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REPORTS

DATE:

2/15/2002

Duke Energy Field Services

1R400

SITE CHARACTERIZATION WORK PLAN

FOR THE

DUKE X-LINE - ETCHEVERRY RANCH

UL-B NW¼ of the NE¼ Section 7, T15S, R34E,
~12 miles northwest of Lovington
Lea County, New Mexico

February 15, 2002

Prepared by

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1.0 INTRODUCTION

Environmental Plus, Inc. (EPI) hereby submits this Site Characterization Work Plan to Duke Energy Field Services (Duke) for the environmental characterization of the Duke X-Line site. This plan characterizes and ranks the site in accordance with the New Mexico Oil Conservation Division (NMOCD) Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993). The initial form C-141 submitted to the NMOCD by DUKE reported that approximately 20 barrels of natural gas pipeline fluid was released with 0 barrels recovered. The X-Line is part of the Duke gas gathering system and as such is exempt from the EPA Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste characterization requirements. Remediation activities to date have included excavation and disposal of approximately 1,400 yd^3 of soil in the NMOCD approved and permitted Artesia Aeration L.L.C. (NM-01-0030) near Maljamar, New Mexico.

2.0 "RESPONSIBLE PERSON"

The "Responsible Person" for the Plan is:

Mr. Steve Weathers
Duke Energy Field Services
Denver, Colorado

3.0 PRELIMINARY SITE CHARACTERIZATION

The preliminary investigation documented the necessary site metrics to classify and rank the site and is being followed by a thorough characterization of the soil and ground water.

3.1 SOIL

Initial analyses of soil samples collected from intervals to 37 feet below grade indicated that the area of the release has been impacted with petroleum hydrocarbon in excess of the NMOCD remediation guideline thresholds for Total Petroleum Hydrocarbon EPA method 8015m (TPH^{8015m}) and Benzene, Toluene, Ethyl Benzene, and m, o, & p Xylenes (BTEX). Being a natural gas gathering system the soil was also analyzed for chloride commonly found in production fluid that may carry over into a gas gathering system. Results were at background concentrations and will not be an issue at the site.

3.2 GROUND WATER

A 2 inch diameter temporary monitor well was installed and developed in the saturated zone within the spill area ~15' east of the leak origin and detected .2' thickness of non-aqueous phase hydrocarbon on the surface of the ground water at approximately 77.2'bgs in excess of 20 NMAC 6.2.3103, i.e., "Non-aqueous phase liquid shall not be present floating atop or immersed within ground water, as can be reasonably measured." The NMOCD offices in Santa Fe and Hobbs, New Mexico were notified of the impact on February 13, 2002. The ground water at the site was sampled on February 14, 2002.

3.3 DOMESTIC WELL SAMPLING

The Etcheverry House and Foreman domestic use wells located 6,800 feet south southeast of the site were sampled for BTEX on February 14, 2002 to verify and document that the release had not impacted the wells. BTEX compounds were not detected above the laboratory instrument detection limits of .002 mg/L (2 parts per billion). The residents were notified immediately of the results. Nevertheless, as a special precaution, Duke will provide the residents with bottled water for a reasonable duration.

4.0 BACKGROUND

The site is located in open pasture land and is traverse by a 10 inch pipeline owned and operated by BP America. The initial form C-141 was submitted on January 22, 2002 estimating a spill volume of approximately 20 bbl of pipeline fluid. Subsequent to discovery, a 500 foot section of pipe was replaced and the line returned to service.

5.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Environmental Plus, Inc., Eunice, New Mexico (EPI) will conduct the field investigation with DUKE ENERGY FIELD SERVICES personnel providing operational support and coordination. Cardinal Laboratories in Hobbs, New Mexico will perform the laboratory analyses and provide analytical reports.

5.1 PROJECT SAFETY

Hazards that will be encountered at this site include the following;

- Moving equipment
- Buried pipelines
- Rotary Equipment
- Highway ingress/egress
- Excavation
- Potential Hydrogen Sulfide Gas

5.2 MOBILIZATION PROTOCOLS

Prior to drilling or excavation, NEW MEXICO ONE CALL will be notified of activities, which will then provide a list of Companies they will notify and a ONE CALL confirmation number. Employees and subcontractors will be required to confirm current training in these hazards. Standard personal protective equipment will include;

- Personal H_2S Monitor
- Hard-hat
- Steel Toed Boots/Shoes and gloves

6.0 SITE DESCRIPTION

The property is owned by Nancy Etcheverry and located ~12 miles northwest of Lovington, Lea County, New Mexico. The DUKE site is known as the "X-Line-Etcheverry."

6.1 HISTORICAL USE

The area has been used historically for livestock grazing and access to oil and gas production facilities.

6.2 LEGAL DESCRIPTION

The legal description of the site is Unit Letter B NW¼ of the NE¼ of Section 7, T15S, R34E at latitude 32°02'12.2"N and longitude 103°32'50.0"W

6.3 PHOTOGRAPHIC DOCUMENTATION

Photographs are provided in Attachment II.

