GW – 049 - 2

2014 WORKPLAN

03 / 31 / 2014

Site Characterization Work Plan

Blanco South Flare Pit and D Plant Areas

Bloomfield, San Juan County, New Mexico

Prepared for

El Paso Natural Gas Company
1001 Louisiana Street, Room 956I
Houston, Texas 77002

May 2014

CH2MHILL®

3721 Rutledge Road, Suite B-1
Albuquerque, NM 87109

Contents

Acronyms and Abbreviations

1,1 DCA	1,1-dichloroethane
AS	Air Sparge
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
^{o}C	degrees Celsius
COC	contaminant of concern
CFR	Code of Federal Regulations
EC	electrical conductivity
EPFS	El Paso Field Services
EPNG	El Paso Natural Gas Company, LLC
ft	feet
HSP	Health and Safety Plan
µg/L	micrograms per liter
mg/kg	milligrams per kilograms
mg/L	milligrams per liter
MSDS	Material Safety Data Sheet
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring Well
NMED	New Mexico Environment Department
NMOCD	New Mexico Oil Conservation Division
NMOSE	New Mexico Office of the State Engineer
NMWQCC	New Mexico Water Quality Control Commission
OSHA	Occupational Health and Safety Administration
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
SOP	standard of practice
TPH	total petroleum hydrocarbons
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

1 Introduction

This Site Characterization Work Plan is prepared to describe activities to identify the nature and extent of environmental impacts at the Blanco South Flare Pit and D Plant Areas ("Blanco South") that resulted from historical operations. The work will incorporate and utilize data gathered during the previously completed document review, meetings with El Paso Natural Gas Company, LLC (EPNG), the initial conceptual site model, and site visit conducted on August 28, 2013. Investigation of both soil and groundwater is proposed.

1.1 Site Location

The Blanco Plant is located in Section 14, Township 29-N, Range II-W, of San Juan County, New Mexico, approximately 1.5 miles northeast of the town of Bloomfield, New Mexico, on San Juan County Road 4900. The plant is used for natural gas processing and distribution. The facility is primarily owned and operated by Enterprise Products, and EPNG operates natural gas compression facilities in one area of the facility. Surrounding land use includes ranching, farming, and oil and gas production and transmission. An irrigation channel, known as Citizen's Ditch, is located along the southern plant property boundary. Residential properties are located south of the irrigation ditch. The site portion of the Blanco South Plant is shown on Figure 1.

1.2 Summary of Previous Investigations

In 1985, the New Mexico Oil Conservation Division (NMOCD) issued a directive for oil and gas producers to cease discharging production fluids to unlined surface impoundments (pits) located in the groundwater recharge areas of the San Juan Basin and major river drainages to the San Juan, Animas, and La Plata Rivers. Once discharge had ceased, producers were required to investigate and remediate soil and groundwater contamination caused by these pits.

In response, an initial assessment of site hydrogeology of the Blanco Plant area was conducted by Bechtel Environmental in 1988 (Bechtel, 1989). Six monitoring wells were installed and sampled during this investigation. Elevated nitrate concentrations were identified in wells MW-2 (290 parts per million [ppm]) and MW-6 (51 ppm) at that time. Based on the information collected during this study, it was concluded that the direction of groundwater flow is to the south-southeast. The average hydraulic conductivity was estimated to be 2.1 x 10-4 centimeters per second. Depth to groundwater ranged from 50 feet at MW-2 to nine feet at MW-10 (abandoned in 2003) below ground surface (EPNG, 1989). The report concluded that the reported concentration of nitrate in the upgradient well (MW-2) could not have been due to plant operations.

As part of a groundwater study by K.W. Brown & Associates, Inc. (K.W. Brown, 1990) to investigate the extent of contamination resulting from a leaking underground storage tank in the D Plant Area, the source of elevated nitrate in groundwater was further investigated. Monitoring well MW-19 was installed upgradient of MW-2. Sampling results from this investigation indicated elevated nitrate concentrations in MW-2 (200 ppm), MW-19 (90 ppm), MW-14 (210 ppm) and MW-15 (89 ppm). Inspection of the plant area at that time did not find a potential nitrate source.

In 2003, a study of area background nitrate data and potential onsite sources of nitrate was conducted (MWH, 2012). The report suggested that evaporites present in geologic materials at the site were capable of causing elevated nitrate concentrations in leachate. In addition, a number of products used in plant operations contained nitrates or nitrites, but no significant releases were identified. The report recommended that annual monitoring be continued.

Following the May 2008 annual monitoring event, a potentiometric surface contour map for the site was prepared based on water level measurements. Groundwater was interpreted to be generally flowing to the southeast, with a hydraulic gradient of 0.020 ft/ft between MW-12 and MW-28. It was concluded that the groundwater flow direction in the South Flare Pit area appeared to be influenced as well by apparent mounding caused by recharge from surface water flow in Citizens Ditch. The most recent site-wide groundwater monitoring event was

completed in December 2013 (CH2M HILL, 2014). Two of the 12 monitoring wells (MW-2 and MW-7) were found to be dry at the time of groundwater monitoring. However, depth to water measurements collected at the remaining 10 monitoring wells (MW-5, MW-6, MW-8, MW-12, MW-13, MW-14, MW-15, MW-28, MW-28, and MW-30) indicated sufficient water available for sampling. The results of the December 2013 monitoring indicated that concentrations of 1,1-dichloroethane (1,1-DCA) in MW-13 exceeded the New Mexico Water Quality Control Commission (NMWQCC) standard of 0.025 milligrams per liter (mg/L). The detected volatile organic compounds (VOCs) concentrations did not exceed the NMWQCC standards in other monitoring wells at the D Plant. However, concentrations of nitrate/nitrite exceeded the NMQWCC standard of 10 mg/L at D plant monitoring wells MW-12, MW-13, MW-14, and MW-15. Also, concentrations of nitrate/nitrite exceeded the NMWQCC standard of 10 mg/kilograms (kg) at the former South Flare Plant monitoring wells MW-5, MW-6, MW-28, MW-29 and MW-30.

1.3 Summary of Previous Removal Actions

The South Flare Pit was closed and replaced by a smokeless flare system in 1992. The pit was historically used for flaring of plant liquids during upset conditions or for the disposal of liquids from plant vessels during operations and maintenance type of activities. The original pit was approximately 100 feet long, 60 feet wide and 10 feet deep.

In 1993, a soil removal action was completed at the South Flare Pit. Contamination was found to extend beyond the original pit boundaries on all sides, based on visual observation and analysis of soil conducted by EPNG. Alternating layers of clay and sandy soil were encountered at 12 to 14 feet below the bottom of the pit. Total petroleum hydrocarbon (TPH) concentrations were reported to be greater in the sandy soils. Approximately 13 to 14 feet of clean overburden was removed and used to backfilled the pit excavation following removal of the TPH-contaminated soil.

