TETRA TECH

March 15, 2013

Mr. Richard Jardine
On-Scene Coordinator (OSC)
U.S. Environmental Protection Agency (EPA), Region 4
61 Forsyth Street, SW, 11th Floor
Atlanta, Georgia 30303

Subject: **Removal Letter Report**
Royster Guano Removal
Columbia, Richland County, South Carolina
Contract No.: EP-W-05-054
TDD No.: TTEMI-05-001-0186

Dear Mr. Jardine:

The Tetra Tech Superfund Technical Assessment and Response Team (START) is submitting this letter report summarizing removal action activities conducted at 13 residences adjacent to the former F.S. Royster Guano Company (RGC) site from October 31 through December 20, 2012 in Columbia, Richland County, South Carolina. This report includes four enclosures. Enclosure 1 provides figures of the site location, layout, soil sampling results, air sampling and monitoring results, and the extent of removal activities. Enclosure 2 provides tables summarizing laboratory analytical results obtained for multimedia samples collected during the investigation and removal action. Enclosure 3 is a photographic log of investigation and removal action activities. Enclosure 4 is a copy of Tetra Tech START's field logbook notes.

EXECUTIVE SUMMARY

The South Carolina Department of Health and Environmental Control (SCDHEC) requested that the U.S. Environmental Protection Agency (EPA) conduct assessment and removal activities in the Edisto Court community adjacent to the former RGC site. At the direction of EPA, Tetra Tech START conducted a removal investigation in the area of the former RGC site from August 3 to 9, 2012 to characterize and determine the extent of contamination in surface and subsurface soil. The removal investigation identified 13 residential properties where arsenic and lead contamination exceeded their respective EPA Removal Management Levels (RML) for residential soil at or near surface levels. Removal activities occurred from October 31 to December 27, 2012, replacing the top 12 inches of contaminated soil at each residence with clean topsoil.

BACKGROUND

The former RGC site covers approximately 2.9 acres located at 2095 Commerce Drive in Columbia, Richland County, South Carolina in a mixed industrial and commercial area, with an adjacent residential community, Edisto Court (see Figure 1 in Enclosure 1). Geographic coordinates for the approximate center of the former RGC site are latitude 33.977275 degrees north and longitude 81.008780 degrees west.

Beginning in the early 1900s, the former RGC site was a fertilizer plant, which produced superphosphate fertilizer. The fertilizer manufacturing process involved mixing sulfuric acid and phosphate ore in lead-lined acid chambers. The waste material generated from the fertilizer manufacturing process contained high levels of arsenic and lead. During operations, a large pond was present north of the plant. Though

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limited historical documentation exists, it is suspected that the pond was the end point for post-manufacturing waste materials. In the 1940s, the pond was drained, backfilled, and subsequently redeveloped into residential properties. A portion of the Edisto Court community was built within the boundaries of the former pond (see Figure 2 in Enclosure 1).

In March 2012, during a pre-buy assessment of a portion of the former RGC site and surrounding property, high concentrations of arsenic were found in soil and groundwater samples. SCDHEC was notified in May 2012 and on July 25, 2012, SCDHEC conducted additional soil sampling at 41 residences, six businesses, two parks, and seven public right-of-way areas. SCDHEC's sampling efforts identified several locations with high concentrations of arsenic and lead. SCDHEC notified EPA of the contamination, which prompted an EPA site visit and review of sampling analytical results.

REMOVAL INVESTIGATION ACTIVITIES

From August 3 to 9, 2012, EPA conducted a removal investigation of the area surrounding the former RGC site to characterize and determine the extent of contamination in surface and subsurface soil and to determine the appropriateness of a removal action in accordance with 40 Code of Federal Regulations (CFR) 300.415. Removal investigation activities were conducted in conjunction with SCDHEC and included the use of an X-ray fluorescence (XRF) instrument for in situ soil screening, collection of surface and subsurface soil samples for laboratory analysis, air sampling for arsenic and lead, particulate monitoring for total suspended particulates (TSP), and photographic documentation of all investigation activities. Below is a brief summary of these activities:

- A total of 49 residential properties were investigated for arsenic and lead contamination by Tetra Tech START and SCDEHC.
- Soil screening was conducted using XRF in situ for surface soils at 42 residential properties.
- A geoprobe was used to collect soil samples at depths of 3 inches below ground surface (bgs), 12 inches bgs, and 24 inches bgs. These samples were screened using XRF ex situ at 27 residential properties.
- A total of 246 samples were collected during removal investigation activities at depths of 0 to 3 inches bgs, 9 to 12 inches bgs, and 21 to 24 inches bgs. A geoprobe was used to collect 53 grab soil samples, 49 front yard grab soil samples, and four back yard grab soil samples. Hand augers were used to collect 193 composite soil samples, including 97 front yard soil samples and 96 back yard soil samples. All soil samples were analyzed for arsenic and lead by two Tetra Tech-procured laboratories, GEL Laboratories (GEL) in Charleston, South Carolina and AES Environmental Services, Inc. (AES) in Atlanta, Georgia.
- Laboratory analytical results confirmed the presence of arsenic and lead at concentrations exceeding their respective EPA RMLs for residential soil at 13 properties. Eight soil samples contained arsenic, eight soil samples contained lead, and 10 soil samples contained both arsenic and lead above EPA RMLs for residential soil (see Table 1 in Enclosure 2). The EPA RML for residential soil for arsenic is 39 milligrams per kilogram (mg/kg) and the EPA RML for residential soil for lead is 400 mg/kg (see Figure 3 in Enclosure 1).
- A total of seven soil samples at varying depths were selected for analysis using a toxicity characteristic leaching procedure (TCLP). TCLP results are necessary for determining proper disposal. Samples with the highest XRF screening values were submitted to AES for TCLP analysis of arsenic and lead. TCLP analytical results for arsenic and lead did not exceed the Resource Conservation and Recovery Act (RCRA) maximum TCLP limits in soil samples (see Table 2 in Enclosure 2).

- Daily photographs and logbooks were maintained by Tetra Tech START to document investigation activities and ensure that residential properties were returned to their pre-investigation conditions.
- Particulate monitoring was conducted using DataRAM DR-4000 units at four locations downwind of the site on August 3 and 4, 2012. An 8-hour time weighted average of TSP was determined for daily operations. On August 3, 2012, the TSP for all monitoring locations had a daily average of 24.2 micrograms per cubic meter (µg/m^3), with TSP ranging from 17.7 to 37.3 µg/m^3. On August 4, 2012, the TSP for all monitoring locations had a daily average of 11.1 µg/m^3, with TSP ranging from 5.6 to 17.1 µg/m^3 (see Figure 4 in Enclosure 1).
- Air samples were collected on August 3, 2012 at five locations and on August 4, 2012 at four locations. Air sampling locations were collocated with particulate monitoring locations, except on August 3, 2012 when an additional air sample was collected at 66 East Street. All air samples were analyzed by Galson Laboratories (Galson) in East Syracuse, New York for arsenic and lead using test method NIOSH 7303/7300 ICP/MS.
- With one exception, laboratory analytical results for air samples indicated no arsenic or lead above their respective National Ambient Air Quality Standards (NAAQS) of 0.050 µg/m^3 and 0.150 µg/m^3. One air sample collected on August 3, 2012 contained lead at 0.79 µg/m^3 (see Table 3 in Enclosure 2). This sampling location was positioned upwind of the former RGC site along a truck route and across from an asphalt facility. Arsenic results indicated no exceedences of its air standard; however, some of the detection limits were above the action level due to differing daily sample volumes.

REMOVAL ACTIVITIES

In October 2012, EPA initiated a removal action at the site. Only yards with surface contamination (0 to 12 inches bgs) were included in the removal action. The front yards of two residential properties, 67 Easy Street and 68 Easy Street, had contamination deeper than 12 inches bgs and were, therefore, not removed. OSC Richard Jardine requested that Tetra Tech START conduct additional XRF screening of surface soil in yards adjacent to removal. Tetra Tech START identified two additional residential properties for removal: 78 Easy Street (back yard) and 1041 Howe Street (front yard). The front yards of 83 Easy Street and 85 Easy Street were also added. With two properties eliminated (67 Easy Street and 68 Easy Street) and two properties added (78 Easy Street and 1041 Howe Street), the list of residential properties identified for removal remained 13 (see Figures 3 and 5 in Enclosure 1).

During the removal action, Tetra Tech START provided daily onsite support including XRF field screening to guide excavation activities, confirmation soil samples for laboratory analysis at residential properties, daily air sampling for arsenic and lead, air monitoring for fine particulates, and written and photographic documentation of all removal activities. Tetra Tech START concluded its removal support on December 27, 2012. A brief summary of these activities is provided below:

- A total of 13 residential properties were excavated down to 12 inches bgs, unless otherwise noted, by EPA's Emergency and Rapid Response Services (ERRS) contractor. Removals occurred in the front yards of two properties, the back yards of six properties, and both the front and back yards of five properties. Small areas of contamination below 6 inches bgs were identified in the yards of 1029 Howe Street, 1041 Howe Street, 66 Easy Street, and 78 Easy Street. At these locations, the excavation was extended down to 12 inches bgs. The remaining portions of these yards were excavated down to 6 inches bgs (see Figure 3 in Enclosure 1).

