GW-211

2013 Area 1&3 Work Plan

Date: 5/8/2013

Enterprise Products

ENTERPRISE PRODUCTS PARTNERS L.P.
ENTERPRISE PRODUCTS HOLDINGS LLC
(General Partner)

ENTERPRISE PRODUCTS OPERATING LLC

May 8, 2013

Return Receipt Requested
7010 1870 0001 2945 4290

Mr. Jim Griswold, Senior Hydrologist
Environmental Bureau
ENMRD/Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: ***Corrective Action Work Plan (Area 1 and Area 3 – Soils)***
Largo Compressor Station
Enterprise Field Services, LLC
OCD GW Discharge Permit Number: GW-211
Rio Arriba County, New Mexico

Attn: Leonard Lowe

Dear Mr. Griswold,

Enterprise Field Services, LLC (Enterprise) is submitting the enclosed *Corrective Action Work Plan (Area 1 and Area 3 – Soils)* dated March 11, 2013 for the facility referenced above.

This Corrective Action Work Plan (CAWP) describes the proposed on-site treatment of petroleum hydrocarbon affected soils at the Largo Compressor Station. These affected soils are located in areas designated as Area 1 (Former Condensate Storage Tank Area), and Area 3 (Retention Pond Area), in previous reporting. Note that additional investigations of the proposed treatment area are currently being scheduled to determine existing soil and groundwater conditions. This investigation will be completed and reported to the OCD prior to utilization of the treatment area.

Previously submitted reports for this facility also include the *Interim Remedial Investigation Report* dated May 15, 2010, the *Proposed Facility-Wide Soil and Groundwater Investigation and Remedial Activities* report dated June 10, 2010, the *Environmental Site Investigation – Largo Compressor Station (GW-211) dated March 24, 2011,* the *Supplemental Site Investigation & Quarterly Groundwater Monitoring Report (April 2012 Event)*, dated July 31, 2012, and the Supplemental Site Investigation Report (November 2012 and January 2013), dated February 22, 2013, in addition to periodic groundwater sampling reports.

Enterprise will continue to perform periodic groundwater monitoring at the facility, and the monitor wells that will be installed during investigation of the proposed treatment area will be added to the facility groundwater monitoring system.

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If you have any questions, or require additional information, please do not hesitate to contact me at (713) 381-2286 or drsmith@eprod.com.

Sincerely,

David R. Smith, P.G.
Sr. Environmental Scientist

Rodney M. Sartor, REM
Sr. Manager, Environmental

/dep
Enclosures (2) – *Corrective Action Work Plan (Area 1 and Area 3 – Soils)*

cc: Brandon Powell, New Mexico Oil Conservation Division, 1000 Rio Brazos Road, Aztec, NM 87410
H. C. Berry, P.O. Box 579, Dexter, NM 88230

ec: Chris Mitchell, Southwest Geoscience
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CORRECTIVE ACTION WORK PLAN
(Area 1 and Area 3 - Soils)

Property:

LARGO COMPRESSOR STATION
GROUNDWATER DISCHARGE PLAN GW-211

SE ¼ of NE ¼, Section 15, Township 26N, Range 7W
Rio Arriba County, New Mexico

March 11, 2013
SWG Project No. 0410G002

Prepared for:

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CORRECTIVE ACTION WORK PLAN
(Area 1 and Area 3 – Soils)

LARGO COMPRESSOR STATION
GROUNDWATER DISCHARGE PLAN GW-211

SE ¼ of NE ¼, Section 15, Township 26N, Range 7W
Rio Arriba County, New Mexico

1.0 INTRODUCTION

1.1 SITE LOCATION AND HISTORY

This Corrective Action Work Plan (CAWP) is for the on-site treatment of petroleum hydrocarbon affected soils at the Largo Compressor Station. The Largo Compressor Station is located off of County Road (CR) 379 in Section 15, Township 26N, Range 7W in Rio Arriba County, New Mexico, referred to hereinafter as the "Site" or "subject Site". The Site is a natural gas compressor station utilized to dehydrate and compress natural gas collected from production wells in the area for transportation via pipeline. The Site was constructed in the mid-1960s and currently includes two (2) compressor engines, a dehydration unit and related treater, one (1) bullet storage tank, a new condensate storage tank battery, which includes seven (7) new condensate storage tanks, inlet scrubbers, a control room, and an office/shop building.

The Site is subject to regulatory oversight by the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), Oil Conservation Division (OCD). To address activities related to condensate releases, the New Mexico EMNRD OCD utilizes the *Guidelines for Remediation of Leaks, Spills and Releases* as guidance, in addition to the OCD rules, specifically NMAC 19.15.30 *Remediation*. These guidance documents establish investigation and abatement action requirements for sites subject to reporting and/or corrective action.

The Site location is depicted on Figure 1 of Appendix A which was reproduced from a portion of the United States Geological Survey (USGS) 7.5-minute series topographic map. A Site vicinity map, created from an aerial photograph, is provided as Figure 2 of Appendix A.

The areas of known or suspected impact at the Site have been previously identified as Areas 1 through 4 in OCD correspondence. Each of the areas is depicted on Figure 3 in relation to pertinent Site features and general Site boundaries. This Corrective Action Work Plan (CAWP) addresses petroleum hydrocarbon impacted soils from Area 1 (Former Condensate Storage Tanks) and Area 3 (Retention Pond Area). Areas 1 and 3 are briefly described below:

Area 1(Former Condensate Storage Tank Area)

Area 1 is defined as the northwestern portion of the Site and includes the former condensate storage tank battery associated with on-going investigation and/or corrective actions since a release from a condensate storage tank valve was reported to the OCD in January of 2008. Additional detail regarding the investigative and corrective

activities at Area 1 are provided in the *Environmental Site Investigation – Largo Compressor Station (GW-211) (SWG - March 24, 2011)*, and the *Corrective Action Pilot Study Report (SWG – October 10, 2011).*

Area 3 (Retention Pond Area)

Area 3 encompasses the northeast/east portion of the Site including the storm-water retention pond. Historical petroleum hydrocarbon affected soil and groundwater were identified during the construction of the retention pond in July of 2009, which apparently originated from historic oil and contact water treatment and storage in the area of the current retention pond. Additional details regarding the investigative and corrective activities at Area 3 are provided in the following reports: *Environmental Site Investigation – Largo Compressor Station (GW-211) (SWG - March 24, 2011),* the *Supplemental Site Investigation & Quarterly Groundwater Monitoring Report (SWG - June 31, 2012), and the Supplemental Site Investigation Report (November 2012 and January 2013) (SWG – February 22, 2013).*

1.2 CHRONOLOGY OF EVENTS

Significant events and related activities associated with the Site, including the results of Site investigation activities and corrective action completed to date, are provided in the following table:

January 4, 2008	Area 1: Release was discovered resulting from frozen valve failure on a condensate storage tank. The release flowed into the below-grade drain tanks, which subsequently overflowed to surrounding containment. The release was subsequently reported to the OCD.
March/April 2008	Area 1: *Geoprobe Investigation at Largo Compressor Station (Lodestar – May 16, 2008)*: Initial field investigation activities were performed by Lodestar Services, LLC (Lodestar) during March and April of 2008. Nineteen (19) soil borings (B-1 through B-19) were advanced at the Site with total depths ranging from 14.5 feet below grade surface (bgs) to 21 feet bgs. Subsurface soils were identified as Quaternary alluvium consisting of unconsolidated silts, sands, and clays. Groundwater was reported in each of the soil borings with static levels ranging from 13.15 to 19.5 feet bgs. Five (5) of the 19 soil borings were subsequently converted to 1-inch piezometers (P-1 though P-5) with screened intervals ranging from 9.5 feet bgs to 21 feet bgs. Based on the depth to groundwater and proximity to a surface water body, the Site was classified with a total ranking score greater than 19. Lodestar collected twenty nine (29) soil samples from the nineteen (19) soil borings and submitted the samples to Hall Environmental Analytical Laboratory (HEAL) in Albuquerque, NM for total petroleum hydrocarbons (TPH) gasoline range organics (GRO)/diesel range organics (DRO) and benzene, toluene, ethylbenzene and xylenes (BTEX) analysis utilizing EPA method SW-846 #8015M and #8021B, respectively. In addition, five (5) groundwater samples collected from the piezometers were submitted for TPH GRO/DRO and BTEX analysis. Based on the laboratory analytical results, soil samples collected from soil borings B-1 at 4 feet bgs, B-2 at 12.5 feet bgs, B-5 at 17.5 feet bgs, and B-14 at 17.5 feet bgs exhibited TPH GRO/DRO concentrations above the OCD *Remediation Action Level.* The

groundwater samples collected from piezometers P-1, P-2, and P-3 exhibited benzene, toluene, and/or total xylene concentrations above the New Mexico Water Quality Control Commission (WQCC) *Groundwater Quality Standards*.

August/September 2008 — Area 1: Enterprise submits notice that the condensate storage tank system is scheduled to be upgraded/replaced. Enterprise intends to update the Groundwater Discharge Plan upon completion of these activities.

September/October 2008 — Areas 1 through 4: The OCD approves the planned storage tank modification from Enterprise with the condition that Enterprise files an appropriate closure plan for the old tank battery.

July 2009 — Area 1: *Inspection Report – NMOCD (July 9, 2009):* Onsite inspection by NMOCD requires tank integrity testing, improvement on leak detection monitoring, liner repair, soil and groundwater remediation, system repair or replacement.

July 2009 — Area 1: *Response to Inspection Report – Enterprise (July 23, 2009):* Enterprise submits a work plan to perform additional investigation activities at the Site.

July/August 2009 — Area 3: Historical petroleum hydrocarbon impact is discovered during the construction of a storm-water retention pond at the facility. SMA was retained to sample the excavation. Initial Form C-141 was submitted to OCD on July 6, 2009.

On July 15, 2009, a cement tank containing water (apparently an old cistern) was unearthed in the vicinity of the planned storm-water retention pond. SMA collected a water sample from the tank, and subsequent BTEX analyses indicate the tank water did not exhibit BTEX concentration in excess of the WQCC *Groundwater Quality Standards (GQSs)*. Soil confirmation samples were collected below the water table (BWT) on the north side of the retention pond excavation and on the northeast wall (NE Wall) of the retention pond excavation. Analytical results indicate the soil confirmation samples BWT and NE Wall contain TPH GRO/DRO, benzene, and/or total BTEX concentrations in excess of the OCD *Remediation Action Levels*. Groundwater which was present at the BWT soil sample location was collected (GE) and submitted for analysis of BTEX. Based on the laboratory analytical results, the GE groundwater sample exhibited benzene, toluene and xylene concentrations in excess of the WQCC *GQSs*.

