J. Brady Crouch
ConocoPhillips Company
Risk Management & Remediation
Program Manager

600 N. Dairy Ashford
EC3-06-W056
Houston, TX 77079
Phone: 832-486-3016

ConocoPhillips

Mr. Randolph Bayliss, P. E.
District III & IV Hydrologist
New Mexico Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

March 21, 2017

Re: NMOCD Case No. 3R-431, 2016 Annual Groundwater Monitoring and Remediation Report

Dear Mr. Bayliss:

Enclosed is the 2016 Annual Groundwater Monitoring and Remediation Report for the Howell K No. 1 site. This report, prepared by GHD Services, Inc., contains the results of groundwater monitoring and remediation activities in 2016.

Please let me know if you have any questions.

Sincerely,

Joseph B. Crouch

J. Brady Crouch

Enc

2016 Annual Groundwater Monitoring and Remediation Report

ConocoPhillips Howell K No. 1
San Juan County, New Mexico
API# 30-045-09313
NMOCD # 3R-431

ConocoPhillips Company

GHD | 6121 Indian School Rd NE Suite 200 Albuquerque NM 87110 USA

074928| Report No 8 | March 21, 2017

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1. Introduction

This report details the results of quarterly groundwater monitoring activities and remediation conducted by GHD Services, Inc. (GHD) during 2016 at the ConocoPhillips Company (ConocoPhillips) Howell K No. 1 site (hereafter referred to as the "Site"). The Site is located on Bureau of Land Management (BLM) land, approximately ½ mile southeast of Navajo Lake State Park and 10 miles east of Aztec in Unit Letter K, Section 21, Township 30N, Range 8W of San Juan County, New Mexico. Geographical coordinates for the Site are 36º 47' 40.34" North, 107º 41' 4.70" West. The Site consists of a natural gas well and associated equipment. The location and general features of the Site are presented on Figures 1 and 2, respectively.

1.1 Background

The environmental investigation at the Site began in August 2005 with the excavation of approximately 4,000 cubic yards of hydrocarbon impacted soil from an area southwest of the Howell K No. 1 wellhead. The impacted soil was discovered during below grade tank removal activities. The final dimensions of the excavation were 70 feet by 50 feet by 36 feet deep. Groundwater was encountered at a depth of approximately 34 feet below ground surface (bgs). Once this extent had been reached, the excavation activities were stopped due to the inability of the equipment to operate safely at this depth; however, the vertical limits of the hydrocarbon impact had not been delineated. The excavation was backfilled with clean soil. In March 2006, one groundwater monitoring well, MW 1, was installed by Envirotech in the area of the backfilled excavation.

A transition in Site consulting responsibilities resulted in a gap in continuous groundwater monitoring in 2006. Tetra Tech sampled groundwater monitoring well MW 1 from November 2007 until August of 2008, when three additional monitoring wells MW 2, MW 3 and MW 4 were installed at the Site by WDC Exploration and Wells of Peralta, New Mexico under Tetra Tech observation. Groundwater monitoring well MW 2 was installed up gradient of MW 1 and monitoring wells MW 3 and MW 4 were installed in the down gradient direction. The additional wells were installed in response to a request by the New Mexico Oil Conservation Division (NMOCD) for Site characterization and additional laboratory analyses.

A generalized geologic cross section was compiled using subsurface data collected from each boring location during installation of monitoring wells MW 2, MW 3, and MW 4. Monitoring wells MW 2 and MW 4 are represented on the cross section which is presented as Figure 3.

October 2008 marked the first quarterly groundwater monitoring event to include all four monitoring wells. BTEX analysis was discontinued following the December 2010 sampling event which represented eight consecutive quarters of BTEX constituents below laboratory detection limits in samples from all Site monitoring wells. Analyses for dissolved iron, dissolved manganese, sulfate, and fluoride were continued quarterly through October 2011. Analyses for sulfate and fluoride were discontinued after the September 2014 sampling event.

On June 15, 2011, Site consulting responsibilities were transferred from Tetra Tech to GHD of Albuquerque, New Mexico.

Apparent settling of the backfill soils in the vicinity of monitoring well MW 1 resulted in damage to the casing, ultimately rendering it unusable. The well was plugged and abandoned and a replacement well, MW 1R, was installed during August of 2013 under GHD management.

Treatment of dissolved phase iron and manganese was begun in November 2014 with the introduction of dilute sodium hydroxide solution into site wells to affect a pH adjustment of groundwater. A second injection event was conducted in May 2015 and a third in October 2016 (see Section 2).

A more detailed summary of the Howell K No. 1 site history is presented in Table 1.

2. Metals Treatment

2.1 Third pH Adjustment Event Summary

Dissolved manganese in monitoring wells MW -R, MW-3, and MW4, and dissolved iron in MW-1R, were reduced significantly as a result of the first pH adjustment event, conducted November 2014. However, as concentrations began to rebound, albeit to just above New Mexico Water Quality Control Commission (NMWQCC) standards, it was determined that a second injection event was warranted. GHD concluded in their treatability study for the Site that the full effect of pH adjustment would likely require multiple injection events. A second pH adjustment event was indeed performed on May 11 and 12, 2015 and a third on October 21 and 24, 2016. The third pH adjustment event consisted of mixing thirty gallons of sodium hydroxide with 4,000 gallons of water and introducing by batches into MW-1R, MW-4 and into MW-3.

3. Groundwater Monitoring Summary, Methodology, and Analytical Results

3.1 Groundwater Monitoring Summary

Quarterly groundwater monitoring events were conducted in 2016 on March 31, July 14, September 7, and November 30, 2016. Data from all of these events are included in the Appendix tables.

3.2 Groundwater Monitoring Methodology

Groundwater levels were measured using an oil/water interface probe prior to sampling. These data are presented in Table 2. Groundwater flow direction continues to be generally to the west. Groundwater potentiometric surface maps for the March, July, and September 2016 monitoring events are presented as Figures 4, 5, and 6, respectively. A potentiometric surface map was not prepared for the November event due to erroneous groundwater elevations, likely as a result of the third injection event performed in October. Groundwater elevations had apparently not yet returned to static conditions, based on historical groundwater flow data.

Prior to sample collection, monitoring wells MW-1R, MW-2, MW-3, and MW-4 were purged of at least three casing volumes of water. A 1.5 inch, polyethylene, dedicated bailer was used to purge and to collect the groundwater samples. Field parameters including pH, conductivity, dissolved oxygen, temperature, and oxidation/reduction potential were measured periodically during purging and recorded. Field parameters are summarized on Table 3. The purge water generated during the event was disposed of in the on Site produced water tank. The groundwater samples were placed in laboratory prepared bottles, packed on ice, and shipped under chain of custody documentation to Pace Analytical Services, Inc. of Lenexa, Kansas. All groundwater samples collected in 2016 were analyzed for dissolved iron, dissolved manganese by EPA Method 6010 and sulfate by EPA Method 300.0.

3.3 Groundwater Monitoring Analytical Results

The NMWQCC regulates that groundwater quality in New Mexico under Title 20, Chapter 6, Part 2, Section 3103 of the New Mexico Administrative Code (20.6.2.3103 NMAC). Groundwater quality standards have been set for the protection of human health, domestic water supply, and irrigation use. Groundwater concentrations above NMWQCC standards during the 2016 sampling events are discussed below:

March 2016

- Dissolved manganese - The NMWQCC groundwater quality standard for dissolved manganese is 0.2 mg/L. The groundwater samples collected from MW-1R and MW-4 contained dissolved manganese at concentrations of 0.538 and 4.23 milligrams per liter (mg/L), respectively.
- Sulfate – The NMWQCC groundwater quality standard for sulfate is 600 mg/L. The groundwater samples collected from MW-1R, MW-2, MW-3, and MW-4 contained sulfate concentrations of 1,600, 1,580, 1,850, and 3,150 ug/L, respectively.

July 2016

- Dissolved manganese - The groundwater samples collected from MW 1R and MW 4 contained dissolved manganese at concentrations of 0.81 and 5.8 mg/L, respectively.
- Sulfate - The groundwater samples collected from MW-1R, MW-2, MW-3, and MW-4 contained sulfate concentrations of 1,730, 1,880, 1,600, and 2,930 ug/L, respectively.
- Dissolved manganese – The groundwater samples collected from MW-1R and MW-4 contained dissolved manganese at concentrations of 1.1 mg/L and 7.3 mg/L, respectively.
- Sulfate - The groundwater samples collected from MW-1R, MW-2, MW-3, and MW-4 contained sulfate concentrations of 1,920, 1,710, 1,960, and 3,130 ug/L, respectively.

November 2016

- The only well sampled in November 2016, MW-2, did not contain manganese above the laboratory detection limit and contained a sulfate concentration of 1,670 mg/L.

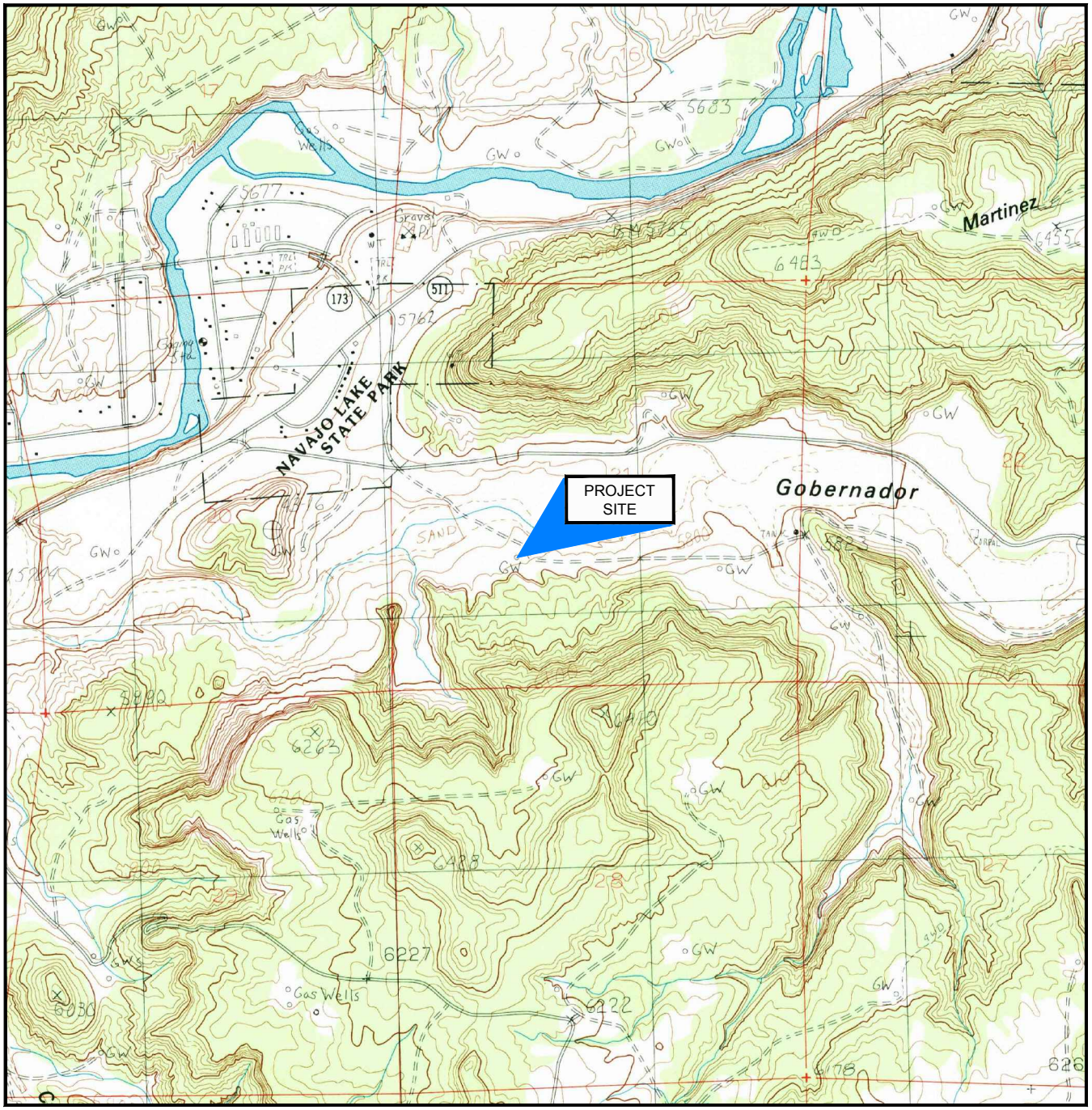
Table 4 summarizes the analytical results from groundwater sampling completed during 2016. The corresponding laboratory analytical reports, including quality control summaries, are presented in Appendix A.

4. Conclusions and Recommendations

Substantial decline of dissolved iron and dissolved manganese concentrations was observed immediately following the second pH adjustment event in May 2015. However, concentrations of dissolved manganese have shown the potential for significant rebound, especially in MW-4. Sulfate concentrations in groundwater have shown to be as high in up-gradient MW-2 as in all other Site wells, indicating that this constituent is at background concentration and not as a result from the historical release.

Additional pH adjustment injections are recommended to treat the remaining dissolved iron and manganese concentrations observed in Site groundwater. The continuation of quarterly groundwater monitoring is also recommended.

Figures



SOURCE: USGS 7.5 MINUTE QUAD
"ARCHULETA, NEW MEXICO"

N

0 1000 2000ft

Figure 1

SITE VICINITY MAP
HOWELL K No. 1, NATURAL GAS WELL SITE
UNIT K. SECTION 21, T30N-R8W, SAN JUAN COUNTY, N.M.
ConocoPhillips Company

GHD

074928-95(008)GN-DL004_TOPO JUN 22, 2016

ConocoPhillips high resolution aerial imagery 2008.

