



AE Order Number Banner

Report Description

This report shows an AE Order Number in Barcode format for purposes of scanning. The Barcode format is Code 39.



App Number: pWCO0127033627

3RP - 381

BP AMERICA PRODUCTION COMPANY

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

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

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

Subsequent Report- Plan Final Report

Name of Company: BP America Production Co.	Contact: Steve Moskal
Address: 380 Airport Road, Durango CO, 81303	Telephone No.: 505-330-9179
Facility Name: Gallegos Canyon Unit 170	Facility Type: Natural gas well
Surface Owner: Fee	Mineral Owner: Fee
API No. 30-045-07658	

LOCATION OF RELEASE

Unit Letter K	Section 35	Township 29N	Range 12W	Feet from the 1,750	North/South Line South	Feet from the 1,777	East/West Line West	County: San Juan
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Latitude 36.68015° Longitude -108.07149°

NATURE OF RELEASE

Type of Release: Produced water and condensate	Volume of Release: 253 bbl	Volume Recovered: 71.1
Source of Release: Failed well casing	Date and Hour of Occurrence: July 21, 2016; 2:15 PM	Date and Hour of Discovery: July 22, 2016; 8:30 AM
Was Immediate Notice Given? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Required	If YES, To Whom? Landowner Contacted Brandon Powell - NMOCD	
By Whom? Jesus Villalobos - Private Landowner	Date and Hour: 7/22/16; Phone 8:30 AM Email - 5:30 PM	
Was a Watercourse Reached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.* A significant increase in water production of the well is suspected to be associated with a breach in the downhole casing. The produced water triggered an alarm, closing the automated choke valve. The water then filled the separator, above ground tank (pit) and production tank which subsequently became overfilled. The well was shut in and the freestanding liquids were recovered via vac-truck. After further investigation, the production well had an apparent integrity failure and was subsequently P&A'd. The remediation via excavation removed 15,000 cubic yards of soil for offsite disposal. Subsequently, a groundwater monitoring plan is attached.

Describe Area Affected and Cleanup Action Taken.* The majority of the existing well pad was excavated to remove impacts associated with the production well integrity failure as well as historical impacts. A total of 15,000 cubic yards of soil was removed and transported off site for landfarm treatment. The report documents the existence and/or extents of groundwater impacts via the installation of several groundwater monitoring wells. The report and confirmation laboratory data demonstrates that the excavation of the recent and historically impacted material was successful in remediating soil and groundwater. Elevated sulfates have been noted in the previous groundwater monitoring events. The sulfate is believed to be sourced from the imported backfill material requested by the current landowner. Subsequently, a groundwater monitoring plan is attached.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD 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 NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD 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.

Signature:	OIL CONSERVATION DIVISION	
Printed Name: Steve Moskal	Approved by Environmental Specialist:	
Title: Field Environmental Coordinator	Approval Date: <u>9/24/18</u>	Expiration Date:
E-mail Address: steven.moskal@bpx.com	Conditions of Approval: <u>→</u>	Attached <input checked="" type="checkbox"/>
Date: August 21, 2018	Phone: 505-330-9179	

* Attach Additional Sheets If Necessary

NCS 16 216 56998
3RP - 381

NMOCD
AUG 22 2018
DISTRICT III

(17)

Smith, Cory, EMNRD

From: Smith, Cory, EMNRD
Sent: Monday, September 24, 2018 3:19 PM
To: Steven Moskal
Cc: 'blagg_njv@yahoo.com'; Blagg, Jefferey; Fields, Vanessa, EMNRD; Billings, Bradford, EMNRD
Subject: RE: GCU 170 Monitoring Plan #ncs1621656998

Steve,

OCD has received the additional sampling plan for incident #ncs1621656998 at the Gallegos Canyon Unit #170. OCD approved BP sampling plan and schedule with the following conditions of approval:

- Should there be any drastic changes in the contaminates during Biannual sampling OCD may require more frequent sampling events.
- BP maybe required to sample using method 8260 prior to closure.

If you have any additional questions please give me a call.

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

From: Steven Moskal <Steven.Moskal@BPX.COM>
Sent: Wednesday, September 12, 2018 5:34 PM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>
Cc: 'blagg_njv@yahoo.com' <blagg_njv@yahoo.com>; Blagg, Jefferey <jeffcblagg@aol.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>; Bayliss, Randolph, EMNRD <Randolph.Bayliss@state.nm.us>
Subject: RE: GCU 170 Monitoring Plan

Cory – Blagg plans to conduct the sampling on September 19th. Please let me know if the sampling parameters satisfy the NMOCD, if not, we will delay the sampling until the sampling plan is agreed on.

Thank you,

Steve Moskal
BP Lower 48 – San Juan
Field Environmental Coordinator
Phone: (505) 330-9179



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From: Smith, Cory, EMNRD [mailto:Cory.Smith@state.nm.us]
Sent: Monday, September 10, 2018 11:42 AM
To: Steven Moskal
Cc: 'blagg_njv@yahoo.com'; Blagg, Jefferey; Fields, Vanessa, EMNRD; Bayliss, Randolph, EMNRD
Subject: RE: GCU 170 Monitoring Plan

Steve,

I have the report on my desk for review please proceed with monitoring I will try and get it reviewed asap.

