ER Site No. 46: Old Acid Waste Line Outfall (Southwest of TA-IV)

ADS: 1309
Operable Unit: Tijeras Arroyo

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Site History

ER Site 46 is the inactive outfall for the Old Acid Waste Line (ER Site 226), that was connected to six research buildings in TA-I. Covering 2.11 acres at the southwest corner of TA-IV, ER Site 46 discharged acid-waste water which contained a variety of chemicals and possibly some radionuclides. At ER Site 46, the acid-waste line is constructed of eight-inch diameter clay-tile pipe; the pipe couplings are sealed with black tar and jute. From about 1948 through late 1974, the TA-I acid-waste water discharged from a series of three outlets on the southern end of the acid-waste line into three shallow earthen ditches (OD-1, OD-2, and OD-3) that extended for several hundred feet across the East Mesa. The confluence of these three outfall ditches is still present on the northern rim of Tijeras Arroyo. The amount of discharge was not well documented, but may have been about 130,000 gallons of acid-waste water per day. Soil-vapor samples suggest ER Site 46 might have been a source of trichloroethylene (TCE) which has impacted groundwater.

The specific types and volumes of waste water discharged from the acid-waste line are not completely known. According to the 1987 CEARP, the "old acid waste line was used to discharge about 130,000 gallons per day (gpd) of acidic waste water from Area I to an open ditch that emptied into Tijeras Arroyo. Most of the water was from cooling tower blowdown; however, this line also carried some waste liquid from etching and photographic processing. The contaminants discharged were primarily chromic acid (approximately 200 gallons per day) and ferric chloride."

The Tijeras Arroyo Operable Unit (TJAOU) manages ER Site 46. Other Operable Units (OUs) also have provided relevant information for the site. In the 1990s, TA-I OU personnel interviewed laboratory personnel; various laterals of the acid-waste line were excavated showing that the acid-waste line was connected to Buildings 839, 840, 841, 860, 863, and 892. In addition

to the chemicals discussed above, the acid-waste line received electroplating solutions and chromates. Most of the chemicals used in the six buildings were typically containerized for off-site disposal. However, some waste waters discharged to the acid-waste line may have contained: various organic compounds (acetone, TCE, and toluene); isopropyl alcohol; methyl alcohol; electroplating solutions containing nickel acetate, cadmium cyanide, copper cyanide, hydrogen sulfide, nickel sulfate, copper sulfate, and sodium dichromate; polyvinyl alcohol binder; various acids (acetic, chromic, sulfuric, nitric); sodium hydroxide; paints; paint strippers; machining coolant oils; metals (aluminum, depleted uranium, lead, and silver); and polychlorinated biphenyls (PCBs). In addition to the waste water, the acid-waste line may have received a relatively minor amount of sanitary waste (sewage) from inadvertent cross-connections between various TA-I piping systems. However, the disposal of sewage in the open ditches would have been limited because of health and odor issues. Storm-water systems were not connected to ER Site 46.

The CEARP is the only historical document that cites a waste-water discharge rate for the acid-waste line. The CEARP-cited discharge rate of 130,000 gpd, which is equivalent to approximately 90 gallons per minute, may be unreasonable. Neither historical aerial photographs nor field inspections of the remaining OD-1 and OD-2 segments has identified a sufficiently large amount of soil erosion which would correspond to such a large amount of waste water. However, the volume of waste water was sufficient to create brushy vegetation that stretched along the 700-foot long outfall ditches and for at least an additional 1,400 feet past the confluence of the outfall ditches.

The soil at ER Site 46 is poorly developed with high alkalinity. The subsurface geology consists of unconsolidated alluvial and colluvial deposits derived from the Sandia and Manzanita Mountains. These upper Santa Fe Group deposits consist of sediments ranging from clay to gravel derived from the granitic rocks of the Sandia Mountains and greenstone, limestone, and quartzite derived from the Manzanita Mountains. The depth to Pennsylvanian strata and/or Precambrian basement beneath TA-IV is approximately 3,000 feet.

ER Site 46 is situated on the steep, northern rim of Tijeras Arroyo but outside the 100-year floodplain. The site is located approximately 2,000 feet north of the active channel of Tijeras Arroyo. Water flows in the active channel near the site several times per year.