Figure 2

SITE PLAN
HOWELL K No. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company

GHD

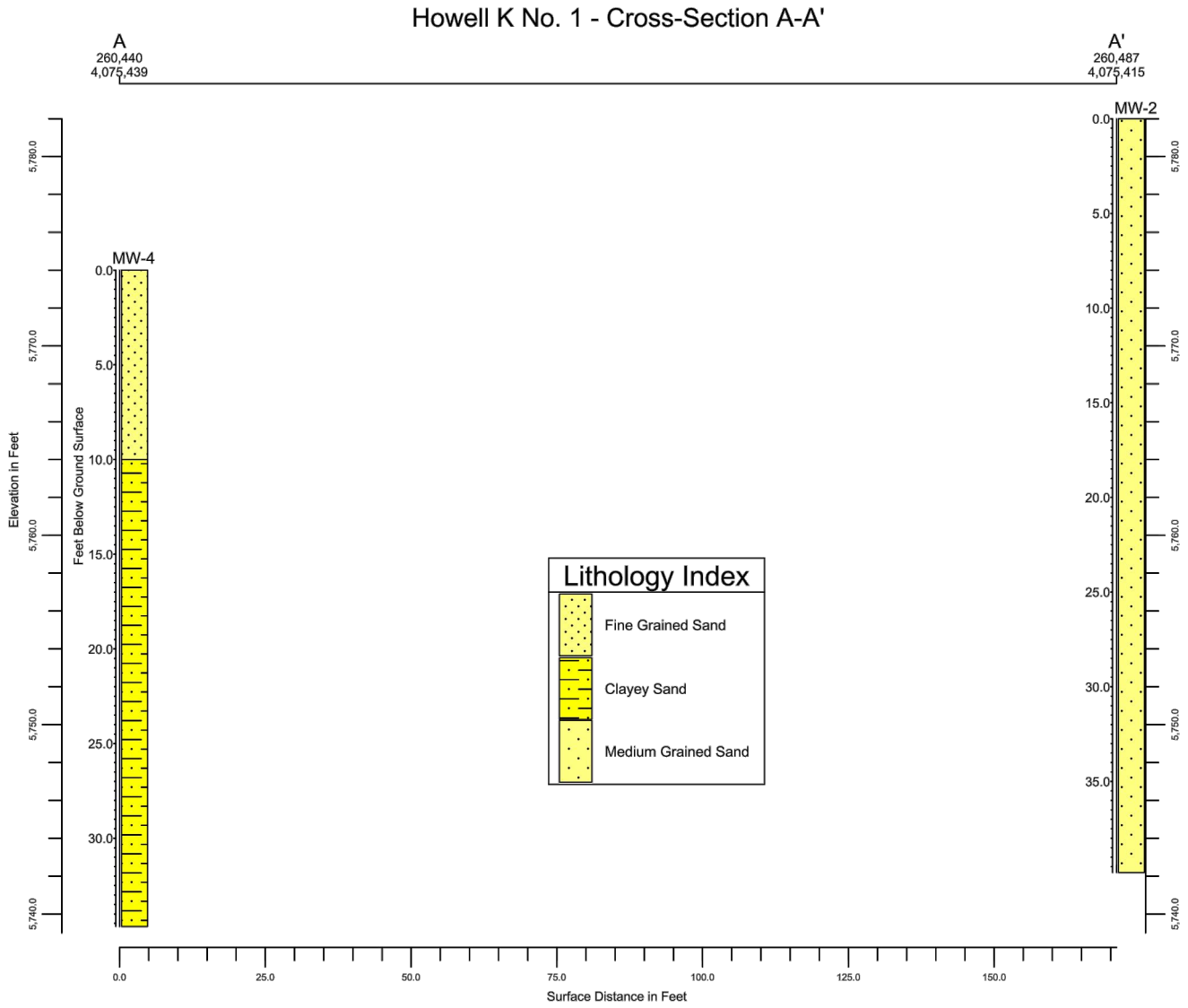
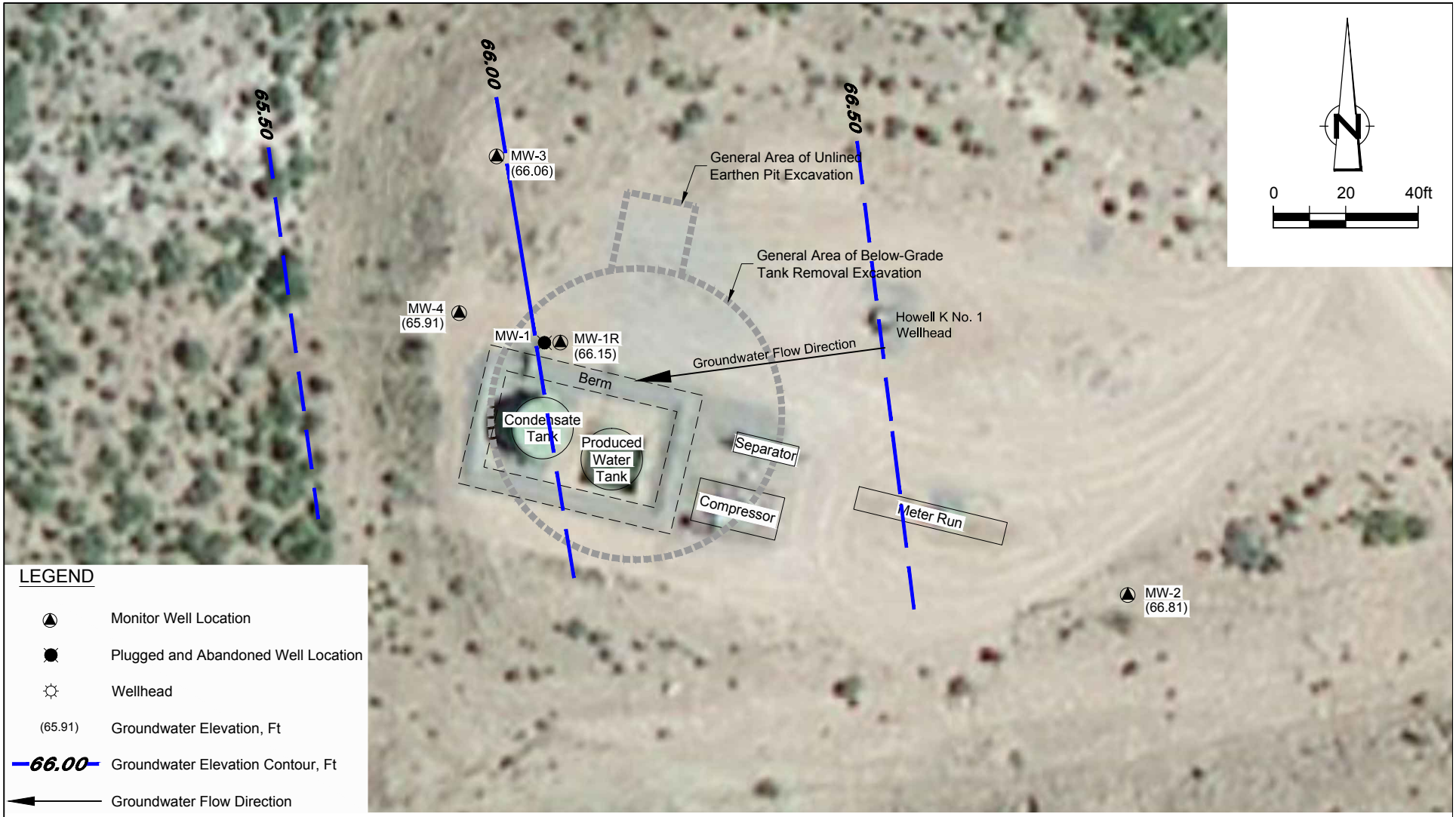


Figure 3

GEOLOGICAL CROSS SECTION
HOWELL K No. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company



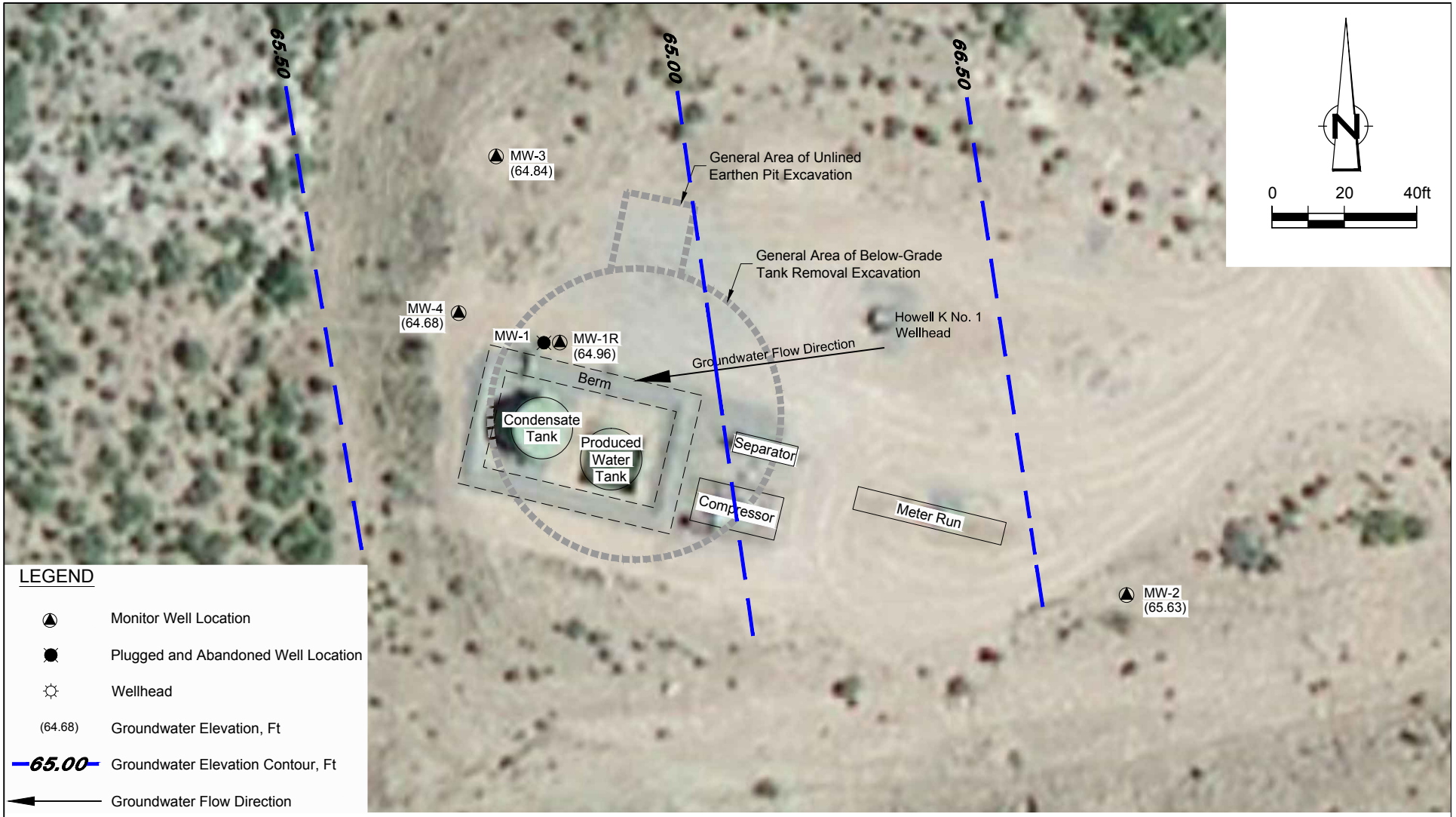
ConocoPhillips high resolution aerial imagery 2008.

Figure 4

MARCH 2016 GROUNDWATER POTENTIOMETRIC SURFACE MAP
HOWELL K NO. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company

GHD

074928-95(008)GN-DL003_GW FEB 28, 2017

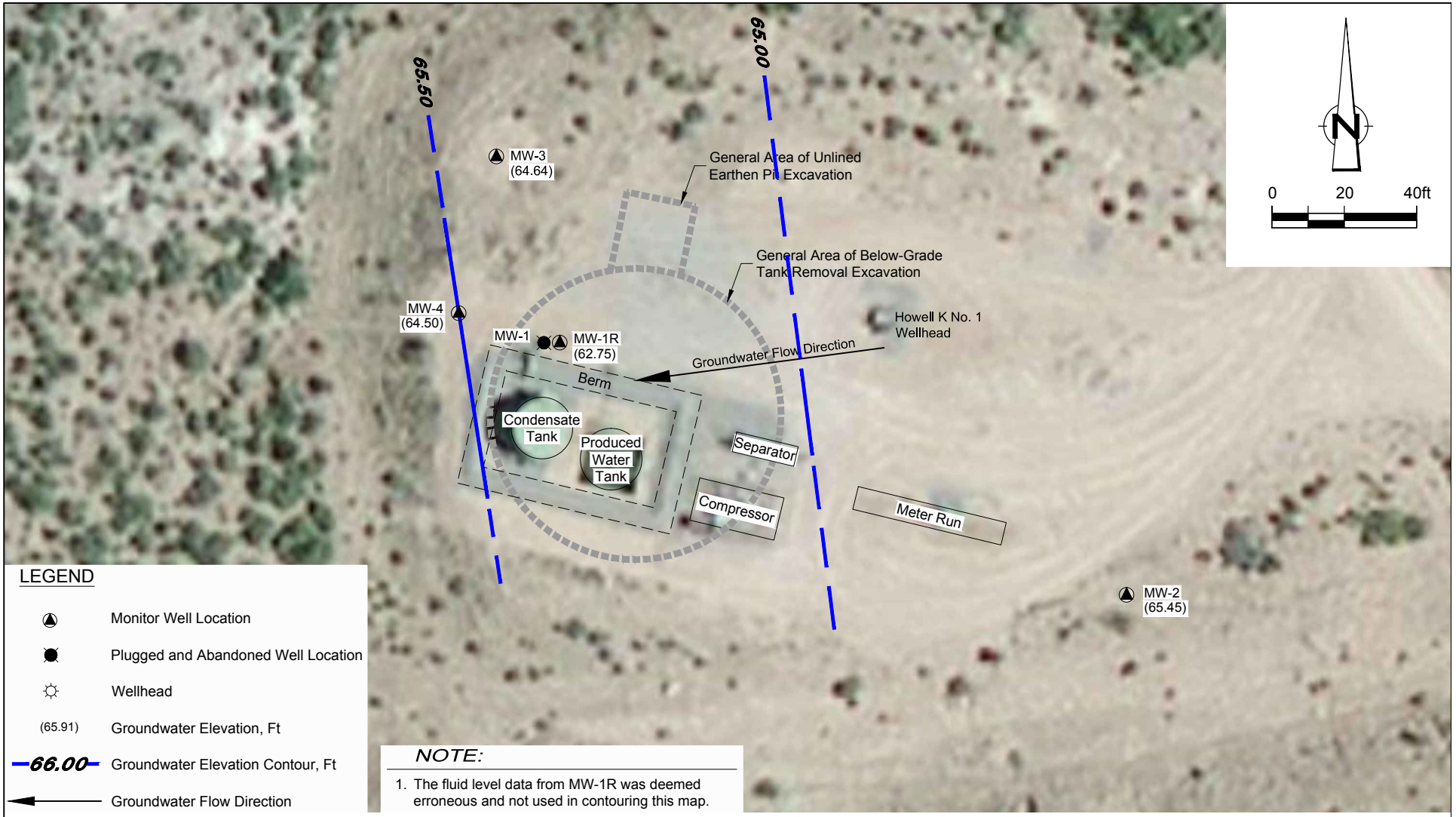


ConocoPhillips high resolution aerial imagery 2008.

