GW - 114

Work Plan
(Soil Investigation)

Date:
August 15, 2013

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Mr. Edward Hansen
Environmental Bureau
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

RE: Work Plan Amendment
Soil Investigation and Soil Vapor Extraction System Closure
Former Dowell Schlumberger Facility, Artesia, New Mexico (GW-114)

Dear Mr. Hansen:

On behalf of Schlumberger and The Dow Chemical Company, CH2M HILL has prepared this work plan amendment, under existing Discharge Plan GW-114, to perform investigation of the soil in areas where historical investigation activities noted the presence of soil contamination at the Former Dowell Schlumberger Facility in Artesia, New Mexico. Additionally, this work plan amendment describes decommissioning of the soil vapor extraction (SVE) system at the Former Wash Bay area of the site.

Background

Soil investigations were performed at the site in the early 1990s. Figure 1 illustrates locations of former plant operational areas as well as locations where soil staining or odors were observed during drilling according to the report *Additional Assessment and Remediation Feasibility Testing*, Dowell Schlumberger Incorporated, Artesia, New Mexico, dated November 20, 1991, and prepared by Western Water Consultants, Inc. Three soil samples were collected from 3 locations, each from roughly 15 to 17 feet below ground surface (bgs). The soil samples indicated the presence of limited concentrations of toluene, ethylbenzene, and xylenes, along with acetone and carbon disulfide. A single detection of chloromethane was deemed as possibly being a laboratory contaminant. The limited scale of the soil sampling, as understood based on the available information, makes it difficult to fully assess the nature, extent, and magnitude of possible soil impacts at the site.

An SVE system has been operating in the Former Wash Bay area to recover vapor-phase VOCs from the vadose zone. The system was reportedly placed into service in 1995 to recover benzene, toluene, ethylbenzene, and xylenes (BTEX) and chlorinated solvents (primarily tetrachloroethene [PCE]) near the Former Wash Bay. However, the exact data on the nature, extent, and magnitude of contamination that prompted the installation of the SVE system have not been able to be identified. Figure 2 presents a trend graph showing the rapid decrease in recovered soil vapor concentrations since 1995. Based on long-term quarterly monitoring results of the SVE system offgas, the vapor-phase volatile organic compounds (VOCs) appear to have been removed and the SVE system is no longer recovering any notable VOC mass from the vadose zone. Therefore, it is recommended that the SVE system

be taken offline. Due to the extended length of time since there were any appreciable VOC detections (since roughly 2000), no rebound study is proposed as part of investigation activities described in this work plan amendment.

Field Activities

The purpose of the soil investigation is to collect data to evaluate whether remaining soil contaminant concentrations at the site have the potential to create effluent or leachate that may impact the quality of the groundwater, thereby warranting additional soil remediation activities. Soil boring locations have been selected to investigate those areas deemed most likely to be affected by historical site operations and also based on the available, although limited, information from prior drilling and soil sampling activities at the site. The proposed soil boring locations will provide data on current VOC concentrations in soil at the following historical site operating areas:

- Former underground storage tanks (USTs) areas
- Former Acid Plant
- Former Wash Bay

Data obtained from the new soil borings will provide the basis for a soil closure strategy. To achieve closure of the site soils, it will need to be demonstrated that residual VOCs present in soils are not of sufficient concentrations to impact groundwater at levels in excess of the New Mexico Water Quality Control Commission groundwater standards in New Mexico Administrative Code 20.6.2.

Ten soil borings will be completed using direct push or hollow-stem auger methods at the locations shown on Figure 1. Continuous coring will be completed at each borehole to a total depth of 30 feet bgs. Soil cores will be logged in accordance with the Unified Soil Classification System at a minimum of 5-ft intervals during advancement of the borehole, or when a change in lithology is observed. Soil vapor concentrations will be monitored with a photoionization detector during advancement of each borehole and staining and odors will be noted and recorded. At the conclusion of field activities, the soil boring locations will be surveyed using a handheld global positioning system unit with submeter accuracy and will be plotted on the site plans.

Soil samples are expected to be collected for analysis at 2, 5, 15, 20, and 30 feet bgs from each borehole. However, sample depths may be modified in the field based on field observations such as staining, odors, or PID detections. Although the static depth to water is roughly 11 to 12 feet bgs at the site, the aquifer is semiconfined and water is not typically encountered until drilling reaches a depth greater than 20 feet bgs. Therefore, the final depth of the sample from the roughly 20-foot-bgs interval will be modified so that an unsaturated sample is collected just above the water table in order to assess potential VOC soil concentrations in contact with groundwater. The soil samples will be properly labeled and then appropriately packed and shipped to the analytical laboratory for VOC analysis by U.S. Environmental Protection Agency (USEPA) Method 8260.

