TETRA TECH

November 10, 2020

Bradford Billings
Hydrologist
District 2 Artesia
Oil Conservation Division
Santa Fe, NM 87505

Re: Letter of Understanding
ConocoPhillips
East Vacuum Battery Playa Release
1RP-413
PLSS Unit Letter N, Section 27, Township 17 South, Range 35 East
Lea County, New Mexico

Mr. Billings:

Tetra Tech, Inc. (Tetra Tech) is submitting this Letter of Understanding for review. This letter of understanding provides the justification for a closure request on an open incident. The ConocoPhillips (COP) East Vacuum Battery Playa Release site (Site) is east of the former Vacuum Glorieta East Tank Battery location adjacent to County Road 50, and is located approximately 3.4 miles east of Buckeye, New Mexico, in Lea County, New Mexico. The release Site is located in the Public Land System Survey (PLSS) Unit Letter N Section 27, Township 17 South, Range 35 East, at GPS coordinates 32.79900°, -103.44500°. The Site location is shown on Figure 1.

This release was first reported by ConocoPhillips to the New Mexico Oil Conservation Division (NMOCD), District 1 office on October 28, 2002, and was subsequently assigned the District Remediation Permit (RP) number 1RP-413. For reasons not fully understood, the same C-141 incident was inadvertently re-submitted on October 31, 2002 and subsequently assigned the District Remediation Permit number 1RP-744.

BACKGROUND

According to the NMOCD initial C-141 report (Attachment A), the release described in the 1RP-413 incident occurred on October 28, 2002 when an air compressor failed at the Vacuum Glorieta Battery. The loss of air pressure on the free water knockout caused oil to release through a gas vent pipe located approximately 80 feet (ft) from the battery location (and 120 ft southeast of the Vacuum Abo 6-80 well). The release consisted of approximately 80 barrels (bbls) of oil and affected an approximately 80-ft by 150-ft area of area in the vicinity of a playa lake. Vacuum trucks were used during initial response and (because of rain) approximately 120% of released fluids were reported recovered on the C-141 (20 bbls rainwater in addition to the 80 bbls oil).

The description of the 1RP-413 incident is wholly identical to the incident described for 1RP-744. In fact, the information contained on the respective C-141's are nearly identical. The reported release extents are identical. The NMOCD has on record that this 1RP-413 incident has been transferred to Abatement Plan (AP)-39 (Attachment A). AP-39 directly address OCD # 1R0413 (1RP-413), describes in detail the path forward for the mitigation of impact, and incorporates 1RP-744 as well as 1RP-413. 1RP-744 superseded 1RP-413 and contains the documentation on record for this October 28, 2002 incident.

TETRA TECH
8911 N. Capital of Texas Hwy, Building 2, Suite 2310, Austin, TX, 78759
Tel 512-338-1667 Fax 512-338-1331 www.tetratech.com

Bradford Billings
NMOCD
November 10, 2020

The re-submittal of the C-141 that resulted in the generation of 1RP-744 was likely in response to a letter from the NMOCD dated October 31, 2002 (Attachment B), which stated that NMOCD did not receive appropriate notification of the release. A facsimile transmission from ConocoPhillips (included with the above-referenced letter in Attachment B) indicates that the release was reported via telephone on October 29, 2002, but that the C-141 was not forwarded to the necessary recipients. 1RP-744 (and by proxy 1RP-413) is currently being addressed via a groundwater monitoring program and the approved abatement plan (AP-39).

SITE ASSESSMENT SUMMARY

Available documentation online with the NMOCD regarding the 1RP-413 release includes a Remediation Report created by consultant Maxim Technologies (Maxim) from 2005 (included in Attachment C). The report contains a project history and timeline, a figure depicting the release extent, details on the ensuing abatement plan, a photographic log with analytical results, and a proposed path forward.

Additional information regarding the release assessment and remediation as well as current groundwater monitoring status was provided in a report submitted under the RP number 1RP-744 entitled *2019 Annual Groundwater Monitoring and Remedial Activities Report,* and prepared by Tetra Tech on March 23, 2020 (Attachment D).

According to these reports, Site assessment activities commenced in November 2002 and continued through May 2004. As part of the assessment efforts, a groundwater monitoring well system was established. In May 2004, Maxim delineated the vertical and horizontal extent of the release area above the underlying (7 ft bgs) caliche zone. Assessment results indicated that soils within the release extent were impacted with Table 1 constituents down to the groundwater table. Groundwater sampling results indicated that groundwater was also impacted with Table 1 constituents in the monitoring well established inside of the playa. The caliche zone was found to be structurally fractured around and below the area of historical contamination, aiding the migration of contaminants to groundwater.

SUMMARY OF REMEDIAL ACTIVITIES

According to the 2005 Maxim report, a work plan based on the assessment efforts was prepared and submitted to the NMOCD on July 7, 2004. The proposed work plan involved excavating affected soils down to a hard caliche zone, placing a geo-membrane in the excavation, and backfilling with clean soils. On July 12, 2004 the NMOCD denied the proposed work plan. The plan was revised to include excavating to the maximum extent practicable (calculated to be 8 ft deep in a 0.25-acre area, for a total of 4,280 cubic yards [CY] of affected soil) and submitted to the NMOCD on August 5, 2004. Excavation activities were initiated a week later, on August 11, 2004. On August 13, 2004, historic impact was encountered and the excavation was deepened to 20 ft below ground surface (bgs). A total of 3,240 CY of soil were taken to a state-regulated facility for disposal at that time.

From September 2004 through February 2005, further assessment work was completed to delineate the historical contamination, and a temporary excavation and restoration plan was submitted to the NMOCD on April 4, 2005. Following approval of the NMOCD-requested Abatement Plan (see below section), an additional 1,000 CY of soil were removed from the release extent footprint in November and December of 2008, and one monitoring well installed within the playa was abandoned as a result of the excavation activities.

Backfilling and re-seeding of the excavation was approved and performed in June 2009, and additional monitoring wells were installed in December 2013 to further assess the northern, western, and southern extent of hydrocarbons and chlorides in the groundwater.

Groundwater monitoring has continued at the Site on a semi-annual basis up to present, as documented in the 2020 Tetra Tech report (Attachment D). Additional remedial activities, including two mobile dual phase extraction (MDPE) events and three soil vapor extraction (SVE) events, have been conducted as necessary

to address contamination in groundwater. These efforts are detailed in Appendix B of the 2020 Tetra Tech report (Attachment D).

ABATEMENT PLAN

A letter from NMOCD dated May 9, 2005 (Attachment E) states:

"Pursuant to the New Mexico Oil Conservation Division rule 19.15.1.19 {Rule 19) Prevention and Abatement of Water Pollution requires all responsible persons who are abating water pollution in excess of the standards shall do so pursuant to an abatement plan approved by the director. Therefore, ConocoPhillips is hereby required to submit an abatement plan for OCD approval by July 15, 2005 for the above referenced site."

According to correspondence between ConocoPhillips and NMOCD, an Abatement Plan (AP) was originally submitted in June 2005 (available on file with NMOCD imaging). While approval of the submitted AP was pending, ConocoPhillips performed work at the Site in accordance with an approved temporary excavation and restoration plan, including excavation and backfilling activities described in the above sections. A revised AP was submitted on October 12, 2007. A copy of the plan is included in Attachment E. Abatement Plan (AP)-39 was approved via email on October 17, 2008 (Attachment E).

The objective of the abatement plan prepared by request of the NMOCD was to remove historical production pit material from the playa, minimize disturbance to the playa's natural soil structure, and limit impact to groundwater below the playa. The plan included removing the remaining historic pit material, installing a geo-membrane, backfilling the excavation with clean material, restoring one monitoring well after excavation is completed, re-establishing vegetation, and quarterly monitoring groundwater for eight (8) consecutive sampling events at three (3) monitoring wells. More details regarding the AP can be found on file with NMOCD imaging.

CONCLUSION

After review of historical documentation, as described above, Tetra Tech concludes with the following observations:

- Remediation permits 1RP-413 and 1RP-744 are duplicates of the same release incident which occurred on October 28, 2002 (Attachment A).
- 1RP-744 supersedes 1RP-413 and contains the documentation on record for this October 28, 2002 incident.
- The October 28, 2002 release is currently and actively being addressed as 1RP-744 via a groundwater monitoring project (Attachment D).
- AP-39 is an NMOCD-approved abatement plan that incorporates the 1RP-413/1RP-744 release and is currently being implemented (Attachment E).

RECOMMENDATION

After an extensive review of the available information on the NMOCD imaging website, documented remediation work performed at the Site, acceptance of the Abatement Plan, and ongoing groundwater monitoring work associated with 1RP-744, ConocoPhillips respectfully requests that the NMOCD close 1RP-413 as it was inadvertently duplicated per 1RP-744.

Bradford Billings
NMOCD
November 10, 2020

If you have any questions or comments concerning this letter, the historical activities which occurred as a result of this incident, or the ongoing activities for this Site, please call Christian Llull at (512) 338-2861 or Greg Pope (432) 682-4559.

Sincerely,
Tetra Tech, Inc.

Christian M. Llull, P.G.
Project Manager

Greg W. Pope, P.G.
Program Manager

cc:
Mr. Charles Beauvais, GBPU – ConocoPhillips
Mr. Marvin Soriwei, RMR – ConocoPhillips

Bradford Billings
NMOCD
November 10, 2020

LIST OF ATTACHMENTS

Figure 1 – Site Location Map

Attachment A – C-141 Form and Record of AP Transfer
Attachment B – NMOCD Letter (October 31, 2002)
Attachment C – Remediation Report (Maxim, 2005)
Attachment D – *2019 Annual Groundwater Monitoring and Remedial Activities Report* (Tetra Tech, 2020)
Attachment E – Abatement Plan Documentation

FIGURE

DOCUMENT PATH: D:\CONOCOPHILLIPS\MXD\ACO\FIGURE 1 SITE LOCATION_413.MXD

TETRA TECH
www.tetratech.com
901 West Wall Street, Suite 100
Midland, Texas 79701
Phone: (432) 682-4559
Fax: (432) 682-3946

CONOCOPHILLIPS

1RP-413
(32.799040°, -103.445887°)
LEA COUNTY, NEW MEXICO

VACUUM GLORIETTA EAST TANK BATTERY PLAYA
SITE LOCATION MAP

PROJECT NO.:	212C-MD-01252
DATE:	JULY 28, 2020
DESIGNED BY:	AAM

Figure No.
1

ATTACHMENT A

District I - (505) 393-6161
P O. Box 1980
Hobbs, NM 88241-1980
District II - (505) 748-1283
811 South First
Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Road
Aztec, NM 87410
District IV - (505) 827-7131

State of New Mexico
Energy Minerals and Natural Resources Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

Form C-141
Originated 2/13/97

Submit 2 copies to Appropriate District Office in accordance with Rule 116 on back side of form

ATTACHMENT

Release Notification and Corrective Action

OPERATOR

☑ Initial Report ☐ Final Report

Name	Contact
ConocoPhillips	Mike Aranda
Address	**Telephone No.**
HC 60 Box 66 Lovington NM.	505-396-7962
Facility Name	**Facility Type**
Vacuum Glorietta East Unit	Oil

Surface Owner	Mineral Owner	Lease No.
State of New Mexico	State of New Mexico	

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
	27	17S	35E	333'	South	2315'	West	Lea

NATURE OF RELEASE

Type of Release	Volume of Release	Volume Recovered
Oil & Water	80 BBLS	100 BBLS
Source of Release	**Date and Hour of Occurrence**	**Date and Hour of Discovery**
Free water knockout	10/28/02 5:00AM	10/28/02 7:00AM
Was Immediate Notice Given? ☐ Yes ☑ No ☐ Not Required	**If YES, To Whom?**	
	Larry Johnson & Bill Pritchard	
By Whom?	**Date and Hour**	
Mike Aranda	10/29/02 1:00 PM	
Was a Watercourse Reached? ☐ Yes ☑ No	**If YES, Volume Impacting the Watercourse.**	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*
Air compressor down @ battery. Lost air pressure to FWKO, causing vessel to go out of balance. Oil went out thru vent pipe appx 80' from Battery.

Describe Area Affected and Cleanup Action Taken.*
Appx area affected, 80'x 150'. Appx 80 BBL Spill. Recovered 80 BBLS oil & 20 BBLS rain water. Oily dirt will be dug out, replaced, and soil remediated as soon as possible. Spill appx 120' SE. of well # VAC ABO 6-80.

Describe General Conditions Prevailing (Temperature, Precipitation, etc.).*

I hereby certify that the information given above is true and complete to the best of my knowledge and belief.
Signature: M.O. Aranda

Printed Name: Mike Aranda

Title: Operations Tech

Date: 10/29/02 Phone: 505-396-7962

OIL CONSERVATION DIVISION

Approved by District Supervisor:

Approval Date: Expiration Date:

Conditions of Approval: Attached ☐

TRANSFERRED

TO: AP-39

Incident ID	
District RP	
Facility ID	
Application ID	

Closure

The responsible party must attach information demonstrating they have complied with all applicable closure requirements and any conditions or directives of the OCD. This demonstration should be in the form of a comprehensive report (electronic submittals in .pdf format are preferred) including a scaled site map, sampling diagrams, relevant field notes, photographs of any excavation prior to backfilling, laboratory data including chain of custody documents of final sampling, and a narrative of the remedial activities. Refer to 19.15.29.12 NMAC.

Closure Report Attachment Checklist: ***Each of the following items must be included in the closure report.***

☐ A scaled site and sampling diagram as described in 19.15.29.11 NMAC

☐ Photographs of the remediated site prior to backfill or photos of the liner integrity if applicable (Note: appropriate OCD District office must be notified 2 days prior to liner inspection)

☐ Laboratory analyses of final sampling (Note: appropriate ODC District office must be notified 2 days prior to final sampling)

☐ Description of remediation activities

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to OCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the OCD does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to groundwater, surface water, human health or the environment. In addition, OCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations. The responsible party acknowledges they must substantially restore, reclaim, and re-vegetate the impacted surface area to the conditions that existed prior to the release or their final land use in accordance with 19.15.29.13 NMAC including notification to the OCD when reclamation and re-vegetation are complete.

Printed Name: _____ Title: _____

Signature: Charles R. Beauvais II Date: _____

email: _____ Telephone: _____

OCD Only

Received by: _____ Date: _____

Closure approval by the OCD does not relieve the responsible party of liability should their operations have failed to adequately investigate and remediate contamination that poses a threat to groundwater, surface water, human health, or the environment nor does not relieve the responsible party of compliance with any other federal, state, or local laws and/or regulations.

Closure Approved by: _____ Date: _____

Printed Name: _____ Title: _____

ATTACHMENT B

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

GARY E. JOHNSON
Governor
Betty Rivera
Cabinet Secretary

Lori Wrotenbery
Director
Oil Conservation Division

October 31, 2002

Phillips Petroleum Company
Attn: Mike Aranda
4001 Penbrook Street
Odessa, TX 79762

Re: **No Notification Pursuant to Rule 116**
Near EVGSAU 3332-001 UL C Sec 33-T17S-R35E
Vacuum Glorieta East Unit-East Tank Battery
No Posted Facility Location Pursuant to Rule 310.B.
Vacuum Glorieta East Unit-East Tank Battery

Dear Mr. Aranda,

Pursuant to Rule 116 a major spill requires immediate notification by telephone and written form C-141 within 14-days. The New Mexico Oil Conservation Division (OCD) did not receive notification as specified for the major spills referenced above. In addition, the tank battery facility sign posted at the East Tank Battery location is inconsistent with Rule 310.B.

The OCD hereby requires Phillips Petroleum Company to submit remediation plans for both sites by November 21, 2002 that include the following:

1. Phillips Petroleum Company shall delineate the horizontal and vertical extent of TPH, Benzene, BTEX and Chloride in the soil and demonstrate that the contaminants have not migrated vertically so as to cause groundwater to exceed New Mexico Water Quality Control Commission (WQCC) standards.

2. Phillips Petroleum Company shall post corrected Unit Letter, Section, Township and Range at all Phillips Petroleum Company facilities pursuant to Rule 310B.

3. Phillips Petroleum Company shall notify OCD 48 hours in advance of any sampling event allowing OCD to witness and/or split samples.

4. A commitment to notify OCD of releases pursuant to Rule 116.

Oil Conservation Division * 1625 French Drive * Hobbs, New Mexico 88240
Phone: (505) 393-6161 * Fax (505) 393-0720 * http://www.emnrd.state.nm.us

For guidance in this matter see Guidelines for Remediation of Leaks, Spills and Releases, August 13, 1993, on the OCD website:

www.emnrd.state.nm.us/ocd/bureaus/environmental/review/spill1.doc

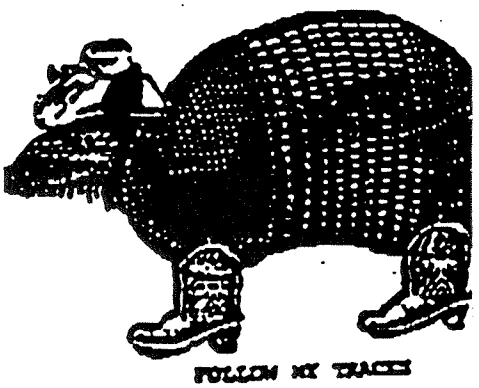
If you have any questions or need assistance please write or call: (505) 393-6161, ext. 113, or e-mail: psheeeley@state.nm.us

Sincerely,

Paul Sheeley-Environmental Engineer
Cc: Roger Anderson - Environmental Bureau Chief
Chris Williams - District I Supervisor
William Olson - OCD Hydrologist
Larry Johnson - Environmental Engineer

FACSIMILE TRANSMISSION

__ PAGES TO FOLLOW



DATE: 2-20-03

TO: Steve wilson

#304

Fax No. 368-1412

Telephone No: _____

FROM: Name: Ken Andersen

Ext. ____, Room ____

MESSAGE: The spill was called in To Larry Johnson + Bill Pritchard on 10/29/02 @ 1:00pm, The C-141 was sent To Kent Oberle To pay surface damage. Kent Then was suppose To send it The The appropriate people.

ATTACHMENT C

1R0413

GENERAL CORRESPONDENCE

2005

IR 0413
↳ AP (COMBO STAGE 1, 2

ConocoPhillips

East Vacuum Glorietta Unit

New Mexico

East Tank Battery Playa Remediation

EAST OF BUCKEYE, LEA CO.

IR 413

MAXIM Technologies
A DIVISION OF TETRA TECH INC.

ConocoPhillips

PROJECT HISTORY

- **October 28, 2002 –** Loss of air pressure to FWKO tank caused vessel to go out of balance. 80 bbls oil released through vent pipe into playa

- **October 29, 2002** – Release reported to NMOCD

- **November 20, 2002 -** B&H Environmental Services delineated the surface extent of the spill and bored one hole to 11 foot depth to delineate vertical extent of affected soil

- **April 7, 2003 -** BBC International deepen B&H "vertical" boring to 35 feet in depth to delineate vertical extent of affected soil

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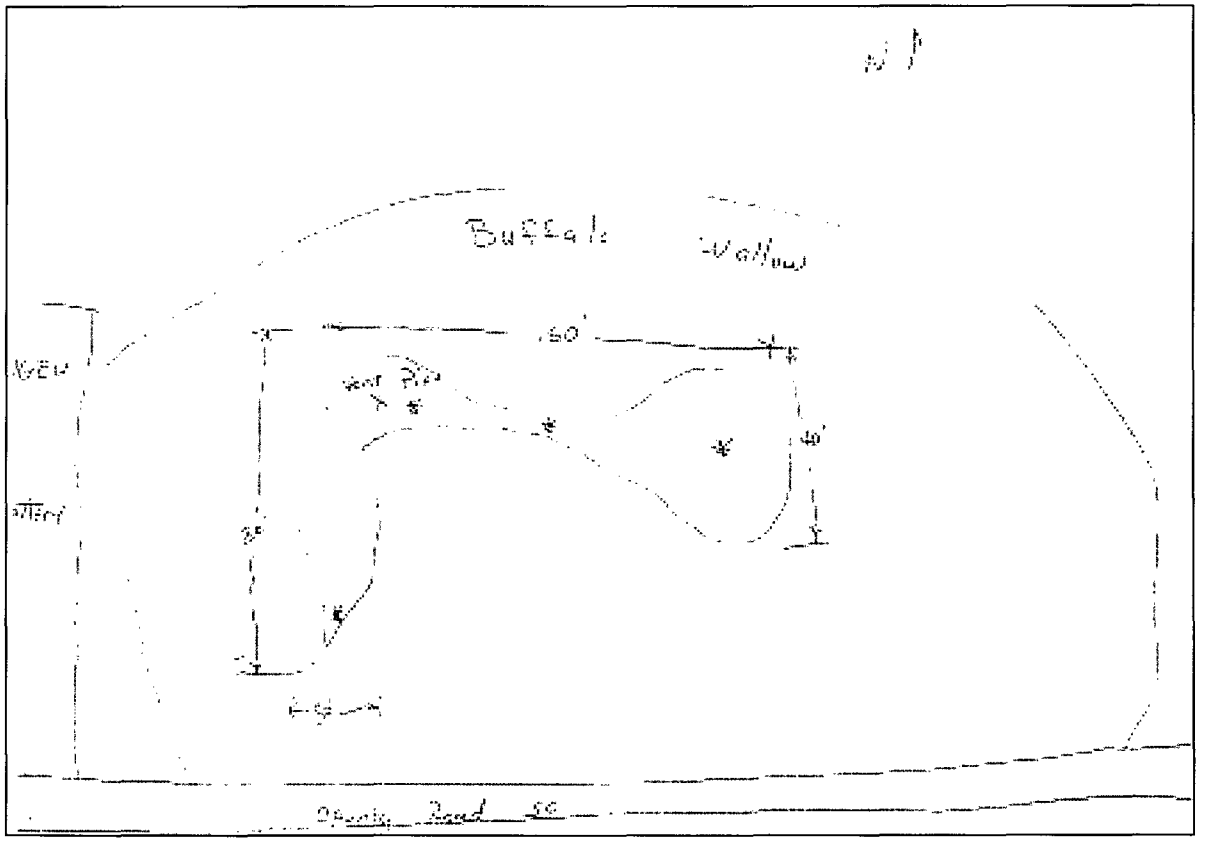
A DIVISION OF TETRA TECH INC.

ConocoPhillips

PROJECT HISTORY (Continued)

Release Site Drawing



Source: 10/28/2002 NMOCD Form C141 Attachment

MAXIM Technologies
A DIVISION OF TETRA TECH, INC.

ConocoPhillips

PROJECT HISTORY (Continued)

- **January 4-6, 2004 –** Maxim Technologies developed three groundwater monitoring wells (one in the affected area and two outside the playa

- **May 19 – 20, 2004 –** Maxim Technologies delineated the vertical and horizontal extent of affected area above the caliche zone

- **July 7, 2004 –** Work Plan submitted to NMOCD Santa Fe to excavate affected soil to caliche zone, place a geo-membrane in excavation and backfill

- **July 12, 2004 –** NMOCD denied the plan

MAXIM Technologies
A DIVISION OF TETRA TECH INC

ConocoPhillips

PROJECT HISTORY (Continued)

- **August 5, 2004 –** Revised plan submitted to NMOCD Santa Fe that included excavating to the extent practicable, backfilling and surface restoration
  - Excavate to extent practicable = 8 feet deep (Contractors indicated caliche in the area was very hard)
  - Affected area = 0.25 acres
  - Estimated volume of affected soil to be removed = 4,280 cubic yards

- **August 11, 2004 -** Excavation of affected soil was initiated

- **August 13, 2004 -** Historic impact encountered, excavation deepened to 20 ft

MAXIM Technologies
A DIVISION OF TETRA TECH, INC.

ConocoPhillips

PROJECT HISTORY (Continued)

- **September 15-16, 2004 –** 6 hole intrusive boring program initiated to further delineate lower strata

- **December 8, 2004 -** Excavation sidewalls and floor examined to determine statue

- **February 3-4, 2005 -** Trenching program to determine lateral extent of TPH contaminates

- **April 4, 2005 -** Remediation plan submitted to NMOCD

MAXIM Technologies
A DIVISION OF TETRA TECH, INC.

ConocoPhillips

PROJECT HISTORY (Continued)

- **May 12, 2005** – NMOCD requests an Abatement Plan

- **June 1, 2005** – Abatement Plan filed with NMOCD

MAXIM Technologies
A DIVISION OF TETRA TECH INC

ConocoPhillips

DATA

- Depth to groundwater in January 2004 study was 60 feet below ground surface

Chloride

- Soil boring data indicated chloride concentration above 250 mg/kg down to groundwater

- Soil geo-probe data indicated chloride concentration above NM proposed guideline in central west area (GP-1 thru -7 & -13)

- Groundwater data indicate chloride concentration above NM regulatory limit (250 mg/l) in monitoring well established in playa

MAXIM Technologies
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ConocoPhillips

DATA (Continued)

Petroleum Hydrocarbon

- Soil boring data indicated TPH-DRO concentration above NM guideline (100 mg/kg) in the center of release site. SPLP/BTEX analysis of soil 20 – 22 fbgs was below NMWQCC clean up standards at VG-1.

- Soil geo-probe data indicated TPH-DRO above NM guideline in center-east area of release location (GP-5 & -6)

- Groundwater data indicated BTEX concentrations below NM regulatory limits in monitoring well established in playa

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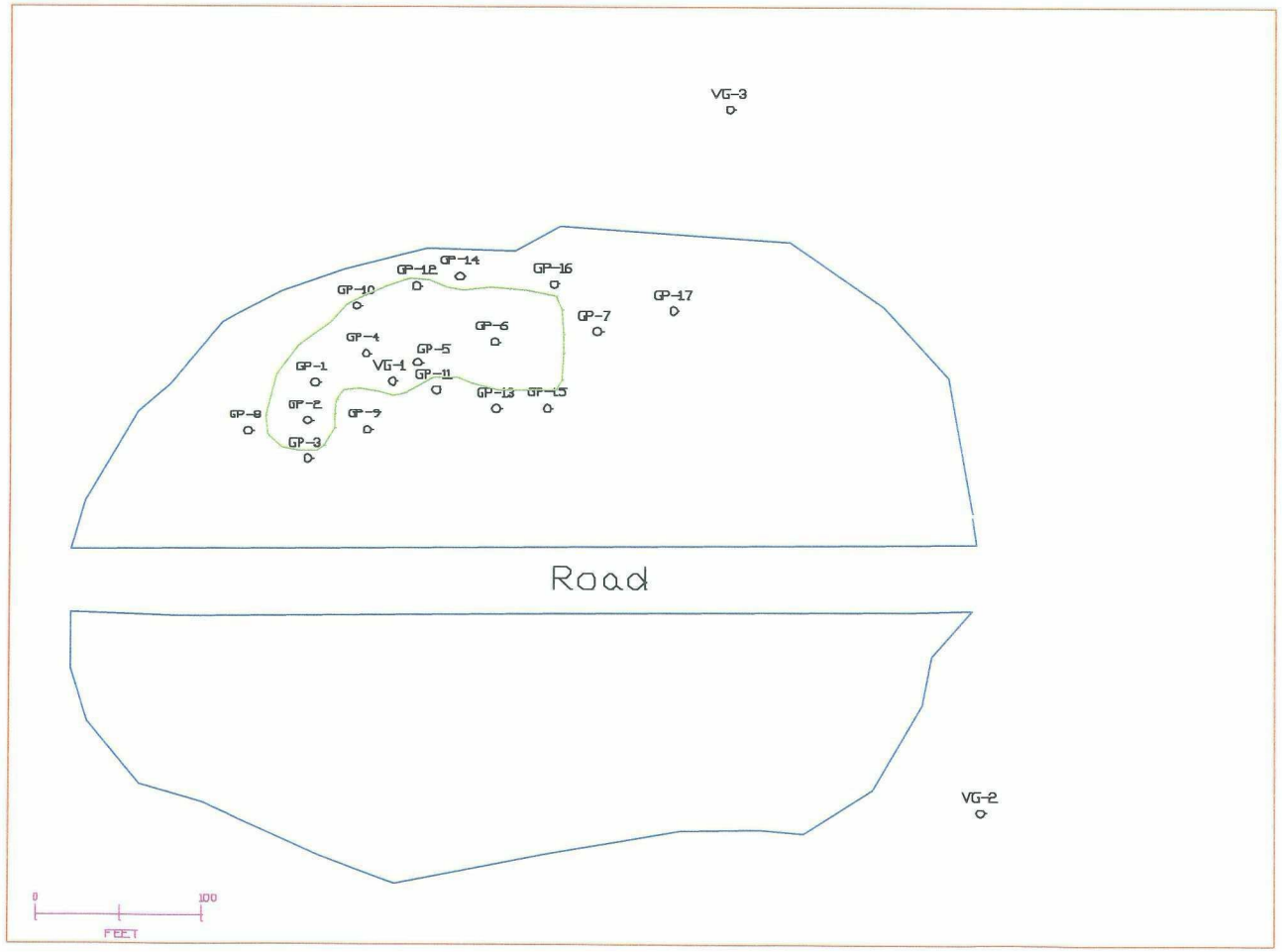
AFFECTED AREA OF PLAYA



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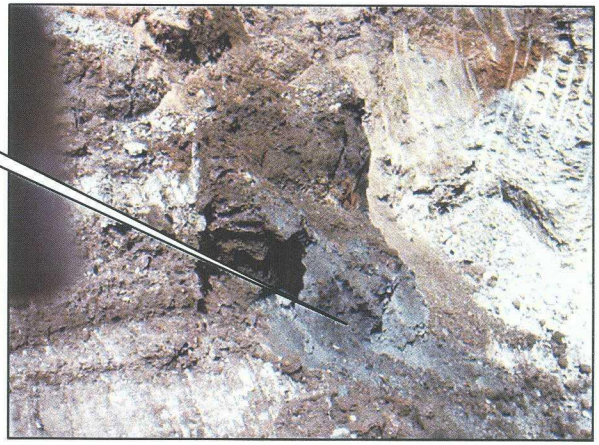
ConocoPhillips

EXCAVATION (Historic Impact)



MAXIM Technologies

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EXCAVATION (Historic Impact)

Historic Impact

MAXIM Technologies

ConocoPhillips

SOIL TESTS

Synthetic Precipitation Leaching Procedure Data

Standard	
Chloride	250 ppm (proposed)
Benzene	10 ppm
BTEX	50 ppm

Depth 16 ft
Cl 266 mg/kg
B <0.1mg/kg
T <0.1 mg/kg
E <0.1 mg/kg
X <0.1 mg/kg

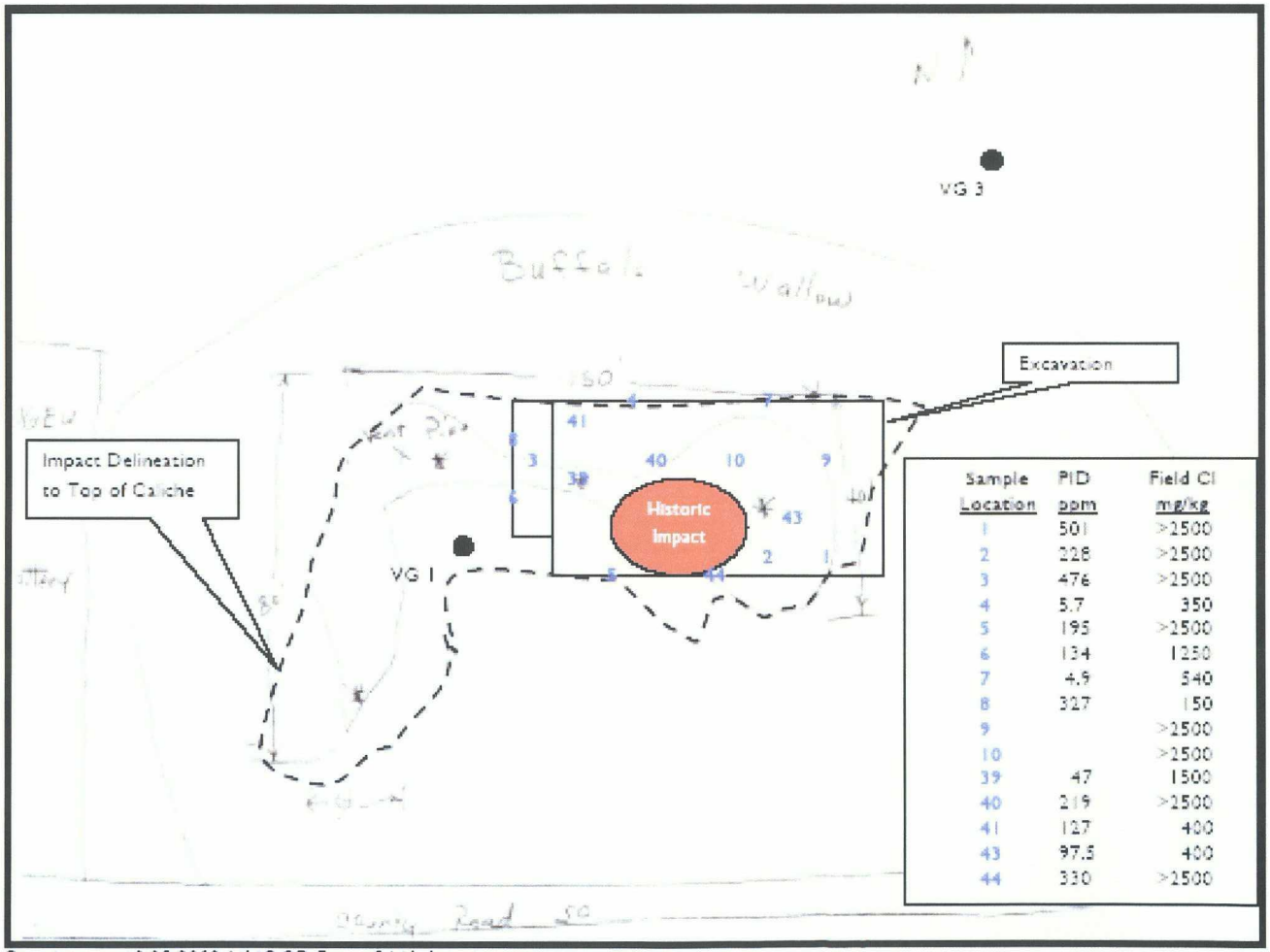
Depth 12 ft
Cl 241 mg/kg
B <0.1 mg/kg
T <0.1 mg/kg
E 0.180 mg/kg
X 0.260 mg/kg