After the removal of pit soils to a depth of 13 to 15 feet and to determine the lateral extent of contamination, test trenches were excavated along the pit sides to a depth of 21 to 23 feet below ground surface (bgs) and samples were collected and analyzed by EPNG. A sandstone bench was encountered at the northeast comer of the pit and along the eastern edge of the pit. The southeast comer of the pit was found to contain the highest concentrations of TPH. The test trenches in the middle and west side of the pit indicated TPH levels below 100 ppm. One of the lateral trenches was found to contain 13 feet of contaminated soil overlain by 4 feet of clean overburden. Contaminated soil was excavated to a depth of approximately 17 feet bgs in this area. Contaminated strata were also found below 12 to 15 feet of clean overburden along the southern and western edge of the excavated area. The NMOCD field inspector approved a plan to discontinue excavation due to inaccessibility of the contaminated strata.

Water was encountered at a depth of 6 feet below pit bottom at the southeast corner and approximately 10 feet below pit bottom in the middle of the pit. Water samples were not collected during excavation activities.

The excavation in the South Flare Pit was discontinued at a depth of approximately 24 feet bgs. Due to the proximity of groundwater at the bottom of the pit, EPNG did not excavate any further. Approximately 35,000 cubic yards of contaminated soil was hauled to a land farm facility. The excavation was backfilled with clean fill. In addition, the entire excavated area and areas beyond the excavated area was covered with approximately 3 to 4 feet of grey siltstone with high clay content to serve as barrier to water infiltration. The cap materials were graded and contoured to avoid ponding, control runoff and erosion and drainage channels were bladed around the pit to divert surface water runoff.

1.4 Current Regulatory Status

EPNG is responsible for the Blanco South site. This site is regulated through NMOCD, generally under the provisions of Ground Water Discharge Permit GW-049. Previous groundwater monitoring activities were initiated pursuant to a NMOCD letter dated May 3, 2002, regarding remediation activities at the Blanco South Plant. The primary regulatory driver for groundwater monitoring at this site was the NMWQCC nitrate/nitrite standard of 10 mg/L. The *Groundwater Nitrate Work Plan for Blanco South Flare Pit and D Plant Areas* (the Work Plan) (MWH,

2002) was submitted to NMOCD in July 2002 and was conditionally approved in a NMOCD letter dated February 21, 2003 and annual monitoring was recommended. The results of 2003 groundwater monitoring (MWH, 2003) concluded that two localized nitrate "hot spots" were present at the Blanco South Plant, one at the D Plant Area and one at the southwest corner of the Former South Flare Pit.

2 Current Site Activities

Current environmental activities are being conducted by EPNG. Numerous phases of investigation, monitoring, remediation, and reporting have been conducted over the last 10 to 20 years at this site. Site investigations, groundwater and product monitoring, and remediation activities are being performed under various letters, reports, and work plans from EPNG and its predecessors, with approvals from NMOCD. All groundwater analytical results will be compared to NMWQCC groundwater standards. The most recent annual groundwater monitoring was completed in December 2013.

2.1 Current Site Monitoring Infrastructure

Based on a review of available monitoring reports and site visit, there are five existing wells that were recently used to monitor shallow groundwater at the D Plant Area (Table 2-1), and seven existing wells which were recently used to monitor shallow groundwater at the former South Flare Pit (Table 2-2).

Table 2-1. Summary of Existing Monitoring Well Information for D Plant Area

Well Identification	Comments
MW-2	Furthest downgradient MW for the Blanco North Site Dry and not sampled since 11/9/2000 No exceedances of NMWQCC standards for benzene, toluene, ethylbenzene and xylenes (BTEX) between 1/15/1990 and 8/22/1994, which was the last time it was sampled before going dry Detections since installation (Benzene: 6.2 µg/L in 9/29/1993, Ethylbenzene: 0.7 µg/L in 6/18/1991, Total Xylenes: 0.9 µg/L in 6/18/1991 Total depth well – 57.5 feet bgs
MW-12	Furthest upgradient D Plant Area well Detections for all chlorinated hydrocarbons; trichloroethene (TCE) exceeded the USEPA maximum contaminant level (MCL) in 2002 and 2005 Nitrate/Nitrite detections between 1990 -2011 near exceedance of NMWQCC standards Total depth well – 26 feet bgs
MW-13	Nitrate/Nitrite exceedances in 1990 and 1993 Exceeded NMWQCC standards for 1,1-DCA between 2002 2011 Nitrate/nitrite detections between 1993 - 2011 near exceedance of NMWQCC standards Total depth well – 23.8 feet bgs
MW-14	Detections for all chlorinated hydrocarbons; TCE exceeded the USEPA MCL in 2007 Centrally located within area which has historic nitrate exceedances of NMWQCC standards Total depth well – 27.4 feet bgs
MW-15	Furthest downgradient D Plant Area well. Exceeded NMWQCC standard for nitrate/nitrite between 1990 - 2011 except during one sampling event in 1993 Total depth well – 26.9 feet bgs

Table 2-2. Summary of Existing Monitoring Well Information for South Flare Pit Area

Well Identification	Comments
MW-5	Exceeded NMWQCC standard for nitrate/nitrite between 2007 and 2011 Well was dry between 2002 – 2006 Total depth well – 20 ft bgs
MW-6	Exceeded NMWQCC standard for Nitrate/Nitrite between 1988 and 2011 except when the well was dry between 2004 – 2006 Furthest downgradient well Total depth well – 30 feet bgs
MW-7	Nitrate/Nitrite detections between 1988 – 1993, below NMWQCC standard Well was dry between 2002 – 2011 Furthest upgradient well for South Flare Pit Total depth well – 20 feet bgs
MW-8	One detection of nitrate/nitrite between 1988 – 2000, below NMWQCC standard Low detections of nitrate/nitrite (0.13-0.43 mg/L) between 2001 -2010, all below NMWQCC standard Well dry during 2011 monitoring event Total depth well - 35 feet bgs
MW-28	Nitrate/Nitrite detections between 1993 – 1995, below NMWQCC standards Detected Nitrate/Nitrite concentrations above NMWQCC standard between 2000 – 2011 Centrally located within area which has exceeded NMWQCC standards Total depth well – 31 feet bgs
MW-29	Nitrate/Nitrite first detected in 1993 Exceeded nitrate/nitrite NMWQCC standard between 1994- 2011 Total depth well – 35 feet bgs
MW-30	Exceeded nitrate/nitrite NMWQCC standard between 1993 – 2011 Total depth well – 34 feet bgs

3 Site Physical Setting

The Blanco South Plant is located on the eastern Colorado Plateau with an average elevation of 5,500 feet. The Blanco South Plant site is has a semi-arid climate. The area can experience hot summers and cold winters with low precipitation throughout the year. The average annual snowfall is 12.3 inches and the average annual rainfall is 8.6 inches. The highest average temperatures occur in July (90 degrees F) and the lowest average temperatures occur in January (20 degrees).

