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Standard Remediation Plan – Marker Oil Loco Hills Area Leases

Environmental Setting

Figure 1 is a groundwater elevation map of the NSLU area and surrounding environs where Marker Oil has active wells. This map shows the highest groundwater elevation in the area is 3500 feet above sea level near the NSLU #3 location. Because NSLU 3 lies at an elevation of about 4020, the depth to groundwater is $(4020-3500=)$ 520 feet. The lowest water elevation in the area is 3350 feet. If groundwater were present near the Loco Hills A-6 location, depth to groundwater would be $(3682-3375=)$ 307 feet. However, data show that groundwater is present around Loco Hills.

Figure 1 also shows the locations of all known wells in the area of Marker Oil leases. There are no drilled water wells (wells with reported depths to water by drillers) within the area shown in Figure 1. We examined the 7.5 minute and 30 minute topographic maps and found no mapped water wells. We also examined the area using Google Earth and found no evidence of wells – other than those located on Figure 1.

Figure 2 is a map of mapped surface water and mapped wetlands for the same area as shown in Figure 1. Surface water features are rare in the area of Marker Oil leases. Unmapped watercourses are present and a ground survey is an important step in evaluating areas of potential erosion near release sites.

We examined other environmental databases and found the area is mapped as low karst potential by the BLM and subsurface mines are not present in the area of Figure 1.

Releases from Marker Oil facilities in the area shown in Figure 1 cannot, with reasonable probability, impact groundwater in the reasonably foreseeable future. The 300+ foot depth to the groundwater surface, where groundwater is present, is only one reason. The geology of the area is the second and more important reason.

We logged a boring due east of Loco Hills that we believe is representative of the general area. The boring log is attached to this plan and shows “rounded frosted quartz grains from 22' - 28'” and the description of the 35-50 foot interval is typical Dockum Group mudstone. This mudstone creates a barrier to the downward migration of any contaminants released at or near the ground surface.

Finally, while not part of the natural environmental conditions, the Marker Oil leases are comprised of small-producing wells that can use infrastructure (e.g. produced water pipelines) that were installed many decades previous. This condition as well as the fact that releases cannot with reasonable probability impact groundwater results in the primary goal of all proposed remedies:

Elimination of the root cause of the release (e.g. replacing old pipe with higher quality pipe to minimize future releases in the same area)

Sampling and Evaluation

Upon discovery of a release of more than 5 barrels, Marker Oil field staff will

- A. Use pin flags to outline the release edges
- B. Take photographs of the release (and pin flags) with latitude/longitude georeferenced on each image:
 - a. From the point of origin looking down hill
 - b. From the end point of release looking up hill
 - c. Of the area of maximum pooling of liquid
 - d. Several additional views as necessary to help define the geometry of the release
 - e. From the highest nearby point looking over the release site
- C. Submit a C-141 Form to OCD and the surface owner if required

Within 30 days of the initial C-141 submission, Marker Oil will submit the following information to support implementing a Corrective Action described later in this plan

1. A map the release outline on Google Earth showing dimensions and an estimate of the surface area of the release
2. Photo-documentation of an inspection around the release (about 200 feet in every direction) for evidence of drainages, playa lakes or wetland vegetation
3. Field chloride titration results of samples from
 - a. Three-five borings
 - i. At the area of maximum pooling of liquids
 - ii. Within 5 feet of the release origin
 - iii. At 1-3 location representative of the remainder of the release
 - b. The root zone at depths of
 - i. 0-18 inches
 - ii. 18-36 inches
 - iii. 36-38 inches
4. A description of a examination of the samples for hydrocarbon staining, odor or hydrocarbon masses
5. A diagnosis of the root cause of the release with a proposed repair or improvement of the infrastructure to minimize the potential of future releases on this same footprint

Criteria for Closure of the Regulatory File

Because the potential that a release will cause groundwater impairment is so small as to be nil, the Remediation Plan objectives are