In addition to the soil boring and sampling methods described above, additional soil samples will be collected at the three locations shown in Figure 1 within the aquifer matrix to support evaluation of the in situ chemical oxidation (ISCO) objectives (see *Artesia Groundwater Remediation Program Modifications Work Plan Amendment* [Schlumberger, August 2013]). The soil samples will be analyzed for soil oxidant demand and soil pH buffering capacity to allow selection of an injectable ISCO amendment, verify parameters for final ISCO dosing calculations, and evaluate the ISCO treatment efficiency expected within the target treatment zones.

A decade's worth of nearly non-detect results from the SVE system effluent indicate the system is no longer removing any significant VOC mass from the subsurface. Therefore, the SVE system will be taken offline at the start of the field investigation; however, the SVE infrastructure will be left in place pending the findings of the soil investigation. Assuming the additional soil investigation at the site does not identify areas of significant soil contamination that would be amenable to remediation through SVE, the SVE system will be properly decommissioned. During decommissioning subsurface extraction wells and piping will be either removed or abandoned in place by filling with grout. Above-grade features, including piping and the SVE blower, will be disconnected and removed.

Waste Management

Solid and liquid waste will be generated during the field activities. Potential solid waste streams include soil from drilling, personal protective equipment, and concrete and pipe from SVE decommissioning. Liquid waste will include rinsate from decontamination. The waste will be characterized, managed, and disposed of offsite in accordance with applicable local, state, and federal regulations.

Data Evaluation and Reporting

Laboratory data will be validated and tabulated for report presentation. Field data will be compiled from field logs and presented in tables listing the sampling details, field observations, and field parameter measurements. The data will be used to further refine the understanding of the site conceptual model and to direct project decisions regarding the need for additional investigation or other activities that will support site remediation and/or closure. A subset of the data will also be used to evaluate the potential for other groundwater treatment methods in lieu of the current recirculation system. Further discussion of that evaluation is presented in a separate work plan amendment.

Following completion of investigation activities and receipt and evaluation of the data, a soil investigation summary report will be prepared to document soil investigation activities and conclusions and to make recommendations for either additional field activities or closure of the site soils.

Evaluation of Possible Targeted Soil Excavation

As described above, the results from the soil investigation will be used to assess the nature, magnitude, and extent of residual VOC concentrations in soil and to evaluate whether such VOCs, if present, have the potential to impact site groundwater. This information will be used

to not only supplement the overall conceptual site model, but also to specifically evaluate whether soil excavation should be considered to achieve site closure goals.

The May 2013 USEPA Regional Screening Levels, Industrial Soil Screening Levels will be used to evaluate the soil VOC results because the New Mexico Oil Conservation Division does not have soil screening levels. The screening levels established for the Artesia facility use the lower of a carcinogenic target risk of 1×10^{-5} or a noncancer hazard index of 1. Table 1 presents the industrial soil screening levels for those VOCs that were detected in the 1991 soil samples. Soils within 15 feet of the ground surface that have VOC concentrations that exceed screening levels could be reasonably excavated if that action would facilitate site closure. If data collected from the soil investigation indicate the presence of contaminated soil, then additional soil borings may be needed to refine an area that is appropriate for excavation and to pre-define the excavation limits. If soil excavation is conducted, the VOC-contaminated soil will be excavated, stockpiled, sampled, and properly disposed of offsite. Overall, the potential need for soil excavation is considered low because available soil, groundwater, and soil vapor data are not suggestive of highly contaminated soils. However, if volumes of soil at concentrations above screening levels are present, excavation provides a viable and complete mechanism to fully remediate those soils to support site closure.

If you have any questions or comments, please call me at 281-285-4747 or contact me through email at cocianni-v@slb.com.

