# *MARATHON OIL COMPANY*
# *NOTICE OF COMPLETION REPORT FOR*
# *INTERIM RECLAMATION OF*
# *596-35D*

***January 20, 2012***

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## INTRODUCTION

This report covers the activities associated with the closure of the on-site reserve pit at Marathon Oil Company's 596-35D well pad. At the time of the initial site visit, the pit contained what appeared to be drill cuttings and fluid (Photo 1, Appendix A).

Marathon retained InterTech Environmental & Engineering, L.L.C. (InterTech), to manage the reclamation of this pit. Pit closure activities began on June 27, 2011, and included mixing the pit's contents with clean soil such that the resulting mixture complied with constituent concentration limits as specified in Table 910-1 of the 900-Series E&P Waste Management section of the Colorado Department of Natural Resources Oil and Gas Conservation Commission (COGCC) Rules (Table 910-1).

## 596-35D SITE ACTIVITIES

### Daily Tailgate Health & Safety Meetings

All personnel attended a daily Tailgate Health & Safety Meeting (Tailgate) and evaluated the site as an excavation utilizing Marathon's excavation safety checklist. These meetings were conducted to refresh all personnel on safety and potential environmental issues relevant to the day's activities. The excavation safety checklist was used to ensure safety and evaluate the need for safe work permits as conditions and tasks changed. A record of each document was kept and all participants were required to sign the Tailgate attendance roster.

### Background Sampling

In 2010, field-wide background sampling occurred to provide baselines for each representative gulch. The Marathon Oil Company 2011-2012 Closure Plan for Piceance Asset Pits, Garfield County, Colorado (2011 Pit Closure Plan), depicts the background grab soil sample locations. The soil samples were submitted to Accutest Laboratories under chain-of-custody protocols and were analyzed for the constituents listed in COGCC's Table 910-1. The 2011 Pit Closure Plan summarizes the analytical results for the background samples.

According to the 2011 Pit Closure Plan, Form 4 Sundry Notices will be submitted for arsenic and PAH concentrations. These concentrations are attributed to naturally-occurring background concentrations of arsenic in the region and the PAH concentrations of the Green River Formation's Mahogany Zone. Please refer to the 2011 Pit Closure Plan for additional information.

### Equipment Mobilization and Start-up

Prior to commencement of closure activities, Moody Construction arranged for the location and marking of all underground utility lines at the facility. Following utility marking, a vacuum truck was used to remove the standing fluids from the pit surface. Equipment consisting of a track hoe, a front-end loader, and a D8 bulldozer were transported to the 596-35D well pad on June 28, 2011, by Moody. A grader was also used during part of the project to assist in material management activities.

## Sectioning, Removal, and Management of the Pit Liner Material

The pit liner system was comprised of 25 mil and 30 mil synthetic (i.e., polyethylene) liners and an underlayment of felt material. The presence of the felt underlayment indicated that preventative and precautionary measures were taken during the construction of the liner system in order to aid in the preservation of the system's integrity.

The pit liner and felt materials were extracted using a track hoe after the mixing and removal of the pit's contents. Any debris or liquid remaining on the liner as it was removed was shaken-off, and the sections of liner were laid on the pad to dry (Photo 2). Once the liner material was dry, Bolton Construction, in association with Knupp Transportation, loaded and transported the liner to ECDC in East Carbon, Utah, for disposal.

## Pit Entry Management

The pit fence was maintained throughout the mixing process. Sections were taken down as needed to facilitate mixing, but were set-up again at the end of each day. This occurred until all of the pit material was mixed and bailed from the pit. After all of the pit material had been removed, a berm approximately three feet in height was maintained around the pit to prevent accidental entry by vehicles. Additionally, the entry ramp was blocked each night by a piece of heavy equipment to prevent unauthorized vehicle entry.

## Pit Contents Sampling

No pit characterization sample was collected prior to mixing the pit contents with clean soil. In order to demonstrate compliance, the mixed soil was analyzed for all of the COGCC Table 910-1 constituents.

