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KANE
ENVIRONMENTAL ENGINEERING, INC.

October 29, 2022

New Mexico Energy, Minerals and Natural Resources Department
Mr. Bradford Billings - Project Manager
5200 Oakland, NE, Suite 100
Albuquerque, NM 87113

RE: ***Proposed LNAPL Reduction Installation, Groundwater Monitoring Reduction Workplan***
Buckeye Compressor Station (AP-104) Lea County, New Mexico

Dear Mr. Billings,

At the request of Morning Star Partners (MSP), Kane Environmental Engineering, Inc. (Kane) has prepared and is providing this Workplan. We are proposing to install an aggressive LNAPL recovery system that will include both a product recovery system along with a soil vapor extraction (SVE) system. MSP also requests that the groundwater monitoring frequency be reduced to an annual event along with a reduction in the number of wells to be sampled for the Buckeye Compressor Station site. The Buckeye Compressor Station is located immediately north of Texas Camp Road, approximately one mile southwest of Buckeye in Lea County, New Mexico. The site location is in Section 36, Township 17 South, Range 34 East at geographic coordinates 32° 47' 3.93"N, 103° 30' 30.08"W. Groundwater monitoring began at the site in June 2002 and the site is currently monitored semiannually. The site groundwater flow is generally to the east. Five monitoring wells currently contain LNAPL. All monitoring wells without LNAPL are currently sampled during both annual and semiannual sampling events. The constituents of concern (COCs) in groundwater include benzene, ethylbenzene, toluene, and xylenes (BTEX); total petroleum hydrocarbons (TPH); chloride and total dissolved solid.

PROPOSED REDUCED SAMPLING PLAN

The following Workplan outlines the specifics of the proposed activities including the installation and operation of the LNAPL recovery systems, along with the reduced sampling plan for select monitoring wells and the methodology for the selection of those monitoring wells. MSP proposes to conduct an annual monitoring event scheduled for September 2023, that will include sampling all site wells as currently conducted with the exception of the following wells that have redundancy with nearby wells;

- **MW-7 (MW-7 has redundancy with MW-20)**
- **MW-15 (MW-15 has redundancy with MW-5)**
- **MW-25 (MW-25 has anomalous water level and has a redundancy with MW-26)**

While these wells will not be sampled the water levels will be measured and recorded. The groundwater sampling frequency will be assessed annually based on the results of the sampling

events for the lifespan of the project and will increase to quarterly for a minimum of eight consecutive quarters prior to closure request for the site. MSP also requests to defer total dissolved solids (TDS) analysis for all wells sampled as analytical results have been previously established. The following sections provide specifics for the proposed reduced groundwater monitoring plan:

Sampling Reduction for Non-Impacted Monitoring Wells

Site monitoring wells with COC concentrations reported below any NMWQCC exceedance standards for two consecutive years or longer will not be gauged or sampled during the annual monitoring event. These wells will be identified and a request will be filed with the agency. The proposed reduction list of monitoring wells is presented on Table 1.

Proposed LNAPL Recovery System

As stated previously, MSP proposed to install solar powered Geotech pumps in wells MW-9 and EW-1. Based on the information gathered during the Semiannual Groundwater Sampling Event, these wells had both the highest LNAPL thickness levels and recovered LNAPL volumes. The observed LNAPL recovery rate for MW-9 ranged from 0.88 to 0.132 gallons per minute. A single controller will be used for both wells. Plastic tubing will be used to transfer the liquid from the wells to dedicated storage tanks located at each well. The tanks will be fitted with sight-glasses in order for field personnel to record the actual recovery rates on a weekly basis. Tank contents will be transferred from these tanks to the existing steel LNAPL storage tanks as needed. The recorded information will be used to evaluate the system recovery efficiency on a monthly basis. Recovery efficiencies will be compared with historical recovery data. MSP also proposes to install and operate a Soil Vapor Extraction (SVE) system for remediation at the Buckeye Compressor Station in Lea County, New Mexico. This system should facilitate both removal of hydrocarbon compounds in the vadose zone and removal the free phase hydrocarbons (FPH) present on the water table in limited areas beneath the site. The system evaluation will be conducted on existing groundwater monitoring well MW-3. This well was selected for the following reasons:

1. The 2-inch diameter well is completed from 124 to 143 feet from the surveyed top of casing. The depth to water was measured at 137.33 feet from the top of casing on June 30, 2022, so there is approximately 13 feet of unsaturated materials between the top of the product and the top of the screened interval that are available for the vacuum system to act on.
2. MW-3 is located near an existing operational facility, simplifying providing power.
3. The recently completed PIANO analysis and FPH visual inspection by Kane personnel in the field, both indicate that this liquid is lighter than the FPH in wells MW-8, MW-9, MW-19 and EW-1 that are present in a hydraulically-separate area to the south. A lighter FPH will typically respond better to removal by vacuum extraction.
4. Monitor wells MW-2 and MW-6, located approximately 100 and 180 feet respectively from MW-3, can be used to measure for vacuum responses during the test to evaluate the extent of influence. They may show no response or limited response at lower vacuum values; however, they could prove to be useful in evaluating the radius of extent of vacuum readings measured in them.