Sincerely,

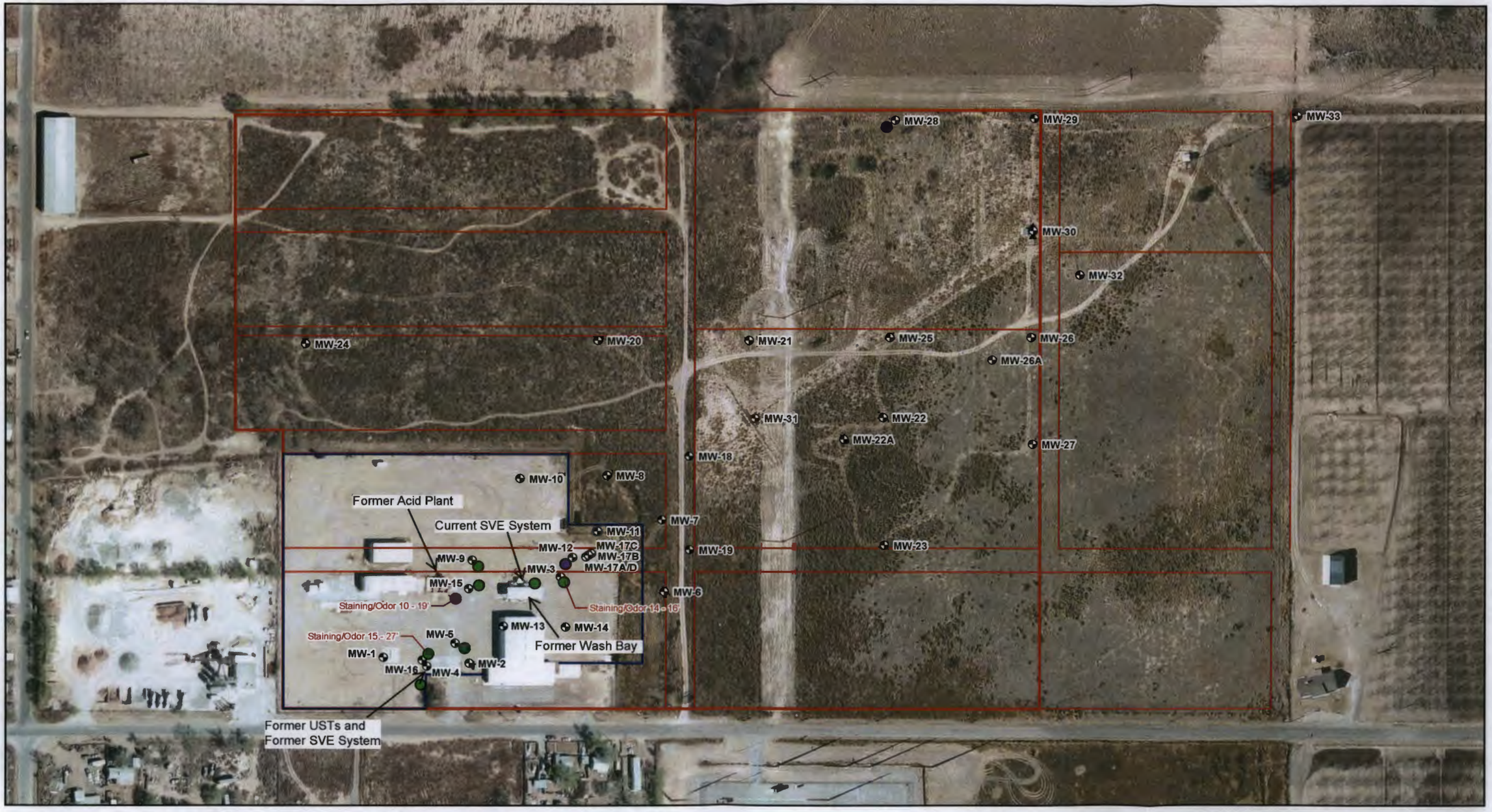
V. Cocianni

Virgilio Cocianni
Remediation Manager

c: Jim Strunk, The Dow Chemical Company (1 hard copy)
Cathy Barnett/CH2M HILL (1 electronic copy)
Jennifer Laggan/CH2M HILL (1 electronic copy)
Jeffrey Minchak/CH2M HILL (1 electronic copy)

Enclosures

Figures



LEGEND

- Monitoring Well
- Groundwater Extraction Well
- Fence
- Right of Way Boundary
- Property Line

- Sample for VOCs at 2, 5, 15, 20, and 30 feet bgs.
- Sample for VOCs at 2, 5, 15, 20, and 30 feet bgs. Additionally, sample aquifer material at 30 feet bgs for SOD and soil buffering capacity.