MAXIM Technologies

ConocoPhillips

SOIL TESTS (Continued)

Field Data



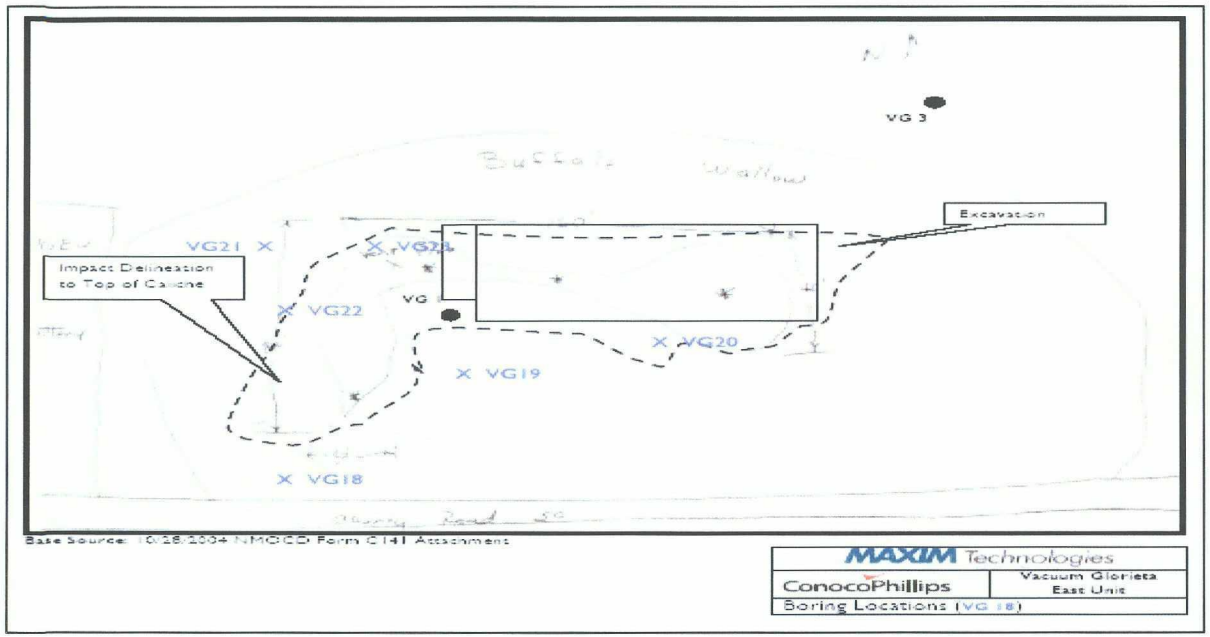
Sample Location	PID ppm	Field Cl mg/kg
1	501	>2500
2	228	>2500
3	476	>2500
4	5.7	350
5	195	>2500
6	134	1250
7	4.9	540
8	327	150
9		>2500
10		>2500
39	47	1500
40	219	>2500
41	127	400
43	97.5	400
44	330	>2500

Base Source: 10/28/2002 NMOCD Form C141 Attachment

MAXIM Technologies

ConocoPhillips

BORING PROGRAM



September 15-16, 2004

Boring	Sample Interval	TPH GRO	TPH DRO	SPLP Chloride	Moisture
VG-18	0-10	<1.1	68	47.5	8.1
VG-18	10-20	<1.0	<12	18.5	2.8
VG-18	20-30	<1.1	<13	45.4	6.7
VG-18	40-50	<1.0	77	8	2.8
VG-19	0-10	<1.1	**110**	3.7	6.6
VG-19	10-20	<1.0	<12	8.9	2.2
VG-19	20-30	<1.0	<13	12.8	4.3
VG-19	40-50	<1.0	44	1.9 J	4.4
VG-20	0-10	<1.1	18	4.5	9.1
VG-20	10-20	**44**	**2000**	30.5	4.6
VG-20	20-30	**340**	**11000**	7.3	6.6
VG-20	40-50	**17**	**1800**	2.2	5.2
VG-21	0-10	**180**	**10000**	19.2	6.7
VG-21	10-20	170	**5300**	4.8	4.5
VG-21	20-30	**84**	**3600**	10	7.6
VG-21	30-40	NA	NA	19.7	6.2
VG-21	40-50	**48**	**2000**	27.7	6
VG-22	0-10	<1.1	**720**	72.1	9.5
VG-22	10-20	<1.0	70	30.7	2.9
VG-22	30-40	<1.1	16	78	4.8
VG-22	40-50	<1.0	**280**	83	4.4
VG-23	0-10	<4.3	**670**	163	7.3
VG-23	10-20	**88**	**4000**	209	6.4
VG-23	20-30	**110**	**6500**	**261**	6.8
VG-23	40-50	<1.0	**730**	222	4.3

MAXIM Technologies

ConocoPhillips

SUMMARY

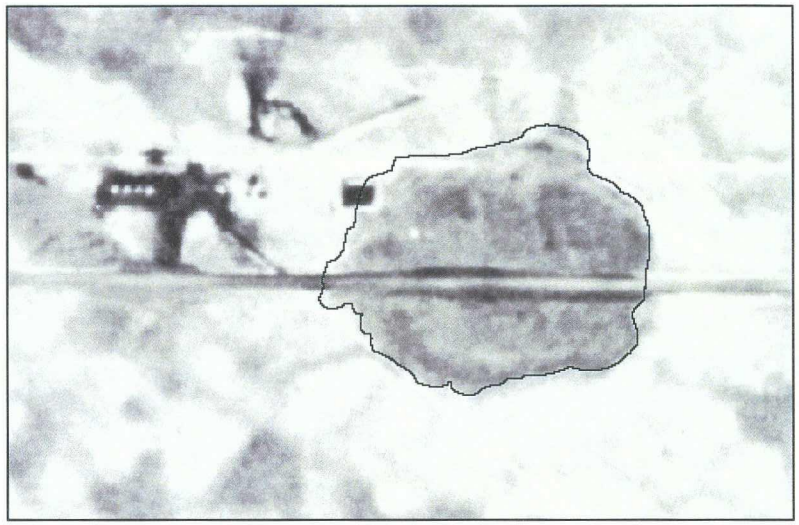
- Data indicated soil was affected down to groundwater
- Initial plan to place set a geo-membrane was denied by NMOCD
- Excavation was initiated to show compliance with NMOCD directive to start work by August 20, 2004
- Historic impact area discovered during excavation
- Caliche zone appears to be structurally fractured around and below historic impact area
- Excavate to 8 ft in revised plan but excavation deepened to 20 ft in area around historic impact area
- 3,240 cubic yards of material hauled to a State regulated disposal facility

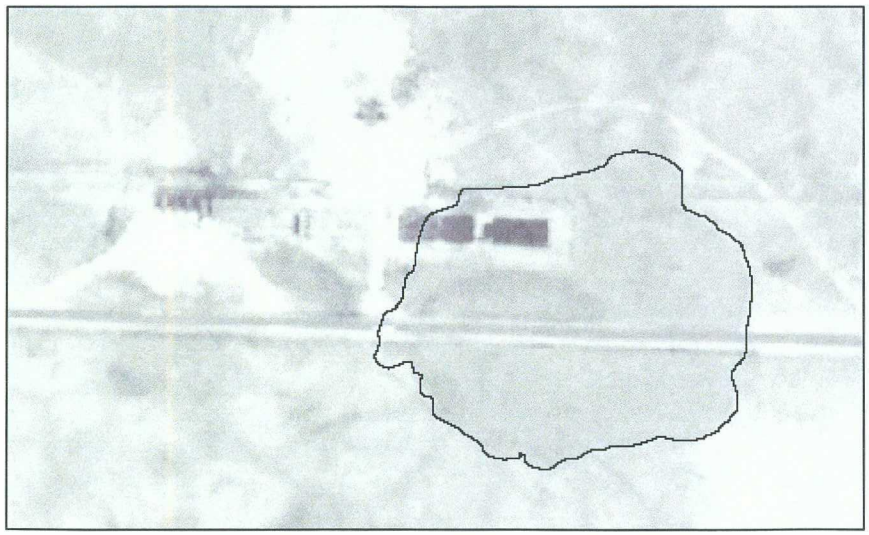
MAXIM Technologies
A DIVISION OF TETRA TECH INC

ConocoPhillips

SUMMARY (Continued)

1949





1966

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PATH FORWARD

The objective of the abatement plan (Plan) is to remove historical production pit material from the playa, minimize disturbance to the playa's natural soil structure and limit impact to groundwater below the playa.

The Plan includes:

- Removing the remaining historic pit material
- Deploying geo-membrane
- Backfilling excavation with clean material
- Restoring 1 monitoring well after excavation is completed
- Re-establishing vegetation
- Quarterly monitoring groundwater for 8 consecutive sampling events at 3 monitoring wells

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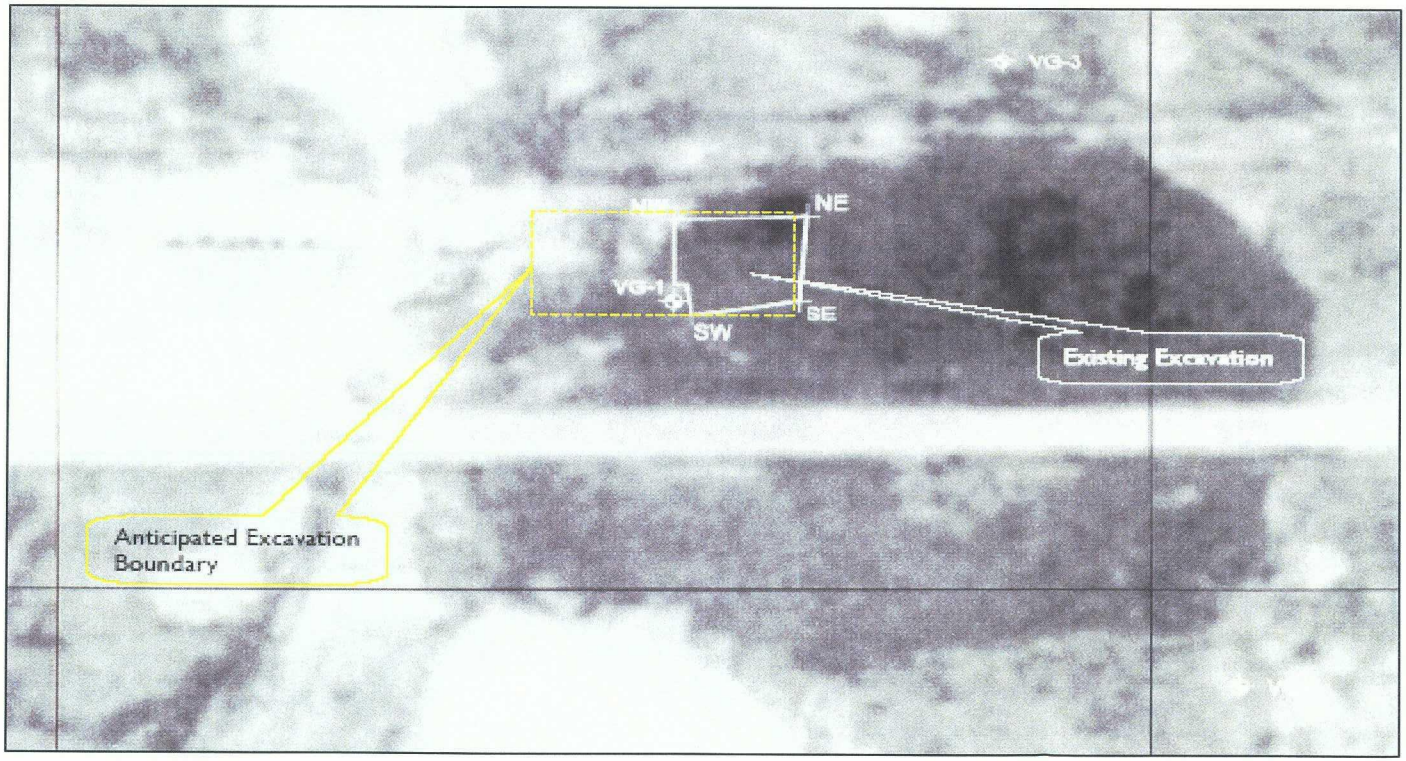
PATH FORWARD (Continued)

- **Proposed Excavation**



MAXIM Technologies

ATTACHMENT D

TETRA TECH

March 23, 2020

Mr. Bradford Billings
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: 2019 Semi-Annual Monitoring and Remedial Activities Report
ConocoPhillips, Vacuum Glorietta East Unit
Lea County, New Mexico (1RP-744)

Mr. Billings:

This report details the continuing groundwater monitoring and remedial activities at the ConocoPhillips Company ("COP") Vacuum Glorietta East Unit, Lea County, New Mexico (Site). The Site location is shown on Figure 1. The Site was assigned the identifier order No. 1RP-744 by the New Mexico Oil Conservation Division (NMOCD).

1.0 BACKGROUND

Impacts to soil and groundwater are believed to be associated with a release that was reported to the NMOCD on October 28, 2002. Approximately 80 barrels of oil and 20 barrels of water were recovered after the release. The affected area was estimated to be approximately 80 feet by 150 feet in size.

An initial investigation was performed at the Site by B&H Environmental Services in November 2002. A total of seven shallow soil borings were advanced during the investigation. Soil samples collected from the borings indicated the presence of chlorides and petroleum hydrocarbons above NMOCD Recommended Remedial Action Limits (RRALs).

2.0 PREVIOUS INVESTIGATIONS

Approximately 3,240 cubic yards (yd^3) of petroleum-impacted soil was excavated in August 2004, and another 1,000 yd^3 of soil was removed in November and December 2008 after additional assessment. One monitoring well (VG-1) was installed during this time, but was abandoned because it was located within the footprint of the excavation.

Backfilling and reseeding of the excavation was approved and performed in June 2009, and three monitoring wells were subsequently installed: VG-2 was installed down gradient of the excavation, VG-3 was installed up gradient of the excavation, and VG-4 was installed within the footprint of the excavation. Three additional groundwater monitoring wells (VG-5, VG-6, and VG-7) were installed

Tetra Tech
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between December 4 and December 13, 2013 to further assess the northern, western, and southern extent of hydrocarbons and chlorides in the groundwater.

Due to the presence of light non-aqueous phase liquid (LNAPL), mobile dual phase extraction (MDPE) was used as a remediation method at the Site. The first MDPE event at the Site took place on September 8 and 9, 2014. MDPE was performed for a total of eight hours, and approximately 1,636 gallons of total fluids were extracted from monitoring well VG-4, including approximately 6.06 gallons of hydrocarbons (liquid and vapor). The second MDPE event performed at the Site occurred from May 4 to 6, 2015. Approximately 6,349 gallons of total fluids were extracted from monitoring well VG-4, including approximately 14.51 gallons of hydrocarbons (liquid and vapor). MDPE events were performed by AcuVac Remediation, LLC (AcuVac) of Houston, Texas.

After a trace amount of LNAPL was observed and exceedances of benzene, toluene, ethylbenzene, and total xylenes (collectively referred to as BTEX) and chlorides were documented in VG-4 in April 2016, an oxygenating compound sock was installed in VG-4 on June 21, 2016 to assist with the degradation of the hydrocarbons.

3.0 HYDROLOGY/GROUNDWATER

The water bearing zone consists of the Pliocene-age Ogallala aquifer under unconfined conditions at the site. The Ogallala aquifer is located at the base of the Ogallala Formation. In general, the Ogallala Formation consists of quartz sand and gravel that is poorly to well-cemented with calcium carbonate and contains minor amounts of clay. The wells installed at the Site were drilled to depths of approximately 70 to 80 feet bgs with static groundwater water levels approximately 65 feet bgs.

4.0 2019 GROUNDWATER MONITORING

4.1 Groundwater Sampling and Analysis

Prior to purging the wells, each well was gauged to measure the depth to groundwater and phase separated hydrocarbons (PSH), if any. The water levels and the PSH measurements are summarized in Table 1, and well locations are shown on Figure 2. Monitoring wells containing PSH are gauged, but not sampled. Each monitoring well not containing PSH was sampled utilizing low flow sampling techniques. The semi-annual groundwater monitoring events occurred in June and November 2019. Groundwater samples were collected and analyzed for BTEX by United States Environmental Protection Agency (EPA) Method 8260 and chlorides by Method 300.0. Groundwater samples were transported to Pace Analytical Services, LLC, in Mount Juliet, Tennessee under chain-of-custody control for the 2019 sampling events. Table 2 presents a summary of the groundwater analyses. The analytical report and chain-of-custody is presented in Appendix A.

4.2 Groundwater Gradient

Groundwater gradient maps were generated for the June and November 2019 sampling events. The hydraulic gradient for the aquifer was generally to the southeast, and consistent with historical

data. The June 2019 and November 2019 groundwater gradient maps are included as Figure 3 and Figure 4, respectively.

4.3 Phase Separated Hydrocarbon (PSH)

The monitoring wells were gauged for the presence of PSH during groundwater sampling events. Monitoring well VG-4 exhibited 0.03 feet of PSH during the June 2019 sampling event and 0.11 feet of PSH during the November 2019 sampling event. VG-4 was not sampled during either sampling event.

5.0 GROUNDATER ANALYTICAL RESULTS

5.1 June 2019 Sampling Event

During the June 2019 sampling event, monitoring wells VG-2, VG-3, VG-5, VG-6, and VG-7 were sampled. No exceedances of the applicable NMWQCC standards were found.

5.2 November 2019 Sampling Event

During the November 2019 monitoring event, the monitoring wells, VG-2, VG-3, VG-5, VG-6, and VG-7, were sampled. No exceedances of the applicable NMWQCC standards were found.

6.0 REMEDIAL ACTIVITIES

On June 11 through 13, 2019, Tetra Tech personnel mobilized to the Site to supervise remedial activities to enhance recovery of PSH in both liquid and vapor phases. AcuVac Remediation, LLC (AcuVac) of Houston, Texas performed three soil vapor extraction (SVE) events on VG-4: two 10-hour events and one 8-hour event. The first 10-hour SVE event on VG-4 resulted in the recovery of 3.41 gallons of vapor LNAPL, the second 10-hour SVE event on VG-4 resulted in the recovery of 3.62 gallons of vapor LNAPL, and the 8-hour SVE event on VG-4 resulted in the recovery of 2.75 gallons of vapor LNAPL. The AcuVac report of remedial activities performed at the Site is presented in Appendix B.

7.0 WORK PLAN

Groundwater monitoring and sampling of the monitoring wells will be continued on a semi-annual basis, with annual reporting to the NMOCD. Tetra Tech will continue to monitor the oxygen release compound (ORC) sock in VG-4 and replace as needed. Additional remedial activities will be evaluated for remediation at the Site, including additional MDPE events.

If you have any questions, please call Julie Evans at (432) 258-3451.

Sincerely,
Tetra Tech, Inc.

Julie Evans
Project Manager

Reviewed By:

Greg W. Pope, P.G.
Program Manager

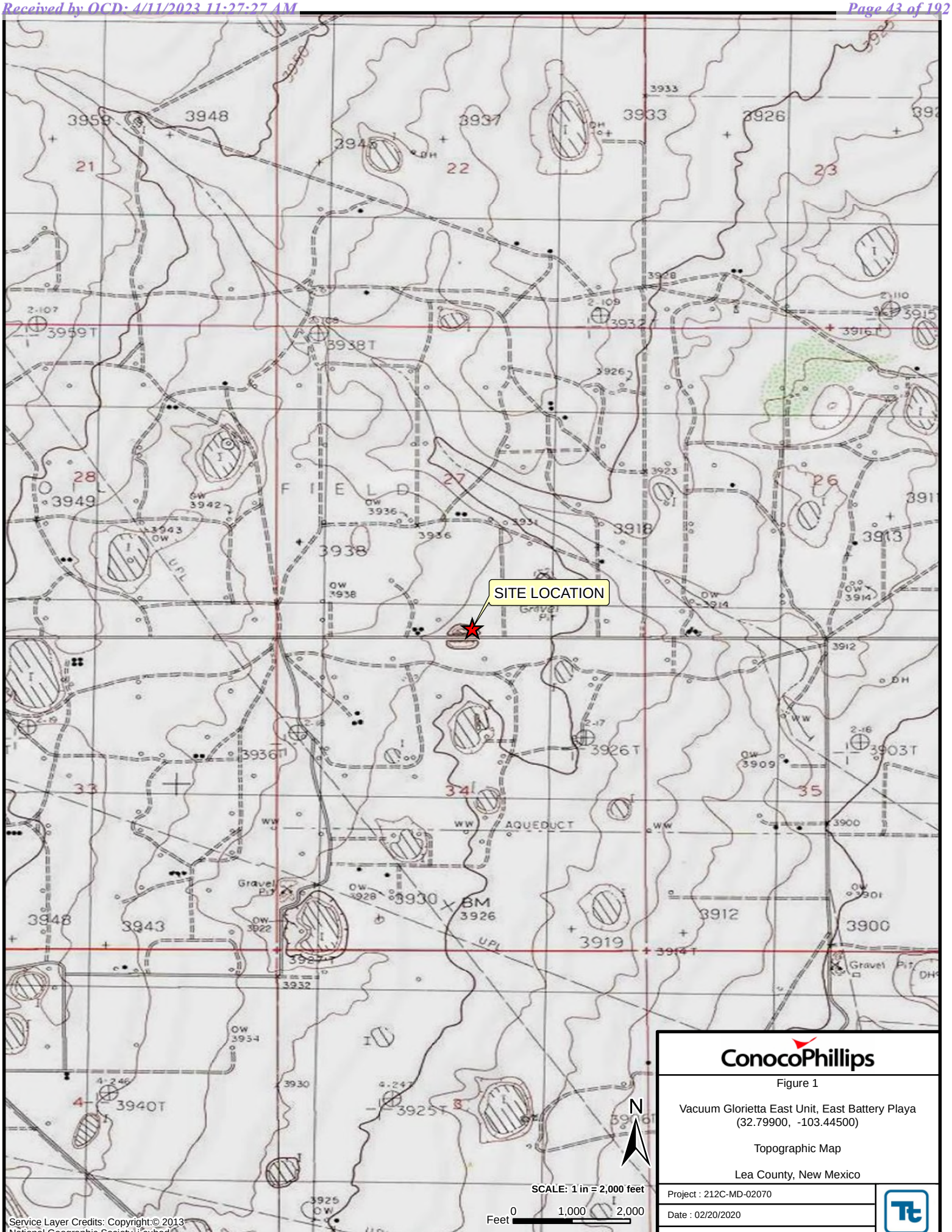
cc: Ms. Jenni Fortunato – ConocoPhillips
Mr. Marvin Soriwei – ConocoPhillips

Attachments:

Figure 1 – Topographic Map
Figure 2 – Site Plan Map
Figure 3 – Groundwater Gradient Map – June 2019
Figure 4 – Groundwater Gradient Map – November 2019
Table 1 – Summary of Groundwater Elevations and PSH Thickness
Table 2 – Summary of Groundwater Analytical Data
Appendix A – Laboratory Analytical Data Packages
Appendix B – AcuVac Remediation, LLC Soil Vapor Extraction Report

TETRA TECH

FIGURES



ConocoPhillips

Figure 1

Vacuum Glorietta East Unit, East Battery Playa
(32.79900, -103.44500)

Topographic Map

Lea County, New Mexico

Project : 212C-MD-02070	
Date : 02/20/2020	
File : Figure 1 Vacuum Glorietta	

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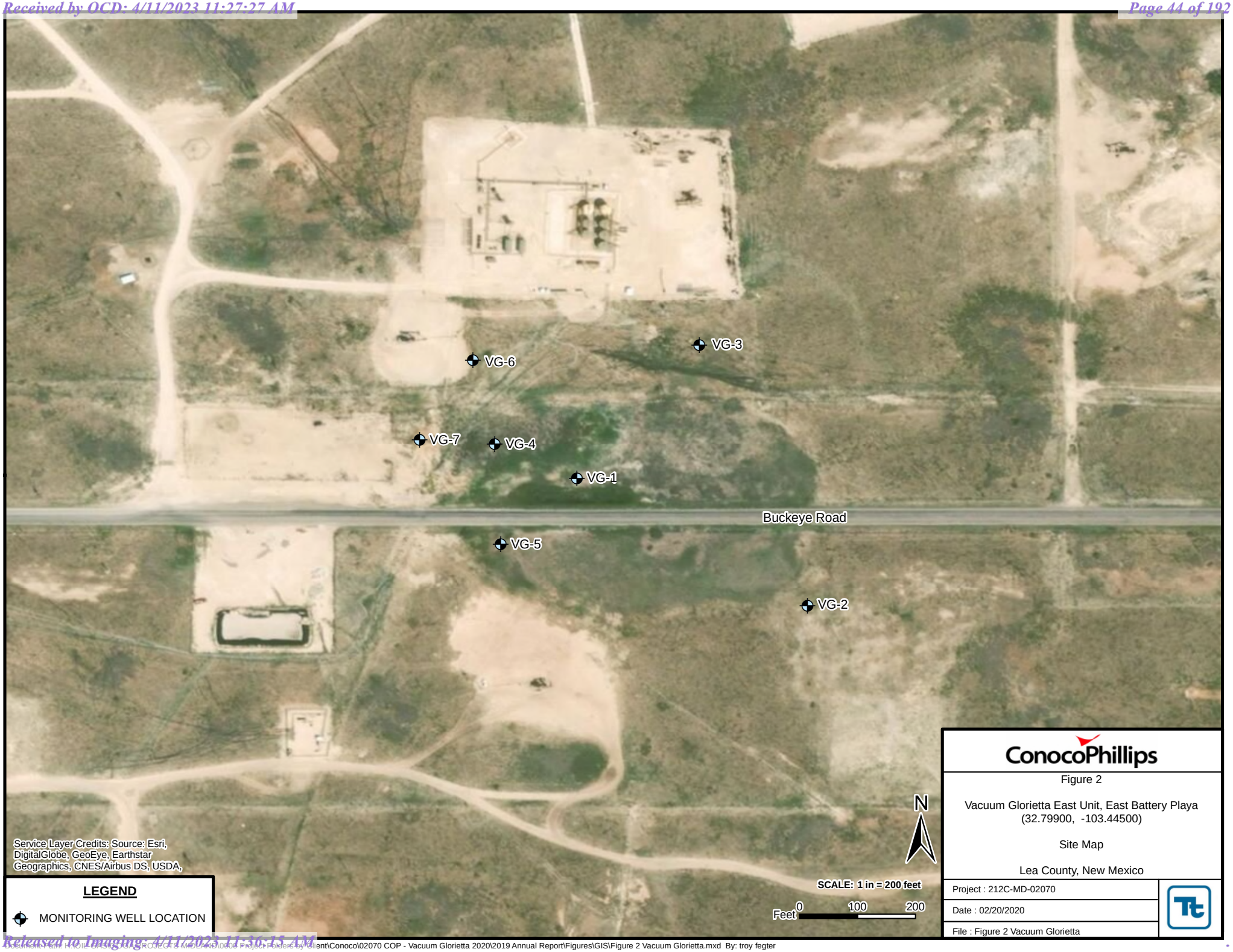


ConocoPhillips

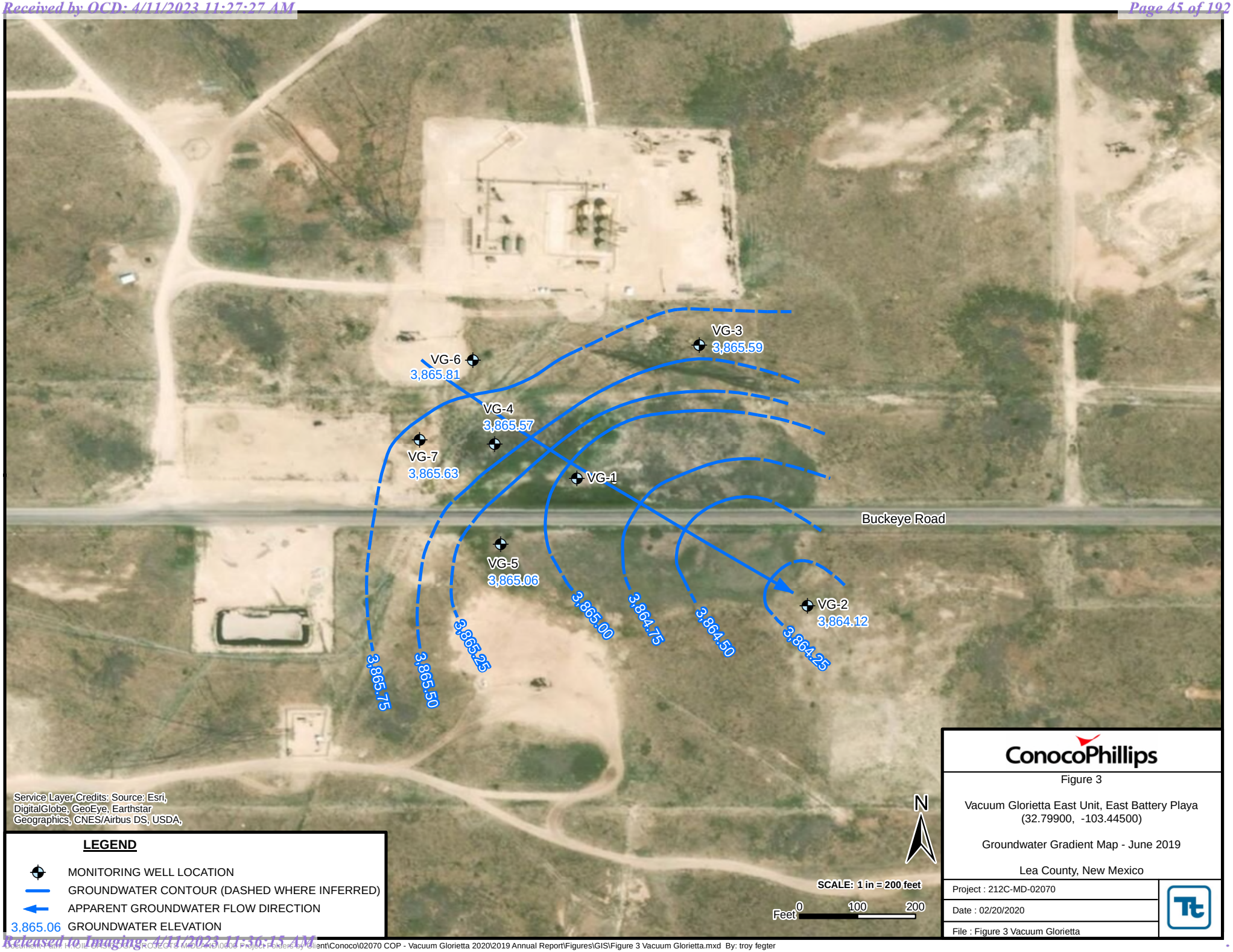
Figure 2

Vacuum Glorietta East Unit, East Battery Playa
(32.79900, -103.44500)

Site Map

Lea County, New Mexico

Project : 212C-MD-02070	
Date : 02/20/2020	
File : Figure 2 Vacuum Glorietta	



ConocoPhillips

Figure 3

Vacuum Glorietta East Unit, East Battery Playa
(32.79900, -103.44500)

Groundwater Gradient Map - June 2019

Lea County, New Mexico

Project : 212C-MD-02070	
Date : 02/20/2020	
File : Figure 3 Vacuum Glorietta	

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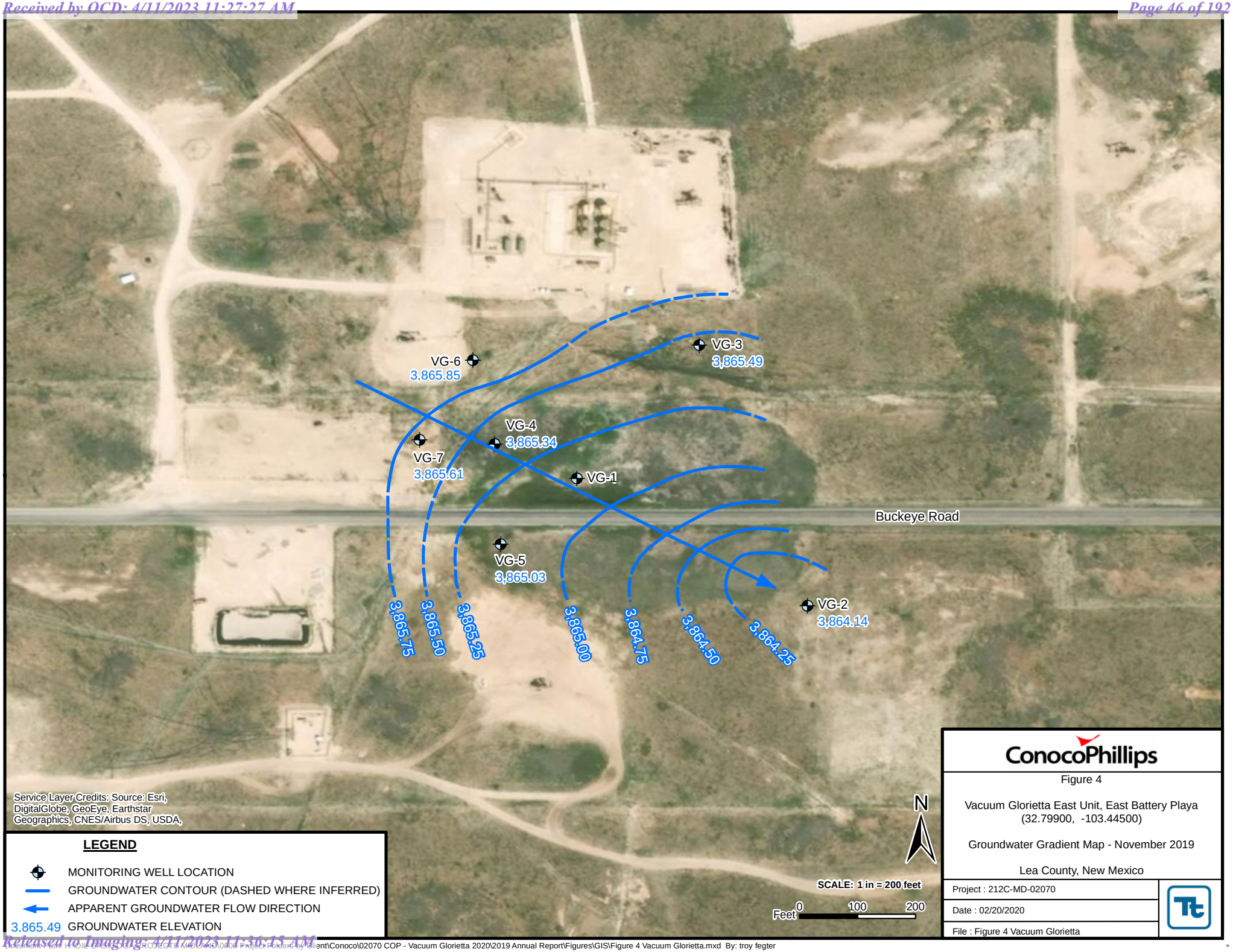


