3R – 450

REVISED GW WP

01 / 27 / 2015

3R-450

Souder, Miller & Associates ♦ 612 East Murray Drive ♦ Farmington, NM 87401
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May 14, 2009
Revised January 26, 2015 per NMOCD comments

Project # 5118915

Mr. Don Johnson
Field Operations Manager
Koch Exploration Company, LLC.
P.O Box 489
Aztec, New Mexico 87410

RE: SUBMITTAL OF THE GROUNDWATER INVESTIGATION WORK PLAN FOR THE KOCH EXPLORATION COMPANY, LLC. (KEC) DRYDEN 2E WELL SITE LOCATED AT THE NE ¼ SE ¼ SECTION 22 TOWNSHIP 28 NORTH RANGE 8 WEST

Dear Mr. Johnson

Please find the enclosed four original Groundwater Investigation Work Plans for the KEC Dryden 2E well site.

If you have any questions, please contact me at 505-325-5667.

Sincerely,
SOUDER, MILLER & ASSOCIATES

Thomas J. Long
Staff Scientist

Attachment: Koch Dryden 2E Groundwater Investigation Work Plan and Figures

WORK PLAN

GROUNDWATER INVESTIGATION

KOCH EXPLORATION COMPANY, LLC.
DRYDEN 2E
NE ¼ SE ¼ SECTION 22, TOWNSHIP 28 NORTH, RANGE 8 WEST

May 14, 2009

I. Introduction

Koch Exploration Company, LLC (KEC) has engaged Souder, Miller & Associates (SMA) to prepare a work plan to conduct a Groundwater Investigation to assess groundwater and soil conditions at KEC's Dryden 2E well site. The well site is located in the NE ¼ SE ¼ Section 22, Township 28 North, Range 8 West, N.M.P.M. Figure 1, Vicinity Map, illustrates the location of the well site. The work includes the drilling of four (4) groundwater monitoring wells. Two (2) soil samples will be collected from each soil boring. Figure 2, Proposed Monitoring Well Location Map, illustrates the location of the wells.

KEC discovered a release at the well site on January 19, 2009. The release was contained inside secondary containment. Approximately four (4) barrels (bbls) of crude oil and ten (10) bbls of produced water were released. A vacuum truck was called to the location and approximately six (6) bbls of fluids were recovered. Oil Gator was mixed into the impacted area to a depth of approximately two (2) inches.

Subsequently, KEC engaged SMA to investigate and remediate impacted soils resulting in the removal of 558 cubic yards of contaminated soils (See Souder, Miller & Associates Spill Response Report dated April 21, 2009). Soil samples were collected from the walls of the excavation to confirm that the impacted soils had been delineated and contaminated soil had been removed. Soils samples were analyzed per United States Environmental Protection Agency (USEPA) Method 8015 for diesel range organics (DRO), gasoline range organics (GRO), and motor oil range organics (MRO). Soil samples were also analyzed per USEPA Method 8021 Benzene, Toluene, Ethyl-Benzene and Xylenes (BTEX). Soil sample analyses indicated that contaminant concentrations in all soil samples collected were below New Mexico Oil Conservation Division (NMOCD) soil standards.

SMA also collected a groundwater sample from the bottom of the excavation. The groundwater sample was analyzed per USEPA Method 8021 BTEX. The sample was collected by attaching a jar to the end of the track-hoe bucket and scooping free-standing water from the excavation floor. Groundwater analyses indicated contaminant concentrations were in excess of the New Mexico Water Quality Control Commission (NMWQCC) groundwater standards.

The objectives of the Groundwater Investigation are to (1) determine whether groundwater at the well site is impacted and, if so, to what extent; and (2) determine if groundwater at the site is protected by NMWQCC regulations. Data acquired from the Groundwater Investigation will be

used to determine if a remedial strategy is required and if necessary to aid in the selection of remedial techniques.

II. Project Management and Field Preparation

The following general project management tasks will be completed prior to any field work at the site:

Health and Safety Plan: A site specific health and safety plan will be developed prior to work performance. The health and safety plan will be utilized for all field tasks in this work plan. All persons on site during field activities will be required to participate in daily safety briefings and sign the health and safety plan to acknowledge their understanding of the plan and to indicate their commitment to comply with the plan. These persons will include personnel from SMA, KEC and any subcontractors. SMA will submit the Health and Safety Plan to NMOCD upon request.