## Mixing Calculations

Based on the closed-loop drilling system that was utilized, it was determined that mixing clean soil with the pit contents at a ratio of 1:1 should result in a soil mixture with constituent concentrations below COGCC Table 910-1 limits. Once the 1:1 ratio had been achieved, soil was collected from two distinct locations (which were documented on field forms) within the mixed materials and composited into one sample. This process was then repeated in order to obtain a total of two composite samples. The analytical results demonstrated that the 1:1 ratio mixture was within COGCC Table 910-1 limits; as such, the final mix ratio was 1:1. Table 1 summarizes the analytical results for the 596-35D 1:1 mix ratio composite samples.

## Mixing of the Cuttings with Native Soil

The mixing of pit contents with clean soil occurred inside of the pit prior to pit liner removal. Native soil was obtained from portions of the pad slated for removal during re-contouring activities necessary for interim reclamation. A bulldozer was used to push soil from the pad's northwest corner onto its interior surface where it could be used as clean material for mixing with the pit's contents (Photo 3). After a pile of clean soil had been established on the pad, the clean soil was systematically added to the cuttings inside of the pit using an excavator to turn and mix the materials (Photo 4). Mixing efforts did not affect the integrity of the pit liner.

The mixing was performed within the pit in order to dry and solidify the pit material, as well as to dilute the concentrations of its COGCC Table 910-1 constituents. The mixed material was then placed on the drilling pad where a bulldozer continued the mixing process by combining additional clean soil with the extracted material and rolling the two together to reach a dry, homogenous mixture (Photos 5 and 6). Samples of the mixed soil were collected for laboratory analysis. These samples were tested for all of the constituents listed in COGCC's Table 910-1. The final mixing ratio of clean soil to pit material was 1:1. The resulting analytical data indicated that the constituent concentrations of the mixture were below COGCC Table 910-1 limits. The results further demonstrated that constituent concentrations were below CDPHE agricultural standards.

As per the 2011 Pit Closure Plan, three feet of clean fill was not required within the pit, so topsoil was placed over the mixed material upon completion of backfilling operations.

**Sub-liner Sampling**

In order to verify the integrity of the pit liner and to ensure sub-liner contamination was prevented, a sample was collected at the lowest point of the pit. The sample was sent for laboratory analysis using chain-of-custody protocols and was analyzed for the constituents listed in COGCC's Table 910-1. Table 1 summarizes the analytical results for the 596-35D sub-liner sample.

**Backfilling of the Excavation**

Backfilling of the excavation was achieved by placing the 1:1 mixture of clean soil and cuttings back into the excavation (Photo 7). The mixed material was placed load-by-load into the excavation with each load being thoroughly compacted using the tracks of a dozer. This process continued until the excavation was completely filled.

Once the excavation had been backfilled, areas of the well pad no longer required for production were roughly graded to their original contour (Photo 8). These re-contoured areas were then top-soiled, thereby mitigating the potential effects of physical parameters on reclamation success. Backfilling and re-contouring operations concluded on July 20, 2011.

**Seeding and Stabilization**

The disturbed areas will be seeded in the spring of 2012. Western States Reclamation (WSR) has evaluated the well pad and has developed a site-specific plan for seeding. Seed, fertilizer, hydro-mulch, and additional amendments have been ordered and are being stored at Marathon's Latham Yard for use next spring. After sufficient snowmelt, all areas disturbed during interim reclamation activities will be seeded by drilling, hydro-seeding, or a combination of techniques in order to achieve slope stabilization.