On July 16, 2009, SMA evaluated a total of four (4) test pits, each with a total depth of approximately 13 feet bgs, to the north and east of the retention pond excavation. Groundwater was encountered in each of the test pits at approximately 13 feet bgs. SMA collected one (1) soil sample just above the water table in each of the test pits to field screen for the presence of volatile organic compounds (VOCs). Based on visual observations within the test pits and the field screening results of the collected soils samples, It was concluded that "soil impacts likely extended beyond a reasonable area for excavation" within Area 3. The decision was made to stop extending the excavation and to remove any visibly contaminated soil remaining in the existing excavation of Area 3. SMA subsequently collected a groundwater sample from the southwest corner of the retention pond excavation (SWCRP) and submitted it for analysis of BTEX. Based on the

laboratory analytical results, the SWCRP groundwater sample exhibited benzene and xylene concentrations above the WQCC *GQSs*.

The excavated soils, approximately 1,701 cubic yards in total (one source indicates 3,000 cubic yards), were transported off-site and disposed of at the Evirotech landfarm near Angel Peak, New Mexico. In addition, a vacuum truck was utilized to remove approximately 1,120 barrels of hydrocarbon impacted groundwater from the excavation prior to backfill. The excavation was backfilled with approximately 1,360 cubic yards of unaffected material, leaving a four (4) to five (5) foot depression to utilize as the storm-water retention pond.

August 2009

Area 1: *Report of Subsurface Investigation at Largo Compressor Station (Lodestar – November 30, 2009:* During August 2009), Lodestar performed a supplemental subsurface field investigation at the Site. Ten (10) additional soil borings (B-21 through B-30) were advanced at the Site with total depths ranging from 22 to 42 feet bgs. In addition, two (2) hand auger borings (HA-1 and HA-2) were advanced within the containment berm with total depths ranging from 8 to 17 feet bgs. Groundwater was reported in each of the soil borings with static levels ranging from 17.5 to 20.5 feet bgs. Four (4) of the ten (10) soil borings were subsequently converted to permanent 2-inch groundwater monitoring wells (MW-6 through MW-9) with screened intervals ranging from 12 to 25 feet bgs.

Lodestar collected nineteen (19) soil samples from the ten (10) soil borings and hand auger borings and submitted them for TPH GRO/DRO and BTEX analysis. In addition, nine (9) groundwater samples were collected from the previously installed piezometers (P-1 through P-5) and the newly installed monitoring wells (MW-6 through MW-9) and submitted for TPH GRO/DRO and BTEX analysis. Based on the laboratory analytical results, soil samples collected from soil borings B-22 at 15 feet bgs, B-23 at 15 feet bgs, B-24 at 15 feet bgs, B-29 at 18 feet bgs, and Hand Auger-1 at 14 feet bgs exhibited total BTEX and/or TPH GRO/DRO concentrations above the NMOCD *Remediation Action Level*. The groundwater samples collected from piezometers P-2 and P-3 and monitoring well MW-7 exhibited benzene, toluene, and/or total xylene concentrations above the WQCC *Groundwater Quality Standards*. In addition, non-aqueous phase liquid (NAPL) was present in piezometer P-1.

Lodestar concluded that soil and groundwater impact was limited to the bermed area and slightly outside of the bermed area in the down gradient (northwest) direction. Furthermore, the dissolved-phase contamination of the groundwater underlying the Site was migrating slightly to the north-northwest.

November 2009/February 2010

Area 1: *November 2009 Groundwater Sampling (Lodestar – December 17, 2009), Quarterly Groundwater Monitoring Report (Lodestar – April 20, 2010):* Quarterly groundwater monitoring events were performed in November of 2009 and February of 2010. Groundwater samples were collected from each of the monitoring wells at the Site and submitted for BTEX analysis. Based on the laboratory analytical results, the groundwater samples collected from the groundwater monitoring wells MW-7 and MW-11 exhibited benzene and/or total xylene concentrations above the WQCC *Groundwater Quality Standards*. However, the concentrations of COCs appeared to be decreasing in some areas between these monitoring

events. NAPL was present in piezometer P-1 during each of these two groundwater monitoring events.

January 2010

Area 1: *Largo Compressor Station Work Plan for Groundwater Remediation GW-211 (Lodestar – December 31, 2009):* Enterprise submits a groundwater remediation work plan for the Site.

February 2010

Area 1: The OCD approves the December 31, 2009 work plan with conditions.

March/April 2010

Area 1: *Interim Remedial Investigation Report (LTE – May 15, 2010):* During March of 2010, LT Environmental, Inc. (LTE), formerly known as Lodestar, advanced two (2) additional soil borings at the Site with total depths ranging from approximately 31 to 32 feet bgs. Groundwater was encountered in both soil borings with static levels ranging from 20 to 22 feet bgs. The two (2) soil borings were subsequently converted to 2-inch groundwater monitoring wells (MW-15 and MW-16). LTE also replaced piezometer P-1 with a 4-inch groundwater monitoring well (MW-12) which was proposed to be utilized in recovering NAPL by introducing adsorbent socks via the well casing. Piezometers P-2, P-3, P-4, and P-5 were also replaced with 2-inch groundwater monitoring wells MW-11, MW3R, MW-14, and MW-13, respectively.

Area 1: During April 2010, LTE collected eleven (11) groundwater samples from the on-site groundwater monitoring wells for TPH GRO/DRO and BTEX analysis. Based on the laboratory analytical results, the groundwater samples collected from groundwater monitoring wells MW-7 and MW-12 exhibited benzene, toluene, and/or xylenes concentrations above the WQCC *Water Quality Standards*. However, concentrations of COCs appeared to be decreasing from the previous monitoring event in February 2010.

May 2010

Area 1: A final C-141 was submitted to the OCD, indicating the need for additional studies.

Areas 1 through 4: On May 27, 2010, Enterprise submits an extension request to the OCD pertaining to investigation activities at the Largo Compressor Station, citing a planned facility-wide investigation.

June 2010

Area 1: The OCD requests clarifications on the *Interim Remedial Investigation Report dated May 15, 2010.*

Areas 1 through 4: *Proposed Facility-Wide Soil and Groundwater Investigation (LTE – June 8, 2010)*: Enterprise submits a work plan to provide a Site-wide assessment of the Largo Compressor Station.

Areas 1 through 4: The OCD approves the proposed work plan submitted on June 10, 2010 with conditions.

June/July 2010

Area 1: *Groundwater Sampling Report (LTE – September 10, 2010):* During June of 2010, LTE advanced ten (10) 4-inch boreholes utilizing hollow stem augers to a total depth of approximately 20 feet bgs. The boreholes were advanced to the north and north-northwest of the containment berm. A slurry of 65% ORC solids and water was poured directly into the hollow

stem at each borehole (approximately 30 pounds of ORC per borehole) to create a plug of ORC covering approximately five vertical feet throughout the smear zone. A 2-foot thick bentonite seal was installed above the ORC slurry and the remainder of the borehole was backfilled with clean soil. LTE applied the ORC slurry to assist in biodegradation of COCs in groundwater and with the intention of limiting further down-gradient migration of the groundwater plume.

Area 1: During July 2010, LTE collected eleven (11) groundwater samples from the on-site groundwater monitoring wells and submitted them for TPH GRO/DRO and BTEX analysis. Based on the laboratory analytical results, the groundwater samples collected from groundwater monitoring wells MW-3R, MW-7, MW-11, MW-12, MW-15, and MW-16 exhibited benzene and/or xylenes concentrations above the WQCC *Water Quality Standards*. Contrary to the prior analytical trend indicating decreasing COC concentrations, the concentrations of COCs now appeared to be rebounding. Elevated benzene concentrations were detected in monitoring wells MW-15 and MW-16 for the first time.

November 2010

Areas 1 through 4: During November 2010, SWG advanced seventeen (17) soil borings across the facility as part of the facility-wide Site investigation. Four (4) of these soil borings were completed as temporary sampling wells to allow the collection of a single groundwater sample prior to plugging and abandonment. The remaining thirteen (13) soil borings were completed as permanent monitoring wells.

February/March 2011

Area 1: *Corrective Action Work Plan (SWG – February 18, 2011)*: Enterprise proposes an in-situ chemical oxidation (ISCO) pilot study at the condensate storage tank area.

Areas 1 through 4: *Environmental Site Investigation (SWG – March 24, 2011)*: Enterprise submits a report to the OCD documenting the facility-wide investigation findings and subsequent groundwater monitoring results. Analytical results from the investigation confirm the presence of hydrocarbon affected soil and groundwater in the vicinity of the retention pond (Area 3). Additionally, benzene is identified at concentrations above the WQCC GQSs in groundwater from monitoring well MW-39, in the vicinity of the current compressors (Area 4).

The groundwater sample collected from monitoring well MW-42, which is located on the hydrogeologically up-gradient boundary of the Site, exhibited a total dissolved solids (TDS) concentration of 75,400 mg/L. Based on the absence of beneficial use of the initial groundwater-bearing unit in the Site vicinity and the identified TDS concentration, the initial groundwater-bearing unit would not be considered an "Underground Source of Drinking Water" in accordance with 19.15.30 NMAC *Remediation*.

May 2011

Area 1: Enterprise performs "pilot study" ISCO activities at the condensate storage tank release area. Approximately 3,500 gallons of injectate were introduced to the substrate near monitoring well MW-12.

October 2011

Area 1: *Corrective Action Pilot Study Report (SWG – October 10, 2011)*: Enterprise submits a report to the OCD documenting the "pilot study" implementation. Field observations during ISCO activities indicate remaining historically impacted soils.

