN\Admin-0004 CUR.doc

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-2990-1
Client Project/Site: Standard Products

For:
Tetra Tech EM Inc.
415 Oak Street
Kansas City, Missouri 64106

Attn: Ms. Emily Fisher

Authorized for release by:
8/14/2013 10:26:00 AM

Erika Gish, Project Manager I
erika.gish@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at:
www.testamericainc.com

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

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

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Job ID: 160-2990-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: Standard Products

Report Number: 160-2990-1

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

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

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

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

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

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

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

RECEIPT

The samples were received on 7/15/2013 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 22.0º C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples AREA 14-SOUTH WALL (160-2990-1), AREA 14-NORTH WALL (160-2990-2), AREA 14-WEST WALL (160-2990-3), AREA 14-EAST WALL (160-2990-4) and AREA 14-FLOOR (160-2990-5) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA 901.1. The samples were leached on 07/16/2013, prepared on 07/18/2013 and analyzed on 08/08/2013.

No other difficulties were encountered during the Gamma spec analysis.

All other quality control parameters were within the acceptance limits.

Job ID: 160-2990-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

TestAmerica St. Louis
13715 Rider Trail North

Earth City, MO 63045
phone 314.298.8566 fax 314.298.8757

Chain of Custody Record

cd 234

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Rob Monnig	Site Contact:	Date: 7/11/13	COC No:
Tetra Tech	Tel/Fax: 816-729-5621	Lab Contact:	Carrier:	1 of 1 COCs
415 Oak Street	Analysis Turnaround Time			Job No.
Kansas City, MO	Calendar (C) or Work Days (W) _____			
(816) 412-1775 Phone	TAT if different from Below _____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Standard Products	☐ 1 week			
Site:	☐ 2 days			
P O # 1096170	☐ 1 day			Sampler: Robert Monnig

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	Gamma Scan	Ra-226 with 21-day in-growth	Sample Specific Notes:
Area 14- South Wall	6/25/13	1027	Soil		1		X	X	
Area 14- North Wall	↓	1029	↓		1		X	X	
Area 14- West Wall		1030			1		X	X	
Area 14- East Wall		1032			1		X	X	
Area 14- Floor	↓	1035	↓		1		X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* _____ *Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	Tetra Tech	7/11/13	Fed Ex		
Relinquished by:	Company:	Date/Time: 7.15.13	Received by: [signature]	Company: TA SL	Date/Time: 7.15.13 0930
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Form No. CA-C-WI-002, Rev. 3, dated 04/4/2012

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-2990-1

Login Number: 2990

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	Thermal preservation not required.
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Method	Method Description	Protocol	Laboratory
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-2990-1	AREA 14-SOUTH WALL	Solid	06/25/13 10:27	07/15/13 09:30
160-2990-2	AREA 14-NORTH WALL	Solid	06/25/13 10:29	07/15/13 09:30
160-2990-3	AREA 14-WEST WALL	Solid	06/25/13 10:30	07/15/13 09:30
160-2990-4	AREA 14-EAST WALL	Solid	06/25/13 10:32	07/15/13 09:30
160-2990-5	AREA 14-FLOOR	Solid	06/25/13 10:35	07/15/13 09:30

Client Sample Results

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Client Sample ID: AREA 14-SOUTH WALL

Lab Sample ID: 160-2990-1

Date Collected: 06/25/13 10:27
Matrix: Solid
Date Received: 07/15/13 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.826	U	0.708	0.716		1.15	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Ac-228	**0.915**		0.232	0.250		0.231	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Bismuth-212	**1.11**		0.723	0.732		1.05	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Bismuth-214	**1.28**		0.231	0.267		0.183	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Lead-210	2.72	U	1.96	1.99		2.80	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Lead-212	**0.828**		0.147	0.182		0.177	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Lead-214	**1.36**		0.190	0.237		0.191	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Potassium-40	**20.6**		2.20	3.05		0.641	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Protactinium-231	0.742	U	0.613	0.619		2.42	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Radium-226	**1.28**		0.231	0.267	1.00	0.183	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Radium-228	**0.915**		0.232	0.250		0.231	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Thallium-208	**0.301**		0.0869	0.0924		0.0854	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Thorium-232	**0.915**		0.232	0.250		0.231	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Thorium-234	0.626	U	0.748	0.751		2.27	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Uranium-235	0.214	U	0.256	0.257		0.499	pCi/g	07/18/13 12:49	08/08/13 03:26	1
Uranium-238	0.626	U	0.748	0.751		2.27	pCi/g	07/18/13 12:49	08/08/13 03:26	1

