

RE: Wilson Creek NE Terrace Remediation Work Plan Addendum_____ May 20, 2016

Terraces

Location ID #443091

REM #9622

(Please refer to this remediation number in all communications related to the Terraces)

Doc #401018482 - E-Form 04 with approval

Doc #2526111 - Approved Form 27 (signed) with Work Plan and COAs

The following details are being submitted to further refine the subject work plan (Work Plan) in response to the Colorado Oil and Gas Conservation Commission (COGCC) conditions of approval (COAs) furnished on April 27, 2016. These details provide additional clarification to the pre-excavation assessment; determination of constituents of concern (COCs); remedial targets for inorganics and arsenic; and post-excavation confirmation sampling.

Initial Assessment (2016)

Purpose: To establish/confirm appropriate constituents of concern (COCs) for the Excavation Delineation Assessment.

Actions:

- Advance one boring inside each Terrace to a depth up to 10' below ground surface (bgs) with a hand auger. Each boring will be advanced in the area where the highest total petroleum hydrocarbon (TPH) results were seen during previous investigations (2007 and 2013):
 - Collect field screening samples at 1' intervals. Seal samples in clean plastic bags.
 - Boring location will be recorded with a Global Positioning System (GPS) device.
 - Soil borings will be logged.
- Use standard field screening methodologies to select two samples from each boring for analysis (a total of 14 samples shall be collected, two from each Terrace):
 - Screening methodologies may include the use of a calibrated photoionization detector (PID), other hydrocarbon screening tools, visual observation of staining, olfactory observations, or other visual observation.
 - One sample shall be collected from the interval that is suspected of being most impacted based on field screening methods. No one field method shall govern the determination; field staff shall use their best professional judgment to select the interval most likely impacted with suspected COCs.
 - One sample shall be collected from below the apparent bottom of impacts (using the field screening guidance described above). However, if the bottom of apparent impacts is not reached before a depth of 10' bgs, the second sample shall be collected from the 10' bgs interval.

- Analyze all 14 samples for **Full** Table 910 list for soil. Analytical methods shall be selected as to provide reporting limits below Table 910 Concentration Levels. **However**, data may be reported at elevated reporting limits because of laboratory operations (e.g. high target concentration or interferences). **Note:** Stantec contacted the project Laboratory and confirmed that there is no way to ensure all data comes back with a reporting limit below the Table 910 criteria. As such, the COGCC agrees to accept data reporting limits/J-flagged (estimated) data/results providing appropriate methods are selected and appropriate field sampling methods and sample preservation practices are observed. The laboratory will be consulted prior to sample collections regarding required reporting limits, and practical actions will be taken to meet reporting limits.
- Results from this assessment will be used to define the COCs applicable to the Excavation Delineation Assessment.
 - All analytes found (detected) below Table 910 criteria, in all of the 14 samples, will be excluded from the COC list for the Excavation Delineation Assessment.
 - Any analytes found (detected) above Table 910 criteria, in any of the 14 samples, will be included on the COC list for the Excavation Delineation Assessment-with the exception of arsenic. Providing that arsenic is found to be below 10 mg/kg in all 14 samples, it will not be included on the COC list for the Excavation Delineation Assessment.

Excavation Delineation Assessment (2016)

Purpose: To delineate impacts of established area COCs and to guide prescribed excavations.

Actions:

- Advance borings at each terrace location based on assessment grid guidelines per Work Plan. Boring locations will be adjusted to account for existing data points. Borings will be advanced with a hand augur to 8' bgs, then deeper via drill rig as needed to reach the non-impacted interval.
- Collect samples using field screening methods as described above; objectives being:
 - Collect one sample from the interval perceived to be most impacted;
 - Collect one sample in an attempt to document the clean bottom interval of the boring location;
 - If boring is perceived to be outside impacted area (i.e. a clean delineation sample from outside terrace footprint); only one sample is required.
- Samples will be analyzed for the COCs determined based on the findings from the Initial Assessment (2016).

Remediation/Excavation (2016 and 2017)

Purpose: To address soils found to be in excess of COGCC table 910 criteria as defined in the Work Plan and in the Initial Assessment and Excavation Delineation Assessment (described above).

Actions:

- Conduct prescribed excavations or soil treatment as described in the Work Plan—with the exception of Arsenic, Electrical Conductivity (EC), Sodium Adsorption Ratio (SAR), and pH as potential COCs.
 - Remediation does not need to be conducted for the purpose of abating EC, SAR, or pH providing these soils will be covered with at least three feet of clean soil.
 - Remediation does not need to be conducted for the purpose of abating arsenic providing soils have arsenic concentrations below 10 mg/kg.

Confirmation Sampling (2016 and 2017)

Purpose: To demonstrate established area COCs have been removed.

Actions:

- Collect three samples at each Terrace (one sidewall and two bottom) biased to areas with the greatest likelihood of impacts.
 - If TPH is the only area COC, given caveats regarding arsenic, SAR, EC, and pH, PetroFLAG Kit can be utilized.