***TABLE 1***

| **Table 1: Analytical Data Summary for Marathon 596-35D** | | | |
|---|---|---|---|
| Parameter Name | Final Concentrations of Remediated Material | Sub-Liner Concentrations | Units of Measure |
| **Organic Compounds** | | | |
| Acenaphthene | 0.17 | 0.013 | mg/kg |
| Anthracene | 0.17 | 0.013 | mg/kg |
| Benzene | 0.04375 | 0.059 | mg/kg |
| Benzo(A)anthracene | 0.42 | 0.033 | mg/kg |
| Benzo(A)pyrene | 0.42 | 0.033 | mg/kg |
| Benzo(B)fluoranthene | 0.42 | 0.033 | mg/kg |
| Benzo(K)fluoranthene | 0.42 | 0.033 | mg/kg |
| Chrysene | 0.42 | 0.033 | mg/kg |
| Dibenzo(A,H)anthracene | 0.42 | 0.033 | mg/kg |
| Ethylbenzene | 0.12 | 0.12 | mg/kg |
| Fluoranthene | 0.17 | 0.013 | mg/kg |
| Fluorene | 0.17 | 0.013 | mg/kg |
| Indeno(1,2,3-CD)pyrene | 0.5 | 0.04 | mg/kg |
| Naphthalene | 0.17 | 0.013 | mg/kg |
| Pyrene | 0.17 | 0.013 | mg/kg |
| Toluene | 0.0762 | 0.12 | mg/kg |
| TPH | 169.405 | 12.5 | mg/kg |
| Xylenes | 0.162 | 0.23 | mg/kg |
| **Metals** | | | |
| Arsenic | 5.25 | 5 | mg/kg |
| Barium | 431 | 253 | mg/kg |
| Boron | 4.8 | 4.9 | mg/kg |
| Cadmium | 0.96 | 0.97 | mg/kg |
| Calcium | 36.35 | 25.3 | mg/l |
| Chromium, Total | 25 | 25 | mg/kg |
| Chromium, Hexavalent | 0.535 | 0.61 | mg/kg |
| Chromium, Trivalent | 24.5 | 24.4 | mg/kg |
| Copper | 11.35 | 13.2 | mg/kg |
| Lead | 11.1 | 12.9 | mg/kg |
| Magnesium | 7.07 | 5.2 | mg/l |
| Mercury | 0.091 | 0.093 | mg/kg |
| Nickel | 15.6 | 17.6 | mg/kg |
| Selenium | 4.8 | 4.9 | mg/kg |
| Silver | 2.85 | 2.9 | mg/kg |
| Sodium | 67.05 | 11.8 | mg/l |
| Zinc | 33.7 | 44.4 | mg/kg |
| **Liquid Hydrocarbons** | | | |
| Diesel Range Organics (DRO) | 160 | 13 | mg/kg |
| Gasoline Range Organics (GRO) | 9.405 | 12 | mg/kg |
| **General Chemistry** | | | |
| Electrical Conductivity (EC) | 454 | 196 | umhos/cm |
| pH | 9 | 9 | su |
| Sodium Adsorption Ratio (SAR) | 2.695 | 0.558 | ratio |

# *APPENDIX A - Photographs*


Photo 1 – 596-35D reserve pit containing drill cuttings with some fluids.

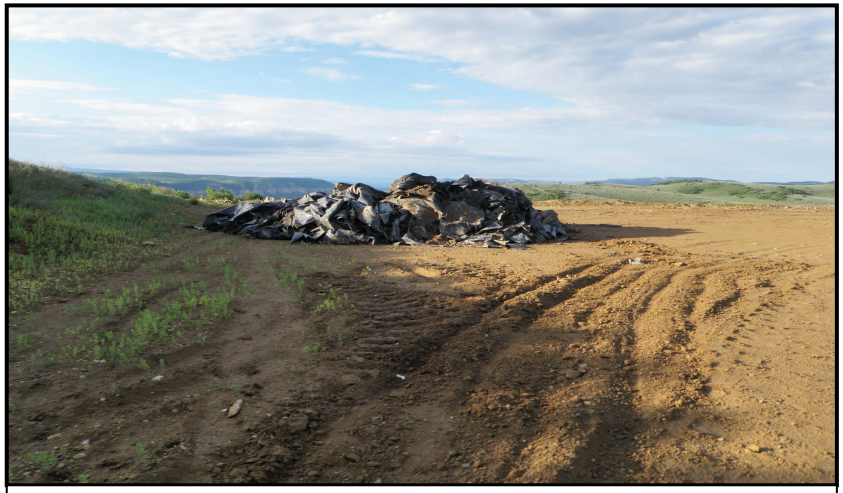


Photo 2 – Sections of liner and felt underlayment drying on pad.