ConocoPhillips

Figure 4

Vacuum Glorietta East Unit, East Battery Playa
(32.79900, -103.44500)

Groundwater Gradient Map - November 2019

Lea County, New Mexico

Project : 212C-MD-02070	
Date : 02/20/2020	
File : Figure 4 Vacuum Glorietta	

TETRA TECH

TABLES

Table 1
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Elevations and PSH Thickness

Well Number	Date Measured	Well Total Depth (ft below TOC)	Product (ft below TOC)	Water level (ft below TOC)	PSH Thickness (ft)	Product Elevation (ft AMSL)	TOC Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)
VG-2	1/27/2014	70	-	65.41	-	-	3,930.56	**3,865.15**
	4/16/2014	70	-	65.38	-	-	3,930.56	**3,865.18**
	7/22/2014	70	-	65.32	-	-	3,930.56	**3,865.24**
	10/9/2014	70	-	64.03	-	-	3,930.56	**3,866.53**
	1/14/2015	70	-	64.3	-	-	3,930.56	**3,866.26**
	4/16/2015	70	-	64.37	-	-	3,930.56	**3,866.19**
	7/8/2015	70	-	64.85	-	-	3,930.56	**3,865.71**
	10/9/2015	70	-	65.15	-	-	3,930.56	**3,865.41**
	1/7/2016	70	-	65.25	-	-	3,930.56	**3,865.31**
	4/6/2016	70	-	65.29	-	-	3,930.56	**3,865.27**
	6/10/2016	70	-	65.35	-	-	3,930.56	**3,865.21**
	8/16/2017	70	-	65.58	-	-	3,930.56	**3,864.98**
	11/30/2017	70	-	65.57	-	-	3,930.56	**3,864.99**
	7/24/2018	-	-	65.79	-	-	3,930.56	**3,864.77**
	11/14/2018	67.7	-	65.9	-	-	3,930.56	**3,864.66**
	6/17/2019	67.89	-	66.44	-	-	3,930.56	**3,864.12**
	11/20/2019	67.89	-	66.42	-	-	3,930.56	**3,864.14**
VG-3	1/27/2014	70	-	64.71	-	-	3,931.15	**3,866.44**
	4/16/2014	70	-	64.66	-	-	3,931.15	**3,866.49**
	7/22/2014	70	-	64.59	-	-	3,931.15	**3,866.56**
	9/10/2014	70	-	63.3	-	-	3,931.15	**3,867.85**
	1/14/2015	70	-	63.58	-	-	3,931.15	**3,867.57**
	4/16/2015	70	-	63.63	-	-	3,931.15	**3,867.52**
	8/7/2015	70	-	64.11	-	-	3,931.15	**3,867.04**
	9/10/2015	70	-	64.38	-	-	3,931.15	**3,866.77**
	7/1/2016	70	-	64.48	-	-	3,931.15	**3,866.67**
	6/4/2016	70	-	64.54	-	-	3,931.15	**3,866.61**
	6/10/2016	70	-	64.61	-	-	3,931.15	**3,866.54**
	8/16/2017	70	-	64.86	-	-	3,931.15	**3,866.29**
	11/30/2017	70	-	64.87	-	-	3,931.15	**3,866.28**
	7/24/2018	-	-	65.02	-	-	3,931.15	**3,866.13**
	11/14/2018	68.48	-	65.21	-	-	3,931.15	**3,865.94**
	6/17/2019	68.61	-	65.56	-	-	3,931.15	**3,865.59**
	11/19/2019	68.61	-	65.66	-	-	3,931.15	**3,865.49**
VG-4	1/27/2014	78	65.52	65.56	0.04	3,866.41	3,931.93	**3,866.40**
	4/16/2014	78	65.48	65.49	0.01	3,866.45	3,931.93	**3,866.45**
	7/22/2014	78	65.44	65.45	0.01	3,866.49	3,931.93	**3,866.49**
	10/9/2014	78	-	63.93	-	-	3,931.93	**3,868.00**
	1/14/2015	78	-	64.48	-	-	3,931.93	**3,867.45**
	4/16/2015	78	-	64.53	-	-	3,931.93	**3,867.40**
	7/8/2015	78	-	65.02	-	-	3,931.93	**3,866.91**
	10/9/2015	78	-	65.25	-	-	3,931.93	**3,866.68**
	1/7/2016	78	-	65.33	-	-	3,931.93	**3,866.60**
	4/6/2016	78	65.35	65.36	0.01	3,866.58	3,931.93	**3,866.58**
	10/6/2016	78	-	65.46	-	-	3,931.93	**3,866.47**
	8/16/2017	78	-	65.75	-	-	3,931.93	**3,866.18**
	11/30/2017	78	-	68.42	-	-	3,931.93	**3,863.51**
	7/24/2018	-	65.13	65.92	0.79	3,866.80	3,931.93	**3,866.64**
	11/14/2018	-	66.06	67.14	1.08	3,865.87	3,931.93	**3,865.65**

Table 1
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Elevations and PSH Thickness

Well Number	Date Measured	Well Total Depth (ft below TOC)	Product (ft below TOC)	Water level (ft below TOC)	PSH Thickness (ft)	Product Elevation (ft AMSL)	TOC Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)
VG-4 continued	6/17/2019	-	66.35	66.38	0.03	3,865.58	3,931.93	**3,865.57**
	11/19/2019	-	66.57	66.68	0.11	3,865.36	3,931.93	**3,865.34**
VG-5	1/27/2014	74	-	64.51	-	-	3,930.52	**3,866.01**
	4/16/2014	74	-	64.8	-	-	3,930.52	**3,865.72**
	7/22/2014	74	-	64.38	-	-	3,930.52	**3,866.14**
	10/9/2014	74	-	63.16	-	-	3,930.52	**3,867.36**
	1/14/2015	74	-	63.42	-	-	3,930.52	**3,867.10**
	4/16/2015	74	-	63.46	-	-	3,930.52	**3,867.06**
	7/8/2015	74	-	63.99	-	-	3,930.52	**3,866.53**
	10/9/2015	74	-	64.25	-	-	3,930.52	**3,866.27**
	1/7/2016	74	-	64.32	-	-	3,930.52	**3,866.20**
	4/6/2016	74	-	64.36	-	-	3,930.52	**3,866.16**
	10/6/2016	74	-	64.43	-	-	3,930.52	**3,866.09**
	8/16/2017	74	-	64.68	-	-	3,930.52	**3,865.84**
	11/30/2017	74	-	64.77	-	-	3,930.52	**3,865.75**
	7/24/2018	-	-	64.84	-	-	3,930.52	**3,865.68**
	11/14/2018	75.3	-	64.98	-	-	3,930.52	**3,865.54**
	6/17/2019	75.31	-	65.46	-	-	3,930.52	**3,865.06**
	11/20/2019	75.31	-	65.49	-	-	3,930.52	**3,865.03**
VG-6	1/27/2014	80	-	68.38	-	-	3,935.16	**3,866.78**
	4/16/2014	80	-	68.32	-	-	3,935.16	**3,866.84**
	7/22/2014	80	-	68.26	-	-	3,935.16	**3,866.90**
	10/9/2014	80	-	67.06	-	-	3,935.16	**3,868.10**
	1/14/2015	80	-	67.27	-	-	3,935.16	**3,867.89**
	4/16/2015	80	-	67.3	-	-	3,935.16	**3,867.86**
	7/8/2015	80	-	67.86	-	-	3,935.16	**3,867.30**
	10/9/2015	80	-	68.12	-	-	3,935.16	**3,867.04**
	1/7/2016	80	-	68.16	-	-	3,935.16	**3,867.00**
	4/6/2016	80	-	68.21	-	-	3,935.16	**3,866.95**
	10/6/2016	80	-	68.27	-	-	3,935.16	**3,866.89**
	8/16/2017	80	-	68.53	-	-	3,935.16	**3,866.63**
	11/30/2017	80	-	68.57	-	-	3,935.16	**3,866.59**
	7/24/2018	-	-	68.69	-	-	3,935.16	**3,866.47**
	11/14/2018	80	-	68.86	-	-	3,935.16	**3,866.30**
	6/17/2019	80.16	-	69.35	-	-	3,935.16	**3,865.81**
	11/19/2019	80.16	-	69.31	-	-	3,935.16	**3,865.85**
VG-7	1/27/2014	80	-	68.23	-	-	3,934.78	**3,866.55**
	4/16/2014	80	-	68.19	-	-	3,934.78	**3,866.59**
	7/22/2014	80	-	68.1	-	-	3,934.78	**3,866.68**
	10/9/2014	80	-	66.93	-	-	3,934.78	**3,867.85**
	1/14/2015	80	-	67.12	-	-	3,934.78	**3,867.66**
	4/16/2015	80	-	67.16	-	-	3,934.78	**3,867.62**
	7/8/2015	80	-	67.7	-	-	3,934.78	**3,867.08**
	10/9/2015	80	-	67.98	-	-	3,934.78	**3,866.80**
	1/7/2016	80	-	68.01	-	-	3,934.78	**3,866.77**
	4/6/2016	80	-	68.07	-	-	3,934.78	**3,866.71**
	10/6/2016	80	-	68.13	-	-	3,934.78	**3,866.65**
	8/16/2017	80	-	68.38	-	-	3,934.78	**3,866.40**
	11/30/2017	80	-	68.36	-	-	3,934.78	**3,866.42**

Table 1
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Elevations and PSH Thickness

Well Number	Date Measured	Well Total Depth (ft below TOC)	Product (ft below TOC)	Water level (ft below TOC)	PSH Thickness (ft)	Product Elevation (ft AMSL)	TOC Elevation (ft AMSL)	Groundwater Elevation (ft AMSL)
VG-7 continued	7/24/2018	-	-	68.58	-	-	3,934.78	**3,866.20**
	11/14/2018	79.8	-	68.65	-	-	3,934.78	**3,866.13**
	6/17/2019	80.09	-	69.15	-	-	3,934.78	**3,865.63**
	11/19/2019	80.09	-	69.17	-	-	3,934.78	**3,865.61**

Notes:

-	no measurement
ft	feet
TOC	top of casing
AMSL	above mean sea level

Table 2
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Analytical Data

Sample Identification	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethlybenzene (mg/L)	Total Xylenes (mg/L)	Chloride (mg/L)
NMWQCC Groundwater Quality Standards (mg/L)		0.01	0.750	0.75	0.62	250
VG-2	1/28/2014	<0.001	<0.001	<0.001	<0.003	**125**
	4/16/2014	<0.001	<0.001	<0.001	<0.003	**134**
	7/22/2014	<0.001	<0.001	<0.001	<0.003	**146**
	10/9/2014	<0.001	<0.001	<0.001	<0.003	**111**
DUP	10/9/2014	<0.001	<0.001	<0.001	<0.003	**139**
	1/14/2015	<0.001	<0.001	<0.001	<0.003	**106**
	4/16/2015	<0.001	<0.001	<0.001	<0.003	**88.4**
	7/8/2015	<0.001	<0.001	<0.001	<0.003	**73.8**
	10/9/2015	<0.001	<0.001	<0.001	<0.003	**106**
	1/7/2016	<0.001	<0.001	<0.001	<0.003	**183**
	4/6/2016	<0.001	<0.001	<0.001	<0.003	**174**
	10/6/2016	<0.001	<0.001	<0.001	<0.003	**200**
	8/16/2017	<0.0020	<0.0050	<0.0020	<0.0060	**200**
	11/30/2017	<0.0020	<0.0050	<0.0020	<0.0060	**195**
	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**173**
DUP	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**169**
	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**175**
	6/17/2019	<0.00100	<0.00100	<0.00100	<0.00300	**193**
	11/20/2019	<0.00100	<0.00100	<0.00100	<0.00300	**192**
VG-3	1/18/2014	<0.001	<0.001	<0.001	<0.003	**45.2**
	4/16/2014	<0.001	<0.001	<0.001	<0.003	**46.7**
	7/22/2014	<0.001	<0.001	<0.001	<0.003	**44.4**
	9/10/2014	<0.001	<0.001	<0.001	<0.003	**38.2**
	1/14/2015	<0.001	<0.001	<0.001	<0.003	**50**
	4/16/2015	<0.001	<0.001	<0.001	<0.003	**45.7**
	7/8/2015	<0.001	<0.001	<0.001	<0.003	**44.2**
	10/9/2015	<0.001	<0.001	<0.001	<0.003	**41.6**
	1/7/2016	<0.001	<0.001	<0.001	<0.003	**40.4**
	4/6/2016	<0.001	<0.001	<0.001	<0.003	**40.9**
	10/6/2016	<0.001	<0.001	<0.001	<0.003	**40.3**
	8/16/2017	<0.0020	<0.0050	<0.0020	<0.0060	**40.4**
	11/30/2017	<0.0020	<0.0050	<0.0020	<0.0060	**38.1**
	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**44.8**
	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**46.6**
	6/17/2019	<0.00100	<0.00100	<0.00100	<0.00300	**49.6**
	11/19/2019	<0.00100	<0.00100	<0.00100	<0.00300	**55.1**
VG-4	10/28/2014	**1.80**	<0.05	**0.82**	0.20	**4140**

Table 2
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Analytical Data

Sample Identification	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethlybenzene (mg/L)	Total Xylenes (mg/L)	Chloride (mg/L)
NMWQCC Groundwater Quality Standards (mg/L)		0.01	0.750	0.75	0.62	250
VG-4 continued	1/14/2015	**2.70**	0.030	**1.10**	**0.78**	**5640**
	4/16/2015	**5.60**	0.037	**1.70**	**0.80**	**3080**
DUP	4/16/2015	**5.00**	0.030	**1.30**	0.31	-
	7/8/2015	**4.94**	<.05	**1.57**	<0.15	**2240**
DUP	7/8/2015	**4.21**	0.002	**1.27**	0.13	-
	10/9/2015	**4.18**	<.05	**1.50**	0.31	**1480**
	1/7/2016	**4.12**	<.05	**2.10**	0.27	**1360**
DUP	1/7/2016	**4.08**	0.022	**2.01**	0.18	-
	4/6/2016	**3.61**	<0.05	**5.47**	**2.13**	**1190**
DUP	4/6/2016	**3.17**	<0.05	**2.95**	0.99	-
	10/6/2016	**1.51**	<0.05	0.54	**0.26**	**1490**
DUP	10/6/2016	**1.58**	<0.05	0.57	0.27	-
	8/16/2017	**0.77**	<0.0050	**0.12**	**0.04**	**1,180**
	11/30/2017	**0.96**	**0.007**	**0.25**	**0.11**	**1,060**
DUP 1	11/30/2017	**1.50**	**0.007**	**0.39**	**0.11**	**1,090**
	7/25/2018	**NS**				
	11/14/2018	**NS**				
	6/17/2019	**NS**				
	11/19/2019	**NS**				
VG-5	1/28/2014	<0.001	<0.001	<0.001	<0.003	**304**
	4/16/2014	<0.001	<0.001	<0.001	<0.003	**342**
DUP	4/16/2014	<0.001	<0.001	<0.001	<0.003	**328**
	7/22/2014	<0.001	<0.001	<0.001	<0.003	140
	10/9/2014	<0.001	<0.001	<0.001	<0.003	**278**
	1/14/2015	<0.001	<0.001	<0.001	<0.003	228
DUP	1/14/2015	<0.001	<0.001	<0.001	<0.003	200
	4/16/2015	<0.001	<0.001	<0.001	<0.003	200
	7/8/2015	<0.001	<0.001	<0.001	<0.003	232
	10/9/2015	<0.001	<0.001	<0.001	<0.003	204
DUP	10/9/2015	<0.001	<0.001	<0.001	<0.003	187
	1/7/2016	<0.001	<0.001	<0.001	<0.003	158
	4/6/2016	<0.001	<0.001	<0.001	<0.003	224
	10/6/2016	<0.001	<0.001	<0.001	<0.003	**283**
	8/16/2017	<0.0020	<0.0050	<0.0020	<0.0060	**298**
	11/30/2017	<0.0020	<0.0050	<0.0020	<0.0060	**417**
	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**225**
	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**180**
DUP	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**177**

Table 2
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Analytical Data

Sample Identification	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethlybenzene (mg/L)	Total Xylenes (mg/L)	Chloride (mg/L)
NMWQCC Groundwater Quality Standards (mg/L)		0.01	0.750	0.75	0.62	250
VG-5 continued	6/17/2019	**0.000862 J**	**0.00439**	**0.000526 J**	**0.00244 J**	**188**
	11/20/2019	<0.00100	<0.00100	<0.00100	<0.00300	**176**
VG-6	1/28/2014	<0.001	<0.001	<0.001	<0.003	**88.3**
	4/16/2014	<0.001	<0.001	<0.001	<0.003	**78.1**
	7/22/2014	<0.001	<0.001	<0.001	<0.003	**95.3**
	10/9/2014	<0.001	<0.001	<0.001	<0.003	**113**
	1/14/2015	<0.001	<0.001	<0.001	<0.003	**88.4**
	4/16/2015	<0.001	<0.001	<0.001	<0.003	**82.3**
	7/8/2015	<0.001	<0.001	<0.001	<0.003	**99.9**
	10/9/2015	<0.001	<0.001	<0.001	<0.003	**134**
	1/7/2016	<0.001	<0.001	<0.001	<0.003	**111**
	4/6/2016	<0.001	<0.001	<0.001	<0.003	**86**
	10/6/2016	<0.001	<0.001	<0.001	<0.003	**139**
	8/16/2017	<0.0020	<0.0050	<0.0020	<0.0060	**140**
	11/30/2017	<0.0020	<0.0050	<0.0020	<0.0060	**84.4**
	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**117**
	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**134**
	6/17/2019	<0.00100	**0.001**	<0.00100	<0.00300	**138**
	11/19/2019	<0.00100	<0.00100	<0.00100	<0.00300	**143**
VG-7	1/28/2014	<0.001	<0.001	<0.001	<0.003	**191**
DUP	1/28/2014	<0.001	<0.001	<0.001	<0.003	**201**
	4/16/2014	<0.001	<0.001	<0.001	<0.003	**211**
	7/22/2014	<0.001	<0.001	<0.001	<0.003	**201**
DUP	7/22/2014	-	-	-	-	**203**
	10/9/2014	<0.001	<0.001	<0.001	<0.003	**189**
	1/14/2015	<0.001	<0.001	<0.001	<0.003	**246**
	4/16/2015	<0.001	<0.001	<0.001	<0.003	**270**
	7/8/2015	<0.001	<0.001	<0.001	<0.003	**203**
	10/9/2015	<0.001	<0.001	<0.001	<0.003	**154**
	1/7/2016	<0.001	<0.001	<0.001	<0.003	**121**
	4/6/2016	<0.001	<0.001	<0.001	<0.003	**148**
	10/6/2016	<0.001	<0.001	<0.001	<0.003	**172**
	8/16/2017	<0.0020	<0.0050	<0.0020	<0.0060	**134**
	11/30/2017	<0.0020	<0.0050	<0.0020	<0.0060	**164**
	7/25/2018	<0.00100	<0.00100	<0.00100	<0.00300	**254**
	11/14/2018	<0.00100	<0.00100	<0.00100	<0.00300	**229**

Table 2
ConocoPhillips
Vacuum Glorietta
Lea County, New Mexico
Summary of Groundwater Analytical Data

Sample Identification	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethlybenzene (mg/L)	Total Xylenes (mg/L)	Chloride (mg/L)
NMWQCC Groundwater Quality Standards (mg/L)		**0.01**	**0.750**	**0.75**	**0.62**	**250**
VG-7 continued	6/17/2019	<0.00100	<0.00100	<0.00100	<0.00300	**207**
DUP	6/17/2019	<0.00100	<0.00100	<0.00100	<0.00300	**207**
	11/19/2019	<0.00100	<0.00100	<0.00100	<0.00300	**149**
DUP	11/19/2019	<0.00100	<0.00100	<0.00100	<0.00300	**145**

Notes:

mg/L	milligrams per liter
NMWQCC	New Mexico Water Quality Control Commission
	concentration exceeds NMWQCC groundwater quality standards
DUP	duplicate sample
NS	not sampled
J	the reported value is an estimate
--	not analyzed

TETRA TECH

APPENDIX A

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

July 01, 2019

ConocoPhillips - Tetra Tech

Sample Delivery Group:	L1111693
Samples Received:	06/21/2019
Project Number:	212C-MD-01748
Description:	COP- Vacuum Glorietta

Report To: Julie Evans
901 West Wall
Suite 100
Midland, TX 79701

Entire Report Reviewed By:

Jordan N Zito
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

TABLE OF CONTENTS

VG-6 L1111693-01 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 11:45 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	5	06/28/19 20:39	06/28/19 20:39	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 19:48	06/29/19 19:48	ADM	Mt. Juliet, TN

VG-7 L1111693-02 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 12:40 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	5	06/28/19 20:54	06/28/19 20:54	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 20:13	06/29/19 20:13	ADM	Mt. Juliet, TN

VG-3 L1111693-03 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 13:35 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	1	06/28/19 21:09	06/28/19 21:09	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 20:39	06/29/19 20:39	ADM	Mt. Juliet, TN

VG-2 L1111693-04 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 11:15 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	5	06/28/19 21:24	06/28/19 21:24	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 21:04	06/29/19 21:04	ADM	Mt. Juliet, TN

VG-5 L1111693-05 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 12:20 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	5	06/28/19 21:39	06/28/19 21:39	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 21:30	06/29/19 21:30	ADM	Mt. Juliet, TN

DUP L1111693-06 GW

Collected by: Preston Poitevint | Collected date/time: 06/17/19 00:00 | Received date/time: 06/21/19 09:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 300.0	WG1302756	5	06/28/19 21:54	06/28/19 21:54	ELN	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1303095	1	06/29/19 21:55	06/29/19 21:55	ADM	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jordan N Zito
Project Manager

Sample Handling and Receiving

VOC pH outside of method requirement.

Lab Sample ID	Project Sample ID	Method
L1111693-04	VG-2	8260B

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	138		0.260	1.00	5.00	5	06/28/2019 20:39	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	0.00100	1	06/29/2019 19:48	WG1303095
Toluene	0.00105		0.000412	0.00100	0.00100	1	06/29/2019 19:48	WG1303095
Ethylbenzene	U		0.000384	0.00100	0.00100	1	06/29/2019 19:48	WG1303095
Total Xylenes	U		0.00106	0.00300	0.00300	1	06/29/2019 19:48	WG1303095
(S) Toluene-d8	*99.6*				*80.0-120*		*06/29/2019 19:48*	WG1303095
(S) 4-Bromofluorobenzene	*103*				*77.0-126*		*06/29/2019 19:48*	WG1303095
(S) 1,2-Dichloroethane-d4	*99.8*				*70.0-130*		*06/29/2019 19:48*	WG1303095

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	207		0.260	1.00	5.00	5	06/28/2019 20:54	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	0.00100	1	06/29/2019 20:13	WG1303095
Toluene	U		0.000412	0.00100	0.00100	1	06/29/2019 20:13	WG1303095
Ethylbenzene	U		0.000384	0.00100	0.00100	1	06/29/2019 20:13	WG1303095
Total Xylenes	U		0.00106	0.00300	0.00300	1	06/29/2019 20:13	WG1303095
(S) Toluene-d8	*102*				*80.0-120*		*06/29/2019 20:13*	WG1303095
(S) 4-Bromofluorobenzene	*103*				*77.0-126*		*06/29/2019 20:13*	WG1303095
(S) 1,2-Dichloroethane-d4	*104*				*70.0-130*		*06/29/2019 20:13*	WG1303095

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	49.6		0.0519	1.00	1.00	1	06/28/2019 21:09	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	0.00100	1	06/29/2019 20:39	WG1303095
Toluene	U		0.000412	0.00100	0.00100	1	06/29/2019 20:39	WG1303095
Ethylbenzene	U		0.000384	0.00100	0.00100	1	06/29/2019 20:39	WG1303095
Total Xylenes	U		0.00106	0.00300	0.00300	1	06/29/2019 20:39	WG1303095
(S) Toluene-d8	*102*				*80.0-120*		*06/29/2019 20:39*	WG1303095
(S) 4-Bromofluorobenzene	*103*				*77.0-126*		*06/29/2019 20:39*	WG1303095
(S) 1,2-Dichloroethane-d4	*102*				*70.0-130*		*06/29/2019 20:39*	WG1303095

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	193		0.260	1.00	5.00	5	06/28/2019 21:24	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	0.00100	1	06/29/2019 21:04	WG1303095
Toluene	U		0.000412	0.00100	0.00100	1	06/29/2019 21:04	WG1303095
Ethylbenzene	U		0.000384	0.00100	0.00100	1	06/29/2019 21:04	WG1303095
Total Xylenes	U		0.00106	0.00300	0.00300	1	06/29/2019 21:04	WG1303095
(S) Toluene-d8	*103*				*80.0-120*		*06/29/2019 21:04*	WG1303095
(S) 4-Bromofluorobenzene	*103*				*77.0-126*		*06/29/2019 21:04*	WG1303095
(S) 1,2-Dichloroethane-d4	*104*				*70.0-130*		*06/29/2019 21:04*	WG1303095

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	188		0.260	1.00	5.00	5	06/28/2019 21:39	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	0.000862	J	0.000331	0.00100	0.00100	1	06/29/2019 21:30	WG1303095
Toluene	0.00439		0.000412	0.00100	0.00100	1	06/29/2019 21:30	WG1303095
Ethylbenzene	0.000526	J	0.000384	0.00100	0.00100	1	06/29/2019 21:30	WG1303095
Total Xylenes	0.00244	J	0.00106	0.00300	0.00300	1	06/29/2019 21:30	WG1303095
(S) Toluene-d8	*102*				*80.0-120*		*06/29/2019 21:30*	WG1303095
(S) 4-Bromofluorobenzene	*104*				*77.0-126*		*06/29/2019 21:30*	WG1303095
(S) 1,2-Dichloroethane-d4	*105*				*70.0-130*		*06/29/2019 21:30*	WG1303095

Wet Chemistry by Method 300.0

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Chloride	207		0.260	1.00	5.00	5	06/28/2019 21:54	WG1302756

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	SDL	Unadj. MQL	MQL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	0.00100	1	06/29/2019 21:55	WG1303095
Toluene	U		0.000412	0.00100	0.00100	1	06/29/2019 21:55	WG1303095
Ethylbenzene	U		0.000384	0.00100	0.00100	1	06/29/2019 21:55	WG1303095
Total Xylenes	U		0.00106	0.00300	0.00300	1	06/29/2019 21:55	WG1303095
(S) Toluene-d8	*105*				*80.0-120*		*06/29/2019 21:55*	WG1303095
(S) 4-Bromofluorobenzene	*104*				*77.0-126*		*06/29/2019 21:55*	WG1303095
(S) 1,2-Dichloroethane-d4	*104*				*70.0-130*		*06/29/2019 21:55*	WG1303095

Method Blank (MB)

(MB) R3425982-1 06/28/19 16:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00

L1111591-12 Original Sample (OS) • Duplicate (DUP)

(OS) L1111591-12 06/28/19 18:40 • (DUP) R3425982-3 06/28/19 18:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	1.10	1.09	1	0.882		20

L1111782-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1111782-10 06/29/19 00:08 • (DUP) R3425982-6 06/29/19 00:23

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	104	104	1	0.109	E	20

Laboratory Control Sample (LCS)

(LCS) R3425982-2 06/28/19 16:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	39.2	98.0	90.0-110	

L1111591-12 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1111591-12 06/28/19 18:40 • (MS) R3425982-4 06/28/19 19:10 • (MSD) R3425982-5 06/28/19 19:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	1.10	52.3	52.0	102	102	1	80.0-120			0.488	20

L1111782-10 Original Sample (OS) • Matrix Spike (MS)

(OS) L1111782-10 06/29/19 00:08 • (MS) R3425982-7 06/29/19 00:38

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	104	149	89.7	1	80.0-120	E

Method Blank (MB)

(MB) R3426123-2 06/29/19 13:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*103*			*80.0-120*
(S) 4-Bromofluorobenzene	*105*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*103*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3426123-1 06/29/19 12:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.0250	0.0240	96.2	70.0-123	
Ethylbenzene	0.0250	0.0252	101	79.0-123	
Toluene	0.0250	0.0235	93.9	79.0-120	
Xylenes, Total	0.0750	0.0777	104	79.0-123	
(S) Toluene-d8			*104*	*80.0-120*	
(S) 4-Bromofluorobenzene			*107*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*102*	*70.0-130*	

L1111664-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1111664-02 06/29/19 17:15 • (MS) R3426123-3 06/29/19 22:21 • (MSD) R3426123-4 06/29/19 22:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	U	0.0232	0.0235	92.8	93.9	1	17.0-158			1.21	27
Ethylbenzene	0.0250	U	0.0239	0.0244	95.5	97.5	1	30.0-155			2.06	27
Toluene	0.0250	U	0.0227	0.0231	90.6	92.5	1	26.0-154			2.04	28
Xylenes, Total	0.0750	U	0.0728	0.0742	97.1	98.9	1	29.0-154			1.90	28
(S) Toluene-d8					*103*	*105*		*80.0-120*				
(S) 4-Bromofluorobenzene					*105*	*106*		*77.0-126*				
(S) 1,2-Dichloroethane-d4					*110*	*110*		*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
MQL	Method Quantitation Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
SDL	Sample Detection Limit.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Sample Detection Limit.
Unadj. MQL	Unadjusted Method Quantitation Limit.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.