- A. elimination of the root cause of the release (e.g. using higher quality pipe in areas where multiple releases have occurred in the past)
- B. restoration of the soil root zone to allow for reestablishment of vegetation within the spill footprint
- C. elimination of crude or sodic clay “hard pan” that prevents moisture infiltration and impairs revegetation and
- D. establishing a surface contour and vegetation cover to minimize the potential of erosion and soil loss

Given the environmental setting of the area shown in Figure 1 and the remedial action objectives outlined above, the closure criteria for regulatory files associated with Marker Oil releases within the area of interest are:

1. a uniform vegetative cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds and
2. documentation that infrastructure that should be improved to prevent future releases has been installed

Corrective Action #1 - Natural Restoration

This Corrective Action Plan will be employed where the sampling described above shows

- The soil horizon is nearly 90-100% sand
- The average chloride concentration from the 0-36 inch sampling program is less than 3000 mg/kg
- Hydrocarbon hardpan is not present above the 36-38 inch sample and, after mixing recently-released surface hydrocarbons with underlying sand, such hardpan will not form
- Implementing a mechanical remedy can create more environmental damage that allowing natural processes to restore vegetation because
 - the small size of the release footprint
 - 1-3 large precipitation events will cause restoration or
 - moving machinery to the site will damage vegetation and/or create potential erosion pathways.

The remedy under these conditions is

1. Identify the root cause of the release
2. Repair or replace the infrastructure or operational practice that caused the release
3. Seed the footprint with BLM #2 when volunteer vegetation is observed
4. Provide photo documentation and a final C-141 when a uniform vegetative cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds is observed within the spill footprint

Corrective Action #2 – Tilling and Drainage/Erosion Control

This Corrective Action Plan will be employed where the sampling described above shows

- The soil horizon is dominantly sand but clay is present in the samples
- The average chloride concentration from the 0-36 inch sampling program is greater than 3000 mg/kg or hydrocarbon hardpan is present or could form above the 36-38 inch sample
- Implementing a mechanical remedy will not create more environmental damage that allowing natural processes to restore vegetation

The remedy under these conditions is

1. Identify the root cause of the release
2. Repair or replace the infrastructure or operational practice that caused the release
3. Place one-call for utility location.

4. Till, loosen and disaggregate the top 18-inches of soil within the release footprint.
5. Build 4-8 inch berms in and around the release footprint in a manner that
 - a. Will capture precipitation and create ponding within the footprint
 - b. Will prevent overland transport of any salt or hydrocarbons from the spill footprint.
6. Take photographs of the site every 30-60 days and check on erosion, volunteer vegetation, overall condition of the berms and remedy
7. Seed the footprint with BLM #2 when volunteer vegetation is observed
Provide photo documentation and a final C-141 when a uniform vegetative cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds is observed within the spill footprint