Photo 3 – D8 providing clean fill material from NW corner to track hoe for mixing.


Photo 4 – Track hoe mixing pit contents with clean material within pit liner.

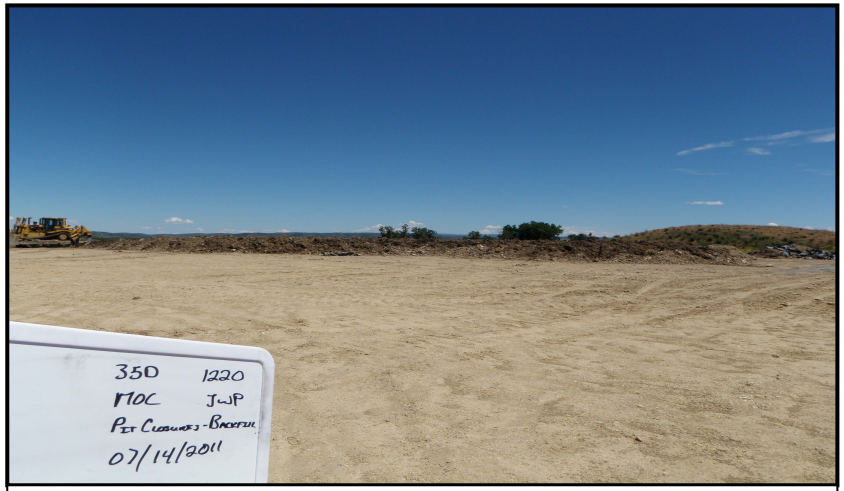



Photo 5 – D8 rolling material to achieve homogenous mixture.


Photo 6 – D8 rolling material to achieve homogenous mixture.


Photo 7 – D8 and track hoe backfilling pit and beginning to contour slopes.

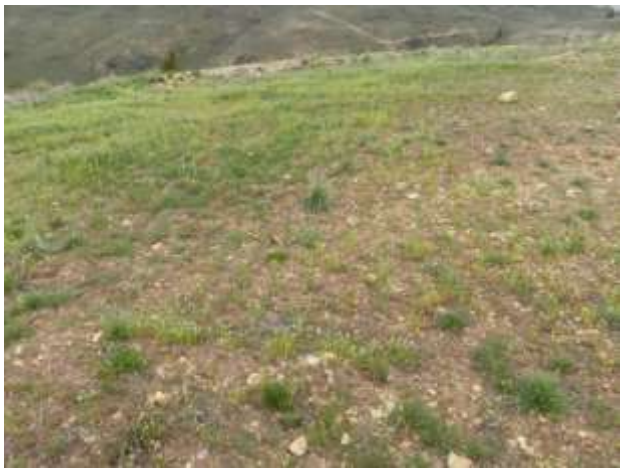

Photo 8 – Well pad after pit closure and reclamation.