Figure 5

JULY 2016 GROUNDWATER POTENTIOMETRIC SURFACE MAP
HOWELL K NO. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company

074928-95(008)GN-DL003_GW FEB 28, 2017



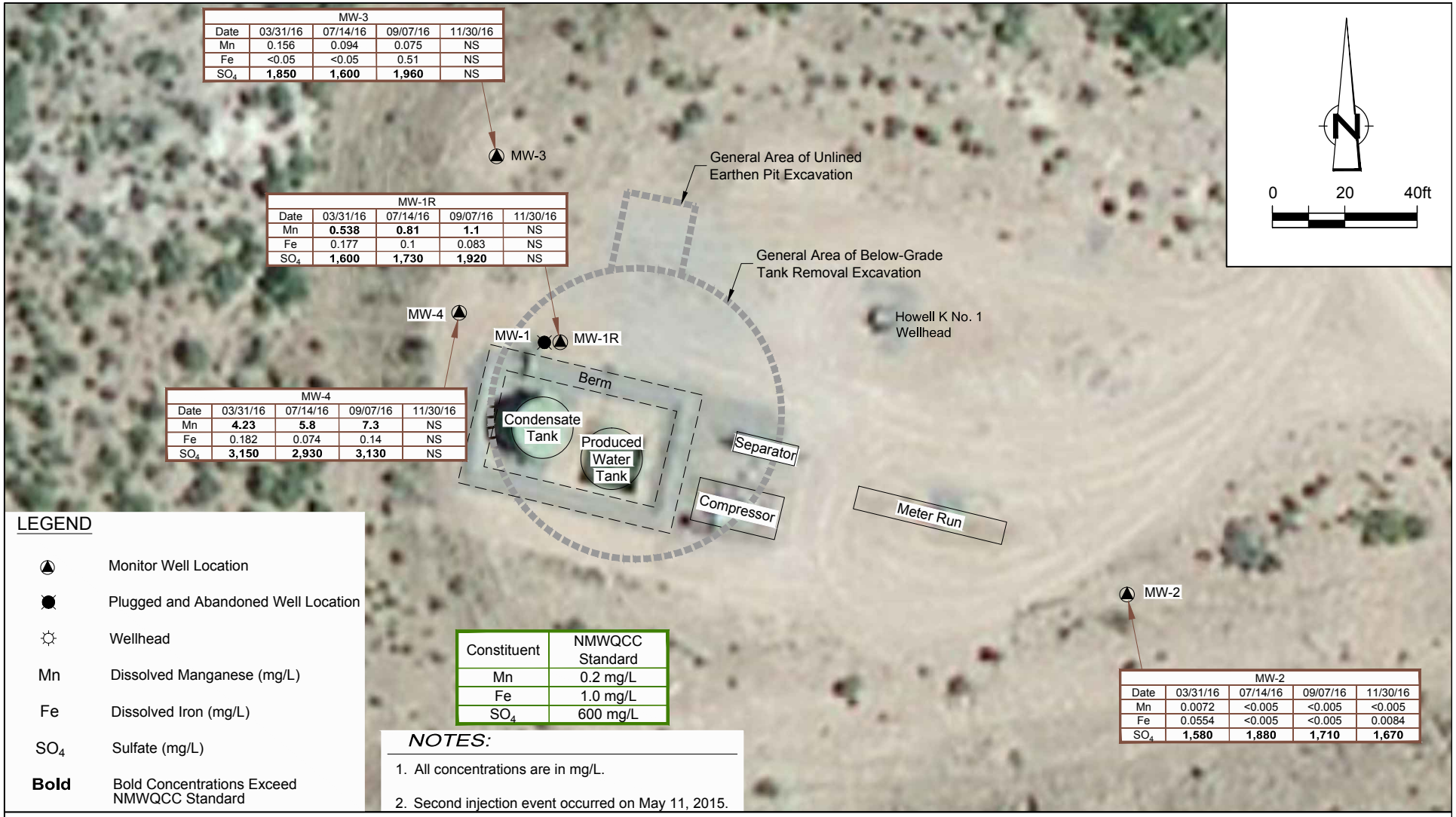
ConocoPhillips high resolution aerial imagery 2008.

Figure 6

SEPTEMBER 2016 GROUNDWATER POTENTIOMETRIC SURFACE MAP
HOWELL K NO. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company

GHD

074928-95(008)GN-DL003_GW FEB 28, 2017



ConocoPhillips high resolution aerial imagery 2008.

Figure 7

GROUNDWATER CONCENTRATION MAP
HOWELL K NO. 1 NATURAL GAS WELL SITE
UNIT LETTER K, SECTION 21, T30N-R8W, SAN JUAN COUNTY, NEW MEXICO
ConocoPhillips Company

GHD

074928-95(008)GN-DL003_GW MAR 1, 2017

Tables

Table 1

Site History Timeline
ConocoPhillips Company
San Juan County, New Mexico
Howell K No. 1

Date/Time Period	*Event/Action*	*Description/Comments*
July 26, through August 18, 2005	Initial Site assessment	Environmental investigation began with the excavation of approximately 4000 cubic yards of impacted soil from an area southwest of the Howell K No.1 well head. Impacted soils were discovered during the removal activities of a below grade tank. Dimensions of the excavation were approximately 70 feet long by 50 feet wide by 36 feet deep. Groundwater was encountered at approximately 34 feet and soils were still impacted at 36 feet deep, the point at which excavation machinery was stopped at the practical limit for safe operation. The total vertical extent of hydrocarbon impacts were not completely delineated. Soil was treated with approximately 600 gallons of potassium permanganate solution. The excavation area was backfilled with clean soil.
March 10, 2006	Groundwater monitor well installation	One ground water monitor well, MW-1, was installed in the area of the backfilled excavation by Envirotech.
March 31, 2006	Site transfer	ConocoPhillips Company completed acquisition of Burlington Resources.
March and June 2007	Groundwater monitoring not performed	After the acquisition of Burlington Resources by ConocoPhillips, consulting responsibilities were transferred from Lode Star LLC of Farmington New Mexico to Tetra Tech of Albuquerque.
November 9, 2007 through March 19, 2008	Groundwater monitoring	Tetra Tech began sampling the Howell K No. 1 site quarterly in November 2007. Groundwater was sampled from MW-1 and was analyzed for BTEX constituents. No constituents were detected at levels that exceeded the NMWQCC standards.
April 1, 2008	Additional monitoring requested by OCD	Oil Conservation Division of NM Energy, Minerals, and Resources Dept. indicates additional investigation and sampling is necessary for closure consideration during a meeting with Glenn Von Gonten.
July 23, 2008	Groundwater monitoring postponed	Groundwater monitoring of MW-1 was postponed after it was found that there was an obstruction caused by settling and shifting of the MW-1 casing. It was determined that the obstruction could be avoided by using a smaller bailer to collect samples. Sampling was postponed and was set to follow upcoming monitor well installation so that proper sampling materials could be used.
August 13 and 14, 2008	Groundwater monitor well installation and groundwater monitoring	Three additional groundwater monitor wells (MW-2, MW-3 and MW-4) were installed by WDC and overseen by Tetra Tech. MW-2 was installed upgradient of MW-1. Both MW-3 and MW-4 were installed downgradient of MW-1. All wells were developed by purging approximately 80 gallons of water using a surge block and a purge pump. A sample was collected from MW-1 on August 14th. A 1/2-inch disposable bailer was used to avoid an obstruction in MW-1. The sample was analyzed for BTEX constituents. All constituents were below NMWQCC standards.
October 24, 2008	Groundwater monitoring	Third quarter 2008 groundwater monitoring was completed and was the first quarter of sampling to include all four monitor wells on site. A baseline analytical suite was completed including major ions, total metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs) including BTEX, diesel range organics, and gasoline range organics. All BTEX constituents were below NMWQCC standards. All four wells were above the standard for sulfate.
January 30, 2009	4th quarter 2008 groundwater monitoring	Tetra Tech conducted fourth quarter 2008 groundwater monitoring at the site for BTEX constituents in all four monitor wells. All wells were below NMWQCC standards for BTEX .
September 25,2009	2009 annual groundwater monitoring	Tetra Tech conducted 2009 annual groundwater monitoring of MW-2, MW-3 and MW-4 for BTEX, dissoved iron, dissolved manganese, sulfate, and fluoride. All three wells were below NMWQCC standards for BTEX. All three wells were above standard for sulfate. Dissolved manganese was above standard in MW-3 and MW-4 and flouride was above standard in MW-4. Dissolved metals analyses conducted for the first time since standards are based on dissolved metals testing. OCD concurred, allowing total metals testing to be discontinued.
October 18, 2009	Groundwater monitoring	Tetra Tech conducted 2009 annual groundwater monitoring of MW-1 for BTEX, dissoved iron, dissolved manganese, sulfate, and fluoride. MW-1 was below NMWQCC standards for BTEX. Sulfate, dissolved manganese and dissolved iron were above standards in MW-1.
December 15, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, sulfate and flouride. All four monitor wells were below NMWQCC standards for BTEX . All four monitor wells were above the standard for sulfate. MW-1, MW-3 and MW-4 were above standard for dissolved manganese and MW-1 and MW-3 were also above the standard for dissolved iron.
March 30, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, and sulfate. All four monitor wells were below NMWQCC standards for BTEX. All four monitor wells were above the standard for sulfate. MW-1, MW-3 and MW-4 were also above the standard for dissolved manganese.

Table 1

Site History Timeline
ConocoPhillips Company
San Juan County, New Mexico
Howell K No. 1

Date/Time Period	*Event/Action*	*Description/Comments*
June 8, 2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, and sulfate. All four monitor wells were below NMWQCC standards for BTEX. All four monitor wells were above the standard for sulfate. MW-1, MW-3 and MW-4 were above the standard for dissolved manganese. MW-1 was also above the standard for dissolved iron.
September 23,2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, fluoride and sulfate. All four monitor wells were below NMWQCC standards for BTEX. All four monitor wells were above the standard for sulfate. MW-1, MW-3 and MW-4 were above the standard for dissolved manganese . MW-1 was also above standard for dissolved iron.
December 15,2010	Groundwater monitoring	Tetra Tech conducted quarterly groundwater monitoring at the site for BTEX, dissolved iron, dissolved manganese, fluoride and sulfate. MW-3 was observed to be dry during this monitoring event, which was likely due to an interface probe malfunction. MW-1, MW-2 and MW-4 were sampled. All three sampled monitor wells are below NMWQCC standards for BTEX . MW-1 and MW-4 were above the the standards for sulfate, dissolved manganese, and dissolved iron. Monitor well MW-4 was also found to be above the the standard for fluoride.
March 15, 2011	Groundwater monitoring	First quarter of groundwater monitoring with BTEX analysis discontinued due to eight consecutive quarters of data below the standards being reached; MW-1, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, fluoride and sulfate.
June 15, 2011	Transfer of site consulting responsibilities	On June 15, 2011, site consulting responsibilities were transferred from Tetra Tech of Albuquerque, NM to Conestoga-Rovers & Associates (CRA) of Albuquerque, NM.
June 23, 2011	Groundwater monitoring	MW-1, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, fluoride and sulfate.
October 11 and 12, 2011	Groundwater monitoring	MW-1, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, fluoride and sulfate.
October 3, 2012	Groundwater monitoring	MW-1, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, fluoride and sulfate.
July 19,2013	Plugging & Abandoning and Well Installation	National EWP, with CRA oversight, plugged and abandoned MW-1 and drilled and installed MW-1R.
September 17, 2013	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, fluoride and sulfate.
October 1, 2013	Groundwater monitoring	MW-1R sampled and analyzed for metals treatability study.
September 23, 2014	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron, dissolved manganese, dissolved sodium, fluoride and sulfate.
November 13-14, 2014	pH adjustment	A dilute sodium hydroxide solution was injected into MW-1R, MW-3, and MW-4.
December 17, 2014	Groundwater monitoring	A post-injection round of groundwater sampling was conducted. MW-1R, MW-3, and MW-4 were sampled and analyzed for iron, dissolved iron, manganese, dissolved manganese, and dissolved sodium.
February 11, 2015	Groundwater monitoring	A post-injection round of groundwater sampling was conducted. MW-1R, MW-3, and MW-4 were sampled and analyzed for iron, dissolved iron, manganese, dissolved manganese, and dissolved sodium.
March 18, 2015	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron and manganese, total iron and manganese, and dissolved sodium.
May 11, 2015	pH adjustment	A second pH adjustment injection event was conducted @ MW-1R, MW-3, and MW-4.
June 17, 2015	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron and manganese, total iron and manganese, and dissolved sodium.
September 22, 2015	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron and manganese, total iron and manganese, and dissolved sodium.
December 2, 2015	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for dissolved iron and manganese, total iron and manganese, and dissolved sodium.
March 31, 2016	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for sulfate, dissolved iron and manganese, total iron and manganese, and dissolved sodium.
July 14, 2016	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for sulfate, dissolved iron, manganese, and sodium.
September 6 - 7, 2016	Groundwater monitoring	MW-1R, MW-2, MW-3, and MW-4 were sampled and analyzed for sulfate, dissolved iron and manganese, total iron and manganese, and dissolved sodium.
October 21 & 24, 2016	pH adjustment	A third pH adjustment injection event was conducted @ MW-1R, MW-3, and MW-4.
November 30, 2016	Groundwater monitoring	MW-2 was sampled and analyzed for sulfate, dissolved iron, and dissolved manganese.

