



**REVISED LATERAL K-51 PIPELINE RELEASE (2010)  
STAGE 1 ABATEMENT PLAN**

Property:  
**K-51 Pipeline Release (2010)**  
**Sections 34 and 35, Township 26 North, Range 6 West**  
**Rio Arriba County, New Mexico**

**(New Mexico EMNRD OCD RP No. 3R-446 (Formerly 206))**  
**Abatement Plan No. 130**

March 21, 2019  
Revised May 22, 2019  
Ensolum Job No: 05A1226010

Prepared for:  
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## 1 INTRODUCTION

Ensolum, LLC (Ensolum) has prepared a Stage 1 Abatement Plan for the Enterprise Field Services, LLC (Enterprise) Lateral K-51 (2010) pipeline release site located within Sections 34 and 35, Township 26 North, Range 6 West, in Rio Arriba County, New Mexico (36.4465°N, 107.4461°W), hereinafter referred to as the “Site”.

Based on correspondence from the New Mexico Energy Minerals and Natural Resources Department (EMNRD) Oil Conservation Division (OCD), dated January 22, 2019, Enterprise is required to submit a Stage 1 Abatement Plan no later than March 22, 2019. The Stage 1 Abatement Plan is intended to define site conditions such that an effective abatement option can be selected. Stage 2 is implementation of the remedial option. This Stage 1 Abatement Plan details the site description and background, historic site investigation and remediation activities and the geologic and hydrogeologic characteristics. Additionally, the Stage 1 Abatement Plan may propose additional delineation, monitoring activities, and remediation activities and provides a proposed schedule to complete delineation activities in accordance with New Mexico Administrative Code (NMAC) 19.15.30. Subsequent to the successful completion and the agency approval of the proposed delineation activities, a Stage 2 Abatement Plan will be developed to address the remediation of constituents of concern (COCs) remaining at the Site in excess of the applicable New Mexico EMNRD closure criteria.

### 1.1 Standard of Care and Limitations

Ensolum's services will be performed in accordance with standards customarily provided by a firm rendering the same or similar services in the area during the same time period. Ensolum makes no warranties, express or implied, as to the services to be performed hereunder. Additionally, Ensolum does not warrant the work of third parties supplying information to be used in the report (e.g. laboratories, regulatory agencies, or other third parties). This scope of services will be performed in accordance with the scope of work agreed with the client and regulatory agency, as detailed in our discussions.

Findings, conclusions, and recommendations resulting from these services will be based upon information derived from public information resources and it should be noted that this information is subject to change over time. Ensolum's findings are based solely upon data available to Ensolum at the time of these services.

This report will be prepared for the exclusive use of Enterprise Products Operating LLC (Enterprise), and any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the Site) is prohibited without the express written authorization Enterprise and Ensolum. Any unauthorized distribution or reuse is at the Client's sole risk. Notwithstanding the foregoing, reliance by authorized parties will be subject to the terms, conditions and limitations stated in the Stage 1 Abatement Plan and Ensolum's Agreement with the client. The limitation of liability defined in the agreement is the aggregate limit of Ensolum's liability to the client.

## 2 SITE DESCRIPTION AND BACKGROUND

The Lateral K-51 pipeline release Site is located on land managed by the United States Bureau of Land Management (BLM) and private land owned by Russell and Connie Luna. The Site is surrounded by rangeland that is periodically interrupted by oil and gas production and gathering facilities, including the natural gas gathering pipeline that traverses the area from approximately southeast to northwest.

Following the release of approximately ten (10) barrels of natural gas condensate on April 13, 2010, Enterprise initiated excavation activities to identify and remediate potential hydrocarbon impact. Souder, Miller & Associates (SMA) collected confirmation soil samples and one (1) groundwater sample from the resulting excavation. The excavation was subsequently backfilled with imported fill. During June 2010, LT Environmental, Inc. (LTE) advanced eight (8) soil borings (BH-1 through BH-8) in the vicinity of the release and four of the soil borings were completed as groundwater monitoring wells (MW-1 through MW-4). Samples collected from the soil borings exhibited concentrations of COCs above the applicable New Mexico EMNRD OCD Closure Criteria in soils, and above the New Mexico Water Quality Control Commission (WQCC) *Groundwater Quality Standards* (GQSs) in groundwater.

During April 2011 and March 2012, Apex TITAN, Inc (Apex) (formerly Southwest Geoscience (SWG)), installed nine (9) additional groundwater monitoring wells (MW-11 through MW-14, and MW-16 through MW-20), and 15 injection points. During May 2011, in-situ chemical oxidation (ISCO) was performed in the pipeline release source area. Groundwater constituent of concern (COC) monitoring is ongoing at the Site.

A **Topographic Map** is provided as **Figure 1 of Appendix A**, which was reproduced from a portion of a 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**, and a **Site Map**, which indicates the locations of the monitoring wells and recent soil borings in relation to pertinent structures and general Site boundaries, is provided as **Figure 3 of Appendix A**.

## 3 SITE CHARACTERIZATION

### 3.1 Regional Geology and Hydrogeology

The Site is located within the San Juan Basin which is the major structural feature in the northwest corner of New Mexico. The San Juan Basin is classified as an arid region, as most of the area receives less than 10 inches of precipitation per year. Mean annual precipitation in the mountainous regions along the basin margin may be as much as 30 inches a year. Surface water is relatively scarce, with the exception of the San Juan River and its tributaries.

Based upon reference information from the New Mexico Bureau of Geology and Mineral Resources publication on the background geology of the San Juan Basin (Decision-Makers Field Conference 2002) “most of the aquifers in the San Juan Basin exist under confined or semi-confined hydrologic conditions. In Mesozoic rocks of the region, the confined sandstone aquifers are interbedded with shales that behave as aquitards. The Triassic mudrock sequence is the aquitard for the Permian Limestone. Groundwater in the alluvium along streams and in the shallow Tertiary sandstone aquifers is generally unconfined and is open to the atmosphere through pores in the overlying permeable rocks.”

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The major aquifer underlying the Site vicinity is listed as the Colorado Plateaus Aquifer, which is made up of four aquifers – Uinta-Anima, Mesa Verde, Dakota-Glen, and Coconino-De Chelly. The Uinta-Animas is the shallowest of these aquifers and is present in the San Juan Basin. The general composition of the aquifers is moderately to well-consolidated sedimentary rocks of an age ranging from Permian to Tertiary. Each aquifer is separated from the others by an impermeable confining unit. Two of the confining units are completely impermeable and cover the entire area of the aquifers. The other two confining units are less extensive and are thinner. These units allow water to flow between the principal aquifers.

According to the New Mexico Bureau of Geology and Mineral Resource (Geologic Map of New Mexico 2003), the Site is located within the lower Eocene San Jose Formation which was deposited along high energy, low-sinuosity streams and on extensive muddy floodplains. The Eocene age San Jose Formation contains a mixture of clastic sedimentary rocks varying from siltstone to conglomerate, dominated by rocks containing sand-sized particles.

### 3.2 Local Geology and Hydrogeology

Boring logs were prepared during historic site investigation activities. The boring logs recorded sample identification, depth collected, and method of collection, as well as observations of soil moisture, color, grain size, contaminant presence, and overall stratigraphy. The lithology encountered at the Site during boring activities were composed of Quaternary alluvial deposits derived from erosion of the parent San Jose sandstones and siltstones which comprise the canyon walls. Based on the data collected during the completion of the soil borings, the alluvium generally consists of brown silty sands and silty clays from the ground surface to at least 20 feet below grade surface (bgs).

The lithology observed during the advancement of soil boring MW-18 at the Site included a tan sandy silt from the surface to approximately four (4) feet bgs. The sandy silt stratum was underlain by a medium brown silty clay from four (4) feet bgs to 10 feet bgs. A tan sand was encountered from 10 feet bgs to the terminus depth of 16 feet bgs. The lithologies observed in the remaining soil borings at the Site were similar to that of soil boring MW-18. Detailed lithologic descriptions are presented on the monitoring well soil boring logs included in **Appendix C**.

The initial groundwater-bearing unit at the Site was encountered at depths ranging from 12 to 25 feet bgs during supplemental investigation activities. The groundwater flow direction (gradient) at the Site is generally toward the west-northwest and averages approximately 0.010 feet per foot (ft/ft) across the Site.

Based on Domenico and Schwartz (1990) a default hydraulic conductivity value for the impacted sand unit at the Site would be, on average,  $2 \times 10^{-6}$  m/sec which is equivalent to 0.57 feet per day (ft/day). Additional site-specific aquifer characterization is proposed in this Stage 1 Abatement Plan Proposal.

### 3.3 Proposed Cleanup Goals

The Site is subject to regulatory oversight by the New Mexico EMNRD OCD. Initial Site activities were performed in accordance with the New Mexico EMNRD OCD *Guidelines for Remediation of Leaks, Spills and Releases*, in addition to the New Mexico EMNRD OCD rules, specifically NMAC 19.15.29 *Release Notification*. This guidance established investigation and abatement action requirements for sites subject to reporting and/or corrective action prior to the update of the rule during July and August 2018. Groundwater remediation activities at the Site will be performed in



accordance with NMAC 19.15.30 *Remediation*.

Ensolum utilized information provided by Enterprise, the general site characteristics, and information available from the New Mexico Office of the State Engineer (OSE) and the New Mexico EMNRD OCD Imaging database to determine the appropriate closure criteria for the Site.

- No water wells were identified within a one-mile search radius of the Site on the OSE Water Rights Reporting System (WRRS) database. Based on water levels measured in groundwater monitoring wells located at the Site, the depth to groundwater is less than 50 feet below grade surface (bgs).
- The Site is located within 300 feet of a New Mexico ENMRD OCD-defined continuously flowing watercourse or significant watercourse. The Site is located approximately 92 feet south of Tapicito Creek.
- The Site is not located within 200 feet of a lakebed, sinkhole or playa lake.
- The Site is not located within 300 feet of a permanent residence, school, hospital, institution or church.
- No springs, or private domestic fresh water wells used by less than five (5) households for domestic or stock watering purposes were identified within 500 feet of the Site.
- No fresh water wells or springs were identified within 1,000 feet of the Site.
- The Site is not located within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3.
- The Site is not located within 300 feet of a wetland.
- Based on information identified on the New Mexico Mining and Minerals Division's GIS, Maps and Mine Data database, the Site is not located within an area overlying a subsurface mine.
- The Site is not located within an unstable area.
- Based on available Federal Emergency Management Agency data, the Site is located adjacent to, but not within, a 100-year floodplain.

Based on the identified siting criteria, cleanup goals for soils remaining in place at the Site include: 10 milligrams per kilogram (mg/kg) for benzene, 50 mg/kg for total BTEX, 100 mg/kg for combined TPH GRO/ DRO/MRO and 600 mg/kg for chlorides.

In addition, cleanup/delineation goals for groundwater located at the Site include: 10 micrograms per liter (µg/L) for benzene, 750 µg/L for toluene, 750 µg/L for ethylbenzene, and 620 µg/L for total xylenes.



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#### 4 SUMMARY OF SITE ASSESSMENT ACTIVITIES

On April 13, 2010, an estimated ten (10) barrels of natural gas condensate was released from the Enterprise natural gas gathering pipeline at the Site. Subsequent to the completion of excavation activities and off-site disposal of hydrocarbon affected soils, confirmation soil samples were collected from the excavation by SMA. In addition, one (1) groundwater sample was collected from the excavation. The excavation was then backfilled with unaffected soils. During June 2010, eight (8) soil borings (BH-1 through BH-8) were advanced on-Site by LTE. Subsequent to advancement, four (4) of the soil borings were completed as groundwater monitoring wells (MW-1 through MW-4) (*Subsurface Investigation Report, dated August 9, 2010 – LTE*). Analytical results from the soil and groundwater sampling activities indicated COC concentrations were present in soil (BH-1, immediately adjacent to the release and near the groundwater interface) above the applicable New Mexico EMNRD OCD Closure Criteria, and in groundwater (monitoring wells MW-1 through MW-4) above the New Mexico WQCC GQSs.

During April 2011, nine (9) soil borings/monitoring wells (SB-9, SB-10, MW-11 through MW-14, SB-15, MW-16, and MW-17) were advanced by Apex (formerly SWG) in and around the K-51 release area to further evaluate the extent of dissolved phase COCs in groundwater. Additionally, 15 injection points were installed to allow ISCO of the COCs. ISCO activities were performed during May 2011 (*Supplemental Site Investigation and Corrective Action Report, dated October 5, 2011 - SWG*).

Based on the distribution of COCs in groundwater, it appears that a former drip valve, tank, or pit may have been an additional historic source of petroleum hydrocarbon impact to groundwater (New Mexico EMNRD OCD reference 3R-206, *El Paso Natural Gas, Final Pit Closure*) in the vicinity of monitoring well MW-14. During March 2012, three (3) additional soil borings/monitoring wells (MW-18, MW-19 and MW-20) were advanced near and downgradient of the historic release area to further evaluate the extent of COCs in groundwater (*Supplemental Site Investigation & Corrective Action Work Plan, dated April 23, 2012 – SWG*). Soil boring/monitoring well MW-18 was advanced to the west of the historic release, and soil borings/monitoring wells MW-19 and MW-20 were advanced to the north and northwest of the historic release.

The proposed activities identified herein are based on a work plan submitted to the New Mexico EMNRD OCD prepared by Apex on behalf of Enterprise (*Recovery Well and Monitoring well Installation, Supplemental Corrective Action, and Groundwater Monitoring Work Plan, dated November 27, 2018 - Apex*). The proposed activities included the potential replacement of monitoring well MW-18, and the installation of a total-fluids recovery well near monitoring well MW-19.

Soil laboratory results, including data from previous site investigations, are provided in **Table 1 (Appendix B)**. Groundwater analytical results are summarized in **Table 2 (Appendix B)**. Groundwater measurements (including historical data) are presented with top of casing (TOC) elevations in **Table 3 (Appendix B)**. Groundwater gradient maps and groundwater quality standards exceedance zone maps that include the June and December 2018 exceedances are provided as **Figure 4A, Figure 4B, Figure 5A and Figure 5B (Appendix A)**. Please note that the historic soil analytical data tables reference the Remediation Action Levels provided in the now obsolete New Mexico ENMRD OCD *Guidelines for Remediation of Leaks, Spills and Releases*.