**596-35D pad location**
**Interim Reclamation - Revegetation**

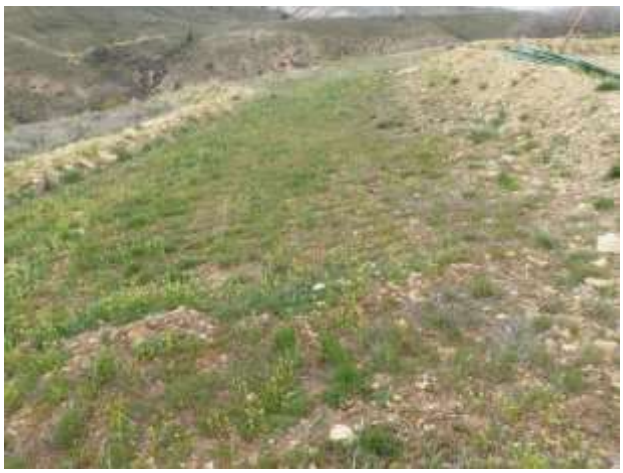


5/18/2012 grading and seeding complete
Photos were taken 5/21/2014

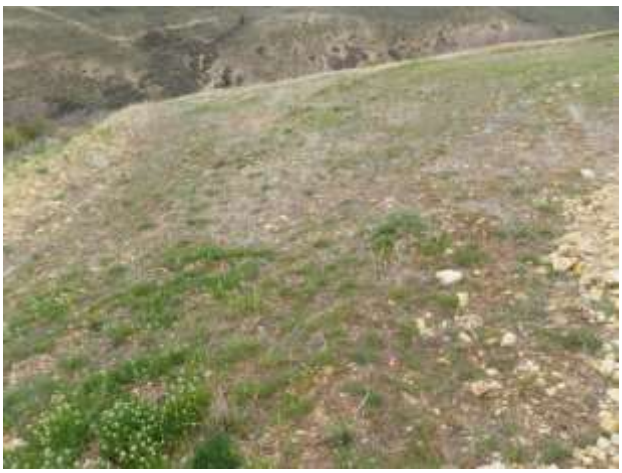
Western end of pad just north of pad entrance