6.4 Ecological Description

The area is typical of the Lower Great Plains Biome consisting primarily typical desert grasses. Mammals represented include Orrd's and Merriam's Kangaroo Rat, Deer Mouse, White Throated Wood Rat, Cottontail Rabbit, Black Tailed Jackrabbit, Pronghorn Antelope, and the Mule Deer. Reptiles, Amphibians, and Birds are numerous and typical of area. A survey of Listed, Threatened, or Endangered species was not conducted. The site surface trends to the southeast.

7.0 Environmental Media Characterization

Chemical parameters of the soil and ground water will be characterized consistent with the New Mexico Oil Conservation Division (NMOCD) guidelines published in the following documents as applicable;

- Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993)
- Unlined Surface Impoundment Closure Guidelines (February 1993)

Normally acceptable thresholds for contaminants of concern (CoC), i.e., TPH and BTEX are determined based on the following;

- Depth to Ground water, i.e., distance from the lower most acceptable concentration to the ground water.
- Wellhead Protection Area, i.e., distance from fresh water supply wells.
- Distance to Surface Water Body, i.e., horizontal distance to down gradient surface water bodies.

However, site specific risk based thresholds may be developed.

7.1 Area Ground Water Levels

According to the New Mexico State Engineers Office, the uppermost aquifer occurs in the area between 67.94' and 83.12' bgs. The site water level was measured to be ~77.0'bgs.

7.2 Water Well Inventory

The New Mexico State Engineers Office in Roswell, New Mexico has the following wells recorded for section 7 and adjacent sections 4, 6, & 9 in T15S R34E and are consistent with the site water level measurements.

Township	Range	Section	Measurement Date	Water Level Feet bgs
15S	34E	5	1981	71.44
15S	34E	6	1996	83.12
15S	**34E**	**7**	**1981**	**77.85**
15S	34E	9	1981	67.94

An abandoned windmill bore is located 3,920 feet south southeast of the site with a measurable water level of 75.7'bgs. The Etcheverry House and Foreman domestic use wells are located 6,800' south southeast of the site. A review of available information and a reconnaissance survey of the area indicate these are the most proximate water well bores. Refer to the topographical map included in Attachment I.

7.3 Aquifer Recharge

According to local water well drillers, the Ogallala formation occurring in the area is unconfined and saturated from ~75'bgs and bottoms at ~200'bgs. Recharge is by surficial infiltration.

7.4 Depth to Ground Water Calculation

The NMOCD requires the site be ranked to determine which soil TPH^{8015m}, Benzene, and BTEX thresholds apply and defines depth to ground water as, "the vertical distance from the lowermost contaminants to the seasonal high water elevation of the ground water." The uppermost occurrence of ground water is at ~77.0'bgs. The lower most contamination occurs at the interface of the vadose zone and the water table. The calculated NMOCD depth to ground water is essentially 0.0' bgs.

7.5 Ground Water Gradient

Altitude and water level information obtained from the New Mexico Tech Geo-Information Internet Mapping System website was plotted and the ground water dip/gradient calculated to have a bearing of 125.5°, i.e., southeast. Refer to the diagram included in Attachment I.

7.6 Wellhead Protection Area

There are no water wells within 1000' of the site.

7.7 Distance to Nearest Surface Water Body

None present.

7.8 Seasonal Stream Flow Characteristics

There are no streams or drainages located at or near the site, however the site surface trends to the southeast.

8.0 Delineation of Nature, Extent, and Magnitude of Contamination

The vertical and horizontal extent of contamination has preliminarily been delineated.

8.1 Highly Contaminated/Saturated Soils

The highly contaminated soil occurring in the near surface has been removed.

8.2 Unsaturated Contaminated Soils

Sample trenches and soil borings have identified a column of contaminated soil that tapers from a surface diameter of ~60' to ~20' at 77.2'bgs, i.e., the ground water-vadose zone interface.

8.3 Ground Water Contamination

The ground water at this site is impacted.

8.4 Other Relevant Media Contamination

There are no other relevant environmental media at the site to be considered.

8.5 Background (Up-gradient) Sample Results

Background soil concentrations for the CoCs will be determined from a soil sample collected during installation of the proposed up gradient monitor well northwest of the site.

8.6 IDENTIFICATION OF REMEDIAL ACTION LEVELS

Remedial goals for soil in this area are determined in accordance with NMOCD Guidelines. The NMOCD depth to ground water is calculated to be 0.0'bgs.

8.6.1 Site Ranking

The area has the following score and site ranking;

NMOCD Depth to Groundwater / <50' = 20
Wellhead Protection Area / <200' = 0
Distance to Surface Water Body / >200' = 0
Site Ranking = 20

8.6.2 Remedial Action Levels

The remedial action objectives for soil at this site according to the NMOCD guidelines are as follows.