The plant area is located on Quaternary alluvium consisting of sand, silt, clay and gravel. At the plant site, the thickness of the alluvium varies from less than three feet to more than 75 feet (Bechtel, 1989). Underlying the alluvium is the Tertiary Nacimiento Formation consisting of interbedded coarse to medium-grained arkosic sandstone, siltstone and shale which were deposited as both channel fill and floodplain deposits (Bechtel, 1988). It was reported that orientation of the channel-fill sandstone deposits may locally control groundwater flow due to higher hydraulic conductivities through these features.

Based on the information collected during an assessment of site hydrogeology of the Blanco Plant area (Bechtel, 1989), it was concluded that the direction of groundwater flow is to the south, toward the San Juan River, which is located approximately 1.5 miles south of the site. The average hydraulic conductivity was estimated to be 2.1 x 10-4 centimeters per second. Depth to groundwater ranged from 50 feet (at MW-2), among wells situated within a buried relict channel, to nine feet (at MW-10) below ground surface, typical of wells completed in the Nacimiento Formation itself. These results were generally consistent with follow-on site investigations completed in early 1990 (K.W. Brown, 1990).

Long-term groundwater elevation trends near the D Plant Area, indicate groundwater levels increased approximately 4 feet from 2002 to 2011. As noted, historically, groundwater generally flows toward the south, toward the San Juan River. The hydraulic gradient in the South Flare Pit determined from the 2011 monitoring event showed that groundwater flow was determined to be toward the north. From this data, it was suggested that surface water recharge from Citizens Ditch seasonally affects the gradient in this area (MWH, 2012). The direction of groundwater flow at the D Plant Area during December 2013 was to the south and the overall groundwater gradient was approximately 0.033 – 0.034 ft./ft.

4 Data Gaps and Proposed Site Characterization Activities

Table 4-1 provides a summary of data gaps identified at the Blanco South Flare Pit site and corresponding site characterization activities to address these data gaps. These locations have been selected to delineate known areas of contamination. The results of these site characterization activities will guide potential investigation of additional delineation locations and other potential sources, if identified.

Table 4-1. Summary of Data Gaps and Proposed Site Characterization Activities

Identified Data Gap	Proposed Site Characterization Activities
Insufficient soil characterization data to address uncertainty regarding source of nitrate at both the D Plant area and the South Flare Pit and evaluate current risks.	- **D-Plant Area:** Drill and sample six soil borings at locations peripheral to previous high detections of nitrate and chlorinated hydrocarbons. This would include locations south, west and northwest of MW-14, and locations north and east and south of MW-15. Data from soil borings will help evaluate the presence of nitrate in the vadose zone and evaluate what actions are needed, if any, for the site to be appropriate for closure. - **South Flare Pit Area:** Drill and sample fourteen soil borings at locations at, northeast, and southwest of the former South Flare Pit and peripheral to previous high detections of nitrate. This would include eight borings around the perimeter of the former flare pit, three borings within the former flare pit, two borings in the surface drainage northeast of the former flare pit, and one boring located between MW-5 and the northern bank of Citizens Ditch. Data from soil borings will help evaluate the presence of nitrate in the vadose zone and evaluate what actions are needed, if any, for the site to be appropriate for closure.
Reported groundwater declines have resulted in dry wells from which groundwater potentiometric surface measurements and groundwater samples cannot be collected.	- Groundwater levels in wells MW-2, MW-7 and MW-8 were evaluated during 2013 groundwater monitoring. Since water levels have not rebounded, abandon MW-5, MW-6, MW-7, and MW-8 and replace with new wells that are screened deeper to monitor groundwater.
Uncertainty regarding groundwater gradient, possible influence of surface water recharge, possible sources of Nitrate/Nitrite, and the extent of the nitrate plume in these areas.	- **D-Plant Area** - Install a true upgradient monitoring well for the D-Plant Area north of MW-12. - **South Flare Pit Area** - Install six new monitoring wells to expand the delineation and attempt to bound the nitrate plume in this area (Figure1).

5 Site Characterization Field Activities

5.1 Notifications

Kinder Morgan and Enterprise Products are the current site operators. Both of these organizations will be informed of the planned drilling program to confirm that there are no concerns with the proposed work locations. Should conflicts with facility operations be identified, attempts will be made to move the proposed drilling location to a technically sound alternate location that is agreeable to all parties.

Prior to the start of field operations, the NMOCD Environmental Bureau will be notified of the planned investigation activities and abandonment of existing monitoring wells. This notice will be provided at least four weeks prior to the start of field operations to allow for NMOCD response.

Prior to the abandonment of any existing monitoring well, a Well Plugging Plan of Operations will be filed with the New Mexico Office of the State Engineer (NMOSE). The NMOSE will review and approve the Plan.

Prior to the installation of any new monitoring wells, well permits will be obtained from the NMOSE. The Plan and well permit processes should be initiated no less than 30 days prior to the anticipated start of field operations.

5.2 Site Preparation

Health and Safety Plan

The existing Health and Safety Plan (HSP) will be updated for the Blanco South site to define the procedures and requirements for the health and safety of CH2M HILL staff and visitors when they are physically on the work site. The site includes the project area and associated oil and gas processing infrastructure, and support facilities thereon, as applicable. The HSP will be developed in conformance with Occupational Safety and Health Administration (OSHA) Code of Federal Regulations (CFR) 1910.120 to describe methods to be used to minimize risk resulting from environmental conditions and incorporate system safety design requirements into all phases of the work by minimizing hazards. The HSP adopts, by reference and as appropriate, the Standard Operating Practices in the CH2M HILL Corporate Health and Safety Program and Contractor Safety guidelines.

The HSP developed for the groundwater monitoring activities will be amended to describe the procedures for additional site characterization activities to include hollow-stem auger drilling operations, installation of soil borings and collection of soil samples for field screening and laboratory analysis, abandonment of several existing monitoring wells, installation of new monitoring wells, location and elevation surveys of soil borings, monitoring wells, and other site features.