Table 2

Monitoring Well Specifications And Groundwater Elevations
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	*Total Depth (ft bgs)*	*Elevation* (ft) (TOC)*	*Screen Interval (ft below TOC)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level*
MW-1	37.47	97.84	21 - 36	3/22/2006	28.54	69.30
				6/21/2006	29.15	68.69
				10/19/2006	27.83	70.01
				12/12/2006	28.22	69.62
				3/1/2007	NM	NM
				6/1/2007	NM	NM
				11/9/2007	29.03	68.81
				1/15/2008	28.34	69.50
				3/19/2008	NM	NM
				7/23/2008	28.46	69.38
				10/24/2008	29.91	67.93
				1/30/2009	28.37	69.47
				9/25/2009	29.95	67.89
				10/18/2009	29.97	67.87
				12/15/2009	29.51	--(1)
				3/30/2010	28.18	--(1)
				6/8/2010	28.38	--(1)
				9/23/2010	29.51	--(1)
				12/15/2010	28.82	--(1)
				3/15/2011	28.51	--(1)
				6/24/2011	28.92	--(1)
				10/11/2011	30.43	--(1)
				10/3/2012	31.39	--(1)
				7/19/2013	Well Plugged and Abandoned	
MW-1R	43.89	96.69	22 - 42	9/17/2013	30.83	65.86
				9/23/2014	31.37	65.32
				12/17/2014	30.61	66.08
				2/11/2015	30.33	66.36
				3/18/2015	30.15	66.54
				6/17/2015	30.26	66.43
				9/22/2015	31.44	65.25
				12/2/2015	31.14	65.55
				3/31/2016	30.54	66.15
				7/14/2016	31.73	64.96
				9/6/2016	33.94	62.75
				11/30/2016	31.74	64.95

Table 2

Monitoring Well Specifications And Groundwater Elevations
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	Total Depth (ft bgs)	Elevation* (ft) (TOC)	Screen Interval (ft below TOC)	Date Measured	Depth to Groundwater (ft below TOC)	Relative Water Level
MW-2	39.81	95.28	21 - 36	10/24/2008	25.74	69.54
				1/30/2009	24.74	70.54
				9/25/2009	26.48	68.80
				12/15/2009	25.97	69.31
				3/30/2010	24.67	70.61
				6/8/2010	24.84	70.44
				9/23/2010	26.38	68.90
				12/15/2010	25.68	69.60
				3/15/2011	25.05	70.23
				6/24/2011	26.70	68.58
				10/11/2011	27.10	68.18
				10/3/2012	27.99	67.29
				9/17/2013	28.53	66.75
				9/23/2014	29.10	66.18
				12/17/2014	28.52	66.76
				2/11/2015	28.18	67.10
				3/18/2015	27.97	67.31
				6/17/2015	28.16	67.12
				9/22/2015	29.37	65.91
				12/2/2015	29.07	66.21
				3/31/2016	28.47	66.81
				7/14/2016	29.65	65.63
				9/6/2016	29.83	65.45
				11/30/2016	29.85	65.43
MW-3	37.47	95.44	19 - 34	10/24/2008	26.95	68.49
				1/30/2009	25.92	69.52
				9/25/2009	27.57	67.87
				12/15/2009	27.05	68.39
				3/30/2010	25.79	69.65
				6/8/2010	26.02	69.42
				9/23/2010	27.35	68.09
				12/15/2010	DRY	--
				3/15/2011	26.19	69.25
				6/24/2011	26.70	68.74
				10/11/2011	28.15	67.29
				10/3/2012	29.02	66.42
				9/17/2013	29.58	65.86
				9/23/2014	30.12	65.32
				12/17/2014	29.47	65.97
				2/11/2015	29.16	66.28
				3/18/2015	28.95	66.49
				6/17/2015	29.17	66.27
				9/22/2015	30.34	65.10
				12/2/2015	29.97	65.47
				3/31/2016	29.38	66.06
				7/14/2016	30.60	64.84
				9/6/2016	30.80	64.64
				11/30/2016	29.62	65.82

Table 2

Monitoring Well Specifications And Groundwater Elevations
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	*Total Depth (ft bgs)*	*Elevation* (ft) (TOC)*	*Screen Interval (ft below TOC)*	*Date Measured*	*Depth to Groundwater (ft below TOC)*	*Relative Water Level*
MW-4	34.66	95.36	17 - 32	10/24/2008	NM	NM
				1/30/2009	26.00	69.36
				9/25/2009	27.64	67.72
				12/15/2009	27.14	68.22
				3/30/2010	25.87	69.49
				6/8/2010	26.09	69.27
				9/23/2010	27.31	68.05
				12/15/2010	26.75	68.61
				3/15/2011	26.26	69.10
				6/24/2011	26.76	68.60
				10/11/2011	28.20	67.16
				10/3/2012	29.06	66.30
				9/17/2013	29.62	65.74
				9/23/2014	31.20	64.16
				12/17/2014	29.50	65.86
				2/11/2015	29.22	66.14
				3/18/2015	29.01	66.35
				6/17/2015	29.22	66.14
				9/22/2015	30.38	64.98
				12/2/2015	30.05	65.31
				3/31/2016	29.45	65.91
				7/14/2016	30.68	64.68
				9/6/2017	30.86	64.50
				11/30/2017	29.68	65.68

Notes:

*Casing elevations are based on an arbitrary 100 ft relative surface elevation set at the gas well head

ft = Feet

bgs = below ground surface

TOC = Top of casing

NM = Not measured

(1) Groundwater elevations can not be calculated accurately due to continual shifting of the PVC casing in previously excavated area of MW-1. Well eventualy plugged, abandoned and replaced by MW-1R.

Table 3

Field Parameters Summary
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	Sample Date	Temperature (°C)	pH	TDS (g/L)	Conductivity (µS/cm)	DO (mg/L)	ORP (mV)	Volume (gallons)
MW-1R	2/11/2015	15.54	7.01	5.661	8709	2.33	-53.0	2.25
	3/18/2015	15.75	7.93	2.100	3270	--	-26.0	6.50
	6/17/2015	No parameters collected due to low well volume.						
	9/22/2015	No parameters collected due to low well volume.						
	12/2/2015	14.81	8.01	2.176	3348	2.40	-122.4	6.00
	3/31/2016	17.69	7.44	2.000	3160	6.58	-20.0	6.25
	7/14/2016	14.74	7.02	2.061	3171	9.02	38.2	6.00
	9/6/2016	14.54	7.06	2.001	3077	1.43	-21.2	4.60
MW-2	3/18/2015	14.80	7.32	1.900	3030	--	77.0	5.75
	6/17/2015	14.30	6.36	1.720	2645	3.24	28.4	5.75
	9/22/2015	14.12	8.90	1.910	2936	3.72	29.2	4.75
	12/2/2015	13.84	7.52	2.046	3147	2.59	-66.1	5.00
	3/31/2016	15.71	7.14	1.800	2810	6.15	104.0	5.25
	9/6/2016	13.59	6.87	1.885	2852	3.86	43.5	4.50
	7/14/2016	14.12	7.11	1.939	2981	3.60	51.3	5.00
	11/30/2016	14.03	7.38	--	2920	2.43	77.5	4.50
MW-3	2/11/2015	14.94	5.61	5.885	9055	2.70	-55.4	3.50
	3/18/2015	15.20	7.66	2.200	3410	--	0.0	3.75
	6/17/2015	15.08	11.62	2.870	4410	3.16	-138.1	3.50
	9/22/2015	14.76	10.90	2.490	3841	5.10	-32.1	2.75
	12/2/2015	14.26	9.57	2.453	3774	4.40	-73.9	3.00
	3/31/2016	17.01	7.71	2.100	3290	6.42	-10.0	3.50
	7/14/2016	14.80	7.33	2.149	3307	3.00	64.3	3.25
	9/6/2016	14.42	7.86	2.048	3150	3.48	-8.8	2.75
MW-4	2/11/2015	15.22	11.47	11.470	17644	2.08	-94.2	2.50
	3/18/2015	15.25	9.52	3.800	603	--	-73.0	2.67
	6/17/2015	15.19	11.24	3.360	5169	1.77	-112.1	2.75
	9/22/2015	14.68	7.75	3.570	5485	2.77	56.9	2.00
	12/2/2015	14.76	7.98	3.914	6022	2.40	-113.6	2.25
	3/31/2016	16.48	7.52	3.800	5970	7.64	-26.0	2.50
	7/14/2016	14.62	6.83	3.418	5259	5.97	37.9	2.25
	9/6/2016	14.28	6.74	3.285	5053	2.12	-20.6	2.00

Notes:
TDS = total dissolved solids
DO = dissolved oxygen
ORP = oxidation-reduction potential

Table 4

Groundwater Laboratory Analytical Results Summary
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	Sample ID	Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Iron (total) (mg/L)	Manganese (total) (mg/L)	Dissolved Sodium (mg/L)
NMWQCC Groundwater Quality Standards			**0.01**	**0.75**	**0.75**	**0.62**	**1.6**	**600**	**1**	**0.2**	NE	NE	NE
MW-1	MW-1	3/22/2006	ND	ND	0.001	0.002	--	--	--	--	--	--	--
	MW-1	6/21/2006	0.0014	0.0014	ND	0.0106	--	--	--	--	--	--	--
	MW-1	10/19/2006	ND	ND	ND	0.0011	--	--	--	--	--	--	--
	MW-1	12/12/2006	ND	0.0005	0.0004	0.0021	--	--	--	--	--	--	--
	MW-1	11/9/2007	< 0.0005	< 0.0007	< 0.0008	< 0.0009	--	--	--	--	--	--	--
	MW-1	1/15/2008	< 0.0005	< 0.0007	< 0.0008	< 0.0008	--	--	--	--	--	--	--
	MW-1	3/19/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-1	8/14/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-1	10/24/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 2.0	**2390**	--	--	--	--	--
	MW-1	1/30/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-1	10/18/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.88	**3840**	**2.24**	**17.4**	--	--	--
	MW-1	12/15/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 50	**3290**	**1.7**	**16.5**	--	--	--
	MW-1	3/30/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**2950**	0.87	**14.9**	--	--	--
	MW-1	6/8/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**2570**	**11.2**	**14.7**	--	--	--
	MW-1	9/23/2010	< 0.001	< 0.001	< 0.001	< 0.001	< 0.5	**2740**	**4.43**	**13.4**	--	--	--
	MW-1	12/15/2010	< 0.001	< 0.001	< 0.001	< 0.001	< 0.5	**2230**	**9.72**	**11.1**	--	--	--
	MW-1	3/15/2011	--	--	--	--	0.654	**2360**	**20**	**11.4**	--	--	--
	GW-74928-062311-PG-04	6/23/2011	--	--	--	--	< 0.50	**2970**	< 0.1	**10.7**	--	--	--
	GW-074928-101211-CM-006	10/12/2011	--	--	--	--	0.28	**2940**	< 0.05	**9.6**	--	--	--
	GW-074928-100312-CM-MW-1	10/3/2012	--	--	--	--	0.56	**3280**	16.7	**6.1**	--	--	--
MW-1R	GW-074928-091713-CM-MW-1R	9/17/2013	--	--	--	--	1.1	**5100**	**2.8**	**3.8**	--	--	--
	GW-074928-092314-CB-MW-1R	9/23/2014	--	--	--	--	0.89	**1860**	0.18	**2.2**	--	--	259
	--	11/13/2014	pH ADJUSTMENT EVENT										
	GW-074928-121414-CM-MW-1R	12/17/2014	--	--	--	--	--	--	< 0.05	< 0.005	53.2	1.8	702
	GW-074928-021115-CK-MW-1R	2/11/2015	--	--	--	--	--	--	< 0.05	0.028	28.5	1.1	426
	GW-074928-031815-CM-MW-1R	3/18/2015	--	--	--	--	--	--	0.052	0.19	6.56	0.378	349
	--	5/11/2015	2nd pH ADJUSTMENT EVENT										
	GW-074928-061715-CB-MW-1R	6/17/2015	--	--	--	--	--	--	0.081	< 0.005	2.3	0.062	595
	GW-074928-061715-CB-DUP	6/17/2015	--	--	--	--	--	--	0.066	< 0.005	--	--	603
	GW-075928-092215-CB-MW-1R	9/22/2015	--	--	--	--	--	--	**1.8**	**0.36**	13.2	0.652	531
	GW-075928-12215-CB-MW-1R	12/2/2015	--	--	--	--	--	--	0.91	**0.28**	30.1	1.38	414
	GW-074928-033116-CM-MW-1R	3/31/2016	--	--	--	--	--	**1600**	0.177	**0.538**	15.5	1.02	285
	GW-074928-071416-JK-MW-1R	7/14/2016	--	--	--	--	--	**1730**	0.1	**0.81**	--	--	232
	GW-074928-090716-SP-MW-1R	9/07/2016	--	--	--	--	--	**1920**	0.083	**1.1**	4.44	1.25	225
		10/21/2016	3rd pH ADJUSTMENT EVENT										