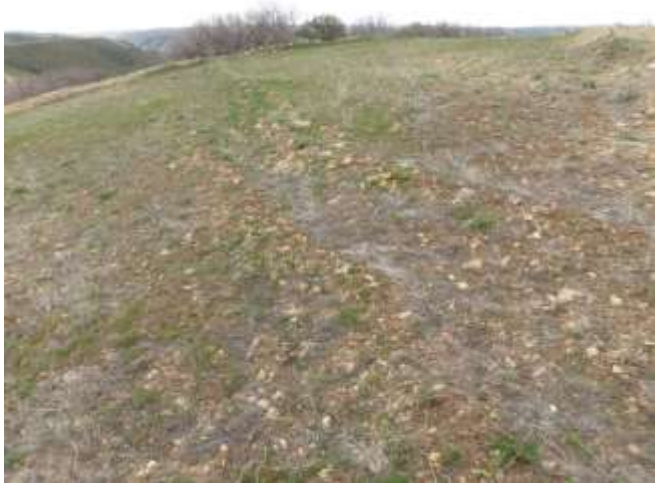
Reclaimed area west of pad



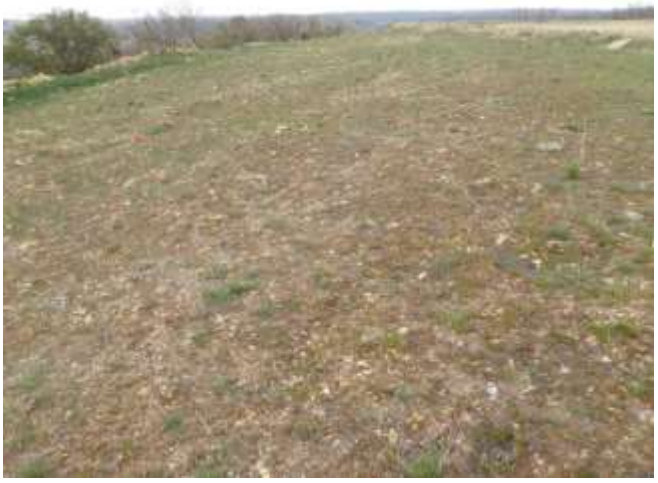
Reclaimed area west of pad



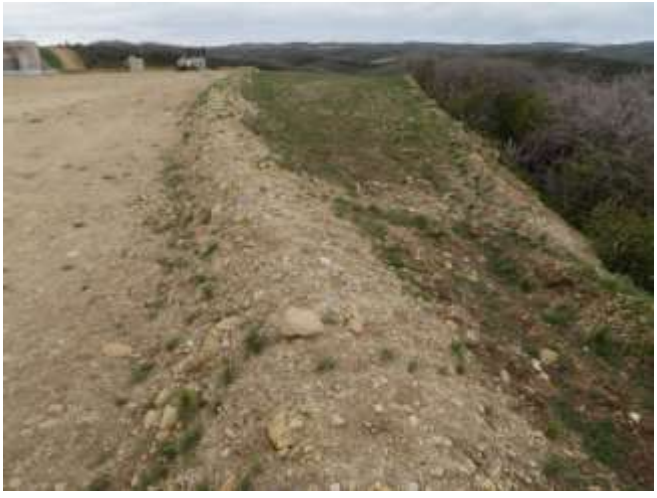
Reclaimed area northwest of pad



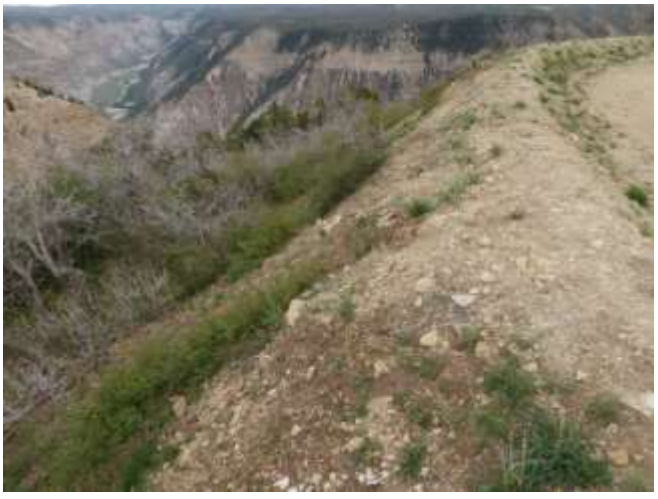
Reclaimed area north of pad



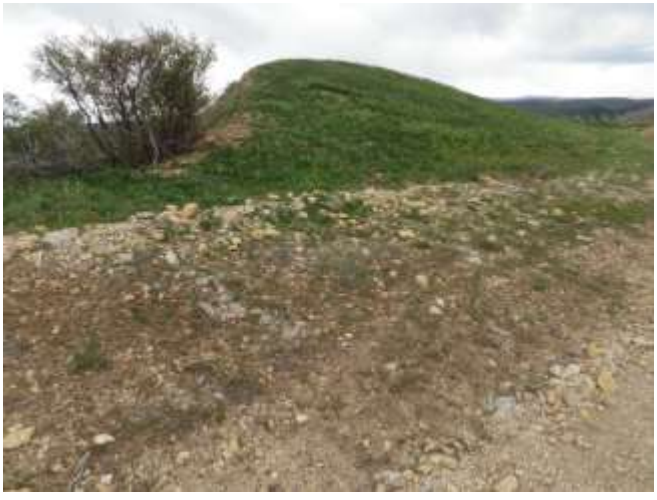
Reclaimed area north of pad



Northern edge of pad