- TPH – 100 mg/Kg
- BTEX – 50 mg/Kg
- Benzene – 10 mg/Kg

The New Mexico Water Quality Control Commission (WQCC) ground water Maximum Contaminant Levels for the CoCs will apply to site ground water.

- TPH – no standard
- Benzene – 0.01 mg/L
- Toluene – 0.75 mg/L
- Ethyl Benzene – 0.75 mg/L
- m, p, o-Xylene – 0.62 mg/L

8.7 SOIL CHARACTERIZATION

Analyses of samples from the Center sample trench indicated petroleum hydrocarbon impact to be >37'bgs. Analysis of samples from the South sample trench indicated a decreasing gradient to 29'bgs. In an effort to bound the vertical impact, a borehole was advanced in the area of the leak origin and sampled to 75'bgs, confirming contamination to that interval. Three additional spill perimeter borings, located along the cardinal radians were advanced and sampled. The north and west borings identified the vertical extent to be ~50' and 65'bgs respectively, however samples collected at 70'bgs were contaminated indicating dispersion of a ground water hydrocarbon source. The east boring was advanced and soil sampled down to the ground water interface. VOC headspace surveys of the soil identified a similar decreasing gradient as in the north and west boreholes with a dramatic increase at the ground water interface. A South perimeter borehole is proposed, along with additional offset boreholes ~20 outside the spill area along the quarter radians. Given that the overburden in these locations is expected to be unimpacted, the drill cuttings will be monitored down to 65'bgs at which time discrete samples will be collected at 5'bgs intervals to 70'bgs. This approach will be able to detect vapors that may be emanating from the ground water and thus aid in placement of monitor and recovery wells and plume delineation. Two additional boreholes will be advanced along the southeast radian, i.e., down dip, at 50' horizontal intervals using the same methodology. Samples will be ascensioned to the laboratory as deemed appropriate. The locations of the previous and proposed delineation boreholes are illustrated on the site sample map in Attachment I. Available survey and laboratory data are provided in the Appendix.

8.8 Ground Water Characterization

Site ground water will be monitored routinely in accordance with the NMOCD stipulations. Environmental data will be summarized into quarterly reports documenting progress and status and submitted to the NMOCD Environmental Bureau Santa Fe and Hobbs offices. A minimum of three monitor wells are to be installed at the site to characterize the ground water. The proposed locations are provided on the site sampling map included in Attachment I. After the ground water has been sufficiently delineated a recovery and remediation system will be designed and submitted to the NMOCD for approval. Installation and operation should begin within 30 days of approval.

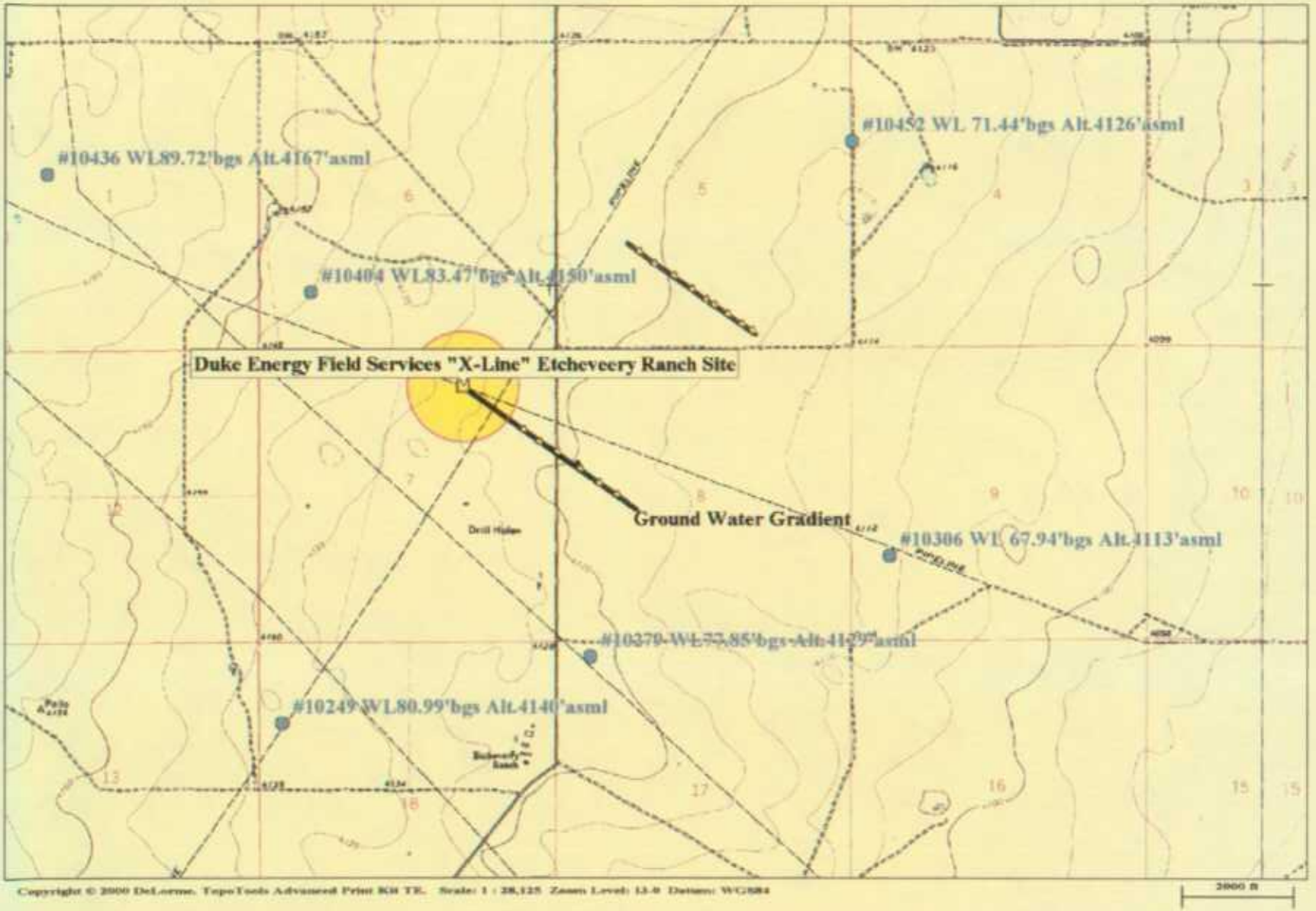
8.9 Schedule for Work Plan Implementation

