



environmental management, inc.

July 9, 2010

Mr. Matt Paque
3301 NW 150th Street
Oklahoma City, Oklahoma 73134-2009

RE: Work Plan for Additional Sampling of a Portion of the Former Trade Effluent Pond Berm
Northwest Portion of Remediation Zone D
Tronox Facility, Henderson, Nevada

Dear Mr. Paque:

This work plan presents proposed additional soil sampling at the north-south trending portion of the former Trade Effluent Pond (TEP) berm located in the northwestern portion of Remediation Zone D (RZ-D) at the Tronox facility in Henderson, Nevada (the Site). Figure 1 shows the portion of the former TEP berm (berm) where sampling is proposed. The berm is approximately 800 feet long, extending southward from the northern property boundary.

OBJECTIVES

The objectives of the sampling program are to: a) determine if the soil in the berm is suitable for use as excavation backfill; and b) to determine if soil beneath the base of the berm is impacted with dioxin and hexachlorobenzene (HCB), as reflected in soil samples on either side of the berm.

BACKGROUND AND SAMPLING RATIONALE

The northern portion of the berm is approximately 15 feet above the surrounding grade, while the southern portion of the berm increases gradually to approximately 18 feet above the surrounding grade at the southern tip. The volume of soil in the berm is estimated to be approximately 25,000 cubic yards.

Soil samples taken from the top of the berm collected during pre-confirmation sampling indicated no dioxin or HCB concentrations were present above comparison criteria¹. However, analyses of soil samples collected east and west of the northern portion of the berm indicate that the soil adjacent to the berm has been impacted with dioxin and HCB above their respective

¹ The Site-specific criterion for dioxin is 2,700 parts per trillion (ppt); Nevada Division of Environmental Protection's (NDEP's) basic comparison levels (BCLs) for HCB is 1.2 milligrams per kilogram (mg/kg).

comparison criteria. Because of the previously observed comparison criteria exceedances, soil excavation is proposed east and west of the berm, as described in the *Draft Work-in-Progress Excavation Plan for Phase B Soil Remediation of RZ-D* submitted to NDEP on June 22, 2010. The excavations are proposed to depths of from 3 to 10 feet below ground surface (bgs) based on concentrations of dioxin and HCB above comparison criteria (see Figure 1).

Soil borings will be advanced from the approximate top of the berm and samples will be collected within the berm and below the base of the berm to evaluate whether: 1) soil within the berm is clean and can be used as fill material for the adjacent excavations; and 2) soil beneath the base of the berm contains concentrations of dioxin and HCB comparable to the neighboring soil samples so that the excavation cutline beneath the berms can be refined if needed.

Soil samples below the base of the berm will be analyzed for dioxin and HCB. Soil samples within the berm will be analyzed for dioxin, HCB, arsenic, perchlorate, and organochlorine pesticides (OCPs). In addition, surface samples will be collected on the berm for analysis of asbestos. Arsenic, perchlorate, OCPs, and asbestos were added to the berm sampling as these constituents have been encountered occasionally in the vicinity at levels above the comparison criteria and, therefore, could potentially be present in the berm material.

SCOPE OF WORK

Work will be conducted following BMI standard operating procedures (SOPs). Specific SOPs employed are described below.

Soil Sampling and Analysis

Soil samples will be collected from five locations, each located at the top of the berm as shown on Figure 1. Three of the five proposed locations, SSAI3-02, SSAI3-03 and SSAJ3-02, are at existing locations that were included in the *Final Revised Pre-confirmation Sampling Work Plan* (Northgate, 2010); one location, SSAI3-04, is at an elective step-out location where soil samples have been collected, analyzed and found to be below comparison criteria; and the southernmost boring, SSAJ3-05, is in a new location where sampling has not yet been conducted. Table 1 includes the proposed sampling plan and analytical results at the existing five sampling locations. As shown in the table, sample collection and analyses are planned for three depth zones:

- Suficial sampling for asbestos;
- Within the berm, with sampling at various depths for dioxin, HCB, arsenic, perchlorate and OCPs; and



- Beneath the base of the berm for borings where excavation is planned adjacent to the berm.