Utility Clearance: SMA will notify New Mexico One Call to identify any underground utilities associated with this well site. The utility locating service will be notified at least three (3) days before proceeding with any invasive field work. SMA will also work with KEC to ensure clearance from underground structures.

III. Groundwater Investigation Fieldwork

SMA will perform a Groundwater Investigation at the site. A total of four (4) groundwater monitoring wells are proposed to evaluate the extent of groundwater contamination. Two (2) soil samples will be collected from each soil boring. All monitoring wells will be completed to approximately 35 feet below ground surface (bgs). Figure 2, Proposed Monitoring Well Location Map, illustrates the location of the wells. Groundwater was observed at approximately 23 feet bgs during soil excavation activities conducted in early April 2009.

Soil Sampling and Field Analysis Procedures: All soil sampling and preservation protocols will follow NMOCD regulations and guidance. All borings will be split spoon sampled at five foot intervals. Each split spoon sample will be collected for the purpose of describing subsurface lithology (ASTM D 2488-93, *Standard Practice for Description and Identification of Soils*), split, and placed in separate containers for field headspace screening and for potential laboratory analysis. Laboratory samples will be collected in clean, laboratory supplied soil jars with Teflon septa that allow for storage on ice for rapid transfer of soils to containers for field preservation or headspace analysis. Samples for laboratory analysis will be labeled with date and time, sealed with chain of custody evidence tape, and placed on ice for transport to the SMA office in Farmington, New Mexico. Samples will then be packaged and shipped to Hall Analytical Laboratory in Albuquerque, New Mexico.

Number of Soil Samples: SMA will collect a total of two (2) soil samples for laboratory analysis from each soil boring. If contaminants are encountered, one sample will be collected from the vadose zone at the depth where field results and/or field observations indicate potential contamination in excess of NMOCD soil standards. If no contamination is encountered a

confirmatory soil sample will be collected from the vadose zone. In addition one sample will be collected from above the water table. SMA anticipates a total of eight (8) soil samples.

Soil Analytical Methods: Soil samples will be analyzed by Hall Analytical Laboratory, a nationally-qualified laboratory (NELAC), for volatile organic hydrocarbons using the following methods:

- **EPA Method 8021** for benzene, toluene, ethylbenzene, total xylenes (BTEX)
- **EPA Method 8015** for Diesel Range Organics (DRO)/Gasoline Range Organics (GRO)/Motor Oil Range Organics (MRO)

Per OCD 9/26/2014 comment: Add TPH via Method 418.1

Monitoring Well Completion Procedures: All four wells will be constructed of two inch PVC with fifteen (15) feet of 0.010-inch slot size screen placed across the water table (10 feet below and 5 feet above) and an end cap at the bottom. Silica sand (10-20 grade) will be placed from total depth to two feet above the top of the well screen, followed by a one-foot fine-grained silica sand filter pack seal. A two-foot bentonite pellet seal will be placed and hydrated above the filter pack. The annular space above the bentonite will be sealed with bentonite/cement grout. A traffic rated, flush mount manway will be installed in a concrete pad. Wells will be capped with locking caps.

Soil Disposal Procedure: Drill cuttings will be stored in appropriately labeled 55-gallon drums. Once the results of laboratory analyses have been reported and reviewed, the cuttings will be disposed of at a permitted facility. Copies of the disposal manifest will be provided to KEC in the Groundwater Investigation report.

Property Restoration: Any property damaged as a result of SMA or its subcontractor's activities will be repaired to original condition within 30 calendar days after the damage occurred, with the exclusion of incorrectly marked utilities.

Monitoring Well Development Procedures: Upon completion of groundwater monitoring wells, SMA will purge the wells with a disposable bailer until turbidity, pH, temperature and specific conductivity reach equilibrium or until ten well volumes have been purged. Per OCD 9/26/2014 comment: Allow MW to recover for 24 hours minimum before purging.

