



March 1, 2016

Mr. Bob Chesson  
Environmental Protection Specialist, Northeast Region  
Colorado Oil and Gas Conservation Commission  
1120 Lincoln Street, Suite 801  
Denver, CO 80203

RECEIVED 03/24/2016  
PROJECT 6926  
Document #: 2212105

**Re: 2015 Annual Groundwater Monitoring Report  
Seele 31, 41, 42-31 Tank Battery  
NENE Section 31 T4N R67W  
Weld County, Colorado  
Facility #: 331188  
Spill Tracking #: 2223041  
Remediation #: 6926**

Dear Mr. Chesson,

On behalf of PDC Energy, Inc. (PDC), Tasman Geosciences, Inc. (Tasman) is submitting this 2015 Annual Groundwater Monitoring Report for quarterly groundwater monitoring activities conducted at the Seele 31, 41, 42-31 tank battery (Site). This report documents the results of groundwater gauging, groundwater sampling, and remediation activities conducted at the Site during 2015. As per discussions with COGCC staff, PDC is providing this summary annual report to assist in updating the COGCC on the progress and status of this open remediation Site.

A dump line release was discovered at the Site on January 9, 2012, during equipment upgrade activities. Following excavation and well installation activities, groundwater monitoring was initiated during the first quarter 2012. The current monitoring well network at the Site consists of 6 temporary monitoring and remediation wells (BH01, BH02R, and BH07 - BH09), as shown in Figure 1. Historic groundwater sampling results are presented in Table 1. Groundwater monitoring results for 2015 are summarized below.

| Sampling Event | Wells Exceeding COGCC Standards | Maximum Benzene Concentration (µg/L) |
|----------------|---------------------------------|--------------------------------------|
| 1Q 2015        | BH07                            | 120                                  |
| 2Q 2015        | None                            | <1.0                                 |
| 3Q 2015        | None                            | <1.0                                 |
| 4Q 2015        | None                            | <1.0                                 |

Tasman initiated enhanced fluid recovery (EFR) and air sparge (AS) events at the site during the third quarter 2012. EFR/AS events were discontinued during the third quarter 2015, and monitored natural attenuation (MNA) was implemented as the selected remediation strategy for this site beginning in the fourth quarter 2015. Three additional quarters of compliance groundwater monitoring will be conducted to confirm that BTEX concentrations remain below applicable COGCC Table 910-1 groundwater standards.

Please contact me at (720) 409-8791 if you have any questions regarding this report.

Sincerely,

Christine Wasko  
Project Manager  
Tasman Geosciences, Inc.



County Road 40



**Note:** Surface drainage direction is estimated based on site topography and is not related to regional topography.

DRAWN BY: ESS  
DATE: 2/3/2016

**Facility Diagram**  
PDC Energy – DJ Basin  
Seele 31, 41, 42-31 Tank Battery  
NENE S31 T4N R67W  
Weld County, CO

**TASMAN** GEOSCIENCES  
6899 Pecos St., Unit C  
Denver CO 80221

**LEGEND**

- Excavation Extent
- Monitoring Well Location
- Monitoring Well Location – Sampling Discontinued
- Bore Hole Location – No Well Installed
- Point of Release
- Groundwater Flow Direction

All locations are approximate unless otherwise noted

**FIGURE 1**  
GROUNDWATER MONITORING SITE MAP

**TABLE 1**  
**SEEE 31, 41, 42-31 TANK BATTERY**  
**GROUNDWATER ANALYTICAL RESULTS SUMMARY TABLE**

| Sample ID   | Date Sampled | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Total Xylenes (µg/L) | Depth to Water (feet) |
|---|--------------|----------------|----------------|---------------------|----------------------|-----------------------|
| <b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b> |              | <b>5</b>       | <b>560</b>     | <b>700</b>          | <b>1,400</b>         |                       |
| BH01  | 1/27/2012    | <b>5,300</b>   | <b>1,200</b>   | 180                 | 1,300                | 13.14                 |
| BH01  | 7/17/2012    | <b>900</b>     | 2.2            | 10                  | 78                   | 12.60                 |
| BH01  | 10/1/2012    | <1.0           | <1.0           | <1.0                | <1.0                 | 13.82                 |
| BH01  | 1/28/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH01  | 5/3/2013     | <b>3,000</b>   | 2.3            | 17                  | 240                  | 13.90                 |
| BH01  | 7/25/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH01  | 11/1/2013    | <1.0           | <1.0           | 4.2                 | 28                   | 13.09                 |
| BH01  | 1/29/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH01  | 4/28/2014    | DRY            | DRY            | DRY                 | DRY                  | 14.26                 |
| BH01  | 7/25/2014    | <1.0           | <1.0           | 1.6                 | 4.3                  | 12.47                 |
| BH01  | 10/27/2014   | DRY            | DRY            | DRY                 | DRY                  | 13.36                 |
| BH01  | 1/20/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH01  | 4/24/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH01  | 7/31/2015    | <1.0           | <1.0           | 49                  | 100                  | 12.87                 |
| BH01  | 10/6/2015    | DRY            | DRY            | DRY                 | DRY                  | 13.82                 |
| BH02  | 1/27/2012    | <b>7,500</b>   | <b>680</b>     | 240                 | <b>1,400</b>         | 11.93                 |
| BH02  | 7/17/2012    | <b>10,000</b>  | <b>2,200</b>   | 220                 | <b>2,140</b>         | 10.92                 |
| BH02  | 10/1/2012    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 1/28/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 5/3/2013     | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 7/25/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 10/31/2013   | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 1/29/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02  | 4/28/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH02R   | 7/25/2014    | <b>93</b>      | 14             | 89                  | 230                  | 10.12                 |
| BH02R   | 10/27/2014   | 1.4            | <1.0           | 1.5                 | 8.7                  | 10.72                 |
| BH02R   | 1/20/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 11.42                 |
| BH02R   | 4/24/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 11.28                 |
| BH02R   | 7/31/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 9.70                  |
| BH02R   | 10/6/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 10.68                 |