## 5 PROPOSED DELINEATION ACTIVITIES

### 5.1 Health and Safety Plan

Ensolum will develop a site-specific Health and Safety Plan (HSP) for the performance of the proposed scope of services described in this work plan. For the purposes of this HSP, it is assumed that the COCs include petroleum hydrocarbon constituents. For the purposes of this proposed plan, it is assumed that the scope of services can be conducted under modified Level D personal protective equipment (PPE), which will include a hard hat, steel-toed boots, protective eyewear, and gloves. Should the need arise to upgrade PPE (e.g. respiratory protection), the client will be notified, and the HSP will be modified accordingly. Although it is not anticipated at this time, it should be noted that a PPE upgrade will constitute a change in scope of work, requiring a change order.

Ensolum will clear utilities through the New Mexico One Call System and will coordinate with the utility companies and Enterprise to evaluate the line locations in order to select the actual soil boring locations.

### 5.2 Monitoring Well Rehabilitation

Prior to commencement of well installation activities, Ensolum will attempt to rehabilitate monitoring wells MW-18 and MW-1 utilizing surging/de-rooting methods. Monitoring well MW-1 does not produce sufficient groundwater recharge to allow effective pumping and monitoring well MW-18 exhibits complete blockage of the groundwater-bearing unit. The rehabilitation methods could potentially assist with the removal of the silt/root blockages within the monitoring well screens.

### 5.3 Soil Boring Installation

Subsequent to “daylighting” the known subsurface utilities and clearing the initial five (5) feet of each proposed drilling location utilizing a hydro-excavator, two (2) soil borings will be advanced utilizing a hollow stem auger drilling rig. The soil borings will be advanced to a maximum total depth of approximately 20 feet below grade surface (bgs), five feet below the initial water table, or auger refusal, whichever is shallower. The proposed total depth of the soil borings/monitoring wells will not be exceeded without verbal approval from Enterprise.

Non-disposable sampling and drilling equipment will be decontaminated using an Alconox<sup>®</sup> wash and potable water rinse prior to commencement of the project and between the advancement of each soil boring.

Soil samples will be collected continuously using core barrels or split spoon samplers to document lithology, color, relative moisture content and visual or olfactory evidence of impairment. In addition, the samples will be scanned with a photoionization detector (PID) to evaluate the presence of volatile organic compounds (VOCs).

Soil boring cuttings will be stored in labeled drums until appropriate disposal measures have been determined.



## 5.4 Soil Sampling Program

A minimum of two (2) soil samples from each monitoring well boring will be submitted for laboratory analysis from combination of the following:

- The depth interval exhibiting the highest concentration of VOCs based on PID evidence;
- An interval exhibiting visual/olfactory evidence of impairment;
- The capillary fringe zone;
- From a change in lithology; or,
- From the bottom of the boring.

The soil samples will be collected in laboratory prepared glassware, labeled/sealed using laboratory supplied labels and custody seals, and stored on ice in a cooler. The samples will be relinquished to the courier for Hall Environmental Analysis Laboratory (HEAL) of Albuquerque, New Mexico, under proper chain-of-custody procedures.

## 5.5 Soil Laboratory Analytical Program

Selected soil samples will be analyzed for TPH GRO/DRO/MRO utilizing EPA Method SW-846 8015, BTEX using EPA Method SW-846 8021 or 8260, and Chlorides using EPA Method 300.0.

A summary of the analytes, sample type, number of samples, and EPA-approved methods is presented in the following table:

Analytes	Sample Type	No. of Samples	Method
TPH GRO/DRO/MRO	Soil	4	SW-846 8015
BTEX	Soil	4	SW-846 8021/8260
Chlorides	Soil	4	Method 300.0

## 5.6 Monitoring Well Installation

Subsequent to advancement, the soil borings will be completed as one (1) recovery well and one (1) groundwater monitoring well (if MW-18 is not salvageable). The recovery well and monitoring well will be completed as follows:

- Installation of 10 feet of 4-inch diameter (recovery well) and 10 feet of 2-inch diameter (monitoring well), machine slotted (0.010-inch) Schedule 40 polyvinyl chloride (PVC) well screen assembly with a threaded bottom plug;
- Installation of Schedule 40 PVC 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 two (2) feet of hydrated bentonite above the sand;
- Addition of cement/bentonite slurry to the surface; and
- Installation of an above-grade steel riser with an integrated padlock hasp.

The monitoring/recovery wells will be developed by surging and removing groundwater until the fluid appears relatively free of fine-grained sediment. Additionally, one (1) or more slug tests will

also be attempted at the Site to obtain site specific aquifer characteristics.

## 5.7 Groundwater Gradient Determination

Following installation, the new monitoring wells will be geospatially surveyed to determine the TOC and ground surface elevation. The TOC elevations will allow the calculation of the groundwater elevations at each well. This information will facilitate the creation of groundwater potentiometric surface maps, which will identify groundwater flow direction and gradient. The relative ground elevations will facilitate the creation of lithologic and/or hydrogeologic cross-sections, if deemed necessary.

## 5.8 Groundwater Sampling Program

A groundwater monitoring event will be performed at the Site following the installation and development of the replacement monitoring well and the recovery well. During the groundwater sampling event, Ensolum will collect one (1) groundwater sample from each on-Site monitoring well.

Prior to sampling, fluid levels in each of the monitoring wells will be gauged utilizing an interface probe capable of detecting non-aqueous phase liquid (NAPL).

Groundwater samples will be collected utilizing low-flow sampling or bailer-purge sampling methods.

Low-flow refers to the velocity with which groundwater enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system, to the extent practical, taking into account established Site sampling objectives. Flow rates on the order of 0.1 to 0.5 liters per minute (L/min) are maintained during sampling activities, using dedicated or decontaminated sampling equipment.

The pump intake is placed within the screened interval such that the groundwater recovered is drawn in directly from the formation with little mixing of casing water or disturbance to the sampling zone.

The groundwater samples will be collected from each monitoring well once produced groundwater is consistent in color, clarity, pH, temperature, and conductivity. Measurements are taken every three to five minutes while purging. Purging is considered complete once key parameters (especially pH and conductivity) have stabilized for three successive readings.

If a disposable bailer is utilized to sample the monitoring well, the monitoring well will be purged until effectively dry and once groundwater recovers to static or near static levels, a groundwater sample will be collected.

Samples will be collected in laboratory supplied containers, labels/sealed using the laboratory supplied custody seals, and placed on ice in a cooler. The samples will be relinquished to the courier for HEAL of Albuquerque, New Mexico under proper chain-of-custody procedures.

## 5.9 Groundwater Laboratory Analytical Program

The groundwater samples collected from the monitoring wells will be analyzed for BTEX utilizing EPA Method SW-846 8021/8260.

A summary of the analytes, sample type, estimated number of samples per event, and EPA-approved methods are presented below:

Analytes	Sample Type	No. of Samples	Method
BTEX	Water	13	SW-846 8021/8260

## 5.10 Stage 2 Abatement Plan Proposal

Based on the data generated from the delineation activities and subsequent groundwater sampling event, Ensolum will prepare a Stage 2 Abatement Plan Proposal. The plan will include an evaluation of the cumulative laboratory analytical data to develop and justify a preferred abatement option for the Site. In addition, the Stage 2 Abatement Plan Proposal will include a modification to the groundwater monitoring program, Site maintenance activities, a proposed schedule for duration of abatement activities, and public notification proposal designed to satisfy the requirement of Subsections A through C of 19.15.30.15 NMAC. The report will be completed within 60 days of receiving final laboratory analytical data packages.

## 5.11 Quality Assurance

Sampling and analytical techniques have been identified in the text above and conforms with the references identified in Subsection B of 20.6.2.3107 NMAC and with 20.6.4.14 NMAC of the water quality standards for interstate and intrastate surface waters in New Mexico.

# 6 PROPOSED SCHEDULE

## Public Notice

Enterprise will provide Public Notice within 15 days of notice from NMOCD that this Abatement Plan is administratively complete as required per NMAC 19.15.30.15. Enterprise will provide written notice of the Stage 1 Abatement Plan to the following parties:

- Surface owners of record within one (1) mile of the perimeter of the identified impacted area as currently delineated in the Stage 1 Abatement Plan. The list of Landowners is provided in **Table A (Appendix D)**.
- The County Commission of Rio Arriba County, New Mexico.
- The Office of Natural Resources Trustee for the State of New Mexico.

Please note the release was not identified to be within one (1) mile of any city limits or tribal boundaries.

Enterprise understands that the NM EMNRD OCD may request additional notification to persons or entities that have requested such, as well as other local, state, or federal governmental

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agencies upon approval of the Stage 1 Abatement Plan.

Once approval is received, Enterprise will publish the NM EMNRD OCD approved notice in the Rio Grande Sun, a newspaper circulated in Rio Arriba County, New Mexico, and in the Albuquerque Journal, a newspaper of general circulation across the state of New Mexico. The newspaper publications will run for a cycle of one (1) business day.

Enterprise will issue the public notice via the newspapers and certified mailings within 15 days after the NM EMNRD OCD has provided determination that the Stage 1 Abatement Plan is administratively complete. Proposed verbiage for the public notice and a list of landowners within a one-mile radius are provided in **Appendix D**.

If no public comments are received within 30 days of posting public notice, Ensolum will proceed with permitting and scheduling supplemental site investigation activities.

### **Field Activities**

The additional delineation activities are proposed to be initiated before the end of June 2019. The availability of drilling and hydro excavation contractors, weather conditions and public notice will dictate the drilling schedule. Prior to any field work, Ensolum and/or Enterprise will provide the NM EMNRD OCD with 48-hour notification.

### **Quarterly Progress Reports**

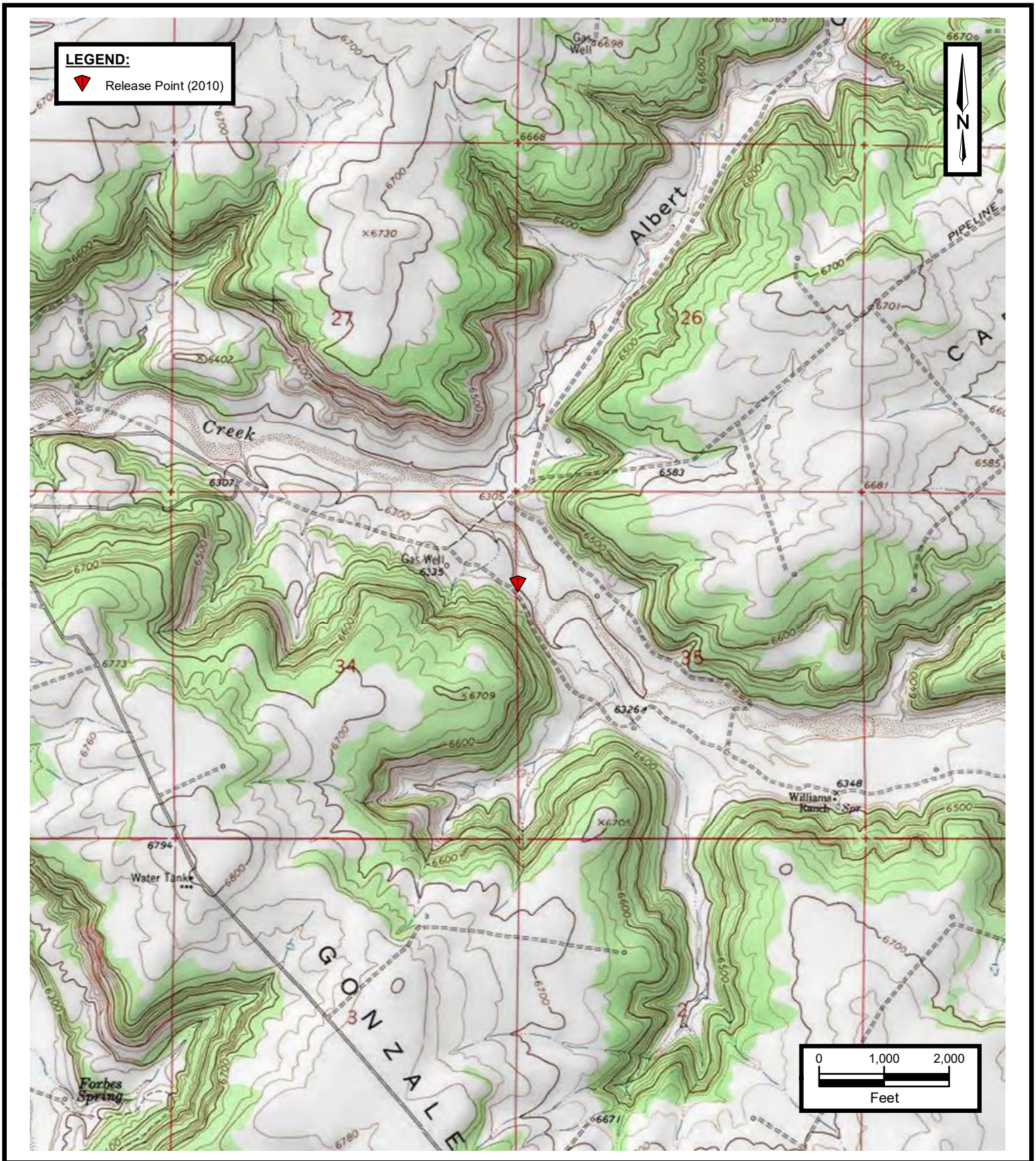
In accordance with NMAC 19.15.30.13 C. (5), Enterprise will provide the New Mexico ENMRD OCD with summary quarterly progress reports of the Stage 1 Abatement Plan implementation beginning 30 days after the approval and initiation of the Stage 1 activities. At this time the summary quarterly progress reports are anticipated to begin in July 2019.