Waste Water Disposal Procedure.: As per telephone conversation with Mr. Brandon Powell in the NMOCD Aztec, New Mexico district office on May 6, 2009, KEC has permission to dispose of water purged from the monitoring wells for development and sampling in the below grade production tank located at the well site. The production tank fluids are disposed in a licensed Class I or II injection well.

Well Surveying: All monitoring well locations will be surveyed to the nearest 0.1 feet with a total station or GPS survey equipment and referenced to a permanent control point or site benchmark established with UTM coordinates. Elevations of the PVC well casing on the monitoring wells will be surveyed to a permanent mark and surveyed to the nearest 0.02 feet relative to the site benchmark using an auto level. All well coordinates (x, y, z) shall be

supplied in the Groundwater Investigation report. Elevations will be referenced to the closest USGS benchmark or a National Geodetic Survey (NGS) monument so that actual elevations relative to a sea level datum are provided. Depth to groundwater will be measured from the permanent mark.

Monitoring Well Sampling Procedures: All monitoring wells will be gauged for depth to water and non aqueous phase liquid (NAPL) prior to purging. If no NAPL exists, the well will be purged of at least three full well bore volumes until pH, temperature and specific conductivity reach equilibrium and turbidity has been reduced. The water sample will be collected using a new disposable bailer for each well.

Groundwater Sampling and Preservation Procedures: SMA will collect groundwater samples for analysis from each well. All sample containers will be laboratory provided. All groundwater sample containers will be labeled with the date and time, sealed with evidence (custody) tape, and stored on ice for shipment to the qualified laboratory using chain-of-custody procedures.

Groundwater Analytical Methods: The sample will be analyzed for the following contaminants of concern:

- **EPA Method 8021 Short List** for benzene, toluene, ethylbenzene, total xylenes (BTEX),
- **EPA Method 8015** for Diesel Range Organics (DRO)/Gasoline Range Organics (GRO)
- **EPA Method 2540 C:** Total Dissolved Solids
- **EPA Method 418.1** Total Petroleum Hydrocarbons (requested by NMOCD) Per OCD 9/26/14 comment: 418.1 analysis is not required for GW samples.
- **EPA Method 6010:** Dissolved Metals
- **EPA Method 300.1:** Chlorides

IV. Groundwater Investigation Report Preparation

SMA will prepare and submit the Groundwater Investigation report after the receipt and review of laboratory analysis from drilling and groundwater sampling activities. The report will include discussion of drilling and soil sampling activities, the horizontal extent of soil contamination if any, and the magnitude and horizontal extent of dissolved phase groundwater contamination if any, as is possible to determine by the number of groundwater monitoring wells completed. Per OCD 9/26/14 comment: Report is due 30 days after Koch receives lab results.

The report will include the following site maps:

- Site location map referenced to USGS Quadrangle map
- Site map
- Potentiometric surface (groundwater elevation) map, if applicable
- Groundwater contamination concentration maps, if applicable