- Site operations will be coordinated with the EPNG project manager and local Kinder Morgan and Enterprise Products field operations personnel.
- Copies of up to date Material Safety Data Sheets (MSDS) for all chemicals brought to the Blanco South site will be maintained onsite in a location where employees may easily access them for reference.
- The HSP will include a Vehicular Traffic Control Plan as an appendix. This document will be provided to Kinder Morgan. This document will include the location of all project deliveries and equipment staging areas.
- All CH2M HILL and subcontractor vehicles will contain a first aid kit equipped with bloodborne pathogen protection kits.
- All CH2M HILL heavy equipment operators will be trained and qualified in compliance with ISNetworld Safety Program.
- All CH2M HILL and subcontractor personnel will be required to don hardhat, safety glasses, fluorescent-color safety vests, hearing protection, steel-toed boots and fire-retardant clothing while working at the Blanco South site.

- A daily Job Hazard Analysis will be developed to review procedural methods and uncover hazards prior to starting up an operation. The JHA is used to address issues that may have developed after the start of the operation or a change in personnel during the operation. Once the hazards of an operation are known, proper solutions or controls can be developed to eliminate the potential for injury.
- All CH2M HILL and subcontractor personnel will be required to review the Kinder Morgan Contractor Environmental /Safety Manual, dated and sign the site Safety Policy document.
- All personnel will complete the CH2M HILL site-specific training before the start of fieldwork. This training will include a discussion of site entry/exit procedures, locations of support facilities, and potential site hazards.

Site Layout

The location coordinates for the soil borings and monitoring wells locations will be taken from the site plans using geographic information system tools. The locations will then be accurately located in the field using a handheld global positioning system tool. Once identified, the locations will be staked with wood lath and flagged with fluorescent survey ribbon. Plans for ingress and egress to work locations will be addressed in accordance with the Vehicular Traffic Control Plan. A portable toilet will be staged in the vicinity of the work area for use by site workers.

Also, the location of the equipment staging area, including vehicle parking area, and equipment decontamination area will be established.

Vegetation Clearance

To access some of the proposed soil boring and well installation locations, vegetation clearance may be required. Vegetation will be cleared to a height between three and six inches above the ground surface using man-portable weed-whackers. Vegetation clearance will be limited to cutting of brush, vines, small trees and tree limbs that would directly impede the movement of the drill rig, service vehicles and site personnel. Cut vegetation will be moved from the work areas so as not to impede field activities.

Utilities Clearance

Subsurface utility clearance will occur at soil boring and monitoring well installation locations. The general areas to be cleared will be clearly marked, and will include a 10-foot radius surrounding each proposed boring/well installation location. Utilities will be located and marked prior to drilling activities. Underground utilities will be marked as appropriate for each utility, (e.g.; electrical, gas, water or communication). Markings will be clearly visible with spray paint and/or pin flags capable of withstanding inclement weather and normal wear.

Once utility clearance has been completed using remote sensing tools, each drilling location will be cleared to a depth of 7 feet bgs using air knifing or water jet techniques. Each borehole will be cleared to the full diameter of the drilling tools (i.e., hollow stem auger outside diameter).

5.3 Well Abandonment

Three existing monitoring wells are proposed for abandonment due to declining groundwater levels, which prevent the collection of water level measurements and sampling. The wells will be abandoned in accordance with procedures specified by the NMOCD – Environmental Bureau, and the NMOSE.

The three wells to be plugged and abandoned include the following:

South Flare Pit

- MW-5 (< 2 feet of water column in well)
- MW-6 (< 2 feet of water column in well)
- MW-7 (Dry)

Based on information from the December 2013 water level monitoring, replacement monitoring wells for MW-5, MW-6, and MW-7 will be installed as near as possible to their current locations and will be constructed with well screen intervals positioned to monitor current water levels, and sufficient screen length above and below the current potentiometric surface to allow for future water level fluctuations. Details regarding the installation of replacement/nested wells are provided in Section 5.5.

The three wells will be abandoned by backfilling the well casing and screen with a cement-bentonite grout slurry consisting of 95% Portland cement and 5% sodium bentonite. The grout will be emplaced in the PVC screen and casing using a tremie pipe. The entire surface components (i.e., well pad, protective casing, PVC casing) of the wells will be demolished and removed and the upper three feet of the well will be filled with a Portland cement plug. The cement plug will be finished flush with the ground surface.

5.4 Drill and Sample Soil Borings

Thirty-two soil borings will be drilled and sampled to address the uncertainty regarding the source of Nitrate/Nitrite, VOCs (including BTEX and chlorinated hydrocarbons), and other COCs, to provide information regarding the necessary actions to obtain site closure. Figure 1 shows the proposed locations of soil borings.

D-Plant Area

- Six soil borings will be drilled and sampled at locations peripheral to previous high detections of nitrate and chlorinated hydrocarbons. This would include locations south, west and northwest of MW-14, and locations north and east and south of MW-15. The borings are expected to be drilled and sampled to a depth of 30 to 40 feet bgs, and may penetrate the underlying cemented sandstone.

South Flare Pit

- Fourteen soil borings will be drilled and sampled at locations south, southwest, and northeast of the former South Flare Pit and peripheral to previous high detections of nitrate. This would include eight borings around the perimeter of the former flare pit, three borings within the former flare pit, two borings in the surface water drainage northeast of the former flare pit, and one boring located between MW-5 and the northern bank of Citizens Ditch. The borings are expected to be drilled and sampled to 40 to 45 feet and may penetrate the underlying cemented sandstone.

Soil borings will be completed using hollow-stem auger (HSA) drilling techniques. Soil samples will be collected using a procedure that allows for undisturbed soil cores to be continuously obtained for logging, screening, and sampling. All boreholes will be advanced into the top of the sandstone unit to ensure that competent bedrock can be identified and penetrated when encountered during drilling. The drilling method may switch to downhole rotary methods, using the augers as a surface casing if needed, to penetrate into the underlying competent bedrock if contamination is indicated to be present at that depth.

Soil samples for laboratory analysis will be collected every ten feet from the soil boring to the depth in which the boring is terminated. Sample collection intervals will be modified in the field based on observations including staining, odors, or headspace readings. Collected soil samples will be immediately placed into a laboratory-certified clean glass jars. If required, additional soil or sediment will be collected in a plastic bag for lithologic description and headspace reading. Each sample will be described using Unified Soil Classification System (USCS) (ASTM International D-1452, D-2487, and D-2488). A photoionization detector (PID) will be used to indicate the presence of volatile organic compounds (VOCs) in the soil by measuring the VOCs in the head-space of the bag.

Once the sample is collected, the sample container will be capped. The exterior of each sample container will be wiped clean of dirt and moisture using a paper towel. The sample will be properly labeled and logged onto chain-of-custody and field sampling form. A custody seal may be placed on the sample container or the insulated shipping package. The sample will be placed in an insulated container maintained at 4 degrees Celsius (°C) prior to being submitted to a laboratory for analysis.