**TABLE 1**  
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| Sample ID   | Date Sampled | Benzene (µg/L) | Toluene (µg/L) | Ethylbenzene (µg/L) | Total Xylenes (µg/L) | Depth to Water (feet) |
|---|--------------|----------------|----------------|---------------------|----------------------|-----------------------|
| <b>COGCC Table 910-1 Groundwater Standard (µg/L) <sup>(1)</sup></b> |              | <b>5</b>       | <b>560</b>     | <b>700</b>          | <b>1,400</b>         |                       |
| BH03  | 1/27/2012    | <b>16,000</b>  | <b>4,400</b>   | 420                 | <b>2,900</b>         | 15.02                 |
| BH03  | 7/17/2012    | <b>18,000</b>  | <b>2,700</b>   | 15                  | <b>3,590</b>         | 12.56                 |
| BH03  | 10/1/2012    | <b>7,300</b>   | <b>1,400</b>   | 250                 | <b>2,400</b>         | 12.69                 |
| BH03  | 1/28/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 5/3/2013     | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 7/25/2013    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 10/31/2013   | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 1/29/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 4/28/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 7/25/2014    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 10/27/2014   | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 1/20/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 4/24/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 7/31/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH03  | 10/6/2015    | DRY            | DRY            | DRY                 | DRY                  | DRY                   |
| BH07  | 7/25/2014    | <1.0           | <1.0           | <1.0                | <1.0                 | 9.01                  |
| BH07  | 10/27/2014   | <b>160</b>     | <1.0           | <1.0                | <1.0                 | 9.75                  |
| BH07  | 1/20/2015    | <b>120</b>     | <1.0           | <1.0                | <1.0                 | 10.63                 |
| BH07  | 4/24/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 10.60                 |
| BH07  | 7/31/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 9.69                  |
| BH07  | 10/6/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 10.49                 |
| BH08  | 7/25/2014    | 3.8            | <1.0           | 6.2                 | 210                  | 9.95                  |
| BH08  | 10/27/2014   | <b>5.5</b>     | <1.0           | <1.0                | 36                   | 10.86                 |
| BH08  | 1/20/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 11.57                 |
| BH08  | 4/24/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 11.43                 |
| BH08  | 7/31/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 9.74                  |
| BH08  | 10/6/2015    | <1.0           | <1.0           | <1.0                | <1.0                 | 10.87                 |

**TABLE 1**  
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| Sample ID   | Date Sampled | Benzene<br>(µg/L) | Toluene<br>(µg/L) | Ethylbenzene<br>(µg/L) | Total<br>Xylenes<br>(µg/L) | Depth to<br>Water<br>(feet) |
|---|--------------|-------------------|-------------------|------------------------|----------------------------|-----------------------------|
| <b>COGCC Table 910-1 Groundwater<br/>Standard (µg/L) <sup>(1)</sup></b> |              | <b>5</b>          | <b>560</b>        | <b>700</b>             | <b>1,400</b>               |                             |
| BH09  | 7/25/2014    | <b>810</b>        | <1.0              | 72                     | 510                        | 11.46                       |
| BH09  | 10/27/2014   | <1.0              | <1.0              | <1.0                   | <1.0                       | 11.73                       |
| BH09  | 1/20/2015    | <1.0              | <1.0              | <1.0                   | <1.0                       | 12.62                       |
| BH09  | 4/24/2015    | <1.0              | <1.0              | <1.0                   | <1.0                       | 12.33                       |
| BH09  | 7/31/2015    | <1.0              | <1.0              | <1.0                   | <1.0                       | 10.78                       |
| BH09  | 10/6/2015    | <1.0              | <1.0              | <1.0                   | <1.0                       | 11.85                       |

**Notes:**

1. Groundwater standards referenced from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

µg/L = Micrograms per liter

(<) = Analytical result is less than the indicated laboratory reporting limit.

DRY = Well contained insufficient volume to collect sample.

**BOLD** = Analytical result is in exceedance of COGCC groundwater standards.