- NAPL (free product) thickness map, if applicable

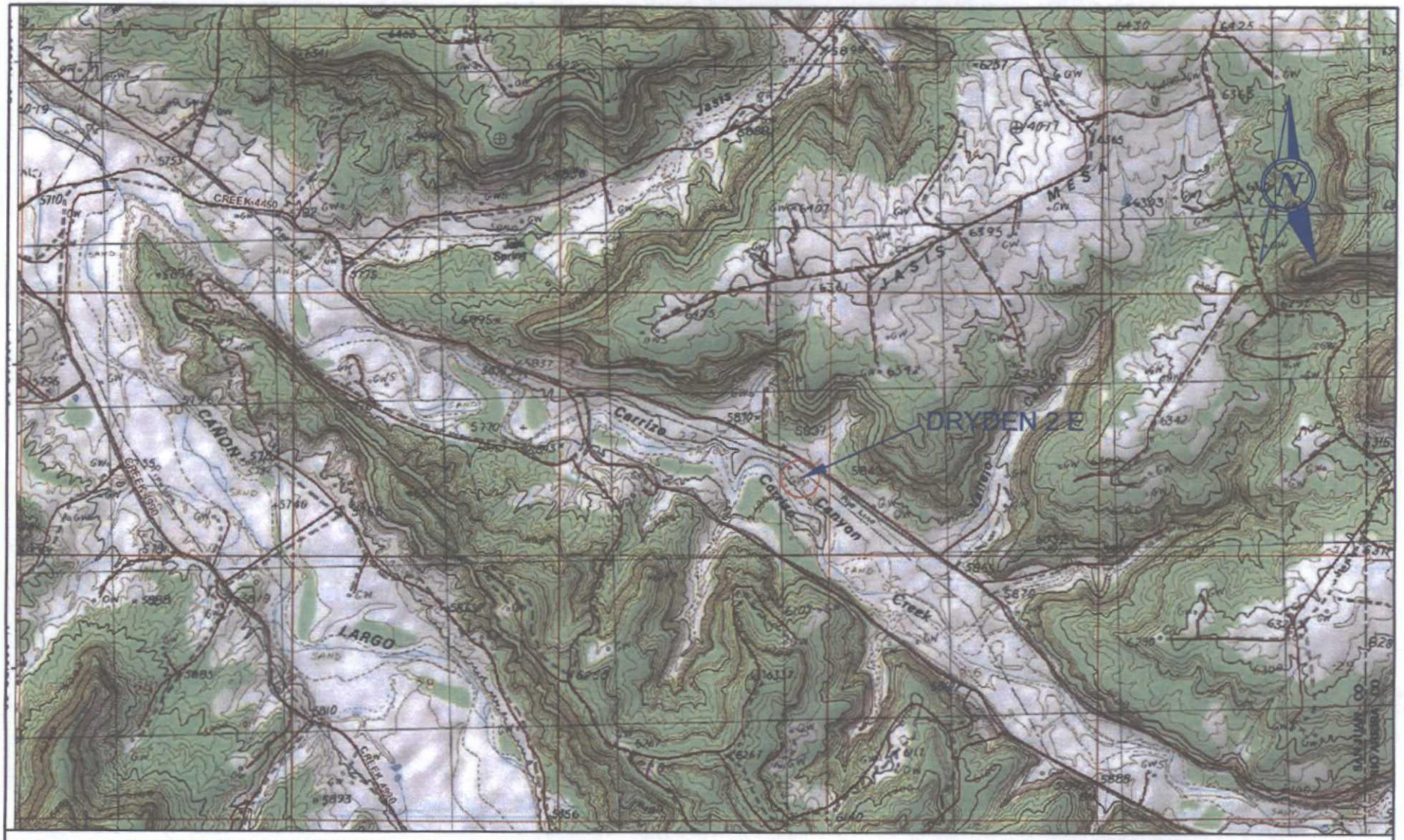
The report will include the following tables:

- x, y, and z coordinates of monitoring well heads, if applicable
- Results of soil sample analyses
- Results of groundwater analyses, if applicable
- NAPL thickness in site wells, if applicable
- Elevation of groundwater and surface water, if applicable

Appendices will include:

- Soil boring logs and monitoring well completion diagrams, as applicable
- Laboratory reports
- Waste Manifests

Per OCD 9/26/14 comment: Report will include a dip cross-section with the results of the headspace analsysis, soil data, ground water data, and lithology.