Soil samples will analyzed via the following:

- Nitrate-nitrite via EPA Method 353.2
- Volatile Organic Compounds (VOCs) via Method 8260
- NMWQCC metals including arsenic, barium, aluminum, boron, cadmium, chromium, cobalt, iron, lead, manganese, mercury, molybdenum, nickel, and selenium using USEPA SW 846 Method 6010B

Should unknown materials or discolored soils be discovered during soil boring activities, the need to evaluate additional COCs will be discussed with EPNG and may warrant the collection of additional soil samples and additional analysis, including waste characterization samples to determine proper disposal procedures for these materials.

Twelve of the soil borings are planned to be completed as monitoring wells, following the procedures described in Section 5.5. For soil borings that will not be completed as monitoring wells, at the conclusion of drilling and soil sampling, each soil boring will be backfilled using a cement-bentonite grout slurry consisting of 95% Portland cement and 5% sodium bentonite. The grout will be emplaced in the borehole using a tremie pipe and the augers will be removed from the borehole as the grout is being placed.

Once final soil sample results are received from the analytical laboratory, CH2M HILL will perform data quality assessment, or validation, on 100 percent of the samples analyzed. The analytical data will be reviewed and validated by CH2M HILL chemists, in accordance with the following documents:

- USEPA Test Methods for Evaluating Solid Wastes, SW-846, Revision 6 (2007)
- USEPA Contracts Laboratory Program (CLP) National Functional Guidelines for Evaluating Organic Data Review (June 2008)

Sample results will be subject to a Level IV data review that includes an evaluation of the following QC parameters:

- Data Completeness
- Holding Times and Preservation
- Calibrations
- Blank Analysis Results
- Analytical reporting limits, method detection limits, and limits of detection
- Surrogate Recoveries
- Laboratory Control Sample Results
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results
- Field Duplicates
- Laboratory Spike Results
- Sample Result Verification
- Overall Assessment

A data validation memorandum will be prepared that summarizes the results of the data review. The report will be appended to the Site Characterization Report.

The New Mexico Soil Screening Levels and USEPA Regional Screening Levels (RSLs) for nitrate-nitrite, VOCs and NMWQCC metals are shown on Tables A-1, A-2 and A-3 respectively of Appendix A for the Blanco South soil samples. Soil sample concentrations will be evaluated against each of the screening criteria.

5.5 Monitoring Well Installation

Twelve soil borings for dedicated monitoring well installation will be drilled and sampled in accordance with the procedures described in Section 5.4 minus the backfilling procedures. Monitoring wells will be constructed so that the screened interval intersects the top of shallow groundwater, as determined from examination of soil boring samples. Each 4-inch diameter PVC well will be equipped with a maximum 50 ft. of 0.010-inch mill slot screen. At

least 15 feet of screen will be installed above the top of shallow groundwater to allow for possible potentiometric surface fluctuations.

The proposed wells to be installed include the following:

D-Plant Area

- MW-70 – True upgradient well for the D-Plant Area, north of MW-12
- MW-71 – Downgradient well for the D Plant Area, south of MW-15

South Flare Pit

- MW-72 - Replacement well for MW-5
- MW-73 - Replacement well for MW-6
- MW-74 - Replacement well for MW-7
- MW-75 - Replacement well for MW-8, located west of current MW-8 location
- MW-76 through MW-81 – Six new wells surrounding the former pit to delineate the nitrate plume

Monitoring wells will be identified beginning with a 70-series designation (i.e., MW-70, MW-71, etc.) to avoid confusion with existing wells at both the Blanco South and adjacent sites.

The new monitoring wells will be constructed as follows:

- Schedule 40 polyvinyl chloride (PVC) 4-inch blank casing – land surface to top of the screen interval,
- Schedule 40 PVC 4-inch 0.010-inch mill slot screen – a total screen length of 50 feet set at least 15 feet above the top of noted saturated conditions in borings.

Sand pack material properties will be selected to match screen slot size and will be installed in the annular space surrounding the well screen to approximately 1 foot above the top of the screen. The well screen will be swabbed during placement of the sand pack to settle the sand until the sand is 1 foot above the top of the screen. A 1-foot-thick hydrated bentonite chip or pellet seal will be installed above the sand pack, followed by bentonite slurry grout to approximately 1 foot bgs. Above-ground wellheads will be constructed at each location, and will consist of a 5-foot-tall (approximately 3 feet of which will remain above ground) 8-inch-diameter steel wellhead protective casing set in a 3-foot by 3-foot by 6-inch-thick concrete pad. Wellhead completions will have a unique well identification number/name inscribed in the concrete pad or permanently affixed to the well. Wells located within the plant property boundary will be secured with plastic zip ties. Wells located outside of the plant property boundary will be secured with keyed locks.

Following monitoring well installation, all new wells will be swabbed, bailed, and purged until field measurement of turbidity stabilizes, or until 5 casing volumes have been removed, whichever is less. Purge water will be containerized in 55-gallon drums, sampled for characterization to determine the appropriate disposal method, and transported to the on-site designated staging area.

Groundwater samples will be collected from the new wells no sooner than 48 hours following the completion of well development.

5.6 Decontamination

The drilling rig and support equipment will arrive at the site clean and ready for drilling activities. Decontamination of augers, drilling rods, casings, downhole equipment, etc. will be decontaminated between drilling soil boring/well installation locations and at the completion of all site work to avoid site cross-contamination and off-site transport of contamination. Decontamination will consist of Liquinox/Alconox solution wash/scrub, potable water high pressure wash, hot water rinse (steam cleaning) and water rinse. A decontamination pad area will be constructed to contain all overspray, liquids and solids generated during decontamination procedures. Decontamination fluids will be containerized and transported the onsite staging

area on a daily basis. Upon completion of drilling activities, the temporary decontamination pad will be removed and properly disposed.

5.7 Site Characterization Groundwater Sampling

Groundwater samples for site characterization will be collected from the new and existing monitoring wells no sooner than 48 hours following the completion of development of the new wells. Groundwater levels will be measured at all Blanco South wells to map and evaluate the current potentiometric surface and assess current groundwater flow direction.

Sampling will be conducted using HydraSleeve™ sampling equipment. The HydraSleeve™ is classified as a no-purge (passive) grab sampling device, meaning that it is used to collect ground-water samples directly from the screened interval of a well without having to purge the well prior to sample collection. The HydraSleeve™ causes no drawdown in the well (until the sample is withdrawn from the water column) and only minimal disturbance of the water column, because it has a very thin cross section and it displaces very little water (<100 ml) during deployment in the well. The HydraSleeve™ collects a sample from within the screen only, and it excludes water from any other part of the water column in the well through the use of a self-sealing check valve at the top of the sampler. It is a single-use (disposable) sampler that is not intended for reuse, so there are no decontamination requirements for the sampler itself. Any purge or excess water generated during sampling will be containerized in 55-gallon drums, sampled for characterization to determine the appropriate disposal method, and transported to the on-site designated staging area.