ACCREDITATIONS & LOCATIONS

ONE LAB. NATIONWIDE.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

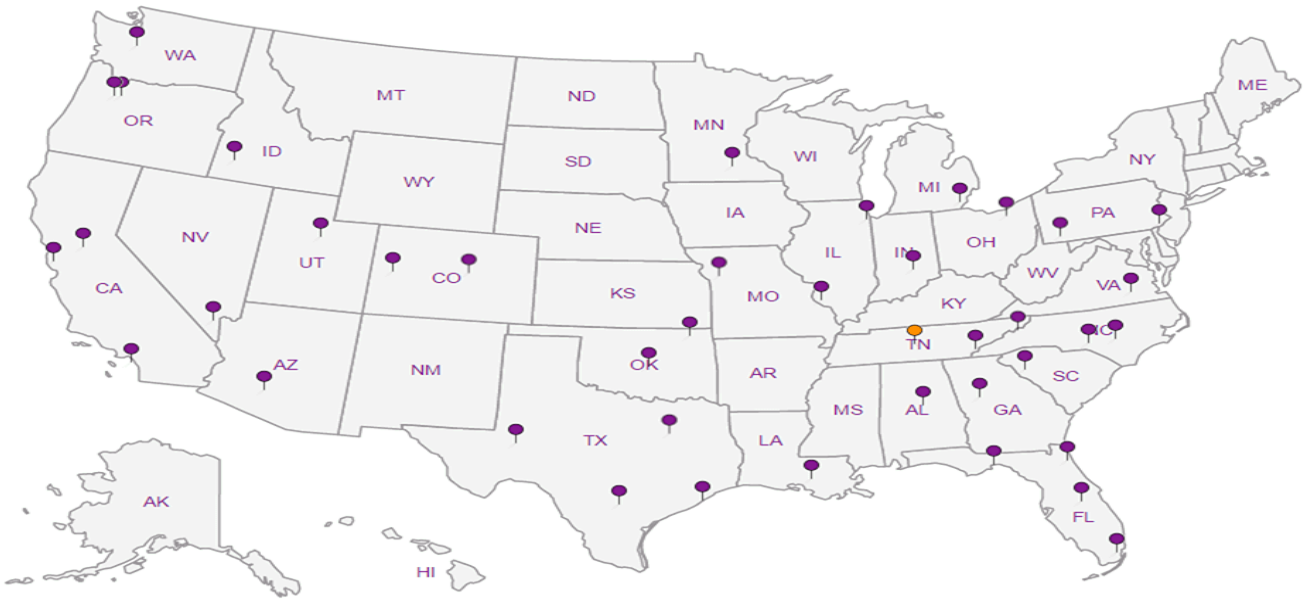
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



ACCOUNT:	PROJECT:	SDG:	DATE/TIME:	PAGE:
ConocoPhillips - Tetra Tech	212C-MD-01748	L1111693	07/01/19 14:13	14 of 15

ConocoPhillips - Tetra Tech

901 West Wall
Suite 100
Midland, TX 79701

Billing Information:
Accounts Payable
901 West Wall
Suite 100
Midland, TX 79701

Email To: julie.evans@tetratech.com

Report to: Julie Evans

Project Description: COP- Vacuum Glorietta

City/State Collected: Lea County, NM

Phone: 432-687-8137
Fax:

Client Project # 212C-MD-01748

Lab Project # COPTETRA-VACUUM

Collected by (print): Preston Pateright

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1111693
G234

Acctnum: COPTETRA
Template: T151596
Prelogin: P714613
TSR: 526 - Chris McCord
PB:
Shipped Via:

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl	Pres Chk	Remarks	Sample # (lab only)
VG-6		GW		6-17-19	1045	3	X	X			-01
VG-7		GW		6-17-19	1240	3	X	X			02
VG-3		GW		6-17-19	1335	3	X	X			03
VG-2		GW		6-18-19	1115	3	X	X			04
VG-5		GW		6-18-19	1220	3	X	X			05
DUP		GW		6-17-19	—	3	X	X			06
		GW				4	X	X			
		GW				4	X	X			
		GW				4	X	X			

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

RAD SCREEN: <0.5 MR/hr

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Trip Blank Received: Yes / NO
HCL / MeoH
TBR

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	6-20-19	15:20	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	6-20-19	17:00	SOA
	Date:	Time:	Received for lab by: (Signature)

Temp: 2.2+0.1=2.3 °C Bottles Received: 18
Date: 6/21/19 Time: 0800

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 05, 2019

ConocoPhillips - Tetra Tech

Sample Delivery Group:	L1164135
Samples Received:	11/22/2019
Project Number:	212C-MD-01748
Description:	COP- Vacuum Glorietta

Report To: Julie Evans
901 West Wall
Suite 100
Midland, TX 79701

Entire Report Reviewed By:

Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

TABLE OF CONTENTS

VG-2 L1164135-01 GW

Collected by: Preston Poitevint | Collected date/time: 11/20/19 12:45 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	5	12/03/19 01:09	12/03/19 01:09	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389171	1	11/30/19 21:53	11/30/19 21:53	JHH	Mt. Juliet, TN

VG-3 L1164135-02 GW

Collected by: Preston Poitevint | Collected date/time: 11/19/19 12:50 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	1	12/03/19 01:48	12/03/19 01:48	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389033	1	11/30/19 08:35	11/30/19 08:35	JHH	Mt. Juliet, TN

VG-5 L1164135-03 GW

Collected by: Preston Poitevint | Collected date/time: 11/20/19 11:30 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	5	12/03/19 02:27	12/03/19 02:27	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389033	1	11/30/19 08:57	11/30/19 08:57	JHH	Mt. Juliet, TN

VG-6 L1164135-04 GW

Collected by: Preston Poitevint | Collected date/time: 11/19/19 11:55 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	5	12/03/19 02:40	12/03/19 02:40	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389171	1	11/30/19 22:13	11/30/19 22:13	JHH	Mt. Juliet, TN

VG-7 L1164135-05 GW

Collected by: Preston Poitevint | Collected date/time: 11/19/19 14:05 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	5	12/03/19 02:54	12/03/19 02:54	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389171	1	11/30/19 22:34	11/30/19 22:34	JHH	Mt. Juliet, TN

DUP L1164135-06 GW

Collected by: Preston Poitevint | Collected date/time: 11/19/19 00:00 | Received date/time: 11/22/19 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1389073	5	12/03/19 03:07	12/03/19 03:07	MCG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1389171	1	11/30/19 22:55	11/30/19 22:55	JHH	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	192		0.260	5.00	5	12/03/2019 01:09	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Benzene	U		0.000331	0.00100	1	11/30/2019 21:53	WG1389171
Toluene	U		0.000412	0.00100	1	11/30/2019 21:53	WG1389171
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 21:53	WG1389171
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 21:53	WG1389171
(S) Toluene-d8	*90.2*			*80.0-120*		*11/30/2019 21:53*	WG1389171
(S) 4-Bromofluorobenzene	*92.4*			*77.0-126*		*11/30/2019 21:53*	WG1389171
(S) 1,2-Dichloroethane-d4	*89.7*			*70.0-130*		*11/30/2019 21:53*	WG1389171

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	55.1		0.0519	1.00	1	12/03/2019 01:48	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	11/30/2019 08:35	WG1389033
Toluene	U		0.000412	0.00100	1	11/30/2019 08:35	WG1389033
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 08:35	WG1389033
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 08:35	WG1389033
(S) Toluene-d8	*91.5*			*80.0-120*		*11/30/2019 08:35*	WG1389033
(S) 4-Bromofluorobenzene	*91.7*			*77.0-126*		*11/30/2019 08:35*	WG1389033
(S) 1,2-Dichloroethane-d4	*120*			*70.0-130*		*11/30/2019 08:35*	WG1389033

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	176		0.260	5.00	5	12/03/2019 02:27	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	11/30/2019 08:57	WG1389033
Toluene	U		0.000412	0.00100	1	11/30/2019 08:57	WG1389033
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 08:57	WG1389033
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 08:57	WG1389033
(S) Toluene-d8	*94.4*			*80.0-120*		*11/30/2019 08:57*	WG1389033
(S) 4-Bromofluorobenzene	*94.1*			*77.0-126*		*11/30/2019 08:57*	WG1389033
(S) 1,2-Dichloroethane-d4	*127*			*70.0-130*		*11/30/2019 08:57*	WG1389033

VG-6
Collected date/time: 11/19/19 11:55

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	143		0.260	5.00	5	12/03/2019 02:40	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	11/30/2019 22:13	WG1389171
Toluene	U		0.000412	0.00100	1	11/30/2019 22:13	WG1389171
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 22:13	WG1389171
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 22:13	WG1389171
(S) Toluene-d8	*92.3*			*80.0-120*		*11/30/2019 22:13*	WG1389171
(S) 4-Bromofluorobenzene	*98.8*			*77.0-126*		*11/30/2019 22:13*	WG1389171
(S) 1,2-Dichloroethane-d4	*87.7*			*70.0-130*		*11/30/2019 22:13*	WG1389171

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	149		0.260	5.00	5	12/03/2019 02:54	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	11/30/2019 22:34	WG1389171
Toluene	U		0.000412	0.00100	1	11/30/2019 22:34	WG1389171
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 22:34	WG1389171
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 22:34	WG1389171
(S) Toluene-d8	*92.3*			*80.0-120*		*11/30/2019 22:34*	WG1389171
(S) 4-Bromofluorobenzene	*91.9*			*77.0-126*		*11/30/2019 22:34*	WG1389171
(S) 1,2-Dichloroethane-d4	*92.4*			*70.0-130*		*11/30/2019 22:34*	WG1389171

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Chloride	145		0.260	5.00	5	12/03/2019 03:07	WG1389073

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Benzene	U		0.000331	0.00100	1	11/30/2019 22:55	WG1389171
Toluene	U		0.000412	0.00100	1	11/30/2019 22:55	WG1389171
Ethylbenzene	U		0.000384	0.00100	1	11/30/2019 22:55	WG1389171
Total Xylenes	U		0.00106	0.00300	1	11/30/2019 22:55	WG1389171
(S) Toluene-d8	*89.5*			*80.0-120*		*11/30/2019 22:55*	WG1389171
(S) 4-Bromofluorobenzene	*95.3*			*77.0-126*		*11/30/2019 22:55*	WG1389171
(S) 1,2-Dichloroethane-d4	*91.4*			*70.0-130*		*11/30/2019 22:55*	WG1389171

Method Blank (MB)

(MB) R3478386-1 12/02/19 18:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.0519	1.00

L1163104-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1163104-02 12/02/19 21:13 • (DUP) R3478386-3 12/02/19 21:26

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	11.5	11.6	1	0.997		15

L1164135-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1164135-02 12/03/19 01:48 • (DUP) R3478386-6 12/03/19 02:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	55.1	53.0	1	3.97		15

Laboratory Control Sample (LCS)

(LCS) R3478386-2 12/02/19 19:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	37.2	92.9	80.0-120	

L1163104-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1163104-02 12/02/19 21:13 • (MS) R3478386-4 12/02/19 21:39 • (MSD) R3478386-5 12/02/19 21:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	11.5	63.4	63.7	104	104	1	80.0-120			0.475	15

L1164135-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1164135-02 12/03/19 01:48 • (MS) R3478386-7 12/03/19 02:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	55.1	100	90.4	1	80.0-120	E

Method Blank (MB)

(MB) R3478085-2 11/29/19 22:39

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*93.8*			*80.0-120*
(S) 4-Bromofluorobenzene	*97.3*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*126*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3478085-1 11/29/19 21:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00460	92.0	70.0-123	
Ethylbenzene	0.00500	0.00436	87.2	79.0-123	
Toluene	0.00500	0.00430	86.0	79.0-120	
Xylenes, Total	0.0150	0.0131	87.3	79.0-123	
(S) Toluene-d8			*90.6*	*80.0-120*	
(S) 4-Bromofluorobenzene			*97.5*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*121*	*70.0-130*	

Method Blank (MB)

(MB) R3478234-2 11/30/19 21:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Benzene	U		0.000331	0.00100
Ethylbenzene	U		0.000384	0.00100
Toluene	U		0.000412	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*91.3*			*80.0-120*
(S) 4-Bromofluorobenzene	*98.6*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*89.5*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3478234-1 11/30/19 20:51

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Benzene	0.00500	0.00445	89.0	70.0-123	
Ethylbenzene	0.00500	0.00499	99.8	79.0-123	
Toluene	0.00500	0.00408	81.6	79.0-120	
Xylenes, Total	0.0150	0.0139	92.7	79.0-123	
(S) Toluene-d8			*88.9*	*80.0-120*	
(S) 4-Bromofluorobenzene			*90.8*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*91.3*	*70.0-130*	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

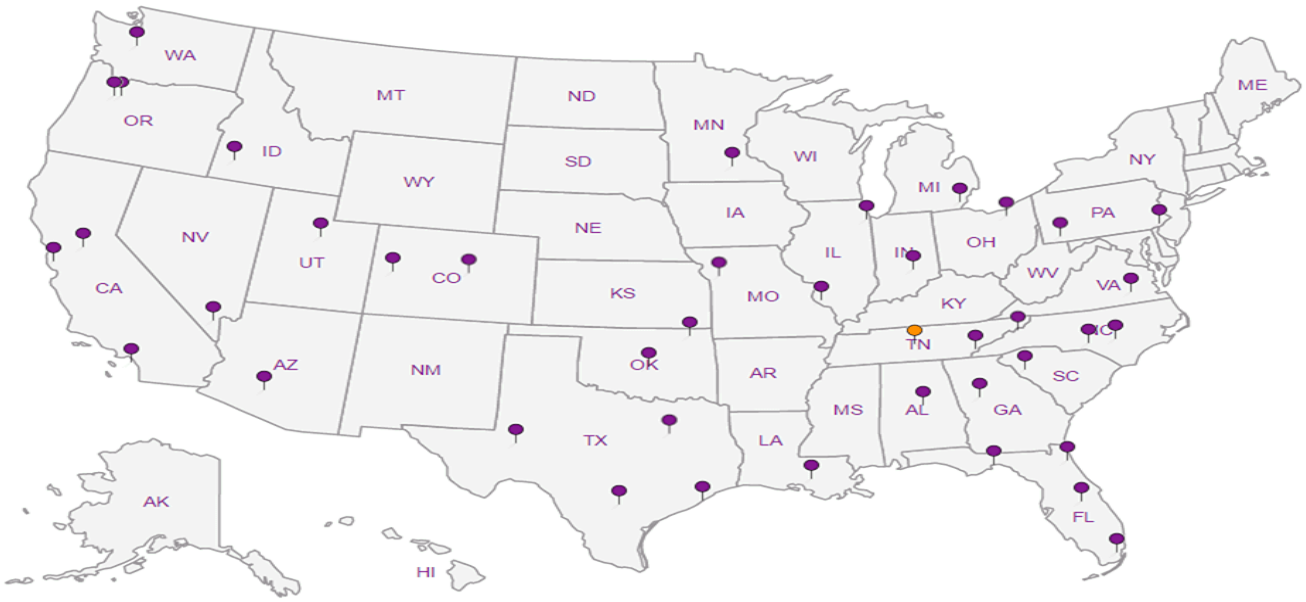
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



ConocoPhillips - Tetra Tech

901 West Wall
Suite 100
Midland, TX 79701

Billing Information:
Accounts Payable
901 West Wall
Suite 100
Midland, TX 79701

Report to: Julie Evans

Email To: julie.evans@tetratech.com

Project Description: COP- Vacuum Glorietta

City/State Collected:

Phone: 432-687-8137
Fax:

Client Project # 212C-MD-01748

Lab Project # COPTETRA-VACUUM

Collected by (print): Preston Pointevint

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	CHLORIDE 125mlHDPE-NoPres	V8260BTEX 40mlAmb-HCl									Remarks	Sample # (lab only)
VG-2		GW		11-20-19	1245	4	X	X										-01
VG-3		GW		11-19-19	1250	4	X	X										02
VG-5		GW		11-20-19	1130	4	X	X										03
VG-6		GW		11-19-19	1155	4	X	X										04
VG-7		GW		11-19-19	1405	4	X	X										05
DUP		GW		11-19-19	—	4	X	X										06
		GW				4	X	X										
		GW				4	X	X										
		GW				4	X	X										

Chain of Custody Page 1 of 1

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1164135

H208

Acctnum: COPTETRA
Template: T151596
Prelogin: P714613
TSR: 526 - Chris McCord
PB:

Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier SUA

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD SCREEN: <0.5 mR/hr

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	11-21-19	12:00			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.7-.1=1.6 °C AA2 Bottles Received: 24	
	11-21-19	16:45	Scott		
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 11-22-19 Time: 16:46	Hold: Condition: NCF OK

TETRA TECH

APPENDIX B

June 14, 2019

Ms. Julie Evans
Hydrogeologist/Environmental Project Manager
Tetra Tech
901 West Wall, Suite 100
Midland, TX 79701

Dear Julie:

Re: Vacuum Glorietta Site, Lea County, NM, (Event #3)

At your request, AcuVac Remediation, LLC (AcuVac) performed three Soil Vapor Extraction (SVE) Events as outlined in the table below at the above referenced site (Site). Following is the Report and a copy of the Operating Data collected during Event #3. Additionally, the attached Table #1 contains the Summary Well Data, and Table #2 contains the Summary Recovery Data.

Event Number	Well Number	Event Type	Event Duration (hrs)	Date
#3A	VG-4	SVE	10.0	06/11/2019
#3B	VG-4	SVE	10.0	06/12/2019
#3C	VG-4	SVE	8.0	06/13/2019

The purpose of the SVE events was to enhance recovery of Phase Separated Hydrocarbons (PSH) present at the Site through the removal of petroleum hydrocarbons in both liquid and vapor phases. PSH is referred to as petroleum hydrocarbons and Light Non-Aqueous Phase Liquids (LNAPL). The source of the PSH is a historical pipeline release.

OBJECTIVES

The objectives of the SVE events were to:

- Maximize liquid and vapor phase petroleum hydrocarbon removal from groundwater and soils in the subsurface formations within the influence of the extraction well.
- Expose the capillary fringe area and below to the extraction well induced vacuums.
- Increase the liquid and vapor phase petroleum hydrocarbon specific yields with high induced vacuums.

METHODS AND EQUIPMENT

AcuVac owns and maintains an inventory of equipment to perform SVE events. No third party equipment was utilized. The event at the Site was conducted using the AcuVac I-6 System (System) with a Roots RAI-33 blower used as a vacuum pump and a Roots RAI-22 positive displacement blower. The table on the following page lists equipment and instrumentation employed during Event #3, and the data element captured by each.

Equipment and Instrumentation Employed by AcuVac	
Measurement Equipment	**Data Element**
Extraction Well Induced Vacuum and Flow	
Dwyer Magnehelic Gauges	Extraction Well Vacuum
Dwyer Averaging Pitot Tubes / Magnehelic Gauges	Extractions Well Vapor Flow
Observation Wells	
Dwyer Digital Manometer	Vacuum / Pressure Influence
Extraction Well Vapor Monitoring	
V-1 Vacuum Box	Extraction Well Non-Diluted Vapor Sample Collection
HORIBA® Analyzer	Extraction Well Vapor TPH Concentration
QRae Mini II O_2 Monitor	Extraction Well Vapor Oxygen Content
NAPL Thickness (if present)	
Solinst Interface Probes Model 122	Depth to LNAPL and Depth to Groundwater
Groundwater Depression / Upwelling	
In-Situ Level Troll 700 Data Logger	Liquid Column in Extraction and Observation Wells
In-Situ Vented Cable with Chamber	Equalize Well Vacuum/Pressure
In-Situ Rugged Reader Data Logger Interface	Capture Readings from Data Logger Trolls
Atmospheric Conditions	
Testo Model 511	Relative and Absolute Barometric Pressure

The vacuum extraction portion of the System consists of a vacuum pump driven by an internal combustion engine (IC engine). The vacuum pump was connected to the extraction well, and the vacuum created on the extraction well caused light hydrocarbons in the soil and on the groundwater to volatilize and flow through a moisture knockout tank to the vacuum pump and the IC engine where they were burned as part of the normal combustion process. Propane was used as auxiliary fuel to help power the engine if the well vapors did not provide the required energy.

The IC engine provided the power necessary to achieve and maintain high induced vacuums and/or high well vapor flows which were required to maximize the vacuum radius of influence.

Emissions from the engine were passed through three catalytic converters to maximize destruction of removed hydrocarbon vapors. The engine's fuel-to-air ratio was adjusted to maintain efficient combustion. Because the engine is the power source for the equipment, the System stops when the engine stops. This prevents an uncontrolled release of hydrocarbons. Since the System is held entirely under vacuum, any leaks in the seals or connections are leaked into the System and not emitted into the atmosphere. The engine is automatically shut down by vacuum loss, low oil pressure, over speed, or overheating.

The design of the AcuVac System enabled independent control of both the induced well vacuum and the groundwater pumping functions such that the AcuVac team controlled the induced hydraulic gradient to increase exposure of the formation to soil vapor extraction (SVE). The ability to separate the vapor and liquid flows within the extraction well improved the LNAPL recovery rates and enabled the AcuVac team to record data specific to each media.

RECOVERY SUMMARY FOR SVE EVENT #3

The Recovery Summary table below lists the groundwater and LNAPL recovery data for Event #3 and compares the results with Event #2 performed in May 2015..

Recovery Summary					
	Event #3A VG-4	Event #3B VG-4	Event #3C VG-4	TOTAL Event #3	TOTAL Event #2
Event Hours	10.0	10.0	8.0	28.0	24.0
GW Recovery	0	0	0	0	6,349
LNAPL Recovery					
Liquid	0	0	0	0	6.35
Vapor	3.41	3.62	2.75	9.78	8.16
Total	3.41	3.62	2.75	9.78	14.51
Gallons/Hour	**0.34**	**0.36**	**0.34**	**0.35**	**0.60**

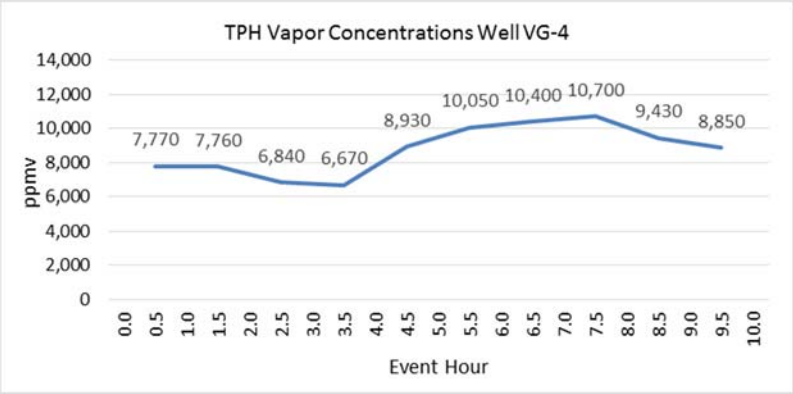
While Event #3 was performed as an SVE event and Event #2 was performed as an MDPE event, the vapor recovery was greater during Event #3 than Event #2.

SUMMARY OF SVE EVENT #3A- WELL VG-4

- The total event time was 10.0 hours. Event #3A was conducted on June 11, 2019. The data is compared with Event #2C conducted on May 6, 2015, which had a total event time of 8.0 hours.
- Based on the HORIBA® data, total vapor hydrocarbons burned as IC engine fuel was 3.41 gals, or 0.34 gals per hour.
- The HORIBA® analytical data from the influent vapor samples for Event #3A is compared with Event #2C in the table below:

Influent Vapor Data Well VG-4			
Event Number		**Event #3A**	**Event #2C**
Event Date		**06/11/2019**	**05/06/2015**
Event Hours		**10.0**	**8.0**
Data Element			
TPH- Maximum	ppmv	10,700	10,630
TPH- Average	ppmv	8,740	9,990
TPH- Minimum	ppmv	6,670	9,310
TPH- Initial	ppmv	7,770	10,570
TPH- Ending	ppmv	8,850	9,310
CO_2	%	8.38	4.92
CO	%	0.01	0.01
O_2	%	4.2	8.2
H_2S	ppm	1.45	78.00

- The TPH vapor concentrations from the influent vapor samples for Event #3A are presented in the graph below:



- The extraction well induced vacuum and well vapor flow for Event #3A is compared with Event #2C in the table below:

Well Vacuum and Well Vapor Flow Well VG-4			
Event Number		**Event #3A**	**Event #2C**
Event Date		**06/11/2019**	**05/06/2015**
Event Hours		**10.0**	**8.0**
Data Element			
Well Vacuum- Maximum	"H_2O	100.00	80.00
Well Vacuum- Average	"H_2O	85.95	79.41
Well Vacuum- Minimum	"H_2O	65.00	70.00
Well Vapor Flow- Maximum	scfm	19.38	17.22
Well Vapor Flow- Average	scfm	18.07	17.14
Well Vapor Flow- Minimum	scfm	16.12	15.86

- A LNAPL thickness of 0.01 ft LNAPL was recorded in well VG-4 prior to the start of Event #3A, and no measureable LNAPL was recorded at the conclusion of the Event #3A.

ADDITIONAL INFORMATION

- All LNAPL volume recovered, 3.41 gals, was burned as IC engine fuel.
- The TPH vapor concentrations increased in response to the increase in the induced extraction well vacuum during Event #3A. The average TPH concentrations in the well vapors were slightly lower than Event #2C.

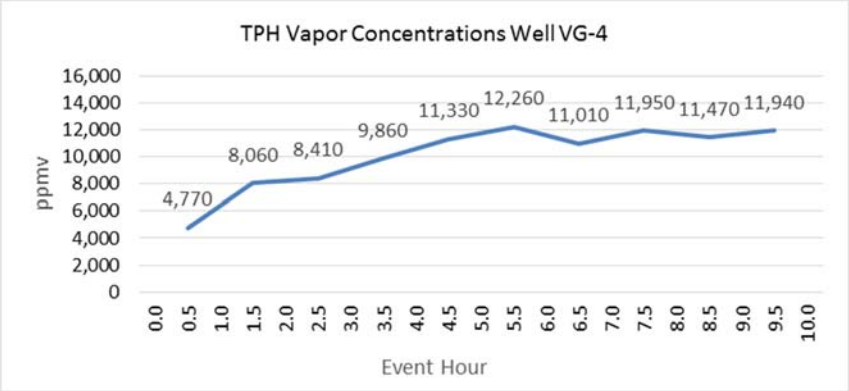
SUMMARY OF SVE EVENT #3B- WELL VG-4

- The total event time was 10.0 hours. Event #3B was conducted on June 12, 2019. The data is compared with Event #3A conducted on June 11, 2019, which had a total event time of 10.0 hours.
- Based on the HORIBA® data, total vapor hydrocarbons burned as IC engine fuel was 3.62 gals or 0.36 gals per hour.

- The HORIBA® analytical data from the influent vapor samples for Event #3B is compared with Event #3A in the table below:

Influent Vapor Data Well VG-4			
Event Number		**Event #3B**	**Event #3A**
Event Date		**06/12/2019**	**06/11/2019**
Event Hours		**10.0**	**10.0**
Data Element			
TPH- Maximum	ppmv	12,260	10,700
TPH- Average	ppmv	10,106	8,740
TPH- Minimum	ppmv	4,770	6,670
TPH- Initial	ppmv	4,770	7,770
TPH- Ending	ppmv	11,940	8,850
CO_2	%	8.93	8.38
CO	%	0.01	0.01
O_2	%	3.2	4.2
H_2S	ppm	3.85	1.45

- The TPH vapor concentrations from the influent vapor samples for Event #3B are presented in the graph below:



- The extraction well induced vacuum and well vapor flow for Event #3B is compared with Event #3A in the table below:

Well Vacuum and Well Vapor Flow Well VG-4			
Event Number		**Event #3B**	**Event #3A**
Event Date		**06/12/2019**	**06/11/2019**
Event Hours		**10.0**	**10.0**
Data Element			
Well Vacuum- Maximum	"H_2O	90.00	100.00
Well Vacuum- Average	"H_2O	79.52	85.95
Well Vacuum- Minimum	"H_2O	70.00	65.00
Well Vapor Flow- Maximum	scfm	17.22	19.38
Well Vapor Flow- Average	scfm	16.56	18.07
Well Vapor Flow- Minimum	scfm	15.88	16.12

- No measureable LNAPL thickness was recorded in well VG-4 prior to the start of Event #3B, and no measureable LNAPL was recorded at the conclusion of the Event #3B.

ADDITIONAL INFORMATION

- All LNAPL volume recovered, 3.62 gals, was burned as IC engine fuel.
- The TPH concentrations in the well vapors were on a mostly increasing trend during Event #3B most likely as a result of a concentration of LNAPL in the radius of influence surrounding well VG-4.
- An obstruction was detected in well VG-4 during the course of Event #3B. The well seemed to be dry, but upon further investigation, an absorbent sock may have fallen to the bottom of the well and was blocking the probe from reaching the liquid. The decision was made to leave the obstruction in the well and have the field personnel attempt to remove it at the next groundwater monitoring event.

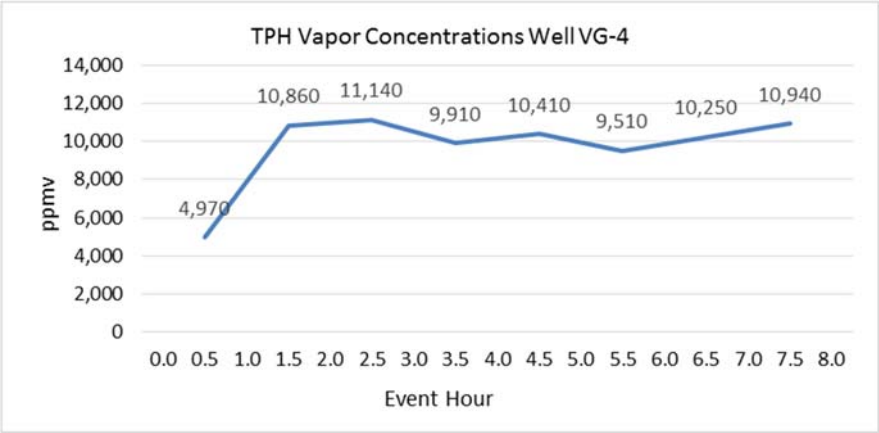
SUMMARY OF SVE EVENT #3C- WELL VG-4

- The total event time was 8.0 hours. Event #3C was conducted on June 13, 2019. The data is compared with Event #3B conducted on June 12, 2019, which had a total event time of 10.0 hours.
- Based on the HORIBA® data, total vapor hydrocarbons burned as IC engine fuel was 2.75 gals or 0.34 gals per hour.

- The TPH vapor concentrations from the influent vapor samples for Event #3C is compared with Event #3B in the table below:

Influent Vapor Data Well VG-4			
Event Number		**Event #3C**	**Event #3B**
Event Date		**06/13/2019**	**06/12/2019**
Event Hours		**8.0**	**10.0**
Data Element			
TPH- Maximum	ppmv	11,140	12,260
TPH- Average	ppmv	9,749	10,106
TPH- Minimum	ppmv	4,970	4,770
TPH- Initial	ppmv	4,970	4,770
TPH- Ending	ppmv	10,940	11,940
CO_2	%	8.90	8.93
CO	%	0.01	0.01
O_2	%	3.0	3.2
H_2S	ppm	3.10	3.85

- The TPH vapor concentrations from the influent vapor samples for Event #3C are presented in the graph below:



- The extraction well induced vacuum and well vapor flow for Event #3C is compared with Event #3B in the table on the following page:

Well Vacuum and Well Vapor Flow Well VG-4			
Event Number		**Event #3C**	**Event #3B**
Event Date		**06/13/2019**	**06/12/2019**
Event Hours		**8.0**	**10.0**
Data Element			
Well Vacuum- Maximum	"H_2O	75.00	90.00
Well Vacuum- Average	"H_2O	70.59	79.52
Well Vacuum- Minimum	"H_2O	65.00	70.00
Well Vapor Flow- Maximum	scfm	16.67	17.22
Well Vapor Flow- Average	scfm	16.33	16.56
Well Vapor Flow- Minimum	scfm	16.01	15.88

- No measureable LNAPL thickness was recorded in well VG-4 prior to the start of Event #3C, and no measureable LNAPL was recorded at the conclusion of the Event #3C.

ADDITIONAL INFORMATION

- All LNAPL volume recovered, 2.75 gals, was burned as IC engine fuel.
- The TPH concentrations in the well vapors were on a mostly increasing trend during Event #3C most likely as a result of a concentration of LNAPL in the radius of influence surrounding well VG-4.

CONCLUSION AND RECOMMENDATION FOR FUTURE EVENTS

SVE proved to be a more cost effective method to remediate the Site over MDPE. While the hourly rate of recovery for vapor phase LNAPL was slightly less than Event #2, the recovery of the liquid phase LNAPL did not outweigh the cost of the disposal of the total liquid produced. The vapor phase recovery rate could be enhanced with the addition of Enhanced Vapor Recovery to the events.

AcuVac recommends that future events be conducted with Enhanced Vapor Recovery performed on the extraction well. Enhanced Vapor Recovery involves positioning an air diffuser near the bottom of the well to volatize the hydrocarbons in the liquid. The SVE of the extraction well would then remove the volatized vapors and burn them as fuel in the internal combustion engine of the AcuVac System.

METHOD OF CALIBRATION AND CALCULATIONS

The HORIBA® Analytical instrument is calibrated with Hexane, CO and CO_2.

The formula used to calculate the emission rate is:

$$ER = HC\ (ppmv) \times MW\ (Hexane) \times Flow\ Rate\ (scfm) \times 1.58E^{-7} \frac{(min)(lb\ mole)}{(hr)(ppmv)(ft^3)} = lbs/hr$$

INFORMATION INCLUDED WITH REPORT

- Table #1 Summary Well Data
- Table #2 Summary Recovery Data
- Description of the Enhanced Vapor Recovery Process
- Recorded Data
- Photographs of the SVE System, well VG-4.

After you have reviewed the report and if you have any questions, please contact me. We appreciate you selecting AcuVac to provide these services.

Sincerely,
ACUVAC REMEDIATION, LLC

Paul D. Faucher
President

Summary Well Data
Table #1

Event		3A	3B	3C
WELL NO.		**VG-4**	**VG-4**	**VG-4**
Current Event Hours		10.0	10.0	8.0
Total Event Hours		42.0	52.0	60.0
TD (estimated)	ft BGS	70.0	70.0	70.0
Well Screen	ft BGS	unknown	unknown	Unknown
Well Size	in	4.0	4..0	4.0
Well Data				
Depth to Groundwater - Static - Start Event	ft BTOC	66.26	-	66.34
Depth To LNAPL - Static - Start Event	ft BTOC	66.25	-	66.33
LNAPL Thickness	ft BTOC	0.01	-	0.01
Hydro-Equivalent- Beginning	ft BTOC	66.25	-	66.33
Depth to Groundwater - End Event	ft BTOC	-	66.03	65.95
Depth To LNAPL - End Event	ft BTOC	-	-	-
LNAPL Thickness	ft BTOC	-	-	-
Hydro-Equivalent- Ending	ft BTOC	-	66.03	65.95
Extraction Data				
Maximum Extraction Well Vacuum	"H_2O	100.00	90.00	75.00
Average Extraction Well Vacuum	"H_2O	85.95	79.52	70.59
Minimum Extraction Well Vacuum	"H_2O	65.00	70.00	65.00
Maximum Extraction Well Vapor Flow	scfm	19.38	17.22	16.67
Average Extraction Well Vapor Flow	scfm	18.07	16.56	16.33
Minimum Extraction Well Vapor Flow	scfm	16.12	15.88	16.01
Influent Data				
Maximum TPH	ppmv	10,700	12,260	11,140
Average TPH	ppmv	8,740	10,106	9,749
Maximum TPH	ppmv	6,670	4,770	4,970
Initial TPH	ppmv	7,770	4,770	4,970
Final TPH	ppmv	8,850	11,940	10,940
Average CO_2	%	8.38	8.93	8.90
Average CO	%	0.01	0.01	0.01
Average O_2	%	4.2	3.2	3.01
Average H_2S	ppm	1.45	3.85	3.10

Summary Recovery Data
Table #2

Event		3A	3B	3C
WELL NO.		VG-4	VG-4	VG-4
Recovery Data- Current Event				
Total Liquid Volume Recovered	gals	-	-	-
Total Liquid LNAPL Recovered	gals	-	-	-
Total Liquid LNAPL Recovered / Total Liquid	%	-	-	-
Total Liquid LNAPL Recovered / Total LNAPL	%	-	-	-
Total Vapor LNAPL Recovered	gals	3.41	3.62	2.75
Total Vapor LNAPL Recovered / Total LNAPL	%	100.00	100.00	100.00
Total Vapor and Liquid LNAPL Recovered	gals	3.41	3.62	2.75
Average LNAPL Recovery	gals/hr	0.34	0.36	0.34
Total LNAPL Recovered	lbs	23.89	25.32	19.27
Total Volume of Well Vapors	cu. ft	10,842	9,936	7,838
Recovery Data- Cumulative				
Total Liquid Volume Recovered	gals	7,984	7,984	7,984
Total Liquid LNAPL Recovered	gals	7.99	7.99	7.99
Total Vapor LNAPL Recovered	gals	16.00	19.61	22.37
Total Vapor and Liquid LNAPL Recovered	gals	23.98	27.60	30.35
Average LNAPL Recovery	gals/hr	0.57	0.53	0.51
Total LNAPL Recovered	lbs	1,006	1,031	1,050
Total Volume of Well Vapors	cu. ft	42,975	52,911	60,749

ENHANCED VAPOR RECOVERY

There are several methods available to clean PSH/NAPL (which includes LNAPL and DNAPL) from groundwater. If the levels are sufficient, Mobile Dual Phase (MDP) can be used to apply vacuum to draw the contaminant into the well and vacate the liquid via a pump to remove the liquid. Soil Vapor Extraction (SVE) can also be used to remove the adsorbed contaminant in the vadose zone. In situations where there are high levels of dissolved phase PSH/NAPL, without the corresponding free phase PSH/NAPL on the groundwater, remediation can become more difficult. In this case, a methodology called Enhanced Vapor Recovery (EVR) can be used to remove the contaminant from the groundwater (GW) without the need to vacate large volumes of liquid.

EVR CONSISTS OF INSERTING AN AIR HOSE INTO THE EXTRACTION WELL and injecting 5 to 7 cfm of clean air at 5 to 10 psi, approximately five feet below the static GW/LNAPL level. The clean air is injected into the GW through an air diffuser. This enhances the volatilization of the dissolved phase contaminant in the GW. The volatilized PSH/LNAPL is then removed via the SVE process and burned as fuel in the Internal Combustion Engine (IC Engine). EVR is most effective where the contaminant is LNAPL or dissolved phase DNAPL (chlorinated solvents). Generally, NAPL (crude oil) will not volatilize sufficiently to be successful.