## APPENDIX A

### Figures





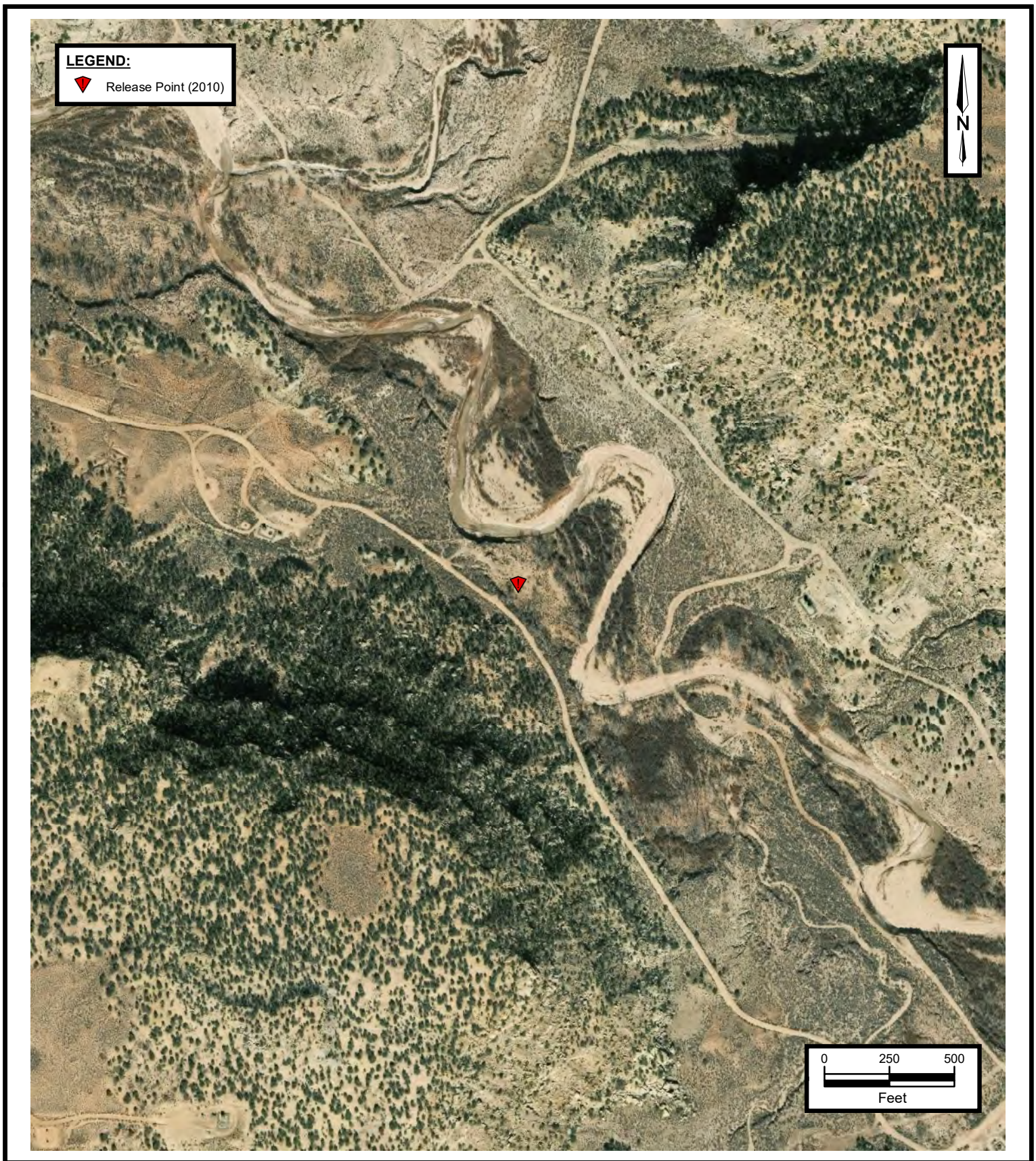
**ENSOLUM**  
Environmental & Hydrogeologic Consultants

**TOPOGRAPHIC MAP**  
ENTERPRISE FIELD SERVICES, LLC  
K-51 PIPELINE RELEASE  
Section 34 and 35 T27N R7W, Rio Arriba County, New Mexico  
36.4465° N, 107.4461° W

PROJECT NUMBER: 05A1226010

**FIGURE**  
**1**





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**SITE VICINITY MAP**

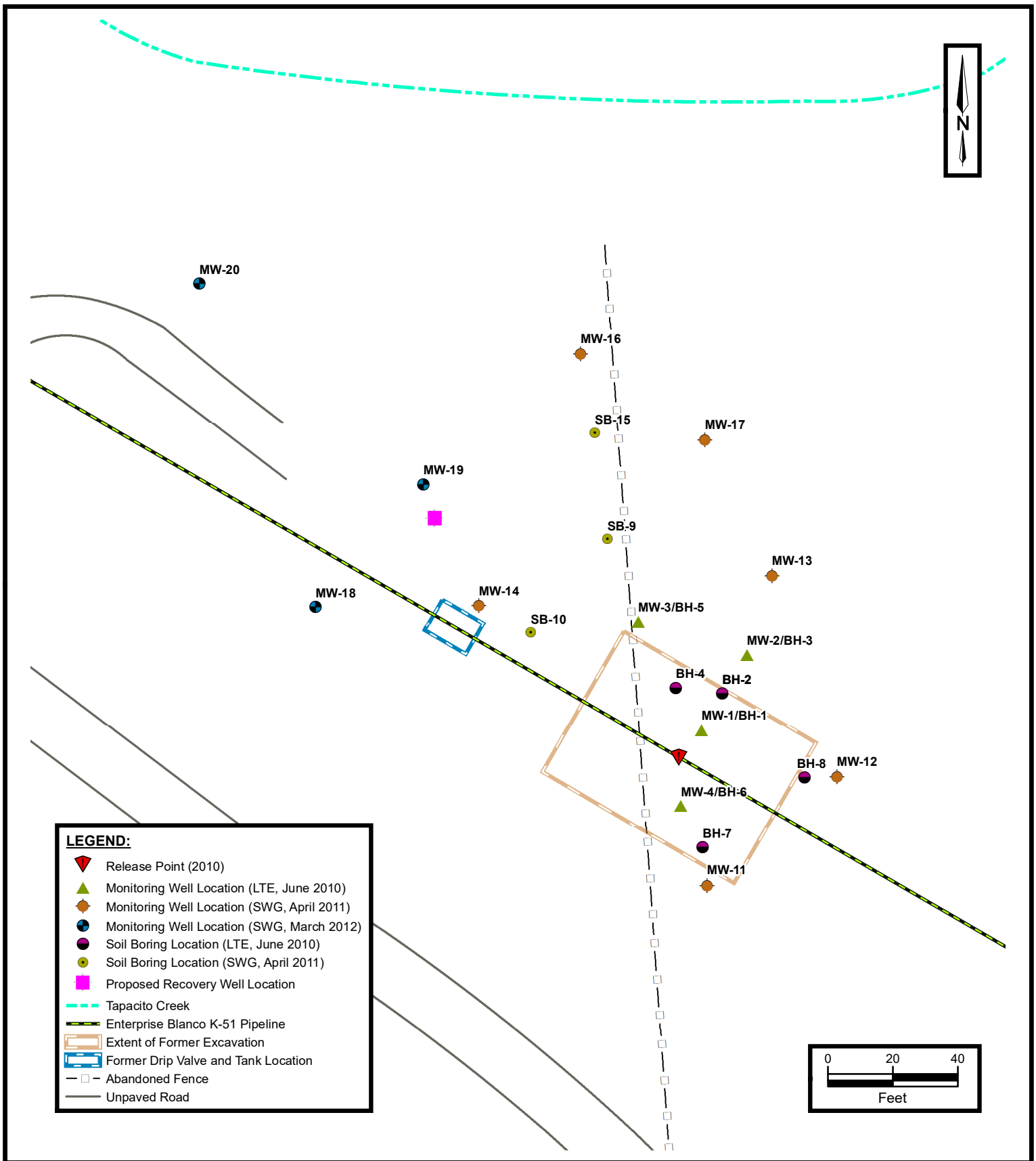
ENTERPRISE FIELD SERVICES, LLC  
K-51 PIPELINE RELEASE  
Section 34 and 35 T27N R7W, Rio Arriba County, New Mexico  
36.4465° N, 107.4461° W

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**FIGURE**

**2**





### SITE MAP

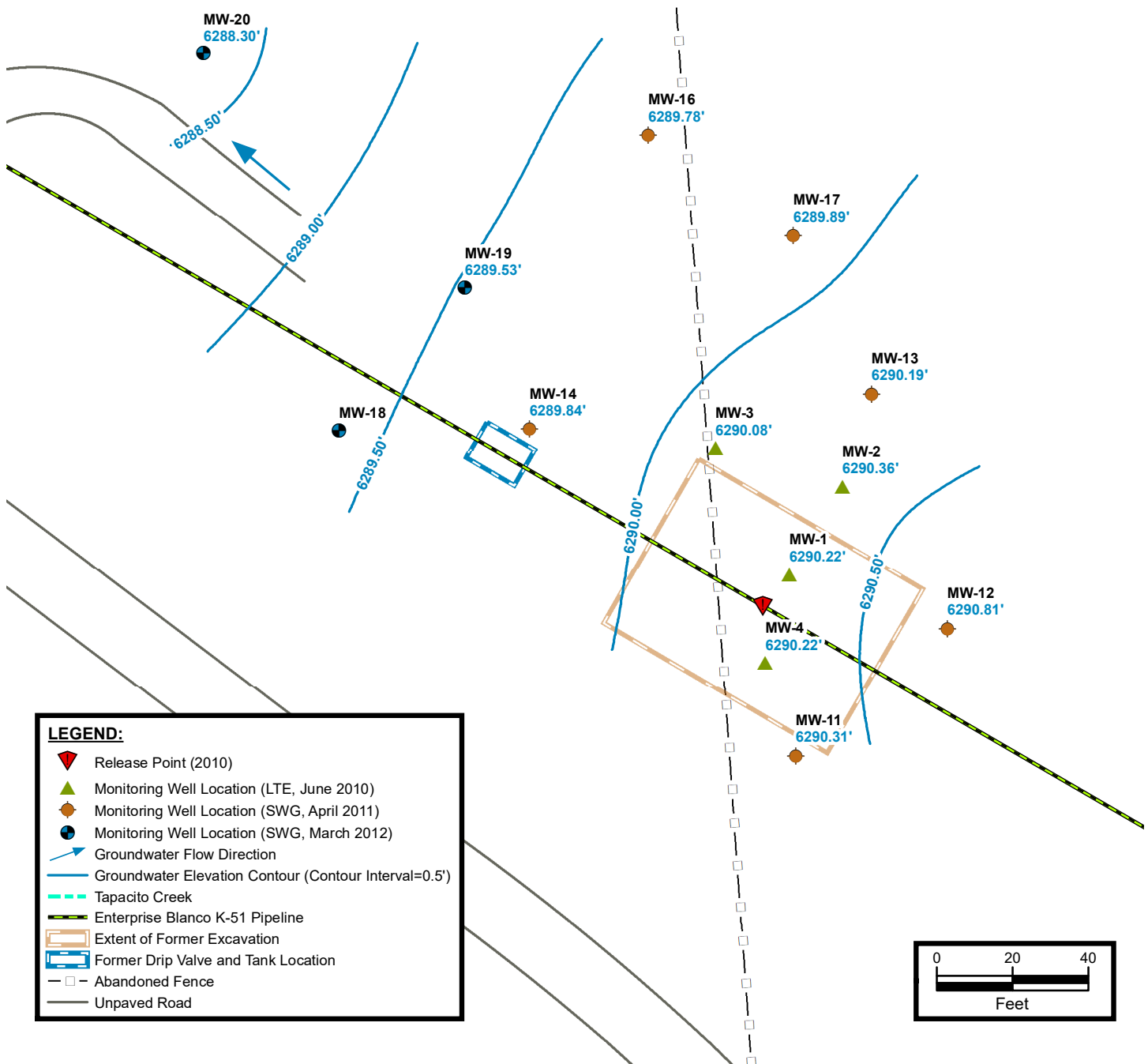
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36.4465° N, 107.4461° W

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**FIGURE**  
**3**

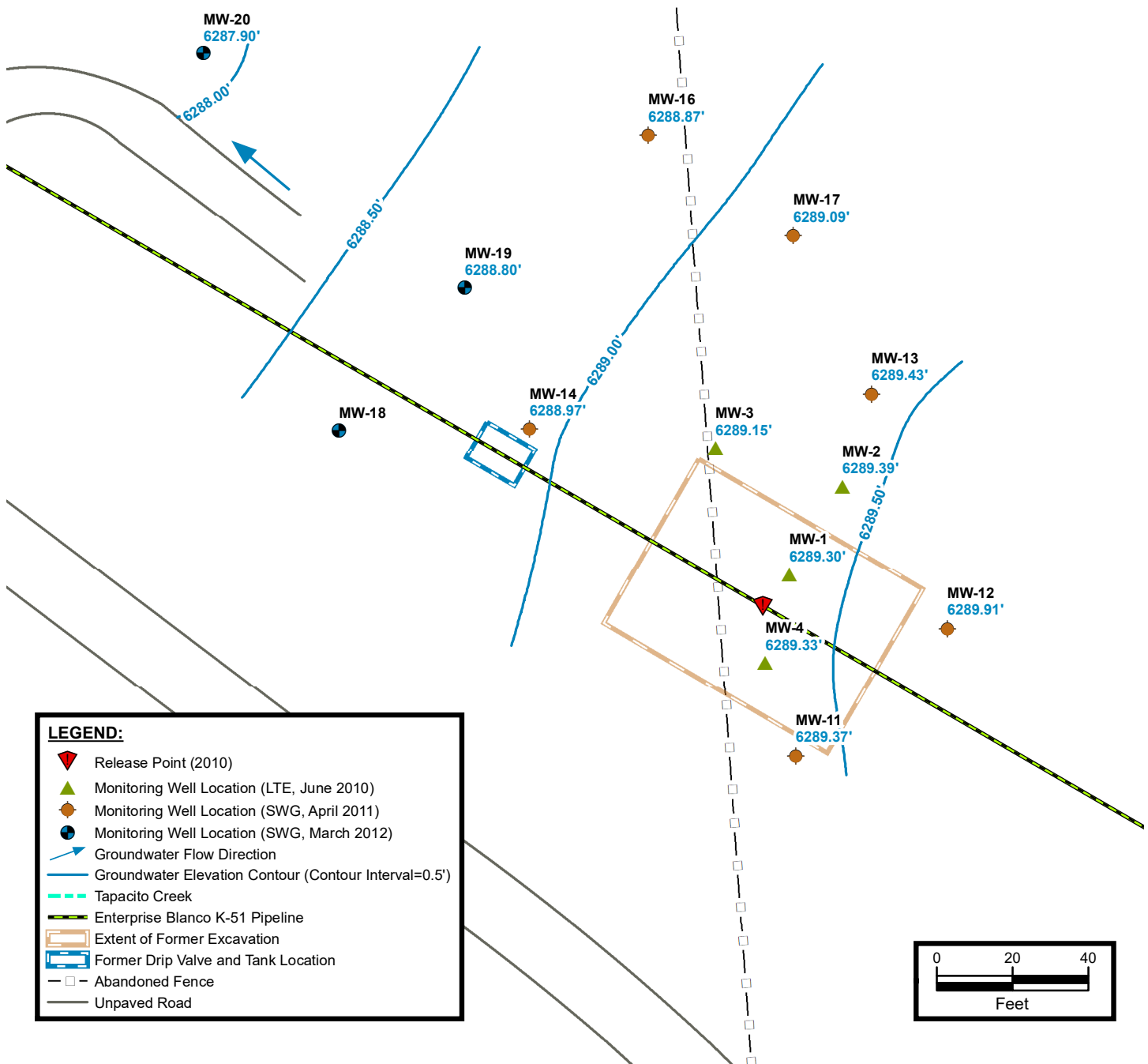
**NOTE:**  
Groundwater Elevations in Blue Are Listed in Feet, NAVD88

Monitoring Well MW-18 is Primarily Silted in.