Table 4

Groundwater Laboratory Analytical Results Summary
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	Sample ID	Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Iron (total) (mg/L)	Manganese (total) (mg/L)	Dissolved Sodium (mg/L)
MW-2	MW-2	10/24/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 2	**1480**	--	--	--	--	--
	MW-2	1/30/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-2	9/25/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	1.09	**1700**	< 0.02	< 0.005	--	--	--
	MW-2	12/15/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 100	**1570**	< 0.02	< 0.005	--	--	--
	MW-2	3/30/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**1410**	< 0.02	0.14	--	--	--
	MW-2	6/8/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**1460**	0.0544	0.0093	--	--	--
	MW-2	9/23/2010	< 0.001	< 0.001	< 0.001	< 0.001	< 0.5	**1760**	< 0.02	< 0.005	--	--	--
	MW-2	12/15/2010	< 0.001	< 0.001	< 0.001	< 0.001	1.01	**1890**	< 0.02	< 0.005	--	--	--
	MW-2	3/15/2011	--	--	--	--	1.21	**1680**	< 0.02	0.0096	--	--	--
	GW-74928-062311-PG-01	6/23/2011	--	--	--	--	1.3	**1990**	< 0.1	< 0.015	--	--	--
	GW-074928-101211-CM-007	10/12/2011	--	--	--	--	0.93	**1680**	0.873	0.0297	--	--	--
	GW-074928-100312-CM-MW-2	10/3/2012	--	--	--	--	1.1	**1850**	< 0.05	0.0055	--	--	--
	GW-074928-091713-CM-MW-2	9/17/2013	--	--	--	--	1.1	**2420**	< 0.05	< 0.005	--	--	--
	GW-074928-092314-CB-MW-2	9/23/2014	--	--	--	--	0.95	**1610**	< 0.05	< 0.005	--	--	156
	--	11/13/2014	pH ADJUSTMENT EVENT										
	GW-074928-031815-CM-MW-2	3/18/2015	--	--	--	--	--	--	0.05	0.028	25	0.518	153
	--	5/11/2015	2nd pH ADJUSTMENT EVENT										
	GW-074928-061715-CB-MW-2	6/17/2015	--	--	--	--	--	--	< 0.05	0.01	49.7	0.96	163
	GW-074928-092215-CB-MW-2	9/22/2015	--	--	--	--	--	--	0.054	0.013	96.3	2.11	156
	GW-074928-092215-CB-DUP	9/22/2015	--	--	--	--	--	--	< 0.05	0.0078	--	--	164
	GW-074928-12215-CB-MW-2	12/2/2015	--	--	--	--	--	--	< 0.05	< 0.005	136	2.74	162
	GW-074928-033116-CM-MW-2	3/31/2016	--	--	--	--	--	**1580**	0.0554	0.0072	20.3	0.568	155
	GW-074928-071416-JK-MW-2	7/14/2016	--	--	--	--	--	**1880**	< 0.05	< 0.005	--	--	145
	GW-074928-090716-SP-MW-2	9/07/2016	--	--	--	--	--	**1710**	< 0.05	< 0.005	152	3.56	158
	GW-074928-090716-SP-DUP	9/07/2016	--	--	--	--	--	**1680**	< 0.05	< 0.005	< 0.050*	0.005	159
		10/21/2016	3rd pH ADJUSTMENT EVENT										
	GW-074928-113016-JK-MW-2	11/30/2016	--	--	--	--	--	**1670**	< 0.05	0.0084	--	--	--
MW-3	MW-3	10/24/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 2	**1480**	--	--	--	--	--
	MW-3	1/30/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-3	9/25/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	1	**1840**	< 0.02	**0.38**	--	--	--
	MW-3	12/15/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 50	**2500**	**1.35**	**0.32**	--	--	--
	MW-3	3/30/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**1890**	< 0.02	**0.43**	--	--	--
	MW-3	6/8/2010	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	**1630**	0.0573	**0.383**	--	--	--
	MW-3	9/23/2010	< 0.001	< 0.001	< 0.001	< 0.001	0.751	**1960**	< 0.02	**0.35**	--	--	--
	MW-3	3/15/2011	--	--	--	--	1.11	**1890**	< 0.02	**0.572**	--	--	--
	GW-74928-062311-PG-02	6/23/2011	--	--	--	--	1.2	**2190**	< 0.1	**0.846**	--	--	--
	GW-074928-101211-CM-008	10/12/2011	--	--	--	--	0.81	**1980**	< 0.05	**0.254**	--	--	--
	GW-074928-100312-CM-MW-3	10/3/2012	--	--	--	--	0.95	**2080**	< 0.05	**0.25**	--	--	--
	GW-074928-091713-CM-MW-3	9/17/2013	--	--	--	--	0.91	**2740**	< 0.05	**0.32**	--	--	--
	GW-074928-092313-CB-MW-3	9/23/2014	--	--	--	--	0.75	**1840**	< 0.05	0.036	--	--	260
	--	11/13/2014	pH ADJUSTMENT EVENT										
	GW-074928-121714-CM-MW-3	12/17/2014	--	--	--	--	--	--	< 0.05	< 0.005	73.0	4.3	496
	GW-074928-021115-CK-MW-3	2/11/2015	--	--	--	--	--	--	< 0.05	0.12	133	7.07	274
	GW-074928-031815-CM-MW3	3/18/2015	--	--	--	--	--	--	0.13	**0.21**	48	2.75	263
	--	5/11/2015	2nd pH ADJUSTMENT EVENT										
	GW-074928-061715-CB-MW-3	6/17/2015	--	--	--	--	--	--	0.2	0.0092	47.6	1.6	812
	GW-074928-092215-CB-MW-3	9/22/2015	--	--	--	--	--	--	< 0.05	< 0.005	15.4	1.23	493
	GW-074928-12215-CB-MW-3	12/2/2015	--	--	--	--	--	--	0.34	0.024	30.3	1.47	427
	GW-074928-12215-CB-DUP	12/2/2015	--	--	--	--	--	--	0.18	0.027	9.9	0.894	393
	GW-074928-033116-CM-MW-3	3/31/2016	--	--	--	--	--	**1850**	< 0.05	0.156	19.3	2.69	317
	GW-074928-071416-JK-MW-3	7/14/2016	--	--	--	--	--	**1600**	< 0.05	0.094	--	--	291
	GW-074928-090716-SP-MW-3	9/07/2016	--	--	--	--	--	**1960**	0.51	0.075	45.5	2.94	304
		10/21/2016	3rd pH ADJUSTMENT EVENT										

Table 4

Groundwater Laboratory Analytical Results Summary
ConocoPhillips Company
Howell K No. 1
San Juan County, New Mexico

Well ID	Sample ID	Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (total) (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Iron (dissolved) (mg/L)	Manganese (dissolved) (mg/L)	Iron (total) (mg/L)	Manganese (total) (mg/L)	Dissolved Sodium (mg/L)
MW-4	MW-4	10/24/2008	< 0.0005	< 0.0005	< 0.0005	< 0.0005	**2.43**	**3400**	--	--	--	--	--
	MW-4	1/30/2009	< 0.0005	< 0.0005	< 0.0005	< 0.0005	--	--	--	--	--	--	--
	MW-4	9/25/2009	< 0.001	< 0.001	< 0.001	< 0.001	**2.47**	**3860**	< 0.02	**7.8**	--	--	--
	MW-4	12/15/2009	< 0.001	< 0.001	< 0.001	< 0.001	< 50	**4540**	0.03	**7.4**	--	--	--
	MW-4	3/30/2010	< 0.001	< 0.001	< 0.001	< 0.001	--	**3970**	< 0.02	**7.83**	--	--	--
	MW-4	6/8/2010	< 0.001	< 0.001	< 0.001	< 0.001	--	**3490**	0.0607	**7.97**	--	--	--
	MW-4	9/23/2010	< 0.001	< 0.001	< 0.001	< 0.001	**1.81**	**3750**	< 0.02	**9.73**	--	--	--
	MW-4	12/15/2010	0.0011	< 0.001	< 0.001	< 0.001	**2.47**	**4310**	0.223	**8.64**	--	--	--
	MW-4	3/15/2011	--	--	--	--	**2.76**	**3990**	0.522	**11**	--	--	--
	GW-74928-062311-PG-03	6/23/2011	--	--	--	--	**2.4**	**4400**	0.492	**11.1**	--	--	--
	GW-074928-101211-CM-005	10/12/2011	--	--	--	--	**1.9**	**4120**	**2.75**	**15.6**	--	--	--
	GW-074928-100312-CM-MW-4	10/3/2012	--	--	--	--	**2.1**	**4280**	**2**	**18**	--	--	--
	GW-074928-100312-CM-DUP	10/3/2012	--	--	--	--	**--**	**--**	**2.2**	**18.4**	--	--	--
	GW-074928-091713-CM-MW-4	9/17/2013	--	--	--	--	**2.2**	**4040**	**1.1**	**15.6**	--	--	--
	GW-074928-091713-CM-DUP	9/17/2013	--	--	--	--	--	--	**1.2**	**16.7**	--	--	--
	GW-074928-092314-CB-MW-4	9/23/2014	--	--	--	--	**1.8**	**3080**	0.58	**16.2**	--	--	709
	--	11/13/2014	pH ADJUSTMENT EVENT										
	GW-074928-121714-CM-MW-4	12/17/2014	--	--	--	--	--	--	0.073	< 0.005	7.1	0.28	1150
	GW-074928-121714-CM-DUP	12/17/2014	--	--	--	--	--	--	< 0.05	< 0.005	--	--	1180
	GW-074928-021115-CK-MW-4	2/11/2015	--	--	--	--	--	--	< 0.05	< 0.005	1.54	0.739	1140
	GW-074928-031815-CMMW4	3/18/2015	--	--	--	--	--	--	< 0.05	0.011	7.3	0.326	960
	--	5/11/2015	2nd pH ADJUSTMENT EVENT										
	GW-074928-061715-CB-MW-4	6/17/2015	--	--	--	--	--	--	< 0.05	< 0.005	75.0	2.2	948
	GW-074928-092215-CB-MW-4	9/22/2015	--	--	--	--	--	--	< 0.05	**0.63**	85.1	3.31	650
	GW-074928-12215-CB-MW-4	12/2/2015	--	--	--	--	--	--	< 0.05	**1.5**	48.7	4.45	647
	GW-074928-033116-CM-MW-4	3/31/2016	--	--	--	--	--	**3150**	0.182	**4.23**	17.1	5.88	690
	GW-074928-033116-CM-DUP	3/31/2016	--	--	--	--	--	--	0.158	**4.14**	--	--	688
	GW-074928-071416-JK-MW-4	7/14/2016	--	--	--	--	--	**2930**	0.074	**5.8**	--	--	516
	GW-074928-090716-SP-MW-4	9/07/2016	--	--	--	--	--	**3130**	0.14	**7.3**	18.6	7.78	554
		10/21/2016	3rd pH ADJUSTMENT EVENT										

Notes:
MW = monitoring well
NMWQCC = New Mexico Water Quality Control Commission
Constituents in **BOLD** are in excess of NMWQCC groundwater quality standards
mg/L = milligrams per liter (parts per million)
< 1.0 = below laboratory detection limit of 1.0 mg/L
-- = not analyzed
ND = not detected
NE = Not Established
* =

Appendix A
Groundwater Laboratory Analytical Reports

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

April 11, 2016

Jeffrey Walker
GHD Services, Inc
6121 Indian School Rd NE
Ste 200
Albuquerque, NM 87110

RE: Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Dear Jeffrey Walker:
Enclosed are the analytical results for sample(s) received by the laboratory on April 01, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Flanagan
alice.flanagan@pacelabs.com
Project Manager

Enclosures

cc: Angela Bown, GHD Services, Inc,
Cassie Brown, GHD Services, Inc,
Cale Kanack, GHD

Pace Analytical Services, Inc.
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Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
WY STR Certification #: 2456.01
Arkansas Certification #: 15-016-0
Illinois Certification #: 003097
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407
Utah Certification #: KS00021
Kansas Field Laboratory Accreditation: # E-92587

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SAMPLE SUMMARY

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60216115001	**GW-074928-033116-CM-MW-1**	Water	03/31/16 11:35	04/01/16 08:50
60216115002	**GW-074928-033116-CM-MW-2**	Water	03/31/16 11:00	04/01/16 08:50
60216115003	**GW-074928-033116-CM-MW-3**	Water	03/31/16 11:45	04/01/16 08:50
60216115004	**GW-074928-033116-CM-MW-4**	Water	03/31/16 11:25	04/01/16 08:50
60216115005	**GW-074928-033116-CM-DUP**	Water	03/31/16 00:00	04/01/16 08:50

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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SAMPLE ANALYTE COUNT

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60216115001	**GW-074928-033116-CM-MW-1**	EPA 6010	SMW	2
		EPA 6010	SMW	3
		EPA 300.0	OL	1
60216115002	**GW-074928-033116-CM-MW-2**	EPA 6010	SMW	2
		EPA 6010	SMW	3
		EPA 300.0	OL	1
60216115003	**GW-074928-033116-CM-MW-3**	EPA 6010	SMW	2
		EPA 6010	SMW	3
		EPA 300.0	OL	1
60216115004	**GW-074928-033116-CM-MW-4**	EPA 6010	SMW	2
		EPA 6010	SMW	3
		EPA 300.0	OL	1
60216115005	**GW-074928-033116-CM-DUP**	EPA 6010	SMW	3

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PROJECT NARRATIVE

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Method: **EPA 6010**
Description: 6010 MET ICP
Client: GHD Services_COP NM
Date: April 11, 2016

General Information:
4 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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(913)599-5665

PROJECT NARRATIVE

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: GHD Services_COP NM
Date: April 11, 2016

General Information:
5 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Method: **EPA 300.0**
Description: 300.0 IC Anions 28 Days
Client: GHD Services_COP NM
Date: April 11, 2016

General Information:
4 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Sample: GW-074928-033116-CM-MW-1 **Lab ID: 60216115001** Collected: 03/31/16 11:35 Received: 04/01/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**15500**	ug/L	50.0	1	04/04/16 15:45	04/07/16 10:07	7439-89-6	
Manganese	**1020**	ug/L	5.0	1	04/04/16 15:45	04/07/16 10:07	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**177**	ug/L	50.0	1	04/04/16 15:45	04/07/16 14:52	7439-89-6	
Manganese, Dissolved	**538**	ug/L	5.0	1	04/04/16 15:45	04/07/16 11:55	7439-96-5	
Sodium, Dissolved	**285000**	ug/L	500	1	04/04/16 15:45	04/07/16 14:52	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1600**	mg/L	200	200		04/09/16 18:43	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(913)599-5665