Cory Smith
Environmental Specialist
Oil Conservation Division
Energy, Minerals, & Natural Resources
1000 Rio Brazos, Aztec, NM 87410
(505)334-6178 ext 115
cory.smith@state.nm.us

From: Steven Moskal <Steven.Moskal@BPX.COM>
Sent: Friday, September 7, 2018 9:34 AM
To: Smith, Cory, EMNRD <Cory.Smith@state.nm.us>
Cc: 'blagg_njv@yahoo.com' <blagg_njv@yahoo.com>; Blagg, Jefferey <jeffcblagg@aol.com>; Fields, Vanessa, EMNRD <Vanessa.Fields@state.nm.us>; Bayliss, Randolph, EMNRD <Randolph.Bayliss@state.nm.us>
Subject: GCU 170 Monitoring Plan

Cory,

The attached plan was submitted on 8/21 and is still pending approval by the NMOCD. Can you provide an update? BP has this monitoring tentatively scheduled for later this month.

Steve Moskal
BP Lower 48 – San Juan
Field Environmental Coordinator
Phone: (505) 330-9179



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BP Remediation Management Plan

To: Randy Bayliss & Cory Smith (CC) (NMOCD)
From: Steve Moskal (BP)
CC: Jeff Blagg (Blagg Engineering)
Date: 8/21/2018
Re: Gallegos Canyon Unit 170 – Continued Groundwater Monitoring Plan
3RP-422; API#30-045-0765 (K) S35, T29N, R12W

Dear Mr. Bayliss and Mr. Smith,

The Gallegos Canyon Unit (GCU) 170 site is an abandoned natural gas production pad within the San Juan Basin Gas Field in San Juan County, New Mexico. The site is located on private land with and the first well in the unit was spud on October 9, 1964 and drilled by Pan American Petroleum Company. The ownership of the land has changed several times since the natural gas well was drilled. The well pad is located on agricultural land with a groundwater table with an average depth of 8-12 feet below ground surface (bgs).

BACKGROUND

A historical release of natural gas liquids from production and process equipment was identified during the closure sampling of an earthen pit in 1995. The area of impacts were remediated at the time of discovery, up to the fence lines of the nearby cultivated field and surround underground pipelines. The remaining impacts beyond these boundaries were left in place per the instruction of the previous landowner, from whom the current landowner purchased the property. Groundwater monitoring wells were installed and have been sampled periodically since completion.

On July 21, 2016, the GCU 170 wellbore experienced an integrity failure resulting in the production of an abnormal amount of produced water. The water filled the surface equipment, resulting in the discharge of water and natural gas condensate to the ground surface. Remediation began immediately via removal of fluids and excavation. Once the integrity failure of the well was identified, the remediation was placed on hold while the natural gas production well was plugged and abandoned. The plugging and abandonment was completed on September 15, 2016. Remediation efforts resumed immediately thereafter.

The site soils consist of loose tan-brown sands and gravel with an intermingled silty-clay layers. The thickness of the soil ranges from 8 to 12 feet above the surface of the groundwater table interface. Below, the groundwater interface the soils become a higher concentration of clay and contains gravel and other deposits.

During the removal of impacted soil associated with the July 21, 2016 wellbore integrity failure, a significant change in contamination was noted on October 24, 2016. After an extensive record search, documents showed that during the 1995 excavation, impacts beyond the property boundary had been left in place per the instruction of the previous landowner. The extents of the residual contamination encountered on October 24, 2016 were the result of remaining impacts from the 1995 excavation and contaminant migration, through the historical backfill material. The residual contamination from the 1995 excavation was noted beyond the western, northern and eastern fence boundaries of the subject property. The residual impacts beyond the mentioned fence boundaries were further remediated with all known soil impacts removed and laboratory confirmation samples collected by BP and observed an NMOCD official.

During remedial excavation along the western fence line, elevated chloride levels were detected in soil samples submitted for laboratory analysis. Chloride levels remained low in all the other portions of the excavation. It is suspected that the elevated chloride levels may be associated with the historic GCU 002 well drilled by Benson, Montin and Greer on August 28, 1951.

Approximately 15,000 cubic yards of soil was excavated and removed from the site. Backfill material from a designated borrow area requested by the landowner was imported and placed in the excavated area during November 2016 through January 2017. A solution of potable water and hydrogen peroxide was also applied to the groundwater interface during this excavation. No hydrogen peroxide was applied to the groundwater interface of the 1995 impacts.

All of the final soil samples collected during excavation were observed by a representative of the New Mexico Oil Conservation Division. The excavation was extended to final lateral extents based on laboratory analysis to meet the following closure standards: 100 ppm total petroleum hydrocarbons, 50 ppm BTEX, 10 ppm benzene and 620 ppm chlorides, with the exception of the chlorides located along the western fence line.