Client Sample ID: AREA 14-NORTH WALL

Lab Sample ID: 160-2990-2

Date Collected: 06/25/13 10:29
Matrix: Solid
Date Received: 07/15/13 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.884	U	0.669	0.679		1.08	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Ac-228	**1.26**		0.296	0.322		0.168	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Bismuth-212	**1.84**		0.844	0.865		0.785	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Bismuth-214	**2.27**		0.266	0.356		0.161	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Lead-210	**3.35**		1.95	1.99		2.29	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Lead-212	**1.21**		0.153	0.218		0.150	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Lead-214	**2.34**		0.240	0.342		0.161	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Potassium-40	**18.8**		2.10	2.85		1.05	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Protactinium-231	-0.447	U	1.54	1.54		2.65	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Radium-226	**2.27**		0.266	0.356	1.00	0.161	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Radium-228	**1.26**		0.296	0.322		0.168	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Thallium-208	**0.418**		0.101	0.110		0.0847	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Thorium-232	**1.26**		0.296	0.322		0.168	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Thorium-234	1.68	U	0.616	0.641		2.64	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Uranium-235	0.170	U	0.380	0.380		0.637	pCi/g	07/18/13 12:49	08/08/13 03:50	1
Uranium-238	1.68	U	0.616	0.641		2.64	pCi/g	07/18/13 12:49	08/08/13 03:50	1

Client Sample Results

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Client Sample ID: AREA 14-WEST WALL

Lab Sample ID: 160-2990-3
Matrix: Solid
Date Collected: 06/25/13 10:30
Date Received: 07/15/13 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.235	U	0.439	0.440		2.27	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Ac-228	0.375	U	0.211	0.215		0.858	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Bismuth-212	0.916	U	1.29	1.30		2.15	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Bismuth-214	**3.46**		0.481	0.600		0.250	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Lead-210	**5.26**		3.36	3.41		4.21	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Lead-212	**0.949**		0.228	0.259		0.289	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Lead-214	**3.20**		0.429	0.543		0.299	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Potassium-40	**18.7**		3.24	3.76		2.03	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Protactinium-231	**2.20**		1.26	1.28		2.13	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Radium-226	**3.46**		0.481	0.600	1.00	0.250	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Radium-228	0.375	U	0.211	0.215		0.858	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Thallium-208	**0.318**		0.125	0.129		0.149	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Thorium-232	0.375	U	0.211	0.215		0.858	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Thorium-234	1.01	U	2.53	2.53		4.33	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Uranium-235	-0.00381	U	0.00972	0.00973		0.987	pCi/g	07/18/13 12:49	08/08/13 08:13	1
Uranium-238	1.01	U	2.53	2.53		4.33	pCi/g	07/18/13 12:49	08/08/13 08:13	1

Client Sample ID: AREA 14-EAST WALL

Lab Sample ID: 160-2990-4
Matrix: Solid
Date Collected: 06/25/13 10:32
Date Received: 07/15/13 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.0959	U	0.191	0.191		0.523	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Ac-228	**1.46**		0.300	0.335		0.160	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Bismuth-212	0.636	U	0.847	0.849		1.40	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Bismuth-214	**1.15**		0.243	0.270		0.198	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Lead-210	**3.58**		2.62	2.65		3.18	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Lead-212	**1.09**		0.171	0.221		0.166	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Lead-214	**1.18**		0.249	0.278		0.223	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Potassium-40	**22.4**		2.93	3.72		1.08	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Protactinium-231	0.771	U	0.979	0.983		2.76	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Radium-226	**1.15**		0.243	0.270	1.00	0.198	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Radium-228	**1.46**		0.300	0.335		0.160	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Thallium-208	**0.385**		0.108	0.115		0.0858	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Thorium-232	**1.46**		0.300	0.335		0.160	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Thorium-234	1.21	U	1.56	1.56		2.30	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Uranium-235	0.211	U	0.308	0.308		0.553	pCi/g	07/18/13 12:49	08/08/13 08:30	1
Uranium-238	1.21	U	1.56	1.56		2.30	pCi/g	07/18/13 12:49	08/08/13 08:30	1

Client Sample Results

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Client Sample ID: AREA 14-FLOOR

Lab Sample ID: 160-2990-5

Date Collected: 06/25/13 10:35

Matrix: Solid

Date Received: 07/15/13 09:30

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.000	U	0.158	0.158		1.41	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Ac-228	**0.733**		0.204	0.218		0.283	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Bismuth-212	0.381	U	0.562	0.564		0.941	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Bismuth-214	**0.916**		0.189	0.212		0.157	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Lead-210	**2.87**		1.94	1.97		2.59	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Lead-212	**0.771**		0.123	0.158		0.137	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Lead-214	**0.917**		0.151	0.178		0.159	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Potassium-40	**21.9**		2.14	3.10		0.776	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Protactinium-231	0.101	U	0.191	0.191		2.09	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Radium-226	**0.916**		0.189	0.212	1.00	0.157	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Radium-228	**0.733**		0.204	0.218		0.283	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Thallium-208	**0.232**		0.0652	0.0695		0.0625	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Thorium-232	**0.733**		0.204	0.218		0.283	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Thorium-234	0.320	U	0.664	0.664		2.23	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Uranium-235	0.161	U	0.222	0.222		0.434	pCi/g	07/18/13 12:49	08/08/13 08:05	1
Uranium-238	0.320	U	0.664	0.664		2.23	pCi/g	07/18/13 12:49	08/08/13 08:05	1