- XRF screening was conducted daily to guide removal excavations and delineate contamination hotspots within 12 inches bgs.
- A total of 18 confirmation soil samples were collected to determine the effectiveness of excavation activities. Composite confirmation soil samples were collected from 0 to 3 inches below the excavation surface (12 to 15 inches bgs) in the front and back yards, with aliquots from the side yard composited with the associated back yard sample. All confirmation soil samples were analyzed by AES for arsenic and lead.
- Laboratory analytical results of confirmation soil samples indicated the presence of arsenic or lead above their respective EPA RMLs for residential soil below the excavated areas of eight properties (see Table 4 in Enclosure 2).
- Five soil samples were collected from the clean topsoil to verify the absence of contamination. These samples were analyzed by AES for arsenic and lead. Analytical results indicated that arsenic and lead did not exceed their respective EPA RMLs for residential soil (see Table 5 in Enclosure 2). Following confirmation sampling activities, the excavated areas of all 13 properties were backfilled with clean topsoil and fresh sod was laid to control potential erosion.
- A total of seven samples were selected for TCLP analysis in order to determine proper disposal. Three composite samples were collected from the soils of seven residential properties not previously analyzed for TCLP during the removal investigation. Three samples were collected from biota onsite, including one sample from a pecan nut and two samples from the interior wood of a pecan tree and sweet gum tree. An additional sample was collected from a set of wood poles behind 85 Easy Street. The seven TCLP samples were analyzed by AES. Analytical results for arsenic, lead, and semi-volatile organic compounds (SVOC) did not exceed the RCRA maximum TCLP limits (see Table 2 in Enclosure 2).
- Daily photographs and logbooks were maintained by Tetra Tech START to document removal activities and ensure that residential properties were returned to their pre-excavation conditions.
- A total of 56 air samples were collected for TSP, including one upwind and one downwind sample collected on each day of excavation activities, or when ERRS was performing load out of contaminated soil for transportation and disposal at an offsite facility. Air samples were analyzed by Galson using test method NIOSH 7303/7300 ICP/MS.
- Laboratory analytical results for air samples indicated no arsenic or lead above their respective National Institute of Occupational Safety and Health Recommended Exposure Limit of 2.0 µg/m^3 and 50 µg/m^3. A few air samples contained arsenic and lead above their respective NAAQSs . Lead was detected in three air samples at concentrations exceeding its NAAQS of 0.150 µg/m^3 and arsenic was detected in one air sample at a concentration exceeding its NAAQS of 0.050 µg/m^3 (see Table 6 in Enclosure 2). Some of the detection limits for arsenic were above the action level due to differing daily sample volumes.
- Particulate monitoring was conducted using two or three DataRAM DR-4000 units collocated with the air sampling locations. An 8-hour time weighted average of $PM_{2.5}$ was determined for daily operations, with an overall average of 14.7 µg/m^3 and a daily average range of 3.4 to 37.9 µg/m^3.

CONCLUSION

At the direction of EPA, Tetra Tech START investigated a total of 49 residential properties for arsenic and lead contamination in the Edisto Court community adjacent to the former RGC facility. Based on investigation results, 13 residential properties with arsenic and lead contamination exceeding EPA RMLs for residential soil at or near surface levels were selected for removal. Contaminated soils were removed and replaced with clean topsoil and fresh sod at all 13 properties. Throughout removal activities, daily air monitoring, air sampling, and soil field screening was conducted. Confirmation samples of excavated yards and surface soil samples of clean topsoil were collected. Tetra Tech START completed onsite activities on December 27, 2012.

If you have any questions regarding this letter report, please contact me at (678) 775-3118.

Sincerely,

James Gooch
Tetra Tech START III Site Manager

Andrew F. Johnson
Tetra Tech START III Program Manager

Enclosures (4)

cc: Katrina Jones, EPA Project Officer
Brian Croft, START III Project Manager
Angel Reed, START III Document Control Coordinator

ENCLOSURE 1

FIGURES

(5 pages)

ENCLOSURE 2

ANALYTICAL DATA SUMMARY TABLES

(19 pages)

ENCLOSURE 3

PHOTOGRAPHIC LOG

(24 pages)

ENCLOSURE 4

LOGBOOK NOTES

(61 Sheets)