The evaluation would be completed in the following fashion:

1. A temporary blower would be connected to MW-3 and a power source and tested. A valve would be installed to be able to vary the flow rate. A sample access port would also be installed to measure flow collect samples during the test.

2. Slip caps with nipple attachments for measuring vacuum with a manometer would be placed on monitor wells MW-2 and MW-6.

3. The test would be started at a vacuum of 30 inches of water. Response vacuums and a flow rate will then be measured after approximately 0.5 hours.

4. The vacuum would be increased or decreased several times based upon the initial response. The above measurements will be made at each setting to evaluate vacuum-flow conditions under multiple scenarios.

5. The system would then be set at the apparent optimal vacuum and allowed to run for an additional 12 to 24 hours to evaluate changes in vacuum and the vapor constituent concentrations.

6. The discharge will be periodically measured throughout the test using a photoionization detector (PID). A sample will then be collected at the end of the test and submitted for benzene, toluene, ethylbenzene, total xylenes (BTEX) and total petroleum hydrocarbons (TPH).

7. The blower will be connected to wells MW-4 and MW-17 along with MW-3 to extend soil vapor extraction through the plume. The system will continue to run to begin long-term remediation.

The data from the test would then be evaluated for the viability of long-term SVE remediation. Kane Environmental will prepare a report that provides the test results and recommendations for further investigation or modifications to the system. The data will also be further evaluated to determine if there are more practical and effective LNAPL recovery system alternatives.

Kane is prepared, with your approval to begin the LNAPL Recovery Program immediately. If you have any questions or comments, please contact Alan Kane, P.E. at (281) 639-9590, or email: alanjkane@comcast.net.

Sincerely,

Alan Kane

Alan Kane, P.E.
Kane Environmental Engineering, Inc.

Enclosures:

Table 1 Monitoring Well List
Product Recovery Pump Information
SVE System Specifications

Supporting Documentation

TABLE 1
BUCKEYE COMPRESSOR STATION
LEA COUNTY, NEW MEXICO

Annual Monitoring Event			
Well ID	**BTEX**	**TPH DRO/GRO**	**Chloride**
MW 1	X	X	X
MW 2	X	X	X
MW-3	-	-	-
MW 4	X	X	X
MW 6	X	X	X
MW 7	X	X	X
MW-8	-	-	-
MW-9	-	-	-
MW 12	X	X	X
MW 13	X	X	X
MW 14	X	X	X
MW 16	X	X	X
MW 17	X	X	X
MW 18	X	X	X
MW-19	-	-	-
MW 20	X	X	X
MW 21	X	X	X
MW 22	X	X	X
MW 24	X	X	X
MW 26	X	X	X
EW-1	-	-	-
TW 11	X	X	X
TW 13	X	X	X

Notes:
USEPA = United States Environmental Protection Agency
X = Data will be collected at monitoring well during respective event
- = Data will not be collected at monitoring well during event
Bold = LNAPL currently in well

Geotech Hydrocarbon Recovery System

geotech

Hydrocarbon Recovery System

Geotech Single & Multi-Well AC Sipper

The Geotech AC Sipper is a Single-Phase, 110-220V AC, powered remediation system, designed for recovery applications where electrical power is available. This uniquely flexible system can be configured for up to eight wells. The compact, easy-to-install features make this unit an industry favorite!

The AC Sipper uses a unique downwell pump to recover hydrocarbons through a floating oleophilic/hydrophobic intake filter. Once the pump canister is filled via the vacuum cycle, the pump reverses, pressurizes the system and pumps the recovered fluid to the surface and into a storage vessel.

The Geotech AC Sipper can effectively extract fluids from depths to 180 feet below ground surface and recover viscous hydrocarbons such as 90 weight oil when our heavy oil skimmer is utilized.

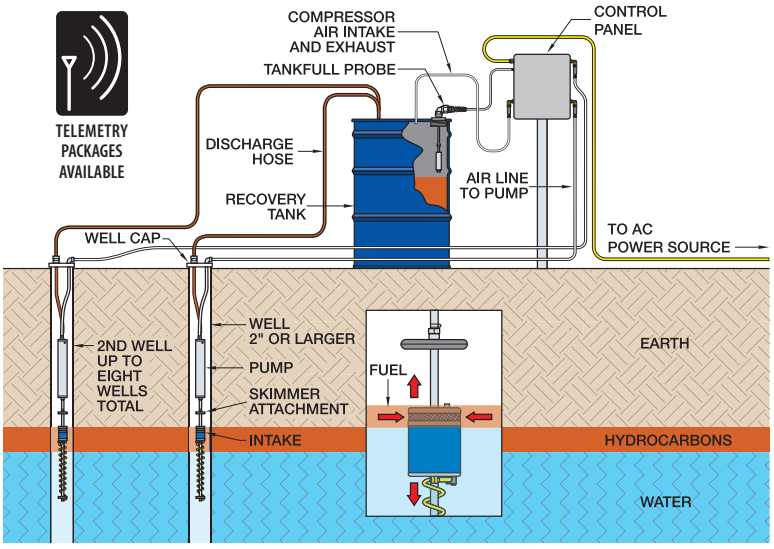
FEATURES

- Available in single or multi-well configurations
- Solar powered versions are also available