N

0 100 200
Feet

FIGURE 1
Soil Investigation Locations
Former Dowell Schlumberger Facility
Artesia, New Mexico

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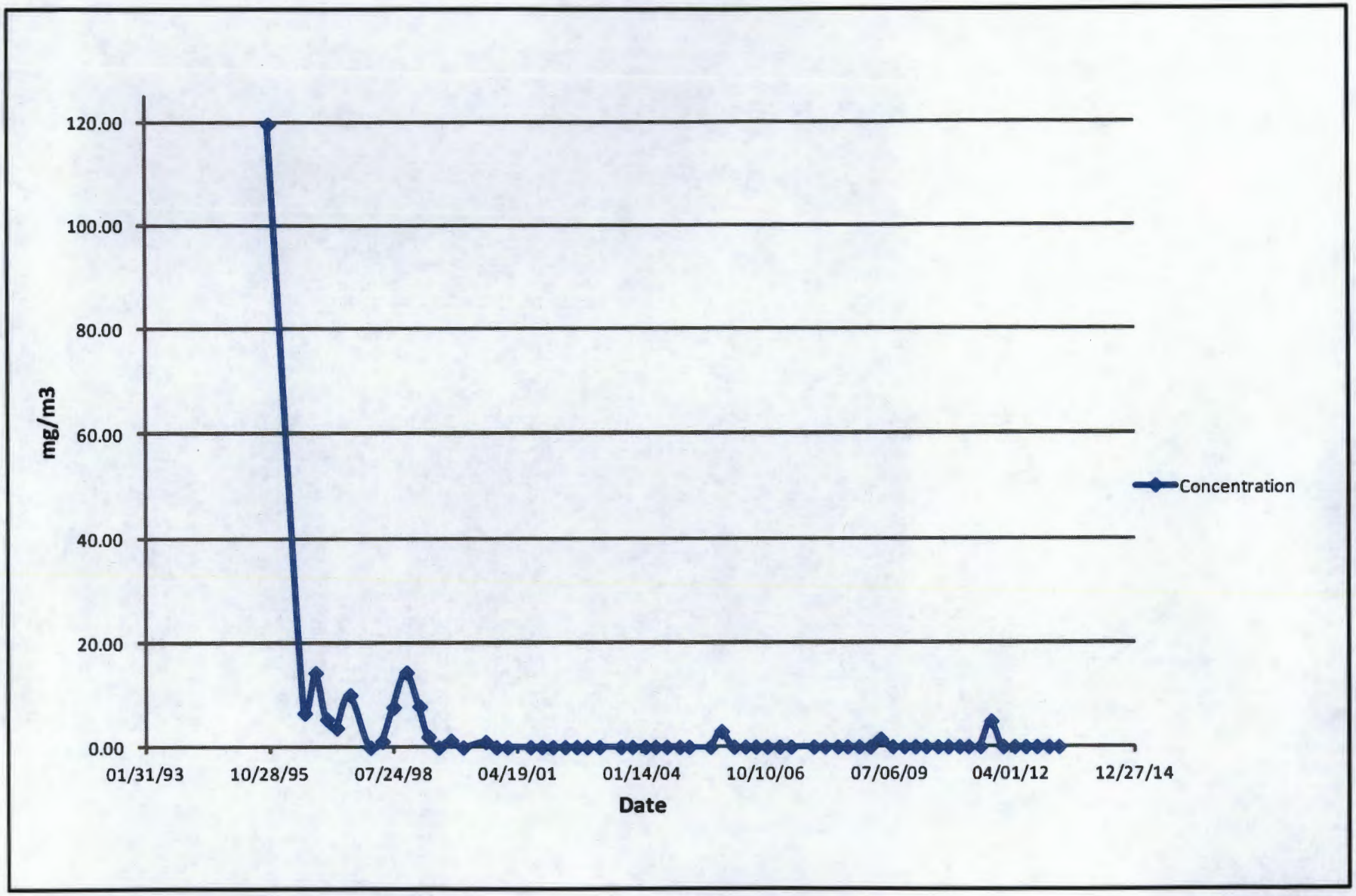

FIGURE 2
BTEX Trend Graph
Former Dowell Schlumberger Facility
Artesia, New Mexico

Table

TABLE 1

USEPA Regional Soil Screening Levels for Selected Analytes—May 2013

Former Dowell Schlumberger Facility, GW-114

Artesia, New Mexico

Analyte	Industrial Soil Screening Level (mg/kg) [a]
Acetone	630,000
Benzene	54
Carbon Disulfide	3,700
Chloromethane	500
1,1-Dichloroethane	170
1,2-Dichloroethane	22
1,1-Dichloroethene (1,1-DCE)	1,100
Ethylbenzene	270
Tetrachloroethene (PCE)	410
Toluene	45,000
1,1,1-Trichloroethane (1,1,1-TCA)	38,000
1,1,2-Trichloroethane	7
Trichloroethene (TCE)	20
p-Xylene	2,600
m-Xylene	2,500
o-Xylene	3,000

mg/kg = milligrams per kilogram

a. The Industrial Soil Screening Levels presented are the lower of either the Carcinogenic Target Risk of $1x10^{-5}$ or Noncancer Hazard Index of 1. The levels are taken from the May 2013 EPA Regional Screening Levels.