SITE LOCATION: NE 1/4 SE 1/4 SECTION 22 TS 28N R 8W

SCALE

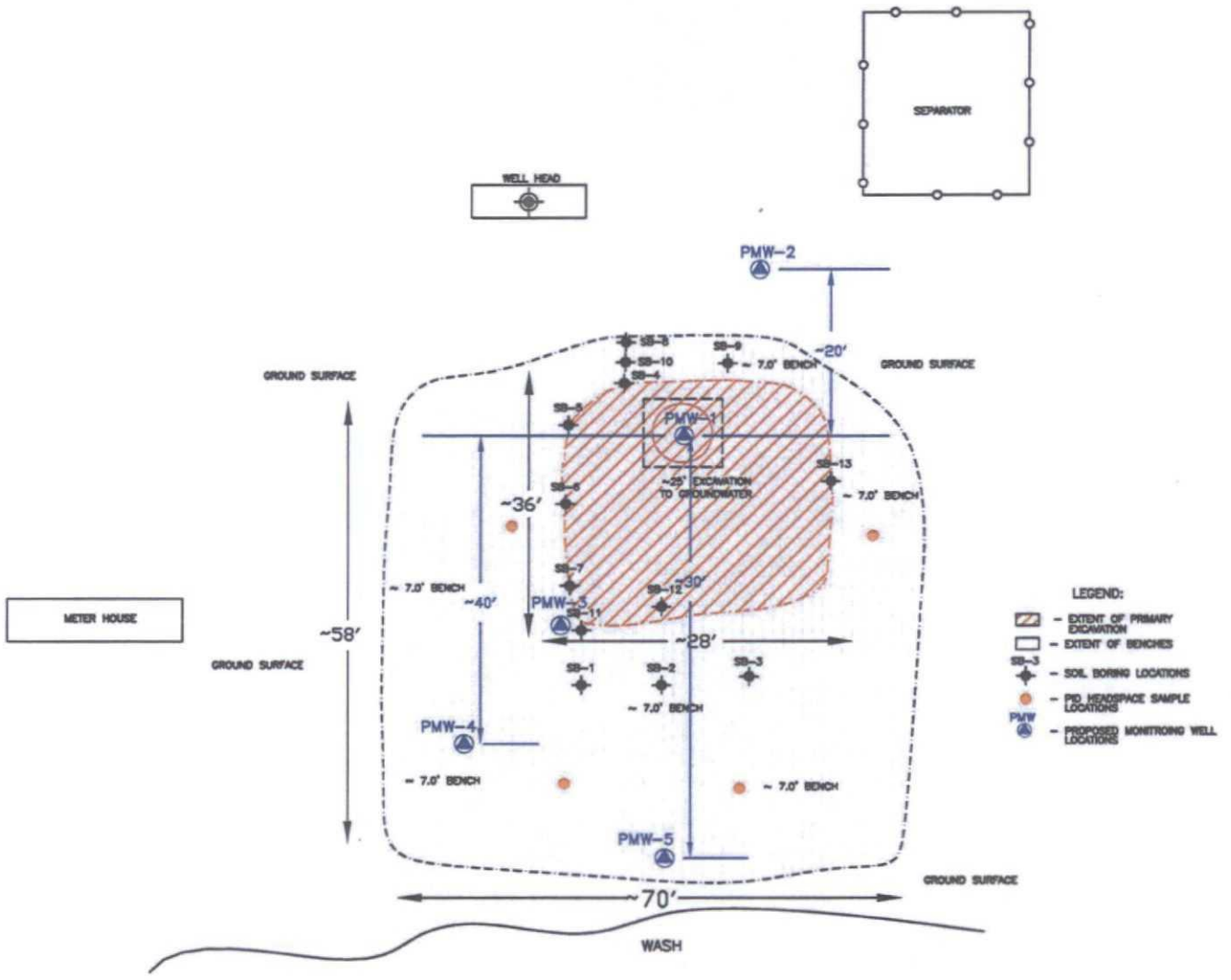
0' 1000' 2000' 4000'

SMA
Civil/Environmental Scientists & Engineers
612 East Murray Drive
Farmington, New Mexico 87401
Phone: (505) 325-5667
Fax: (505) 327-1496

REVISED BY:	DATE:
DRAWN BY: TLONG	DATE: 4/24/09
CHECKED BY: CAG	DATE: 4/24/09
PROJECT NO: 5118915	FIGURE: 1

VICINITY MAP
DRYDEN 2E
KOCH EXPLORATION COMPANY, LLC

SAN JUAN SECTION 22 TWS 28N R8W



Per email dated 11/25/2014 from Glenn von Gonten, PMW-3 and PMW-4 will be combined into a single monitoring well location.

SMA
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REVISED BY:	DATE:
DRAWN BY: TLONG	DATE: 4/24/09
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PROPOSED MONITORING WELL LOCATION MAP

DRYDEN 2E
KOCH EXPLORATION COMPANY, LLC
SAN JUAN SECTION 22 TWS 28N R8W