THE PROCESS IS VERY SIMILAR TO AN IN-WELL AIR STRIPPER in that the in-well air diffuser creates an interface between the water and the injected air, volatilizing the contaminant as the air bubbles through the GW. The low vacuum SVE process then removes the contaminant from the well bore and burns it as fuel in the IC Engine.

THE ACUVAC SYSTEM CONTAINS A CLEAN AIR POSITIVE DISPLACEMENT BLOWER that is used to inject the clean air into the well. A special manifold has been designed that enables the control of both the volume of air and the pressure under which it is delivered to the well. The air is heated by the process, and when mixed with the GW creates a natural circulation that draws more contaminant into the well bore.

EVR IS NOT AIR SPARGING. There is often a misunderstanding about the methodology and effectiveness of EVR. EVR is a time tested and proven method for remediating contaminated GW. The EVR process is controlled because the air is injected into and removed from the well bore. The injected air does not leave the well bore as the SVE vacuum is applied to remove the injected air and contaminant vapors as it rises above the static water level.

WHEN PERFORMED BY EXPERIENCED PERSONNEL, Enhanced Vapor Recovery is a very effective methodology to clean an adjoining well when combined with MDP or SVE Pilot Tests or Events to enhance the remediation of free and dissolved phase PSH/LNAPL.

AcuVac Remediation

OPERATING DATA – EVENT # 3A PAGE # 1 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM **Project Managers: Hendley/George**

Well # VG-4

	Date		6-11-A					
	Time		0730	0800	0830	0900	0930	1000
	Hr Meter							
ENGINE / BLOWER	Engine Speed	RPM	2000	2000	2000	2000	2000	2000
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	140	140	140	140	140	140
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	15	15	15	15	15	15
	Gas Flow Fuel/Propane	cfh	110	110	110	110	110	110
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	65	65	65	65	65	85
	Extraction Well Flow	scfm	16.12	16.12	16.12	16.12	16.12	18.01
	Influent Vapor Temp.	°F	54	54	54	54	54	54
	Air Temp	°F	60	62	65	69	69	71
	Barometric Pressure	"Hg	30.34	30.34	30.33	30.33	30.32	30.31
VAPOR / INFLUENT	TPH	ppmv	–	7770	–	7760	–	6840
	CO_2	%	–	8.04	–	7.88	–	7.24
	CO	%	–	0.01	–	.01	–	.01
	O_2	%	–	5.4	–	4.9	–	5.8
	H_2S	ppm	–	0	–	0.6	–	0

NOTES

Arrived at site @ 0645. Mobed. Tetra Tech (Joe Tyler) arrived @ 0715, Event start @ 0730. Initial vacuum to 65 H_2O. Water logger upwell to 5.28 ft. TPH ↓ decreasing consistently through morning. At 1000 increased well vac to 85 H_2O. Well flow ↑ to 18.01 and upwelling to 6.93.

RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	5.17 ft	5.17	10.45	10.45	10.47	10.52	12.10
	GW Depression	ft		5.28	5.28	5.30	5.35	6.93
	Extraction Well	DTNAPL	66.25					
	Extraction Well	DTGW	66.26					

69.5✓

AcuVac Remediation

OPERATING DATA – EVENT # PAGE # 2 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well # VG-4

		Date	6-11-19					
		Time	1030	1100	1130	1200	1230	1300
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	2000	2000	2000	2000	2000	2000
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	150	150	160	160	160	150
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	14	14	14	14	14
	Gas Flow Fuel/Propane	cfh	110	110	110	110	110	120
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	85	85	85	85	85	90
	Extraction Well Flow	scfm	17.97	17.97	17.97	17.97	17.97	17.94
	Influent Vapor Temp.	°F	56	56	56	56	58	58
	Air Temp	°F	73	75	77	78	79	80
	Barometric Pressure	"Hg	30.30	30.29	30.28	30.27	30.26	30.25
VAPOR / INFLUENT	TPH	ppmv	–	6670	–	8930	–	10050
	CO_2	%	–	7.04	–	8.54	–	9.18
	CO	%	–	.01	–	.01	–	.01
	O_2	%	–	6.8	–	3.9	–	2.6
	H_2S	ppm	–	0	–	1.6	–	2.3
NOTES	Upselling ↑ until 1130 then ↓. Increased well vac to 90 H2O @ 1300.							
RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	ft	12.20	12.31	12.81	12.77	12.67	12.59
	GW Depression	ft	7.03	7.14	7.64	7.60	7.50	7.42
	Extraction Well	DTNAPL						
	Extraction Well	DTGW						

AcuVac Remediation

OPERATING DATA – EVENT # 3A PAGE # 3 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well #		Date	6-11-19					
		Time	1330	1400	1430	1500	1530	1600
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	2000	2000	2000	2000	2000	2000
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	160	160	160	160	160	160
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	14	14	14	14	14
	Gas Flow Fuel/Propane	cfh	120	120	120	120	120	120
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	90	95	95	100	100	100
	Extraction Well Flow	scfm	19.38	19.20	19.20	19.00	18.98	18.96
	Influent Vapor Temp.	°F	58	58	58	59	60	61
	Air Temp	°F	81	82	83	84	85	87
	Barometric Pressure	"Hg	30.23	30.21	30.20	30.18	30.17	30.15
VAPOR / INFLUENT	TPH	ppmv	—	10400	—	10700	—	9430
	CO_2	%	—	9.34	—	9.22	—	8.80
	CO	%	—	.01	—	.01	—	.01
	O_2	%	—	2.3	—	2.2	—	3.7
	H_2S	ppm	—	2.6	—	2.9	—	2.3
NOTES	Increased well vac to 95 H_2O @ 1400, TPH ↑ @ 1100 and continued as well as minimal amount of H_2S. Increased well vac @ 1500 to 100 H_2O. This was max. well vac.							
RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	ft	12.51	12.44	12.94	13.77	13.66	13.58
	GW Depression	ft	7.34	7.27	7.77	8.60	8.49	8.39
	Extraction Well	DTNAPL						
	Extraction Well	DTGW						

AcuVac Remediation

OPERATING DATA – EVENT # 3A PAGE # 4 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM **Project Managers: Hendley/George**

Well #	Date	6-11-19						
	Time	1630	1700	1730				
	Hr Meter							
ENGINE / BLOWER	Engine Speed RPM	2000	2000	2000				
	Oil Pressure psi	50	50	50				
	Water Temp °F	160	160	160				
	Alternator Volts	14	14	14				
	Intake Vacuum "Hg	14	14	14				
	Gas Flow Fuel/Propane cfh	120	120	120				
ATMOSPHERE VACUUM / AIR	Extraction Well Vac. "H_2O	100	100	100				
	Extraction Well Flow scfm	18.96	18.96	18.96				
	Influent Vapor Temp. °F	61	61	61				
	Air Temp °F	87	87	87				
	Barometric Pressure "Hg	30.14	30.12	30.12				
VAPOR / INFLUENT	TPH ppmv	–	8850	–				
	CO_2 %	–	8.52	–				
	CO %	–	.01	–				
	O_2 %	–	3.9	–				
	H_2S ppm	–	2.2	–				
NOTES								
RECOVERY	Totalizer gals							
	Pump Rate gals/min							
	Total Volume gals							
	NAPL % Vol							
	NAPL Gals							
EW	Data Logger Head ft	13.77	13.68	13.52				
	GW Depression ft	8.60	8.51	8.35				
	Extraction Well DTNAPL							
	Extraction Well DTGW							

AcuVac Remediation

OPERATING DATA – EVENT # 3B PAGE # 1 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well # VG-4

	Date		6-12-19					
	Time		0700	0730	0800	0830	0900	0930
	Hr Meter							
ENGINE / BLOWER	Engine Speed	RPM	1900	1900	1900	1900	1900	1900
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	140	140	140	140	180	180
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	14	14	14	14	14
	Gas Flow Fuel/Propane	cfh	110	110	110	110	110	110
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	85	85	90	90	90	90
	Extraction Well Flow	scfm	17.22	17.22	17.06	17.06	17.03	16.99
	Influent Vapor Temp.	°F	52	52	52	52	54	56
	Air Temp	°F	63	65	67	69	71	73
	Barometric Pressure	"Hg	30.30	30.29	30.28	30.28	30.29	30.30
VAPOR / INFLUENT	TPH	ppmv	–	4770	–	8060	–	8410
	CO_2	%	–	5.50	–	8.08	–	8.32
	CO	%	–	.01	–	.01	–	.01
	O_2	%	–	9.8	–	4.9	–	4.4
	H_2S	ppm	–	0	–	2.0	–	2.9

NOTES

Arrived at site @ 0645. Gauged well which was dry. Event start at 0700. TPH ↑ from 0730 to 0830. Data logger was reading but unsure if water was in well.

RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	ft						
	GW Depression	ft						
	Extraction Well	DTNAPL	Dry					
	Extraction Well	DTGW	Dry					

AcuVac Remediation

OPERATING DATA – EVENT # 3B PAGE # 2 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM **Project Managers: Hendley/George**

Well # VG-4

		Date	6-12-19					
		Time	1000	1030	1100	1130	1200	1230
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	1900	1700	1700	1700	1700	1600
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	175	175	175	170	175	175
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	16	16	16	16	16
	Gas Flow Fuel/Propane	cfh	110	100	100	100	100	90
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	90	85	85	85	85	80
	Extraction Well Flow	scfm	16.99	17.15	17.15	17.15	17.15	16.49
	Influent Vapor Temp.	°F	56	56	56	56	56	56
	Air Temp	°F	73	75	76	77	79	79
	Barometric Pressure	"Hg	30.30	30.31	30.31	30.32	30.32	30.32
VAPOR / INFLUENT	TPH	ppmv	–	9860	–	11330	–	12260
	CO_2	%	–	8.78	–	9.64	–	10.01
	CO	%	–	.01	–	.01	–	.01
	O_2	%	–	3.5	–	1.7	–	0.8
	H_2S	ppm	–	3.8	–	4.8	–	5.5
NOTES	At 1030 cut RPM to 1700 to cool water temp. Vacuum held. TPH continued to increase to 1300 when unit was shut down to change propane lines.							
RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	ft						
	GW Depression	ft						
	Extraction Well	DTNAPL						
	Extraction Well	DTGW						

AcuVac Remediation

OPERATING DATA – EVENT # 3B PAGE # 3 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well # VG-4

		Date	6-12-19					
		Time	1300	1390	1400	1430	1500	1530
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	1700	1700	1700	1700	1700	1700
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	1800	1850	1850	1850	1850	1850
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	16	16	16	16	16	16
	Gas Flow Fuel/Propane	cfh	100	100	100	100	100	100
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	70	70	70	70	70	70
	Extraction Well Flow	scfm	15,91	15,88	15,88	15,88	15,88	15,88
	Influent Vapor Temp.	°F	58	60	60	60	60	60
	Air Temp	°F	79	80	80	81	81	82
	Barometric Pressure	"Hg	30,31	30,30	30,30	30,29	30,29	30,28
VAPOR / INFLUENT	TPH	ppmv	—	11010	—	11950	—	11470
	CO_2	%	—	9,34	—	10,42	—	9,44
	CO	%	—	,01	—	,01	—	,01
	O_2	%	—	2,5	—	1,3	—	1,7
	H_2S	ppm	—	4,1	—	5,2	—	5,1

NOTES

At 1300 unit shut down to change propane from tempory tanks to main tank along w/ propane lines. Gauged well = Dry, Re-Start unit. Water temp high, lowered vac and air flow into engine. TPH remained constant through end of event, Water temp. on unit continued high, RPM = 1700, Air flow = ,22 to keep engine cool.

RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	ft						
	GW Depression	ft						
	Extraction Well	DTNAPL						
	Extraction Well	DTGW						

AcuVac Remediation

OPERATING DATA – EVENT # 3B PAGE # 4 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM **Project Managers: Hendley/George**

Well # VG-4

	Date	6-12-P						
	Time	1600	1630	1700				
	Hr Meter							
ENGINE / BLOWER	Engine Speed RPM	1700	1700	1700				
	Oil Pressure psi	50	50	50				
	Water Temp °F	190	190	190				
	Alternator Volts	14	14	14				
	Intake Vacuum "Hg	16	16	16				
	Gas Flow Fuel/Propane cfh	100	100	100				
ATMOSPHERE VACUUM / AIR	Extraction Well Vac. "H_2O	70	70	70				
	Extraction Well Flow scfm	15.88	15.88	15.88				
	Influent Vapor Temp. °F	60	60	60				
	Air Temp °F	82	83	83				
	Barometric Pressure "Hg	30.28	30.28	30.28				
VAPOR / INFLUENT	TPH ppmv	–	11,940	–				
	CO_2 %	–	9.74	–				
	CO %	–	.01	–				
	O_2 %	–	1.3	–				
	H_2S ppm	–	5.1	–				
NOTES	Event ended @ 1700, Gauged well and DTW = 66.03, TD = 72'., TD had been @ 69.5' until then. Possible obstruction in well, An attempt will be made to clear any obstruction next morning before event starts.							
RECOVERY	Totalizer gals							
	Pump Rate gals/min							
	Total Volume gals							
	NAPL % Vol							
	NAPL Gals							
EW	Data Logger Head ft							
	GW Depression ft							
	Extraction Well DTNAPL			–				
	Extraction Well DTGW			66.03				

AcuVac Remediation

OPERATING DATA – EVENT # 3C PAGE # 1 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM **Project Managers: Hendley/George**

Well # VG-4

	Date		6-13-19					
	Time		0600	0630	0700	0730	0800	0830
	Hr Meter							
ENGINE / BLOWER	Engine Speed	RPM	1800	1800	1800	1800	1800	1800
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	170	170	160	160	160	165
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	14	14	14	14	14
	Gas Flow Fuel/Propane	cfh	110	110	110	110	110	110
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	65	65	65	65	65	70
	Extraction Well Flow	scfm	16.26	16.20	16.20	16.18	16.16	16.01
	Influent Vapor Temp.	°F	49	49	49	50	51	52
	Air Temp	°F	63	64	64	64	66	69
	Barometric Pressure	"Hg	30.31	30.31	30.31	30.32	30.33	30.34
VAPOR / INFLUENT	TPH	ppmv	–	4970	–	10,860	–	11,140
	CO_2	%	–	5.02	–	9.88	–	10.10
	CO	%	–	.01	–	.01	–	.01
	O_2	%	–	10.4	–	1.1	–	0.8
	H_2S	ppm	–	0	–	2.3	–	3.8

NOTES

Arrived at site @ 0530. Attempted to remove obstruction in VG-4 w/fish hooks + weights. Observed there is an obstruction but unable to remove it. Possibly absorbant sock which was deteriorating. Started unit @ 0600. TPH ↑ after initial reading same as day before.

RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	5.08 ft	7.90	9.04	10.15	10.86	10.78	10.80
	GW Depression	ft	2.82	3.96	5.07	5.78	5.70	5.72
	Extraction Well	DTNAPL	66.33					
	Extraction Well	DTGW	66.34					

.01

AcuVac Remediation

OPERATING DATA – EVENT # 3C PAGE # 2 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well # VG-4

		Date	6-13-19					
		Time	0900	0930	1000	1030	1100	1130
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	1800	1800	1800	1800	1800	1800
	Oil Pressure	psi	50	50	50	50	50	50
	Water Temp	°F	165	165	160	160	165	170
	Alternator	Volts	14	14	14	14	14	14
	Intake Vacuum	"Hg	14	14	14	14	14	14
	Gas Flow Fuel/Propane	cfh	110	105	105	105	105	105
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	70	70	70	70	75	75
	Extraction Well Flow	scfm	16.01	16.01	16.01	16.01	16.67	16.67
	Influent Vapor Temp.	°F	52	52	52	52	54	54
	Air Temp	°F	69	70	72	74	75	76
	Barometric Pressure	"Hg	30.34	30.33	30.32	30.30	30.29	30.28
VAPOR / INFLUENT	TPH	ppmv	—	9910	—	10,410	—	9510
	CO_2	%	—	9.22	—	9.48	—	8.72
	CO	%	—	.01	—	.01	—	.01
	O_2	%	—	2.3	—	1.9	—	3.3
	H_2S	ppm	—	3.7	—	4.3	—	3.4
NOTES	TPH remained constant through event with variable small fluctuations.							
RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head	5.08 ft	10.75	10.70	10.64	10.60	11.09	11.40
	GW Depression	ft	5.67	5.62	5.56	5.52	6.01	6.32
	Extraction Well	DTNAPL						
	Extraction Well	DTGW						

AcuVac Remediation

OPERATING DATA – EVENT # 3C PAGE # 3 ACUVAC MDPE SYSTEM

Location: Vacuum Glorietta Site, Lea County, NM Project Managers: Hendley/George

Well # VG-4

		Date	6-13-19					
		Time	1200	1230	1300	1330	1400	
		Hr Meter						
ENGINE / BLOWER	Engine Speed	RPM	1800	1800	1800	1800	1800	
	Oil Pressure	psi	50	50	50	50	50	
	Water Temp	°F	170	175	175	175	175	
	Alternator	Volts	14	14	14	14	14	
	Intake Vacuum	"Hg	14	14	14	14	14	
	Gas Flow Fuel/Propane	cfh	105	105	105	105	105	
ATMOSPHERE VACUUM / AIR	Extraction Well Vac.	"H_2O	75	75	75	75	75	
	Extraction Well Flow	scfm	16.67	16.67	16.67	16.67	16.67	
	Influent Vapor Temp.	°F	54	54	54	54	54	
	Air Temp	°F	79	80	82	84	86	
	Barometric Pressure	"Hg	30.27	30.26	30.26	30.26	30.26	
VAPOR / INFLUENT	TPH	ppmv	—	10250	—	10,540	—	
	CO_2	%	—	9.38	—	9.38	—	
	CO	%	—	.01	—	.01	—	
	O_2	%	—	2.5	—	1.8	—	
	H_2S	ppm	—	3.6	—	3.7	—	
NOTES	Event ended @ 1400. De-mobed and departed site 1415.							
RECOVERY	Totalizer	gals						
	Pump Rate	gals/min						
	Total Volume	gals						
	NAPL	% Vol						
	NAPL	Gals						
EW	Data Logger Head 5.08	ft	11.44	11.52	11.51	11.57	11.50	
	GW Depression	ft	6.36	6.44	6.43	6.49	6.42	
	Extraction Well	DTNAPL					—	
	Extraction Well	DTGW					65.95	

—

VACUUM GLORIETTA
LEA COUNTY, NM

VACUUM GLORIETTA
LEA COUNTY, NM

ATTACHMENT E

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON
Governor

Joanna Prukop
Cabinet Secretary
Mark Fesmire
Director
Oil Conservation Division

May 09, 2005

Mr. Neal Goates
ConocoPhillips
Threadneedle Office
PO Box 2197
Houston, TX 77252-2197

Re: East Vacuum Glorietta Tank Battery Playa OCD # 1R0413

Dear Mr. Goates:

Pursuant to the New Mexico Oil Conservation Division rule 19.15.1.19 (Rule 19) Prevention and Abatement of Water Pollution requires all responsible persons who are abating water pollution in excess of the standards shall do so pursuant to an abatement plan approved by the director.

Therefore, ConocoPhillips is hereby required to submit an abatement plan for OCD approval by July 15, 2005 for the above referenced site.

After OCD receives the plan the site will be assigned a new Abatement Plan number (AP#) for tracking purposes. If you have any questions please do not hesitate to contact me at 505-476-3493 or E-mail DJSanchez@state.nm.us; or contact Wayne Price of my staff at 505-476-3487 or e-mail WPRICE@state.nm.us.

Sincerely;

Daniel Sanchez
Enforcement and Compliance Manager
DS/wp

Cc: OCD Hobbs office

TETRA TECH, INC.

October 12, 2007

Certified Mail
7005 0390 0000 6086 9115

Mr. Wayne Price
Environmental Bureau Chief
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: **East Vacuum Glorietta, East Tank Battery Playa**
SW¼ & SE ¼, Sec 27, T17S, R35E
Stage I & II Abatement Plan Revised

Dear Mr. Price:

On behalf of ConocoPhillips, Tetra Tech, Inc. (formerly Maxim Technologies) is re-submitting the attached Stage I and II Abatement Plan (2 copies) for your review. The Plan proposes a path forward for mitigating the petroleum hydrocarbon and chloride impaired soil found in a playa (Site) located east of ConocoPhillips' East Vacuum Glorietta, East Tank Battery. The Site is located on State owned land, within Lea County, New Mexico (32° 47.932' N, 103° 26.726' W).

The proposed abatement option includes the deployment of a geo-membrane barrier to confine existing petroleum hydrocarbons and chloride below the caliche (caprock) zone to minimize their further migration to groundwater. Approval of the Stage II Abatement Plan would re-direct water flow away from the lower aquifer sands located immediately below the barrier. The water would flow over the geo-membrane, into adjacent sub-soils, and then percolate downward through the unaffected sands to the aquifer.

If this Plan is acceptable to the New Mexico Oil Conservation Division and it receives favorable public comment, ConocoPhillips is prepared to charge Tetra Tech with the task of executing the proposed Plan. If you have any questions concerning this Plan, please contact Mr. Tom Wynn (918-667-0310) or me.

Sincerely,

Greg W. Pope, P.G.
Project Manager

Cc: Mr. Chris Williams, NMOCD District I
Mr. Tom Wynn, ConocoPhillips
Mr. Larry Deen, ConocoPhillips

Certified Mail
7005 0390 0000 6086 9122

1703 West Industrial Avenue, Midland, TX 79701
Tel 432.686.8081 Fax 432.686.8085
www.tetratech.com

Durrett, Charles

From: Price, Wayne, EMNRD [wayne.price@state.nm.us]
Sent: Friday, October 17, 2008 3:40 PM
To: Durrett, Charles
Cc: Tom.R.Wynn@conocophillips.com; VonGonten, Glenn, EMNRD
Subject: RE: ConocoPhillips Vacuum Glorietta East Battery 1RP 744

OCD hereby approves of the plan. Please include this approve in your correspondence. Please submit a report within 60 days.

From: Durrett, Charles [mailto:Charles.Durrett@tetratech.com]
Sent: Friday, October 17, 2008 5:40 AM
To: Price, Wayne, EMNRD
Cc: Tom.R.Wynn@conocophillips.com
Subject: ConocoPhillips Vacuum Glorietta East Battery 1RP 744

East Vacuum Glorietta East Battery Playa

32˚47.932N ˚103 26.726W

Sec 27, T17S, R35E

Buckeye, Lea County, New Mexico

Wayne, as discussed in our telephone conversation in January 2008, the subject project has had two Abatement Plans (AP) submitted to NMOCD. No AP number has been assigned to this project. ConocoPhillips would like to complete the excavation and backfill work at the location in accordance with the plan submitted to NMOCD in October 2007.

Brief Overview of the project:

The initial work began in October 2002 with release of approximately 80 bbls of crude oil into a playa. In June 2005, NMOCD approved a temporary excavation and restoration plan independent of the AP submitted in June 2005. Excavation began and approximately 3,200 CY of material was removed. Owing to flowlines in front of the excavation, work was halted and NMOCD was notified in September 2005. The excavation was partially backfilled in accordance with the pending AP. The work was put on hold until ConocoPhillips could abandon the Vacuum Glorietta East Tank Battery and remove some 40 flowlines. This work was completed by ConocoPhillips and a new

Abatement Plan was submitted in November 2007.

We request your approval to complete the excavation, restore the area and establish a monitoring program in accordance with Subsection B of 20.6.2.3107 NMAC and with 20.6.4.13 NMAC. If you have any questions concerrning this request, please call me or Mr. Tom Wynn (ConocoPhillips, 918-661-0310).

Charles Durrett | **Project Manager II**
Main: 432.686.8081 | Fax: 432.682.3946
charles.durrett@tetratech.com

AP - 39

STAGE 1 & 2 WORKPLANS

DATE: OCT 2007

AP-39

STAGE I & II ABATEMENT PLAN

CONOCOPHILLIPS EAST VACUUM GLORIETTA EAST TANK BATTERY PLAYA

LEA COUNTY, NEW MEXICO

Prepared for:

ConocoPhillips

ConocoPhillips Remediation Technology

Prepared by:

TETRA TECH, INC.

1703 W. Industrial Ave.
Midland, Texas 79701

October 12, 2007

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STAGE I & II ABATEMENT PLAN
CONOCOPHILLIPS EAST VACUUM GLORIETTA
EAST TANK BATTERY PLAYA

1.0 INTRODUCTION

ConocoPhillips proposes a path forward plan for mitigating the petroleum hydrocarbon affected soil found in a playa (Site) and monitoring groundwater quality in the vicinity of the playa located east of ConocoPhillips' East Vacuum Glorietta, East Tank Battery. The Site is located on State owned land in the SW¼, SE ¼, Section 27, Township 17S, Range 35E, within Lea County, New Mexico (32° 47.932' N, 103° 26.726' W). Impairment of the soil and groundwater in and below the playa was caused by historic placement of production ponds in the playa beginning in the late 1940's and intermittent releases of crude oil and production water from the 1940's to the most recent release reported to the New Mexico Oil Conservation Division (NMOCD) in October 28, 2002.

ConocoPhillips' proposes to remove historical production pit material from the playa to a depth of approximately eight (8) feet below ground surface (fbgs) or to the top of a caliche lens, located 7 to 9 fbgs, to minimize disturbance to the playa's natural soil structure and limit impact to groundwater below the playa. A membrane barrier will be installed in the playa excavation to channel precipitation away from the affected area and prevent further downward migration of petroleum hydrocarbons and chlorides in the vadose zone below the caliche lens in this area of the playa.

A quarterly groundwater sampling program will be established to monitor water levels, petroleum hydrocarbon constituents and chloride concentration levels in three monitoring wells. If the aquifer does not show evidence of self attenuation within one year, then ConocoPhillips would propose alternatives for NMOCD approval.

1.1 DESCRIPTION OF THE SITE

The playa is located immediately east of ConocoPhillips' East Vacuum Glorietta East Tank Battery. The playa is bisected east to west by Lea County Road 50 and the location of the Site is in the northwestern area of the northern portion of the playa. Figure 1 is a map showing the location of the Site. The Site is located in the SW¼, SE ¼, Section 27, Township 17S, Range 35E, within Lea County, New Mexico (32° 47.932' N, 103° 26.726' W).

1.2 SITE HISTORY AND NATURE OF THE RELEASE

Table 1 provides the chronology of the Site. Aerial photographic evidence indicates the presence of a production pit in the playa in 1949, and a later photography (1966) provided evidence of two additional pits developed in the playa (Appendix A). The latest petroleum hydrocarbon and produced water release was discovered October 28, 2002, and was reported to NMOCD. Approximately 80 barrels of oil was released into the playa, which is located approximately 120 feet southeast of well number VAC ABO 6-80, and affected an area of approximately 80 feet by 150 feet in the adjacent playa. Immediately after the release, ConocoPhillips recovered 80 barrels of oil and 20 barrels of water from the playa.

1.3 SUMMARY OF PREVIOUS INVESTIGATIONS

The initial Site investigation was performed after the petroleum hydrocarbon and produced water release was discovered October 28, 2002, and reported to NMOCD. B&H Environmental Services was called to the Site to delineate the contamination and ConocoPhillips submitted their data in a letter to the NMOCD, dated November 20, 2002. A compilation of their findings is presented in Table 2 and on Figure 2.

B&H Environmental Services bored six 2-fbgs borings to delineate the spill horizontally and one 11-fbgs boring to delineate the spill vertically. Detectable concentrations of petroleum hydrocarbons were reported in all borings and concentrations were highest in the northwest portion of the playa. Hydrocarbon and chloride concentrations were noted down to 11 fbgs in the boring located in the northwestern area of the release Site, at 1,240 milligrams per kilogram (mg/kg) and 3,470 mg/kg, respectively (Table 2). In the NMOCD letter, ConocoPhillips indicated groundwater in a nearby water well was at 51 fbgs.

On April 7, 2003, BBC International deepened B&H Environmental's "vertical" boring to further delineate the vertical extent of hydrocarbon and chloride affected soil (Table 3). These data indicated that hydrocarbon and chloride concentrations were present down to a depth of 35 fbgs in the northeast portion of the release Site.

On February 4-6, 2004, Maxim Technologies (Maxim, dba/Tetra Tech) used a truck-mounted air rotary drill unit to install three soil borings at the Site to assess subsurface and groundwater conditions below the playa east of the Vacuum Glorietta East Unit, East Tank Battery. Soil boring VG-1 was located inside the playa; VG -2 and VG-3 were located outside the playa (Figure 3). Boring VG-1 established the presence and extent of hydrocarbon and chloride impact vertically in the vadose zone of the playa (Table 4). VG-2 and VG-3, located north and southwest of the playa, respectively, established the lateral extent of groundwater impact (Table 5). Once hydrocarbons were detected immediately above the soil-water interface, borings VG-1, -2 and -3 were completed as monitoring wells. Boring logs and well completion diagrams are included in Appendix B.

On May 19, 2004, Maxim initiated a GeoProbe soil survey to assess subsurface conditions below the playa east of the Vacuum Glorietta East Unit, East Tank Battery. Maxim used a truck-mounted hydraulic push probe unit to examine 17 locations inside the northern portion of the playa adjacent to the tank battery (Figure 4). The probe was pushed until refusal at all locations. Soil probes GP-3, -7, -8, -9, -11, -13, -14, -15, and -16 were located outside the affected area, GP-1, -2, -4, -5, -6, and -10 were located inside the affected area, and GP-17 represented background. The soils from these 17 penetrations were logged for sediment type or lithology, and the split-spoon cuttings were tested with a photo-ionization detector (PID) to determine the presence of volatile organic compounds (VOCs). The hydraulic probe, split-spoon penetrations were continuously sampled and logged by the field geologist (Appendix B). The probes established the presence and extent of hydrocarbon and chloride impact horizontally and vertically in the shallow vadose zone of the playa (Table 6).

In accordance with ConocoPhillips' remediation plan, presented to NMOCD on August 9, 2004, Maxim initiated the excavation of affected soils in the East Vacuum Glorietta, East Tank Battery playa on August 11, 2004. Figure 5 illustrates the footprint in which the excavation of the petroleum hydrocarbon/produced water affected soil has occurred. Maxim began excavation of the affected soil to a depth of approximately 8 fbgs and hauled this material to a State-approved disposal facility. As the excavation advanced, a historic petroleum hydrocarbon zone was encountered, forcing the excavation to deepen to approximately 20 fbgs. In reviewing aerial photographs, this historic petroleum hydrocarbon zone was shown to be from historic production pits existing on or before year 1949 (Appendix A).

Because the unexpected historic petroleum hydrocarbon zone was encountered, Maxim halted excavation and advanced six exploratory borings to better define the area inside the spill footprint not yet excavated (Figure 6). A mobile air rotary boring unit was used to delineate the vertical and horizontal extent of the vadose zone petroleum hydrocarbons and chloride in this area (Table 7). Soil samples were collected at 10 foot intervals and logged by the field geologist (Appendix B). Groundwater from monitoring well VG-1 was also analyzed (Table 8).

On June 29, 2005 NMOCD approved the temporary excavation and restoration independent of Abatement Plan submitted June 1, 2005. To show good faith effort, on July 11, 2005 the following tasks were implemented: monitoring well clean-out, groundwater sampling & analysis, abandment of monitoring well MW-1, backfill the existing excavation, and begin sloping the sides of the existing excavation.

On September 13, 2005, NMOCD Santa Fe was verbally notified that further excavation of the affected area was hold until ConocoPhillips' Business Unit removed flowlines immediately west of the present excavation. Owing to the Business Unit's desire to abandon the Vacuum Glorietta East Tank Battery and construct a new battery to the north all work was stopped. Current state is excavation at 8 to 9 feet bgs waiting facility revamp and final excavation prior to engineered controls installation and backfill.

2.0 SITE HYDROLOGY

2.1 REGIONAL GEOLOGY

According to the Geologic Map of New Mexico (NMBGMR, 2003[1]), Vacuum Glorietta is underlain by the Pliocene-age Ogallala Formation, which consists of fluvial sand, silt, clay, and gravel capped by caliche. The Ogallala sand is very fine to medium grained quartz, silty in part, and calcareous, clay balls are common, clayey in upper part, indistinctly bedded to massive, crossbedded, unconsolidated to weakly cohesive, with local quartzite lenses, and colored various shades of gray and red. The sand may have silt and clay with caliche nodules, colored reddish brown, dusky red, and pink. Gravel, not everywhere present, is mostly quartz, some quartzite, sandstone, limestone, chert, igneous rock, metamorphic rock, and worn *Gryphaea* in intraformational channel deposits and as basal conglomerate. Caliche, hard, sandy and pisolitic at top, produces a "caprock" along Mescalero Ridge. Maximum thickness of the Ogallala is up to 100 feet.

2.2 SITE LITHOLOGY

Soils in the Vacuum Glorietta area are white caliche and black clays, red sandy loams, and sands. Based on drill cuttings collected during the subsurface investigations, the shallow subsurface geology consists of white to light gray caliche to approximately 6-9 fbgs, and light reddish brown sand with thin caliche and clay stringers to approximately 70 bgs. The dry playa contains dark gray clay to a depth of 7-9 fbgs overlying the caliche and sand sequence.

2.3 SURFACE WATER HYDROLOGY

The land surface is a nearly level to very gently undulating constructional plain that has little dissection. Local topography is characterized by a dry playa located on a southeast-sloping plateau consisting of a level to gently rolling prairie broken by draws and playas. Large areas within the region have poorly developed drainage systems. The elevation ranges from 4,400 feet to 3,350 feet above sea level. There is a general slope of about 10 to 15 feet per mile (Turner, et al, 1974[2]).

Two local relic drainage ways, both un-named, cross just east of the area from northwest to southeast. These drainage ways end on a flat area to the southeast. These draws are shallow, usually dry, and seldom carry runoff water.

---

[1] New Mexico Bureau of Geology and Mineral Resources, 2003. Geologic Map of New Mexico, 1:500,000.
[2] Turner, M.T., D.N. Cox, B.C Mickelson, A.J. Roath, and C.D Wilson, 1973. Soil Survey Lea County, New Mexico. U.S. Department of Agriculture Soil Conservation Service, 89p.

Playas, or shallow ephemeral lakes, are common in the area. The playas provide the only surface drainage in many areas. Aquifer recharge occurs through these playa basins during and after significant rainfall events. Recharge is limited once the clays in the basins swell and effectively stop percolation of groundwater.

