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Site Investigation Results
Remediation Project #7539. Location ID: 316767

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API Number: 05-107-06175
County: Routt
Facility Name: Dry Creek UT HD 31-#1A
Facility No.: 232760
Location: NENE 31, 6N 88W, 6th PM Lat: 40.43865°N Long: 107.298851°W

Site Investigation and Characterization

1.0 Introduction

A Subsurface Investigation was initiated at the referenced site on December 9 and completed on December 10, 2013. The intent of the investigation was to define the extent of contamination both horizontally and vertically at two areas of suspected contamination on the site. The two areas that were investigated were around the UT HD 31-#1 Production Well (Boring Locations P-1 to P-6 in Figure 1) and an area north of the Production Well where a temporary tank was placed (about 40 ft. northeast of the existing 400 bbl Production Tank, Boring Locations P-7 to P-14 in Figure 1). Kris Neidel from the Colorado Oil and Gas Commission was on site to observe the site operations.

A Geoprobe 7822 DT Drilling Rig was used to direct push 3 ½" diameter hollow stem sleeves at each of the locations to depths of 15 to 18 feet below ground surface. The drilling crew from Drilling Engineers, Inc. out of Fort Collins, Co was used for this procedure. The soil collected from the borings was identified, screened with a photoionization detector (PID), and samples were collected at selected intervals for laboratory analysis.

2.0 Field Procedure

Day One 12/9/2013: Mobilization to the site was initiated at 7:00 am from Fort Collins, CO under snowy and subzero conditions. The drilling crew arrived at about 12:00 noon along with Will Huskie from North Park Engineering & Consulting, Inc. to find the site under a recent 18" blanket of snow. Kris Neidel (COGCC) arrived shortly thereafter. The utility locates were performed on the previous Friday, 12/6/2013, and considerable time was spent searching for utility locate flags that were buried by the

recent snow. A gentleman from the Water Well HOA arrived at the site and was able to assist in identification of the buried 4" and 2" water lines, shown on Figure 1.

Soil borings were completed on 12/9/13 at locations P-1, P-2, and P-3 (as shown in the attached Figure 1). Boring Log information is contained in Appendix 1. Soil Samples were collected at one to three locations per boring with the results shown on Table 1. Analytical reports are provided in Appendix 2.

Problems were experienced with the PID meter due to the weather conditions and the meter quit working at about the 10 ft. depth in Boring P-1. Due to equipment malfunction, no PID readings were obtained on the remainder of P-1, P-2 and P-3.

Day Two 12/10/2013: Will Huskie (NPENG) , Drilling Engineers Crew, and Kris Neidel (COGCC) were at the site. The temperature was still subzero but the PID batteries were maintained in a warm environment and the meter remained functional throughout the day. The remainder of the borings were completed at the proposed locations on the approved plat except for P-7. Boring P-7 was too close to the existing water lines and the decision was made by Huskie and Neidel to eliminate it and move it to the location where P-8 was going to be (location of hand auger by COGCC, 40 ft. northeast of 400 bbl tank). The borings activitieswere completed on 12/10/13 and the samples were collected in general accordance with the approved plan. The samples were organized for delivery to the lab on 12/11/2013.

3.0 Geological Summary:

Soil Boring Logs are presented in Appendix 1 for the 14 Soil Borings that were extended at the two areas of contamination concern. The geology is fairly consistent with silty-clay from the surface down to about 12 – 14 ft. below the surface. A layer of poorly sorted sand and gravel was found at the 12 – 14 ft depth in most of the borings. This is valuable information to consider possible routes of any contamination transport horizontally or vertically at the site in the past or in the future. It seems unlikely that any surface spills would penetrate very far below the ground surface.

4.0 Soil Sampling and Analytical Summary:

As discussed in the approved plan, soil sample collection from the soil borings was performed at intervals where high PID readings were observed (when functional) and at the bottom of the boring. The full suite of the Table 910-1 analytes (including metals) was run on the samples collected from locations P-1, P-2, and P-7, in the range where either high PID readings were observed or potential impact was observed visually or by odor. These locations were near the source of the suspected releases and a rush was put on the laboratory analysis for these samples in guide analysis of the remaining samples collected from the three borings. A summary of the sample collection depths and analytical methods is shown on Figure 2.

Based on an absence of impact exceeding Table 910-1 concentration limits (excepting TPH and arsenic)it was determined to run only Total Petroleum Hydrocarbons (TPH) on the remainder of the samples collected during the investigation for cost effectiveness and efficiency.

Table 1 and Figure 4 present the results of organic analyses conducted during the investigation. As shown, there were no exceedances of the Table 910-1 concentration levels for any specific organic compound.

Table 1 and Figure 5 present the results of metals analyses conducted during the investigation. As shown, arsenic was present in the borings collected from P-1, P-2, and P-7 above the limits allowed in Table 910-1, however the arsenic levels are consistent with the background levels for the soil at the site. Two near surface samples were collected to assess local background conditions (BG-1 and BG-2). Results for the background samples are provided on Table 1 and Figure 5, with approximate locations shown on Figure 5.

TPH levels exceeded the 500 milligram per kilogram (mg/Kg) limits provided on Table 910-1 at various depths in soil samples collected at location P-1, P-2, and P-7, which are near the sources of the suspected releases. All other samples collected during the investigation were below the detection limits. Table 1 and Figure 3 provide a summary of TPH results for samples collected during the investigation.

Appendix 2 provides full analytical reports for the samples collected during this investigation.

Conclusions:

Based on the site investigation activities completed at that site, impact from oil production activities are limited to low-level TPH (in the diesel range) compounds. The extent of impact appears to be limited to the two areas immediately within or adjacent to the suspected releases.

Area 1 (as defined by borings P-1 through P-6) is encompasses an approximate area 10 to 20 ft. radial from the Dry Creek UT HD 31-#1A Production Well. The impact extends down to a depth of approximately 14 feet below grade.

Area 1 (as defined by borings P-6 through P-15) is at a location approximately 40 feet northeast of the 400 bbl Production Tank, near boring P-7. The extent of impact in Area 2 is likely limited to 5 ft. radial from P-7 and 2 to 3 ft. deep.

While found at levels exceeding Table 910-1 concentration limits, arsenic concentrations are consistent with background conditions and not attributed to oil production activities.