QC Sample Results

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-61437/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 65541 — **Prep Batch: 61437**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.0000	U	0.0728	0.0728		0.556	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Ac-228	-0.07203	U	0.758	0.758		0.308	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Bismuth-212	0.04626	U	0.429	0.429		0.816	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Bismuth-214	-0.03866	U	0.259	0.259		0.187	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Lead-210	-0.01537	U	0.982	0.982		1.91	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Lead-212	0.02166	U	0.0523	0.0524		0.104	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Lead-214	-0.003509	U	0.0844	0.0844		0.158	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Potassium-40	-0.2879	U	1.25	1.25		1.43	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Protactinium-231	0.0000	U	0.866	0.866		1.90	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Radium-226	-0.03866	U	0.259	0.259	1.00	0.187	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Radium-228	-0.07203	U	0.758	0.758		0.308	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Thallium-208	-0.008424	U	0.0436	0.0436		0.0812	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Thorium-232	-0.07203	U	0.758	0.758		0.308	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Thorium-234	0.1703	U	0.473	0.473		1.60	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Uranium-235	-0.02142	U	0.270	0.270		0.338	pCi/g	07/18/13 12:49	08/08/13 08:11	1
Uranium-238	0.1703	U	0.473	0.473		1.60	pCi/g	07/18/13 12:49	08/08/13 08:11	1

Lab Sample ID: LCS 160-61437/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 65542 — **Prep Batch: 61437**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Americium-241	97.6	101.1		10.6		1.22	pCi/g	104	87 - 116
Cesium-137	31.7	31.80		3.39		0.302	pCi/g	100	87 - 120
Cobalt-60	24.9	24.59		2.52		0.132	pCi/g	99	87 - 115

Lab Sample ID: 160-2990-1 DU — **Client Sample ID: AREA 14-SOUTH WALL**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 65550 — **Prep Batch: 61437**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Actinium-227	-0.826	U	0.03618	U	0.235		0.987	pCi/g	0.91	1
Ac-228	0.915		1.223		0.246		0.0836	pCi/g	0.62	1
Bismuth-212	1.11		0.7638	U	0.668		1.04	pCi/g	0.24	1
Bismuth-214	1.28		1.380		0.251		0.141	pCi/g	0.20	1
Lead-210	2.72	U	1.770	U	1.46		2.32	pCi/g	0.28	1
Lead-212	0.828		0.8851		0.165		0.114	pCi/g	0.16	1
Lead-214	1.36		1.470		0.242		0.157	pCi/g	0.23	1
Potassium-40	20.6		23.04		3.12		0.723	pCi/g	0.39	1
Protactinium-231	0.742	U	0.7467	U	0.566		2.23	pCi/g	0	1
Radium-226	1.28		1.380		0.251	1.00	0.141	pCi/g	0.20	1
Radium-228	0.915		1.223		0.246		0.0836	pCi/g	0.62	1
Thallium-208	0.301		0.3318		0.0816		0.0617	pCi/g	0.18	1
Thorium-232	0.915		1.223		0.246		0.0836	pCi/g	0.62	1
Thorium-234	0.626	U	0.7358	U	0.594		2.15	pCi/g	0.08	1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-2990-1 DU
Matrix: Solid
Analysis Batch: 65550

Client Sample ID: AREA 14-SOUTH WALL
Prep Type: Total/NA
Prep Batch: 61437

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Uranium-235	0.214	U		0.1535	U	0.247		0.539	pCi/g			0.12	1
Uranium-238	0.626	U		0.7358	U	0.594		2.15	pCi/g			0.08	1

QC Association Summary

Client: Tetra Tech EM Inc.
Project/Site: Standard Products

TestAmerica Job ID: 160-2990-1

Rad

Leach Batch: 60776

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-2990-1	AREA 14-SOUTH WALL	Total/NA	Solid	Dry and Grind	
160-2990-1 DU	AREA 14-SOUTH WALL	Total/NA	Solid	Dry and Grind	
160-2990-2	AREA 14-NORTH WALL	Total/NA	Solid	Dry and Grind	
160-2990-3	AREA 14-WEST WALL	Total/NA	Solid	Dry and Grind	
160-2990-4	AREA 14-EAST WALL	Total/NA	Solid	Dry and Grind	
160-2990-5	AREA 14-FLOOR	Total/NA	Solid	Dry and Grind	

Prep Batch: 61437

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-2990-1	AREA 14-SOUTH WALL	Total/NA	Solid	Fill_Geo-21	60776
160-2990-1 DU	AREA 14-SOUTH WALL	Total/NA	Solid	Fill_Geo-21	60776
160-2990-2	AREA 14-NORTH WALL	Total/NA	Solid	Fill_Geo-21	60776
160-2990-3	AREA 14-WEST WALL	Total/NA	Solid	Fill_Geo-21	60776
160-2990-4	AREA 14-EAST WALL	Total/NA	Solid	Fill_Geo-21	60776
160-2990-5	AREA 14-FLOOR	Total/NA	Solid	Fill_Geo-21	60776
LCS 160-61437/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
MB 160-61437/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	