Groundwater information for ER Site 46 was obtained from the Tijeras Arroyo Groundwater (TAG) investigation. The hydrogeologic setting of the TAG study area is dominated by two water-bearing zones, the perched system and the regional aquifer, both of which are present within the upper Santa Fe Group. The perched system is not used for water supply. However, the City of Albuquerque, Kirtland Air Force Base, (KAFB), and the Veterans Administration utilize the regional aquifer for water supply purposes.
At the northern end of ER Site 46, the depth to the perched system is approximately 303 feet below ground surface (bgs). However, the site extends across the southwestern boundary of the perched system. The perched system covers approximately 3.5 square miles in the central part of the TAG study area. The direction of groundwater flow in the perched system is to the southeast. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the perched system and above the regional aquifer. The depth to the

regional aquifer is approximately 499 feet bgs at the northern edge of the site. The direction of groundwater flow in the regional aquifer is principally to the northwest towards the water-supply wells. The nearest water-supply well (KAFB-1) is located approximately 1.3 miles northwest of the site. Groundwater from the perched system merges with the regional aquifer southeast of Tijeras Arroyo. The regional aquifer extends across the entire TAG study area and the Albuquerque Basin.

Constituents of Concern

The constituents of concern (COCs) for ER Site 46 are:

- volatile organic compounds (VOCs)
- semi-volatile organic compounds (SVOCs)
- Target Analyte List (TAL) metals
- chromium-VI
- cyanide
- PCBs
- nitrate
- tritium
- gamma-emitting radionuclides.

Current Hazards

Near-surface soil at the northern end of ER Site 46 near the acid-waste line (clay-tile pipe) is contaminated with heavy metals and PCBs. No radioactive hazards are present at the site.

Current Status of Work

In 1994, ER Site 46 was surveyed for unexploded ordnance / high explosive (UXO/HE) and radioactive material; neither was found. Eight soil samples (46-01-A/B through 46-04-A/B) were collected from a nearby storm-water ditch. The samples were analyzed for VOCs, SVOCs, TAL metals, chromium-VI, cyanide, total Kjeldahl nitrogen (TKN), nitrate/nitrite, tritium, and gamma-emitting radionuclides. No contamination was detected in the soil samples. However, recent research has revealed that the soil samples did not properly characterize the site because the storm-water ditch did not receive any waste water.

In 1995, TA-I OU personnel collected soil and sediment samples at 27 locations along nearly the entire length of the acid-waste line north of ER Site 46. A GeoProbe® rig was used to collect soil samples from within a few feet laterally of the line, and to a maximum sampling depth of 14 feet below ground surface (bgs). Sediment samples also were collected from the acid-waste line by hand. The soil and sediment samples were analyzed for VOCs, SVOCs, PCBs, TAL metals, tritium, and gamma-emitting radionuclides. No significant contamination was detected. However, the New Mexico Environmental Department (NMED) has recently requested that the TA-I OU collect additional soil samples on both sides of the acid-waste line.

In 1996, SNL/NM Facilities Engineering conducted a video-camera survey of the acid-waste line. Because the acid-waste line was not constructed with cleanouts, openings for the video camera were cut into the acid-waste line at a series of locations that were identified as acid waste access points (AWAPs). Two AWAPs are located at ER Site 46. Much of the waste line at ER Site 46 was found to be partially collapsed and filled with sloughed soil, apparently due to heavy equipment used for constructing the nearby surface-water ditch in 1977.

As part of the Sandia North (now known as the TAG) groundwater investigation, monitoring well TJA-3 was installed at the northern end of ER Site 46 in 1998. The well was completed in the regional aquifer at a depth of 496 to 516 feet bgs. During drilling, soil-vapor samples were collected at six depths (37, 97, 137, 197, 237, and 312 feet bgs) with a SimulprobeTM sampler driven ahead of the drill string. Low to high levels of 16 VOCs were detected in soil vapor. TCE had the maximum VOC concentration in soil vapor at 10,000 parts per billion by volume (ppbv) in the 137-foot sample. However, the TCE concentration at 197 feet bgs was only 320 ppbv. The second highest VOC concentration was methylene chloride at 620 ppbv from the 137-foot sample. Vinyl chloride was not detected in any of the soil-vapor samples. Soil samples were not collected. The perched system was not encountered during the drilling of test hole 46-BH-01, which was located 25 feet southeast of TJA-3.

In August 1998, the DOE collected soil-vapor samples from four Geoprobe® boreholes (EPA-ERTA2/4-BH-1, EPA-ERTA2/4-BH-2, EPA-ERTA2/4-BH-3, and EPA-ERTA2/4-BH-5). Samples were collected at depths of 10, 20, and/or 30 feet bgs using a TedlarTM bag system. Low levels of 16 VOCs were detected in soil-vapor samples collected near the confluence of the outfall ditches at boreholes EPA-ERTA2/4-BH-3 and EPA-ERTA2/4-BH-5. TCE had the maximum VOC concentration at 55 ppbv. VOCs were not detected at boreholes EPA-ERTA2/4-BH-1 and EPA-ERTA2/4-BH-2, which were located about 700 and 300 feet, respectively south of the confluence.

In October 1999, passive soil-vapor samples were collected using 36 VaporTecTM collectors (TJAOU-46-SVX-01 thorough TJAOU-46-SVX-36). The sampling area covered approximately seven acres and focused on the storm-water ditch, which at the time was the suspected waste-water discharge location. After being buried for 30 days at shallow depths ranging from approximately 0.5 to 1 feet bgs, the collectors were retrieved and subsequently analyzed for VOCs and gasoline/diesel range organics using U.S. Environmental Protection Agency methods 8021M and 8015M, respectively. VOC values were reported in nanograms [ng] of contaminant that had sorbed onto the activated carbon sampling media. Low levels of 17 VOCs were detected. The highest values for TCE and vinyl chloride were 257 and 103 ng, respectively.

TCE was detected at 14 of the 36 VaporTecTM locations, but the distribution of TCE did not coincide well with the storm-water ditch. This prompted the review of aerial photography that is discussed below. The highest TCE value of 257 ng corresponded to collector TJAOU-46-SVX-01, which was located near the previously overlooked acid-waste line. Most of the TCE in soil vapor was present near the estimated locations of the northern ends of the outfall ditches. However, TCE was not detected in collector TJAOU-46-SVX-24, which was located adjacent to monitor well TJA-3. This partially dislocation between the TCE in soil vapor and the location of

the outfall ditches was suspected to be the result of past TA-IV construction activities and the historical migration and/or degradation of contaminants.

The maximum concentration of vinyl chloride in soil vapor was 103 ng in VaporTecTM collector TJAOU-46-SVX-24, which was located adjacent to monitor well TJA-3. Vinyl chloride was detected at each of the 36 soil-vapor sampling locations even though no documents suggest that SNL/NM has ever used vinyl chloride. Because vinyl chloride was not detected in the trip blank or in any analytical laboratory quality assurance / quality control (QA/QC) samples, the presence of vinyl chloride at each sampling location suggests that vinyl chloride is a degradation product of TCE in soil. The lack of vinyl chloride in the deeper soil-vapor samples from the TJA-3 borehole also suggests that TCE degradation is more prevalent near the ground surface. An interpretation that other contaminants present in soil vapor are the result of degradation is not defensible because a variety of VOCs were present in the waste water.

Minor amounts of fuel hydrocarbons were detected in soil vapor. Twenty-six VaporTecTM collectors yielded diesel-range organics. The maximum value for diesel-range organics in soil vapor was 49.6 ng. Only two collectors yielded detectable concentrations of gasoline-range organics; the maximum value was 2.31 ng. These fuel hydrocarbons may be result of activities associated with TA-IV construction or the nearby fire-training facility.

In 1999, a minor amount of lead shot was identified at some of the ant hills that are located at ER Site 46. A soil layer consisting of a few inches of blow sand (loess) covers most of the lead shot. The lead shot is fallout from the nearby Kirtland Air Force Base (KAFB) skeet range, which was used from the mid-1960s through May 1998. In 1998 and 1999, the KAFB Installation Restoration Program (IRP) remediated the skeet range (IRP Site SS-83) by excavating the upper few inches of the ground surface. Approximately 174,000 pounds of lead shot were sent to a recycling facility. However, the area adjacent to ER Site 46 was located far enough from the shooting positions that remediation was not practical. However, the lead shot at ER Site 46 may impact soil analyses.

In the Summer of 2000, the ER Project conducted a comprehensive review of historic aerial photography for the period of 1951 to the present. Three previously overlooked outfall ditches were identified, and are now known as OD-1, OD-2, and OD-3. The outfall ditches extended southeastward from various outlets on the acid-waste line and merged into a confluence that is currently visible amongst some elm trees about 150 feet south of the TA-IV fence. Each of the outfall ditches was about three-feet deep, five-feet wide, and 700-feet long. The discharge of waste water began in 1948 at the first outfall ditch (OD-1). Soon after, the flow of waste water was apparently limited by the buildup of either vegetation and/or sloughed soil from the unlined ditch banks. The low slope (grade) of the acid-waste line aggravated the flowage problem. Thus, more than one outfall ditch was required. In about 1950, an intermediate outlet was constructed on the acid-waste line about 240 feet north of the OD-1 outlet; this second outlet became the starting point for outfall ditch OD-2. In the mid-1960s, another intermediate outlet was constructed in the acid-waste line about 20 feet north of the OD-2 outlet; this third outlet became the starting point for OD-3. A slight topographic low near the three outlets allowed waste water to eventually flow into all three ditches simultaneously. The flow continued through the three outfall ditches until late 1974. No waste water has discharged at ER Site 46 since then.

The aerial photography also shows that construction of TA-IV has disturbed much of the ER Site 46 area. In 1977, an 1,150-foot long storm-water ditch was constructed from the northwest corner of TA-IV to an undisturbed ravine on the arroyo rim. The ditch was used for about one year to drain storm water from some of the unpaved TA-IV parking lots. Use of the storm-water ditch was discontinued in 1978 after buried piping was extended from TA-IV to the Ninth Street Channel. In late 1978, the northernmost 150 feet of the storm-water ditch was backfilled with soil. In the early 1980s, virtually the entire length of each outfall ditch was similarly backfilled with soil when two TA-IV structures (Building 981-I and the ER Site 77 surface-water impoundment) were built. The southernmost 25 feet of the acid-waste line and the original 1948 outlet were destroyed by the construction activities. The near total disappearance of the three outfall ditches and the coincidental construction of the storm-water ditch led to the storm-water ditch being mistakenly identified in 1994 as an outfall ditch for ER Site 46. As mentioned before, soil samples were collected from the storm-water ditch in 1994.

In July 2000, the confluence of the ER Site 46 outfall ditches was identified in the field for the first time. The remaining easternmost segments of OD-1 and OD-2 were found to be about 60-feet long. Nearby, no evidence was found for OD-3. The easternmost segment of OD-3 had been disturbed by the construction of a TA-IV storm-water outfall pipe, which is now known as ER Site 234. TA-IV storm water discharged at ER Site 234 from 1979 to the early 1990s.

During January through March 2001, four monitor wells (TJA-6, TJA-7, 46-VW-01, and 46-VW-02) were installed at Site 46. At the northern end of the site, monitor wells TJA-7 and 46-VW-01 were installed near TJA-3. Monitor well TJA-7 was completed in the shallow water-bearing zone at 291 to 311 feet bgs and is a companion well for regional well TJA-3. Near the southern end of the site, monitor wells 46-VW-02 and TJA-6 were installed about 300 feet south of the outfall-ditch confluence. Monitor well TJA-6 was completed in the regional aquifer at a depth of 455 to 475 feet bgs. Shallow groundwater was not detected during the drilling for TJA-6.

In March 2001, a series of shallow trenches were hand dug along the southern end of the acid-waste line. The top of the line was covered by just a couple of inches of soil. The trenches served to better define the surviving end of the line. The present end of the line is now known to be about 20 feet west of TJA-3. When compared to the digitized locations of the outfall ditches which are based on the historical aerial photographs, it is apparent that about 26 feet of the southernmost part of the line was destroyed when the nearby surface-water ditch was constructed in 1977.

In 2001, soil samples were collected from deep boreholes located at both ends of ER Site 46. Soil samples were collected from the 46-VW-01 borehole (north end of site) at depths of 45, 95, 145, 195, 245, and 295 feet bgs. Soil samples were collected from the TJA-6 borehole (south end of site) at depths of 45, 95, 145, and 245 feet bgs. The analytical results for the 46-VW-01 and the TJA-6 soil samples showed no contamination. No PCBs were detected. Metal concentrations were within, or similar to, background levels. Radionuclides (gamma emitters and tritium) were within background levels. Low levels of four VOCs and two SVOCs were reported. TCE was not detected.

In April 2001, grab samples were collected from four locations including where a backhoe was used at the northern end of the site. Beginning at the southeast corner of the fire-training facility, a backhoe was used to dig through a gravel-parking lot. The top of the acid-waste line was found at a depth of approximately 1.5 feet. A hand auger was used to collect a soil sample (TJAOU-46-GR-01) from beneath the acid-waste line at a depth of 2.5 to 3.5 feet. The backhoe was then used to dig down to four feet; no stained soil was evident in the vicinity of sample TJAOU-46-GR-01. A trench was dug southward along the acid-waste line for a distance of about 30 feet until the third outlet (for OD-3) of the acid-waste line was found. Between the first sample location and the third outlet, the acid-waste line was intact and no discolored soil was evident. However, stained soil was found at the third outlet, which was buried at a depth of only about six inches bgs. The soil staining varied from gray to green to blue. The stained soil appeared to be confined to about three feet laterally of the line. However, the limit of stained soil was not fully determined. The staining was most likely associated with organic dyes that were used in the TA-I photo-processing laboratories. Sample (TJAOU-46-GR-02) was collected from the sloughed soil present inside the third outlet. Farther south along the acid-waste line, another sample of sloughed soil (TJAOU-46-GR-03) was collected from a broken section of the acid-waste line. Here, the top of the acid-waste line was only a few inches bgs and the degree of staining was less.

Except for cadmium at 55.3 ppm, grab sample TJAOU-46-GR-01 (located at north end of site and under one of acid-waste line couplings) contained no contamination. Soil samples TJAOU-46-GR-02 and TJAOU-46-GR-03 were collected from openings in the acid-waste line and contained significant contamination, especially for metals and PCBs. For example, soil samples TJAOU-46-GR-02 and TJAOU-46-GR-03 contained total-PCBs at 49.9 ppm and 6.17 ppm, respectively. The two samples contained 13 metals at concentrations above background levels. The maximum metal concentrations for the two soil samples were antimony at 19.4 ppm, arsenic at 8.35 ppm, barium at 589 ppm, cadmium at 105 ppm, total chromium at 4,820 ppm, chromium-VI at 7.41 ppm, copper at 1,150 ppm, lead at 1,100 ppm, mercury at 0.9 ppm, nickel at 693 ppm, selenium at 1.67 ppm, silver at 278 ppm, and zinc at 427 ppm. The maximum cyanide concentration was 311 ppm. Two VOCs were detected; the TCE concentration was 2 ppb and the methylene chloride concentration was 2.21 "J" (estimated value) ppb. Seven SVOCs were detected; benzo(a)fluoranthene had the highest concentration at 843 ppb. No HE compounds were detected. Radionuclides (gamma emitters and tritium) were within, or similar to, background levels. Soil sample TJAOU-46-GR-02 contained nitrate plus nitrite at 123 ppm.

Also in April 2001, soil sampling was conducted at the southeastern end of outfall ditch OD-2 near the confluence. Two soil samples were collected at location TJAOU-46-GR-04. The samples were collected at 0.5 and 1.5 feet bgs. The samples consisted of native soil from beneath the floor of the outfall ditch. Here, the ditch was only about three feet wide and two feet deep. No soil staining was evident at OD-2. Grab sample TJAOU-46-GR-04 (from ditch OD-2 at southeast end of site) contained no contamination except possibly cadmium at 2.69 ppm (background is 0.9 ppm).

Twelve Geoprobe® boreholes were sampled in August 2001. The boreholes were located along the visible portion of the acid-waste line at the northern end of the site. The sampling depths

ranged from 3 to 18 feet bgs. Green staining was evident to a depth of 10 feet at 46-BH-02; none of the other boreholes had stained soil. The detected contaminants were the same as the grab samples, but the borehole samples contained significantly lesser concentrations. Located near grab samples GR-02 and GR-03, three boreholes (46-BH-02, 46-BH-08, and 46-BH-09) contained the highest concentrations. For the 12 boreholes, eight metals exceeded background levels. For example, chromium was reported at 120 ppm. The maximum total-PCBs concentration was 0.841 ppm. Cyanide was reported at 12.7 ppm. Radionuclides (gamma emitters) were within, or similar to, background levels. Four VOCs were reported; toluene had the highest concentration at 107 ppb. Twenty-five SVOCs were reported; 13 SVOCs had low "J" concentrations. All but two of the 12 remaining SVOCs were less than 1 ppm. Phenol and bis(2-ethylhexyl)phthalate were reported at 1.59 and 2.04 ppm, respectively.

Three groundwater monitoring wells (TJA-3, TJA-6, and TJA-7) are located at the site. Monitoring wells TJA-3 and TJA-6 are completed in the regional aquifer. Monitoring well TJA-7 is completed in the perched system, which does not extend as far as the southeastern end of ER Site 46. The last available groundwater analyses are March 2002. Sampling of TAG monitoring wells was suspended in April 2002 with NMED approval. The COCs for the TAG study area are TCE and nitrate. At ER Site 46, groundwater samples from the perched system have not contained detectable concentrations of TCE. However, groundwater samples from the perched system have contained a maximum nitrate concentration of 41 milligrams per liter (mg/L), which exceeds the Federal Maximum Contaminant Limit (MCL) of 10 mg/L. Regional aquifer samples have contained a maximum TCE concentration of 1.39 ug/L, which is below the MCL of 5 µg/L. Groundwater samples from the regional aquifer have contained a maximum nitrate concentration of 3.7 milligrams per liter (mg/L). Several sites, including ER Site 46, may be responsible for the groundwater contamination beneath the site.

Soil-vapor samples were collected from monitoring wells 46-VW-01 and 46-VW-02 for five quarterly events from April 2001 through March 2002. These two monitoring wells are equipped with FLUTe (Flexible Liner Underground Technology)TM systems. The sampling ports for monitor well 46-VW-01 are set at 15, 65, 115, 165, 215, and 265 feet bgs. The sampling ports for monitor well 46-VW-02 are set at 46, 96, 146, 196, 246, and 296 feet bgs. SummaTM canisters are used to collect soil-vapor samples, which are analyzed for VOCs. For the five quarters, the maximum TCE concentration from monitoring well 46-VW-01 was 46,000 parts per billion on a volume/volume ratio (ppbv), which was collected from a depth of 115 feet bgs. The 265-foot bgs sampling port at monitoring well 46-VW-01 yielded a maximum TCE concentration of 350 ppbv. For the five quarters, the maximum TCE concentration from monitoring well 46-VW-02 was 650 ppbv, which was collected from a depth of 96 feet bgs. The 246-foot bgs sampling port at monitoring well 46-VW-02 yielded a maximum TCE concentration of 480 ppbv.

Twenty-two VOCs were detected in soil-vapor samples collected from the two monitoring wells, but most are single-digit "J" values. The maximum total-VOCs concentrations at monitoring wells 46-VW-01 and 46-VW-02 were 48,380 and 703 ppbv, respectively. For perspective, the soil-vapor investigation at the SNL/NM Chemical Waste Landfill (CWL) used a NMED-approved 100,000 ppbv threshold for defining the total-VOCs plume edge. NMED has not specified a threshold value for ER Site 46. Therefore, additional soil-vapor characterization at ER Site 46 does not appear to be necessary.

Several compliance documents are applicable to ER Site 46. In June 1995, SNL/NM submitted a No Further Action proposal to the New Mexico Environment Department (NMED) for ER Site 46. After receiving the June 1996 Notice of Deficiency (NOD) comments from NMED, SNL/NM submitted a NOD response in October 1996. In October 1999, NMED issued a second set of NOD comments for ER Site 46 in which they requested several types of additional sampling. SNL/NM submitted a second NOD Response in December 1999, which confirmed the need for additional work.

Future Work Planned

A Voluntary Corrective Measure (VCM) will be conducted in 2003 for removing contaminated soil and the acid-waste line near the northern end of ER Site 46. Confirmatory soil samples will be collected from the VCM trench and other areas. After the analytical results from the VCM sampling are received, an NOD response will be prepared. The NOD response will include at least seven sets of analytical results:

- soil data for the 2001 grab samples (TJAOU-46-GR-01 through TJAOU-46-GR-04),
- soil data from the 2001 Geoprobe® boreholes (46-BH-02 through 46-BH-12),
- soil data from the drilling of deep boreholes (TJA-6 and 46-VW-01),
- soil-vapor data from monitor wells 46-VW-01 and 46-VW-02,
- groundwater data from monitor wells TJA-3, TJA-6, and TJA-7,
- reformatted data tables for the soil-sampling results previously submitted in the June 1995 NFA Proposal and the October 1996 NOD Response,
- and soil data from the VCM confirmatory sampling.

Waste Volume Estimated/Generated

No waste has been generated at ER Site 46.

Information for ER Site 46 was last updated Apr 2, 2003.