The initial response has been to dispose of contaminated soil and proceed with site characterization and delineation consistent with this work plan. All subsurface investigation and monitor well installations should be completed within a 30-day start to finish timeframe. Finalized laboratory data reports should be available within 30 days and the Final Site Investigation Report issued within 30 days.

9.0 Conclusion

The objective of this Site Characterization Work Plan will delineate the areal extents of petroleum hydrocarbon impacts in the soil and ground water. A "Site Characterization Report" will be developed and submitted summarizing information collected during the investigation and will discuss viable remediation alternatives.

Attachment I: Figures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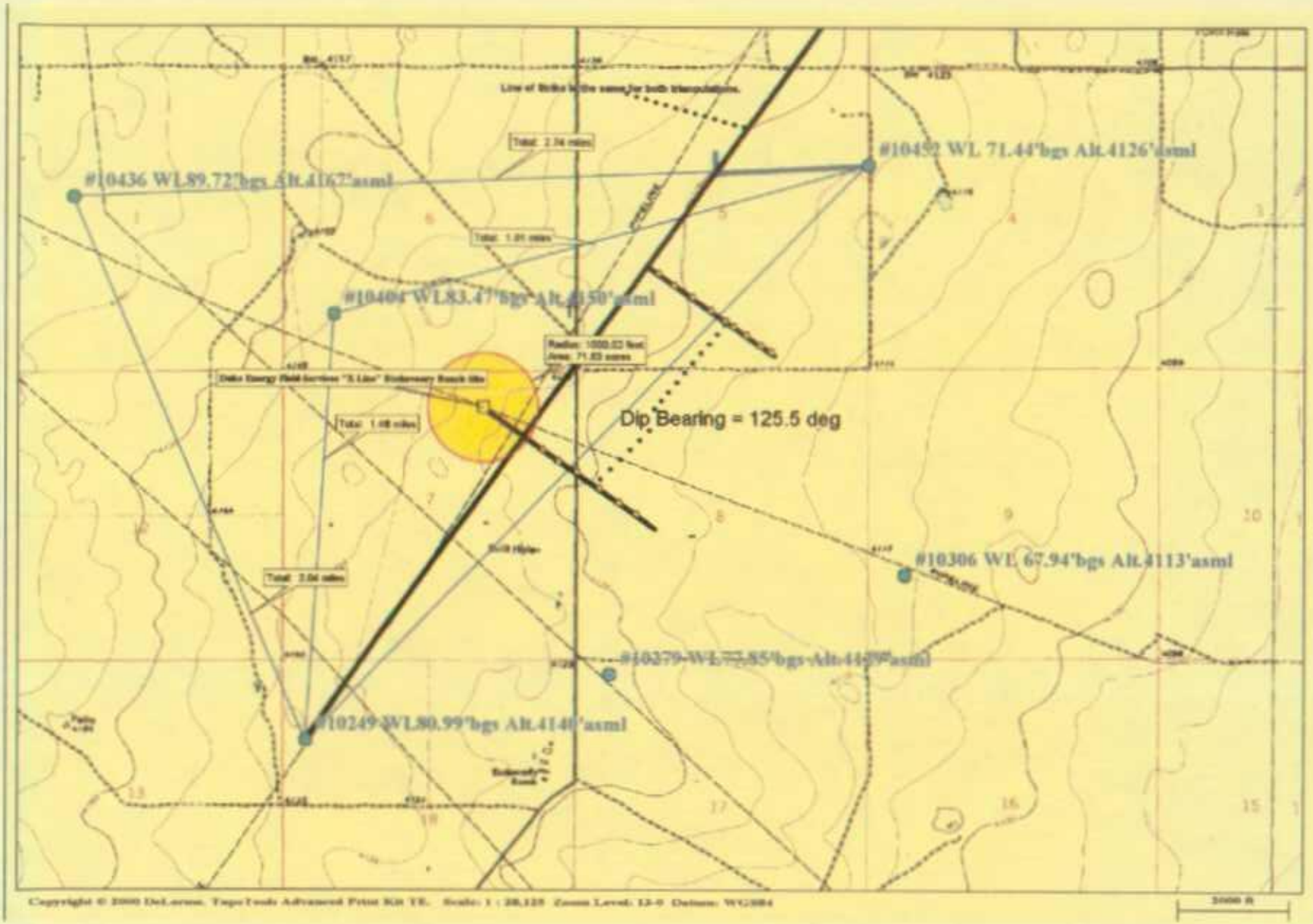
#10452 WL 71.44'bgs Alt.4126'asml
#10404 WL83.47'bgs Alt.4150'asml
Duke Energy Field Services "X-Line" Etcheveery Ranch Site
Ground Water Gradient