Surficial sampling for asbestos will be collected and analyzed at each of the five boring locations.

A total of 25 sampling locations (5 borings and 5 depths) are proposed for characterization purposes within the above-grade berm for dioxin, HCB, arsenic, perchlorate and OCPs. These 25 locations will result in a frequency of approximately one sample per 1,000 cubic yards of berm material. Existing data will be utilized where available.

Sample collection and analysis are planned below the berm at locations where neighboring soil samples were found to be above comparison levels and excavation is required. At these locations, soil samples will be collected just below the base of the berm and at the associated cutline depths of the adjacent areas.

In summary, the following sample collection depths are proposed:

- **SSAI3-02** – Collect samples at 0-2” and 4-6” (surficial asbestos); 1, 5, 8, 11, and 14 feet bgs (within the berm), and 15, 19, and 25 feet bgs (at the base of the berm, and 4 and 10 feet below the base of the berm);
- **SSAI3-03** – Collect samples at 0-2” and 4-6” (surficial asbestos); 1, 5, 8, 11, and 14 feet bgs (within the berm), and 15, 23, and 25 feet bgs (at the base of the berm, and 8 and 10 feet below the base of the berm);
- **SSAI3-04** – Collect samples at 0-2” and 4-6” (surficial asbestos); 1, 5, 8, 11, and 14 feet bgs (within the berm), and 15, 23, and 25 feet bgs (at the base of the berm, and 8 and 10 feet below the base of the berm);
- **SSAJ3-02** – Collect samples at 0-2” and 4-6” (surficial asbestos); 1, 5, 8, 12, and 15 feet bgs (within the berm), and 16 and 19 feet bgs (at the base of the berm and 3 feet below the base of the berm); and
- **SSAJ3-05** – Collect samples at 0-2” and 4-6” (surficial asbestos); 1, 5, 8, 12, and 16 feet bgs (within the berm). No below base samples are needed at this location because soil on either side of the berm at this location did not require excavation.

Asbestos samples will be collected from the surficial soil (0-2” and 4-6”) at each of the five sampling locations according to *SOP-12 Asbestos Soil Sampling* (BRC, 2009a). The 0-2” samples will be analyzed and the 4-6” will be held pending results of the 0-2” analyses. The asbestos quadrant sampling protocol may need to be revised based on the dimensions of the berm in order to remain within the berm material.



Soil samples collected for analysis (other than asbestos sampling described above) will be collected using a sonic rig. Soil borings will be logged in the field using the procedures as described in *SOP-14 Field Documentation* (BRC, 2009b) and *SOP-17 Soil Logging* (BRC, 2009c). Soil samples will be collected following the procedures described in *SOP-07 Soil Sampling* (BRC, 2009d). A split-spoon sampler fitted with brass liners will be used to collect soil samples for laboratory analyses using the procedures described in *SOP-23 Split Spoon Sampling* (BRC, 2009e). Surveying of final sample locations will follow the procedures described in *SOP-10 Surveying* (BRC, 2009f).

Sample containers will be sealed, labeled, and placed on ice inside an ice chest and provided to the laboratory under chain-of-custody protocol using the procedures described in *SOP-06 Sample Management and Shipping* (BRC, 2009g). Soil samples collected within the berm will be analyzed for dioxin using United States Environmental Protection Agency (USEPA) Method 8290; for HCB using USEPA Method 8270C; for arsenic using USEPA Method 6020; for perchlorate using USEPA Method 314.0; and for OCPs using USEPA Method 8081A. Soil samples beneath the base of the berm will be analyzed for dioxin and HCB using USEPA Methods 8290 and 8270C, respectively. Surficial asbestos samples will be analyzed using 540-R-97-028.

Equipment Decontamination

Equipment cleaning or decontamination will follow procedures described in *SOP-31 Drilling Equipment Decontamination* (BRC, 2009h).