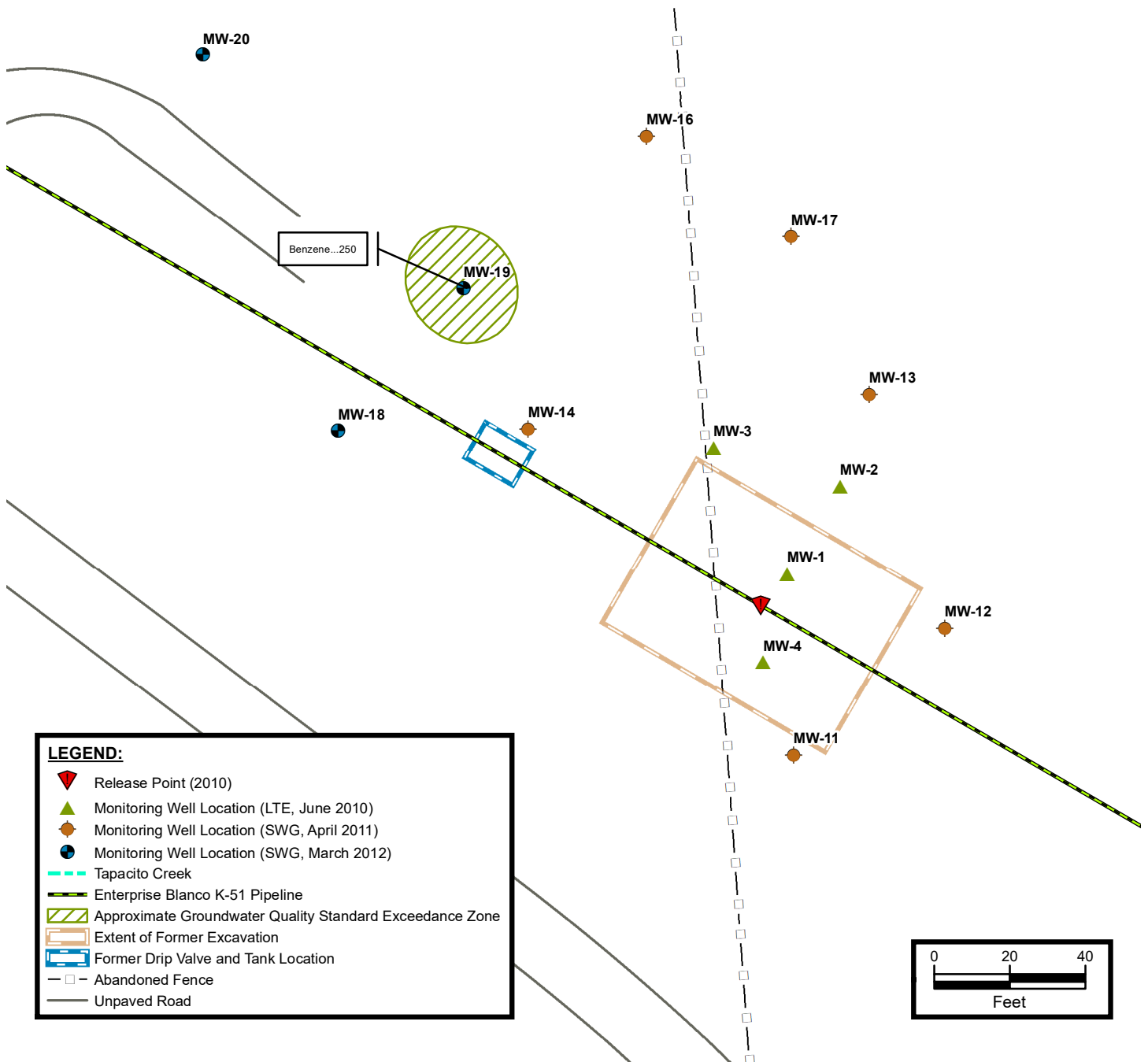


**NOTE:**  
Groundwater Elevations in Blue Are Listed in Feet, NAVD88

Monitoring Well MW-18 is Primarily Silted in.



**NOTE:**  
All Concentrations are Listed in ug/L.



### GROUNDWATER QUALITY STANDARD EXCEEDANCE MAP (MAY 2018)

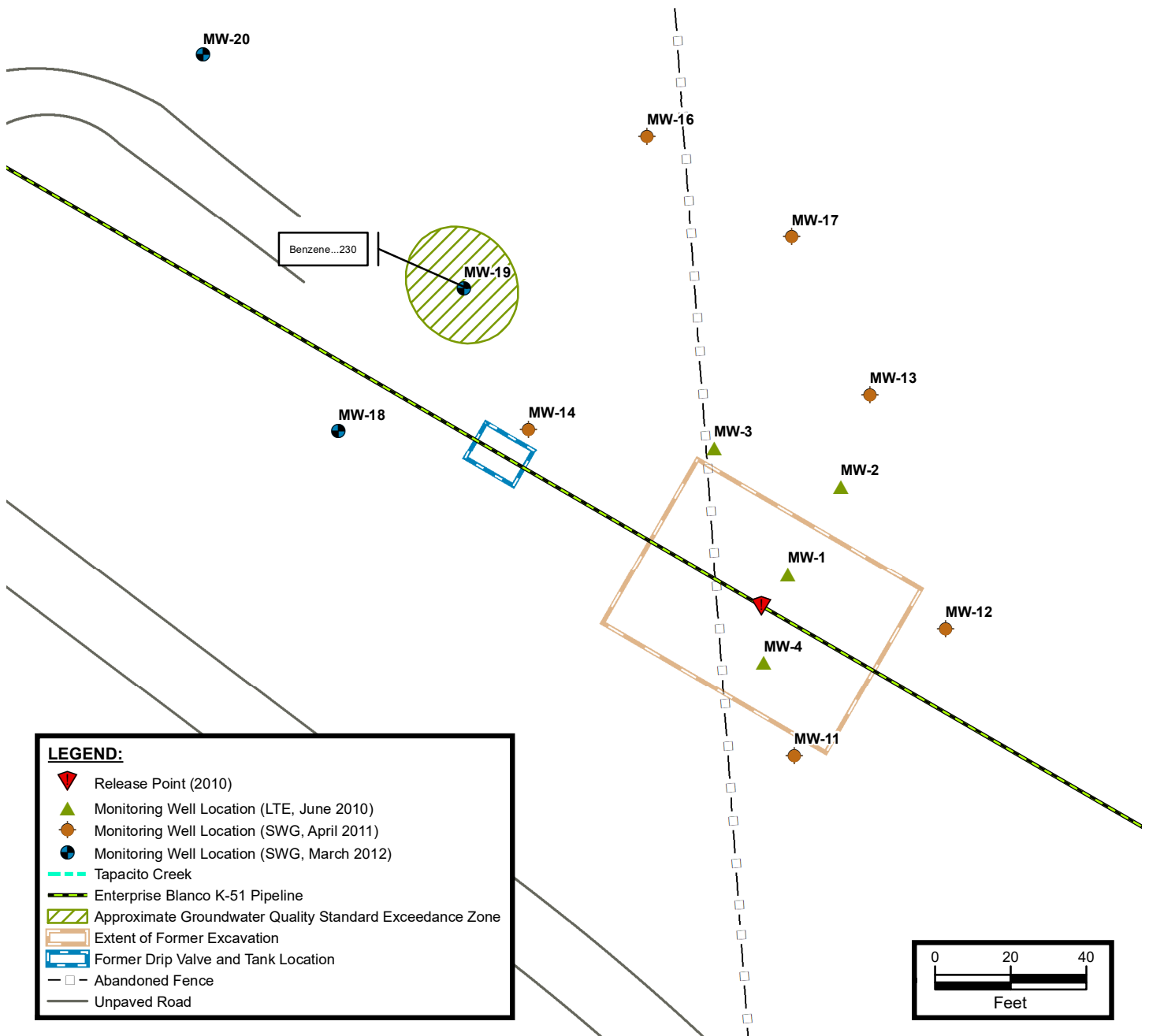
ENTERPRISE FIELD SERVICES, LLC  
K-51 PIPELINE RELEASE  
Section 34 and 35 T27N R7W, Rio Arriba County, New Mexico  
36.4465° N, 107.4461° W

PROJECT NUMBER: 05A1226010

FIGURE  
**5A**

**ENSOLUM**  
Environmental & Hydrogeologic Consultants

**NOTE:**  
All Concentrations are Listed in ug/L.



### GROUNDWATER QUALITY STANDARD EXCEEDANCE MAP (NOVEMBER 2018)

ENTERPRISE FIELD SERVICES, LLC  
K-51 PIPELINE RELEASE  
Section 34 and 35 T27N R7W, Rio Arriba County, New Mexico  
36.4465° N, 107.4461° W

PROJECT NUMBER: 05A1226010

FIGURE  
**5B**

**ENSOLUM**  
Environmental & Hydrogeologic Consultants





## APPENDIX B

### Tables



**TABLE 1**  
**K-51 PIPELINE RELEASE**  
**SOIL ANALYTICAL SUMMARY**

Sample I.D.	Date	Sample Depth (feet)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	TPH GRO (mg/kg)	TPH DRO (mg/kg)
New Mexico Entergy, Mineral & Natural Resources Department, Oil Conservation Division, Closure Criteria			10	NE	NE	NE	100	
SMA Confirmation Samples								
North Wall	4.21.10		<0.05	<0.05	<0.05	<0.1	<5.0	49
South Wall	4.23.10		<0.05	<0.05	<0.05	<0.1	<5.0	10
East Wall	4.23.10		<0.05	<0.05	<0.05	<0.1	<5.0	26
West Wall	4.24.10		<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
Soil Borings Installed by LTE								
BH-1	6.8.10	8-12 above clay	<2.5	31	6.8	72	740	1,400
BH-1	6.8.10	8-12 below clay	0.12	<0.05	<0.05	<0.1	<5.0	<10.0
BH-1	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-2	6.8.10	8-12	<0.05	0.062	<0.05	0.19	8.5	12
BH-2	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-3	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-4	6.8.10	8-12	0.055	0.74	0.12	1.3	25	45
BH-4	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-5	6.8.10	8-12	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-5	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-6	6.8.10	12-16	<0.05	0.72	0.12	1.2	16	<10.0
BH-7	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0
BH-8	6.8.10	12-16	<0.05	<0.05	<0.05	<0.1	<5.0	<10.0

Note: Concentrations in **bold** and yellow exceed the applicable OCD Closure Criteria

NE = Not Established

mg/kg = milligrams per kilogram

TPH = Total Petroleum Hydrocarbons

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
SMA Sample - Open Excavation							
Excavation	4.21.10	7,000	13,000	540	5,200	NA	NA
Monitoring Wells Installed by LTE							
MW-1	6.21.10	8,400	1,300	560	4,200	NA	NA
	9.24.10	2,300	28	200	520	8.4	<1.0
	4.21.11	430	<20	120	60	2.1	<1.0
	6.21.11	820	370	33	140	5.1	130
	9.22.11	690	1,200	120	1,200	8.9	30
	12.13.11	260	250	54	650	3.4	<1.0
	3.20.12	280	230	94	550	3.5	<1.0
	6.19.12	300	<5.0	81	96	1.7	<1.0
	9.20.12*	45	3.4	15	23	0.45	<1.0
	12.17.12	34	<1.0	11	16	0.19	<1.0
	3.25.13	41	<1.0	19	32	0.27	<1.0
	6.27.13	24	<1.0	<1.0	36	0.22	<1.0
	10.22.13	39	<1.0	24	13	0.23	<1.0
	12.16.13	10	<1.0	14	11	0.18	<1.0
	4.18.14	23	<1.0	28	86	0.38	1.1
	11.6.14	32	<1.0	27	61	NA	NA
	5.29.15	11	<1.0	21	55	NA	NA
	12.1.15	5.3	<1.0	4.0	6.2	NA	NA
	5.26.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	17	<1.0	1.6	2.4	NA	NA
	5.30.17	4.1	<1.0	<1.0	<1.5	NA	NA
	12.07.17	2.8	<1.0	2.0	<1.5	NA	NA
	5.30.18	3.0	<1.0	<1.0	2.2	NA	NA
	11.02.18	1.2	<1.0	<1.0	<1.5	NA	NA
MW-2	6.21.10	200	53	14	96	NA	NA
	9.24.10	2.3	<1.0	<1.0	<2.0	<0.050	<1.0
	4.21.11	3.3	<1.0	<1.0	<2.0	0.065	<1.0
	6.21.11	2.2	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.28.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	12.1.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA

**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
MW-3	6.21.10	640	57	72	1,000	NA	NA
	9.24.10	150	<1.0	16	28	0.48	<1.0
	4.21.11	52	<1.0	17	10	0.25	<1.0
	6.21.11	62	14	13	160	0.67	<1.0
	9.22.11	3	<1.0	8.7	<2.0	0.066	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	1.3	<1.0	1.9	<2.0	<0.050	<1.0
	6.19.12	3.1	<1.0	1.4	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.28.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	12.1.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	<1.0	<1.0	<1.0	<2.0	NA	NA
MW-4	5.30.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.07.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	6.21.10	3,600	10,000	600	6,600	NA	NA
	9.24.10	870	870	260	1,600	12	1
	4.21.11	670	<20	520	790	6.3	<1.0
	6.21.11	17	22	36	77	0.64	1.1
	9.22.11	62	140	220	820	3.8	1.2
	12.13.11	84	<20	430	490	2.6	<1.0
	3.20.12	36	<20	1,100	1,400	6.5	<1.0
	6.19.12	37	<5.0	250	350	2.2	<1.0
	9.19.12	9.4	1.4	74	97	0.84	<1.0
	12.17.12	<1.0	<1.0	6.2	9.7	0.12	<1.0
	3.25.13	3.2	<1.0	51	55	1.0	<1.0
	6.27.13	3.9	<1.0	61	60	1.3	<1.0
	10.22.13	<1.0	<1.0	12	3.8	0.13	<1.0
	12.13.13	<1.0	<1.0	16	6.2	0.4	<1.0
	4.17.14	<1.0	<1.0	76	14	0.78	<1.0
	11.6.14	<1.0	<1.0	11	2.9	NA	NA
	5.29.15	<1.0	<1.0	24	6.1	NA	NA
	12.1.15	<1.0	<1.0	2.5	2.1	NA	NA
	5.25.16	<1.0	<1.0	7.4	<2.0	NA	NA
	11.08.16	2.4	<1.0	4.8	2.1	NA	NA
	5.26.17	<1.0	<1.0	3.9	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA

**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
Monitoring Wells Installed by Apex TITAN (formerly Southwest Geoscience)							
MW-11	4.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.29.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.30.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA
MW-12	4.21.11	1.9	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	4.6	<1.0	<1.0	<2.0	0.063	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	1.7	<1.0	<1.0	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.29.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.30.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA

**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
MW-13	4.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.20.12	NS	NS	NS	NS	NS	NS
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.12.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.28.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.30.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.08.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.30.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA
MW-14	4.21.11	2,800	<100	280	720	8.7	<1.0
	6.21.11	470	<10	37	210	1.9	<1.0
	9.22.11	540	<10	100	36	1.7	<1.0
	12.13.11	220	<10	110	<20	1.0	<1.0
	3.20.12	660	<5.0	240	15	2.9	<1.0
	6.19.12	660	<5.0	300	100	3.4	<1.0
	9.20.12*	7.3	<1.0	<1.0	<2.0	0.1	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	1.6	<2.0	<0.050	<1.0
	6.27.13	34	4.4	30	130	0.56	1.4
	10.22.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.16.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.18.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.28.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.30.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.07.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.06.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.31.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA



**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
MW-16	4.21.11	4.4	<2.0	<2.0	<4.0	<0.10	<1.0
	6.21.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	0.065	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	0.12	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	3.1	<1.0	2.1	14	0.19	<1.0
	3.25.13	<1.0	<1.0	<1.0	<1.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.12.13	1	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	1.4	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	1.2	<1.0	<1.0	<2.0	NA	NA
	5.29.15	3.0	<1.0	<1.0	<2.0	NA	NA
	12.1.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	2.2	<1.0	<1.0	<2.0	NA	NA
	11.07.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.30.17	2.1	<1.0	<1.0	<1.5	NA	NA
	12.07.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.31.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.02.18	<1.0	<1.0	<1.0	<1.5	NA	NA
MW-17	4.21.11	<2.0	<2.0	<2.0	<4.0	<0.10	<1.0
	6.21.11	<2.0	<2.0	<2.0	<4.0	<0.10	<1.0
	9.22.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.13.11	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.21.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.12.13	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.17.14	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.28.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	12.1.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.25.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.07.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.07.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.31.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.01.18	<1.0	<1.0	<1.0	<1.5	NA	NA

**TABLE 2**  
**K-51 Pipeline Release**  
**GROUNDWATER ANALYTICAL SUMMARY**

Sample I.D.	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH GRO (mg/L)	TPH DRO (mg/L)
New Mexico Water Quality Control Commission Groundwater Quality Standards		10	750	750	620	NE	NE
MW-18	3.20.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.19.12	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	9.20.12*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12	<2.0	<2.0	<2.0	<4.0	<0.10	<1.0
	3.25.13	NS	NS	NS	NS	NS	NS
	6.27.13	NS	NS	NS	NS	NS	NS
	10.21.13	NS	NS	NS	NS	NS	NS
	12.12.13	NS	NS	NS	NS	NS	NS
	4.17.14	NS	NS	NS	NS	NS	NS
	11.6.14	NS	NS	NS	NS	NS	NS
	5.29.15	NS	NS	NS	NS	NS	NS
	11.30.15	NS	NS	NS	NS	NS	NS
	5.25.16	NS	NS	NS	NS	NS	NS
	11.07.16	NS	NS	NS	NS	NS	NS
	5.26.17	NS	NS	NS	NS	NS	NS
	12.07.17	NS	NS	NS	NS	NS	NS
	5.30.18	NS	NS	NS	NS	NS	NS
	11.01.18	NS	NS	NS	NS	NS	NS
MW-19	3.20.12	<b>250</b>	56	310	<b>3,900</b>	16	5.3
	6.19.12	<b>NAPL</b>	<b>NAPL</b>	<b>NAPL</b>	<b>NAPL</b>	NA	NA
	9.19.12	<b>NAPL</b>	<b>NAPL</b>	<b>NAPL</b>	<b>NAPL</b>	NA	NA
	12.17.12	<b>180</b>	<5.0	5.4	23	2.2	2.6
	3.25.13	<b>160</b>	<5.0	17	<10	1.5	1.4
	6.27.13	<b>390</b>	<1.0	79	66	2.7	5.9
	10.22.13	<b>140</b>	<1.0	<1.0	<2.0	0.51	2.1
	12.16.13	<b>160</b>	<1.0	37	12	1.4	4.2
	4.18.14	<b>230</b>	<1.0	41	53	2.2	10
	11.6.14	<b>260</b>	<1.0	75	42	NA	NA
	5.29.15	<b>190</b>	<1.0	7.2	81	NA	NA
	12.1.15	<b>210</b>	<1.0	75	23	NA	NA
	5.26.16	<b>260</b>	<1.0	86	340	NA	NA
	11.08.16	<b>270</b>	<1.0	80	190	NA	NA
	5.30.17	<b>270</b>	<1.0	88	<b>640</b>	NA	NA
	12.07.17	<b>180</b>	<1.0	70	150	NA	NA
	5.31.18	<b>250</b>	<1.0	83	260	NA	NA
	11.02.18	<b>230</b>	<1.0	62	280	NA	NA
MW-20	3.20.12	<b>35</b>	<1.0	1.1	3.3	0.14	<1.0
	6.19.12	3.4	<1.0	<1.0	<2.0	<0.050	<1.0
	9.20.12*	4.7	<1.0	<1.0	<2.0	<0.050	<1.0
	12.17.12*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	3.25.13*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	6.27.13*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	10.22.13*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	12.16.13*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	4.18.14*	<1.0	<1.0	<1.0	<2.0	<0.050	<1.0
	11.6.14*	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.29.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	12.1.15	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.26.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	11.07.16	<1.0	<1.0	<1.0	<2.0	NA	NA
	5.30.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	12.07.17	<1.0	<1.0	<1.0	<1.5	NA	NA
	5.31.18	<1.0	<1.0	<1.0	<1.5	NA	NA
	11.02.18	<1.0	<1.0	<1.0	<1.5	NA	NA

Note: Concentrations in **bold** and yellow exceed the applicable WQCC GQS

\* = Monitoring well purged/sampled utilizing disposable bailer during this event

µg/L= micrograms per liter

mg/L= milligrams per liter

NA = Not Analyzed

NS = Not Sampled

NE = Not Established

NAPL = Non-aqueous phase liquid

TPH = Total Petroleum Hydrocarbon

GRO = Gasoline Range Organics

DRO = Diesel Range Organics



TABLE 3 K-51 Pipeline Release GROUNDWATER ELEVATIONS						
Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-1	4.21.11	ND	11.80	ND	6300.89	6289.09
	6.21.11	ND	12.16	ND		6288.73
	9.22.11	ND	12.92	ND		6287.97
	12.13.11	ND	12.45	ND		6288.44
	3.20.12	ND	12.13	ND		6288.76
	6.19.12	ND	12.76	ND		6288.13
	9.19.12	ND	13.10	ND		6287.79
	12.17.12	ND	12.33	ND		6288.56
	3.15.13	ND	11.88	ND		6289.01
	6.27.13	ND	12.61	ND		6288.28
	10.22.13	ND	11.71	ND		6289.18
	12.12.13	ND	11.35	ND		6289.54
	4.18.14	ND	11.04	ND		6289.85
	11.6.14	ND	11.56	ND		6289.33
	5.28.15	ND	10.86	ND		6290.03
	11.30.15	ND	10.90	ND		6289.99
	5.25.16	ND	10.52	ND		6290.37
	11.07.16	ND	11.42	ND		6289.47
	5.26.17	ND	10.41	ND		6290.48
	12.06.17	ND	10.53	ND		6290.36
	5.30.18	ND	10.67	ND		6290.22
	11.01.18	ND	11.59	ND		6289.30
MW-2	4.21.11	ND	10.55	ND	6299.82	6289.27
	6.21.11	ND	11.87	ND		6287.95
	9.22.11	ND	11.86	ND		6287.96
	12.13.11	ND	11.38	ND		6288.44
	3.20.12	ND	10.95	ND		6288.87
	6.19.12	ND	11.64	ND		6288.18
	9.19.12	ND	12.10	ND		6287.72
	12.17.12	ND	11.23	ND		6288.59
	3.15.13	ND	10.65	ND		6289.17
	6.27.13	ND	11.44	ND		6288.38
	10.21.13	ND	10.44	ND		6289.38
	12.12.13	ND	10.09	ND		6289.73
	4.17.14	ND	9.73	ND		6290.09
	11.6.14	ND	10.33	ND		6289.49
	5.28.15	ND	9.61	ND		6290.21
	11.30.15	ND	9.67	ND		6290.15
	5.25.16	ND	9.34	ND		6290.48
	11.07.16	ND	10.24	ND		6289.58
	5.26.17	ND	9.23	ND		6290.59
	12.06.17	ND	9.33	ND		6290.49
	5.30.18	ND	9.46	ND		6290.36
	11.01.18	ND	10.43	ND		6289.39
MW-3	4.21.11	ND	11.30	ND	6300.22	6288.92
	6.21.11	ND	11.64	ND		6288.58
	9.22.11	ND	12.45	ND		6287.77
	12.13.11	ND	11.89	ND		6288.33
	3.20.12	ND	11.60	ND		6288.62
	6.19.12	ND	12.22	ND		6288.00
	9.19.12	ND	12.53	ND		6287.69
	12.17.12	ND	11.75	ND		6288.47
	3.15.13	ND	11.37	ND		6288.85
	6.27.13	ND	12.06	ND		6288.16
	10.21.13	ND	11.12	ND		6289.10
	12.12.13	ND	10.84	ND		6289.38
	4.17.14	ND	10.55	ND		6289.67
	11.6.14	ND	11.02	ND		6289.20
	5.28.15	ND	10.37	ND		6289.85
	11.30.15	ND	10.40	ND		6289.82
	5.25.16	ND	10.10	ND		6290.12
	11.07.16	ND	10.90	ND		6289.32
	5.26.17	ND	10.00	ND		6290.22
	12.06.17	ND	10.05	ND		6290.17
	5.30.18	ND	10.14	ND		6290.08
	11.01.18	ND	11.07	ND		6289.15



**TABLE 3**  
**K-51 Pipeline Release**  
**GROUNDWATER ELEVATIONS**

Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-4	4.21.11	ND	11.90	ND	6300.91	6289.01
	6.21.11	ND	12.18	ND		6288.73
	9.22.11	ND	12.90	ND		6288.01
	12.13.11	ND	12.41	ND		6288.50
	3.20.12	ND	12.45	ND		6288.46
	6.19.12	ND	12.72	ND		6288.19
	9.19.12	ND	13.09	ND		6287.82
	12.17.12	ND	12.33	ND		6288.58
	3.15.13	ND	11.85	ND		6289.06
	6.27.13	ND	12.60	ND		6288.31
	10.22.13	ND	11.74	ND		6289.17
	12.12.13	ND	11.37	ND		6289.54
	4.17.14	ND	11.05	ND		6289.86
	11.6.14	ND	11.58	ND		6289.33
	5.28.15	ND	10.91	ND		6290.00
	11.30.15	ND	10.94	ND		6289.97
	5.25.16	ND	10.59	ND		6290.32
	11.07.16	ND	11.43	ND		6289.48
	5.26.17	ND	10.47	ND		6290.44
	12.06.17	ND	10.60	ND		6290.31
	5.30.18	ND	10.69	ND		6290.22
	11.01.18	ND	11.58	ND		6289.33
MW-11	4.21.11	ND	11.98	ND	6301.19	6289.21
	6.21.11	ND	12.40	ND		6288.79
	9.22.11	ND	13.07	ND		6288.12
	12.13.11	ND	12.55	ND		6288.64
	3.20.12	ND	12.26	ND		6288.93
	6.19.12	ND	12.93	ND		6288.26
	9.19.12	ND	13.27	ND		6287.92
	12.17.12	ND	12.51	ND		6288.68
	3.15.13	ND	12.05	ND		6289.14
	6.27.13	ND	12.82	ND		6288.37
	10.21.13	ND	11.94	ND		6289.25
	12.12.13	ND	11.61	ND		6289.58
	4.17.14	ND	11.25	ND		6289.94
	11.6.14	ND	11.80	ND		6289.39
	5.28.15	ND	11.12	ND		6290.07
	11.30.15	ND	11.18	ND		6290.01
	5.25.16	ND	10.79	ND		6290.40
	11.07.16	ND	11.66	ND		6289.53
	5.26.17	ND	10.66	ND		6290.53
	12.06.17	ND	10.82	ND		6290.37
	5.30.18	ND	10.88	ND		6290.31
	11.01.18	ND	11.82	ND		6289.37
MW-12	4.21.11	ND	8.96	ND	6299.08	6290.12
	6.21.11	ND	9.42	ND		6289.66
	9.22.11	ND	10.82	ND		6288.26
	12.13.11	ND	10.13	ND		6288.95
	3.20.12	ND	9.41	ND		6289.67
	6.19.12	ND	10.09	ND		6288.99
	9.19.12	ND	11.03	ND		6288.05
	12.17.12	ND	10.21	ND		6288.87
	3.15.13	ND	9.26	ND		6289.82
	6.27.13	ND	9.99	ND		6289.09
	10.21.13	ND	9.09	ND		6289.99
	12.12.13	ND	8.78	ND		6290.30
	4.17.14	ND	8.44	ND		6290.64
	11.6.14	ND	9.05	ND		6290.03
	5.28.15	ND	8.34	ND		6290.74
	11.30.15	ND	8.44	ND		6290.64
	5.25.16	ND	8.11	ND		6290.97
	11.07.16	ND	8.87	ND		6290.21
	5.26.17	ND	8.01	ND		6291.07
	12.06.17	ND	8.12	ND		6290.96
	5.30.18	ND	8.27	ND		6290.81
	11.01.18	ND	9.17	ND		6289.91