Subsequently, 7 groundwater monitoring wells were installed at the location, MW-2A, 3A, 4, 6, 7, and 8; MW-5 was existing from previous activity on site. These 8 wells have been sampled a total of 4 times from April 17, 2017 through April 10, 2018. All of the wells were sampled for API Water, including pH, conductivity, total dissolved solids (TDS) and volatile organics using EPA Method 8260. The results of these sampling events are summarized in the attached table. All volatiles and chlorides are below NMWQCC standards. Elevated sulfate and TDS have been detected in MW-2A, 3A, 5, 7 and 8.

The elevated sulfate and TDS is believed to be sourced from the backfill material directed for use by the private landowner during the 2016 remedial excavation. BP will continue to monitor the sulfate and TDS within these wells until either levels drop below the regulatory limit or further information is obtained regarding this backfill material. The following plan will be implemented within 60 days of approval from the NMOCD.

CONTINUED GROUNDWATER MONITORING PLAN

BP currently has 8 groundwater monitoring wells on location. The wells will be sampled on a biannual frequency. Each well will be purged for a minimum of 3 well volumes and where field screening for temperature, conductivity and pH become stable for a minimum of three consecutive readings (within 10%). The purged water will be contained and disposed of in the nearby GCU 170E below grade tank.

The wells will then be sampled for General Water Chemistry via API General Chemistry methods (including pH, TDS, cations/anions and conductivity). Since laboratory results have indicate volatiles organic compounds below detection limits for all wells sampled, volatile organic compounds no longer be analyzed during the future groundwater monitoring events. All sampling will follow sample handling and chain of custody protocols.

REPORTING

BP will furnish an annual report to the NMOCD detailing sample activities and laboratory results. All these activities will be performed by a third party contractor. The report will be delivered to the NMOCD within 60 days of the final biannual laboratory report.

Regards,



Steve Moskal
BP America Production Co.

BP AMERICA PRODUCTION COMPANY

GCU # 170 - (Prod. Tank & Historical Releases)

Unit Letter K, Section 35, T29N, R12W - API Number: 30-045-07658

SAMPLE ID	LABORATORY PARAMETERS								
	SAMPLE DATE	SAMPLE TIME	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl - benzene (µg/L)	Total Xylenes (µg/L)
MW # 2A (source area)	04/17/17	1002	8.8	440	1,010	<1.0	<1.0	<1.0	<1.5
	08/10/17	0942	5.3	210	795	<1.0	<1.0	<1.0	<1.5
	10/19/17	0944	8.1	220	780	<1.0	<1.0	<1.0	<1.5
	04/10/18	0842	6.6	340	1,000	<1.0	<1.0	<1.0	<1.5
MW # 3A (source area)	04/17/17	1104	13	520	1,160	<1.0	<1.0	<1.0	<1.5
	08/10/17	1145	6.5	980	1,940	<1.0	<1.0	<1.0	<1.5
	10/19/17	1001	6.1	820	1,670	<1.0	<1.0	<1.0	<1.5
	04/10/18	0918	9.6	810	1,680	<1.0	<1.0	<1.0	<1.5
MW # 4A (source area)	04/17/17	0906	7.7	270	770	<1.0	<1.0	<1.0	<1.5
	08/10/17	1023	6	140	650	<1.0	<1.0	<1.0	<1.5
	10/19/17	0922	7.4	140	596	<1.0	<1.0	<1.0	<1.5
	04/10/18	0829	10	140	740	<1.0	<1.0	<1.0	<1.5
MW # 5 (down gradient)	04/17/17	1225	12	840	1,490	<1.0	<1.0	<1.0	<1.5
	08/10/17	1321	8.4	2500	3,460	<1.0	<1.0	<1.0	<1.5
	10/19/17	1158	6.1	1800	3,060	<1.0	<1.0	<1.0	<1.5
	04/10/18	1015	8.7	1100	2,400	<1.0	<1.0	<1.0	<1.5
MW # 6 (up gradient)	04/17/17	0935	5.6	85	450	<1.0	<1.0	<1.0	<1.5
	08/10/17	0908	7.6	76	560	<1.0	<1.0	<1.0	<1.5
	10/19/17	0902	5.7	77	540	<1.0	<1.0	<1.0	<1.5
	04/10/18	0806	6.8	75	560	<1.0	<1.0	<1.0	<1.5
MW # 7 (side gradient)	04/17/17	1036	7.7	930	1,610	<1.0	<1.0	<1.0	<1.5
	08/10/17	1104	17	690	1,570	<1.0	<1.0	<1.0	<1.5
	10/19/17	1102	<5.0	730	1,510	<1.0	<1.0	<1.0	<1.5
	04/10/18	0933	6.6	720	1,800	<1.0	<1.0	<1.0	<1.5
MW # 8 (down gradient)	04/17/17	1157	12	1200	1,880	<1.0	<1.0	<1.0	<1.5
	08/10/17	1245	8.7	1100	1,760	<1.0	<1.0	<1.0	<1.5
	10/19/17	1129	6.3	920	1,760	<1.0	<1.0	<1.0	<1.5
	04/10/18	0954	7.5	680	1,600	<1.0	<1.0	<1.0	<1.5
MW # 9 (down gradient)	04/17/17	1130	55	220	800	<1.0	<1.0	<1.0	<1.5
	08/10/17	1218	38	210	850	<1.0	<1.0	<1.0	<1.5
	10/19/17	1129	21	190	710	<1.0	<1.0	<1.0	<1.5
	04/10/18	0858	24	120	970	<1.0	<1.0	<1.0	<1.5
NMWQCC STANDARDS -			600	600	1000	10	750	750	620