#10306 WL 67.94'bgs Alt.4113'asml
#10379 WL77.85'bgs Alt.4129'asml
#10249 WL80.99'bgs Alt.4140'asml
Copyright © 2000 DeLorme. TopoTools Advanced Print Kit TE. Scale: 1 : 28,125 Zoom Level: 13.0 Datum: WGS84
2000 ft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#10436 WL89.72'bgs Alt.4167'asml
#10404 WL83.47'bgs Alt.4150'asml
Dip Bearing = 125.5 deg
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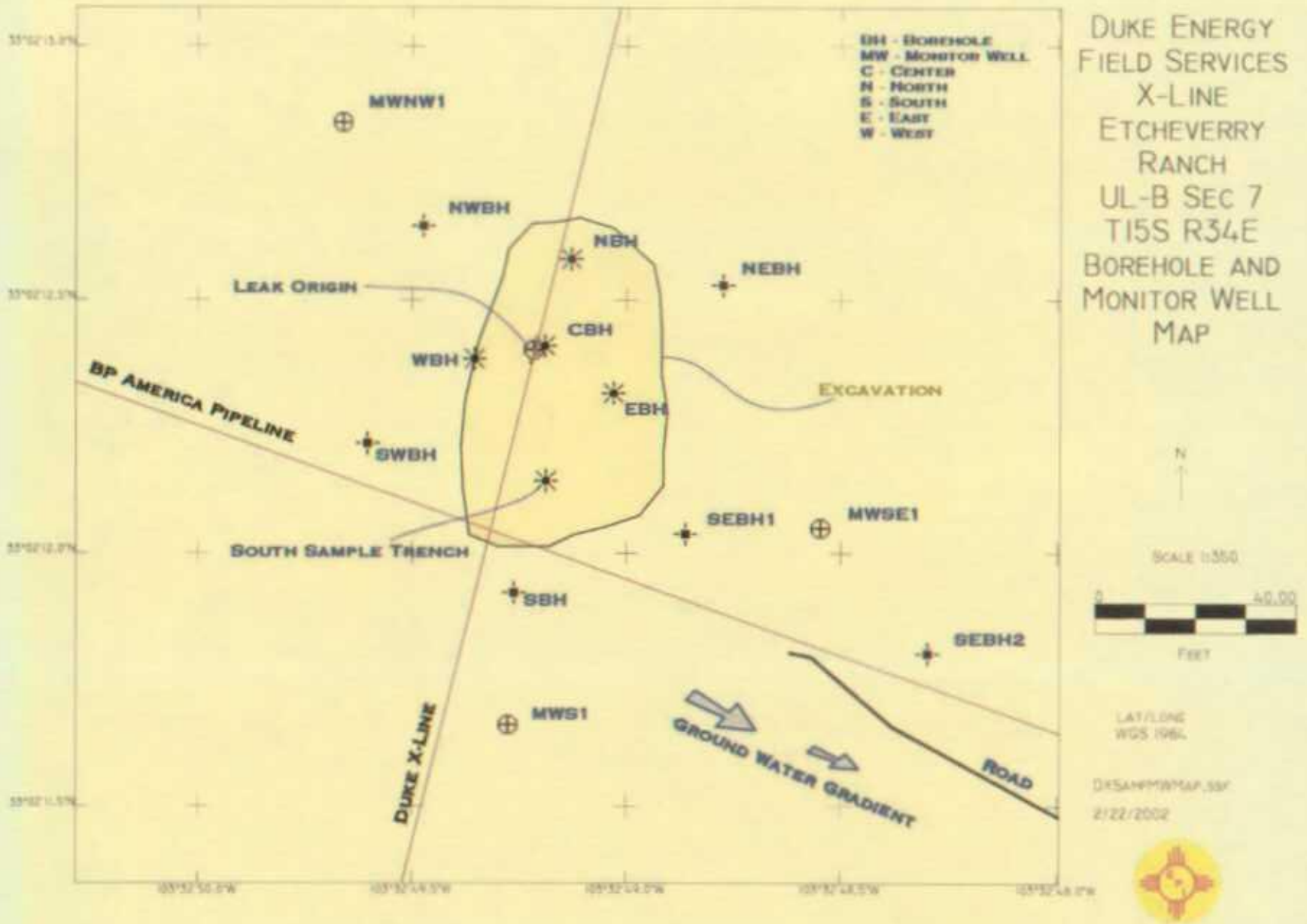
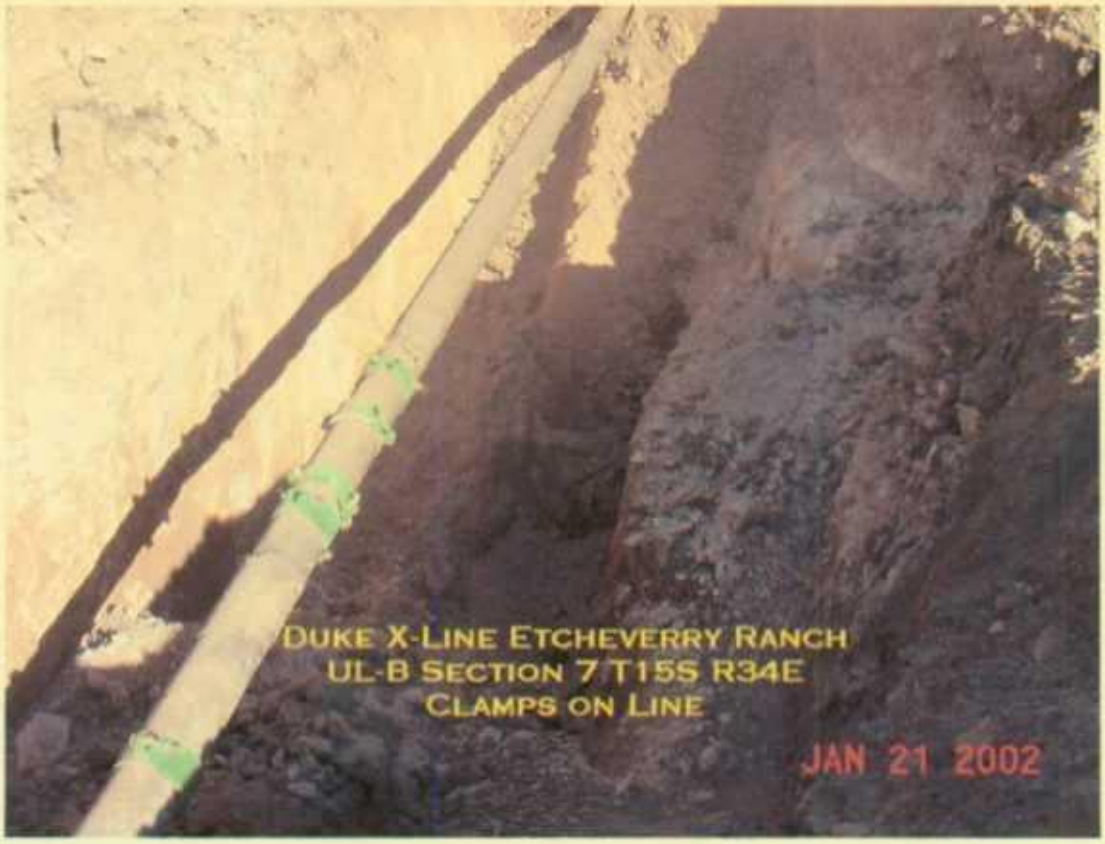