Also, two samples of surface water will be collected from Citizens Ditch. One surface water sample will be collected upgradient and one sample will be collected downgradient of the Blanco South site. Also, samples will be collected if surface water is present in the in the small drainage located north of Citizens Ditch. Finally, if any standing water is present in the South Flare pit, a surface sample will be collected from this location.

During sample collection, the following field parameters will be collected from groundwater and surface water:

- Dissolved oxygen
- pH
- Electrical Conductivity (EC)
- Temperature

Groundwater and surface water samples will be submitted to the analytical laboratory for the following analyses:

- VOCs using USEPA SW-846 Method 8260B for samples collected from MW-12, MW-13, MW-14 and MW-15 only, because these compounds have been detected during previous site monitoring and characterization work.
- Nitrate plus nitrite via EPA Method 353.2
- Dissolved calcium, magnesium, potassium, sodium via EPA Method 6010/7000 series
- Dissolved sulfate, chloride and bromide via EPA Method 300
- Carbonate (CO_3) and bicarbonate (HCO_3) Alkalinity via EPA Method 310.1
- Dissolved boron via EPA Method 200.7
- Methylene Blue Active Substances (from detergents) via Method 5540C
- Total Dissolved Solids via EPA Method 160.1

Laboratory MS/MSD samples will be collected for the laboratory to assess accuracy, precision, and matrix interference of the groundwater samples. These samples will be collected in the same manner as duplicate samples and will be labeled extra volume samples for MS/MSD. Quality control duplicate samples will be collected at a rate of approximately 10% of the total number of samples at the Blanco South Site to assess the total precision of field and laboratory components of the monitoring event. Also, equipment rinsate samples and trip blanks will be collected to assess field operations and sample transport.

Once final results are received from the analytical laboratory, CH2M HILL will perform data quality assessment, or validation, on 100 percent of the samples analyzed in accordance with the procedures described in Section 6. All groundwater sample results will be subject to a Level IV data review discussed in Section 5.4.

The New Mexico Groundwater Standards and USEPA Regional Screening Levels (RSLs) for VOCs, nitrate plus nitrite, NMWQCC metals and other water quality parameters are shown on Table A-4 through A-6 in Appendix A. Groundwater sample concentrations will be evaluated against each of the applicable screening criteria.

Upon receipt of analytical results, a cross correlation will be performed to determine how nitrate concentrations compare with the other water quality parameters. Certain anion and cation combinations (TDS, sodium, sulfate, boron) may indicate groundwater influence from Citizens Ditch. Also, a comparison of nitrate and chloride may help differentiate contributions from evaporate minerals versus other sources. In addition, calculating ratios for nitrate/bromide and chloride/bromide versus chloride may help in separating nitrate contributions from sewage effluent from production brine. Also, the groundwater results will also be compared to the results of soil samples collected from the vadose zone (if there is standing water in the South Flare Pit), to help evaluate possible source area(s).

Finally, updated soil profiles will be developed using detailed lithologic descriptions of soil, sediment and bedrock from new and existing soil borings to assist in the evaluation of possible source area.

The results of the site characterization groundwater monitoring will be summarized in the Site Characterization Report.

5.8 Management of Investigation Derived Wastes

Waste generated during the well abandonment including PVC pipe, concrete pads, and protective casings will be moved by drilling subcontractor to a central staging area and placed in roll-off boxes for off-site disposal.

Unconsolidated soil generated during drilling activities, including solids from decontamination, will be containerized in rolloff containers for bulk storage and transport to an offsite disposal facility. Samples will be collected from the IDW to characterize the waste and determine the appropriate disposal method.

Water generated during well development, purging and decontamination activities will be containerized in DOT-approved 55-gallon steel drums for off-site disposal. Samples will be collected from the IDW to characterize the waste and determine the appropriate disposal method.

Rubbish, personal protective clothing, and other waste materials generated during field activities will be placed in a trash receptacle provided by CH2M HILL.

5.9 Surveying

The new and existing well locations at Blanco South will be surveyed for horizontal location and elevation. The surveying will be completed by a New Mexico licensed surveyor. The center of each well casing will be surveyed for horizontal location relative to New Mexico State Plane coordinates and the ground surface top of the PVC well casing will be surveyed relative to elevation in feet above mean sea level to the neared 0.01 feet.

The horizontal location and elevation of soil borings that were not completed as monitoring wells will be determined using a hand-held Differential Global Position System devices.

5.10 Site Characterization Report

Once the field activities have been completed and data have been received and evaluated, draft and final versions of a Site Characterization Report will be prepared for the Blanco South Flare Pit and D-Plant Area to summarize the results of soil boring, soil sampling, and monitoring well installation. The Site Characterization Report will include a presentation of field observations and tabular summary of all soil laboratory analytical results. The report will also summarize the results of QC sampling performed as part of the field program.

Following incorporation of EPNG review comments, CH2M HILL will submit the draft reports to NMOCD for review and approval or comment. If comments are received, CH2M HILL and EPNG will discuss and decide upon the appropriate response. The agreed upon response to NMOCD comments will be submitted to NMOCD before issuing the final reports for consideration and approval.

6 Annual Groundwater Monitoring

All new and existing groundwater monitoring wells in the South Flare Pit and D Plant areas of the Blanco Plant will become part of the annual groundwater monitoring program.

Field operations will be conducted by two field personnel. All site operations will be coordinated with the EPNG project manager and local Kinder Morgan and Enterprise Products field operations personnel.

Field operations will commence by locating and collecting water level measurements from all monitoring well locations. Sampling will be conducted using HydraSleeve™ sampling equipment as described in Section 5.7. Any purge or excess sampling water will be containerized in 55-gallon drums, sampled for characterization to determine the appropriate disposal method, and transported to the on-site designated staging area.

Prior to field mobilization, the sampling team will ensure the necessary field equipment and supplies are available, and in good condition and functional. All water level measurement probes and other non-dedicated or non-disposable sampling devices will be decontaminated prior to each sampling event. If new, dedicated equipment is used, it will be thoroughly rinsed with distilled water before placement in the well. All dedicated sampling equipment will be decontaminated between sample locations. Investigation-derived waste will be managed and disposed in conformance with procedures described in the Work Plan.

Samples from all wells in the South Flare Pit and D Plant Area will be submitted to the analytical laboratory for:

- Nitrate plus nitrite USEPA Method 353.2.
- VOCs using USEPA SW-846 Method 8260B for samples collected from MW-12, MW-13, MW-14 and MW-15 only, because these compounds have been detected during previous site monitoring and characterization work.