Notes: NMWQCC Exceedence highlighted in Yellow
Groundwater standards are applied to values assigned in blue highlighted boxes or confirmed background levels, which ever is higher.

MW - Monitor well
µmhos/cm - Micromhos per centimeter
TDS - Total dissolved solids
mg/L - Milligram per Liter

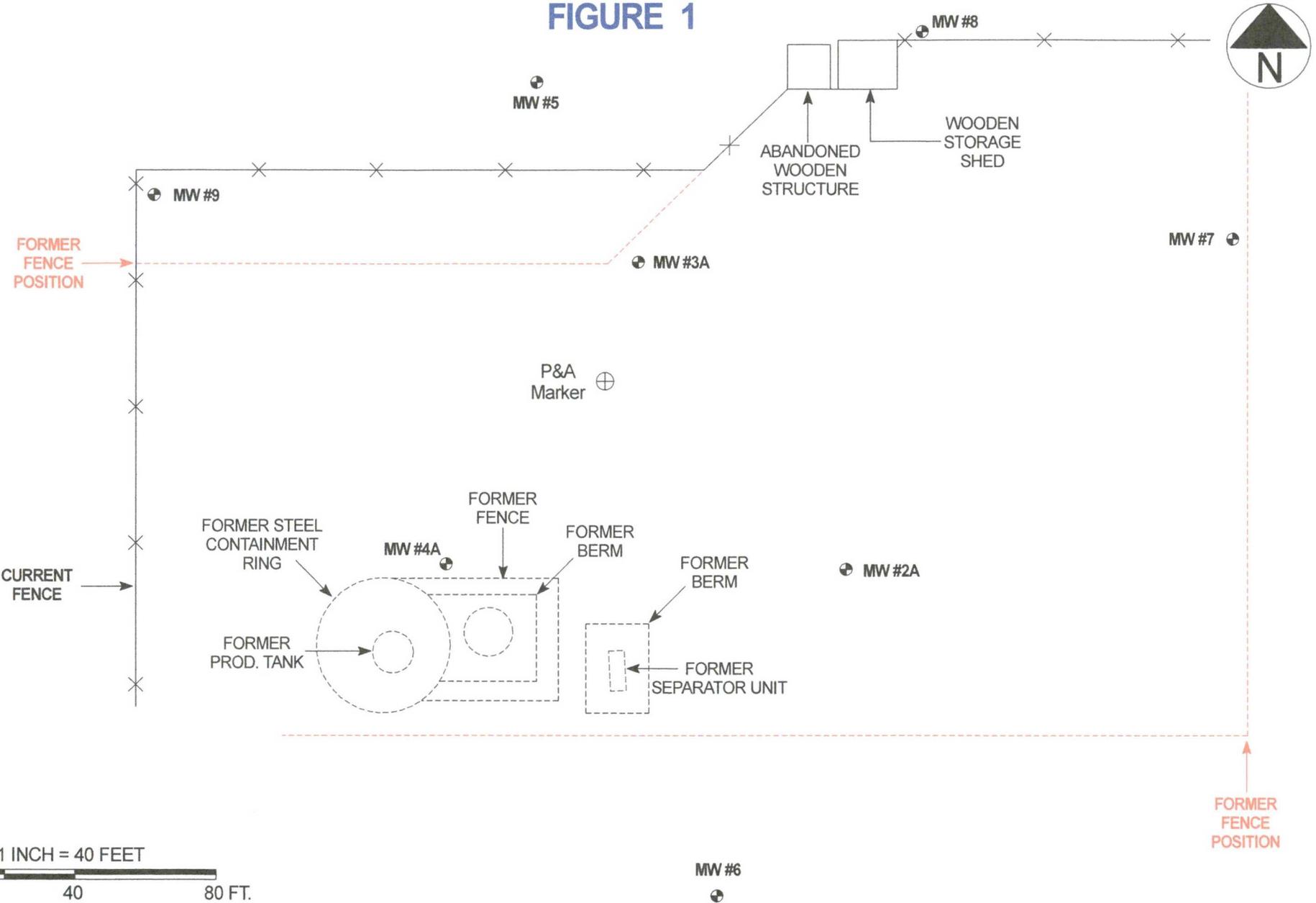
µg/L - Microgram per liter
NMWQCC - New Mexico Water Quality Control Commission

ND - Not detected at Reporting Limit

APPENDIX A

FIGURES

FIGURE 1



BP AMERICA PRODUCTION COMPANY

GCU # 170

NE/4 SW/4 SEC. 35, T29N, R12W

SAN JUAN COUNTY, NEW MEXICO

BLAGG ENGINEERING, Inc.