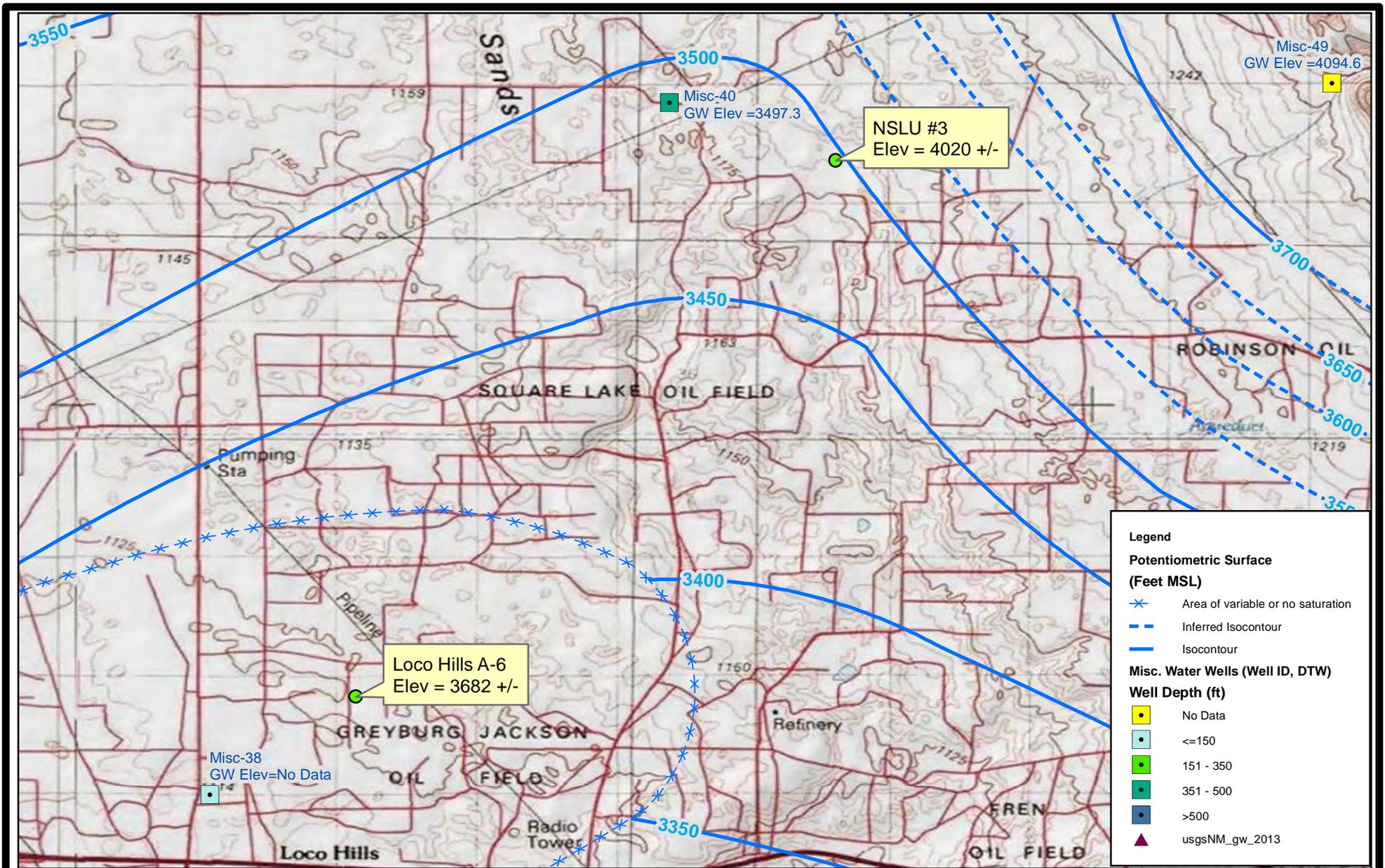
Corrective Action #3 – Repair or Replace Infrastructure

This Corrective Action Plan will be employed where the sampling described above shows

- The spill footprint lies within a operational tank battery and is confined by the firewalls
- Implementing a mechanical remedy is logistically difficult or provides no environmental value
- Restoration of vegetation during the operational lifetime of the tank battery is not allowed due to the fire hazard