**TABLE 3**  
**K-51 Pipeline Release**  
**GROUNDWATER ELEVATIONS**

Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-13	4.21.11	ND	9.07	ND	6298.27	6289.20
	6.21.11	ND	9.51	ND		6288.76
	9.22.11	ND	10.15	ND		6288.12
	12.13.11	ND	9.59	ND		6288.68
	3.20.12	ND	9.35	ND		6288.92
	6.19.12	ND	10.09	ND		6288.18
	9.19.12	ND	10.29	ND		6287.98
	12.17.12	ND	9.47	ND		6288.80
	3.15.13	ND	9.11	ND		6289.16
	6.27.13	ND	9.94	ND		6288.33
	10.21.13	ND	8.91	ND		6289.36
	12.12.13	ND	8.57	ND		6289.70
	4.17.14	ND	8.39	ND		6289.88
	11.6.14	ND	8.83	ND		6289.44
	5.28.15	ND	8.32	ND		6289.95
	11.30.15	ND	8.21	ND		6290.06
	5.25.16	ND	8.01	ND		6290.26
	11.07.16	ND	8.67	ND		6289.60
	5.26.17	ND	7.83	ND		6290.44
	12.06.17	ND	7.90	ND		6290.37
	5.30.18	ND	8.08	ND		6290.19
	11.01.18	ND	8.84	ND		6289.43
MW-14	4.21.11	ND	12.54	ND	6301.20	6288.66
	6.21.11	ND	12.88	ND		6288.32
	9.22.11	ND	13.53	ND		6287.67
	12.13.11	ND	13.11	ND		6288.09
	3.20.12	ND	12.80	ND		6288.40
	6.19.12	ND	13.42	ND		6287.78
	9.19.12	ND	13.70	ND		6287.50
	12.17.12	ND	12.93	ND		6288.27
	3.15.13	ND	12.55	ND		6288.65
	6.27.13	ND	13.26	ND		6287.94
	10.22.13	ND	12.39	ND		6288.81
	12.12.13	ND	12.06	ND		6289.14
	4.18.14	ND	11.79	ND		6289.41
	11.6.14	ND	12.23	ND		6288.97
	5.28.15	ND	11.67	ND		6289.53
	11.30.15	ND	11.62	ND		6289.58
	5.25.16	ND	11.35	ND		6289.85
	11.07.16	ND	12.09	ND		6289.11
	5.26.17	ND	11.24	ND		6289.96
	12.06.17	ND	11.27	ND		6289.93
	5.30.18	ND	11.36	ND		6289.84
	11.01.18	ND	12.23	ND		6288.97
MW-16	4.21.11	ND	12.06	ND	6299.89	6287.83
	6.21.11	ND	12.26	ND		6287.63
	9.22.11	ND	12.57	ND		6287.32
	12.13.11	ND	12.28	ND		6287.61
	3.20.12	ND	12.24	ND		6287.65
	6.19.12	ND	12.71	ND		6287.18
	9.19.12	ND	12.80	ND		6287.09
	12.17.12	ND	11.90	ND		6287.99
	3.15.13	ND	11.80	ND		6288.09
	6.27.13	ND	12.37	ND		6287.52
	10.21.13	ND	11.32	ND		6288.57
	12.12.13	ND	10.92	ND		6288.97
	4.17.14	ND	10.76	ND		6289.13
	11.6.14	ND	10.99	ND		6288.90
	5.28.15	ND	10.56	ND		6289.33
	11.30.15	ND	10.39	ND		6289.50
	5.25.16	ND	10.10	ND		6289.79
	11.07.16	ND	10.86	ND		6289.03
	5.26.17	ND	10.02	ND		6289.87
	12.06.17	ND	10.01	ND		6289.88
	5.30.18	ND	10.11	ND		6289.78
	11.01.18	ND	11.02	ND		6288.87



TABLE 3 K-51 Pipeline Release GROUNDWATER ELEVATIONS						
Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-17	4.21.11	ND	9.90	ND	6298.57	6288.67
	6.21.11	ND	9.56	ND		6289.01
	9.22.11	ND	10.83	ND		6287.74
	12.13.11	ND	10.31	ND		6288.26
	3.20.12	ND	10.12	ND		6288.45
	6.19.12	ND	10.81	ND		6287.76
	9.19.12	ND	10.95	ND		6287.62
	12.17.12	ND	10.13	ND		6288.44
	3.15.13	ND	9.85	ND		6288.72
	6.27.13	ND	10.62	ND		6287.95
	10.21.13	ND	9.61	ND		6288.96
	12.12.13	ND	9.28	ND		6289.29
	4.17.14	ND	9.13	ND		6289.44
	11.6.14	ND	9.47	ND		6289.10
	5.28.15	ND	9.00	ND		6289.57
	11.30.15	ND	8.87	ND		6289.70
	5.25.16	ND	8.65	ND		6289.92
	11.07.16	ND	9.32	ND		6289.25
	5.26.17	ND	8.56	ND		6290.01
	12.06.17	ND	8.52	ND		6290.05
	5.30.18	ND	8.68	ND		6289.89
	11.01.18	ND	9.48	ND		6289.09
MW-18	3.20.12	ND	16.60	ND	6304.77	6288.17
	6.19.12	ND	17.42	ND		6287.35
	9.19.12	ND	17.45	ND		6287.32
	12.17.12	ND	16.73	ND		6288.04
	3.15.13	Blockage	Blockage	Blockage		Blockage
	6.27.13	Blockage	Blockage	Blockage		Blockage
	10.22.13	Blockage	Blockage	Blockage		Blockage
	12.12.13	Blockage	Blockage	Blockage		Blockage
	4.17.14	Blockage	Blockage	Blockage		Blockage
	11.6.14	Blockage	Blockage	Blockage		Blockage
	5.28.15	Blockage	Blockage	Blockage		Blockage
	11.30.15	Blockage	Blockage	Blockage		Blockage
	5.25.16	Blockage	Blockage	Blockage		Blockage
	11.07.16	Blockage	Blockage	Blockage		Blockage
	5.26.17	ND	15.12	ND		6289.65
	12.06.17	ND	15.31	ND		6289.46
	5.30.18	Blockage	Blockage	Blockage		Blockage
	11.01.18	Blockage	Blockage	Blockage		Blockage
MW-19	3.20.12	ND	15.69	ND	6303.80	6288.11
	6.19.12	16.25	16.32	0.07**		6287.52
	9.19.12	16.47	16.49	0.02**		6287.32
	12.17.12	ND	15.91	ND		6287.89
	3.15.13	ND	15.38	ND		6288.42
	6.27.13	ND	16.19	ND		6287.61
	10.22.13	ND	15.13	ND		6288.67
	12.12.13	ND	14.78	ND		6289.02
	4.18.14	ND	14.68	ND		6289.12
	11.6.14	ND	14.99	ND		6288.81
	5.28.15	ND	14.60	ND		6289.20
	11.30.15	ND	14.38	ND		6289.42
	5.25.16	ND	14.28	ND		6289.52
	11.07.16	ND	14.83	ND		6288.97
	5.26.17	ND	14.20	ND		6289.60
	12.06.17	ND	14.08	ND		6289.72
	5.30.18	ND	14.27	ND		6289.53
	11.01.18	ND	15.00	ND		6288.80





**TABLE 3**  
**K-51 Pipeline Release**  
**GROUNDWATER ELEVATIONS**

Well I.D.	Date	Depth to Product (feet BTOC)	Depth to Water (feet BTOC)	Product Thickness	TOC Elevations (feet AMSL)	Groundwater Elevation* (feet AMSL)
MW-20	3.20.12	ND	25.82	ND	6312.59	6286.77
	6.19.12	ND	26.30	ND		6286.29
	9.19.12	ND	26.31	ND		6286.28
	12.17.12	ND	25.42	ND		6287.17
	3.15.13	ND	25.38	ND		6287.21
	6.27.13	ND	26.11	ND		6286.48
	10.22.13	ND	24.98	ND		6287.61
	12.12.13	ND	24.57	ND		6288.02
	4.17.14	ND	24.66	ND		6287.93
	11.6.14	ND	24.81	ND		6287.78
	5.28.15	ND	24.80	ND		6287.79
	11.30.15	ND	24.15	ND		6288.44
	5.25.16	ND	24.28	ND		6288.31
	11.07.16	ND	24.48	ND		6288.11
	5.26.17	ND	24.37	ND		6288.22
	12.06.17	ND	23.95	ND		6288.64
	5.30.18	ND	24.29	ND		6288.30
	11.01.18	ND	24.69	ND		6287.90

BTOC - below top of casing

AMSL - above mean sea level (North American Vertical Datum 1988)

TOC - top of casing

\* - corrected for presence of phase-separated hydrocarbon using a site-specific density correction factor of 0.63

\*\* - No visual verification. May not be hydrocarbon.

ND - Not Detected



## APPENDIX C

### Soil Boring/Monitoring Well Logs

<b>Location Map:</b> 				 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>					
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>									
Boring/Well Number: <b>BH1/MW1</b>				Project: <b>K-51 Pipeline</b>					
Date: <b>6/8/2010</b>				Project Number: <b>GMS1005</b>					
Logged By: <b>TL</b>				Drilled By: <b>Earth Worx</b>					
Elevation:		Detector: <b>PID</b>		Drilling Method: <b>Geoprobe</b>		Sampling Method: <b>Push Core</b>			
Gravel Pack:		<b>10/20 Colorado Silica Sand</b>		Seal: <b>3/8" Bentonite</b>		Grout: <b>3/8" Bentonite</b>			
Casing Type: <b>PVC</b>		Diameter: <b>2"</b> Length: <b>5'</b>		Hole Diameter: <b>2"</b>		Depth to Liquid:			
Screen Type: <b>PVC</b> Slot: <b>0.01"</b>		Diameter: <b>2"</b> Length: <b>10'</b>		Total Depth: <b>14'</b>		Depth to Water: <b>8'</b>			
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	0	no		0	0' 4'	SM	Brown (7.5YR 4/3) silty sand, med-cr. sand grains, unconsolidated, sub rounded.	
					2				
					4				
	Dry	0	no		4	8'	SM	Brown (7.5YR 4/3) silty sand, med-cr. sand grains, unconsolidated, sub rounded.	
					6				
	Damp: 6-7.5'			BH 1 8-12' above clay	8	12'	SM 8-9'	Brown (7.5 YR 4/3) silty sand, med. sand gr. Sub rounded,	
	Sat: 8'			1652 (above clay) staining	10		CH 9-11'	Brownish gray (7.5 YR 4/1) tight clay, high plasticity	
				39 (below clay) no staining	12	16'	SM 11-12'	Brown (7.5 YR 4/3) silty sand, med. sand gr	
				BH 1 8-12' below clay	12		SM 12-13.75'	Brown (7.5 YR 4/3) silty sand, fine sand gr w/ minor clay, 90% sand, 10% clay	
				BH 1 12-16'	14		CH 13.75-16'	Brownish gray (7.5 YR 4/1) tight clay, high plasticity	
	Sat	2.3	slight		16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				

<b>Location Map:</b> 				 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>					
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>									
Boring/Well Number: <b>BH-2</b>				Project: <b>K-51 Pipeline</b>					
Date: <b>6/8/2010</b>				Project Number: <b>GMS1005</b>					
Logged By: <b>TL</b>				Drilled By: <b>Earth Worx</b>					
Drilling Method: <b>Geoprobe</b>				Sample Method: <b>Push Core</b>					
Elevation:		Detector: <b>PID</b>		Seal: <b>n/a</b>		Grout: <b>n/a</b>			
Gravel Pack: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>		Hole Diameter: <b>n/a</b>			
Casing Type: <b>n/a</b>		Slot: <b>n/a</b>		Total Depth: <b>n/a</b>		Depth to Liquid: <b>n/a</b>			
Screen Type: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>		Depth to Water: <b>8'</b>			
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry	0	no		0	0 4'	SM 0-1'	Brown (7.5 YR 4/3) silty sand; 20% gravel, 80% sand, unconsolidated, med-cr. Sand, sub-rounded	
					2		SM 1-4'	Brown (7.5 YR 4/3) silty sand, 20% silt, 80% fine sand, unconsolidated, sub rounded	
	Damp	0	no		4	4 8'	SM 4-8'	Brown (7.5 YR 4/3) silty sand, semi-consolidated, 80% fine sand, 20% silt, sub rounded	
					6				
	Sat: 8'	37	yes	BH2 8-12'	8	8 12'	SM 8-8.5'	Brown (7.5 YR 4/3) silty sand, semi-consolidated, 80% fine sand, 20% silt, sub rounded	▽
					10		SC 8.5-12'	Brownish gray (5 YR 5/1) clayey sand, low plasticity	
	Sat	0	no		12	12 16'	SC 12-13.75'	Brownish gray (5 YR 5/1) clayey sand, low plasticity	
				BH2 12-16'	14		SM 13.75-16'	Brownish gray (5 YR 5/1) silty sand, 80% fine sand, 20% silt	
					16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				

<b>Location Map:</b> 				 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>			
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>							
Boring/Well Number: <b>BH3/MW2</b>				Project: <b>K-51 Pipeline</b>			
Date: <b>6/8/2010</b>				Project Number: <b>GMS1005</b>			
Logged By: <b>TL</b>				Drilled By: <b>Earth Worx</b>			
Drilling Method: <b>Geoprobe</b>				Sampling Method: <b>Push Core</b>			
Gravel Pack: <b>10/20 Colorado Silica Sand</b>				Seal: <b>3/8" Bentonite</b>		Grout: <b>3/8" Bentonite</b>	
Casing Type: <b>PVC</b>				Diameter: <b>2"</b>		Length: <b>5'</b>	
Screen Type: <b>PVC</b>				Slot: <b>0.01"</b>		Diameter: <b>2"</b>	
Screen Type: <b>PVC</b>				Slot: <b>0.01"</b>		Length: <b>10'</b>	
Total Depth: <b>15'</b>				Depth to Liquid: <b>8'</b>			
Depth to Water: <b>8'</b>							

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry 0-0.5'				0	0 4'	SP 0-0.5'	(10 YR 7/1) light gray gravelly sand, unconsolidated, 10% gravel, 30% cr-sand, 60% med sand grains - grading into 80% fine sand, 20% silt	
	Damp 0.5-4'				2				
	Damp 4-6'	0	no		4	4 8'	SM 0.5-4'	(10 YR 7/1) light gray silty sand, unconsolidated, 40% cr, 60% med	
	Damp 6-8'				6		SM 4-8'	(10 YR 7/1) light gray silty sand, unconsolidated, 40% cr-sand, 60% med sand grains - grading into 80% fine sand, 20%	
	Sat: 8'	0	no		8	8 12'	SM 8-8.25'	silty sand - same as above	
					10		CH 8.25-10'	(10 YR 3/3) Dark brown, tight clay, high plasticity	
					12	12 16'	SP 10-12'	(10 YR 7/1) light gray sand, poorly sorted with minor gravel, 90% fine, 10% gravel	
	Sat	0	no		14		SP 12-14'	SP, light gray sand, same as above	
					16		CH 14-15.5'	7.5 YR 5/1 brownish gray, clay with minor sand, low plasticity	
	Sat	0	no	BH3 12-16'	18		SM 15.5-16'	7.5 YR 4/3 brown silty sand, 80% fine sand, 20% silt, sub rounded	
					20				
					22				
					24				
					26				
					28				
					30				