Duke Energy Field Services X-Line Etcheverry Ranch UL-B Sec 7 T15S R34E Borehole and Monitor Well Map

Attachment II: Site Photographs


DUKE X-LINE ETCHEVERRY RANCH
UL-B SECTION 7 T15S R34E


DUKE X-LINE ETCHEVERRY RANCH
UL-B SECTION 7 T15S R34E
CLAMPS ON LINE
JAN 21 2002

Attachment III: Quality Assurance Plan

1.0 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Plan (QAP) will ensure the quality and usability of information and data used to support a successful site investigation and subsequent environmental management decisions.

1.1 DATA QUALITY OBJECTIVES

For analytical information derived from samples, the following quality controls will be documented and verified. If data is within the specifications it will be deemed quantitative and acceptable for use in making environmental management decisions.

- Laboratory data must have extraction recovery for TPH, BTEX and general chemistry parameters ≤30.0%. Or a "%Extraction Accuracy " between 70 and 130%.
- Laboratory data must have <30% Relative Percent Difference or a "%Instrument Accuracy" between 70 and 130%.
- Field headspace analyses must be supported with instrument calibration data and calibration gas certification.

1.2 METHODOLOGY

Collecting representative site samples and information requires that the sampling and observational processes and procedures be implemented within strict bounds. These control procedures will further ensure the quality of site data and information and are consistent with the DUKE ENERGY FIELD SERVICES standard operating procedures as referenced in the NMOCD approved "General Work Plan for Remediation of DUKE ENERGY FIELD SERVICES Pipeline Spills, Leaks, and Releases in New Mexico." Likewise, personnel will implement standard environmental and occupational safety protocols.

1.2.1 Borehole Drilling, Lithologic Sampling, Logging, and Abandonment

Boreholes will be located strategically to best determine vertical and horizontal extent of contamination in the vadose zone and ground water. Borelogs will be developed for each boring noting site lithology. Likewise, laboratory samples may be collected to determine more detailed lithologic characteristics, i.e., porosity, transmissivity, etc. Each borehole not developed into a permanent monitor well will be plugged with Sodium Bentonite in accordance with the NMOCD guidelines.

1.2.1.1 General Drilling Procedures

The investigation will use the Environmental Plus, Inc. drill rig with hollow stem auger and "thin-wall probe" method of discrete sampling.

1.2.1.2 Soil Sampling and Logging

Upon advancing to the desired sampling interval the probe will be extended through the end of the hollow stem auger and pushed into the soil matrix to collect the sample. As the 1.5" X 48" stainless steel probe with a vinyl sampling sleeve is detached from the sampling bar, it will be immediately placed on the rack and logged. A 4 oz. sample will then be decanted into the sample jar for refrigeration and preparation with the remainder (~1 Kg) placed in a 1 gallon Ziplock bag, warmed to ambient ~ 70-80 °F and VOC Headspace concentration measured and recorded. All pertinent information will be recorded on the field borelog data sheet.

1.2.1.3 Monitor and Pollution Abatement Well Installation

Boreholes exhibiting contamination from the surface to ground water will be abandoned. Those advanced down gradient of the site for the purpose of plume delineation and found to be unimpacted will be completed and developed as monitor wells. Some boreholes may be temporarily abandoned, i.e., covered but not plugged, for future development as pollution abatement wells. The New Mexico State Engineers Office will be notified in writing of all pollution abatement well installations. All monitor and pollution abatement wells will be installed and developed in accordance with the NMOCD guidelines.

1.2.1.4 Ground Water Sampling

Ground water will be sampled within 24 hours of well development using a new and certifiably clean one-liter weighted baler. The water will be immediately decanted into the appropriate containers and prepared for ascension to the laboratory.

1.2.1.5 Borehole Abandonment

The boreholes will be filled with a mixture of distilled water and Sodium Bentonite and a wooden marker denoting the borehole number driven into the center of each backfilled hole.

1.2.1.6 Sample Handling

Soil and water samples will be collected and prepared in accordance with accepted ASTM and EPA SW846 methods.

1.2.1.7 Sampling protocols

- Decontaminate sampling equipment and area with Alconox distilled water after each sample.
- Prepare samples and refrigerate as soon as practicable.

Duplicates or blanks may be submitted to the laboratory to establish reproducibility and identify laboratory contamination, respectively.

1.2.1.8 Sample Containers

Laboratory and field analyses of soil and water require specific containers and are listed in the matrix below.

	TPH	BTEX	VOC Headspace	Metals	PAH	General Chemistry
Soil	4 oz. Jars with Teflon seal	4 oz. Jars with Teflon seal	1-gallon Ziplock® bags			
Water	1 liter amber glass w/HCL	2-40 ml VOA vials w/ HCL		16 oz. Plastic w/ 1ml HNO_3	1 liter Amber Glass	1 liter Plastic

1.2.2 Sample Custody

All analytical request forms will be completed and signatured by EPI as sampler. EPI personnel will ascension the samples to the AnalySys, Inc. sample-receiving personnel under chain-of-custody signature.

1.2.3 Quality Control Samples

Quality control samples will be analyzed to ensure data quality.

1.2.3.1 Field Blank

A field blank for soil or water is not deemed necessary.

1.2.3.2 Equipment Blank

None will be collected.

1.2.3.3 Field Duplicate or Co-located Samples

For water and soil samples, one duplicate or co-located sample will be collected for analysis every 10^{th} sample.

1.2.3.4 Trip Blank

A laboratory prepared trip blank will accompany each water sample batch.

1.2.4 Field Measurements

The VOC Headspace concentration for each soil sample will be measured. The instrument used will be the Ultra-Rae PID manufactured by Rae Systems. The calibration gas will be 100.0 ppm isobutylene standard from Scott Specialty Gases, Freemont, Colorado.