CONSULTING PETROLEUM / RECLAMATION SERVICES

P.O. BOX 87

BLOOMFIELD, NEW MEXICO 87413

PHONE: (505) 632-1199

PROJECT: GROUNDWATER MONITORING

DRAWN BY: NJV

DRAFTED: 04/21/2017

FILENAME: GCU170 SM20170417.SKF

**SITE
MAP**

04/17

Figure 3

BORE / TEST HOLE REPORT

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 87.5 FEET, S52E FROM P&A MARKER (GPS COORD.: 36.680182,-108.071353).

BORING #..... BH - 2
 MW #..... 2A
 PAGE #..... 1
 DATE STARTED 04/06/17
 DATE FINISHED 04/06/17
 OPERATOR..... KP
 LOGGED BY..... NJV

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ. & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS	
										GROUND SURFACE	
1										TOP OF CASING APPROXIMATELY AT GRADE.	
2										DARK YELLOWISH ORANGE SAND TO SILTY SAND, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 8.0 FT. BELOW GRADE).	
3											
4											
5			TOS 3.8								
6				5.0-7.0	1255	0.0	10	ND ND	5 - 3"		
7											
8										GROUNDWATER ~ 8.71 ft. BELOW GRADE ; MEASURED 04/17/17.	
9										OLIVE GRAY SILTY CLAY TO CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (8.0 - 13.0 FT. BELOW GRADE).	
10											
11											
12											
13											
14			BOS 13.8								
15			TD 14.8	14.0-16.0	1355	0.0	ND	ND ND	8 - 14"	OLIVE GRAY SAND, NON COHESIVE, SATURATED, LOOSE TO FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (13.0 - 16.0 FT. BELOW GRADE).	
16										All soil samples collected via split spoon.	
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

NOTES: - SAND & SILTY SAND. - SAND. - SILT CLAY TO CLAY.

TOS - Top of screen interval. TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 BOS - Bottom of screen interval. Benz. - Benzene per US EPA Method 8021B.
 TD - Total depth/bottom extent of monitor well. BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 OVM - Organic vapor meter or photoionization detector (PID). ppm - Parts per million or milligram per kilogram (mg/Kg).
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/06/17.
 Time - 1400.

Monitor well consist of 2 inch PVC piping - casing from grade to 3.80 ft. below grade, 0.020 slotted screen between 3.80 to 13.80 ft. below grade, sand packed annular to 2.5 ft. below grade, bentonite grout between 2.5 to grade. Flush mount well protector encompassing exposed casing top, secured with locking cap and padlock.

Figure 4

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW # 3A

BORE / TEST HOLE REPORT

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 35.4 FEET, N15.5E FROM P&A MARKER (GPS COORD.: 36.680423,-108.071556).

BORING #..... BH - 8
 MW#..... 3A
 PAGE #..... 2
 DATE STARTED 04/10/17
 DATE FINISHED 04/10/17
 OPERATOR..... KP
 LOGGED BY..... JCB

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS	
										GROUND SURFACE	
1										TOP OF CASING APPROXIMATELY AT GRADE.	
2										DARK YELLOWISH ORANGE SAND TO SILTY SAND, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 8.0 FT. BELOW GRADE).	
3											
4											
5			TOS 4.9								
6				5.0-7.0	0850	0.0	ND	ND	10 - 8"		
7											
8										GROUNDWATER ~ 7.92 ft. BELOW GRADE ; MEASURED 04/17/17.	
9											
10										OLIVE GRAY SILTY CLAY TO CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (8.0 - 13.0 FT. BELOW GRADE).	
11											
12											
13											
14											
15			BOS 14.9	14.0-16.0	0920	0.0	ND	ND	7 - 16"	OLIVE GRAY SAND, NON COHESIVE, SATURATED, LOOSE TO FIRM, COURSE GRAINED, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (13.0 - 16.5 FT. BELOW GRADE).	
16			TD 15.9								
17										All soil samples collected via split spoon.	
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

NOTES: - SAND & SILTY SAND. - SAND. - SILT CLAY TO CLAY.

TOS - Top of screen interval.
 BOS - Bottom of screen interval.
 TD - Total depth/bottom extent of monitor well.
 OVM - Organic vapor meter or photoionization detector (PID).
 ppm - Parts per million or milligram per kilogram (mg/Kg).

TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 Benz - Benzene per US EPA Method 8021B.
 BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/10/17.
 Time - 0930.