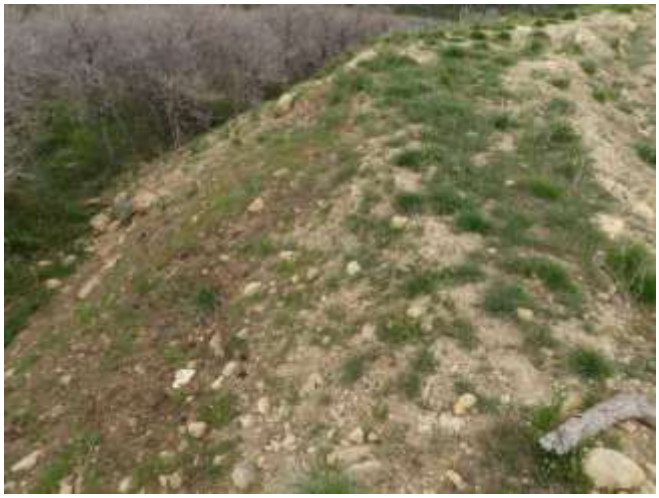


Northeast corner of pad

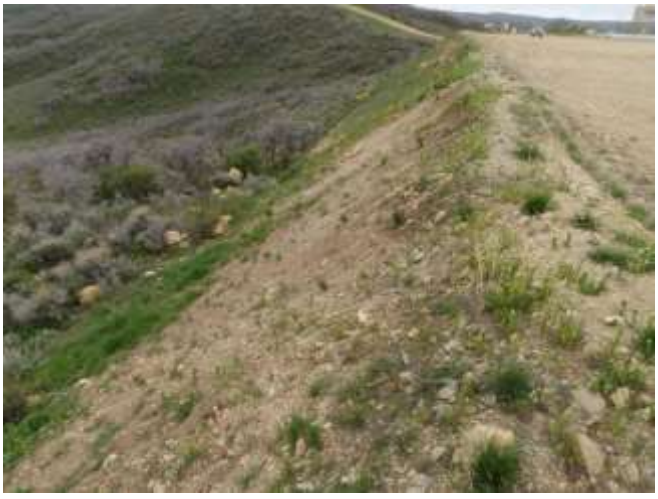


Top soil pile

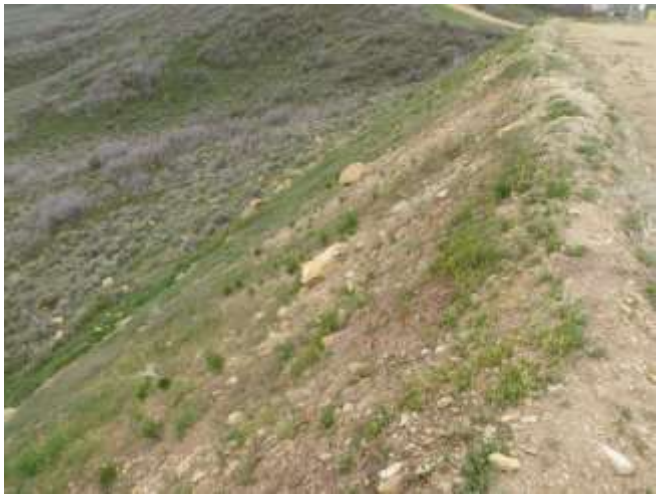
Top soil pile



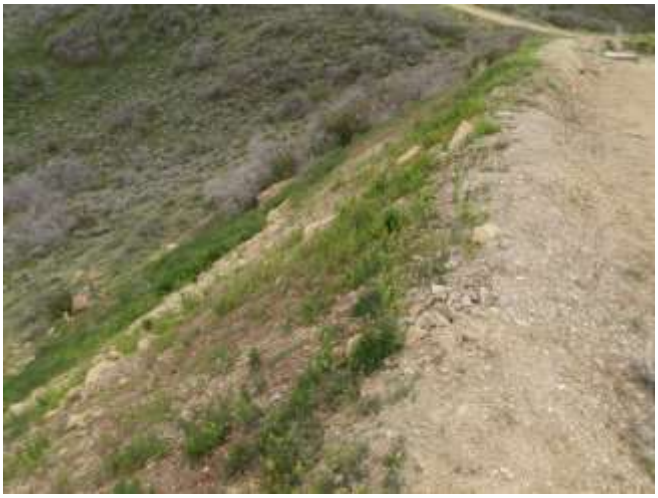
Southeast corner of pad



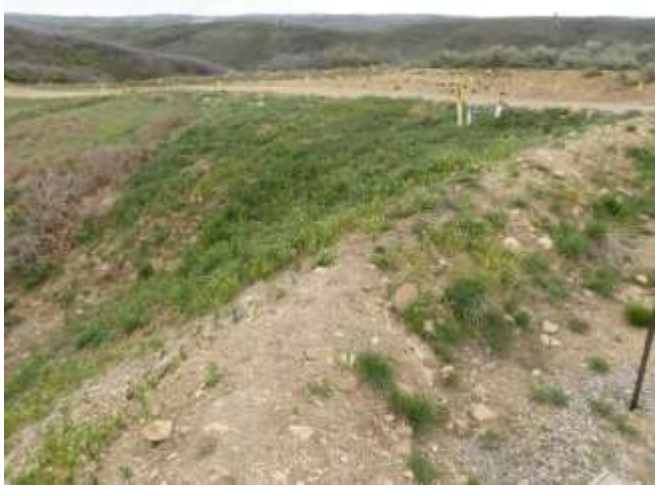
Southern fill slope



Southern fill slope



Southern fill slope



Southwest corner of pad

Looking north across pad