In addition, laboratory MS/MSD samples will be collected for the laboratory to assess accuracy, precision, and matrix interference of the groundwater samples. These samples will be collected in the same manner as duplicate samples and are labeled extra volume samples for MS/MSD. Also, equipment rinsate samples and trip blanks will be collected to assess field operations and sample transport. Samples will identified and documented on chain-of-custody documents and prepared for shipment to the analytical laboratory.

Once final results are received from the analytical laboratory, CH2M HILL will perform data quality assessment, or validation, on 100 percent of the samples analyzed. The analytical data will be reviewed and validated by CH2M HILL chemists, in accordance with the following documents:

- EPA Test Methods for Evaluating Solid Wastes, SW-846, Revision 6 (2007)
- EPA CLP National Functional Guidelines for Evaluating Organic Data Review (June 2008)

Sample results will be subject to a Level IV data review that includes an evaluation of the following QC parameters:

- Data Completeness
- Holding Times and Preservation
- Calibrations
- Blank Analysis Results
- Analytical reporting limits, method detection limits, and limits of detection
- Surrogate Recoveries

- Laboratory Control Sample Results
- MS/MSD Results
- Field Duplicates
- Laboratory Spike Results
- Sample Result Verification
- Overall Assessment

A data validation memorandum will be prepared that summarizes the results of the data review. The report will be appended to the Annual Report, described below.

Draft and final versions of an Annual Groundwater Monitoring report will be prepared to summarize the results of annual water level measurements and groundwater sampling at new and existing wells at the Blanco South Flare Pit and D-Plant Area. The Annual Groundwater Monitoring Report will include a tabular summary of all groundwater laboratory analytical results, results of QC sampling and data validation technical memorandum. The report will also include a discussion and comparison of water levels and detected COCs in reference to previous monitoring data.

Following incorporation of EPNG review comments, CH2M HILL will submit the draft reports to NMOCD for review and approval or comment. If comments are received, CH2M HILL and EPNG will discuss and decide upon the appropriate response. The agreed upon response to NMOCD comments will be submitted to NMOCD before issuing the final reports for consideration and approval.

7 References

Bechtel Environmental, 1989. *Groundwater Investigation Report, El Paso Natural Gas Company's Blanco Plant, San Juan County, New Mexico*. January.

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Montgomery Watson Harza (MWH), 2003. *Groundwater Nitrate Report for the Blanco Plant South Flare Pit and D Plant Areas.* April.

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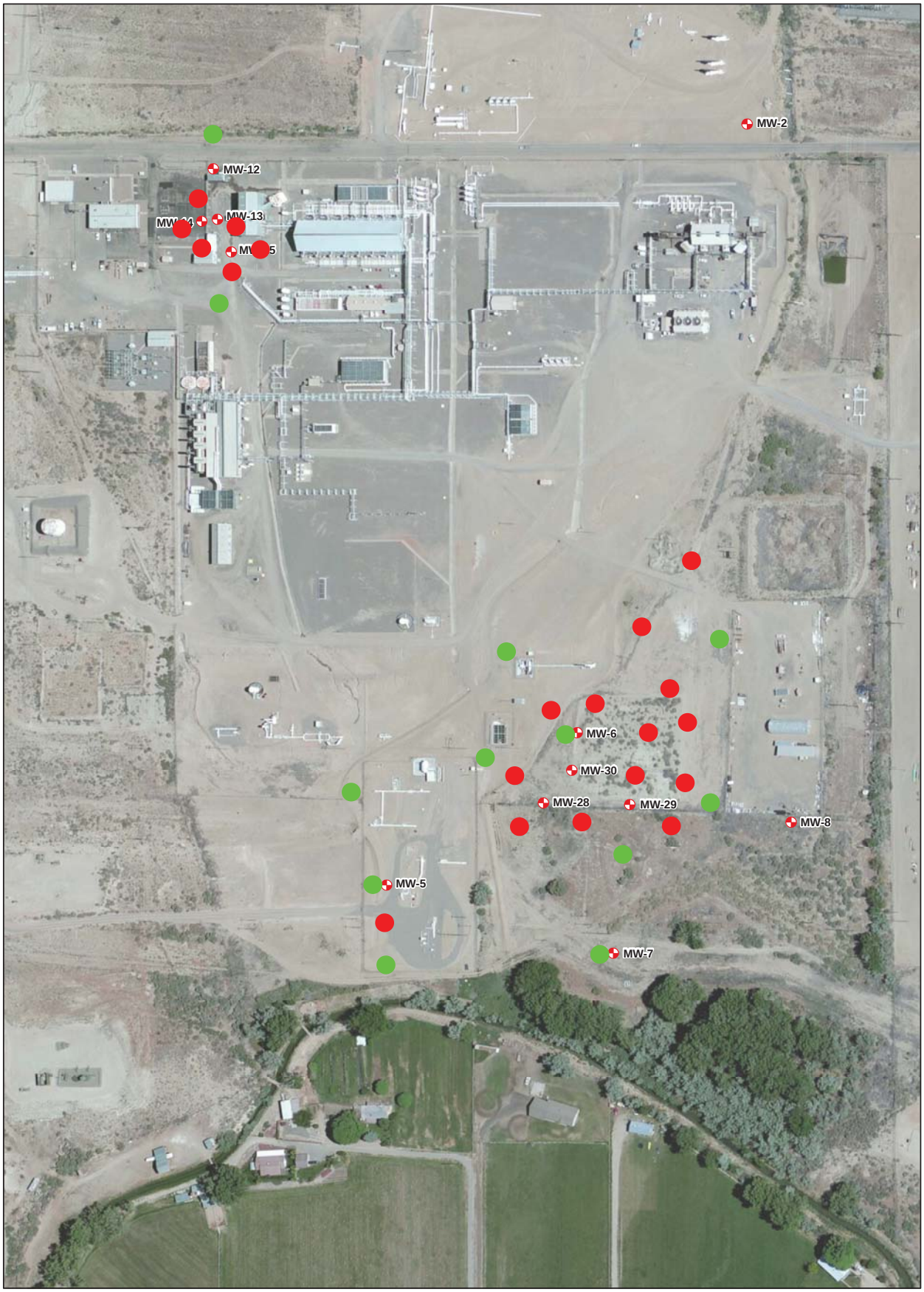
Figure



LEGEND

Monitoring_Wells

Proposed Monitoring Well

Proposed Soil Boring

N

0 100 200

Feet

FIGURE 1
Blanco Plant South Flare Pit
Proposed Site Characterization Locations
Bloomfield, New Mexico