The only fresh surface water nearby is a pond created by discharge of cooling water from a power plant located approximately 6 miles to the southeast. There are many dry playas that briefly hold water following a rainfall event.

2.4 GROUNDWATER HYDROGEOLOGY

The Site is underlain by the Ogallala Aquifer. The aquifer extends from the ground surface downward, ranging in thickness from 80 feet to more than 200 feet. The formation consists of heterogeneous sequences of clay, silt, sand and gravel. A resistant layer of calcium carbonate-cemented caliche, known locally as the caprock, occurs near the surface of much of the area (Ashworth and Hopkins, 1995[3]).

The Ogallala Formation can be divided up into the unsaturated zone and the saturated zone. The upper section of the Ogallala is unsaturated and is known as the "Vadose Zone". The lower section of the Ogallala Formation is the primary water-bearing unit and is the Ogallala Aquifer. Groundwater in the Ogallala Aquifer generally flows from northwest to southeast, normally at right angles to water level contours. Velocities of less than one foot per day are typical, but higher velocities may occur along filled erosional valleys where coarser grained deposits have greater permeabilities.

The nearest water well to the Site is located approximately 675 feet northwest of the Site. No information is available on depth to water for this well. A water well (L010593) is located approximately 1,525 feet north with no depth to water information (New Mexico Office of the State Engineer's database). There is a water well located approximately 2,190 feet to the south with depth to water reported as 33 feet. A water well (L10297), located to approximately 2,450 feet to the southwest, has a depth to water of 42 feet. A water well located approximately 2,460 feet east of the Site has depth to water of 85 feet. A water well (L04793 [3]) located approximately 2,285 feet to the southeast has no depth to water information. A water well (L05362) located approximately 3,500 feet west, has a depth to water of 80 feet.

Shallow groundwater at the Site occurs under unconfined conditions. In the three monitoring wells drilled at the Site, groundwater was encountered at a depth of approximately 60 feet. Based on groundwater elevations measured in the three monitoring wells, groundwater flow direction was determined to be southeast at a gradient of 0.004 feet per foot.

[3] Asworth, J.B. and J. Hopkins, 1995. Aquifers of Texas. Texas Water Development Board Report 345, 69p.

Recharge of the aquifer system in the area mainly occurs in two ways: (1) infiltration of precipitation runoff in and around playa lakes and (2) direct infiltration of precipitation into the coarse eolian surfical deposits.

2.5 *MAGNITUDE, EXTENT AND ORIGIN PETROLEUM HYDROCARBONS AND CHLORIDE IN THE PLAYA*

Present Condition

From the previously described investigations, it was determined that groundwater in the vicinity of the Site is less than 50 ft below the depth of impairment. Distance from the nearest fresh water supply well at the Site is less than 1,000 feet. Benzene concentration in soil was reported below 10 mg/kg and total benzene, toluene, ethylbenzene and total xylenes (BTEX) concentration was reported below 50 mg/kg. Total petroleum hydrocarbons (TPH) concentration in soil was detected above 100 mg/kg in earlier investigations.

Based on deep drill cuttings and shallow GeoProbe samples collected in the dry playa during previous subsurface investigations, the shallow subsurface geology can be described as dark gray clay to a depth of 7-9 fbgs, white to light gray caliche to approximately 20 fbgs, and light reddish brown sand with thin caliche and clay stringers to approximately 70 fbgs (Appendix B).

For the clayey soil above the caliche lens, evidence suggests the petroleum hydrocarbons concentrated in an area defined by GeoProbe and six deep borings in the northwestern portion of the playa. Data from these investigations suggests the hydrocarbons infiltrated the caliche zone and migrated into the sands above the aquifer (water level at 60 fbgs). Groundwater chemistry from previous sampling suggests that detectable amounts of hydrocarbons reached groundwater in the vicinity of monitoring well VG-1 below the playa bed (Tables 5, 8 and 9).

Chloride present in the release area described above, also affected soils below the playa. Data from the previous investigations (Tables 2, 3, 4, 6 and 7) suggest chloride infiltrated the caliche zone and is present in the sands above the aquifer. Groundwater chemistry from previous sampling suggests that chloride made contact with groundwater below the playa bed (Table 5, 8, 9).

Excavation of affected soils in the East Vacuum Glorietta, East Tank Battery playa began on August 11, 2004. Figure 6 illustrates the footprint in which the excavation of the petroleum hydrocarbon/produced water-affected soil has occurred. The excavation began at a depth of approximately 8 fbgs. As the excavation advanced, a historic petroleum hydrocarbon zone was encountered in the southern portion of the excavation, forcing the excavation to deepen to approximately 20 fbgs. In reviewing aerial photographs, this historic petroleum hydrocarbon zone was shown to be from historic production pits existing on or before year 1949

(Appendix A – Photographs collected in February 2005). Approximately 3,240 cubic yards of material has been removed and hauled to a State approved disposal location.

Because the unexpected historic petroleum hydrocarbon zone was encountered, excavation was halted and six exploratory borings were advanced in September 2004 to better define the area inside the spill footprint not yet excavated (Figure 6). These borings described vadose zone conditions above and below the 7-9 fbgs caliche zone in the unexcavated portion of the playa (Table 7).

The gasoline (GRO) and diesel (DRO) range concentrations for TPH are presented in Table 7. TPH concentrations were above the NMOCD remediation standard (100 parts per million [ppm]) in the northwestern (VG-21, VG-22, VG-23) unexcavated portion of the spill footprint (Figure 6). In boring VG-21, residual TPH >100 ppm was found from 0-50 fbgs [10,000 – 2,000 mg/kg, respectively]. Residual TPH in VG-23 was also found above the remediation standard from 0-50 fbgs (670 to 730 mg/kg, respectively), with the highest concentration found in the 20-30 fbgs sampling interval (6,500 mg/kg). Boring VG-22 was positioned approximately 40 feet south of VG-21, and this boring exhibited residual TPH above the remediation standard in the 0-10 fbgs (720 mg/kg) and the 40-50 fbgs (280 mg/kg) sampling intervals. Near the southern edge of the excavation (Figure 5), boring VG-20 had residual TPH >100 ppm from 10-50 fbgs (2,000 to 1,800 mg/kg, respectively), with the highest TPH concentration in the 20-30 fbgs sampling interval (11,000 mg/kg). All sampling intervals for borings VG-18 and VG-19 exhibited <100 ppm TPH, with the exception of the 0-10 fbgs sampling interval at VG-19 (110 mg/kg).

Laboratory analysis [Synthetic Precipitation Leach Procedure (SPLP)] reported either non-detection or low migration concentrations for BTEX in all September 2004 sample borings at all sampling depths (Table 7). All samples containing BTEX concentrations were below NMOCD remediation standards (10 ppm benzene, 50 ppm BTEX).

Chloride laboratory analyses (both ion chromatography and SPLP methods) of soils collected from the playa are also presented in Table 7. SPLP chloride concentrations in all borings and at all depths were found to be below NMOCD's stated chloride cleanup level (250 ppm) in NMOCD's guidance e-mail dated July 7, 2004 (Appendix C), with the exception of VG-23, 40-50 fbgs sample range (261 mg/kg).

In September 2004 and January 2005, monitoring well VG-1 was tested for BTEX, polynuclear aromatic hydrocarbons (PAH) and chlorides in groundwater (Tables 8 and 9). Benzene increased from 0.005 milligrams per liter (mg/l) in September 2004 to 0.752 mg/l in January 2005 in VG-1. Other constituents not detected in September 2004 were present at VG-1 in the January 2005 sampling (ethylbenzene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, and 1-methynaphthalene). During this period, benzene and naphthalene concentrations were above regulatory action levels. Groundwater conditions in VG-2 and -3 remained essentially the same from September 2004 to January 2005. Chloride concentrations increased from 1,040 mg/l in January 2004 to 1,140 mg/l in September 2004 and to 2,880 mg/l in January 2005.

Additional information was collected in December 2004, and January, February and March 2005. The December 2004 excursion provided data on the condition of the excavation floor and side walls (Table 10) Composite soil samples, collected using a trachoe, indicated the south and west walls and the floor were above NMOCD's July 12, 2004 e-mail guidance for TPH (<100 mg/kg; Appendix C). The north wall TPH concentrations were also above the guidance level concentrations but were very close to compliance (470 mg/kg). BTEX and chloride concentrations were below regulatory action levels. In February and March 2005, a backhoe was used to further delineate the lateral extent of hydrocarbons south and west of the existing excavation. The south boundary was found but the presence of crude oil flowlines to the west prevented the finding of the western boundary. Based on the information collected to date, a new excavation design was created (Figure 7).

Fate and Transport of BTEX, Chlorides to Groundwater

The SPLP test evaluates the potential for leaching materials into groundwater. It provides an assessment of material mobility under field conditions (i.e. rainfall) and is a method of choice when evaluating fate and transport (Alforque, 1996[4]). The SPLP analysis of soil collected in investigations supporting this document indicate leachable concentrations of BTEX were present in playa soil at low levels, below the New Mexico Water Quality Control Commission (NMWQCC) cleanup standards. However between September 2004 and January 2005, benzene and naphthalene concentrations were above water quality regulatory action levels. Also, there was a 153 percent increase in groundwater chloride concentration between September 2004 and January 2005.

During the fall of 2004, the area experienced greater than normal rainfall. According to the National Weather Service, rainfall in the Hobbs area was 4.78 inches in September 2004 (153% above normal), and 3.44 inches in November 2004 (395% above normal). During these storm events, the playa filled with water and the water migrated to groundwater through the open excavation. Because aquifer sands were exposed during excavation, hydrologic head pressure created by the weight of the impounded water may have flushed the hydrocarbons from the sand, causing an increase in petroleum hydrocarbons in the groundwater.

Provided that no further releases of crude oil and produced water enter the playa, a simple geo-membrane barrier will confine existing petroleum hydrocarbon and chloride below the caliche (caprock) zone, minimizing further migration to groundwater. Approval of the Stage II Abatement Plan, which requires:

- Removing additional impaired vadose zone material above the caprock
- Backfilling the existing excavation to grade with the top of the caprock with clean material
- Constructing a geo-membrane barrier above the caprock, and
- Backfilling the remaining excavation with clean material,

[4] Alforque, Maricia, 1996. Synthetic Precipitation Leaching Procedure. USEPA Manchester Laboratory Tech Notes 9/06/1996.

would re-direct water flow away from the lower aquifer sands located immediately below the barrier. The water would flow over the geo-membrane, into adjacent sub-soils, then percolate downward through the unaffected sands to the aquifer. Details concerning the construction of the proposed barrier are in the Section 6 entitled *Design and Support of the Preferred Abatement Option*.

3.0 PROPOSED MONITORING PROGRAM

For the first year of implementation of the Abatement Plan, ConocoPhillips will:

- Obtain quarterly water levels and water samples from all monitoring wells,
- Submit all water samples to a laboratory for analysis of BTEX, PAH, chloride and total dissolved solids, and
- Provide the results of the monitoring program to NMOCD.

If the aquifer does not show evidence of self attenuation within one year, then ConocoPhillips would propose alternatives for NMOCD approval.

4.0 QUALITY ASSURANCE PLAN

With the report of results, ConocoPhillips will present evidence that the sampling and analysis is consistent with the techniques listed in Subsection B of 20.6.2.3107 NMAC and with 20.6.4.13 NMAC of the Water Quality Standards of Interstate and Intrastate Surface Water in New Mexico 20.6.4 MAC.

5.0 ASSESSMENT OF ABATEMENT OPTIONS

The following options are available:

Option 1: *Continue excavation of impaired soil down to the aquifer sands.*
Option 2: Remove remaining impaired soil above the caprock, backfill and construct geo-member barrier.

Continued excavation of all impaired materials from the playa removes the effective caprock barrier and alters the lithologic structure of the playa (Option 1). The change in subsoil structure exposes the aquifer to unimpeded in-flow of potential contaminants. Option 1 is also the most expensive option and will not provide greater protection of human health or the environment than Option 2.

The preferred abatement Option 2 removes the remnants of the historic production pits in the northwestern portion of the playa. By removing these pits and deploying a geo-membrane

barrier to divert downward water flow around the impaired area, natural attenuation will allow groundwater to meet regulatory water quality mandates. Implementation of this option requires NMOCDs approval.

6.0 DESIGN AND SUPPORT OF THE PREFERRED ABATEMENT OPTION

The design of the preferred abatement option is described below.

Based on the most recent investigation (Table 7), the excavation configuration was altered to include the area immediately west of the present excavation and an expansion of southern boundary (Figure 7). It is the objective of this abatement option (Plan) to remove historical production pit material from the playa, minimize disturbance to the playa's natural soil structure and limit impact to groundwater below the playa. The Plan includes:

- Removing petroleum hydrocarbon affected material west and south of the excavation down to the top of the caliche zone (7-9 fbgs),
- Backfilling the present excavation to the top of the caliche zone with clean material,
- Backfilling the excavation (top of clean backfilled material) with clean sand, free of rocks to a depth of one foot on the sides and 1.5 feet in the center to slightly dome the surface,
- Place a 40-mil medium density polyethylene geo-membrane (liner) directly above the sand base (the slight doming of the sand beneath the liner will promote lateral drainage off of the liner after placement),
- Backfilling an additional one foot of sand, with no rocks or debris, over the liner for surface protection,
- Backfilling clean caliche/soil up to 3 fbgs in the excavation,
- B
- Backfilling with "good, clean" soil of a similar nature to that which was excavated, and;
- Preparing soil for re-seeding (a seed drill will be used to plant the appropriate seed mix).

The plan is to install a membrane barrier in the playa excavation to channel precipitation away from the affected area and prevent further downward migration of hydrocarbons and chlorides in this area of the playa.

Also, monitoring well VG-1 would be re-established (removed during excavation). A quarterly groundwater sampling program would be established to monitor water levels, BTEX, PAH, chloride concentration levels and intrinsic bio-remediation indicator (total dissolved solids, dissolved oxygen, carbonate, bicarbonate, total alkalinity, methane, carbon dioxide, sulfate, sulfide, nitrates, calcium, magnesium, manganese, potassium, sodium, ferrous iron and oxidation reduction potential, temperature, pH, and specific conductance) in the 3 monitoring wells. If the aquifer does not show evidence of self attenuation within one year, then alternatives would be proposed for NMOCDs approval.

If this program is acceptable to NMOCD, ConocoPhillips is prepared to immediately execute the above proposed Plan.

7.0 POST CLOSURE PLAN

When eight (8) consecutive sampling events or other evidence demonstrates to the satisfaction of NMOCD that the water quality standards of Rule 19 are met, ConocoPhillips will petition for closure of the Abatement Plan. ConocoPhillips will plug and abandon monitoring wells that are associated the Abatement Plan and restore the ground surface well sites as required by the landowners.

TABLES

Table 1
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Chronology of Events

Date	Comment
10/28/02	Spill occurred at heritage Phillips location at Sec 33-T17S-R35E indicating 80 bbls into the playa. 100 bbls recovered consisting of spill and rainwater.
10/29/02	A fax sheet indicated from Conoco field office that spill was called in to New Mexico Oil Conservation Division District 1 (NMOCD, Larry Johnson and Bill Pritchard). Form C 141 was sent to Kent Oberle.
11/05/02	Letter written from ConocoPhillips (CoP) Buckeye field personnel to NMOCD (L. Johnson) describing delineation planned.
11/20/02	Partial delineation performed by B&H and CoP field personnel.
01/03	Quotes to complete additional delineation was requested by CoP Buckeye Unit personnel.
05/23/03	Project communicated to CoP Remediation and Risk Management group (CoPRM&R; Neal Goates) from ConocoPhillips field operations.
05/30/03	CoPRM&R (N. Goates) forwarded all information via email to NMOCD District 1 (L. Johnson) in order to get a path forward.
06/24/03	CoPRM&R (N. Goates) sent follow up email to NMOCD (L. Johnson) on establishing path forward.
07/14/03	Maxim submits work plan to CoPRM&R for exploratory borings.
08/01/03	Steve Wilson transferred to CoP Buckeye Unit as Safety, Health and Environment Asset Resource (SHEAR) Specialist.
8/11/03	CoPRM&R (N. Goates) sent follow up email to NMOCD (L. Johnson) on establishing path forward.
08/23/03	Work plan approved by CoPRM&R.
09/15/03	Plan submitted to NMOCD District 1 (L. Johnson).
10/03	CoPRM&R (N. Goates) sent paper copy via request by NMOCD (L. Johnson) for orientation.
11/03	CoPRM&R (N. Goates) sent follow up email to NMOCD (L. Johnson) on establishing path forward.
01/26/04	NMOCD approved revised work plan.
01/29/04	New Mexico State Land Office permit granted.
01/30/04	Proposed monitoring wells staked and work notification given to NMOCD (L. Johnson & P. Sheeley).
02/5-6/04	Three (3) temporary monitor wells were developed to 70 feet below ground surface (fbgs).
03/12/04	Maxim's draft report forwarded to CoPRM&R (N. Goates).

Table 1 (Continued)

Date	Comment
03/23/04	CoPRM&R reviewed findings with CoP Buckeye Unit personnel.
03/24/04	CoPRM&R (N. Goates) left message for NMOCD (P. Sheeley) to call me back.
03/25/04	CoPRM&R (N. Goates) left message with NMOCD Santa Fe (Bill Olson) on preliminary findings of elevated chlorides below spill site in playa.
04/06/04	Maxim submitted GeoProbe work plan to CoPRM&R.
05/19/04	GeoProbe investigation initiated.
05/22/04	Draft GeoProbe report submitted to CoPRM&R.
07/01/04	Maxim (Clyde Yancey) received confirmation that Wayne Price (Santa Fe office) would be the NMOCD contact for project.
07/07/04	Investigative report and path forward plan submitted to NMOCD Santa Fe (W. Price). Plan detailed excavation to caliche, placement of a bio-membrane, backfill.
07/21/04	NMOCD denies work plan and sets requirements.
07/20/04	Revised work plan submitted to NMOCD for approval.
08/11/04	Work was initiated to excavate northwestern area of playa.
08/13/04	Historic impact was discovered during excavation operation causing the excavation to deepen to 20+ feet and removing the caliche (caprock) lens.
08/16/04	Excavation halted so that a new work plan could be developed to examine sub-soils in front of excavation.
08/17/04	NMOCD (P. Sheeley) visits site.
08/18/04	NMOCD (W. Price) visits site.
09/08/04	CoPRM&R approved work plan to examine sub-soil in front of excavation.
09/13-15/04	Soil borings to examine sub-soil in front of excavation completed.
10/08/04	Results of boring investigation prepared for CoPRM&R.
12/06/04	Floor and sidewalls of excavation sampled using backhoe.
02/03/05	Backhoe used to delineate surface impairment, flowlines west of the playa limited the examination.
02/23/05	Excavation findings indicated that the excavation would extend into the area west of the playa (location of numerous flowlines). Air photos indicate large historic production pits in northwestern portion of playa.
03/15/05	After flowlines were moved, a backhoe was used to further delineate surface impairment.

Table 1 (Continued)

Date	Comment
03/23/05	Maxim (C. Durrett) met with NMOCD (W. Price) to discuss path forward.
04/07/05	Update report submitted to NMOCD (W. Price).
05/0/9/05	NMOCD (W. Price) requested an abatement plan be prepared.
06/01/05	An abatement plan was submitted to NMOCD Santa Fe and Hobbs
06/14/05	CoPRM&R (N. Goates) and Maxim (G. Pope) met with NMOCD in Santa Fe (W. Price). Topics of interest included: Review abatement plan with the intent to excavate at recommended depth w/liner installation, and complete public notice requirement according to Subsection G within 15 days of receiving NMOCD approval letter of abatement plan administrative completeness. Excavation and restoration can proceed independent of abatement plan schedule after receiving NMOCD approval letter.
06/29/05	NMOCD approved the temporary excavation and restoration independent of the in-process abatement plan approval. To show good faith, the following tasks were implemented: monitoring well clean-out, groundwater sampling & analysis, abandment of monitoring well MW-1, backfill the existing excavation, and begin sloping the sides of the existing excavation.
09/13/05	Further excavation of the affected area on hold until ConocoPhillips Business Unit removes the flowlines immediately west of the present excavation.
01/17/06	CoPRM&R (N. Goates) advised NMOCD that ConocoPhillips was planning to outsource facility engineering work to move the battery which includes routing flowlines to a new battery.
	Current state of project is excavation at 8 to 9 feet bgs waiting facility abandonment and final excavation prior to engineered controls installation and backfill.

Table 2

ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
November 2, 2002 Investigation

B&H Environmental Services Sample Locations								
Parameter	Depth (ft)	Vertical	South	East	North 1	North 2	West 1	West 2
TPH (ppm)	Surface	72700	261	159	200		980	995
	2		125	915	1290	985	5680	500
	4	1730						
	6	541						
	8							
	11	1240						
Chloride (ppm)	6	5440						
	8	3230						
	11	3470						

TPH = Total petroleum hydrocarbon
ppm = Parts per million
ft = Feet

Table 3

ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
April 7, 2003 Investigation

		11/20/2002 B&H Environmental Services Data*		BBC International								
Sample I.D.	Depth	TPH	Chloride	PID	Chloride	TPH** (mg/kg)		Chloride**	Benzene**	Toluene**	Ethyl-benzene**	Total Xylenes**
	(ft)	(ppm)	(ppm)	(ppm)	(ppm)	GRO	DRO	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
	Surface	72700										
SB1	4	1730										
SB1	6	514	5440									
SB1	8		3230									
SB1	11	1240	3470									
SB1	14	106	700									
SB1	14-15			700	106							
SB1	15	109	880	820	109							
SB1	17	232	1600									
SB1	16-17			1600	232							
SB1	18	355	2120	2120	355	261	5170	1680	1.17	3.41	11.00	14.50
SB1	18-20			3900	247							
SB1	20	247	3900									
SB1	26-28			4400	269	154	2350	4160	0.42	1.05	3.86	6.95
SB1	28	269	4400									
SB1	28-30			3800	167							
SB1	30	167	3800									
SB1	34.5-35			4350	162	81.9	1520	3200	0.04	0.36	2.44	4.74
SB1	35	162	4350									

* BBC reported the same data in their 4/07/2003 Report

** Cardinal Laboratories, Methods 8015M, 4500-Cl⁻ B and 8260.

ft = Feet
ppm = Parts per million
mg/kg = Milligrams per kilogram

Table 4
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Soil Analysis
February 5, 2004

Parameters	Bore Hole Location				Quality Control
	VG - 1		VG - 2	VG - 3	
Sample Depth (fbgs)	20 - 22	50 - 55	55-60	55 - 60	Blank
Total Petroleum Hydrocarbon (mg/kg)					
Diesel Range	6,700.0	280.00	3.70	3.20	ND
Gasoline Range	440.0	0.18	ND	ND	ND
Total	7,140.0				
Volatile Organics (mg/kg)					
Benzene	0.89	ND	ND	ND	ND
Ethylbenzene	5.40	ND	ND	ND	ND
Toluene	1.30	ND	ND	ND	ND
Xylenes (Total)	10.00	0.0057	ND	ND	ND
Synthetic Precipitation Leaching Procedure (mg/kg)					
Benzene	ND	-	-	-	-
Ethylbenzene	0.046	-	-	-	-
Toluene	0.006	-	-	-	-
Xylenes (Total)	0.094	-	-	-	-
Inorganic Analysis (mg/kg)					
Chloride	1380	2040	ND	ND	ND

fbgs = Feet below ground surface
mg/kg = Milligrams per kilogram
ND = Not detected at or above laboratory detection limits
- = Analysis not performed

Table 5
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Groundwater Analysis
February 6, 2004

Analytical Parameters	Monitoring Well			Water Quality
Water Matrix	VG-1	VG-2	VG-3	Standards
Volatile Organics (mg/l)				
Benzene	0.0031	ND	ND	0.01
Ethylbenzene	0.0024	ND	ND	0.75
Toluene	ND	ND	ND	0.75
Xylenes (Total)	0.0029	ND	ND	0.62
Semivolatile Organic Compounds (mg/l)				
Acenaphthene	ND	ND	ND	
Acenaphthylene	ND	ND	ND	
Anthracene	ND	ND	ND	
Benzo (a) pyrene	ND	ND	ND	0.0007
Benzo (b) fluoranthene	ND	ND	ND	
Benzo (ghi) perylene	ND	ND	ND	
Benzo (k) fluoranthene	ND	ND	ND	
Chrysene	ND	ND	ND	
Dibenz (a,h) anthracene	ND	ND	ND	
Fluoranthene	ND	ND	ND	
Fluorene	ND	ND	ND	
Indeno (1,2,3 - cd) pyrene	ND	ND	ND	
Naphthalene	ND	ND	ND	0.03*
Phenanthrene	ND	ND	ND	
Pyrene	ND	ND	ND	
Inorganic Analysis (mg/l)				
Chloride	1040	109	33.7	250

mg/l = Milligrams per liter
ND = Not detected at or above laboratory detection limits
* PAH's total naphthalene plus monomethylnaphthalenes

Table 6
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
GeoProbe Soil Investigation and Earlier Investigations
May 19-20, 2004

Probe Sample No.	Depth (fbgs)	Soil Type	VOC (ppm)	Parameter (mg/kg)						
				DRO	GRO	Benzene	Ethylbenzene	Toluene	Total Xylenes	Chloride
GP-1	0-3	C	1416	**4100**	13	ND	ND	ND	0.44	**1410**
	3-6	C, Ca	620							**2780**
	6-8	Ca	371	**140**	ND	ND	ND	ND	ND	**5000**
GP-2	0-3	C	0	20	ND	ND	ND	ND	ND	619
	3-7	C	0.5	10	ND	ND	ND	ND	ND	**1090**
GP-3	0-3	C	0.4							637
	3-6	C	1.1	3.1	ND	ND	ND	ND	ND	**1780**
	6-9	Ca	0.1	ND	ND	ND	ND	ND	ND	**1490**
GP-4	0-3	C	14.9	**770**	0.20	ND	ND	ND	ND	972
	3-6	C, Ca		**800**	0.39	ND	0.01	ND	0.01	**2310**
GP-5	0-3	C	73.4							**3420**
	3-6	C	61.3	**810**	15	0.54	0.59	0.13	2.00	**2600**
	6-8	Ca	140	**3300**	11	0.08	0.96	0.03	0.55	**2550**
GP-6	0-3	C	12.2							**2640**
	3-6	C	0.6							**2070**
	6-9	Ca	251							**2820**
	9-12	Ca	185							**1990**
	12-15	Ca	294	**7500**	150	0.32	4.50	ND	4.50	**2790**
	15-18	Ca, S	235	**3600**	35	ND	2.70	0.25	3.70	**1960**
GP-7	0-3	C	5.9							14.4
	3-6	C	8.3	4.2	ND	ND	ND	ND	ND	72.6
	6-9	C	1.3							326
	9-11	Ca	2.9	3.4	ND	ND	ND	ND	ND	855
GP-8	0-3	C	7	21.0	ND	ND	ND	ND	ND	ND
	3-6	Ca	9	4.0	ND	ND	ND	ND	ND	ND
GP-9	0-3	C	0							ND
	3-6	C	0	2.1	ND	ND	ND	ND	ND	64.3
	6-8	Ca	0.6	1.8	ND	ND	ND	ND	ND	73
GP-10	0-3	C, Ca	10.1	**970**	ND	ND	ND	ND	ND	129
GP-11	0-3	C	21.9	13.0	ND	ND	ND	ND	ND	ND
	3-6	C	3.4							ND
	6-9	Ca	16.2	2.2	ND	ND	ND	ND	ND	164
GP-12	0-3	C	31.5	**470**	ND	ND	ND	ND	ND	ND
	3-6	C	17.9							12.4
	6-9	Ca	10.6	**370**	ND	ND	ND	ND	ND	17
GP-13	0-3	C	17.7	5.5	ND	ND	ND	ND	ND	ND
	3-6	C	8.5							38.1
	6-9	C, Ca	8.8	2.2	ND	ND	ND	ND	ND	863
GP-14	0-3	C	8.8	14.0	ND	ND	ND	ND	ND	ND
	3-6	Ca	5.7	1.9	ND	ND	ND	ND	ND	ND
GP-15	0-3	C	6.3	3.3	ND	ND	ND	ND	ND	44.6
	3-6	C	2.3							119
	6-9	Ca	0	4.1	ND	ND	ND	ND	ND	144
GP-16	0-3	C	0	24.0	ND	ND	ND	ND	ND	13.3
	3-6	C	0	3.9	ND	ND	ND	ND	ND	152
	6-9	C, Ca	0							
GP-17	0-3	C	0.1	6.2	ND	ND	ND	ND	ND	54.3
	3-6	C	0.1							15.5
	6-9	C	0							104
	9-11	Ca		2.2	ND	ND	ND	ND	ND	135

Table 6 Continued

Probe Sample No.	Depth (fbgs)	Soil Type	VOC (ppm)	Parameter (mg/kg)						
				DRO	GRO	Benzene	Ethylbenzene	Toluene	Total Xylenes	Chloride
BS-1*	0-3			ND	ND	ND	ND	ND	ND	
	3-6			ND	ND	ND	ND	ND	ND	**5440**
	6-9			ND	ND	ND	ND	ND	ND	**3230**
	9-12			ND	ND	ND	ND	ND	ND	**3470**
	12-15			ND	ND	ND	ND	ND	ND	700
	15-18			**5170**	261	**1.17**	**11.00**	**3.41**	**14.50**	**2120**
	20			ND	ND	ND	ND	ND	ND	**3900**
	28			**2350**	154	**0.42**	**3.86**	**1.05**	**6.95**	**4400**
	30			ND	ND	ND	ND	ND	ND	**3800**
	35			**1520**	82	0.04	2.44	0.36	4.74	**4350**
VG-1**	0-4		1289							
	4-6		1116							
	6-9		591							
	9-15		243							
	15-20		>9999							
	20-22	S	907	**6700**	440	**0.89**	**5.40**	**1.30**	**10.00**	**1380**
	22-25		322							
	25-27		274							
	27-30		290							
	30-32		245							
	32-35		133							
	35-40		138							
	40-45		95.8							
	45-50		71.9							
	50-55	S	35.4	280	0.18	ND	ND	ND	0.01	**2040**

* Data from 11/20/2002 Environmental Services and 4/7/2003 BBC International investigations

** Data from Maxim 3/15/2004 report

Notes:

Soil Types:
- C - Clay
- Ca - Caliche
- S - Sand

DRO - Diesel Range Organic
GRO - Gasoline Range Organic
ND - Not detected at or above laboratory reporting limit
fbgs - Feet below ground surface
ppm - parts per million
mg/kg - milligrams per kilogram

Table 7
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Soil Analysis
September 15 – 16, 2004

Boring	Sample Interval	Synthetic Precipitation Leaching Procedure				TPH		Chloride by IC (solid)	SPLP Chloride	Moisture
		Benzene	Toluene	Ethylbenzene	Xylene (total)	GRO	DRO			
VG-18	0-10	ND	ND	ND	ND	<1.1	68	970	47.5	8.1
VG-18	10-20	ND	ND	ND	ND	<1.0	<12	384	18.5	2.8
VG-18	20-30	ND	ND	ND	ND	<1.1	<13	734	45.4	6.7
VG-18	40-50	ND	ND	ND	ND	<1.0	77	179	8	2.8
VG-19	0-10	ND	ND	ND	ND	<1.1	110	63.1	3.7	6.6
VG-19	10-20	ND	ND	ND	ND	<1.0	<12	165	8.9	2.2
VG-19	20-30	ND	0.001 J	0.017	0.13	<1.0	<13	237	12.8	4.3
VG-19	40-50	ND	ND	ND	ND	<1.0	44	27.7	1.9 J	4.4
VG-20	0-10	ND	ND	ND	ND	<1.1	18	92	4.5	9.1
VG-20	10-20	ND	ND	0.006	0.011	44	2000	634	30.5	4.6
VG-20	20-30	ND	0.002 J	0.032	0.052	**340**	**11000**	136	7.3	6.6
VG-20	40-50	ND	ND	ND	ND	17	1800	37.4	2.2	5.2
VG-21	0-10	0.043	0.074	0.05	0.065	**180**	**10000**	302	19.2	6.7
VG-21	10-20	0.0008 J	0.002 J	0.045	0.026	170	5300	80.8	4.8	4.5
VG-21	20-30	ND	0.002 J	0.02	0.035	84	3600	211	10	7.6
VG-21	30-40	NA	NA	NA	NA	NA	NA	391	19.7	6.2
VG-21	40-50	ND	ND	0.004 J	0.009	48	2000	542	27.7	6
VG-22	0-10	ND	ND	ND	ND	<1.1	720	1260	72.1	9.5
VG-22	10-20	ND	ND	ND	ND	<1.0	70	665	30.7	2.9
VG-22	30-40	ND	ND	ND	ND	<1.1	16	1300	78	4.8
VG-22	40-50	ND	ND	ND	ND	<1.0	280	1530	83	4.4
VG-23	0-10	ND	ND	ND	ND	<4.3	670	2690	163	7.3
VG-23	10-20	ND	0.004 J	0.03	0.047	88	4000	3990	209	6.4
VG-23	20-30	ND	ND	0.009	0.018	110	6500	5170	**261**	6.8
VG-23	40-50	ND	ND	ND	ND	<1.0	730	3970	222	4.3

All units are in milligrams per kilogram (mg/kg) except for moisture which is in percent (%)

IC Analysis by Inductively Coupled Plasma Ion Chromatography

SPLP Synthetic Precipitation Leaching Procedure

ND Not detected at or above the Laboratory detection limit

NA Not analyzed

J Estimated Value - the result is ≥ # the Method of Determination Limit and < the Limit of Quantification

Table 8
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Groundwater Analysis
September 16, 2004

Constituent	Units	Well VG-1	WQ Standard
Chloride (titrimetric)	mg/l	1,140	250
Volatile Organics			
Benzene	mg/l	0.005	0.01
Toluene	mg/l	ND	0.75
Ethylbenzene	mg/l	ND	0.75
Xylene (Total)	mg/l	ND	0.62
Semivolatile Organics			
Acenaphthene	mg/l	ND	
Acenaphthylene	mg/l	ND	
Anthracene	mg/l	ND	
Benzo(a)anthracene	mg/l	ND	
Benzo(a)pyrene	mg/l	ND	0.0007
Benzo(b)fluoranthene	mg/l	ND	
Benzo(g,h,i)perylene	mg/l	ND	
Benzo(k)fluoranthene	mg/l	ND	
Chrysene	mg/l	ND	
Dibenz(a,h)anthracene	mg/l	ND	
Fluoranthene	mg/l	ND	
Fluorene	mg/l	ND	
Indeno(1,2,3-cd)pyrene	mg/l	ND	
Naphthalene	mg/l	ND	
Phenanthrene	mg/l	ND	
Pyrene	mg/l	ND	

