



August 18, 2011

Attention: Steve Hunter, Lime Rock
From: Rob Johnston, R&A Technology
832-244-3811
Regarding: Site Remediation Work Proposal

Remediation Proposal for:
Lime Rock Resources - Marathon Transfer Line Release

Site Analysis

The Marathon Water Transfer Line Release is located approximately fifteen (15) miles east of Artesia, New Mexico. The legal location for the site is Section 26, Township 17S and Range 28E in Eddy County. The New Mexico State Engineer web site indicates the nearest groundwater data to be in S34-T17S-R28E. Drainage courses in the area are normally dry. The ground water in section 34 is reported to be at an average depth of 53' below ground surface (bgs). Section 34 is approximately 2 miles South West from the release location.

Incident Description

On May 24, 2011, produced water was released from a below grade 2-inch diameter steel water transfer line. Approximately 190 barrels of produced water were released. Areas of contamination include an area North of Highway 82 that measures approximately 10-feet by 30- feet. The contaminated soils are also located along the north side of Highway 82 running east from the initial release site and measure approximately 8-feet by 240-feet. The produced water also traveled underneath the highway leaving an area of contamination approximately 80-feet wide and narrowing down to 4-feet for about 550-feet. The entire area of contaminated soils is approximately 0.54 acres.

Field Analysis

Initial Field Analysis and delineation was completed by Talon/LPE (Talon). (See Talon's Report for Chlorides and TPH analysis)

Additional sampling will be completed by R&A Technology to determine the CEC, SAR and ESP. This sample analysis will be utilized to determine the amount of sodic contamination and the amount of De-Salt need to remediate the area and return vegetative growth.

Accepted for record
NMOCD

Summary and Conclusions

- Ground water in the area is more than 2 miles distant and greater than 50-feet below land surface.
- Chloride remediation standard is considered to be 1000 mg/kg. Chloride remediation will not enable vegetation growth. Sodic Soil remediation is required to ensure re-growth of vegetation in the area. There are no NM State recommendations for sodic soil remediation. The industry standard is to reduce ESP below 10%.
- Visual inspection indicated hydrocarbon contamination at the release site and the conduit opening on the south side of the highway.
- Background chloride samples taken by Talon revealed high chlorides on the south side of Highway 82. There are multiple flow lines and historical drilling pits belonging to other companies in the immediate area.
- A hard rock barrier was found at 2- feet during the initial sampling.

Proposed Remediation

1. **Initial Release area:**

Treat the oil-impacted area with biodegradable surfactants, mixing the area with a back-hoe.

2. **North Side of Highway 82:**

Disk the area with a small tractor and treat with the required amount of desalt to a depth of 2-feet. Water the area with a water truck after treatment is complete.

3. **Conduit Exit Point South Side:**

Treat the oil-impacted area with biodegradable surfactants, mixing the area with a back-hoe.

4. **South Side Flow Path:**

Turn the area with a track-hoe to a depth of about 18"-24".

Mix hay in the turned area

Treat with the required amount of desalt to a depth of 2-feet. Water the area with a water truck after treatment is complete.

5. **De-Salt Requirements**

The estimated amount of De-Salt, prior to lab Analysis, of 4000 gallons for the entire area.

Thanks,

Rob Johnston

Remediation and Applied Technology, LLP

Accepted for record
NMOCD