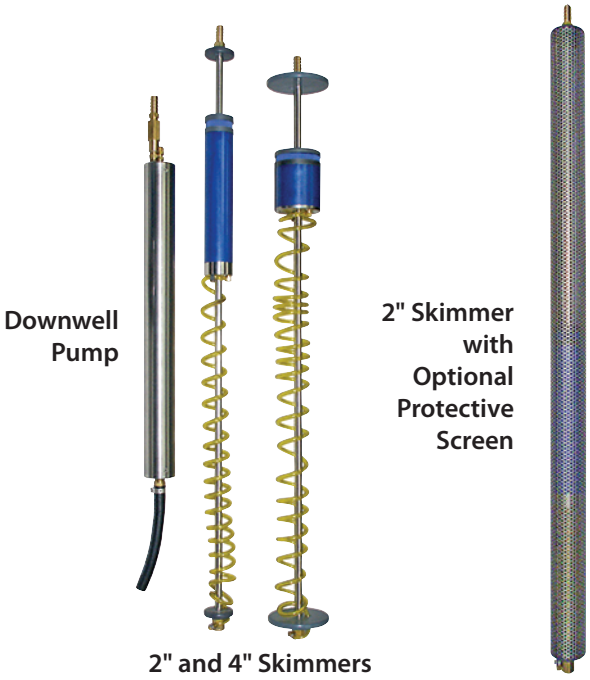
OPERATION

The Geotech AC Sipper recovers floating hydrocarbons (LNAPL) from wells using an AC powered pressure/vacuum pump. The standard Skimmer features a unique product intake assembly that incorporates both a density float and an oleophilic/hydrophobic filter that differentiates between floating hydrocarbons and water. The skimmer floats just above the oil/water interface to collect and remove hydrocarbons from the well into an optional above ground storage tank.

The Geotech AC Sipper is also available for recovery of sinking product (DNAPL) from wells when using a fixed intake.



Control Panel and Pressure/Vacuum Pump
(eight-well controller shown)



Downwell Pump

2" Skimmer with Optional Protective Screen

2" and 4" Skimmers

CALL GEOTECH TODAY (800) 833-7958

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2650 East 40th Avenue • Denver, Colorado 80205
(303) 320-4764 • FAX (303) 322-7242
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CONSIDERATIONS FOR THE BUCKEYE COMPRESSOR STATION SVE SYSTEM

There are some important logistical considerations to consider along with the size/type of the blower. Let's look at what we know and don't know.

We are looking at using MW-3 for the extraction well, MW-2/MW-6 for response measurement wells and attaching MW-4/MW-17 after the pilot test. The table below summarizes relevant information.

Well	Distance To MW-3 (feet)	Completion Interval (feet,TOC))	6/22 Depth To Water (feet)	Unsaturated Interval Thickness
MW-3	0	124-143	135.9*	11.9
MW-2	61	123-143	135.9	12.9
MW-6	216	122-141	136.8	14.8
MW-4	350	122-142	137.5	15.5
MW-17	620	122-145	136.6	14.6

*LNAPL

I estimated the distance numbers using Google Earth so they should be close. Placing a vacuum on groundwater can cause it to upwell and reduce the available unsaturated interval. Upwelling is information we should try to measure during the pilot test. I don't expect it to be substantial but it needs to be verified.

We need to know more about the existing power situation, namely:
1. How close is the nearest power drop to MW-3?
2. Is it single phase or three phase?
3. What is the maximum voltage that we can access?
4. What is the maximum amperage available?

For the blower assembly. the best alternative would be to locate a used system on a skid that includes the blower, motor, control panel, knockout tank, valves, etc. There should be environmental equipment companies that have some in inventory or potentially units for sale from private companies. You may want to consider renting a system for a week or 30 days so that we can gather site-specific information before obtaining a final system.

Finally, the cost for attaching MW-4 and MW-17 after the pilot study. You will be installing approximately 1,000 feet of pipe, fittings, valves, etc. before completing your pilot study. I have attached information on a system I installed in 2011 to give you a feel for the components for pricing. I also included a blower we considered using although we ended up buying a used system for the 2011 project that I don't have the final specs on.

My recommendations before proceeding are:
- Determine items 1 to 4 above from the client.
- Search the area for suitable blowers to rent or used systems to purchase. You can send me the specs on them but they should be similar to those for the blower that I attached.
- Make sure the client wants to install the MW-4/MW-17 components before we finish the pilot study and gain final NMOCD approval.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
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Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
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Phone:(505) 476-3470 Fax:(505) 476-3462

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

CONDITIONS

Operator: CROSS TIMBERS ENERGY, LLC 400 West 7th Street Fort Worth, TX 76102	OGRID: 298299
	Action Number: 175856
	Action Type: [UF-GWA] Ground Water Abatement (GROUND WATER ABATEMENT)

CONDITIONS

Created By	Condition	Condition Date
nvelez	Accepted for the record. See app ID 196689 for most updated status.	3/14/2023