Borehole Abandonment

Each borehole will be abandoned once the target depth has been reached and the necessary samples are obtained. The boreholes will be abandoned by backfilling with a bentonite/neat cement grout using the procedures described in *SOP-19 Borehole Abandonment* (BRC, 2009i). Soil cuttings (including unused soil cores) will be temporarily stored in U.S. Department of Transportation (DOT) -approved steel 55-gallon drums while awaiting receipt of the final laboratory results. Each drum will be managed according to the procedures described in *SOP-34 Investigative Derived Waste (IDW) Management* (BRC, 2009j). At the end of each day, equipment decontamination water will be temporarily stored in DOT-approved 55-gallon drums. Each drum will be marked with water-proof labels and water-proof markers. Each drum will receive a unique identification number and will be catalogued for waste containment documentation purpose. Following characterization, each drum of material will be disposed of as appropriate per federal, state, and local requirements.



Field Quality Assurance/Quality Control (QA/QC) Requirements

Field QA/QC requirements will follow the procedures defined in the Phase B Sampling and Analysis Plans (SAPs) and Quality Assurance Project Plan (June 2009). Summary information is provided below for these requirements.

Field Quality Assurance/Quality Control (QA/QC) procedures will be followed to ensure viability and integrity of sample analytical data. The field investigative team will be responsible for submitting QA/QC samples to the laboratory. QA/QC samples include field duplicates, equipment decontamination blanks, and field blanks. In addition, matrix spike and matrix spike duplicate samples will be collected at five percent of the sampling locations (for a total of one sample) to supplement laboratory QC sample analyses.

Field Duplicate Samples

One field duplicate will be collected for every 10 samples submitted for analysis. The duplicate samples will be tested for the same suite of analytical parameters as the corresponding original sample.

Equipment Decontamination Blank Samples

Equipment decontamination blanks will consist of laboratory-grade distilled water rinsed through clean sampling devices. These devices include the soil sampling equipment used in the investigation. Equipment decontamination blanks will be collected at five percent of the sampling locations. Equipment decontamination blank samples will be analyzed for the same suite of analytical parameters for that boring (except asbestos).

Field Blank Samples

Field blank samples consisting of the decontamination source water will be analyzed for all of the constituents analyzed that day (except for asbestos). One field blank sample per day will be collected from water used for the equipment blank samples. As with the previous Phase B sampling, the decontamination water source will be laboratory-grade water obtained from the Tronox on-Site laboratory.



CLOSING

If you have any questions or comments on this Work Plan, please contact either of the undersigned.

Sincerely,
Northgate Environmental Management, Inc.



Deni Chambers, C.E.G., C.Hg.
Principal-in-Charge



Derrick Willis
Project Manager

Attachments: References
Figure 1
Table 1



REFERENCES

Basic Remediation Company (BRC). 2009a. *SOP 12 Asbestos Soil Sampling*. Revision 6. December 2009.

BRC. 2009b. *SOP 14 Field Documentation*. Revision 4. December 2009.

BRC. 2009c. *SOP 17 Soil Logging*. Revision 4. December 2009.

BRC. 2009d. *SOP 07 Soil Sampling*. Revision 4. December 2009.

BRC. 2009e. *SOP 23 Split Spoon Sampling*. Revision 4. December 2009.

BRC. 2009f. *SOP 10 Surveying*. Revision 4. December 2009.

BRC. 2009g. *SOP 06 Sample Management and Shipping*. Revision 4. December 2009.

BRC. 2009h. *SOP 31 Equipment Drilling Decon*. Revision 4. December 2009.

BRC. 2009i. *SOP 19 Borehole Abandonment*. Revision 4. December 2009.

BRC. 2009j. *SOP 34 IDW Management*. Revision 4. December 2009.

Northgate Environmental Management, Inc. (Northgate). 2010. *Final Revised Pre-Confirmation Sampling Work Plan*. March 25, 2010.