Monitor well consist of 2 inch PVC piping - casing from grade to 4.90 ft. below grade, 0.020 slotted screen between 4.90 to 14.90 ft. below grade, sand packed annular to 3.0 ft. below grade, bentonite grout between 3.0 to grade. Flush mount well protector encompassing exposed casing top, secured with locking cap and padlock.

Figure 5

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW # 4A

BORE / TEST HOLE REPORT

BORING #..... BH-7
 MW#..... 4A
 PAGE #..... 3
 DATE STARTED 04/07/17
 DATE FINISHED 04/07/17
 OPERATOR..... KP
 LOGGED BY..... NJV

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 69.2 FEET, S41W FROM P&A MARKER (GPS COORD.: 36.680186,-108.717440).

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS	
										GROUND SURFACE	
1										TOP OF CASING APPROXIMATELY AT GRADE.	
2										DARK YELLOWISH ORANGE SAND TO SILTY SAND, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 8.0 FT. BELOW GRADE).	
3											
4											
5											
6			TOS 5.0	5.0-7.0	1225	0.0	ND	ND	9 - 14"		
7											
8											
9										GROUNDWATER ~ 8.86 ft. BELOW GRADE ; MEASURED 04/17/17.	
10										OLIVE GRAY SILTY CLAY TO CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (8.0 - 13.0 FT. BELOW GRADE).	
11											
12											
13											
14											
15			BOS 15.0	14.0-16.0	1355	0.0	ND	ND	7 - 19"	OLIVE GRAY SAND, NON COHESIVE, SATURATED, LOOSE TO FIRM, COURSE GRAINED, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (13.0 - 16.5 FT. BELOW GRADE).	
16			TD 16.0								
17										All soil samples collected via split spoon.	
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

NOTES: - SAND & SILTY SAND. - SAND. - SILT CLAY TO CLAY.

TOS - Top of screen interval. TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 BOS - Bottom of screen interval. Benz - Benzene per US EPA Method 8021B.
 TD - Total depth/bottom extent of monitor well. BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 OVM - Organic vapor meter or photoionization detector (PID). ppm - Parts per million or milligram per kilogram (mg/Kg).
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/07/17.
 Time - 1110.

Monitor well consist of 2 inch PVC piping - casing from grade to 5.00 ft. below grade, 0.020 slotted screen between 5.00 to 15.00 ft. below grade, sand packed annular to 3.0 ft. below grade, bentonite grout between 3.0 to grade. Flush mount well protector encompassing exposed casing top, secured with locking cap and padlock.

Figure 6

BORE / TEST HOLE REPORT

BORING #..... BH-6
 MW#..... 5
 PAGE #..... 4
 DATE STARTED 02/14/12
 DATE FINISHED 02/14/12
 OPERATOR..... KP
 LOGGED BY..... NJV

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / KYVEK ENERGY SERVICES, INC.
 EQUIPMENT USED: MOBILE DRILL RIG (CME 75) - HOLLOW STEM AUGER
 BORING LOCATION: 87.7 FEET, N7.5W FROM WELL HEAD.

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	BLOW COUNT PER 6" & RECOVERY	FIELD CLASSIFICATION AND REMARKS
1								<p>GROUND SURFACE</p> <p>TOP OF CASING APPROXIMATELY AT GRADE.</p> <p>MODERATE BROWN SILTY SAND, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 4.0 FT. BELOW GRADE).</p>
2								
3								
4								<p>OLIVE GRAY SILTY CLAY TO CLAY, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (4.0 - 8.0 FT. BELOW GRADE).</p> <p>GROUNDWATER ~ 7.00 ft. BELOW GRADE ; MEASURED 03/22/12.</p>
5			TOS 4.3 ft.	5.00 6.50	1030	0.0	1-1-2	
6								<p>OLIVE GRAY SAND TO SILTY SAND, NON COHESIVE, SLIGHTLY MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (8.0 - 20.0 FT. BELOW GRADE).</p>
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20			TD 19.3 ft.					
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

- NOTES:
-  - SILTY SAND.
 -  - SAND TO SILTY SAND.
 -  - SILT CLAY TO CLAY.

- TOS - Top of screen of monitor well.
- TD - Total depth/bottom extent of monitor well.
- OVM - Organic vapor meter or photoionization detector (PID).
- ppm - parts per million or milligram per kilogram (mg/Kg).

OVM CALIBRATION:
 52.8 ppm; RF = 0.52
 (RF = response factor).
 100 ppm calibration gas
 - isobutylene.
 Date - 02/14/12.
 Time - 1050.

Monitor well consist of 2 inch PVC piping - casing from grade to 4.30 ft. below grade, 0.020 slotted screen between 4.30 to 19.30 ft. below grade, sand packed annular to 2.0 ft. below grade, bentonite grout between 1.0 to 2.0 ft. below grade, grout to surface. Flush mount well protector encompassing exposed casing top, secured with locking cap and padlock.

Figure 7

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW# 6

BORE / TEST HOLE REPORT

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 150.5 FEET, S12E FROM P&A MARKER (GPS COORD.: 36.679925,-108.071479).