Appendix A
Soil and Groundwater Regulatory Screening Levels

TABLE A-1
Soil Sample Screening Criteria - Nitrate
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	New Mexico Residential Soil Screening[1] Criteria (mg/kg)	New Mexico Industrial/Occupational Soil Screening Criteria[1] (mg/kg)	New Mexico Construction Worker Soil Screening Criteria[1] (mg/kg)	USEPA RSLs for Industrial[2] (mg/kg)
Nitrate plus Nitrite as N	14797-55-8	125,000	1,820,000	496,000	160,000

Notes:
[1] = New Mexico Environment Department Risk Assessment Guidance for Site Investigations and Remediation, February 2012
[2] = United States Environmental Protection Agency Regional Screening Levels (RSLs), November 2013
CAS = chemical abstract service
mg/kg = milligram per kilogram

TABLE A-2
Soil Sample Screening Criteria – Volatile Organic Compounds
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	New Mexico Residential Soil Screening[1] Criteria (mg/kg)	New Mexico Industrial/Occupational Soil Screening Criteria[1] (mg/kg)	New Mexico Construction Worker Soil Screening Criteria[1] (mg/kg)	USEPA RSLs for Industrial (mg/kg)[2]
1,1-Dichloroethane	75-34-3	64.5	359	1700	17
1,2-Dichlorobenzene	95-50-1	2,310	14,000	2,710	980
1,1-Dichloroethene	75-35-4	449	2,290	432	110
Trans-1,2-Dichloroethene	156-60-5	270	1,440	273	69
Cis-1,2-Dichloroethene	156-59-2	156	2,270	619	200
Trichloroethene	79-01-6	8.77	41.3	7.68	2
Tetrachloroethene	127-18-4	7.02	36.6	212	41

Notes:
[1] = New Mexico Environment Department Risk Assessment Guidance for Site Investigations and Remediation, February 2012
[2] = United States Environmental Protection Agency Regional Screening Levels (RSLs), November 2013
CAS = chemical abstract
mg/kg = milligram per kilogram

TABLE A-3
Soil Sample Screening Criteria - Metals
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	New Mexico Residential Soil Screening[1] Criteria (mg/kg)	New Mexico Industrial/Occupational Soil Screening Criteria[1] (mg/kg)	New Mexico Construction Worker Soil Screening Criteria[1] (mg/kg)	USEPA RSLs for Industrial (mg/kg)[2]
Aluminum	7429-90-05	78,000	1,130,000	40,700	99,000
Arsenic	7440-38-2	3.9	17.7	53	240
Barium	7440-39-3	15,600	223,000	4,350	19,000
Boron	7440-42-8	15,600	227,000	46,500	20,000
Cadmium	7440-43-9	70.3	897	277	80
Chromium	16065-83-1	117,000	1,700,000	465,000	150,000
Cobalt	744-48-4	NA	NA	NA	30
Iron	7439-89-6	54,800	795,000	217,000	72,000
Lead	7439-92-1	400	800	800	800
Manganese	7439-96-5	1,860	26,700	440	2,300
Mercury	7439-97-6	15.6	73.6	13.6	4.3
Molybdenum	7439-98-7	391	5,680	1,550	510
Nickel	7440-02-0	1,560	22,500	6,190	2,000
Selenium	7782-49-2	391	5,680	1,550	510

Notes:
[1] = New Mexico Environment Department Risk Assessment Guidance for Site Investigations and Remediation, February 2012
[2] = United States Environmental Protection Agency Regional Screening Levels (RSL), November 2013
CAS = chemical abstract service
mg/kg = milligram per kilogram
NA = Not Available

TABLE A-4
Groundwater Sample Screening Criteria – Volatile Organic Compounds
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	NMWQCC Standard[1] (µg/L)	USEPA Tap Water RSL[2] (µg/L)	USEPA MCL[2] (µg/L)
1,1-Dichloroethane	75-34-3	25	2.4	NA
1,2-Dichlorobenzene	95-50-1	NA	28	600
1,1-Dichloroethene	75-35-4	5	26	7
Trans-1,2-Dichloroethene	156-60-5	NA	8.6	100
Cis-1,2-Dichloroethene	156-59-2	NA	2.8	70
Trichloroethene	79-01-6	100	0.26	5
Tetrachloroethene	127-18-4	20	3.5	5

Notes:
[1]= New Mexico Administrative Code, Title 20 Environmental Protection, Chapter 6 Water Quality, Part 2 Ground and Surface Water Protection
[2] = United States Environmental Protection Agency Regional Screening Levels (RSL), November 2013
CAS – chemical abstract service
MCL = Maximum Contaminant Level
µg/L = micrograms per liter
NA = Not Available
NMWQCC = New Mexico Water Quality Control Commission

TABLE A-5
Groundwater Sample Screening Criteria – Nitrate
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	NMWQCC Standard[1] (mg/L)	USEPA Tap Water RSL[2] (mg/L)	USEPA MCL[2] (mg/L)
Nitrate-Nitrite as N	14797-55-8	10	NA	10

Notes:
[1] = New Mexico Administrative Code, Title 20 Environmental Protection, Chapter 6 Water Quality, Part 2 Ground and Surface Water Protection
[2] = United States Environmental Protection Agency Regional Screening Levels (RSL), November 2013
MCL = Maximum Contaminant Level
mg/L = milligrams per liter
NA = Not Available
NMWQCC = New Mexico Water Quality Control Commission

TABLE A-6
Water Sample Screening Criteria – Water Quality Parameters
Site Characterization Work Plan, Blanco South Flare Pit, Bloomfield, New Mexico

Analyte	CAS Number	NMWQCC Standard (mg/L)[1]	USEPA Tap Water RSL[2] (µg/L)	USEPA MCL (mg/L)[2]
Boron	7440-42-8	0.75[3]	3.1	NA
Calcium	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA
Potassium	NA	NA	NA	NA
Sodium	NA	NA	NA	NA
Sulfate	NA	600	NA	NA
Chloride	NA	250	NA	NA
Bromide	NA	NA	NA	NA
Alkalinity as CO3 and HCO3	NA	NA	NA	NA
Total Dissolved Solids	NA	10,000	NA	NA

Notes:
[1] = New Mexico Administrative Code, Title 20 Environmental Protection, Chapter 6 Water Quality, Part 2 Ground and Surface Water Protection
[2] = United States Environmental Protection Agency Regional Screening Levels (RSL), November 2013
[3] = New Mexico Standard for Irrigation Use
CAS = chemical abstract service
CO_3 = carbonate
HCO_3 = bicarbonate
MCL = Maximum Contaminant Level
µg/L = micrograms per liter
mg/L = milligrams per liter
NA = Not Available