1.2.4.1 Equipment Calibration and Quality Control

The PID will be calibrated at least 3 times daily and checked with the calibration gas hourly. When a check with the calibration gas indicates the instrument reading is 10 ppm too high or low it will be calibrated. Variation in the daytime ambient temperature will cause the variation.

1.2.4.2 Equipment Maintenance and Decontamination

All sampling and survey equipment will be routinely decontaminated between samples. Nitrile gloves will be worn and changed with each sampling iteration.

1.2.4.3 Ground Water Level Measurements

Ground water levels will be taken with an accurate water level meter at each borehole where ground water is encountered and may require the use of an interface meter. Levels will be recorded as "feet below ground surface" to the nearest ".1 ft."

1.2.5 Analyses

Selected soil and ground water samples will be analyzed in accordance with the following EPA Methods.

The analytical suite for soil samples will include;

TPH (EPA method 8015M)
BTEX (EPA method 8020 or equivalent)
SPLP for selected samples

The analytical suite for water samples will include:

TPH (EPA method 8015B)
BTEX (EPA method 8021B)

Total Dissolved Solids (EPA method 150.1)
PAH (EPA method 8270)
Sample Identification
Sample identification numbers will be designated as follows;

Site: DUKE ENERGY FIELD SERVICES LL	Date 1-22-02	Borehole "north"	Interval bgs	Qualification: Cutting/Probe Sample
DXL	12202	BHN	20'	C or P

Example: DXL12202BHN-20C

1.2.6 Data Evaluation

All data will be reviewed based on the Data Quality Objectives in section 1.1.

Attachment IV: Site Information and Metrics Form

Site Information and Metrics	
SITE: X-Line Etcheverry	Assigned Site Reference #: X-Line Etcheverry
Company: DUKE ENERGY FIELD SERVICES	
Company Street Address: 1625 W. Marland	
Company Mailing Address: same	
Company City, State, Zip: Hobbs, New Mexico 88240	
Company Representative: Paul Mulkey – Hobbs Steve Weathers - Denver	
Company Representative Telephone: Mulkey - 505.910.4704 Weathers – 303.605.1718	
Company Telephone: 505.397.5716 Fax: 505.397.5781	
Fluid volume released (bbls) = estimated 20 bbls with 0 bbls recovered	
>25 bbls: Notify NMOCD verbally within 24 hrs and submit form C-141 within 15 days. (Also applies to unauthorized releases >500 mcf Natural Gas)	
5-25 bbls: Submit form C-141 within 15 days (Also applies to unauthorized releases of 50-500 mcf Natural Gas)	
Leak, Spill, or Pit (LSP) Name: X-Line Etcheverry Ranch	
Source of contamination: Natural Gas Pipeline Leak	
Land Owner, i.e., BLM, ST, Fee, Other: Nancy Etcheverry	
LSP Dimensions: affected area = 60' x30'	
LSP Area = 1240 ft^2	
Location of Reference Point (RP):	
Location distance and direction from RP:	
Latitude: 32° 02' 12.2N	
Longitude: 103°32'50.0"W	
Elevation above mean sea level: ~ 4,130 amsl	
Feet from South Section Line	
Feet from West Section Line	
Location- Unit or ¼¼ = UL-B NW¼ of the NE¼	
Location- Section = 7	
Location- Township = 15S	
Location- Range = 34E	
Surface water body within 1000 ' radius of site: None	
Domestic or Commercial water wells within 1000' radius of site: none	
Agricultural water wells within 1000' radius of site: None	
Public water supply wells within 1000' radius of site: None	
Depth from land surface to ground water (DG): ~77' bgs	
Depth of contamination (DC): The lower most contamination >100 mg/Kg occurs ground water interface	
Depth to ground water (DG – DC = DtGW) 0.0' bgs	

1. Ground Water	2. Wellhead Protection Area	3. Distance to Surface Water Body
If Depth to GW <50 feet: *20 points*	If <1000' from water source, or;<200' from private domestic water source: *20 points*	<200 horizontal feet: *20 points*
If Depth to GW 50 to 99 feet: *10 points*		200-100 horizontal feet: *10 points*
If Depth to GW >100 feet: *0 points*	If >1000' from water source, or; >200' from private domestic water source: *0 points*	>1000 horizontal feet: *0 points*
Ground water Score = 20	*Wellhead Protection Area Score= 0*	*Surface Water Score= 0*
Site Rank (1+2+3) = 20+0+0 = 20 points		

Total Site Ranking Score and Acceptable Concentrations			
Parameter	**>19**	10-19	0-9
Benzene[1]	**10 ppm**	10 ppm	10 ppm
BTEX[1]	**50 ppm**	50 ppm	50 ppm
TPH	**100 ppm**	1000 ppm	5000 ppm
[1]100 ppm field VOC headspace measurement may be substituted for lab analysis			

APPENDIX

General Information
(none included)

Ground Water Data
(none included)

Soil Delineation Data
(none included)