



November 7, 2016

Mr. Kyle Waggoner
Whiting Oil and Gas Corporation
208 Racquette Drive
Fort Collins, Colorado 80524

**RE: Confirmation Sampling
Razor 12F Tank Battery
Weld County, Colorado
Project # 701530.064.03**

Mr. Waggoner:

On September 23, 27, & 29, 2016, and October 4, 6, 11, & 14, 2016, Talon/LPE conducted confirmation soil sampling at the Razor 12F tank battery (Site) in Weld County, Colorado. The purpose of the sampling events were to ensure that produced water had not impacted soils located under a lined tank battery and if so, that all produced water impacted soil had been removed to the extent required by the Colorado Oil and Gas Conservation Commission (COGCC). The Site is identified by the COGCC as Spill/Release Point ID 401116017.

On September 23, 2016, Talon/LPE arrived on site and visually inspected the liner of the tank battery. A total of four (4) grab samples (UL-1, UL-2, UL-3, and UL-4) were collected under the liner where areas of the liner appeared to be compromised. Additionally, three (3) grab samples (P-1, P-2, and P-3) were collected outside of the tank battery's containment where the ground surface appeared to be wet. A site map with the sample locations is presented in Figure 1.

The collected samples were analyzed for Total Petroleum Hydrocarbons (TPH) via Gasoline Range Organics (GRO) method EPA8260B and Diesel Range Organics (DRO) method 8015, for Benzene, Toluene, Ethyl-benzene, and Xylenes (BTEX) via method EPA8260B, and for inorganics (Electrical Conductivity (EC), Sodium Adsorption Ratio (SAR), and pH) via method USDA60 at Summit Scientific (Summit) in Golden, Colorado. All samples were below COGCC Table 910-1 thresholds for TPH and BTEX. Samples UL-1, UL-2, UL-4, and P-1 were below COGCC thresholds for inorganic constituents while samples UL-3, P-2, and P-3 were above COGCC Table 910-1 thresholds for at least one of the inorganic constituents. A soil concentration map is presented in Figure 2, a topographic map is presented in Figure 3, and a



breakdown of the soil analytical data is presented in Table 1.

On September 27, 2016, Talon/LPE collected three (3) grab samples (UL-3 @ 6", P-2 @ 6", and P-3 @ 12") from the previous sampling locations after minor excavating by Whiting contractors and one (1) grab sample (UL-5) from a new area where the tank battery liner appeared to be compromised. These samples were analyzed for TPH, BTEX, and inorganics at Summit. All samples were below COGCC Table 910-1 thresholds for TPH and BTEX. All samples, with the exception of P-3 @ 12", were above COGCC Table 910-1 thresholds for at least one of the inorganic constituents.

On September 29, 2016, Talon/LPE collected three (3) grab samples (UL-3 @ 12", UL-5 @ 12", and P-2 @ 12") from the previous sampling locations after minor excavating by Whiting contractors and six (6) grab samples (UL-6, UL-7, UL-8, UL-9, UL-10, and UL-11) from new areas where the tank battery liner appeared to be compromised. These samples were analyzed for TPH, BTEX, and inorganics at Summit. All samples were below COGCC Table 910-1 thresholds for TPH and BTEX. All samples, with the exception of UL-7, were above COGCC Table 910-1 thresholds for at least one of the inorganic constituents.

Based on the collected analytical data, further excavation was performed by Whiting contractors to remove additional impacted areas. On October 4, 2016, Talon/LPE conducted additional soil confirmation sampling to confirm the remaining areas of impact had been removed. A total of eight (8) grab samples (UL-3 @ 24", UL-5 @ 24", UL-6 @ 12", UL-8 @ 12", UL-9 @ 12", UL-10 @ 12", UL-11 @ 12", and P-2 @ 24") were collected from the previous sampling locations and analyzed for inorganics at Summit. All samples, with the exception of UL-10 @ 12" and UL-11 @ 12", were below COGCC Table 910-1 thresholds for inorganic constituents. Samples UL-10 @ 12" and UL-11 @ 12" both failed the COGCC threshold for pH with concentrations of 9.35 and 9.18 units, respectively.

On October 6, 2016, Talon/LPE collected two (2) grab samples (UL-10 @ 3' and UL-11 @ 3') from the previous sampling locations after further excavation by Whiting contractors. Both samples were analyzed for pH at Summit and both reported results were above the COGCC Table 910-1 threshold for pH with concentrations of 9.46 and 9.93 units.

On October 11, 2016, Talon/LPE collected two (2) grab samples (UL-10 @ 4' and UL-11 @ 4') from the previous sampling locations after further excavation by Whiting contractors. Both samples were analyzed for pH at Summit. Sample UL-10



@ 4' was reported to exhibit a pH concentration of 8.70 units which is below the COGCC Table 910-1 threshold for pH. Sample UL-11 @ 4' was reported to exhibit a pH concentration of 9.93 units which is above the COGCC Table 910-1 threshold for pH.

Based on the collected analytical data, further excavation was performed by Whiting contractors in the area of sample UL-11. On October 14, 2016, Talon/LPE collected (5) grab samples (UL-11 @ 5', SW-N @ 4', SW-E @ 4', SW-S @ 4', and SW-W @ 4') in the excavation and had them analyzed for pH at Summit. The five (5) samples were reported to exhibit pH concentrations ranging from 9.27 to 9.45 units. Additionally, Talon/LPE collected a background sample at four (4) foot below ground surface (bgs) in native soil east of the tank battery. This sample was analyzed for pH at Summit and exhibited a pH concentration of 9.06 units which is above COGCC Table 910-1 concentration levels for pH.

Following the excavations, Whiting contractors transported and disposed the excavated stockpile material at an approved landfill facility. Clean soil was then brought in to the Site to backfill the excavated areas.

Due to the pH level exceeding COGCC Table 910-1 concentrations in the background sample at 4' bgs, Talon/LPE believes the elevated pH levels at the Site are naturally occurring. Furthermore, all soils with elevated SAR and EC levels were removed and the Site is not being reclaimed at this time.

Based upon the collected analytical data and the fact the Site is not being reclaimed, Talon/LPE believes that no further corrective action is necessary and that Whiting can request conditional closure from the COGCC. If you have any questions or comments, please do not hesitate to call me at (970) 818-5330.

Respectfully Submitted,

Colby Sterling
District Manager
Talon/LPE