<b>Location Map:</b> 				 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>			
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>							
Boring/Well Number: <b>BH-4</b>				Project: <b>K-51 Pipeline</b>			
Date: <b>6/8/2010</b>				Project Number: <b>GMS1005</b>			
Logged By: <b>TL</b>				Drilled By: <b>Earth Worx</b>			
Drilling Method: <b>Geoprobe</b>				Sampling Method: <b>Push Core</b>			
Elevation:		Detector: <b>PID</b>		Gravel Pack: <b>n/a</b>		Seal: <b>n/a</b>	
Gravel Pack: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>		Grout:	
Casine Type: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>		Hole Diameter:	
Screen Type: <b>n/a</b>		Slot: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>	
Total Depth: <b>n/a</b>		Depth to Liquid:		Depth to Water: <b>11.5'</b>			

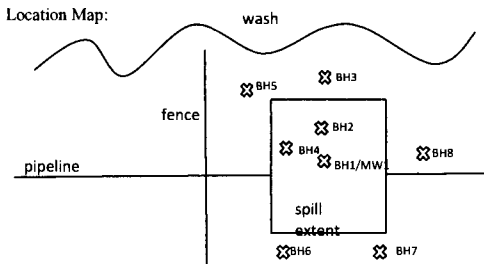

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry				0	0 - 4'	SM	Brown (7.5 YR 4/3) silty sand, med. sand gr, poorly sorted, unconsolidated, sub rounded	
	Damp 1.5-4'				2				
	Damp	0	no		4	4 - 8'	SM	Brown (7.5 YR 4/3) silty sand, med. Sand gr. Poorly sorted unconsolidated, sub rounded	
					6				
	Damp: 8-11.5'		no		8	8 - 12'	SM	Brown (7.5 YR 4/3) silty sand, med. Sand gr. Poorly sorted unconsolidated, sub-rounded	
	Sat: 11.5'	1770 (above clay)	minor		10			minor HC odor just at 11.5'	
		52 (below clay)	no	BH4 8-12'	12	12 - 16'	SC 12-15.5	7.5 YR 5/1 brownish gray sandy clay with med. sand, low plasticity	▽
					14				
	Sat	0.7	no	BH4 12-16'	16		CH 15.5-16'	7.5 YR 5/1 brownish gray fat clay, high plasticity	
					18				
					20				
					22				
					24				
					26				
					28				
					30				

<b>Location Map:</b> 		 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>							
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>									
Elevation: 6314'     Detector: PID		Boring/Well Number: BH-5/MW-3     Project: K-51 Pipeline							
Date: 6/8/2010		Project Number: GMS1005							
Logged By: TL		Drilled By: Earth Worx							
Drilling Method: Geoprobe		Sampling Method: Push Core							
Gravel Pack: 10/20 Colorado Silica Sand		Seal: 3/8" Bentonite							
Grout: 3/8" Bentonite									
Casings Type: PVC		Diameter: 2"     Length: 5'							
Screen Type: PVC		Hole Diameter:     Depth to Liquid:							
Slot: 0.01"		Diameter: 2"     Length: 10'     10'							
Total Depth: 15'		Depth to Water: 12'							
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry 0-2'				0	0' 4'	SP 0-1'	7.5 YR 4/3 brown gravelly sand, unconsolidated, 40% cr. sand, 60% med. sand	
	Dry				2		SM 1-4'	grading to 80% fine sand, 20% silt, poorly-sorted	
	Damp 2-4'	0	no		4	4' 8'	SM	7.5 YR 4/3 brown sand, 80% fine sand, 20% silt, unconsolidated med. sand	
					6				
	Damp	0	no		8	8' 12'	SM	7.5 YR 4/3 brown sand, 80% fine sand, 20% silt, unconsolidated med. sand	
				BH5 8-12'	10				
	Sat	5.7	no		12	12' 16'	SM 12-14'	7.5 YR 4/3 brown sand, 80% fine sand, 20% silt, unconsolidated med. sand	
					14		SC 14-16'	7.5 YR 5/1 brownish gray clayey sand; low plasticity, fine sand grains	
	Sat	0	no	BH5 12-16'	16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				

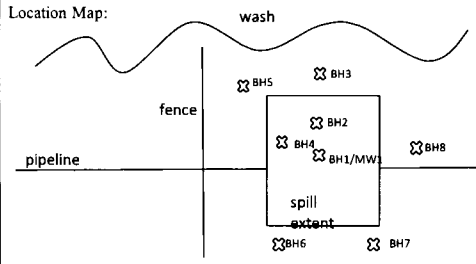

<b>Location Map:</b> 								<b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>			
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>											
Boring/Well Number: <b>BH-6/MW-4</b>					Project: <b>K-51 Pipeline</b>						
Date: <b>6/8/2010</b>					Project Number: <b>GMS1005</b>						
Logged By: <b>TL</b>					Drilled By: <b>Earth Worx</b>						
Drilling Method: <b>Geoprobe</b>					Sampling Method: <b>Push Core</b>						
Elevation: <b>6314'</b>		Detector: <b>PID</b>			Seal: <b>3/8" Bentonite</b>			Grout: <b>3/8" Bentonite</b>			
Gravel Pack: <b>10/20 Colorado Silica Sand</b>					Diameter: <b>2"</b>			Length: <b>5'</b>			
Casing Type: <b>PVC</b>					Hole Diameter: <b>2"</b>			Depth to Liquid: <b>13'</b>			
Screen Type: <b>PVC</b>					Total Depth: <b>15'</b>			Depth to Water: <b>13'</b>			
Slot: <b>0.01"</b>					Diameter: <b>2"</b>			Length: <b>5'</b>			

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry 0-0.5'				0	0 4'	SP 0-0.5 SM 0.5-4'	Brown (7.5 YR 4/2) gravelly sand, 40% cr. Sand, 60% med. Sand grading into silty sand, 80% fine sand, 20 % silt, poorly-sorted unconsolidated	
	Damp 0.5-4'	0	N		2				
	Damp				4	4 8'	SM 4-5.25'	Brown (7.5 YR 4/3) silty sand, 80% fine sand, 20% silty, poorly sorted same as above clayey sand, high plasticity, fine sand grains	
					6		SC 5.25-8'	Light brown (7.5 YR 7/1) clayey sand, high plasticity, fine sand grains	
	Damp				8	8 12'	SC	Light brown (7.5 YR 7/1) clayey sand, high plasticity, fine sand grains	
					10				
		1.3	N		12	12 16'	SC 12-13.75 SM 13.75-16'	Light brown (7.5 YR 7/1) clayey sand, high plasticity fine sand grains	
	Sat 13'				14			Brown (7.5 YR 4/3) silty sand, poorly sorted, unconsolidated, 80% fine sand, 20% silt	
	Sat	16.8	N		16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				



<b>Location Map:</b> 				 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>			
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>							
Boring/Well Number: <b>BH-7</b>				Project: <b>K-51 Pipeline</b>			
Date: <b>6/8/2010</b>				Project Number: <b>GMS1005</b>			
Logged By: <b>TL</b>				Drilled By: <b>Earth Worx</b>			
Elevation: <b>6314'</b>		Detector: <b>PID</b>		Drilling Method: <b>Geoprobe</b>		Sampline Method: <b>Push Core</b>	
Gravel Pack: <b>n/a</b>		Seal: <b>n/a</b>		Grout: <b>n/a</b>			
Casing Type: <b>n/a</b>		Diameter: <b>n/a</b>		Length: <b>n/a</b>		Hole Diameter:	Depth to Liquid:
Screen Type: <b>n/a</b>		Slot: <b>n/a</b>		Diameter: <b>n/a</b>		Total Depth: <b>n/a</b>	Depth to Water: <b>12.75'</b>

Penetration Resistance	Moisture Content	Vapor (ppm)	Staining	Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type	Lithology/Remarks	Well Completion
	Dry 0-0.75'				0	0 4'	SP	7.5 YR 4/3 brown silty sand w/minor gravel, 80% fine sand, 15% silt, 5% gravel	
	Damp 0.75-4'	0	no		2				
					4	4 8'	SM	7.5 YR 4/3 brown silty sand, 80% fine sand, 20% silt, unconsolidated sub rounded	
					6				
	Damp	0	no		8	8 12'	SM 8-8.5'	7.5 YR 4/3 brown silty sand, 80% fine sand, 20% silt, unconsolidated sub rounded	
					10		SC 8.5-12'	7.5 YR 5/1 brownish gray clayey sand; low plasticity, fine sand grains poorly sorted	
	Sat: 12.75	0	no		12	12 16'	SC	7.5 YR 5/1 brownish gray clayey sand; low plasticity, fine sand grains poorly sorted	▽
					14				
	Sat	0	no	BH7 12-16'	16				
					18				
					20				
					22				
					24				
					26				
					28				
					30				

Location Map: 		 <b>Compliance • Engineering • Remediation</b> <b>LT Environmental, Inc.</b> <b>4600 W. 60th Avenue</b> <b>Arvada, Colorado 80003</b>	
<b>BORING LOG/MONITORING WELL COMPLETION DIAGRAM</b>			
Borehole/Well Number: <b>BH-8</b>		Project: <b>K-51 Pipeline</b>	
Date: <b>6/8/2010</b>		Project Number: <b>GMS1005</b>	
Logged By: <b>TL</b>		Drilled By: <b>Earth Worx</b>	
Elevation: <b>6314'</b>	Detector: <b>PID</b>	Drilling Method: <b>Geoprobe</b>	Sampling Method: <b>Push Core</b>
Gravel Pack: <b>n/a</b>		Seal: <b>n/a</b>	Grout: <b>n/a</b>
Casing Type: <b>n/a</b>	Diameter: <b>n/a</b>	Length: <b>n/a</b>	Hole Diameter: <b>n/a</b>
Screen Type: <b>n/a</b>	Slot: <b>n/a</b>	Diameter: <b>n/a</b>	Length: <b>n/a</b>
			Depth to Liquid: <b>8.25'</b>
Penetration Resistance	Moisture Content	Vapor (ppm)	Staining
Sample #	Depth (ft. bgs.)	Sample Run	Soil/Rock Type
Lithology/Remarks			
Well Completion			
	0	0 4'	SM
	2		
Dry 0-0.5'			
Damp 0.5-4'	4	4 8'	SM 4-6'
Damp 4-8'	6		SC 6-8'
	8	8 12'	SC 8-8.25'
Sat: 8.25'			SM 8.25-9.5'
	10		CH 9.5-12'
Sat	12	12 16'	SM
	14		
Sat	16		
	18		
	20		
	22		
	24		
	26		
	28		
	30		

Client: Enterprise Products Operating, LLC  
 Project Name: K-51 Pipeline Release  
 Project Location: Rio Arriba County, NM  
 Project Manager: K. Summers

## SOIL BORING/MONITORING WELL LOG

### DRILLING & SAMPLING INFORMATION

Date Started: 4/19/11  
 Date Completed: 4/19/11  
 Drilling Company: Earth Worx  
 Driller: Louis Trujillo  
 Geologist: K. Summers  
 Boring Method: GP  
 Bore Hole Dia: 1.5"  
 Sampler OD: 1.5"

Soil Boring / Monitoring Well Number: SB-9  
 Project #: 0410003  
 Drawn By: RDH  
 Approved By: KS

**BORING METHOD**  
 HSA - HOLLOW STEM AUGERS  
 CFA - CONTINUOUS FLIGHT AUGERS  
 GP - GEOPROBE  
 AR - AIR ROTARY

**SAMPLER TYPE**  
 CB - FIVE FOOT CORE BARREL  
 SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
 ▽ AT COMPLETION  
 ▽ AT WELL STABILIZATION

Monitor Well Depth	SOIL CLASSIFICATION		Stratum Depth	Depth Scale	Sample No.	Sample Interval	% Recovery	Groundwater Depth	FID/PID Readings (ppm)	BORING AND SAMPLING NOTES
	SURFACE ELEVATION:									
	SAND, Moderate Yellowish Brown, Moist, No Odor									
	CLAY, Moderate Yellowish Brown to Grayish Brown, Tight, Moist to Wet, No Odor									
	SAND, Saturated, Hydrocarbon Odor									
	SAND, Moderate Yellowish Brown, No Odor									
	SANDY CLAY, Moderate Yellowish Brown to Olive Brown, No Odor									
	Bottom of Boring @ 16 ft bgs									

NOTE: This log is not to be used outside of the original report.

**Southwest**  
 GEOSCIENCE

Client: Enterprise Products Operating, LLC  
Project Name: K-51 Pipeline Release  
Project Location: Rio Arriba County, NM  
Project Manager: K. Summers

**SOIL BORING/MONITORING WELL LOG****DRILLING & SAMPLING INFORMATION**

Date Started: 4/19/11  
Date Completed: 4/19/11  
Drilling Company: Earth Worx  
Driller: Louis Trujillo  
Geologist: K. Summers  
Boring Method: GP  
Bore Hole Dia: 1.5"  
Sampler OD: 1.5"

Soil Boring / Monitoring Well Number: SB-10  
Project #: 0410003  
Drawn By: RDH  
Approved By: KS

**BORING METHOD**  
HSA - HOLLOW STEM AUGERS  
CFA - CONTINUOUS FLIGHT AUGERS  
GP - GEOPROBE  
AR - AIR ROTARY

**SAMPLER TYPE**  
CB - FIVE FOOT CORE BARREL  
SS - DRIVEN SPLIT SPOON  
ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
▼ AT COMPLETION  
▼ AT WELL STABILIZATION

**BORING AND  
SAMPLING NOTES**

Monitor Well Depth	SOIL CLASSIFICATION		Stratum Depth	Depth Scale	Sample No.	Sample Interval	% Recovery	Groundwater Depth	FID/PID Readings (ppm)	BORING AND SAMPLING NOTES
	SURFACE ELEVATION:									
	SAND, Moderate Yellowish Brown, Moist, No Odor									
	SANDY CLAY, Moderate Yellowish Brown, Wet, Slight Odor									
	SILTY CLAY, Moderate Yellowish Brown to Olive Brown, Wet, Slight Hydrocarbon Odor									
	SILTY SAND, Moderate Yellowish Brown to Olive Brown, No Odor									
	Bottom of Boring @ 16 ft bgs									

NOTE: This log is not to be used outside of the original report.

