RELEASE SITE CHARACTERIZATION AND REMEDIATION CLOSURE REPORT JUNIPER 8" LINE RELEASE SECTION 3, TOWNSHIP 24S, RANGE 29E

Lucid Energy Delaware

Prepared by:

Michael Gant, Environmental Coordinator

Lucid Energy Group

December 2019
Artesia, NM

LUCID
energy group

Summary of Release

Site Name	Juniper 8”		
Location	Lat.	Long.	Unit Letter, Section, Township, Range
	32.248098°	-103.972614°	Unit Letter F, Section 03, Township 24S, Range 29E
District RP	2RP-5637		
Estimated Date of Release	9/5/2019		
Date Reported	9/5/2019		
Reported By	Michael Gant – Lucid Energy Group		
Reported To	NMOCD and BLM		
Surface Owner	Federal		
Cause of Release	Rupture at a weld along the poly line		
Released Material/Volume(s)	Gas 750 MCF		
Depth to Groundwater/Nearest Surface Water	~80ft bgs/Pecos River 2.1 miles SW		
Site Characterization	Two areas of investigation complete.		
Remediation Area(s)	Main = 390 sq ft; Overspray Area = 10000 sq ft		
Confirmatory Sampling	One excavated area analyzed; 5 soil composite samples collected and submitted to an accredited laboratory		
Recommendations	Request file to be closed		

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

Lucid Energy Delaware LLC (Lucid) conducted a site assessment and characterization program at the Juniper Pipeline release site located within Section 3, Township 24 South, Range 29 East (Figure 1). The release was discovered on September 5, 2019 and notification was sent to New Mexico Oil Conservation Division (NMOCD; see Appendix A–C141).

The Lucid Juniper 8" gas line ruptured along a pipeline weld (32°14´53.2" N, 103°58´21.4" W) which resulted in a release of natural gas. The natural gas sprayed over an area that was recently backfilled following remediation of another release in July. The leading edge of the overspray area was mapped to a vegetative patch approximately 80 ft northwest of the release point (Figure 1). The purpose of this site assessment and characterization program was to determine the extent of the soil impacts, mitigate any potential environmental adverse effect, and develop an effective remediation program protective of identified receptors.

2.0 AREA DESCRIPTION

2.1 Regional Physiography

The Juniper pipeline is within Eddy County located in the southeastern part of New Mexico approximately 20 miles southeast of Carlsbad and 7.5 miles from Loving, NM (Figure 1). The area is within the Chihuahuan Desert ecoregion, specifically the Chihuahuan Basins and Playas. The playas and basin floors have saline or alkaline soils and areas of salt flats, dunes, and windblown sands.

The area generally showcases flat to rolling plains that gently slope towards the Pecos River. The predominant land use is grazing, irrigation agriculture, potash mining, and oil & gas development. Locally, the surrounding area consists of limited cattle grazing, a couple large potash mines, and oil & gas operations as part of the Permian Basin.

The lower elevations (i.e. <4,500 ft) of this area result in a hot and arid climate. The vegetation is typical of desert shrubs and grasses, dominated by creosote bush, tarbush, fourwing saltbush, gyp grama, and similar species that can withstand large diurnal temperature ranges, low moisture, and a high evapotranspiration rate. An area topographical map is provided on (Figure 2).

2.2 Regional Geology

The site location is in the northwestern part of the Delaware Basin, at the southern boundaries of Nash Draw, a partially closed depression. The Delaware Basin has been described as a deep, oval, sedimentary basin 75 miles wide and 135 miles long. The basin lithology is made up of

crystalline sedimentary rocks overlain by evaporites deposited in the late Permian Period. As seawater evaporated, the deep marine environment of limestone and dolomite transitioned to a shallower marine and eventually dry environment of gypsum, halite, anhydrite, and potassium salts. Early assessment conducted by USGS, as part of the Project Gnome site, noted several thousand feet of accumulated salt deposits on the basin floor.

The composition of the highly soluble rock within the subsurface has the potential for karst formations or features to be present in the vicinity of the area of investigation. Figure 4 presents the mapped karst areas of southeastern New Mexico in relation to the area of investigation.

2.3 Regional Hydrogeology

The Pecos River Basin alluvial aquifer consists of generally unconsolidated, poorly to moderately sorted deposits of gravel, sand, silt, and clay; as well as small amounts of gypsum and caliche formed by chemical processes. Groundwater in the Cenozoic alluvium is an important resource as the surrounding area receives an average annual rainfall of less than 12 inches (USGS Groundwater Atlas). Natural concentrations of total dissolved solids (TDS) in water in the alluvial aquifer typically exceeds 1,000 mg/L. Freshwater is defined as having a TDS concentration of <1,000 mg/L. Groundwater for the alluvial aquifer is mainly used for irrigation. Water well sustainability is variable based on the proximity to the Pecos River.

A review of the NM Office of the State Engineer (OSE) water well database presented 9 water wells within a 3-mile radius and only 5 of these wells measured water levels. Most of these wells were near the Pecos River or Salt Lake to the north. The United States Geological Survey (USGS) National Water Information System depicted water wells greater than 3 miles from location, within a 5-mile radius the water level ranged depending on the proximity to the Pecos River. Figure 3 shows the radius of water wells from the site of investigation. The corresponding water levels are in Table 1.

The closest significant watercourse, as defined in Subsection P of 19.15.17.7 NMAC, is the Pecos River. The Malaga Bend of the river is the closest bank to the site of investigation at a distance of 2.15 miles (Figure 3).

2.4 Local Setting

The Juniper pipeline release point is located in Section 3, Township 24S, Range 29E at an elevation of approximately 3,070 feet above sea level (Figure 1). The right of way is shared by an EOG saltwater line. In the vicinity of the area under investigation, the native soil and subsurface material was locally shown to be highly disturbed due to the number of buried pipelines.

According to the National Resources Conservation Services Web-based Soil Survey, the soil composition is mainly of the Pajarito unit and the typical profile is loamy fine sand to 13 inches, with fine sandy loam upwards of 60 inches in areas. The parent material of this unit is mixed

alluvium and/or eolian sands. The area is susceptible to severe wind erosion, drifting sand, and is well drained, with very low runoff. The area slopes are found to be less than 3%.

The northern portion of subject location also borders Upton gravelly loam unit that is a result of weathered limestone. Upton soils are typically shallow (<13 inches) over indurated caliche. The natural drainage is considered to be well drained, with runoff classified as high. The area slopes are 0 to 9 percent.

The nearest waterbody is Pecos River located 2.1 miles southwest of the site investigation and Salt Lake is 2.8 miles north. There are no identified springs or wetlands in the area.

The ChevronTexaco depth to groundwater map was reviewed and the groundwater depth beneath the site location is estimated at 80 feet below ground surface (bgs). The contour lines shown on Figure 6 are 25 ft intervals and the release point as shown on the Figure is close to the 75 ft contour.

The local area is mainly populated with oil and gas operations, with a number of right-of-way's and access roads/trails.

3.0 SCOPE OF WORK

The objective of this site investigation was to map the extent of any chemicals of concern (COC) from the reported fire incident and to determine if there may be a potential for an adverse effect to surrounding receptors. In order to meet these objectives, the following tasks were conducted:

- Review public databases for subsurface conditions and soil lithology.
- Review the New Mexico OSE water column reports and the USGS National Water Information System database, as well as any maps to determine depth to groundwater and distance to any significant watercourses.
- Review requirements for an archaeological survey outside the existing right of way.
- Initiate a NM One-call and notify all pipeline owners in the vicinity.
- Collect initial soil samples based on visual release footprint and submit select soil samples to the laboratory to characterize potential chemicals of concerns.
- Field screen soil samples using HACH Chloride QuanTab Test Strips to determine chloride concentrations and a MiniRAE 3000 to analyze VOCs.
- Horizontally and vertically delineate the COC and submit select soil samples to Hall Environmental Analysis Laboratory.

- Excavate impacted subsurface material and dispose of at R360 waste management facility.
- Obtain confirmatory soil samples to meet Table I - *Closure Criteria for Soils Impacted by a Release* (19.15.29 NMAC).
- Reclaim excavated areas with clean caliche, and in vegetated areas add at least 12 inches of topsoil and seed with BLM approved seed mix.

4.0 SITE CHARACTERIZATION

4.1 Field Program

Field events took place between September 6, 2019 to December 4, 2019. During this time several composite soil samples were collected from the release area and in the northwest direction following the path of the plume. For ease of description, the area of investigation was broken up into 2 zones – 1) Main Excavation; 2) Overspray Area & BLM off right of way (ROW). The field screening results can be found in Table 2a. Appendix B contains area photographs that illustrates the described site conditions.

1. Main Excavation

    - September 6: Soil samples were collected from around the riser, and the base and walls of the pipeline repair excavation, to better understand the chemicals of concern and to investigate any residual impacts. Hydrocarbon and chloride concentrations were field screened in 13 soil samples. Natural Gas hydrocarbons released from the Juniper 8” line release was determined to be the chemical of concern and the parameter that would be investigated to influence remediation.

    - September 11: Field screen for hydrocarbons and chlorides along the extent of the entire excavation. The excavation area was broken up into north and south (width of excavation), and east, central, west (length of excavation). Composite samples were collected from base and walls to further aid in the excavation.

2. Overspray Area & BLM Off ROW

    - September 6: Field screen hydrocarbons and chlorides in the vicinity of each of these pipelines to vertically assess potential chloride impacts. This area was lightly covered in overspray and was scraped down approximately 6-12” bgs during the repair activities after hydrocarbons were identified in field screening.

    - September 11: Map out the area to delineate overspray area. Surface samples were collected at approximately 0.5 inches bgs.

4.2 Soil Sampling – Confirmatory

On September 30, a confirmatory sampling program was initiated at the main excavation. The results are presented in Table 2b. Results were compared to Table A – Closure Criteria (below).

- Main Excavation (Figure 7a): Five composite samples submitted to Hall Environmental Analysis Laboratory for BTEX and TPH concentrations. The base sample was a 5-point composite grab sample between 5ft and 6ft bgs, and the wall samples were 5-point composite samples collected at less than 4ft. The material was very heterogenous likely due to the number of pipelines right of ways in the area vicinity.

- All soil samples submitted met the closure criteria of 50 mg/kg for BTEX, and 2,500 mg/kg for TPH concentrations, as well as the reclamation requirement of minimum 4 ft depth. Area of excavation = 390 sq ft

Table A: Closure Criteria for Soils Impacted by a Release (19.15.29 NMAC)

Closure Criteria		
Depth to Ground Water	**Constituent**	**Limit**
51-100 feet	Chloride	10,000 mg/kg
	TPH (GRO+DRO+MRO)	2,500 mg/kg
	GRO+DRO	1,000 mg/kg
	BTEX	50 mg/kg
	Benzene	10 mg/kg

5.0 CONCLUSION

5.1 Summary

The initial C141 report for this release was provided to NM OCD on September 5, 2019 (Appendix A). The Bureau of Land Management (BLM) was also informed of the release as being the landowners of the property. Initial conversations between Michael Gant (Lucid) and Jim Amos (BLM) discussed the Off-RoW release portion and the possibility of a resource specialist to conduct an archeological survey. A follow up conversation with Mr. Amos resulted in dismissing the archeological requirement.

The two areas of investigation showed a heterogeneous subsurface component. The depth to caliche varied as did the thickness of the fine sandy loam. The variation in the subsurface composition correlated with pipeline installations and associated disturbance.

The depth of groundwater beneath the site of investigation was determined to be approximately 80ft bgs (Figure 6), thus the 50 mg/kg for BTEX, and 2,500 mg/kg for TPH concentrations were

met in all confirmatory samples analyzed. Table 2 shows that the BTEX and TPH concentrations were remediated, and the laboratory analytical reports are in Appendix C.

Table 2 verifies the rooting zone meets 600 mg/kg chloride. One composite sample exceeded 600 mg/kg but this location was at a depth greater than 4 feet (3,600 mg/kg @ 5ft).

5.2 Closure Request

The initial site assessment conducted by HRL followed New Mexico remediation requirements and pertinent regulations. The site investigation and subsequent remediation was completed by the Lucid Energy environmental field technicians utilizing appropriate soil sampling protocol, decontamination procedures, and best management practices (NRCS Field Guide). As described in Section 5.1 above, the footprint of the release has been remediated such that delivers human health and ecological protection. Based on the site investigation and analytical results, it is recommended that the Lucid Juniper pipeline release site located at 32.248098, -103.972614 be consider closed.

Please see the photographs in Appendix B that depicts the site investigation and area surroundings.