The remedy under these conditions is

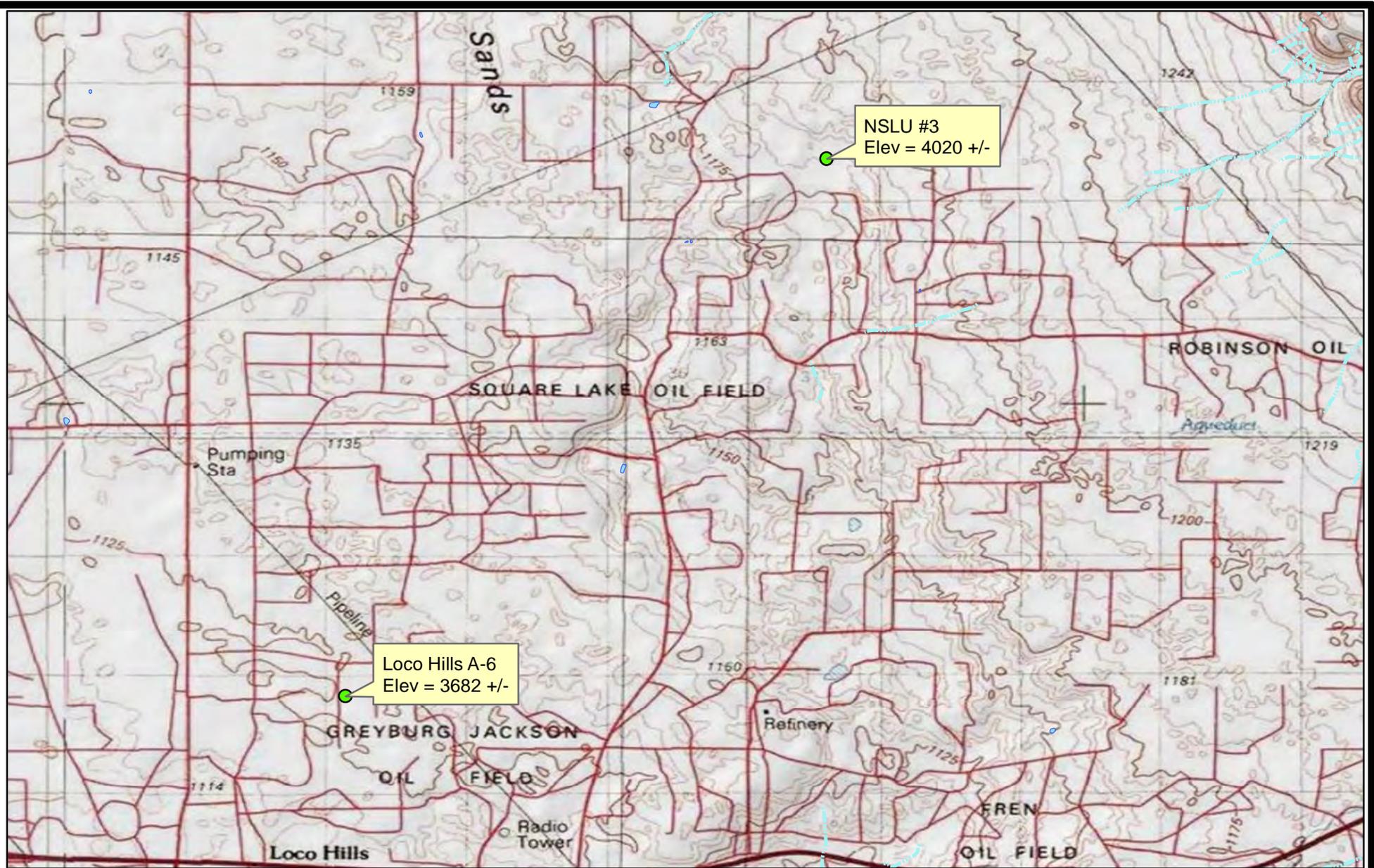
1. Identify the root cause of the release
2. Repair or replace the infrastructure or operational practice that caused the release
3. Submit documentation that infrastructure has been corrected to minimize the potential of similar releases in the future
4. Provide photo-documentation and a description of an annual inspection of the release site with an affirmation that the operator understands that the regulatory file relating to the release remains open and must be addressed in the future.
5. During closure or replacement/relocation of the tank battery, submit a closure plan to OCD and the surface owner that proposes to
 - a. Collect representative samples within the release footprint as described in Corrective Action Plan #1 plus an additional sample at a depth of 5 feet
 - b. Remove the upper 4-feet of hydrocarbon hardpan and stained soils to a phyto-remediation cell – which may be created within the footprint of the tank battery
 - c. Remove the upper 4-feet of salt-impacted soil to a soil flushing cell that will flush salt below a 3-foot root zone
 - d. Reclaim and seed the phyto-remediation cell and soil flushing cell to blend into the surrounding countryside.



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Groundwater Elevation
 Marker Oil Loco Hills Leases

Figure 1
 April 2016



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Surface Water and Mapped Wetlands
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Figure 2
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