ANALYTICAL RESULTS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Sample: GW-074928-033116-CM-MW-2 **Lab ID: 60216115002** Collected: 03/31/16 11:00 Received: 04/01/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**20300**	ug/L	50.0	1	04/04/16 15:45	04/07/16 10:22	7439-89-6	
Manganese	**568**	ug/L	5.0	1	04/04/16 15:45	04/07/16 10:22	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**55.4**	ug/L	50.0	1	04/04/16 15:45	04/07/16 14:56	7439-89-6	
Manganese, Dissolved	**7.2**	ug/L	5.0	1	04/04/16 15:45	04/07/16 11:59	7439-96-5	
Sodium, Dissolved	**155000**	ug/L	500	1	04/04/16 15:45	04/07/16 14:56	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1580**	mg/L	200	200		04/09/16 18:57	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Sample: GW-074928-033116-CM-MW-3 **Lab ID: 60216115003** Collected: 03/31/16 11:45 Received: 04/01/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**19300**	ug/L	50.0	1	04/04/16 15:45	04/07/16 10:26	7439-89-6	
Manganese	**2690**	ug/L	5.0	1	04/04/16 15:45	04/07/16 10:26	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	ug/L	50.0	1	04/04/16 15:45	04/07/16 15:00	7439-89-6	
Manganese, Dissolved	**156**	ug/L	5.0	1	04/04/16 15:45	04/07/16 12:03	7439-96-5	
Sodium, Dissolved	**317000**	ug/L	500	1	04/04/16 15:45	04/07/16 15:00	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1850**	mg/L	200	200		04/09/16 19:11	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Sample: GW-074928-033116-CM-MW-4 **Lab ID: 60216115004** Collected: 03/31/16 11:25 Received: 04/01/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**17100**	ug/L	50.0	1	04/04/16 15:45	04/07/16 10:30	7439-89-6	
Manganese	**5880**	ug/L	5.0	1	04/04/16 15:45	04/07/16 10:30	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**182**	ug/L	50.0	1	04/04/16 15:45	04/07/16 15:04	7439-89-6	
Manganese, Dissolved	**4230**	ug/L	5.0	1	04/04/16 15:45	04/07/16 12:14	7439-96-5	
Sodium, Dissolved	**690000**	ug/L	2500	5	04/04/16 15:45	04/07/16 15:08	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**3150**	mg/L	500	500		04/09/16 19:25	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Sample: GW-074928-033116-CM-DUP **Lab ID: 60216115005** Collected: 03/31/16 00:00 Received: 04/01/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**158**	ug/L	50.0	1	04/04/16 15:45	04/07/16 15:12	7439-89-6	
Manganese, Dissolved	**4140**	ug/L	5.0	1	04/04/16 15:45	04/07/16 12:18	7439-96-5	
Sodium, Dissolved	**688000**	ug/L	2500	5	04/04/16 15:45	04/07/16 15:58	7440-23-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(913)599-5665

QUALITY CONTROL DATA

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

QC Batch: MPRP/35426 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004

METHOD BLANK: 1735612 Matrix: Water
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron	ug/L	ND	50.0	04/07/16 10:00	
Manganese	ug/L	ND	5.0	04/07/16 10:00	

LABORATORY CONTROL SAMPLE: 1735613

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron	ug/L	10000	10100	101	80-120	
Manganese	ug/L	1000	978	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1735614 1735615

Parameter	Units	60216115001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	ug/L	15500	10000	10000	26600	26300	111	108	75-125	1	20	
Manganese	ug/L	1020	1000	1000	1960	1960	94	94	75-125	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

QC Batch: MPRP/35427 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004, 60216115005

METHOD BLANK: 1735616 Matrix: Water
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004, 60216115005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	ug/L	ND	50.0	04/07/16 14:38	
Manganese, Dissolved	ug/L	ND	5.0	04/07/16 11:29	
Sodium, Dissolved	ug/L	ND	500	04/07/16 14:38	

LABORATORY CONTROL SAMPLE: 1735617

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	ug/L	10000	10300	103	80-120	
Manganese, Dissolved	ug/L	1000	992	99	80-120	
Sodium, Dissolved	ug/L	10000	10100	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1735618 1735619

Parameter	Units	60216170001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	ug/L	3030	10000	10000	13200	13300	101	103	75-125	1	20	
Manganese, Dissolved	ug/L	0.21 mg/L	1000	1000	1190	1200	98	99	75-125	1	20	
Sodium, Dissolved	ug/L	64000	10000	10000	73200	73500	92	94	75-125	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

QC Batch: WETA/38915 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004

METHOD BLANK: 1738929 Matrix: Water
Associated Lab Samples: 60216115001, 60216115002, 60216115003, 60216115004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	04/09/16 09:15	

LABORATORY CONTROL SAMPLE: 1738930

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.9	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1738931 1738932

Parameter	Units	60216140002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	36.6	25	25	61.5	61.4	99	99	80-120	0	15	

MATRIX SPIKE SAMPLE: 1738933

Parameter	Units	60216140004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	358	250	605	99	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

QUALIFIERS

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074928 COP Howell K No. 1
Pace Project No.: 60216115

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60216115001	**GW-074928-033116-CM-MW-1**	EPA 3010	MPRP/35426	EPA 6010	ICP/25920
60216115002	**GW-074928-033116-CM-MW-2**	EPA 3010	MPRP/35426	EPA 6010	ICP/25920
60216115003	**GW-074928-033116-CM-MW-3**	EPA 3010	MPRP/35426	EPA 6010	ICP/25920
60216115004	**GW-074928-033116-CM-MW-4**	EPA 3010	MPRP/35426	EPA 6010	ICP/25920
60216115001	**GW-074928-033116-CM-MW-1**	EPA 3010	MPRP/35427	EPA 6010	ICP/25919
60216115002	**GW-074928-033116-CM-MW-2**	EPA 3010	MPRP/35427	EPA 6010	ICP/25919
60216115003	**GW-074928-033116-CM-MW-3**	EPA 3010	MPRP/35427	EPA 6010	ICP/25919
60216115004	**GW-074928-033116-CM-MW-4**	EPA 3010	MPRP/35427	EPA 6010	ICP/25919
60216115005	**GW-074928-033116-CM-DUP**	EPA 3010	MPRP/35427	EPA 6010	ICP/25919
60216115001	**GW-074928-033116-CM-MW-1**	EPA 300.0	WETA/38915		
60216115002	**GW-074928-033116-CM-MW-2**	EPA 300.0	WETA/38915		
60216115003	**GW-074928-033116-CM-MW-3**	EPA 300.0	WETA/38915		
60216115004	**GW-074928-033116-CM-MW-4**	EPA 300.0	WETA/38915		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt
ESI Tech Spec Client

WO# : 60216115

60216115

Client Name: GHD _ COP

Optional
Proj Due Date:
Proj Name:

Courier: FedEx ☑ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Other ☐ Client ☐

Tracking #: 6508 9165 7055 Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☑ None ☐ Other ☐

Thermometer Used: CF +1.0 T-239 / CF 0.0 T-262 **Type of Ice:** (Wet) Blue None ☐ Samples received on ice, cooling process has begun.
(circle one)

Cooler Temperature: 5.6

Temperature should be above freezing to 6°C

Date and initials of person examining contents: BS 9/1/16

Chain of Custody present:	☑Yes ☐No ☐N/A	1.
Chain of Custody filled out:	☑Yes ☐No ☐N/A	2.
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	3.
Sampler name & signature on COC:	☑Yes ☐No ☐N/A	4.
Samples arrived within holding time:	☑Yes ☐No ☐N/A	5.
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	7.
Sufficient volume:	☑Yes ☐No ☐N/A	8.
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	9.
Containers intact:	☑Yes ☐No ☐N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	☐Yes ☐No ☑N/A	11.
Filtered volume received for dissolved tests?	☑Yes ☐No ☐N/A	12.
Sample labels match COC:	☐Yes ☐No ☐N/A	
Includes date/time/ID/analyses WT Matrix:		13.
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	14.
Exceptions: VOA, Coliform, O&G, WI-DRO (water)	☐Yes ☑No	Initial when completed / Lot # of added preservative
Trip Blank present:	☐Yes ☑No ☐N/A	
Pace Trip Blank lot # (if purchased):		15.
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	16.
Project sampled in USDA Regulated Area:	☐Yes ☐No ☑N/A	17. List State:
Additional labels attached to 5035A vials in the field?	☐Yes ☐No ☑N/A	18.

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AAC Date: 9/1/16

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start:	Start:
End:	End:
Temp:	Temp:

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	GHD Services_COP NM	Report To:	Christine Mathews	Attention:	
Address:	6212 Indian School Rd. NE St2	Copy To:		Company Name:	
Albuquerque, NM 87110				Address:	
Email:	christine.mathews@ghd.com	Purchase Order #:		Pace Quote:	
Phone:	505-884-0672 Fax	Project Name:	074928 COP Howell K No 1	Pace Project Manager:	alice.flanagan@pacelabs.com,
Requested Due Date:		Project #:		Pace Profile #:	

Regulatory Agency	
State / Location	NM

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Sulfate by 300.0	Metals-diss Na,Fe,Mn	Total Metals	2.0		Residual Chlorine (Y/N)	2.0 6021 0115
1	GW-074928-033116-CM-MW-1	WT	G			3.31.16	1135		3	1		2							X	X	X	BP3N	BP3F		BP3U 001
2	GW-074928-033116-CM-MW-2	WT	G			3.31.16	1100		3	1		2							X	X	X				002
3	GW-074928-033116-CM-MW-3	WT	G			3.31.16	1145		3	1		2							X	X	X				003
4	GW-074928-033116-CM-MW-4	WT	G			3.31.16	1125		3	1		2							X	X	X				004
5	GW-074928-033116-CM-DUP	WT	G			3.31.16	—		1			1								X					005
6																									
7																									
8																									
9																									
10																									
11																									
12																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
- one container from each sample and unfiltered is for total metals, preserved w/ HNO_3	[signature] / GHD	3.31.16	1545	Ben Burgett / Pace	4/1/16	0850	5.6	Y	Y	Y
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: C. Mathews

SIGNATURE of SAMPLER: [signature] DATE Signed: 3/31/16

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

July 28, 2016

Christine Mathews
GHD Services, Inc.
6212 Indian School Rd. NE St2
Albuquerque, NM 87110

RE: Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Dear Christine Mathews:
Enclosed are the analytical results for sample(s) received by the laboratory on July 15, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Spiller

Alice Spiller
alice.spiller@pacelabs.com
Project Manager

Enclosures

cc: Angela Bown, GHD Services, Inc,
Jeffrey Walker, GHD Services, Inc

Pace Analytical Services, Inc.
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(913)599-5665

CERTIFICATIONS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
WY STR Certification #: 2456.01
Arkansas Certification #: 15-016-0
Illinois Certification #: 003097
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407
Utah Certification #: KS00021
Kansas Field Laboratory Accreditation: # E-92587

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SAMPLE SUMMARY

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60223652001	**GW-074928-071416-JK-MW1**	Water	07/14/16 08:45	07/15/16 08:40
60223652002	**GW-074928-071416-JK-MW2**	Water	07/14/16 09:30	07/15/16 08:40
60223652003	**GW-074928-071416-JK-MW3**	Water	07/14/16 10:15	07/15/16 08:40
60223652004	**GW-074928-071416-JK-MW4**	Water	07/14/16 11:00	07/15/16 08:40
60223652005	**GW-074928-071416-JK-DUP**	Water	07/14/16 00:00	07/15/16 08:40

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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SAMPLE ANALYTE COUNT

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60223652001	**GW-074928-071416-JK-MW1**	EPA 6010	SMW	3
		EPA 300.0	OL	1
60223652002	**GW-074928-071416-JK-MW2**	EPA 6010	SMW	3
		EPA 300.0	OL	1
60223652003	**GW-074928-071416-JK-MW3**	EPA 6010	SMW	3
		EPA 300.0	OL	1
60223652004	**GW-074928-071416-JK-MW4**	EPA 6010	SMW	3
		EPA 300.0	OL	1
60223652005	**GW-074928-071416-JK-DUP**	EPA 6010	SMW	3

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PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: GHD Services_COP NM
Date: July 28, 2016

General Information:
5 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 439321

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60223694001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 1796758)
  - Sodium, Dissolved
- MSD (Lab ID: 1796759)
  - Sodium, Dissolved

Additional Comments:

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Method: **EPA 300.0**
Description: 300.0 IC Anions 28 Days
Client: GHD Services_COP NM
Date: July 28, 2016

General Information:
4 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Sample: GW-074928-071416-JK-MW1 **Lab ID: 60223652001** Collected: 07/14/16 08:45 Received: 07/15/16 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.10**	mg/L	0.050	1	07/20/16 11:15	07/21/16 10:29	7439-89-6	
Manganese, Dissolved	**0.81**	mg/L	0.0050	1	07/20/16 11:15	07/21/16 10:29	7439-96-5	
Sodium, Dissolved	**232**	mg/L	0.50	1	07/20/16 11:15	07/21/16 10:29	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1730**	mg/L	200	200		07/28/16 10:52	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Sample: GW-074928-071416-JK-MW2 **Lab ID: 60223652002** Collected: 07/14/16 09:30 Received: 07/15/16 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	mg/L	0.050	1	07/20/16 11:15	07/21/16 10:31	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	1	07/20/16 11:15	07/21/16 10:31	7439-96-5	
Sodium, Dissolved	**145**	mg/L	0.50	1	07/20/16 11:15	07/21/16 10:31	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1880**	mg/L	200	200		07/28/16 11:07	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Sample: GW-074928-071416-JK-MW3 **Lab ID: 60223652003** Collected: 07/14/16 10:15 Received: 07/15/16 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	mg/L	0.050	1	07/20/16 11:15	07/21/16 10:34	7439-89-6	
Manganese, Dissolved	**0.094**	mg/L	0.0050	1	07/20/16 11:15	07/21/16 10:34	7439-96-5	
Sodium, Dissolved	**291**	mg/L	0.50	1	07/20/16 11:15	07/21/16 10:34	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1600**	mg/L	200	200		07/28/16 11:21	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Sample: GW-074928-071416-JK-MW4 **Lab ID: 60223652004** Collected: 07/14/16 11:00 Received: 07/15/16 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.074**	mg/L	0.050	1	07/20/16 11:15	07/21/16 10:36	7439-89-6	
Manganese, Dissolved	**5.8**	mg/L	0.0050	1	07/20/16 11:15	07/21/16 10:36	7439-96-5	
Sodium, Dissolved	**516**	mg/L	2.5	5	07/20/16 11:15	07/21/16 10:17	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**2930**	mg/L	500	500		07/28/16 11:36	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Sample: GW-074928-071416-JK-DUP **Lab ID: 60223652005** Collected: 07/14/16 00:00 Received: 07/15/16 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.093**	mg/L	0.050	1	07/20/16 11:15	07/21/16 10:39	7439-89-6	
Manganese, Dissolved	**0.79**	mg/L	0.0050	1	07/20/16 11:15	07/21/16 10:39	7439-96-5	
Sodium, Dissolved	**223**	mg/L	0.50	1	07/20/16 11:15	07/21/16 10:39	7440-23-5	