March 2012	Areas 3 and 4: *SSI Work Plan (SWG January 12, 2012)*: Enterprise proposes additional field activities to further delineate dissolve-phase groundwater impact in Areas 3 and 4. Enterprise initiates the proposed investigative activities by installing six (6) monitoring wells to further evaluate COCs at the Site.
June 2012	Areas 3 and 4: *Supplemental Site Investigation & Quarterly Groundwater Monitoring Report (SWG - June 31, 2012):* Enterprise submits a report to the OCD which documents the initial SSI activities for Areas 3 and 4. The report includes results from the quarterly monitoring event that was performed following the installation of additional monitoring wells.
November 2012	Area 3: Enterprise resumes the supplemental investigation, focusing on additional soil and groundwater COC delineation in Area 3.
March 2013	Area 3: Enterprise submits the *Supplemental Site Investigation (November 2012 and January 2013) (SWG – February 22, 2013)* to the OCD documenting SSI activities for Area 3. The report documents soil and groundwater sampling performed during the SSI activities, and identifies a potential second source of impact at the retention pond area.

1.3 CHEMICALS OF CONCERN

The soil samples collected during previous site investigation activities were analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015 and BTEX using EPA SW-846 method #8021.

Summary of Historical Soil Exceedances

- Based on the laboratory analytical results, TPH GRO/DRO concentrations were identified in soil samples collected from borings B-1(4'), B-2(12.5'), B-5 (17.5'), B-14(17.5') (*Geoprobe Investigation at Largo Compressor Station, Lodestar - May 16, 2009*); B-22(15.0'), B-23(15.0'), B-24(15.0'), B-29(18.0'), hand auger-2(14.0') (*Report of Subsurface Investigation at Largo Compressor Station, Lodestar - November 30, 2009*); MW-33(7.5'), MW-35(9.5'), MW-37(11.5') (*Environmental Site Investigation, SWG – March 24, 2011*); SB-59(15.0') (*Supplemental Site Investigation (November 2012 and January 2013) (SWG – February 22, 2013)*); and Area 3 excavation samples "BWT" and "NE Wall" (*General Report EPCO Largo Station Summary, SMA - 2009*) above the OCD *Remediation Action Level* of 100 mg/Kg.

- Based on the laboratory analytical results, benzene concentrations were identified in soil samples collected from borings MW-35(9.5') (*Environmental Site Investigation, SWG – March 24, 2011*), and Area 3 excavation sample "BWT" (see *General Report EPCO Largo Station Summary, SMA - 2009*) above the OCD *Remediation Action Level* of 10 mg/Kg.

- Based on the laboratory analytical results, the total BTEX concentrations identified in soil samples collected from borings B-22(15.0'), B-23(15.0') (*Report of*

Subsurface Investigation at Largo Compressor Station, Lodestar - November 30, 2009); MW-33(7.5'), MW-35(9.5'), MW-37(11.5') (*Environmental Site Investigation, SWG – March 24, 2011)*; SB-59(15.0') (*Supplemental Site Investigation (November 2012 and January 2013) (SWG – February 22, 2013)*); and excavation samples "BWT" and "NE Wall" (see *General Report EPCO Largo Station Summary, SMA - 2009*) were above the OCD *Remediation Action Level* of 50 mg/Kg.

Figure 3 indicates the approximate locations of the borings/piezometers/monitoring wells completed at the Site in relation to pertinent Site features and general Site boundaries. Figure 4 details the OCD *Remediation Action Level* Exceedance Zone in soil. Comprehensive soil analytical results for the Site are included in Table 1 in Appendix B.

1.4 SITE RANKING & PROPOSED CLEANUP GOALS

The Site is subject to regulatory oversight by the New Mexico EMNRD OCD. To address activities related to condensate releases, the New Mexico EMNRD OCD utilizes the *Guidelines for Remediation of Leaks, Spills and Releases* as guidance, in addition to the OCD rules, specifically NMAC 19.15.30 *Remediation*. These guidance documents establish investigation and abatement action requirements for sites subject to reporting and/or corrective action.

In accordance with the OCD's *Guidelines for Remediation of Leaks, Spills and Releases*, SWG utilized the general site characteristics to determine the appropriate "ranking" for the Site. The ranking criteria and associated scoring are provided in the table below:

Ranking Criteria			Ranking Score
Depth to Groundwater	<50 feet	20	20
	50 to 99 feet	10	
	>100 feet	0	
Wellhead Protection Area • <1,000 feet from a water source, or; <200 feet from private domestic water source.	Yes	20	0
	No	0	
Distance to Surface Water Body	<200 feet	20	10
	200 to 1,000 feet	10	
	>1,000 feet	0	
Total Ranking Score			**30**

Based on SWG's evaluation of the scoring criteria, the Site would have a Total Ranking Score of 30. This ranking is based on the following:

- The depth to the initial groundwater-bearing zone is <50 feet at the Site.
- Nearby drinking water sources were not identified within 1,000 feet of the Site.

- Largo wash, which is approximate 425 feet north of the Site, is the nearest surface water feature.

- Two (2) Out of Service water wells are located up- and/or cross-gradient from the areas of impact, greater than 200 feet from delineated impact.

Based on a Total Ranking Score of 30, cleanup goals for soils remaining in place at Area 1 and Area 3 include: 10 mg/Kg for benzene, 50 mg/Kg for total BTEX, 100 mg/Kg for TPH GRO/DRO.

Proposed cleanup goals for the treated soils removed from Areas 1 and 3 include: 0.2 mg/kg for benzene, 50 mg/kg for total BTEX, 2,500 mg/kg total TPH, 500 mg/kg for TPH GRO and DRO fractions, and 500 mg/kg for chlorides.

Based on the absence of beneficial use of the initial groundwater-bearing unit in the Site vicinity and the presence of elevated TDS concentrations in several of the apparently unaffected monitoring wells across the site, the initial groundwater-bearing unit should not be considered an "Underground Source of Drinking Water" in accordance with 19.15.30 NMAC *Remediation*.

1.5 BACKGROUND SAMPLING

Prior to the initiation of corrective action activities, background sampling will be performed within the proposed treatment area to evaluate the proposed backfill material and determine soil conditions on the floor of the proposed treatment cells. Seven (7) soil borings will be advanced via hand auger or hydraulic push-probe to a total depth of 6 feet bgs or refusal, whichever occurs first. A minimum of two (2) samples will be collected for laboratory analysis from each background soil boring at the following intervals:

- 2.5 feet bgs;
- 6 feet bgs, and/or;
- Any depth of apparent impact based on visual, olfactory or photoionization detector (PID) evidence of impairment.

Additionally, prior to use of the treatment area, up to five (5) soil borings will be installed utilizing a hollow-stem-auger and completed as monitoring wells both within, and up-gradient of, the proposed treatment area to evaluate backfill, soil conditions, the depth to groundwater and groundwater quality. Each of these monitoring wells will be incorporated into the existing groundwater monitoring network and program. Figure 5 (Appendix A) identifies the approximate locations of the proposed soil borings and monitoring wells. The monitoring wells will be completed as follows:

- Installation of 10 to 15 feet of 2-inch diameter, machine slotted PVC well screen assembly with a threaded bottom plug;
- Installation of riser pipe to surface;
- Addition of graded silica sand for annular sand pack around the well screen from the bottom of the well to two feet above the top of the screen;
- Placement of 2 feet of hydrated bentonite pellets above the sand pack;
- Addition of cement/bentonite slurry to the surface; and,

- Installation of a locking well cap and upright well cover.

The monitoring wells will be developed by surging and removing groundwater until the fluid appears free of fine-grained sediment.

The soil and groundwater samples collected from each soil boring/monitoring well will be analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015, BTEX utilizing EPA SW-846 #8021, TPH utilizing EPA method 418.1 (soils only), chlorides utilizing EPA method 300.1 or equivalent, and total dissolved solids (groundwater only) utilizing SM 2540C. A summary of the analyses, sample type, and EPA-approved methods for background samples collected from the excavation within Area 1 and Area 3 are presented in the following table:

Analysis	Sample Type	Number of Samples	Method
TPH GRO/DRO	Soil	22	SW-846 #8015
BTEX	Soil	22	SW-846 #8021
TPH	Soil	22	EPA 418.1
Chloride	Soil	22	EPA 300.1 or equivalent
TPH GRO/DRO	Water	5	SW-846 #8015
BTEX	Water	5	SW-846 #8021
Chloride	Water	5	EPA 300.1 or equivalent
TDS	Water	5	SM 2540C

1.6 OBJECTIVES OF CORRECTIVE ACTION

The primary objective of the proposed corrective actions is to reduce the concentrations of COCs in soil in two (2) areas of the facility, Area 1 and Area 3, which are a result of historic operations. Affected soils in these areas of the facility will be excavated to the extent possible, and moved to an area within the facility for treatment prior to final disposal or reuse on-site. These actions will remove source area soils present near Largo Wash (Area 1), and from a historical retention pond and offsite drainage area (Area 3).

2.0 PROPOSED ON-SITE TREATMENT OF SOILS

Enterprise proposes to proceed with the physical removal of impacted soils from Area 1 and Area 3. The out-of-service condensate tanks (Area 1) have been cleaned and removed from the facility, and the area is now accessible for the remediation of soils. In addition, the affected soils in Area 3 have been more concisely defined as a result of

a recent Supplemental Site Investigation (*Supplemental Site Investigation (November 2012 and January 2013) (SWG – February 22, 2013)).* Enterprise now proposes to remove and treat the affected soils from Area 1 and Area 3. Due to the high volume of soil, Enterprise proposes a phased approach with affected soils in Area 1 treated first, followed by the removal and treatment of affected soils at Area 3.

2.1 TREATMENT CELL & BACKFILL MATERIAL

Prior to the initiation of corrective action activities, an approximate six (6) acre treatment area will be constructed on the southeast portion of the Site. A containment berm, approximately 2 feet high and 4 feet wide, will be constructed along the perimeter of each of the three (3) proposed treatment cells within the treatment area utilizing unaffected surface soils from the treatment and/or excavation areas. Silt fencing will be installed around the perimeter of the treatment area as a best management practice. The cells will not be utilized to treat more than 2,000 cubic yards of petroleum hydrocarbon affected soils at any given time.

To enhance containment as well as generate unaffected soils suitable for backfill, Enterprise proposes to obtain a majority of, if not all, backfill material from the proposed treatment cell construction area. Unaffected soils as determined during the background sampling described in Section 1.5 will be excavated during treatment cell construction to an average depth of (3) feet below grade (refer to the "Proposed Treatment Cells" depicted on Figure 5 in Appendix A). The actual depth of backfill excavation will vary based on depth to bedrock, and the actual locations of the excavations will be modified to account for buried utilities (no closer than 20-foot encroachment). This material will be stockpiled for use as backfill material for Areas 1 and 3.

The proposed treatment cell area is located completely within the fenced facility boundary, in an upgradient portion of the facility (both topographically and hydrogeologically). If required, Enterprise will place polyethylene sheeting or liners at the base of the proposed treatment area prior to utilization, to inhibit potential downward migration of COCs. The area is currently fenced, and new fencing will be added to enhance security, along with signage to identify the use of the area.

Based on available data, the depth to the initial groundwater bearing unit in the proposed treatment cell area ranges from approximately 15 feet bgs north of the elevated on-site road that traverses the site, to ≥25 feet bgs in the southern and more elevated areas. Soil boring data indicates a fine-grained (typically silty clay or clay) sediment is present at the top of the potentiometric surface in the areas south of the elevated road, ranging in thickness from four (4) to six (6) feet.

Based on the absence of beneficial use of the initial groundwater-bearing unit in the Site vicinity and the presence of elevated TDS concentrations in several of the apparently unaffected monitoring wells across the site, the initial groundwater-bearing unit should not be considered an "Underground Source of Drinking Water" in accordance with 19.15.30 NMAC *Remediation.*

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared for the proposed remediation activities prior to the initiation of corrective actions. The SWPPP will detail

the proposed best management practices (BMPs) designed to prevent the erosion of exposed soils and/or off-site discharge of sediments and/or COCs. Run-on and run-off potential from precipitation events will be evaluated to determine the necessary engineering controls at the excavation and treatment areas, and Site plans will be adjusted or amended as necessary to accommodate the new and temporary site features. Additionally, silt fencing will be installed around the perimeter of the treatment cell as a BMP.

2.2 EXCAVATION AND TREATMENT

Area 1(Former Condensate Storage Tank Area)
Excavation activities will be initiated in the vicinity of the former condensate storage tanks and will proceed horizontally and vertically to remove soils in exceedance of the OCD *Remediation Action Levels*. An estimated total of approximately 6,000 cubic yards (in-place) of soils affected by historical condensate releases from gathering operations will be excavated from the condensate storage tank area during the completion of corrective actions. Unaffected overburden soils, if any, excavated during corrective actions will be segregated to the extent practical and utilized as berm material or stockpiled on the site adjacent to the excavation pending reuse.

The excavated petroleum hydrocarbon impacted soils will be transported directly from the excavation and placed in the treatment cell in shallow (8-inch) lifts. Saturated soils will be drained into temporary containment equipped with a polyethylene liner prior to transfer to the treatment area and the drained liquids will be properly disposed. Soils removed from the temporary drainage containment will be subjected to field chloride tests and paint filter tests prior to loading into trucks for transport to the treatment cells or off-site disposal. Materials not suitable for treatment will be segregated for alternative treatment or off-site disposal in accordance with applicable local, state and federal regulations.

Once the petroleum hydrocarbon affected soils are spread within the treatment cell, the soils will be tilled or agitated utilizing mechanical means (earth moving/tilling equipment) to increase oxygen availability to and stimulate naturally occurring bacteria in the soils which can metabolize organics including petroleum hydrocarbons. Soils in the treatment cell will be monitored and ultimately sampled for laboratory analysis, to determine treatment effectiveness.

Area 3 (Retention Pond Area)
Due to the anticipated volume of impacted soil at Area 1, Enterprise expects to perform the remediation of soils from Area 3 during a second phase. The excavation/treatment of soils from Area 3 will follow the same iterations as the corrective actions proposed at Area 1.

Excavation activities will be initiated in the vicinity of the retention pond and will proceed horizontally and vertically to remove soils in exceedance of the OCD *Remediation Action Levels*. An estimated total of approximately 4,000 cubic yards (in-place) of soils affected by historical condensate releases from gathering operations will be excavated from the retention pond area during the completion of corrective actions. Unaffected overburden soils, if any, excavated during corrective actions will be utilized as berm material or segregated to the extent practical and stockpiled on the site

adjacent to the excavation pending reuse. Saturated soils will be drained into temporary containment equipped with a polyethylene liner prior to transfer to the treatment area and the drained liquids will be properly disposed. Soils removed from the temporary drainage containment will be subjected to paint filter tests prior to loading into trucks for transport to the treatment cells or off-site disposal.

2.2.1. Enhanced Corrective Action Option

If, during the course of soil treatment, it is determined that the natural and mechanical processes alone are not providing adequate treatment of the affected soils, Enterprise, subsequent to OCD approval, will evaluate the addition of microbial nutrients and/or a bioremediation agent (Micro-Blaze®)/water mixture to enhance the degradation process.

If warranted, the petroleum hydrocarbon affected soils may be treated utilizing the direct application of a bioremediation agent (Micro-Blaze®)/water mixture to enhance natural attenuation of the petroleum hydrocarbons, stimulate naturally occurring bacteria in the on-site soils and introduce additional nonpathogenic bacterial strains designed to metabolize petroleum hydrocarbons. Micro-Blaze® is an advanced bio-technological product which contains surfactants, nutrients and a synergized blend of non-pathogenic bacterial strains selectively adapted to degrade organic compounds such as petroleum hydrocarbons.

The petroleum hydrocarbon affected soils would be repeatedly turned during treatment applications utilizing earth moving equipment/tiller and the bioremediation agent/water mixture topically applied to the affected media utilizing a water truck or similar equipment. Information with regard to Micro-Blaze® is included in Appendix C.

3.0 CORRECTIVE ACTION EFFECTIVENESS

Subsequent to the completion of excavation and treatment activities, SWG will evaluate the effectiveness of the completed corrective actions utilizing a confirmation sample program designed to verify the attainment of cleanup goals in the treated soils, ensure COCs did not migrate to unaffected soils underlying the treatment area and document the COC concentrations which remain in-place in both Areas 1 and 3.

Please note the objective of the proposed corrective actions is to remove source soils from Areas 1 and 3. It will not be possible to remove all affected soils at these locations, due to the presence of pipelines, structures and related appurtenances. Additionally, that portion of the affected soils present only in the capillary fringe, such as areas where impacted groundwater or free-phase hydrocarbon has affected the capillary fringe soils but overlying soils in the vadose zone are not affected, will be addressed during groundwater corrective actions.

To evaluate the effectiveness of the proposed treatment action, Enterprise will perform PID monitoring during each treatment phase until the clean-up goals (see Section 1.4) have apparently been met, at which time confirmation samples will be collected for laboratory analysis.

Enterprise will collect one (1) vadose zone sample (between 3 feet and 4 feet beneath the treatment zone) in each treatment cell. These samples will be analyzed for TPH, BTEX, and chlorides. If soils affected in excess of the proposed cleanup goals are encountered, the affected soils will be treated to meet the cleanup goals or removed for proper offsite disposal.

3.1 CONFIRMATION SOIL SAMPLING

3.1.1 Area 1 and Area 3 Excavations

The extent of excavation in Areas 1 and 3 will be guided by visual, olfactory and PID evidence of impairment. Subsequent to the completion of excavation activities, confirmation samples will be collected from the sidewalls and floor of each excavation and submitted for laboratory analyses.

Non-disposable sampling equipment will be decontaminated using an Alconox® wash and potable water rinse prior to commencement of the project and between the collection of each sample.

The soil samples collected from each excavation will be analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015 and BTEX using EPA SW-846 #8021. A summary of the analyses, sample type, and EPA-approved methods for samples collected from the excavation within Area 1 and Area 3 are presented in the following table:

Analysis	Sample Type	Number of Samples	Method
TPH GRO/DRO	Soil	20	SW-846 #8015
BTEX	Soil	20	SW-846 #8021

3.1.2 Treatment Area Soils

Subsequent to the completion of treatment activities, up to ten (10) discrete soil samples (one sample per 1,000 cubic yards) will be collected from the treated soils. The treated soils will be evaluated for potential reuse at the Site based on the laboratory analytical results and OCD approval. The soil samples collected from the treated soils will be analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015, TPH utilizing EPA method 418.1, chlorides utilizing EPA method 300.1 (or equivalent), and BTEX using EPA SW-846 #8021. A summary of the analyses, sample type, and EPA-approved methods are presented in the following table:

Analysis	Sample Type	Number of Samples	Method
TPH GRO/DRO	Soil	10	SW-846 #8015
BTEX	Soil	10	SW-846 #8021
TPH	Soil	10	EPA 418.1
Chlorides	Soil	10	EPA 300.1 or equivalent

In addition, subsequent to the completion of treatment activities, Enterprise will collect one (1) vadose zone sample (between 3 feet and 4 feet beneath the treatment zone) in each treatment cell. Soil borings will be advanced through the treated soils into the underlying native soils utilizing a direct-push drilling rig to evaluate if underlying soils were impacted during the completion of treatment activities. These borings will be located in the center of each treatment cell, or in an area where water collected.

Soil samples will be collected using core barrels or split spoon samplers.

The soil samples will be collected in laboratory prepared glassware and placed on ice in a cooler, which will be secured with a custody seal. The samples will be transported to a selected analytical laboratory along with a completed chain-of-custody form.

The soil samples collected from the confirmation soil borings will be analyzed for TPH GRO/DRO utilizing EPA method SW-846 #8015, TPH utilizing EPA method 418.1, chlorides utilizing EPA method 300.1 (or equivalent), and BTEX using EPA SW-846 #8021. A summary of the analysis, sample type, and EPA-approved methods are presented below:

Analysis	Sample Type	Number of Samples	Method
TPH GRO/DRO	Soil	3	SW-846 #8015
BTEX	Soil	3	SW-846 #8021
TPH	Soil	3	EPA 418.1
Chloride	Soil	3	EPA 300.1 or equivalent

3.1.3 Site Restoration

Subsequent to the attainment of the OCD *Remediation Action Levels*, the treated soils will remain in-place within the treatment area.

The Area 1 and 3 excavations will be backfilled with the on-site unaffected soils and compacted with on-site equipment. The excavations and treatment area will then be contoured to approximate former grade (including berm removal), sloped to drain, and

re-vegetated with an approved seed blend or covered with sand/gravel suitable as an informal driving surface, as appropriate.

4.0 CORRECTIVE ACTION REPORT

Within 90 days of the completion of excavation, treatment, confirmation sampling and site restoration activities, a report will be prepared that includes documentation of field activities, a site plan detailing pertinent site features, laboratory analytical results, an evaluation of corrective action results, and recommendations concerning future actions at the Site.

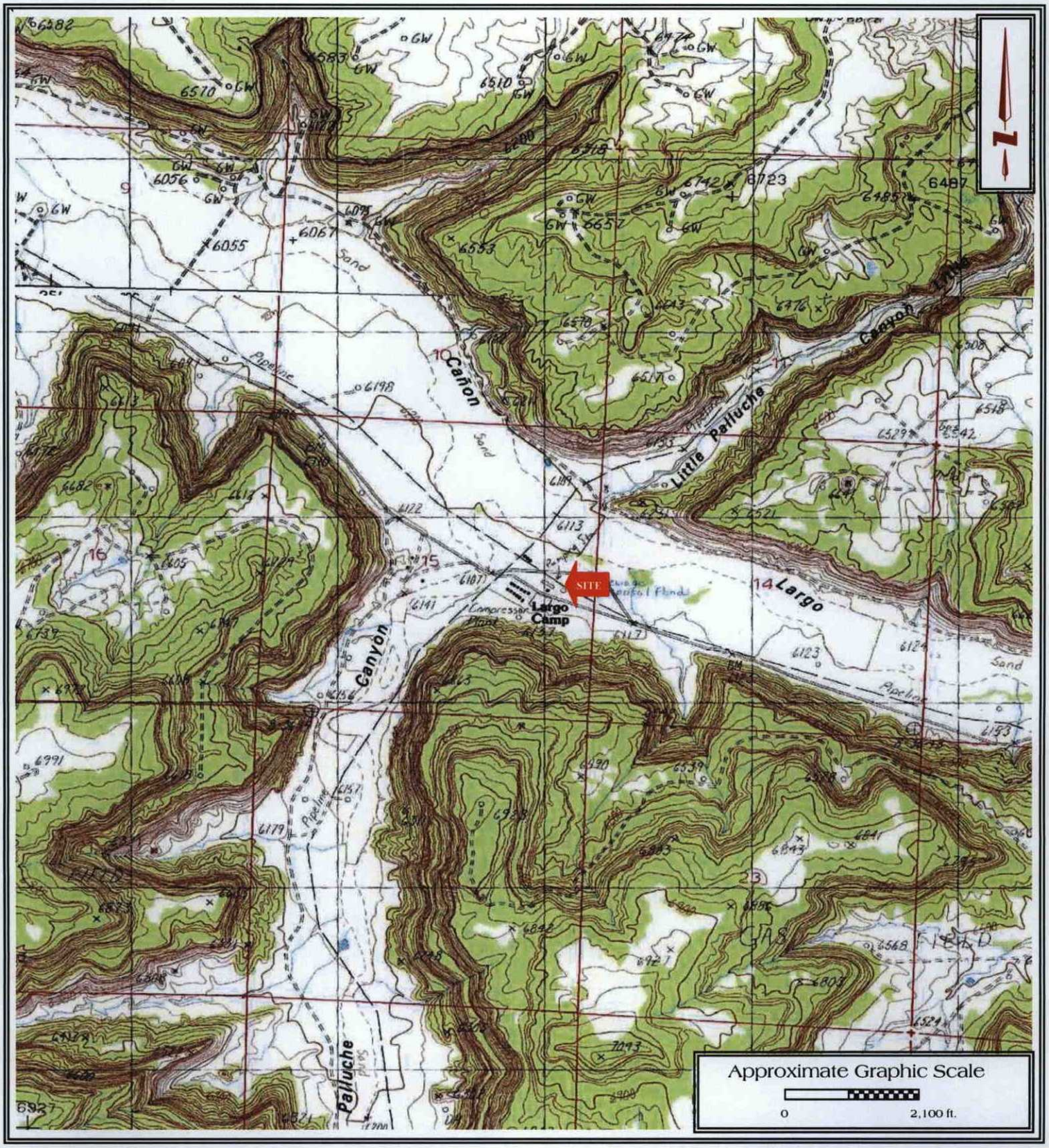
5.0 SCHEDULE

The optimum performance of the proposed treatment activities is climatologically limited to the warmer half of the calendar year, due to the temperature dependence of microbial activity and aeration. A project schedule will not be estimated until the first "batch" of treated soil achieves the desired treatment goals, but the maximum schedule is set at three (3) years.

Southwest GEOSCIENCE

APPENDIX A

Figures



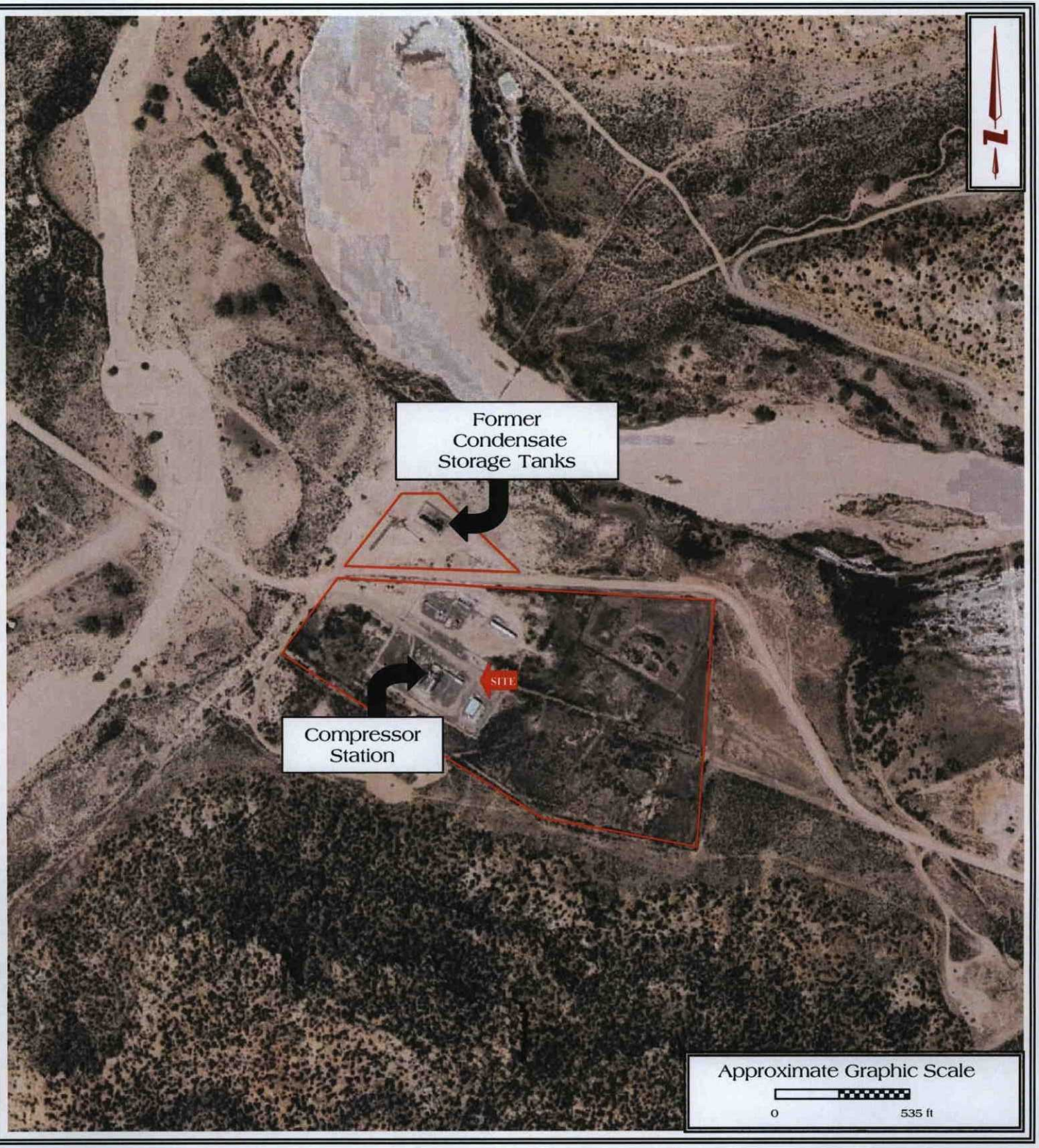
Largo Compressor Station
SE1/4 of NE1/4, S15 T26N R7W
Rio Arriba Co., New Mexico
N36° 29' 12.63"; W107° 33' 27.79"

SWG Project No. 0410002

Southwest GEOSCIENCE

FIGURE 1

Topographic Map
Smouse Mesa & Gould Pass, NM Quadrangle
Contour Interval – 20 Feet
1985



Largo Compressor Station
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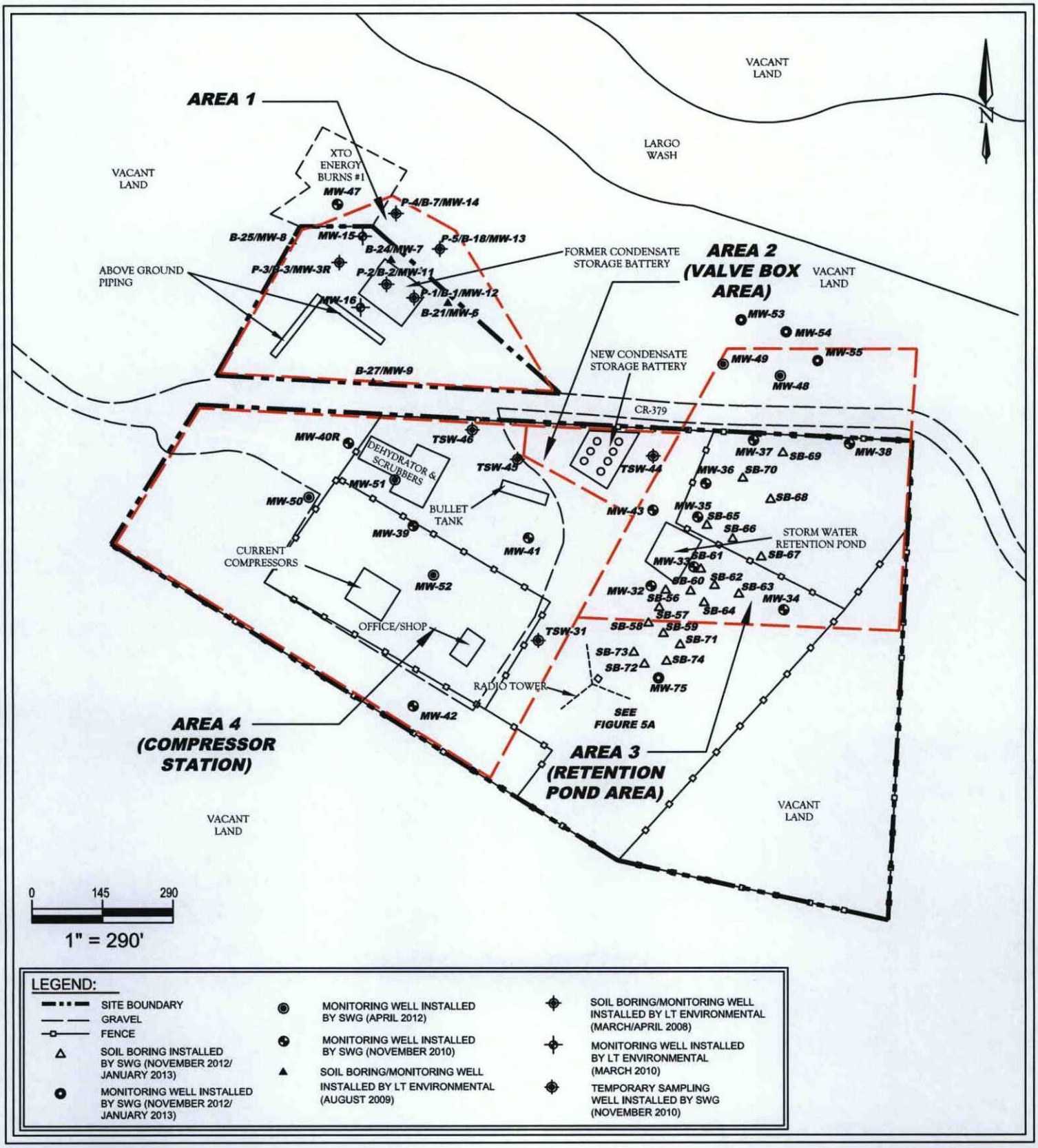
N36° 29' 12.63"; W107° 33' 27.79"

SWG Project No. 0410002

Southwest GEOSCIENCE

FIGURE 2
Site Vicinity Map
2010 Google Earth



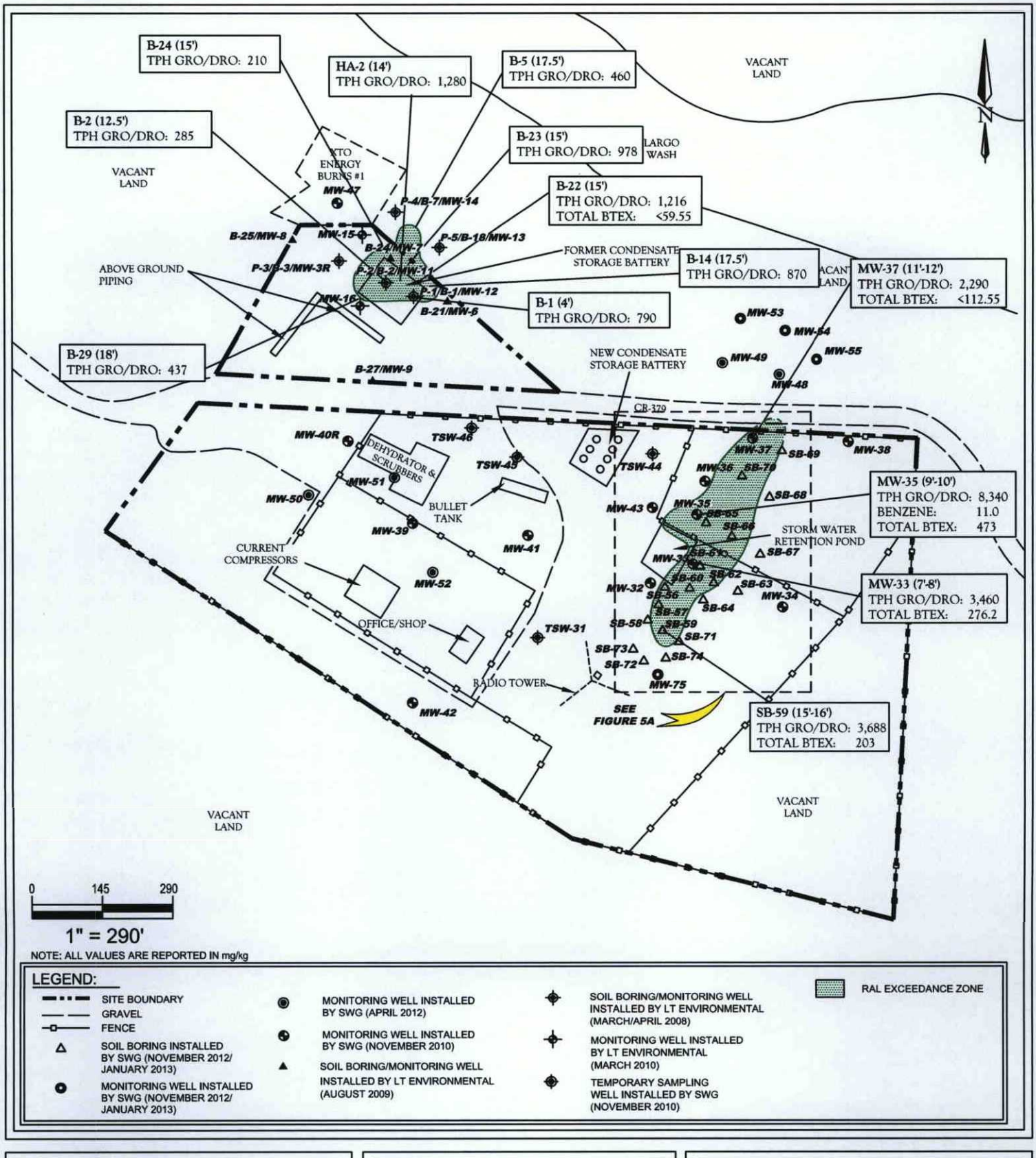
Largo Compressor Station
SE1/4 of NE1/4, S15 T26N R7W
Rio Arriba Co., New Mexico
N36° 29' 12.63"; W107° 33' 27.79"

SWG Project No. 0410002

Southwest GEOSCIENCE

FIGURE 3

SITE MAP



Largo Compressor Station
SE1/4 of NE1/4, S15 T26N R7W
Rio Arriba Co., New Mexico
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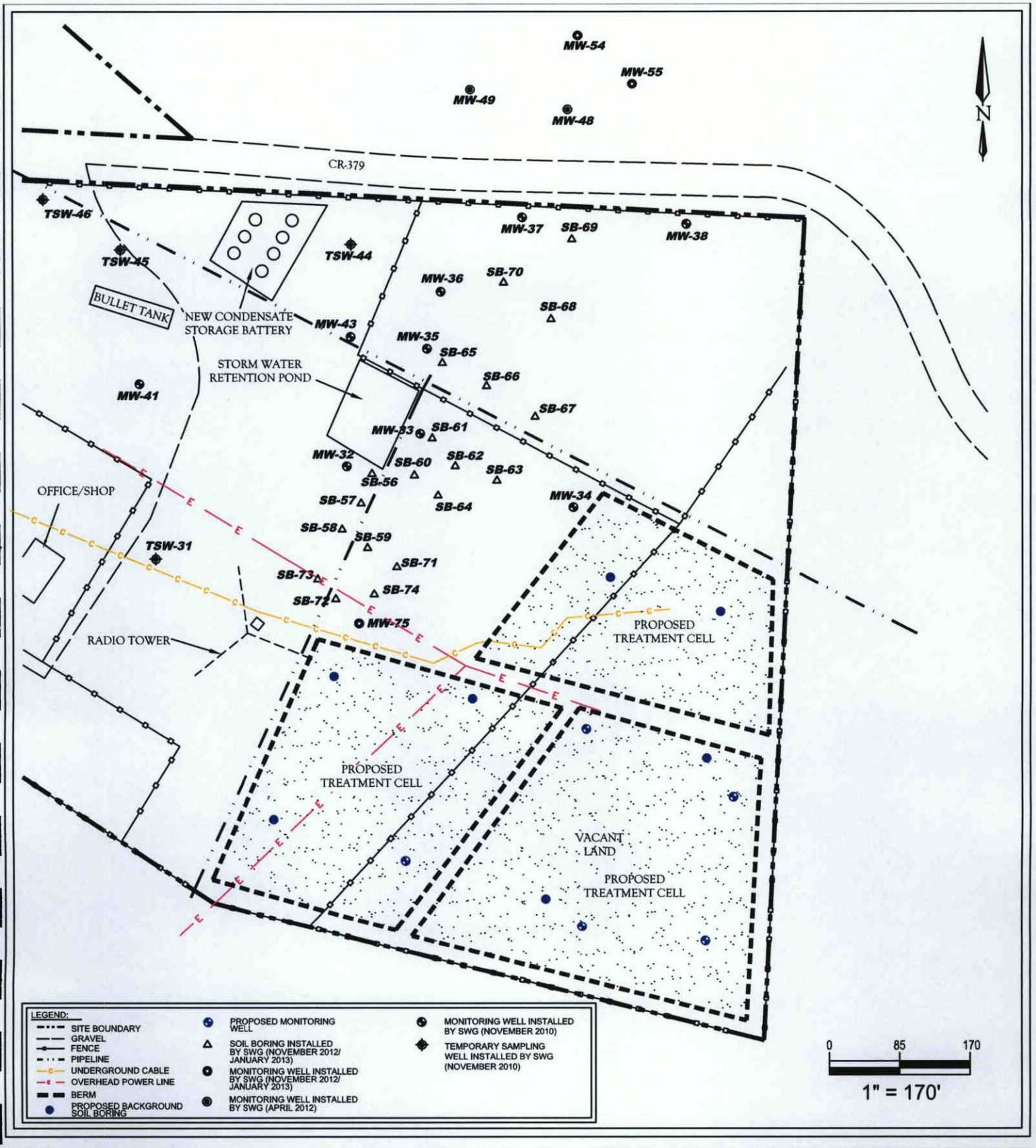
FIGURE 4

REMEDIATION ACTION LEVEL (RAL) EXCEEDANCE ZONE IN SOIL



Largo Compressor Station
SE1/4 of NE1/4, S15 T26N R7W
Rio Arriba Co., New Mexico
N36° 29' 12.63"; W107° 33' 27.79"

SWG Project No. 0410002

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FIGURE 5

PROPOSED TREATMENT AREA

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APPENDIX B

Tables

Southwest GEOSCIENCE

TABLE 1
Largo Compressor Station
SOIL ANALYTICAL SUMMARY

Sample I.D.	Date	Sample Depth (feet)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)
New Mexico Energy, Mineral & Natural Resources Department, Oil Conservation Division, Remediation Action Level			10	NE	NE	NE	50	100	
Soil Boring Advanced by Lodestar/LTE									
B-1	3.31.08	4.0	<0.5	<0.5	1.5	44	<46.5	**550**	**240**
B-1	3.31.08	14.5	1.8	<0.05	0.12	0.25	<2.22	6.7	<10
B-2	3.31.08	12.5	<0.5	1.4	0.82	13	<15.72	**240**	**45**
B-2	3.31.08	21.0	1.5	<0.05	<0.05	0.23	<1.83	7.5	<10
B-3	3.31.08	21.0	<0.05	<0.05	<0.05	<0.1	<0.16	<5.0	<10
B-4	3.31.08	23.0	0.64	<0.05	0.19	0.12	<1	<5.0	<10
B-5	4.01.08	17.5	1.2	<0.1	1.7	17	<20	**400**	**60**
B-6	4.01.08	18.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-7	4.01.08	18.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-8	4.01.08	18.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-9	4.01.08	21.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-10	4.01.08	10.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-10	4.01.08	20.0	0.06	<0.05	0.16	2.3	<2.57	55	<10
B-11	4.01.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-12	4.02.08	18.5	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-12	4.02.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-13	4.02.08	10.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-13	4.02.08	12.5	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-13	4.02.08	20.0	0.092	<0.05	<0.05	<0.1	<0.292	9.8	<10
B-14	4.02.08	5.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-14	4.02.08	17.5	6.2	5.5	1.8	18	31.5	**870**	**<10**
B-14	4.02.08	22.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-15	4.02.08	17.5	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-15	4.02.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-16	4.02.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-17	4.02.08	17.5	0.47	<0.05	<0.05	<0.1	<0.67	<5.0	<10
B-17	4.02.08	20.0	0.069	<0.05	<0.05	<0.1	<0.269	<5.0	<10
B-18	4.02.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-19	4.02.08	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-21	8.04.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-22	8.04.09	15.0	10	25	5.8	62	**102.8**	**1200**	**16**
B-22	8.04.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-23	8.04.09	15.0	<0.25	9.3	4	46	**<59.55**	**960**	**18**
B-23	8.04.09	20.0	0.28	<0.05	<0.05	<0.1	<0.48	<5.0	<10
B-24	8.04.09	15.0	<0.25	<0.25	0.63	7.9	<9.03	**200**	**10**
B-24	8.04.09	22.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-25	8.04.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-26	8.04.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-27	8.04.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-28	8.07.09	15.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-28	8.07.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-29	8.07.09	15.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-29	8.07.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-29	8.07.09	18.0	<1.0	<1.0	1.7	18	<21.7	**420**	**17**
B-30	8.07.09	15.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
B-30	8.07.09	20.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
Hand Auger -1	8.07.09	5.0	<0.05	<0.05	<0.05	<0.1	<0.25	<5.0	<10
Hand Auger -2	8.07.09	14.0	<1.0	<1.0	<1.0	<3.0	<6.0	**980**	**300**

Note: Concentrations in **bold** and yellow exceed the applicable OCD Remediation Action Level

NA = Not Analyzed

NE = Not Established

NAPL = Non-aqueous phase liquid

* = piezometer well was replaced with associated monitoring well

Southwest GEOSCIENCE

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Largo Compressor Station
SOIL ANALYTICAL SUMMARY

Sample I.D.	Date	Sample Depth (feet)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)
New Mexico Entergy, Mineral & Natural Resources Department, Oil Conservation Division, Remediation Action Level			10	NE	NE	NE	50	100	
Soil Samples Collected by Souder, Miller and Associates									
Area 2 (Valve Box Area)									
Riser Wall (South)	7.01.09	5 - 10	NA	NA	NA	NA	NA	<5.0	28
South Wall (East)	7.01.11	5 - 10	NA	NA	NA	NA	NA	<5.0	17
North Wall (West)	7.01.11	5 - 10	NA	NA	NA	NA	NA	<5.0	<10
Road Wall (North)	7.09.11	13	<0.050	<0.050	<0.050	<0.10	ND	<5.0	<10
Area 3 (Retention Pond Area)									
PH-6	6.26.09	Not Avail.	NA	NA	NA	NA	NA	<10	<10
RPE	7.14.09	13.0	0.5	1.8	0.25	2.6	5.15	28	13
RPES	7.14.09	0.0	<0.050	1.2	0.07	8.4	9.72	130	40
BWT	7.15.09	20.0	14	210	45	460	729	7,200	540
NE Wall	7.15.09	Not Avail.	9.7	67	31	230	111	4,000	360
Soil Borings Advanced by Southwest Gesocience									
TSW-31	11.16.10	12.0 - 14.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-32	11.16.10	13.0 -14.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-33	11.16.10	7.0 - 8.0	7.2	82	17	170	276.2	3,300	160
MW-34	11.16.10	16.0 - 17.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-35	11.17.10	9.0 - 10.0	11	130	32	300	473	7,900	440
MW-36	11.17.10	12.0 - 13.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-37	11.17.10	11.0 - 12.0	<0.05	14	9.5	89	<112.55	2,000	290
MW-38	11.17.10	9.0 - 10.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-39	11.17.10	15.0 - 16.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-40	11.17.10	16.0 - 17.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-41	11.17.10	13.0 - 14.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-42	11.17.10	19.0 - 20.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-43	11.17.10	15.0 - 16.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
TSW-44	11.17.10	15.0 - 16.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
TSW-45	11.17.10	14.0 - 15.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
TSW-46	11.17.10	12.0 - 13.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-47	11.22.10	16.0 - 18.0	<0.05	<0.05	<0.05	<0.10	<0.25	<5.0	<10
MW-48	3.20.12	11.0 -12.0	0.056	<0.049	<0.049	0.40	0.456	<4.9	<9.9
MW-49	3.20.12	10.0 - 11.0	<0.050	<0.050	<0.050	<0.099	<0.249	<5.0	<9.8
MW-50	3.20.12	20.0 - 21.0	<0.050	<0.050	<0.050	<0.10	<0.25	<5.0	<10.0
MW-51	3.20.12	12.0 - 13.0	0.049	0.16	<0.047	0.13	0.339	<4.7	<10.0
MW-52	3.20.12	16.0 - 17.0	<0.048	<0.048	<0.048	<0.097	<0.241	<4.8	<10
MW-53	11.28.12	9.0 - 10.0	<0.046	<0.046	<0.046	<0.092	<0.23	<4.6	<9.9
MW-54	11.28.12	9.0 - 10.0	<0.049	<0.049	<0.049	<0.098	<0.245	<4.9	<10
MW-55	11.28.12	8.5 - 9.5	<0.048	<0.048	<0.048	<0.096	<0.24	<4.8	<9.9
SB-59	11.28.12	15.0 - 16.0	3	57	13	130	203	3,600	88
MS-75	1.22.13	17.0 - 18.0	<0.050	<0.050	<0.050	<0.10	<0.25	<5.0	<10

Note: Concentrations in **bold** and yellow exceed the applicable OCD Remediation Action Level

NA = Not Analyzed

NE = Not Established

NAPL = Non-aqueous phase liquid

* = piezometer well was replaced with associated monitoring well

Southwest GEOSCIENCE

APPENDIX C

Remediation Technology Information

Emergency Response
Spills, Leaks
Industrial
Restaurants
Wastewater
Military
Firefighting
Videos

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Characteristics of Micro-Blaze®
Emergency Liquid Spill Control

Micro-Blaze® Emergency Liquid Spill Control contains surfactants, nutrients and non-pathogenic bacteria. When applied to a hydrocarbon-based or organic spill or contaminant, the surfactant starts emulsifying (breaking down) the contaminants into smaller molecules for more efficient degradation by the microbes.

Physical Characteristics:

- White, opaque perfumed liquid formulation
- pH: 7.3
- Completely soluble in water
- Bacteria count: ~200 billion / gallon
- Contains several strains of *Bacillus* bacterial cultures; non-pathogenic, non-toxic
- Completely biodegradable
- 10-year shelf life
- Ships concentrated ready to dilute with water and use; no mixing dry powders and waiting 24 hours

The microbes used in the Micro-Blaze formulations are in a spore form. When conditions become dry, a large percentage will revert back to a spore state, and will reactivate when conditions again become favorable. Other products normally use what is commonly called a *vegetative* microbe. Vegetative microbes will die off when conditions become dry and they cannot reactivate.

The spores in Micro-Blaze products can normally handle pH ranges of 4.5 to 11.5. Vegetative microbes can usually only handle pH ranges of 6 to 9.

- FAQs
- Regulatory Listings
- Application Rates
- Applying Micro-Blaze using a Fire Extinguisher
- Case Histories

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Regulatory Listings For Micro-Blaze Products

Micro-Blaze microbial products have been reviewed by many federal, state and local regulatory agencies. Although **no** political entity can endorse a product, some agencies have given written acknowledgements, permission to use letters, licenses, etc. to Verde Environmental, Inc. and some have given verbal acknowledgements.*

Some of the written acknowledgements are from:

- U. S. Environmental Protection Agency: listed as a bioremediation agent on the National Contingency Plan (NCP Schedule)
- USDA
- Texas Commission on Environmental Quality (TCEQ)
- Texas Department of Transportation (TxDOT)
- Louisiana Department of Environmental Quality
- State of New Mexico – Environmental Quality
- Arizona Department of Environmental Quality
- Florida Department of Environment Protection
- State of California - Office of Spill Prevention and Response
- State of California - Department of Fish and Game

We are adding listings constantly… Contact us for the latest additions!

- Micro-Blaze FAQs
- Application Rates
- Physical Characteristics

*: Always work in accordance with your local, regional and federal environmental authorities as to proper spill treatment protocols in your area. This product is listed with the U.S. EPA on the NCP Product Schedule as a bioremediation agent.
Disclaimer as required by U.S. EPA regulations: "This listing does not mean the EPA approves, recommends, licenses, certifies or authorizes the use of Micro-Blaze Emergency Liquid Spill Control or any other product on an oil discharge. This listing only means that date has been submitted to EPA as required by subpart J of the NCP § 300.915"

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Contact us *concerning this web page.*

Micro-Blaze® Microbial Products

"Partnering with Nature for a Cleaner Tomorrow"

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Spill and Leak Cleanup

Spills and leaks are a fact of life. They range from minor time consuming chores to major hazards. Hydraulic lines, valves, on / offloading sites, gasoline pumping areas, and maintenance bays are constantly needing to be cleaned of leaks and spills*.

Micro-Blaze® Emergency Liquid Spill Control addresses these pollution problems with one of Nature's smallest yet most powerful weapons: microbes. It was developed to attack spills and leaks quickly and efficiently, turning the offending hydrocarbons and other organic wastes into harmless by-products of carbon dioxide and water.

Above: Micro-Blaze Emergency Liquid Spill Control is applied to a motor oil drip. Application rates vary; see Application Rates page for details.

Click here for a video on using Micro-Blaze Emergency Liquid Spill Control on spills and leaks

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Makes the Site Safe and Cleans Up the Waste…All In One Step!

- Reduces odors at their origin
- Inerts volatile vapors, "hot spots"
- Ready to use - no "mix and wait"
- Won't spoil - Keep pre-mixed for emergencies
- Reduces or eliminates "dig and haul" charges to landfills and incinerators
- Reduces worker exposure on hazardous cleanups

NSF
The Public Health and Safety Company™

Micro-Blaze® Emergency Liquid Spill Control can also be used in restaurant and kitchen areas, latrines, campgrounds and similar places. Along with **Micro-Blaze® F·O·G**, they have both been tested and Certified by NSF International.

- Transportation Industry benefits from cleaning up with Micro-Blaze
- Micro-Blaze FAQs
- Physical Characteristics

Micro-Blaze® Microbial Products

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Characteristics of Micro-Blaze®
Emergency Liquid Spill Control

Micro-Blaze® Emergency Liquid Spill Control contains surfactants, nutrients and non-pathogenic bacteria. When applied to a hydrocarbon-based or organic spill or contaminant, the surfactant starts emulsifying (breaking down) the contaminants into smaller molecules for more efficient degradation by the microbes.

Physical Characteristics:

- White, opaque perfumed liquid formulation
- pH: 7.3
- Completely soluble in water
- Bacteria count: ~ 400 billion / gallon
- Contains several strains of *Bacillus* bacterial cultures; non-pathogenic, non-toxic; will not mutate
- Completely biodegradable
- 10-year shelf life
- Ships concentrated ready to dilute with water and use; no mixing dry powders and waiting 24 hours

The microbes used in the Micro-Blaze formulations are in a spore form. When conditions become dry, a large percentage will revert back to a spore state, and will reactivate when conditions again become favorable. Other products normally use what is commonly called a *vegetative* microbe. Vegetative microbes will die off when conditions become dry and they cannot reactivate.

The spores in Micro-Blaze products can normally handle pH ranges of 4.5 to 11.5. Vegetative microbes can usually only handle pH ranges of 6.0 to 9.0.

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General Application Rates for
Micro-Blaze Emergency Liquid Spill Control

The following are considered general guidelines for product use in commercial, institutional and industrial applications....

On spills *[pure or almost pure product]:* Determine the amount of contamination by volume. 10% of that contaminated volume is the amount of Micro-Blaze Emergency Liquid Spill Control concentrate to have ready to dilute and apply. Dilute the concentrate to the specific percentage rate per contamination parameters (type of contamination, age of spill, viscosity, volatility, etc. as described below). [*See example below.*]

Usually, heavier weight hydrocarbons like motor oils and hydraulic fluids use a 3% solution (3 parts Micro-Blaze concentrate with 97 parts water). Apply the diluted solution forcefully with good pressure so the oils will thoroughly mix with the solution and start emulsifying.

The LELs of volatile lighter-weight fuels like gasoline and jet fuels can be reduced to non-dangerous levels with an application of Micro-Blaze Emergency Liquid Spill Control in a 6% solution.

Diluted solutions can be put into a 2.5 gallon water-type fire extinguisher (best with an aspirating nozzle) *Note:* Only use 2 gallons of water/Micro-Blaze mixture in the 2.5 gal. extinguishers so there will be plenty of compressed air space to fully utilize the container's contents. A garden-type pump-up sprayer can also be used or even draw it up through a fire hose eductor setup.

Micro-Blaze products will not harm rubber gaskets and fittings and does not corrode equipment.

On soils: There are many variables in soil remediation. Factors to consider are the type of contamination, the depth to which it has seeped into the soil; the porosity of the soil impacted, soil surface compaction, available moisture and ambient temperature. Always follow local, regional, and federal environmental regulations when cleaning up any type of contamination*.

The general "rule of thumb" for using Micro-Blaze Emergency Liquid Spill Control in soil cleanup is: for every 10 cubic yards of contaminated soil, have one gallon of the concentrated product on hand, ready to dilute with water to apply. Dilution rates are determined by the type of contamination. [*See example below.*]

Thoroughly drench the contaminated area when applying. Keep the soil moistened, like a garden, for best rate of remediation. [For very high concentrations of spillage into the soil, contact Verde

or your distributor for suggested application rates.]

Long-term remediation of heavily contaminated soils may need a "booster" application after 30 days of our biocatalyst ,called **BudKicker**, to add supplemental nutrients for the microbial population to continue at "top performance".

For example: Company XYZ has a spill that winds up affecting a 350 cubic yards of soil. Using the above "formula", the company figures they need 35 gallons of Micro-Blaze Emergency Liquid Spill Control.

Since the contamination is a low-volatile viscous hydrocarbon, the company determines they need to apply the Micro-Blaze at a 3% solution. That means, for every 10 gallons of concentrate, dilute with 333 gallons of water. So, the company will dilute the 35 gallons of concentrated product with 1166 gallons of water. (35 gallons divided by 3% equals 1166 gallons water) and apply onto spill area.

For specific application rates for particular situations, please contact your Micro-Blaze distributor or contact Verde Environmental, Inc. offices by email or phone at 800/626-6598.

- Videos
- Micro-Blaze FAQs
- Physical Characteristics
- Bioremediation
- Case Histories

*: Always work in accordance with your local, regional and federal environmental authorities as to proper spill treatment protocols in your area. This product is listed with the U.S. EPA on the NCP Product Schedule as a bioremediation agent.
Disclaimer as required by U.S. EPA regulations: This listing does not mean the EPA approves, recommends, licenses, certifies or authorizes the use of Micro-Blaze Emergency Liquid Spill Control or any other product on an oil discharge. This listing only means that date has been submitted to EPA as required by subpart J of the NCP § 300.915"

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910 1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY) ***Micro-Blaze® Emergency Liquid Spill Control***

Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's name	Verde Environmental, Inc.	Emergency Telephone Number	800 / 626-6598
Address	9223 Eastex Freeway	Telephone Number for Information	713 / 691-6468
	Houston, Texas 77093-7001	Date Prepared	12 / 01 / 05
		Signature of Preparer	*William L. Scogin, President*

Section II—Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	CAS Number:	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

****** NO HAZARDOUS COMPONENTS OR INGREDIENTS ******

Per OSHA –29 CFR 1910.1200 -- All ingredients are organic and completely biodegradable.

Ingredients not precisely identified are proprietary or non-hazardous. All chemical ingredients appear on the EPA TSCA Inventory.

Section III—Physical/Chemical Characteristics

Boiling Point	100°C	Specific Gravity (H_20 = 1)	1.0
Vapor Pressure (mm Hg)	Equiv. water	Melting Point	N / A
Vapor Density (AIR = 1)	Equiv. water	Evaporation Rate (Butyl Acetate = 1)	N / A

Solubility in Water 99%

Appearance and Odor Cream to tan, opaque liquid, perfumed

Section IV—Fire and Explosion Hazard Data

Flash Point (Method Used)	N / A	Flammable Limits	LEL ----	UEL ----
		Non-flammable		

Extinguishing Media Non-flammable

Special Fire Fighting Procedures None

Unusual Fire and Explosion Hazards None - **NON-FLAMMABLE**

OSHA 174 Sept. 1985

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable XXXX		

Incompatibility *(Materials to Avoid)* Strong acids or alkali compounds may inactivate biological cultures.

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	XXXX	

Section VI—Health Hazard Data

Route(s) of Entry Inhalation? Skin? Ingestion?

Health Hazards *(Acute and Chronic)* May cause diarrhea if ingested in large amounts. **NON-TOXIC**

Organisms used are non-pathogenic. These organisms are susceptible to commonly use antibiotics.

Carcinogenicity N/A NTP? N/A IARC Monographs? N/A OSHA Regulated? N/A

Signs and Symptoms of Exposure Skin: slight redness on hands and forearms if individual has a history of dermal allergic reaction.

Medical Conditions
Generally Aggravated by Exposure Dermal allergic reaction on skin if susceptible person has continual exposure.

Emergency and First Aid Procedures Ingestion: Drink water or milk to dilute. Induce vomiting only if advised by physician or poison control center.

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled May mop up spills; may flush down sanitary drain into waste water treatment lines.

Waste Disposal Method Disposal of this product or its residue must be done in accordance with all local, state and federal requirements.

Precautions to Be Taken in Handling and Storing Avoid eye contact.

Other Precautions To maintain shelf life, avoid temperatures under 32° or over 120°F for long periods of time. Microbes are viable up to 180° F. KEEP FROM PROLONGED FREEZING.

Section VII—Control Measures

Respiratory Protection *(Specify Type)* None required with adequate ventilation.

Ventilation	Local Exhaust		Special
	Mechanical *(General)*		Other Normal room ventilation.

Protective Gloves None required. Eye Protection None required.

Other Protective Clothing or Equipment None required.

Work/Hygienic Practices Minimize exposure in accordance with good hygiene practices.

We believe the statements, technical information and recommendations herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.