**Southwest**  
GEOSCIENCE

Client: Enterprise Products Operating, LLC  
 Project Name: K-51 Pipeline Release  
 Project Location: Rio Arriba County, NM  
 Project Manager: K. Summers

## SOIL BORING/MONITORING WELL LOG

### DRILLING & SAMPLING INFORMATION

Date Started: 4/19/11  
 Date Completed: 4/19/11  
 Drilling Company: Earth Worx  
 Driller: Louis Trujillo  
 Geologist: K. Summers  
 Boring Method: GP  
 Bore Hole Dia: 3.25"  
 Sampler OD: 1.5"

Soil Boring / Monitoring Well Number: MW-11  
 Project #: 0410003  
 Drawn By: RDH  
 Approved By: KS

**BORING METHOD**  
 HSA - HOLLOW STEM AUGERS  
 CFA - CONTINUOUS FLIGHT AUGERS  
 GP - GEOPROBE  
 AR - AIR ROTARY

**SAMPLER TYPE**  
 CB - FIVE FOOT CORE BARREL  
 SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
 ▽ AT COMPLETION  
 ▽ AT WELL STABILIZATION

Sample Interval	% Recovery	Groundwater Depth	FID/PID Readings (ppm)	BORING AND SAMPLING NOTES

Soil Classification	Stratum Depth
SURFACE ELEVATION:	

SAND & SILTY SAND, Moderate Yellowish Brown, Moist, No Odor	
SILTY CLAY, Moderate Yellowish Brown, Wet, No Odor	
SILTY SAND, Moderate Yellowish Brown to Olive Brown, Wet, No Odor	

Bottom of Boring @ 16 ft bgs	
------------------------------	--

6	
-	
7	
8	
8	
8	
10	
8	
7	

NOTE: This log is not to be used outside of the original report.

**Southwest**  
 GEOSCIENCE





Client: Enterprise Products Operating, LLC  
 Project Name: K-51 Pipeline Release  
 Project Location: Rio Arriba County, NM  
 Project Manager: K. Summers

## SOIL BORING/MONITORING WELL LOG

### DRILLING & SAMPLING INFORMATION

Date Started: 4/19/11  
 Date Completed: 4/19/11  
 Drilling Company: Earth Worx  
 Driller: Louis Trujillo  
 Geologist: K. Summers Well Diam: 2"  
 Boring Method: GP Screen Size: 0.01  
 Bore Hole Dia: 3.25" Screen Length: 10'  
 Sampler OD: 1.5" Casing Length: 5'

Soil Boring / Monitoring Well Number: MW-13  
 Project #: 0410003  
 Drawn By: RDH  
 Approved By: KS

**BORING METHOD**  
 HSA - HOLLOW STEM AUGERS  
 CFA - CONTINUOUS FLIGHT AUGERS  
 GP - GEOPROBE  
 AR - AIR ROTARY

**SAMPLER TYPE**  
 CB - FIVE FOOT CORE BARREL  
 SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
 ▽ AT COMPLETION  
 ▽ AT WELL STABILIZATION

### BORING AND SAMPLING NOTES

Monitor Well Depth	SOIL CLASSIFICATION		Stratum Depth	Depth Scale	Sample No.	Sample Interval	% Recovery	Groundwater Depth	FID/PID Readings (ppm)	BORING AND SAMPLING NOTES
	SURFACE ELEVATION:									
	SILTY SAND, Moderate Yellowish Brown, Moist, No Odor									
	SILTY CLAY, Moderate Yellowish Brown, Wet @ 8 ft bgs, No Odor									
	SILTY SAND & CLAY, Wet, No Odor									
	CLAY, Olive Brown, No Odor									
	Bottom of Boring @ 15 ft bgs									

NOTE: This log is not to be used outside of the original report.

**Southwest**  
 GEOSCIENCE





# SOIL BORING/MONITORING WELL LOG

## Soil Boring / Monitoring Well Number: MW-16

Geologist: <u>K. Summers</u>	Well Diam: <u>2"</u>				
Boring Method: <u>GP</u>	Screen Size: <u>0.01</u>				
Bore Hole Dia: <u>3.25"</u>	Screen Length: <u>10'</u>				
Sampler OD: <u>1.5"</u>	Casing Length: <u>5'</u>				

BORING METHOD	SAMPLER TYPE	GROUNDWATER DEPTH
HSA - HOLLOW STEM AUGERS	CB - FIVE FOOT CORE BARREL	
CEA - CONTINUOUS FLIGHT AUGERS	SS - DRIVEN SPLIT SPOON	▽ AT COMPLETION
GP - GEOPROBE	ST - PRESSED SHELBY TUBE	▽ AT WELL STABILIZATION
AR - AIR ROTARY		

NOTE: This log is not to be used outside of the original report.

# Southwest GEOSCIENCE

Client: Enterprise Products Operating, LLC  
 Project Name: K-51 Pipeline Release  
 Project Location: Rio Arriba County, NM  
 Project Manager: K. Summers

## SOIL BORING/MONITORING WELL LOG

### DRILLING & SAMPLING INFORMATION

Date Started: 4/19/11  
 Date Completed: 4/19/11  
 Drilling Company: Earth Worx  
 Driller: Louis Trujillo  
 Geologist: K. Summers Well Diam: 2"  
 Boring Method: GP Screen Size: 0.01  
 Bore Hole Dia: 3.25" Screen Length: 10'  
 Sampler OD: 1.5" Casing Length: 5'

Soil Boring / Monitoring Well Number: MW-17

Project #: 0410003

Drawn By: RDH

Approved By: KS

### BORING AND SAMPLING NOTES

**BORING METHOD**  
 HSA - HOLLOW STEM AUGERS  
 CFA - CONTINUOUS FLIGHT AUGERS  
 GP - GEOPROBE  
 AR - AIR ROTARY

**SAMPLER TYPE**  
 CB - FIVE FOOT CORE BARREL  
 SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
 ▽ AT COMPLETION  
 ▽ AT WELL STABILIZATION

Monitor Well Elevation	SOIL CLASSIFICATION		Stratum Depth	Depth Scale	Sample No.	Sample Interval	% Recovery	Groundwater Depth	FID/PID Readings (ppm)	BORING AND SAMPLING NOTES
	SURFACE ELEVATION:									
	SILTY SAND, Moderate Yellowish Brown, Moist, No Odor									
	CLAY, Moderate Yellowish Brown, Wet, No Odor									
	SILTY SAND, Olive Brown, Wet No Odor									
	CLAY & SILTY CLAY, Moderate Yellowish to Olive Brown, Wet, No Odor									
	SILTY SAND, Moderate Yellowish to Olive Brown, Wet, No Odor									
	Bottom of Boring @ 16 ft bgs									

NOTE: This log is not to be used outside of the original report.

**Southwest**  
 GEOSCIENCE



# SOIL BORING / MONITORING WELL LOG

Soil Boring / Monitoring Well Number: MW-18

Project #: 0410003  
 Drawn By: BCM  
 Approved By: BCM

## GROUNDWATER DEPTH

▽ AT COMPLETION

▽ AT WELL STABILIZATION

## BORING AND SAMPLING NOTES

# Southwest GEOSCIENCE

Client: Enterprise Field Services LLC  
 Project Name: K-51 Release  
 Project Location: Rio Arriba County, NM  
 Project Manager: Kyle Summers

## SOIL BORING / MONITORING WELL LOG

### DRILLING & SAMPLING INFORMATION

Date Started: 3.19.12  
 Date Completed: 3.19.12  
 Drilling Company: Earthworx  
 Driller: Louis Trujillo  
 Geologist: B. Chris Mitchell Well Diam: 1"  
 Boring Method: Geoprobe Screen Size: 0.010"  
 Bore Hole Dia: 3.25" Screen Length: 10'  
 Casing Length: 10'

Soil Boring / Monitoring Well Number: MW-19  
 Project #: 0410003  
 Drawn By: BCM  
 Approved By: BCM

**BORING METHOD**  
 HSA - HOLLOW STEM AUGERS  
 CFA - CONTINUOUS FLIGHT AUGERS  
 GP - GEOPROBE  
 AR - AIR ROTARY

**SAMPLER TYPE**  
 CB - FIVE FOOT CORE BARREL  
 SS - DRIVEN SPLIT SPOON  
 ST - PRESSED SHELBY TUBE

**GROUNDWATER DEPTH**  
 ∇ AT COMPLETION  
 ∇ AT WELL STABILIZATION

### BORING AND SAMPLING NOTES

Monitor Well Detail	SOIL CLASSIFICATION		Stratum Depth	Depth Scale	Sample No.	Sample Interval	% Recovery	Groundwater Depth	PID/PID Readings (ppm)	BORING AND SAMPLING NOTES																																																																																																									
	SURFACE ELEVATION:																																																																																																																		
	SAND, Tan, Dry, No Odor																																																																																																																		

Client: Enterprise Field Services LLC  
Project Name: K-51 Release  
Project Location: Rio Arriba County, NM  
Project Manager: Kyle Summers

# SOIL BORING / MONITORING WELL LOG

## DRILLING & SAMPLING INFORMATION

Date Started: 3.19.12  
Date Completed: 3.19.12  
Drilling Company: Earthworx  
Driller: Louis Trujillo  
Geologist: B. Chris Mitchell Well Diam: \_\_\_\_\_  
Boring Method: Geoprobe Screen Size: \_\_\_\_\_  
Bore Hole Dia: 3.25" Screen Length \_\_\_\_\_  
Casing Length \_\_\_\_\_

Soil Boring / Monitoring Well Number: MW-20  
Project #: 0410003  
Drawn By: BCM  
Approved By: BCM

## BORING METHOD

HSA - HOLLOW STEM AUGERS  
CFA - CONTINUOUS FLIGHT AUGERS  
GP - GEOPROBE  
AR - AIR ROTARY

**SAMPLER TYPE**

CB - FIVE FOOT CORE BARREL  
SS - DRIVEN SPLIT SPOON  
ST - PRESSED SHELBY TUBE

## GROUNDWATER DEPTH

▽ AT COMPLETION  
▽ AT WELL STABILIZATION

## BORING AND SAMPLING NOTES

## SOIL CLASSIFICATION

SURFACE ELEVATION:

SILTY SAND, Tan, Dry, No Odor

CLAYEY SAND, Tan, Dry, No Odor

SAND, Tan, Moist to Wet, No Odor

Bottom of Boring @ 28'

Slight Staining @ 24' - 25'

# Southwest GEOSCIENCE



## APPENDIX D

### Public Notice and Landowner Table

Enterprise proposes the following verbiage for public notice:

Enterprise Field Services, LLC (Enterprise) hereby announces the publication of a Stage 1 Abatement Plan for soil and groundwater impacts identified at the Lateral K-51 pipeline release site located at latitude 36.4465° and longitude -107.4461° in Sections 34 and 35 of Township 26 North, Range 6 West in rural Rio Arriba County.

On April 13, 2010, a release of approximately ten (10) barrels of natural gas condensate was identified due to a leak on the Lateral K-51 pipeline. Initial response activities were implemented to remediate hydrocarbon impacts at the site. Subsurface investigations concluded that soil and groundwater impacts were present above applicable New Mexico (NM) Energy, Minerals and Natural Resource Department (EMNRD) Oil Conservation Division (OCD) standards for soil and Water Quality Control Commission (WQCC) standards for groundwater. Soil remediation has been initiated at the site. The current extent of groundwater impact is estimated to be less than 0.1 acres. No surface water was impacted.

The Director of the NM EMNRD OCD has approved a Stage 1 Abatement Plan in which Enterprise proposes to confirm delineation through the replacement of a damaged monitoring well at the site. Groundwater will be sampled subsequent to the replacement of the damaged well and analyzed for applicable constituents of concern. The data obtained from the Stage 1 Abatement Plan activities will be evaluated to determine a preferred abatement plan remediation option at the site. In order to determine that the Stage 1 Abatement Plan is administratively complete, the NM EMNRD OCD Director has complied with Subsection B of 19.15.30.15 of the New Mexico Administrative Code (NMAC) by reviewing the document and concluding that it satisfies the requirements of Subsection C of 19.15.30.13 NMAC.

Members of the public may view a copy of the Stage 1 Abatement Plan at the NM EMNRD OCD's Santa Fe office located at 1220 South St Francis Drive, #3, Santa Fe, New Mexico or at the NM EMNRD OCD's district office at 1000 Rio Brazos Road, Aztec, New Mexico. Additionally, the Stage 1 Abatement Plan is available for viewing electronically on the NM EMNRD OCD public database at <http://www.emnrd.state.nm.us/OCD/>.

The NM EMNRD OCD is accepting written comments and requests for consideration if they are received within 30 days after the publication date of this public notice. Any person seeking to comment on a Stage 1 Abatement Plan should submit written comments to:



Mr. Corey Smith  
Environmental Specialist  
New Mexico Oil Conservation Division  
1000 Rio Brazos Road  
Aztec, New Mexico 87410

The NM ENMRD OCD shall distribute notice of the submittal of the Stage 1 Abatement Plan with the next division and commission hearing docket following receipt of the plan.

Additional information can be obtained from the Enterprise project contact:

Gregory E. Miller, P.G.  
Supervisor, Environmental  
1100 Louisiana Street  
Houston, Texas 77002-5227  
(713) 381-8780

Table A  
Property Owners Within One (1) Mile Radius

Lateral K-51 Pipeline Release (2010)  
Rio Arriba County, New Mexico  
Enterprise Field Services, LLC

Parcel Number	Owner Name	Owner Address	Owner City, State, Zip Code
2032152134014	Luna, Max G., Sharon L., Russell G., and Connie J.	PO Box 753	Bloomfield, NM 87413
No Parcel Number	Federal	6251 College Blvd., Suite A	Farmington, NM 87402

Sante Fe Main Office  
Phone: (505) 476-3441

General Information  
Phone: (505) 629-6116

Online Phone Directory  
<https://www.emnrd.nm.gov/oed/contact-us>

State of New Mexico  
Energy, Minerals and Natural Resources  
Oil Conservation Division  
1220 S. St Francis Dr.  
Santa Fe, NM 87505

CONDITIONS

Action 531548

CONDITIONS

Operator: Enterprise Field Services, LLC PO Box 4324 Houston, TX 77210	OGRID: 241602
	Action Number: 531548
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
shanna.smith	Accepted for record only.	12/3/2025