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QUALITY CONTROL DATA

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

QC Batch: 439321 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60223652001, 60223652002, 60223652003, 60223652004, 60223652005

METHOD BLANK: 1796756 Matrix: Water
Associated Lab Samples: 60223652001, 60223652002, 60223652003, 60223652004, 60223652005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.050	07/21/16 09:59	
Manganese, Dissolved	mg/L	ND	0.0050	07/21/16 09:59	
Sodium, Dissolved	mg/L	ND	0.50	07/21/16 09:59	

LABORATORY CONTROL SAMPLE: 1796757

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	10	9.7	97	80-120	
Manganese, Dissolved	mg/L	1	0.97	97	80-120	
Sodium, Dissolved	mg/L	10	9.7	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1796758 1796759

Parameter	Units	60223694001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	ND	10	10	10.1	9.8	101	98	75-125	3	20	
Manganese, Dissolved	mg/L	8.4 ug/L	1	1	1.0	0.94	101	93	75-125	8	20	
Sodium, Dissolved	mg/L	359000 ug/L	10	10	388	375	294	162	75-125	3	20	M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

QC Batch: 440313 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60223652001, 60223652002, 60223652003, 60223652004

METHOD BLANK: 1801388 Matrix: Water
Associated Lab Samples: 60223652001, 60223652002, 60223652003, 60223652004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	07/28/16 08:57	

LABORATORY CONTROL SAMPLE: 1801389

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	5.4	108	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1801390 1801391

Parameter	Units	60223997002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	50.3	25	25	74.0	72.9	95	91	80-120	2	15	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074928 COP HOWELL K NO. 1
Pace Project No.: 60223652

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60223652001	**GW-074928-071416-JK-MW1**	EPA 3010	439321	EPA 6010	439349
60223652002	**GW-074928-071416-JK-MW2**	EPA 3010	439321	EPA 6010	439349
60223652003	**GW-074928-071416-JK-MW3**	EPA 3010	439321	EPA 6010	439349
60223652004	**GW-074928-071416-JK-MW4**	EPA 3010	439321	EPA 6010	439349
60223652005	**GW-074928-071416-JK-DUP**	EPA 3010	439321	EPA 6010	439349
60223652001	**GW-074928-071416-JK-MW1**	EPA 300.0	440313		
60223652002	**GW-074928-071416-JK-MW2**	EPA 300.0	440313		
60223652003	**GW-074928-071416-JK-MW3**	EPA 300.0	440313		
60223652004	**GW-074928-071416-JK-MW4**	EPA 300.0	440313		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt
ESI Tech Spec Client

WO# : 60223652

60223652

AFT

Client Name: GHD COP

Optional
Proj Due Date:
Proj Name:

Courier: FedEx ☒ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Other ☐ Client ☐

Tracking #: 6703 1644 5842 Pace Shipping Label Used? Yes ☐ No ☐

Custody Seal on Cooler/Box Present: Yes ☒ No ☐ Seals intact: Yes ☒ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☒ Other ☐

Thermometer Used: CF -0.1 / CF 0.0 T-239 / T-262 **Type of Ice:** Wet Blue None ☐ Samples received on ice, cooling process has begun.
(circle one)

Cooler Temperature: 1.2

Date and initials of person examining contents: JB 7/15

Temperature should be above freezing to 6°C

Chain of Custody present:	☒Yes ☐No ☐N/A	1.
Chain of Custody filled out:	☒Yes ☐No ☐N/A	2. No unpres. volume for Dup to run 300.00.
Chain of Custody relinquished:	☒Yes ☐No ☐N/A	3.
Sampler name & signature on COC:	☒Yes ☐No ☐N/A	4.
Samples arrived within holding time:	☒Yes ☐No ☐N/A	5.
Short Hold Time analyses (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time requested:	☐Yes ☒No ☐N/A	7.
Sufficient volume:	☒Yes ☐No ☐N/A	8.
Correct containers used:	☒Yes ☐No ☐N/A	
Pace containers used:	☒Yes ☐No ☐N/A	9.
Containers intact:	☒Yes ☐No ☐N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	☐Yes ☐No ☒N/A	11.
Filtered volume received for dissolved tests?	☐Yes ☐No ☒N/A	12.
Sample labels match COC:	☒Yes ☐No ☐N/A	
Includes date/time/ID/analyses Matrix: WT		13.
All containers needing preservation have been checked.	☒Yes ☐No ☐N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	☒Yes ☐No ☐N/A	14.
Exceptions: VOA, Coliform, O&G, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Trip Blank present:	☐Yes ☐No ☒N/A	
Pace Trip Blank lot # (if purchased):		15.
Headspace in VOA vials (>6mm):	☐Yes ☐No ☒N/A	16.
Project sampled in USDA Regulated Area:	☐Yes ☐No ☒N/A	17. List State:
Additional labels attached to 5035A vials in the field?	☐Yes ☐No ☒N/A	18.

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start: 1115	Start:
End: 1120	End:
Temp:	Temp:

Project Manager Review: AAF Date: 07/15/16

F-KS-C-004-Rev.4, 30June 2015

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: GHD Services_COP NM	Report To: Christine Mathews	Attention:
Address: 6212 Indian School Rd. NE St2	Copy To:	Company Name:
Albuquerque, NM 87110		Address:
Email: christine.mathews@ghd.com	Purchase Order #:	Pace Quote:
Phone: 505-884-0672 Fax:	Project Name: 074928 COP Howell K No 1	Pace Project Manager: alice.flanagan@pacelabs.com
Requested Due Date:	Project #:	Pace Profile #:

Regulatory Agency	
State / Location	NM

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Sulfate by 300.0	Metals-diss Na,Fe,Mn	Residual Chlorine (Y/N)	60223652
1	GW-074928-071416-JK-MW1	WT	G	7-14	845			2	2	1		1						Y	Y	Y		001
2	GW-074928-071416-JK-MW2	WT	G	7-14	930			2	2	1		1						Y	Y			002
3	GW-074928-071416-JK-MW3	WT	G	7-14	1015			2	2	1		1						Y	Y			003
4	GW-074928-071416-JK-MW4	WT	G	7-14	1000			2	2	1		1						Y	X			004
5	GW-074928-071416-JK-DUP	WT	G	7-14				1	1			1						Y	Y			005
6																						
7																						
8																						
9																						
10																						
11																						
12																						

BP3U BP3F 2.0 7/15

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	GHD	7/14	1508		7/15	0840	1.2	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joshua Kuzmik

SIGNATURE of SAMPLER: DATE Signed: 7.14.15

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
1.2	Y	Y	Y

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

September 26, 2016

Christine Mathews
GHD Services, Inc.
6212 Indian School Rd. NE St2
Albuquerque, NM 87110

RE: Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Dear Christine Mathews:
Enclosed are the analytical results for sample(s) received by the laboratory on September 09, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Spiller

Alice Spiller
alice.spiller@pacelabs.com
Project Manager

Enclosures

cc: Angela Bown, GHD Services, Inc,
Jeffrey Walker, GHD Services, Inc

Pace Analytical Services, Inc.
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
WY STR Certification #: 2456.01
Arkansas Certification #: 15-016-0
Illinois Certification #: 003097
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407
Utah Certification #: KS00021
Kansas Field Laboratory Accreditation: # E-92587

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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SAMPLE SUMMARY

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60227294001	**GW-074928-090716-SP-MW-1R**	Water	09/07/16 19:35	09/09/16 08:50
60227294002	**GW-074928-090716-SP-MW-2**	Water	09/07/16 19:20	09/09/16 08:50
60227294003	**GW-074928-090716-SP-MW-3**	Water	09/07/16 19:50	09/09/16 08:50
60227294004	**GW-074928-090716-SP-MW-4**	Water	09/07/16 19:43	09/09/16 08:50
60227294005	**GW-074928-090716-SP-DUP**	Water	09/07/16 00:00	09/09/16 08:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60227294001	**GW-074928-090716-SP-MW-1R**	EPA 6010	TDS	2
		EPA 6010	TDS	3
		EPA 300.0	OL	1
60227294002	**GW-074928-090716-SP-MW-2**	EPA 6010	TDS	2
		EPA 6010	TDS	3
		EPA 300.0	OL	1
60227294003	**GW-074928-090716-SP-MW-3**	EPA 6010	TDS	2
		EPA 6010	TDS	3
		EPA 300.0	OL	1
60227294004	**GW-074928-090716-SP-MW-4**	EPA 6010	TDS	2
		EPA 6010	TDS	3
		EPA 300.0	OL	1
60227294005	**GW-074928-090716-SP-DUP**	EPA 6010	TDS	2
		EPA 6010	TDS	3
		EPA 300.0	OL	1

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PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Method: **EPA 6010**
Description: 6010 MET ICP
Client: GHD Services_COP NM
Date: September 26, 2016

General Information:
5 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 446114

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60227294002

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 1824045)
  - Iron
  - Manganese
- MSD (Lab ID: 1824046)
  - Iron
  - Manganese

Additional Comments:

Analyte Comments:

QC Batch: 446114

1e: PDS recovery 89% for Mn

- GW-074928-090716-SP-MW-2 (Lab ID: 60227294002)
  - Manganese
- MS (Lab ID: 1824045)
  - Manganese

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Method: **EPA 6010**
Description: 6010 MET ICP
Client: GHD Services_COP NM
Date: September 26, 2016

Analyte Comments:

QC Batch: 446114

1e: PDS recovery 89% for Mn

- MSD (Lab ID: 1824046)
  - Manganese

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PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved
Client: GHD Services_COP NM
Date: September 26, 2016

General Information:
5 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Method: **EPA 300.0**
Description: 300.0 IC Anions 28 Days
Client: GHD Services_COP NM
Date: September 26, 2016

General Information:
5 samples were analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Sample: GW-074928-090716-SP-MW-1R **Lab ID: 60227294001** Collected: 09/07/16 19:35 Received: 09/09/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**4440**	ug/L	50.0	1	09/12/16 12:15	09/13/16 15:16	7439-89-6	
Manganese	**1250**	ug/L	5.0	1	09/12/16 12:15	09/13/16 15:16	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.083**	mg/L	0.050	1	09/12/16 12:15	09/13/16 12:53	7439-89-6	
Manganese, Dissolved	**1.1**	mg/L	0.0050	1	09/12/16 12:15	09/13/16 12:53	7439-96-5	
Sodium, Dissolved	**225**	mg/L	0.50	1	09/12/16 12:15	09/13/16 12:53	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1920**	mg/L	200	200		09/24/16 14:54	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Sample: GW-074928-090716-SP-MW-2 **Lab ID: 60227294002** Collected: 09/07/16 19:20 Received: 09/09/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**152000**	ug/L	50.0	1	09/12/16 12:15	09/13/16 15:19	7439-89-6	M1
Manganese	**3560**	ug/L	5.0	1	09/12/16 12:15	09/13/16 15:19	7439-96-5	1e,M1
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	mg/L	0.050	1	09/12/16 12:15	09/13/16 12:55	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	1	09/12/16 12:15	09/13/16 12:55	7439-96-5	
Sodium, Dissolved	**158**	mg/L	0.50	1	09/12/16 12:15	09/13/16 12:55	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1710**	mg/L	200	200		09/24/16 15:08	14808-79-8	

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Sample: GW-074928-090716-SP-MW-3 **Lab ID: 60227294003** Collected: 09/07/16 19:50 Received: 09/09/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**45500**	ug/L	50.0	1	09/12/16 12:15	09/13/16 15:28	7439-89-6	
Manganese	**2940**	ug/L	5.0	1	09/12/16 12:15	09/13/16 15:28	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.51**	mg/L	0.050	1	09/12/16 12:15	09/13/16 12:58	7439-89-6	
Manganese, Dissolved	**0.075**	mg/L	0.0050	1	09/12/16 12:15	09/13/16 12:58	7439-96-5	
Sodium, Dissolved	**304**	mg/L	0.50	1	09/12/16 12:15	09/13/16 12:58	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1960**	mg/L	200	200		09/24/16 15:22	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Sample: GW-074928-090716-SP-MW-4 **Lab ID: 60227294004** Collected: 09/07/16 19:43 Received: 09/09/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	**18600**	ug/L	50.0	1	09/12/16 12:15	09/13/16 15:35	7439-89-6	
Manganese	**7780**	ug/L	5.0	1	09/12/16 12:15	09/13/16 15:35	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	**0.14**	mg/L	0.050	1	09/12/16 12:15	09/13/16 13:00	7439-89-6	
Manganese, Dissolved	**7.3**	mg/L	0.0050	1	09/12/16 12:15	09/13/16 13:00	7439-96-5	
Sodium, Dissolved	**554**	mg/L	1.0	2	09/12/16 12:15	09/13/16 13:10	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**3130**	mg/L	500	500		09/24/16 15:36	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