BORING #..... BH-5
 MW#..... 6
 PAGE #..... 5
 DATE STARTED 04/07/17
 DATE FINISHED 04/07/17
 OPERATOR..... KP
 LOGGED BY..... JCB

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS
1										TOP OF CASING APPROXIMATELY AT GRADE.
2										
3										DARK YELLOWISH BROWN SILTY CLAY, COHESIVE TO MEDIUM PLASTIC, SLIGHTLY MOIST, FIRM TO STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 7.0 FT. BELOW GRADE).
4										
5			TOS 5.0							
6				5.0-7.0	1015	0.0	ND	ND	10 - 11"	
7										
8										OLIVE GRAY CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (7.0 - 13.0 FT. BELOW GRADE).
9										
10										GROUNDWATER ~ 9.98 ft. BELOW GRADE ; MEASURED 04/17/17.
11										
12										
13										
14										
15			BOS 15.0	14.0-16.0	1050	0.0	ND	ND	6 - 3"	MODERATE BROWN SAND, NON COHESIVE, SATURATED, LOOSE, COURSE GRAINED, MINOR GRAVEL INCLUSIONS, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (13.0 - 16.5 FT. BELOW GRADE).
16			TD 16.0							
17										All soil samples collected via split spoon.
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

NOTES: - SILTY CLAY. - CLAY. - SAND.

TOS - Top of screen interval.
 BOS - Bottom of screen interval.
 TD - Total depth/bottom extent of monitor well.
 OVM - Organic vapor meter or photoionization detector (PID).
 ppm - Parts per million or milligram per kilogram (mg/Kg).
 TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 Benz - Benzene per US EPA Method 8021B.
 BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - Isobutylene.
 Date - 04/07/17.
 Time - 1100.

Monitor well consist of 2 inch PVC piping - casing from grade to 5.00 ft. below grade, 0.020 slotted screen between 5.00 to 15.00 ft. below grade, sand packed annular to 3.0 ft. below grade, bentonite grout between 3.0 to grade. Flush mount well protector encompassing exposed casing top, secured with locking cap and padlock.

Figure 8

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW# 7

BORE / TEST HOLE REPORT

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 184.4 FEET, N77E FROM P&A MARKER (GPS COORD.: 36.680440,-108.070975).

BORING #..... BH-3
 MW#..... 7
 PAGE #..... 6
 DATE STARTED 04/06/17
 DATE FINISHED 04/06/17
 OPERATOR..... KP
 LOGGED BY..... NJV

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS	
										GROUND SURFACE	
1										TOP OF CASING APPROXIMATELY 2.60 FT. ABOVE GRADE..	
2										DARK YELLOWISH ORANGE SAND TO SILTY SAND, NON COHESIVE, SLIGHTLY MOIST TO MOIST, FIRM, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 8.0 FT. BELOW GRADE).	
3											
4											
5			TOS 5.2								
6				5.0-7.0	1449	0.0	ND	ND	8 - 16"	GROUNDWATER ~ 6.65 ft. BELOW GRADE ; MEASURED 04/17/17.	
7											
8											
9											
10										OLIVE GRAY CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (8.0 - 12.0 FT. BELOW GRADE).	
11											
12											
13											
14											
15			BOS 15.2	14.0-16.0	1455	0.0	ND	ND	2 - 14"	DARK YELLOWISH ORANGE SAND, NON COHESIVE, SATURATED, LOOSE, COURSE GRAINED, MINOR GRAVEL INCLUSIONS, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (12.0 - 16.5 FT. BELOW GRADE).	
16			TD 16.2								
17										All soil samples collected via split spoon.	
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

NOTES: - SILTY CLAY. - CLAY. - SAND.

TOS - Top of screen interval.
 BOS - Bottom of screen interval.
 TD - Total depth/bottom extent of monitor well.
 OVM - Organic vapor meter or photoionization detector (PID).
 ppm - Parts per million or milligram per kilogram (mg/Kg).

TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 Benz - Benzene per US EPA Method 8021B.
 BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/06/17.
 Time - 1400.

Monitor well consist of 2 inch PVC piping - casing from 2.60 ft. above grade to 5.20 ft. below grade, 0.020 slotted screen between 5.20 to 15.20 ft. below grade, sand packed annular to 4.0 ft. below grade, bentonite grout between 4.0 to grade. Above-grade steel well protector encompassing exposed casing and secured with concrete base and hinged lid top with padlock.

Figure 9

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW# 8

BORE / TEST HOLE REPORT

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 135.1 FEET, N42E FROM P&A MARKER (GPS COORD.: 36.680603,-108.071279).

BORING #..... BH-4
 MW#..... 8
 PAGE #..... 7
 DATE STARTED 04/07/17
 DATE FINISHED 04/07/17
 OPERATOR..... KP
 LOGGED BY..... JCB

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ. & TOTAL BTEX (ppm)	BLOW COUNT PER 10" & RECOVERY	FIELD CLASSIFICATION AND REMARKS	
										GROUND SURFACE	
1										TOP OF CASING APPROXIMATELY 3.00 FT. ABOVE GRADE..	
2											
3											
4			TOS 4.1								
5										GROUNDWATER ~ 5.63 ft. BELOW GRADE ; MEASURED 04/17/17.	
6				5.0-7.0	0840	0.0	ND	ND	8 - 15"		
7										PALE YELLOWISH BROWN SILTY CLAY, COHESIVE TO MEDIUM PLASTIC, SLIGHTLY MOIST TO WET, FIRM TO STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (0.0 - 16.5 FT. BELOW GRADE).	
8											
9											
10											
11											
12											
13											
14			BOS 14.1								
15			TD 15.1	14.0-16.0	0850	0.0	ND	ND	8 - 13"		
16											
17										All soil samples collected via split spoon.	
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

NOTES:  - SILTY CLAY.

TOS - Top of screen interval.
 BOS - Bottom of screen interval.
 TD - Total depth/bottom extent of monitor well.
 OVM - Organic vapor meter or photoionization detector (PID).
 ppm - Parts per million or milligram per kilogram (mg/Kg).

TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 Benz. - Benzene per US EPA Method 8021B.
 BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/07/17.
 Time - 0855.

Monitor well consist of 2 inch PVC piping - casing from 3.00 ft. above grade to 4.10 ft. below grade, 0.020 slotted screen between 4.10 to 14.10 ft. below grade, sand packed annular to 3.0 ft. below grade, bentonite grout between 3.0 to grade. Above-grade steel well protector encompassing exposed casing and secured with concrete base and hinged lid top with padlock.

Figure 10

BLAGG ENGINEERING, INC.

P.O. BOX 87
 BLOOMFIELD, NM 87413
 (505) 632-1199

MW # 9

BORE / TEST HOLE REPORT

BORING #..... BH - 1
 MW#..... 9
 PAGE #..... 8
 DATE STARTED 04/06/17
 DATE FINISHED 04/06/17
 OPERATOR..... KP
 LOGGED BY..... JCB

CLIENT: BP AMERICA PRODUCTION CO.
 LOCATION NAME: GCU #170 API #: 3004507658 UNIT K, SEC. 35, T29N, R12W
 CONTRACTOR: BLAGG ENGINEERING, INC. / GEOMAT
 EQUIPMENT USED: MOBILE DRILL RIG (CME 55) - HOLLOW STEM AUGER
 BORING LOCATION: 140.4 FEET, N67.5W FROM P&A MARKER (GPS COORD.: 36.680476,-108.072031).

DEPTH (FT.)	INTERVAL	LITHOLOGY INTERVAL	MW SCHEMATIC	SAMPLE INTERVAL	SAMPLE TIME	FIELD OVM (ppm)	TPH (ppm)	BENZ & TOTAL BTEX (ppm)	BLOW COUNT PER 18" & RECOVERY	FIELD CLASSIFICATION AND REMARKS
										GROUND SURFACE
1										TOP OF CASING APPROXIMATELY 2.70 FT. ABOVE GRADE.
2										
3										
4										
5			TOS 4.7	3.0-6.0	1019	0.1	ND	ND	7 - 10"	DARK YELLOWISH BROWN SILTY CLAY TO CLAY, COHESIVE TO MEDIUM PLASTIC, MOIST, FIRM TO VERY STIFF, NO APPARENT HYDROCARBON ODOR DETECTED PHYSICALLY WITHIN CUTTINGS (7.0 - 16.5 FT. BELOW GRADE).
6										
7										
8				7.0-9.0	1047	0.2	ND	ND	9 - 22"	
9										GROUNDWATER ~ 8.68 ft. BELOW GRADE ; MEASURED 04/17/17.
10										
11										
12										
13										
14										
15			BOS 14.7							
16			TD 15.7							
17										All soil samples collected via split spoon.
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

NOTES:  - SILTY CLAY TO CLAY.

TOS - Top of screen interval.
 BOS - Bottom of screen interval.
 TD - Total depth/bottom extent of monitor well.
 OVM - Organic vapor meter or photoionization detector (PID).
 ppm - Parts per million or milligram per kilogram (mg/Kg).

TPH - Total Petroleum Hydrocarbons per US EPA Method 8015M.
 Benz. - Benzene per US EPA Method 8021B.
 BTEX - Benzene, toluene, ethylbenzene, total xylenes per US EPA Method 8021B.
 ND - Not detected at laboratory reporting limits.

OVM CALIBRATION
 100.0 ppm; RF = 1.00 (RF = response factor).
 100 ppm calibration gas - isobutylene.
 Date - 04/06/17.
 Time - 1105.

Monitor well consist of 2 inch PVC piping - casing from 2.70 ft. above grade to 4.70 ft. below grade, 0.020 slotted screen between 4.70 to 14.70 ft. below grade, sand packed annular to 3.0 ft. below grade, bentonite grout between 3.0 to grade. Above-grade steel well protector encompassing exposed casing and secured with concrete base and hinged lid top with padlock.