ND = Not detected at or above the laboratory detection limit
mg/l = Milligrams per liter

Table 9
ConocoPhillips
Vacuum Glorietta Unit, East Tank Battery Playa
Groundwater Analysis
January 14, 2005

Parameter	Method	Unit	VG-1	VG-2	VG-3	Regulatory Limit
Chloride	300	mg/l	2880	88.3	35.6	250
Volatile Organics	8260B	mg/l				
Benzene			**0.752**	ND	ND	0.01
Ethylbenzene			0.147	ND	ND	0.75
Toluene			ND	ND	ND	0.75
Xylenes (total)			ND	ND	ND	0.62
Semivolatile Organics	8270C	mg/l				
Acenaphthene			ND	ND	ND	
Acenaphthylene			ND	ND	ND	
Anthracene			ND	ND	ND	
Benzo(a)anthracene			ND	ND	ND	
Benzo(b)fluoranthene			ND	ND	ND	
Benzo(k)fluoranthene			ND	ND	ND	
Benzo(ghi)perylene			ND	ND	ND	
Benzo(a)pyrene			ND	ND	ND	0.0007
Chrysene			ND	ND	ND	
Dibenzo(a,h)anthracene			ND	ND	ND	
Fluoranthene			ND	ND	ND	
Fluorene			0.002816	ND	ND	
Indeno(1,2,3-cd)pyrene			ND	ND	ND	
2-Methylnaphthalene			0.05457	ND	ND	
Naphthalene			**0.07128**	ND	ND	0.03*
Phenanthrene			0.006317	ND	ND	
Pyrene			ND	ND	ND	
1-Methylnaphthalene			0.07064	ND	ND	

mg/l = Milligrams per liter
ND = Not detected at or above laboratory detection limits
* PAH's total naphthalene plus monomethylnaphthalenes

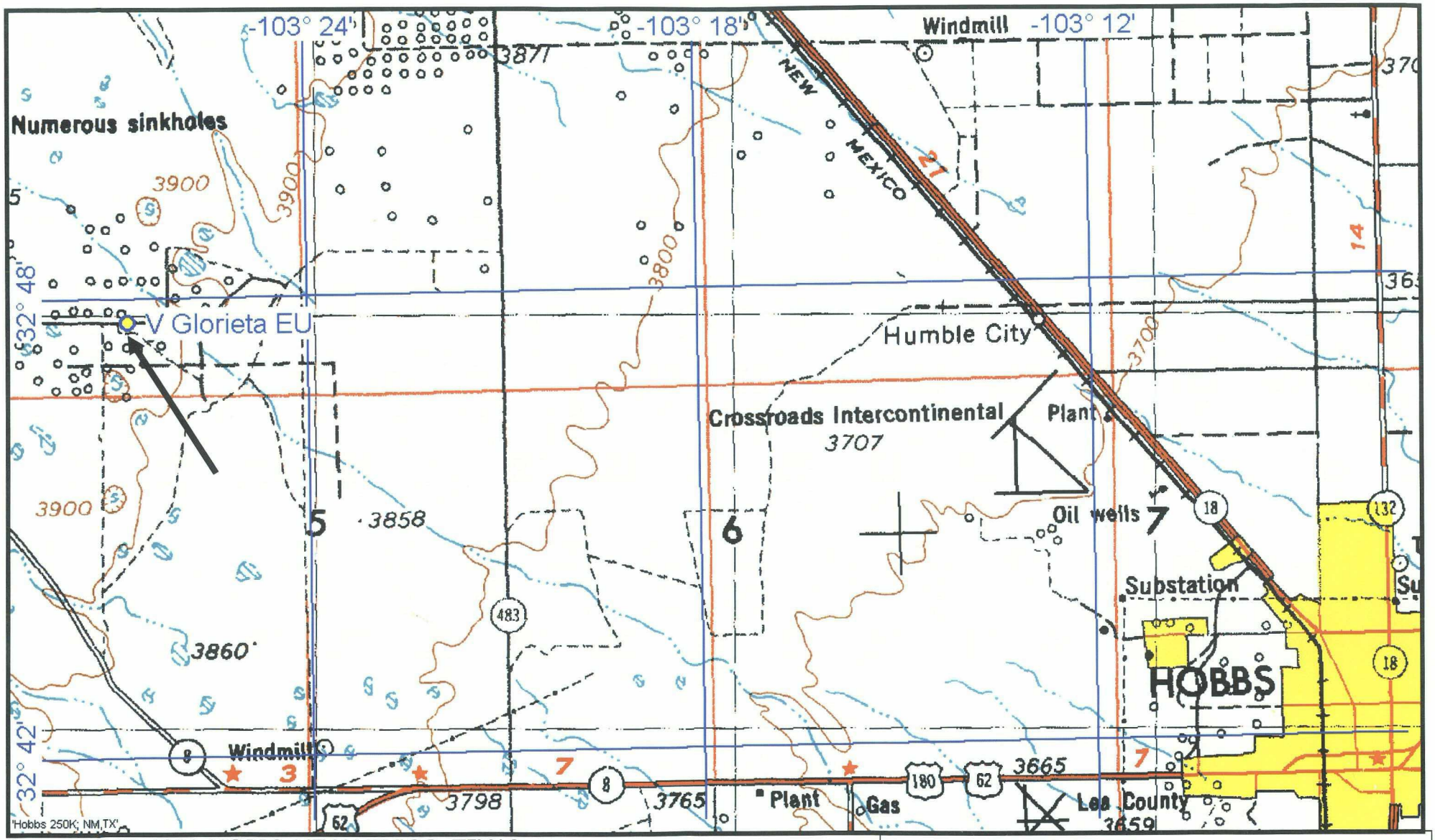
Table 10
ConocoPhillips
East Vacuum Glorietta Unit, East Tank Battery Playa
Soil Analysis
December 8, 2004

Parameter	Method	Unit	Excavation Walls*				Excavation Floor
			West	South	East	North	
TPH-DRO	8015B	mg/kg	**6,500**	**10,000**	<14	**470**	**13,000**
TPH-GRO	8015B	mg/kg	23	190	10	34	260
Moisture	160.3	%	13.9	16.6	16.8	19.5	20.3
Chloride	1312/300	mg/l	3.9	45.6	37.5	37.5	4.2
Benzene	1312/8260	µg/kg	< 5	< 5	< 5	< 5	< 5
Toluene	1312/8260	µg/kg	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	1312/8260	µg/kg	< 5	< 5	< 5	< 5	< 5
Xylene (Total)	1312/8260	µg/kg	< 5	< 5	< 5	< 5	13

mg/kg = Milligrams per kilogram
% = Percent
mg/l = Milligram per liter
µg/kg = Micrograms per kilogram
* Locations based on field observations

FIGURES

FIGURES

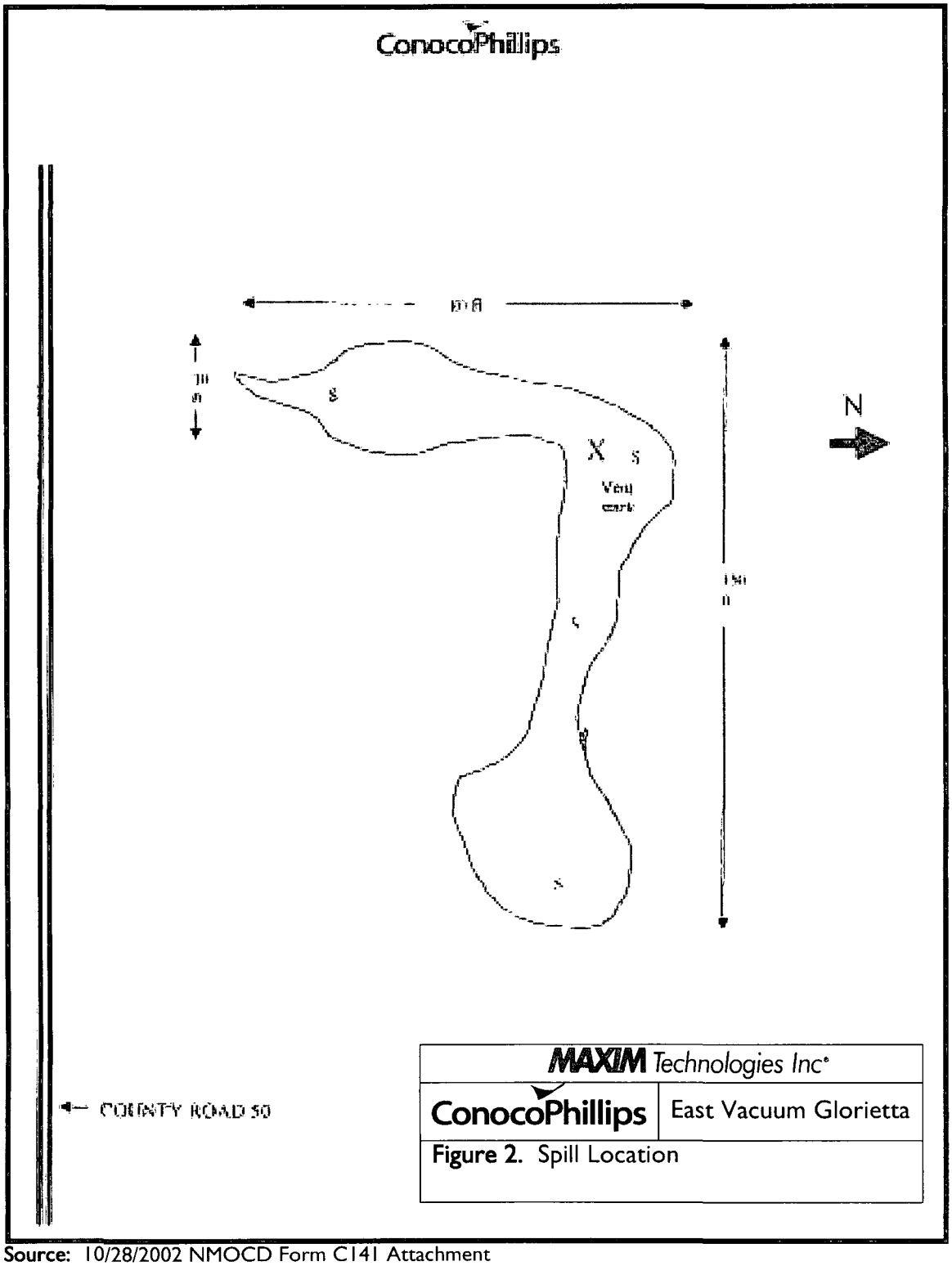


Source: USGS, 1954. HOBBS, NEW MEXICO; TEXAS
1:250,000 scale (Reduced 60%)

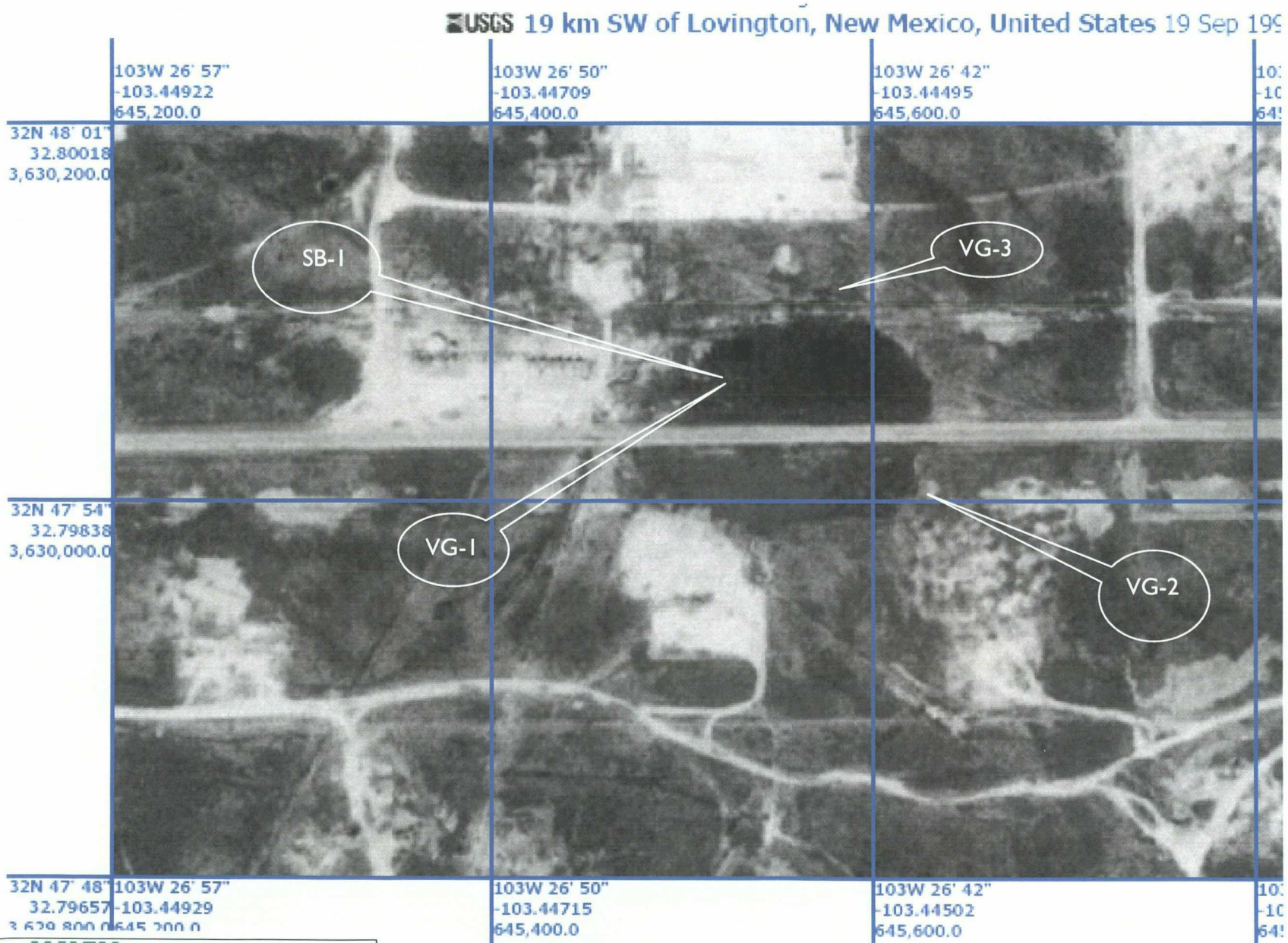
MAXIM Technologies

ConocoPhillips	East Vacuum Glorietta

Figure 1. East Tank Battery Location



Source: 10/28/2002 NMOCD Form C141 Attachment

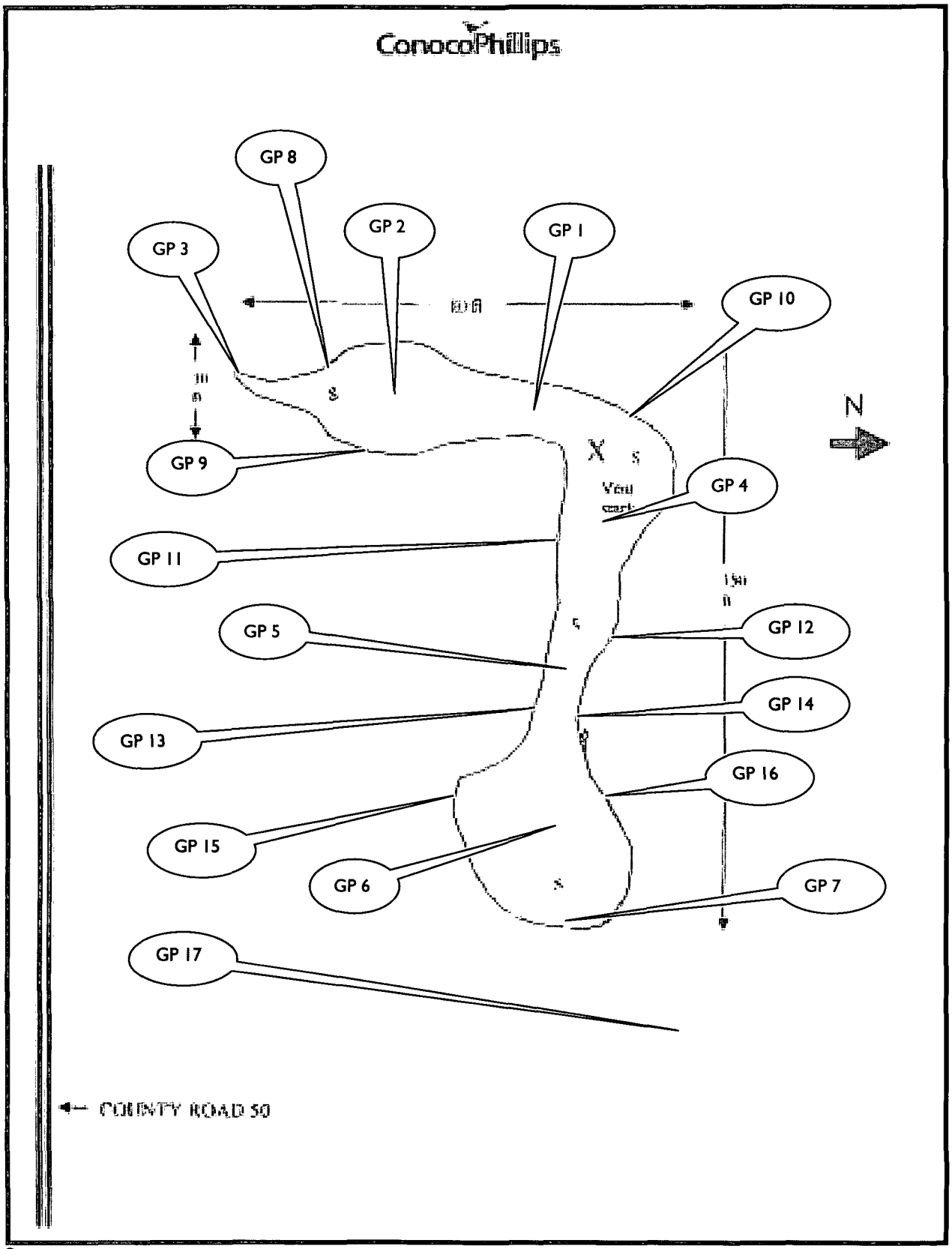


MAXIM Technologies Inc

ConocoPhillips | East Vacuum Glorietta

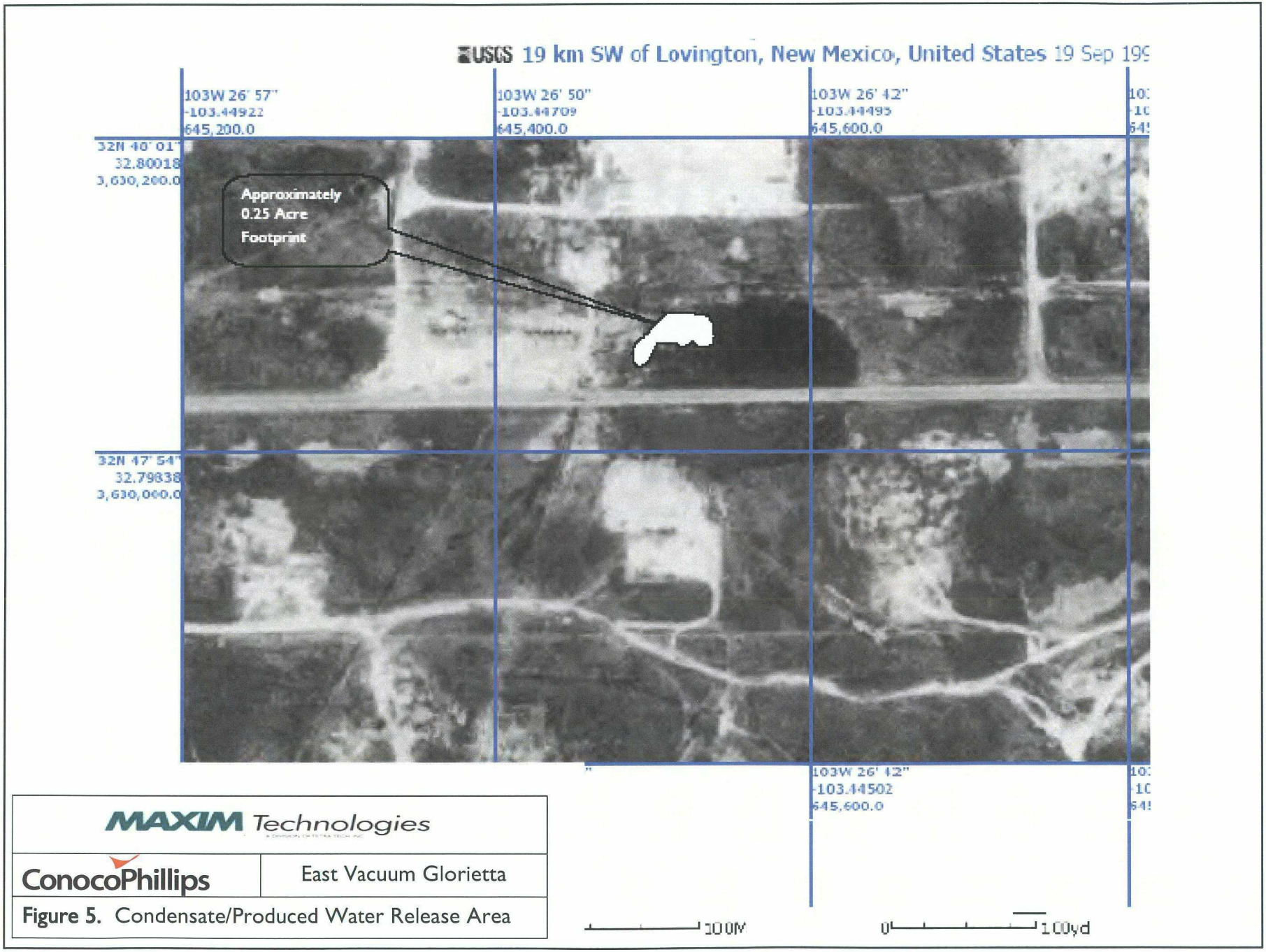
SB-1 B&H Boring

Figure 3. Monitoring Well Locations (VG)



Source: 10/28/2002 NMOCD Form C141 Attachment

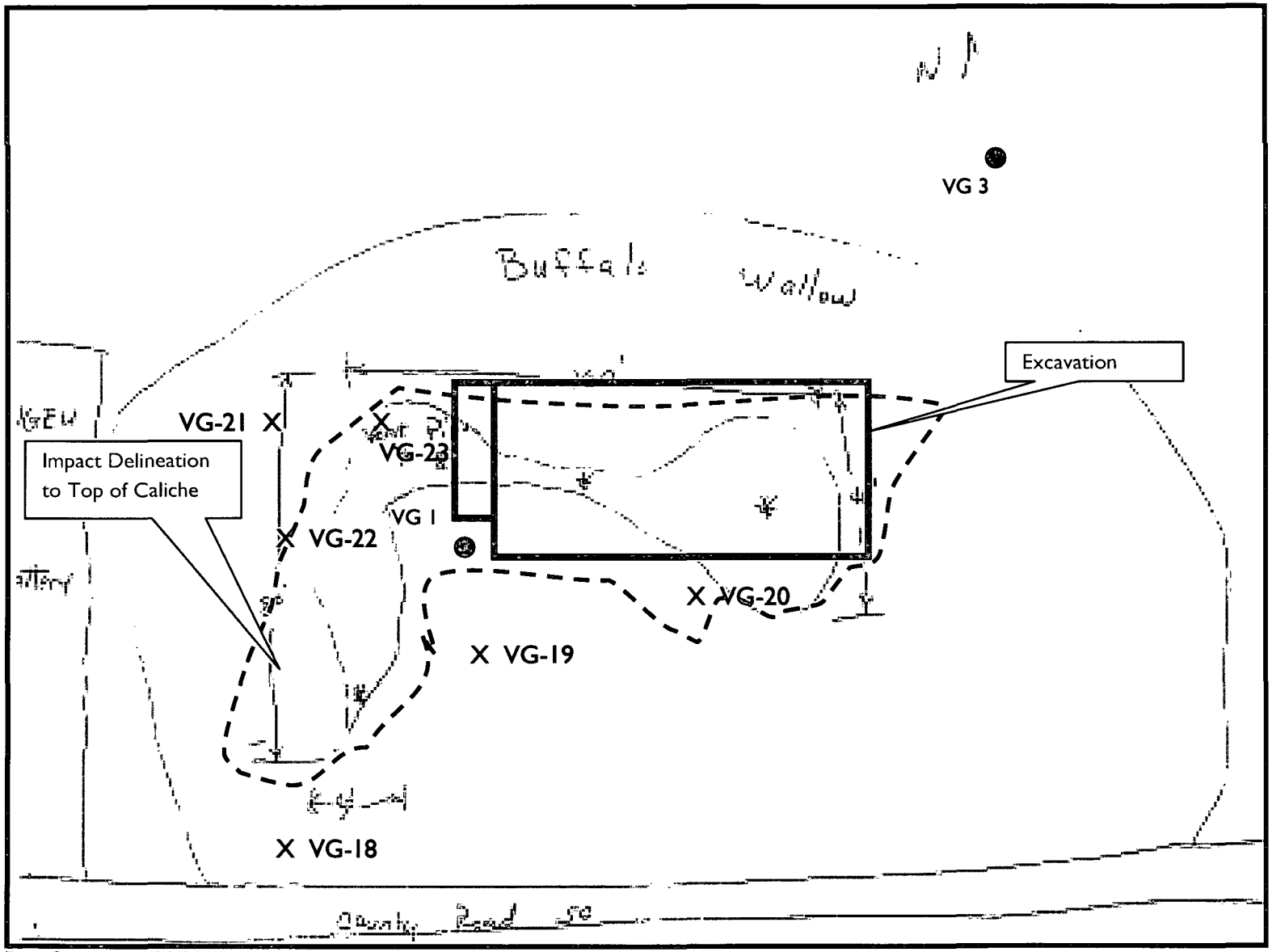
MAXIM Technologies	
ConocoPhillips	East Vacuum Glorietta
Figure 4. GeoProbe Locations	



MAXIM Technologies

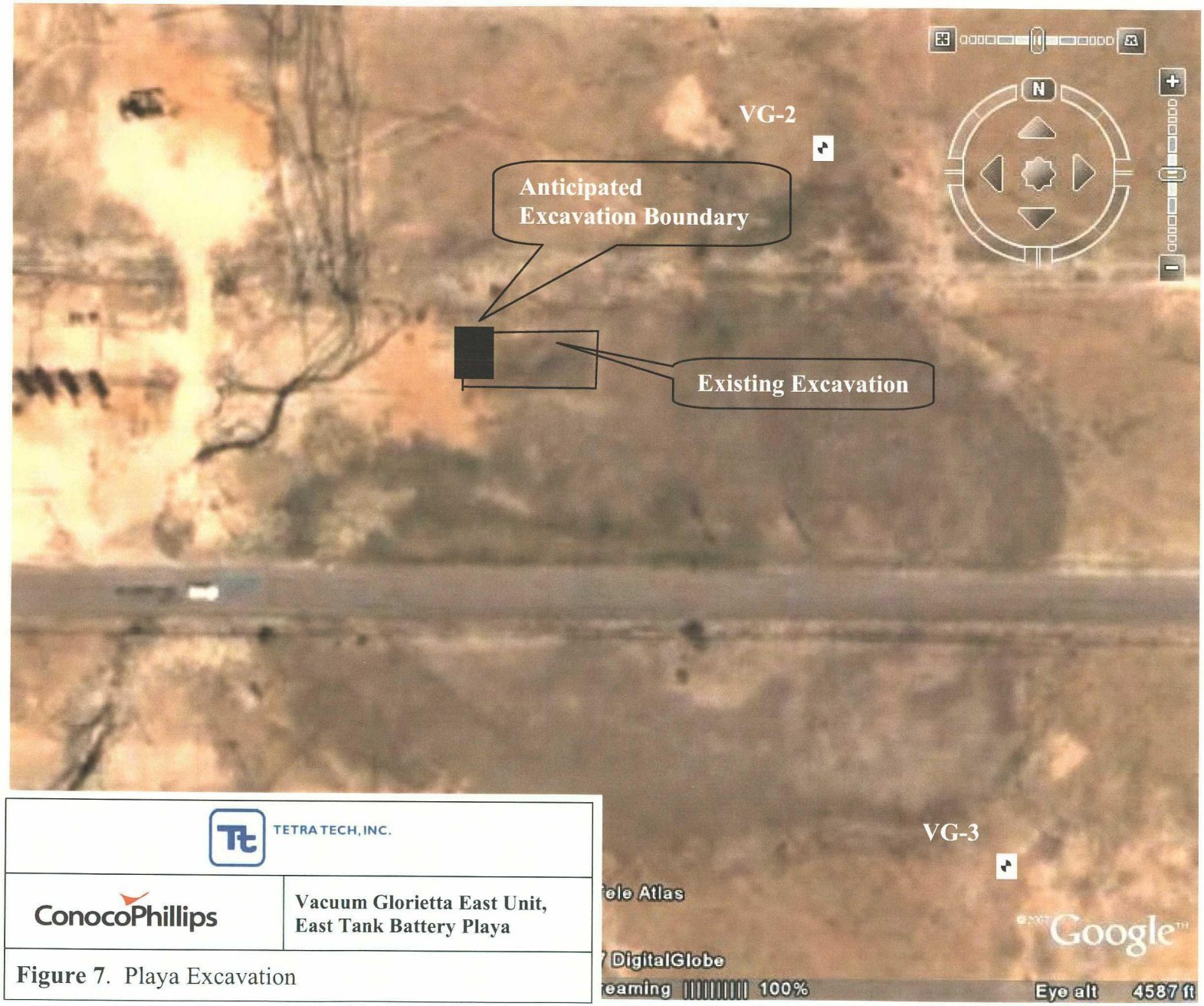
ConocoPhillips | East Vacuum Glorietta

Figure 5. Condensate/Produced Water Release Area



Base Source: 10/28/2004 NMOCD Form C141 Attachment

MAXIM Technologies	
ConocoPhillips	East Vacuum Glorietta
Figure 6. Spill Footprint & September 2004 Boring Locations	



TETRA TECH, INC.	
ConocoPhillips	Vacuum Glorietta East Unit, East Tank Battery Playa

Figure 7. Playa Excavation

APPENDICES

A – AERIAL PHOTOGRAPHS

B – LOGS & CONSTRUCTION DIAGRAMS

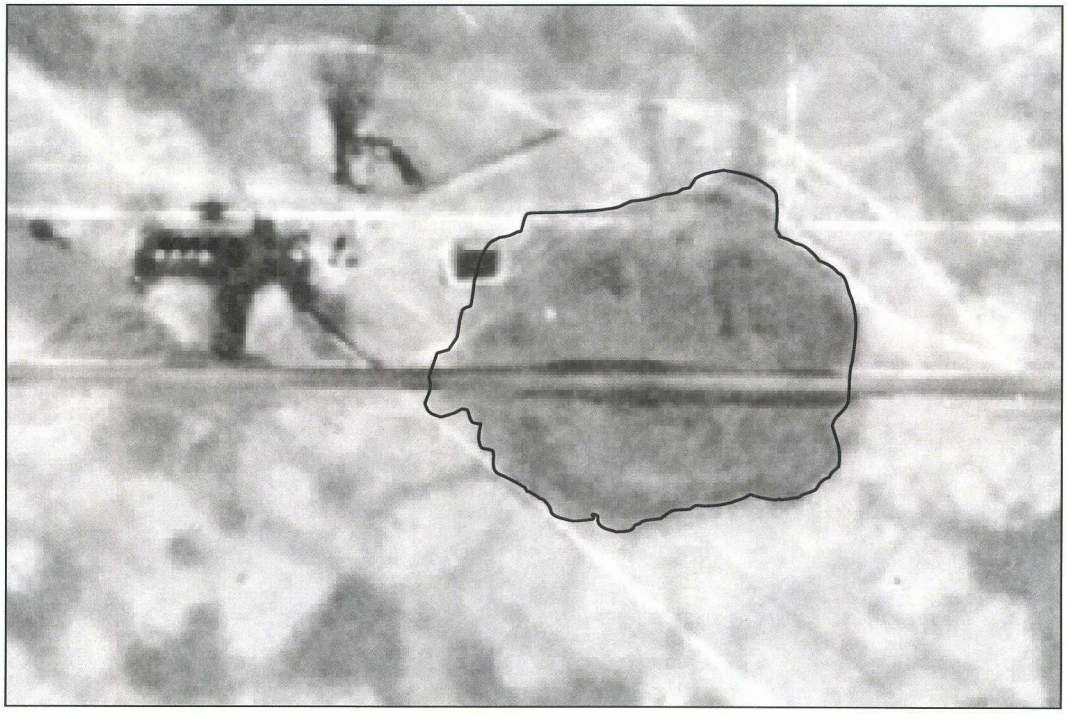
C – 07/12/2004 NMOCD E-MAIL

APPENDIX A

AERIAL PHOTOGRAPHS

ConocoPhillips

VACUUM GLORIETTA EAST TANK BATTERY PLAYA PHOTO LOG



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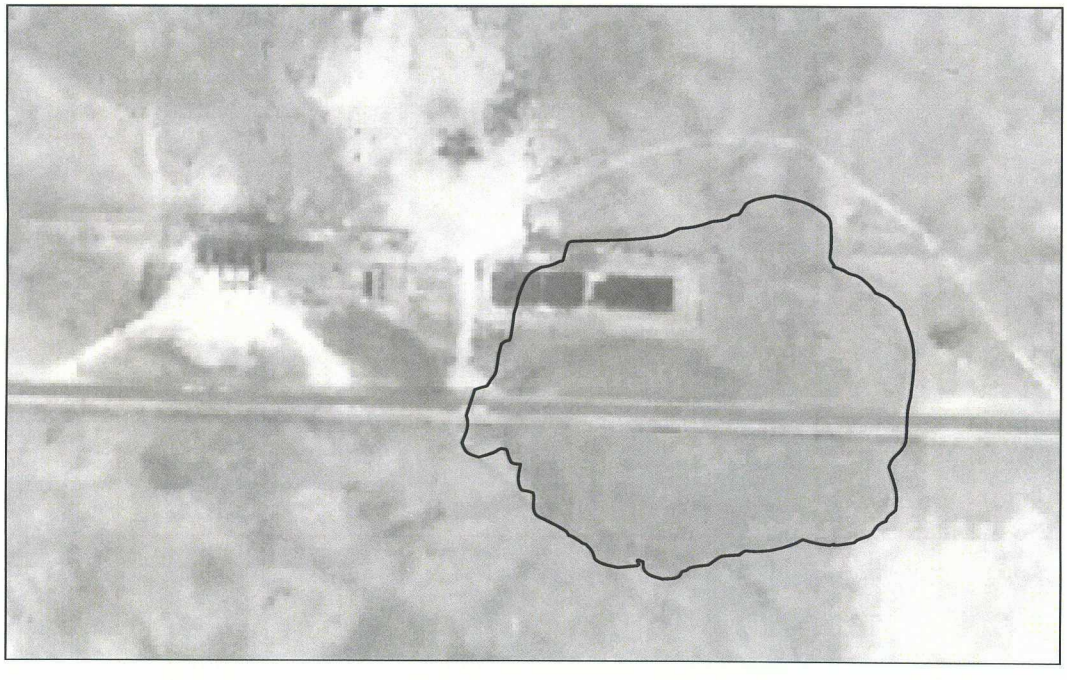
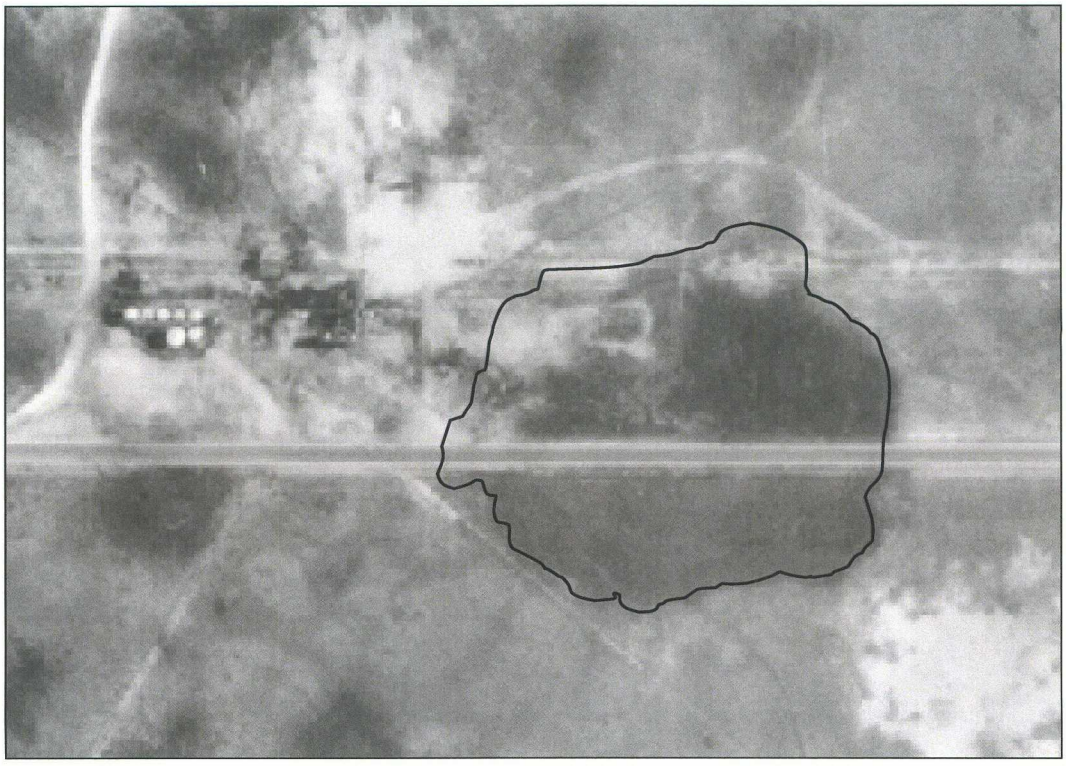
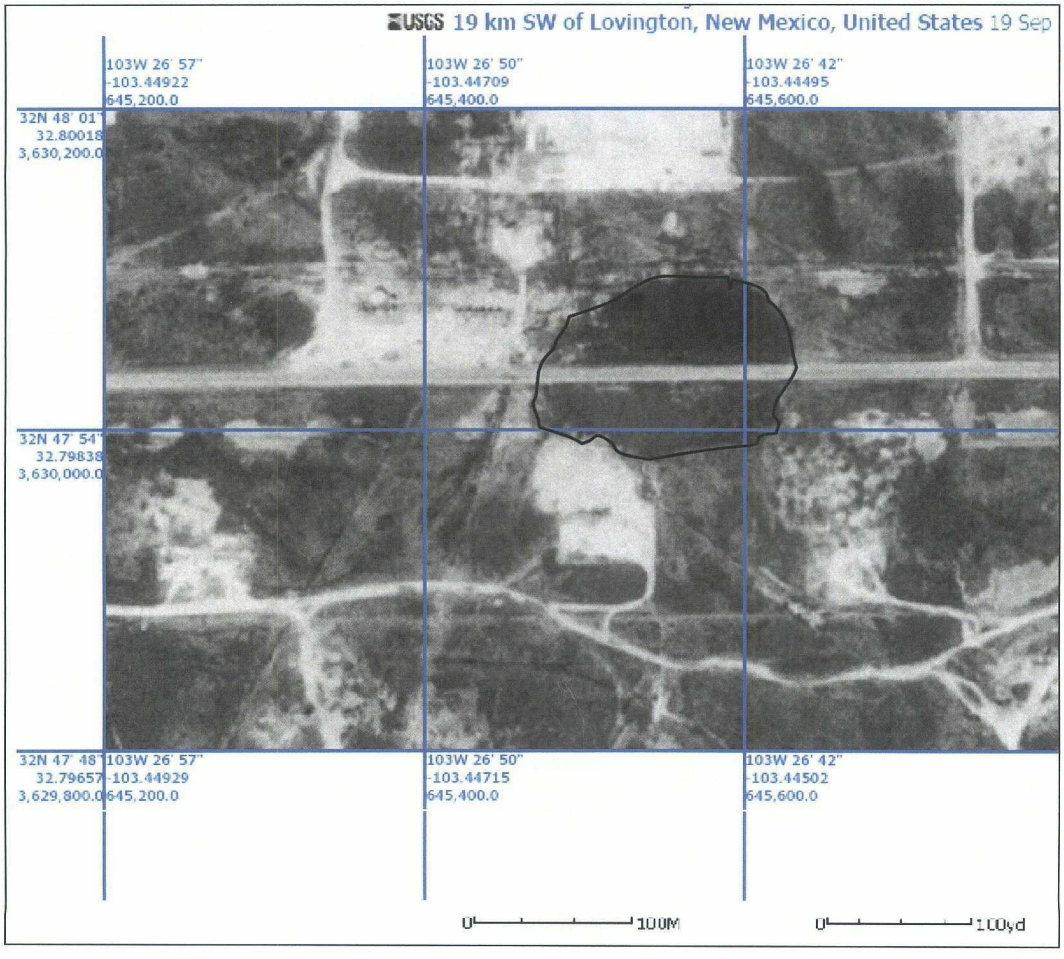


1966



1978


USGS 19 km SW of Lovington, New Mexico, United States 19 Sep
103W 26' 57"
-103.44922
645,200.0
103W 26' 50"
-103.44709
645,400.0
103W 26' 42"
-103.44495
645,600.0
32N 48' 01"
32.80018
3,630,200.0
32N 47' 54"
32.79838
3,630,000.0
32N 47' 48"
32.79657
3,629,800.0
103W 26' 57"
-103.44929
645,200.0
103W 26' 50"
-103.44715
645,400.0
103W 26' 42"
-103.44502
645,600.0
0
100M
0
100yd

1996

APPENDIX B

LOGS & WELL CONSTRUCTION DIAGRAMS

MAXIM Boring/ Well Log

Client__Conoco_____ Project No.__4640008_____
Location__Vacuum Glorieta_____ Driller _Lane_____
Boring/Well No.__VG - 1_____ Drilling Co._Scarborough Drillin
Surface Elevation_3,928.84'_____ Boring Dia._5 in._____
Dates Drilled___02-04-04_____ Fluids used___Air_____
Logged By__Lichnovsky_____ Depth to Water___60'_____
Weather_Sunny and Cool_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark gray, plastic, strong hydrocarbon smell Split spoon 0-2 no rec.	0 - 4	1289		
5	Clay, light brown, sandy, Caliche, white, hard strong hydrocarbon smell Split spoon 4-6 PID 1116 1 foot rec.	4 - 9	591		
10	Caliche, white to light gray, hard with sandy clay stringers, hydrocarbon smell	9 - 15	243		
15	Caliche, white to light gray, hard Strong hydrocarbon smell	15 - 20	>9999		
20	Sand, light brown, very fine to fine, with thin caliche layers. Split spoon 20-22 PID 907 1 foot rec.	20 - 25	322		
25	Sand, light brown, very fine to fine, with thin caliche layers. Split spoon 25-27 PID 274 1 foot rec.	25 - 30	290		
30	Sand, light brown, very fine to fine, with thin caliche layers. Split spoon 30-32 PID 245 1 foot rec.	30 - 35	133		
35					

MAXIM Boring/ Well Log

Client__Conoco_____ Project No.__4640008_____
Location__Vacuum Glorieta_____ Driller _Lane_____
Boring/Well No.__VG - 2_____ Drilling Co._Scarborough Drilling_
Surface Elevation____3,930.39'_____ Boring Dia._5 in._____
Dates Drilled___02-05-04_____ Fluids used___Air_____
Logged By__Lichnovsky_____ Depth to Water___63'_____
Weather_Sunny and Cool_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Caliche, white to light gray, hard with sandy clay stringers, no smell	0 - 5	1.7		
5	Caliche, white to light gray, hard	5 - 10	0.8		
10	Caliche, white to light gray, hard	10 - 15	4.2		
15	Caliche, white to light gray, hard	15 - 20	0.6		
20	Clay, light grayish brown, sandy	20 - 25	1.4		
25	Sand, light brown, very fine to fine, with thin caliche layers.	25 - 30	0.9		
30	Sand, light brown, very fine to fine, with thin caliche layers.	30 - 35	0.6		
35					

MAXIM Boring/ Well Log

Client__Conoco_____ Project No.__4640008_____
Location__Vacuum Glorieta_____ Driller __Lane_____
Boring/Well No._VG-2_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._5 in._____
Dates Drilled__02-05-04_____ Fluids used___Air_____
Logged By__Lichnovsky_____ Depth to Water____63'_____
Weather__Sunny and cool_____

Site Map

	Description	Interval	PID	Graphic	Well Design
35	Sand, light brown, very fine to fine, with thin caliche layers.	35 - 40	0.8		
40	Sand, light brown, very fine to fine, with thin caliche layers.	40 - 45	0.9		
45	Sand, light brown, very fine to fine, with thin caliche layers.	45 - 50	0.4		
50	Sand, light brown, very fine to fine, with thin caliche layers.	50 - 55	0.3		
55	Sand, light brown, very fine to fine, with thin caliche and gray clay stringers, moist	55 - 60	2.9		
60	Wet, no samples to surface.	60 - 70			
65					
70					
	TD 70 feet				

Page_2___of __2___

MAXIM Boring/ Well Log

Client__Conoco_____ Project No.__4640008_____
Location__Vacuum Glorieta_____ Driller _Lane_____
Boring/Well No.__VG - 3_____ Drilling Co._Scarborough Drilling
Surface Elevation____3,930.84'_____ Boring Dia._5 in._____
Dates Drilled___02-05-04_____ Fluids used___Air_____
Logged By__Lichnovsky_____ Depth to Water___62'_____
Weather_Sunny and Cool_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Caliche, white to light gray, with sandy clay	0 - 5	1.4		
5	Sand, light yellowish brown to light tan, very fine to fine grained, with caliche layers	5 - 10	0.2		
10	Sand, light yellowish brown to light tan, very fine to fine grained, with caliche layers	10 - 15	0.1		
15	Caliche, white to light gray, hard	15 - 20	1.2		
20	Sand, light brown, very fine to fine, with thin caliche and light brown clay stringers	20 - 25	3.2		
25	Sand, light brown, very fine to fine, with thin caliche layers.	25 - 30	0.7		
30	Sand, light brown, very fine to fine, with thin caliche layers.	30 - 35	1.6		
35					

MAXIM Boring/ Well Log

Client__Conoco_____ Project No.__4640008_____
Location__Vacuum Glorieta_____ Driller __Lane_____
Boring/Well No._VG-3_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._5 in._____
Dates Drilled__02-05-04_____ Fluids used___Air_____
Logged By__Lichnovsky_____ Depth to Water____62'_____
Weather__Sunny and cool_____

Site Map

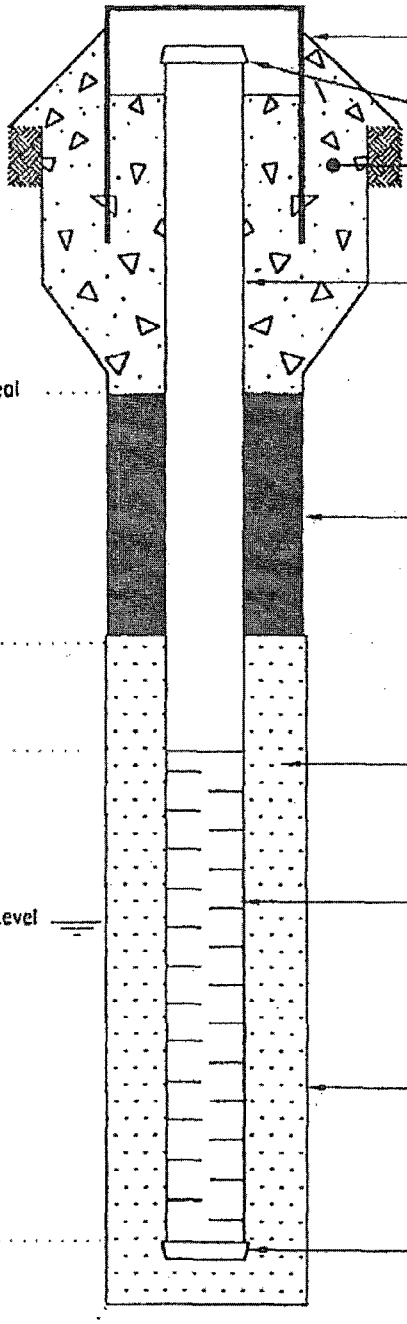
	Description	Interval	PID	Graphic	Well Design
35	Sand, light brown, very fine to fine, with thin caliche layers.	35 - 40	1.0		
40	Sand, light brown, very fine to fine, with thin caliche layers.	40 - 45	1.6		
45	Sand, light brown, very fine to fine, with thin caliche layers.	45 - 50	0.4		
50	Sand, light brown, very fine to fine, with thin caliche layers.	50 - 55	0.3		
55	Sand, light brown, very fine to fine, with thin caliche and gray clay stringers, moist	55 - 60	0.3		
60	Wet, no samples to surface.	60 - 70			
65					
70	TD 70 feet				

PROJECT NAME: Vacuum Glorieta
LOCATION: Buckeye
PROJECT NUMBER: 464008

MONITORING WELL NO. VG-1
SHEET 1 OF 1
LOCATION: Refer to Site Map

DRILL TYPE: Air
DRILLED BY: Scarborough Drilling
LOGGED BY: Frank Lichnovsky
REMARKS:

DATE HOLE STARTED: 2-4-04
COMPLETED: 2-4-04



Ground Surface

Protective Casing: 8-inch Diam. Steel Bolt-down Manhole
Water Tight Cap: Locking Expandable
Surface Completion: 2 ft. x 2 ft. Concrete Pad
Well Casing: 2-inch Schedule 40 PVC

Depth to Top of Bentonite Seal: 36
Bentonite Seal: Bentonite chips

Depth to Top of Filter Pack: 46
Depth to Top of Well Screen: 49
Filter Pack: 8-16 Sand

Depth to Initial Static Water Level: 59.62
Well Screen: 2" slotted PVC

Boring Diameter: 5 inch

Depth to Bottom Screen: 69
End Cap: 69 feet 2 inch PVC

Depth to Bottom of Boring: 70

NOT TO SCALE

MAXIM TECHNOLOGIES INC

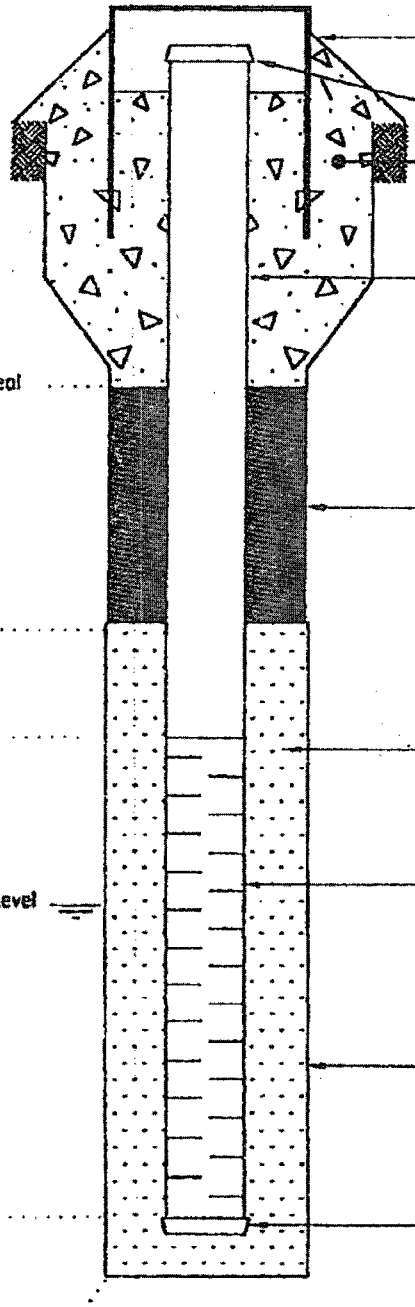
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Vacuum Glorieta
LOCATION: Buckeye
PROJECT NUMBER: 464 0008

MONITORING WELL NO. VG-2
SHEET 1 OF 1
LOCATION: Refer to Site Map

DRILL TYPE: Air
DRILLED BY: Scarborough Drilling
LOGGED BY: Frank Lichyovsky
REMARKS:

DATE HOLE STARTED: 2-5-04
COMPLETED: 2-5-04



Ground Surface

Depth to Top of Bentonite Seal: 41

Depth to Top of Filter Pack: 52

Depth to Top of Well Screen: 54

Depth to Initial Static Water Level: 62.77

Depth to Bottom Screen: 69

Depth to Bottom of Boring: 70

NOT TO SCALE

Protective Casing	8-inch Diam. Steel Bolt-down Manhole
Water Tight Cap	Locking Expandable
Surface Completion	2 ft. x 2 ft. Concrete Pad
Well Casing	2-inch Schedule 40 PVC
Bentonite Seal	Bentonite chips
Filter Pack	8-16 Sand
Well Screen	2" slotted PVC
Boring Diameter	5 inch
End Cap	2 in PVC

MAXIM TECHNOLOGIES INC

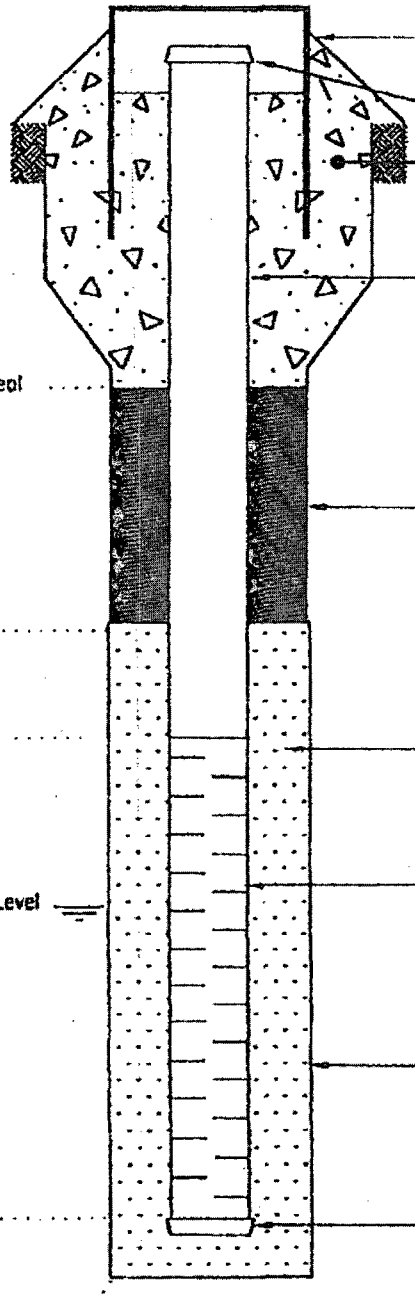
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Vacuum Glorieta
LOCATION: Buck eye
PROJECT NUMBER: 464008

MONITORING WELL NO. VG-3
SHEET 1 OF 1
LOCATION: Refer to Site Map

DRILL TYPE: Air
DRILLED BY: Scarborough Drilling
LOGGED BY: Frank Lichnovsky
REMARKS:

DATE HOLE STARTED: 2-5-04
COMPLETED: 2-5-04



Ground Surface

Depth to Top of Bentonite Seal: 36

Depth to Top of Filter Pack: 52

Depth to Top of Well Screen: 55

Depth to Initial Static Water Level: 62.15

Depth to Bottom Screen: 70

Depth to Bottom of Boring: 70

NOT TO SCALE

Protective Casing	8-inch Diam. Steel Bolt-down Manhole
Water Tight Cap	Locking Expandable
Surface Completion	2 ft. x 2 ft. Concrete Pad
Well Casing	2-inch Schedule 40 PVC
Bentonite Seal	Bentonite chips
Filter Pack	8-16 Sand
Well Screen	2" slotted PVC
Boring Diameter	5 inch
End Cap	2 inch PVC

MAXIM TECHNOLOGIES INC

MONITORING WELL CONSTRUCTION DIAGRAM

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-1_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, black to reddish brown, strong smell	0 - 3	1416		
	Clay, reddish brown, slightly sandy, moderate smell	3 - 6	620		
5	Caliche, white, chalky				
	Caliche, white, chalky to indurated	6 - 8	371		
8	TD 8 feet				

Page____of _____

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-2_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown, no smell	0 - 3	0		
	Clay, dark reddish brown, slightly sandy	3 - 6	0.5		
5	Caliche, white, chalky	6 - 7			
7	Caliche, white, chalky to indurated. with gravel				
	TD 7 feet				

Page____of _____

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-3_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

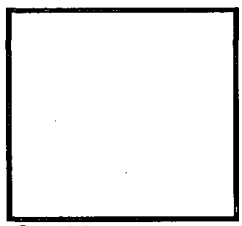
Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown, no smell	0 - 3	0.4		
	Clay, reddish brown, slightly sandy	3 - 6	1.1		
5	Caliche, white, chalky				
	Caliche, white, chalky to indurated, with gravel	6 - 9	0.1		
9	TD 9 feet				

Page____of _____

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-4_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____


Site Map

Description	Interval	PID	Graphic	Well Design
Clay, black to dark brown	0 - 3	14.9		
Clay, reddish brown, slightly sandy	3 - 6			
Caliche, white, chalky to indurated				
TD 6 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-5_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, black, strong smell	0 - 3	73.4		
	Clay, reddish brown, slightly sandy	3 - 6	61.3		
5	Caliche, white to dark gray, chalky to indurated	6 - 8	140		
8	TD 8 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-6_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, black	0 - 3	12.2		
	Clay, dark brown, slightly sandy	3 - 6	0.6		
5	Caliche, white to dark gray, chalky to indurated, with gravel lenses	6 - 9	251		
10	Caliche, white to dark gray, chalky to indurated,	9 - 12	185		
	Caliche, white to dark gray to orange chalky to indurated	12 - 15	294		
15	Caliche, white to dark gray to orange chalky to indurated Sand, black,	15 - 18	235		
	TD 18 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-7_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	5.9		
	Clay, dark brown, slightly sandy	3 - 6	8.3		
5					
	Clay, dark brown, slightly sandy, with light browr sand lenses	6 - 9	1.3		
10	Caliche, white, chalky to indurated,	9 - 11	2.9		
	TD 11 feet				

Page____of _____

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-8_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-19-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	7		
	Clay, reddish brown, slightly sandy	3 - 6	9		
5	Caliche, white, chalky to indurated				
	TD 6 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-9_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, brown	0 - 3	0		
	Clay, brown, slightly sandy	3 - 6	0		
5	Caliche, white, chalky				
	Caliche, white, chalky to indurated	6 - 8	0.6		
8	TD 8 feet				

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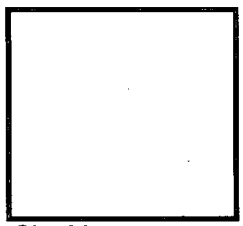
MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-10_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____


Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	10.1		
	Caliche, white, chalky to indurated				
	TD 3 feet				

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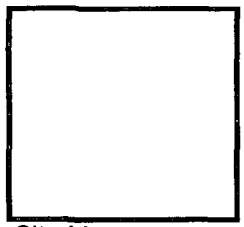
MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-11_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____


Site Map

Description	Interval	PID	Graphic	Well Design
0 Clay, dark brown	0 - 3	21.9		
Clay, dark brown, slightly sandy	3 - 6	3.4		
5 Caliche, white, chalky to indurated	6 - 9	16.2		
9 TD 9 feet				

Page____of _____

MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-12_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	31.5		
	Clay, dark brown, slightly sandy	3 - 6	17.9		
5					
	Caliche, white, chalky to indurated	6 - 9	10.6		
9					
	TD 9 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-13_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	17.7		
	Clay, brown, sticky	3 - 6	8.5		
5					
	Clay, brown, slightly sandy	6 - 9	8.8		
	Caliche, white, chalky to indurated				
9	TD 9 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-14_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	8.8		
	Caliche, white, chalky to indurated	3 - 6	5.7		
5	TD 6 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-15_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	6.3		
	Clay, brown, sticky in part	3 - 6	2.3		
5	Caliche, white, chalky to indurated	6 - 9	0		
9	TD 9 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-16_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	0		
	Clay, dark brown, slightly sandy	3 - 6	0		
5					
	Clay, dark brown, slightly sandy Caliche, white, chalky to indurated	6 - 9	0		
9	TD 9 feet				

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MAXIM GeoProbe/ Well Log

Client__Conoco_____ Project No.__4640031_____
Location_Vacuum Glorieta_____ Driller __Don_____
Boring/Well No.____GP-17_____ Drilling Co.__ESN, South_____
Surface Elevation_____ Boring Dia._2 in._____
Dates Drilled__5-20-04_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark brown	0 - 3	0.1		
	Clay, dark brown, slightly sandy	3 - 6	0.1		
5	Clay, brown	6 - 9	0		
10	Caliche, white, chalky to indurated,	9 - 11			
	TD 11 feet				

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MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-18_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-14-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

Description	Interval	PID	Graphic	Well Design
Clay, dark brown, plastic, slightly moist,with red sand, VF, clayey, 3-	0 - 10	0		
Caliche, white, chalky to moderate hard	10-20	0		
Sand, lt brown, yellowish, vf-f, friable to slightly compact, subangular to sub rounded	20-30	0		
Sand, lt yellowish, lt reddish brown.vf-f, slightly compact, subangulor to subrounded, thin clay stringers	30-40	0		
Sand, lt yellowish, lt brown, vf-f, subangulor to subround, slighty compact, thin clay and caliche stringers	40-50	0		
TD 50 feet				

Page__1__of ___1__

MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-19_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-15-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark gray to lt brown, slightly plastic, trace to slightly sandy, caliche, white, chalky to hard 8-	0 - 10	0		
	Caliche, white, chalky, f, hard	10-20	0		
5					
	Sand, lt yellowish brown, vf-f, subangular-subround, slightly compact, scattered thin clay stringers	20-30	0		
10	Sand, as above	30-40	0		
	Sand, as above	40-50	10.2		
	TD 50 feet				

Page__1__of ___1__

MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-20_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-15-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay dark gray, lt brown, slightly plastic, slightly sandy	0 - 10	0		
	Caliche, white, chalky-hard	10-20	208		
5	Sand, lt yellow orange, vf-f, subangular-subround	20-30	249		
10	As above	30-40	128		
	Sand, lt tan, lt brown, vf-f, subangular - subround, slighty compact	40-50	52.1		
	TD 50 feet				

Page__1__of __1___

MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-21_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-15-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

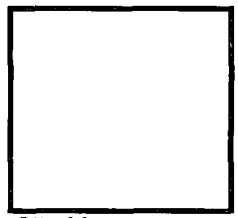
	Description	Interval	PID	Graphic	Well Design
0	1' black clay, caliche, white, chalky-hard, dark black clay smell	0 - 10	636		
	Caliche, white, chalky - hard, sand, greeenish gray, smell	10-20	274		
5	Sand, gray, vf-f, subangular-subround, smell, oil on water	20-30	237		
10	As above	30-40	192		
	As above	40-50	133		
	TD 50 feet				

Page__1__of ___1__

MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-22_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-16-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____


Site Map

Description	Interval	PID	Graphic	Well Design
Clay, dark brown, slightly plastic, slightly sandy, 8-19	0-10	72.6		
Caliche, white, chalky to hard	10-20	31.6		
Sand, lt yellow-lt brown, vf-f, subangular-subround, slightly compact, scattered thin clay stringers	20-30	26.9		
Sand, as above	30-40	12.6		
Sand, as above	40-50	133		
TD 50 feet				

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MAXIM safety excellence

Boring/ Well Log

Client__Conoco_____ Project No.__4640037_____
Location_Vacuum Glorieta_____ Driller __Scott_____
Boring/Well No.____VG-23_____ Drilling Co.__Scarborough____
Surface Elevation_____ Boring Dia._4.75 in._____
Dates Drilled__9-16-2004_____ Fluids used_____
Logged By__Lichnovsky_____ Depth to Water_____
Weather_____

Site Map

	Description	Interval	PID	Graphic	Well Design
0	Clay, dark gray, slightly plastic, slightly sandy	0 -10	24.5		
	Caliche, white, chalky-hard	10-20	683		
5	Sand, black, vf-f, subangular- subround, slightly compact, strang smell	20-30	285		
10	Sand, lt yellowish brown, as above	30-40	95.7		
	Sand, as above	40-50	267		
	TD 50 feet				

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APPENDIX C

NMOCD E-MAIL

Subj: **RE: ConocoPhillips Vacuum Glorieta Findings Report and Recommendations**
Date: 7/12/2004 6:40:01 PM Eastern Daylight Time
From: "Price, Wayne" <WPrice@state.nm.us>
To: "'Cwdurrett1@aol.com'" <Cwdurrett1@aol.com>, "Price, Wayne"<WPrice@state.nm.us>
Cc: "Williams, Chris" <CWilliams@state.nm.us>, "Sheeley, Paul"<PSheeley@state.nm.us>, neal.goates@conocophillips.com, Stephen.R.Wilson@ConocoPhillips.com, "Johnson, Larry"<LWJohnson@state.nm.us>

Sent from the Internet (Details)
OCD has reviewed the document and hereby **denies** your request to install a liner to cover contaminated soils in the playa lake. OCD will require ConocoPhillips to excavate soils to some practical extent to remove the major source of contamination and dispose of contaminated soils at an OCD approved site. Bottom hole and sidewall samples shall be collected and analyzed for BTEX and Chlorides using the SPLP method. Excavation may cease before the practical extent is reached if TPH and chloride levels are 100 ppm and 250 ppm or less respectfully. If analysis shows constituents to be below the WQCC groundwater limits or the actual groundwater conditions at the time then Conoco may backfill and compact with similar clean soil. ConocoPhillips shall notify the OCD District office to witness the sampling. A report shall be submitted by **August 20, 2004** describing all activities, analytical results, photos, a groundwater monitoring and remediation plan for OCD approval. OCD will forgo the formal Rule 19 abatement process if the above actions are taken and groundwater remediated in a timely manner pursuant to the Rule 19 exemptions.

In addition, ConocoPhillips shall perform an internal investigation to determine why the spill report did not reflect that a watercourse was impacted and why ConocoPhillips did not report the spill or perform clean-up actions in a timely manner. The delay in clean-up actions may have caused groundwater contamination. The spill was found by OCD approximately 30 hours after the initial occurrence. Please provide to OCD by **August 20, 2004** your findings in this manner and what actions, if necessary will be taken to remedy this problem in the future.
-----Original Message-----
From: Cwdurrett1@aol.com [mailto:Cwdurrett1@aol.com]
Sent: Wednesday, July 07, 2004 10:15 AM
To: WPrice@state.nm.us
Cc: Cwilliams@state.nm.us; psheeley@state.nm.us; neal.goates@conocophillips.com; Stephen.R.Wilson@ConocoPhillips.com
Subject: ConocoPhillips Vacuum Glorieta Findings Report and Recommendations

Attach is Mr. Neal Goates, ConocoPhillips, transmittal letter and Maxim Technologies' findings report for a playa adjacent to East Glorieta, East Tank Battery located in Lea County, New Mexico (Sec 27, T35S, R35E).

If you concur with the approach as presented in Mr. Goates letter, ConocoPhillips will authorize Maxim to proceed with the proposed program. Please contact Mr. Goates (832-379-6427) or me if you have any questions or require additional information.

If requested, Maxim will send a hard copy of the subject report. Please acknowledge receipt of this e-mail.

Bradford Billings
NMOCD
November 10, 2020

LIST OF ATTACHMENTS

Figure 1 – Site Location Map

Attachment A – C-141 Form and Record of AP Transfer
Attachment B – NMOCD Letter (October 31, 2002)
Attachment C – Remediation Report (Maxim, 2005)
Attachment D – *2019 Annual Groundwater Monitoring and Remedial Activities Report* (Tetra Tech, 2020)
Attachment E – Abatement Plan Documentation

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
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
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

Action 206287

CONDITIONS

Operator: CONOCO INC 10 Desta Drive,Ste 649 W Midland, TX 79705	OGRID: 184043
	Action Number: 206287
	Action Type: [IM-SD] Incident File Support Doc (ENV) (IM-BNF)

CONDITIONS

Created By	Condition	Condition Date
jharimon	None	4/11/2023