ANALYTICAL RESULTS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Sample: GW-074928-090716-SP-DUP **Lab ID: 60227294005** Collected: 09/07/16 00:00 Received: 09/09/16 08:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron	ND	ug/L	50.0	1	09/12/16 12:15	09/13/16 15:37	7439-89-6	
Manganese	**5.0**	ug/L	5.0	1	09/12/16 12:15	09/13/16 15:37	7439-96-5	
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	mg/L	0.050	1	09/12/16 12:15	09/13/16 13:08	7439-89-6	
Manganese, Dissolved	ND	mg/L	0.0050	1	09/12/16 12:15	09/13/16 13:08	7439-96-5	
Sodium, Dissolved	**159**	mg/L	0.50	1	09/12/16 12:15	09/13/16 13:08	7440-23-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1680**	mg/L	200	200		09/24/16 15:50	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
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(913)599-5665

QUALITY CONTROL DATA

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

QC Batch: 446114 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

METHOD BLANK: 1824043 Matrix: Water
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron	ug/L	ND	50.0	09/13/16 15:12	
Manganese	ug/L	ND	5.0	09/13/16 15:12	

LABORATORY CONTROL SAMPLE: 1824044

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron	ug/L	10000	10200	102	80-120	
Manganese	ug/L	1000	947	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1824045 1824046

Parameter	Units	60227294002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	ug/L	152000	10000	10000	152000	157000	5	55	75-125	3	20	M1
Manganese	ug/L	3560	1000	1000	4140	4230	58	67	75-125	2	20	1e,M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

QC Batch: 446110 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

METHOD BLANK: 1824025 Matrix: Water
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	mg/L	ND	0.050	09/13/16 12:12	
Manganese, Dissolved	mg/L	ND	0.0050	09/13/16 12:12	
Sodium, Dissolved	mg/L	ND	0.50	09/13/16 12:12	

LABORATORY CONTROL SAMPLE: 1824026

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	mg/L	10	10.1	101	80-120	
Manganese, Dissolved	mg/L	1	0.96	96	80-120	
Sodium, Dissolved	mg/L	10	9.6	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1824027 1824028

Parameter	Units	60227292002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	709 ug/L	10	10	10.9	10.9	102	102	75-125	0	20	
Manganese, Dissolved	mg/L	1670 ug/L	1	1	2.6	2.6	93	96	75-125	1	20	
Sodium, Dissolved	mg/L	95400 ug/L	10	10	105	105	97	93	75-125	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1824029 1824030

Parameter	Units	60227293005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	mg/L	4600 ug/L	10	10	14.6	14.7	100	101	75-125	1	20	
Manganese, Dissolved	mg/L	2070 ug/L	1	1	3.0	3.0	94	95	75-125	0	20	
Sodium, Dissolved	mg/L	25400 ug/L	10	10	35.8	35.9	103	105	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

QC Batch: 447841 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

METHOD BLANK: 1832280 Matrix: Water
Associated Lab Samples: 60227294001, 60227294002, 60227294003, 60227294004, 60227294005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	09/24/16 12:18	

LABORATORY CONTROL SAMPLE: 1832281

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.8	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1832282 1832283

Parameter	Units	60227293002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	131	50	50	179	179	97	96	80-120	0	15	

MATRIX SPIKE SAMPLE: 1832284

Parameter	Units	60227293005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	104	50	155	103	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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(913)599-5665

QUALIFIERS

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

1e	PDS recovery 89% for Mn
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074928 COP HOWELL K NO 1
Pace Project No.: 60227294

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60227294001	**GW-074928-090716-SP-MW-1R**	EPA 3010	446114	EPA 6010	446264
60227294002	**GW-074928-090716-SP-MW-2**	EPA 3010	446114	EPA 6010	446264
60227294003	**GW-074928-090716-SP-MW-3**	EPA 3010	446114	EPA 6010	446264
60227294004	**GW-074928-090716-SP-MW-4**	EPA 3010	446114	EPA 6010	446264
60227294005	**GW-074928-090716-SP-DUP**	EPA 3010	446114	EPA 6010	446264
60227294001	**GW-074928-090716-SP-MW-1R**	EPA 3010	446110	EPA 6010	446261
60227294002	**GW-074928-090716-SP-MW-2**	EPA 3010	446110	EPA 6010	446261
60227294003	**GW-074928-090716-SP-MW-3**	EPA 3010	446110	EPA 6010	446261
60227294004	**GW-074928-090716-SP-MW-4**	EPA 3010	446110	EPA 6010	446261
60227294005	**GW-074928-090716-SP-DUP**	EPA 3010	446110	EPA 6010	446261
60227294001	**GW-074928-090716-SP-MW-1R**	EPA 300.0	447841		
60227294002	**GW-074928-090716-SP-MW-2**	EPA 300.0	447841		
60227294003	**GW-074928-090716-SP-MW-3**	EPA 300.0	447841		
60227294004	**GW-074928-090716-SP-MW-4**	EPA 300.0	447841		
60227294005	**GW-074928-090716-SP-DUP**	EPA 300.0	447841		

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Sample Condition Upon Receipt
ESI Tech Spec Client

WO# : 60227294

60227294

AFS

Client Name: GHDCoP-NM

Courier: FedEx ☒ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 7044 6652 7940 Pace Shipping Label Used? Yes ☒ No ☐

Custody Seal on Cooler/Box Present: Yes ☒ No ☐ Seals intact: Yes ☒ No ☐

Packing Material: Bubble Wrap ☒ Bubble Bags ☒ Foam ☐ None ☐ Other ☐

Thermometer Used: CF +1.1 T-266 / CF -0.1 T-239 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 1.6 **Corr. Factor** CF +1.1 CF -0.1 **Corrected** 2.7

Date and initials of person examining contents: JK 9/9/16

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☒N/A	
Filtered volume received for dissolved tests?	☑Yes ☐No ☐N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: water	☐Yes ☐No ☒N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	
Cyanide water sample checks: ☐ N/A Lead acetate strip turns dark? (Record only) Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No ☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☒N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: alice Date: 09/09/16

Temp Log: Record start and finish times when unpacking cooler, if >20 min, recheck sample temps.

Start: 1000	Start:
End: 1010	End:
Temp:	Temp:

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 Of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	GHD Services_COP NM	Report To:	Christine Mathews	Attention:	
Address:	6212 Indian School Rd. NE St2	Copy To:	Jeff Walker, Angela Bown	Company Name:	
Albuquerque, NM 87110				Address:	
Email:	christine.mathews@ghd.com	Purchase Order #:	34005856	Pace Quote:	
Phone:	505-884-0672 Fax:	Project Name:	074928 COP Howell K No 1	Pace Project Manager:	alice.spiller@pacelabs.com,
Requested Due Date:		Project #:		Pace Profile #:	8644 , 15

Regulatory Agency: | State / Location: NM

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Sulfate by 300.0	diss Na,Fe,Mn-field filtered	Total Metals Fe, Mn	Residual Chlorine (Y/N)	60227294
1	GW-074928-090716-SP-MW-1R	WT	G	9-7-16	1935				3										X	X	X		(BTEX) (BTEX) (BTEX)
2	GW-074928-090716-SP-MW-2				1920				3														002
3	GW-074928-090716-SP-MW-3				1950				3														003
4	GW-074928-090716-SP-MW-4				1943				3														004
5	GW-074928-090716-SP-DUP								3														005
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Steve Rose	9-8-16	1629		9/9/16	850	2.7	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Steve Rose

SIGNATURE of SAMPLER: Steve Rose DATE Signed: 9-8-16

Pace Analytical Services, LLC
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Lenexa, KS 66219
(913)599-5665

December 19, 2016

Jeffrey Walker
GHD Services, Inc
6121 Indian School Rd NE
Ste 200
Albuquerque, NM 87110

RE: Project: 074928 HOWELL K
Pace Project No.: 60233547

Dear Jeffrey Walker:
Enclosed are the analytical results for sample(s) received by the laboratory on December 03, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Alice Spiller

Alice Spiller
alice.spiller@pacelabs.com
Project Manager

Enclosures

cc: Angela Bown, GHD Services, Inc,

Pace Analytical Services, LLC
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CERTIFICATIONS

Project: 074928 HOWELL K
Pace Project No.: 60233547

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
WY STR Certification #: 2456.01
Arkansas Certification #: 15-016-0
Illinois Certification #: 003097
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407
Utah Certification #: KS00021
Kansas Field Laboratory Accreditation: # E-92587
Missouri Certification: 10070

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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SAMPLE SUMMARY

Project: 074928 HOWELL K
Pace Project No.: 60233547

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60233547001	**GW-074928-11-30-16-JK-MW-2**	Water	11/30/16 13:35	12/03/16 08:20
60233547002	**TRIP BLANK**	Water	11/30/16 13:35	12/03/16 08:20

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 074928 HOWELL K
Pace Project No.: 60233547

Lab ID	Sample ID	Method	Analysts	Analytes Reported
60233547001	**GW-074928-11-30-16-JK-MW-2**	EPA 6010	TDS	2
		EPA 300.0	OL	1

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PROJECT NARRATIVE

Project: 074928 HOWELL K
Pace Project No.: 60233547

Method: **EPA 6010**
Description: 6010 MET ICP, Dissolved (LF)
Client: GHD Services_COP NM
Date: December 19, 2016

General Information:
1 sample was analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: 074928 HOWELL K
Pace Project No.: 60233547

Method: **EPA 300.0**
Description: 300.0 IC Anions 28 Days
Client: GHD Services_COP NM
Date: December 19, 2016

General Information:
1 sample was analyzed for EPA 300.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 074928 HOWELL K
Pace Project No.: 60233547

Sample: GW-074928-11-30-16-JK-MW-2 **Lab ID: 60233547001** Collected: 11/30/16 13:35 Received: 12/03/16 08:20 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved (LF)	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Iron, Dissolved	ND	ug/L	50.0	1	12/05/16 15:30	12/09/16 11:33	7439-89-6	
Manganese, Dissolved	**8.4**	ug/L	5.0	1	12/05/16 15:30	12/09/16 11:33	7439-96-5	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0							
Sulfate	**1670**	mg/L	100	100		12/17/16 21:59	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: 074928 HOWELL K
Pace Project No.: 60233547

QC Batch: 457686
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 60233547001

METHOD BLANK: 1873723 Matrix: Water
Associated Lab Samples: 60233547001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Iron, Dissolved	ug/L	ND	50.0	12/09/16 10:55	
Manganese, Dissolved	ug/L	ND	5.0	12/09/16 10:55	

LABORATORY CONTROL SAMPLE: 1873724

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Dissolved	ug/L	10000	10300	103	80-120	
Manganese, Dissolved	ug/L	1000	1000	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1873725 1873726

Parameter	Units	60233432002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron, Dissolved	ug/L	ND	10000	10000	10300	10900	103	109	75-125	6	20	
Manganese, Dissolved	ug/L	1.1 mg/L	1000	1000	2040	2100	97	103	75-125	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 074928 HOWELL K
Pace Project No.: 60233547

QC Batch: 459253 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60233547001

METHOD BLANK: 1880249 Matrix: Water
Associated Lab Samples: 60233547001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	ND	1.0	12/17/16 09:19	

LABORATORY CONTROL SAMPLE: 1880250

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.9	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1880251 1880252

Parameter	Units	60233382001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	14.0	5	5	19.7	19.4	115	107	80-120	2	15	

MATRIX SPIKE SAMPLE: 1880253

Parameter	Units	60233382002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	11.9	5	17.2	106	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 074928 HOWELL K
Pace Project No.: 60233547

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 074928 HOWELL K
Pace Project No.: 60233547

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60233547001	**GW-074928-11-30-16-JK-MW-2**	EPA 3010	457686	EPA 6010	457730
60233547001	**GW-074928-11-30-16-JK-MW-2**	EPA 300.0	459253		

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Sample Condition Upon Receipt

WO# : 60233547

60233547

Client Name: GHD

Courier: FedEx ☒ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: 7848 4414 4232 Pace Shipping Label Used? Yes ☐ No ☐

Custody Seal on Cooler/Box Present: Yes ☒ No ☐ Seals intact: Yes ☒ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☒ Other ☐

Thermometer Used: CF +0.7 T-266 / CF -0.5 T-239 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 4.3 **Corr. Factor** (CF +0.7) CF -0.5 **Corrected** 5.0

Date and initials of person examining contents: JO 12/3

Temperature should be above freezing to 6°C

Chain of Custody present:	☒Yes ☐No ☐N/A	
Chain of Custody relinquished:	☒Yes ☐No ☐N/A	
Samples arrived within holding time:	☒Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☒No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☒No ☐N/A	
Sufficient volume:	☒Yes ☐No ☐N/A	
Correct containers used:	☒Yes ☐No ☐N/A	
Pace containers used:	☒Yes ☐No ☐N/A	
Containers intact:	☒Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☒N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☒N/A	
Sample labels match COC: Date / time / ID / analyses	☒Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☒No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☐Yes ☐No ☒N/A	
Cyanide water sample checks: ☒ N/A Lead acetate strip turns dark? (Record only) Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No ☐Yes ☐No	
Trip Blank present:	☒Yes ☐No ☐N/A JB 12/3	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☒N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☒N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☒N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Date: 12/5/16

CHAIN OF CUSTODY RECORD

COC NO.: 55537

Address: 6121 Indian School NE #200, Albuquerque
Phone: Jeff.walker@GHD.com Fax:

Project No/ Phase/Task Code: 074928	Laboratory Name: Pace Analytical	Lab Location: Kansas	SSOW ID:
Project Name: Howel K	Lab Contact: Alice Spiller		Cooler No:
Project Location: San Juan County			Carrier: FedEx
GHD Chemistry Contact:			Airbill No:
Sampler(s): JW			Total # of Containers: 1

6023547

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)	Dissolved Mg, Fe	Sulfate									Total Containers/sample	MS/MSD Request	Comments/ Special Instructions:	
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)																			
1	GW-074928-12-30-16-JK-MW-2	12-30-16	1335	WG	G	N	X	X								BP3N		1		Please filter -	W1
2																(3) DGN15					W2
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1. Charles Neligh	GHD	12-02-16	1500	1.		12/3	0820
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew