CONCHO

March 18, 2016

Summary of Sampling at the Crossman 25-1 Well Location

At the request of the NMOCD, on Tuesday, March 8, 2008, a temporary well (TW-1) was installed at the Crossman 25-1 well location. The well was completed to a total depth of approximately 21' below ground surface (bgs). The well was developed by installing a submersible pump into the well and purging approximately 40 gallons of water from the well. The purge water was stored onsite in a 55 gallon drum. After development, the well was allowed to stabilize for approximately 48 hours.

On March 10, 2016, Concho Personnel met onsite with NMSLO representatives. The temporary well was purged three (3) casing volumes of water with a clean disposable bailer. The well was allowed to recover while a surface water sample was collected from pooled water in the draw upgradient of the Crossman well pad. Once this sampling was completed, a new disposable bailer was lowered into TW-1 and a sample collected. Both sets of samples were placed into laboratory supplied sample containers and placed on ice for transport to the laboratory for analysis of chlorides by EPA method 300.0.

Results of the sample analyses showed the water upgradient in the pooled surface water to contain 1,150 mg/L of chlorides. The sample from TW-1 exhibited a chloride concentration of 2,160 mg/L. Both numbers show elevated chloride concentrations consistent with previously sampled background surface water samples collected upstream of the Crossman well pad by GL Environmental in 2015 of 1,800 mg/L and 3,200 mg/L.

Excerpts of the GL Environmental Report are attached to this summary. As discussed in their report, the seeps and low velocity flows in Red Bluff Draw reflect a natural background salinity, possibly related to near surface presence of the Salado Formation.

The slightly lower chloride concentration exhibited in the current upstream surface water sample in relation to the previous background sampling could be due to not being the exact sampling location, lower evaporation rates during time of collection (winter vs summer) or from recent localized heavy snows and precipitation causing higher than normal run-off and dilution of surface water.

Regardless, the chloride concentrations shown in the two (2) water sample do show elevated chloride concentrations in the realm of historic background sampling events that have been documented.

As such, Concho Respectfully requests to proceed with the previously discussed and agreed upon closure path forward for this site. Concho also requests permission, with prior notice to plug the temporary monitor well TW-1.

Summary Report

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Report Date: March 14, 2016

Work Order: 16031023

Project Location: Eddy Co, NM
Project Name: Crossman 25 State #1
Project Number: ENVO15.0002.1

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
415783	TW-1	water	2016-03-10	10:40	2016-03-10
415784	Up Stream Draw	water	2016-03-10	10:50	2016-03-10

Sample: 415783 - TW-1

Param	Flag	Result	Units	RL
Chloride		**2160**	mg/L	2.5

Sample: 415784 - Up Stream Draw

Param	Flag	Result	Units	RL
Chloride		**1150**	mg/L	2.5

Site Characterization Report of Oil and Gas-Related Spills in Red Bluff Draw, New Mexico

July, 2015

PREPARED FOR

THE NEW MEXICO STATE LAND OFFICE

PREPARED BY

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3 SAMPLE LOCATIONS AND DESCRIPTIONS

Three soil samples were collected along a transect perpendicular to the channel (Soil 1 – Soil 3) in the reference area in order to characterize soil conditions in cross-section across the draw. A fourth soil sample (Soil 4) was collected downstream within the channel bed. A surface water and sediment sample (SW 1 and Sed 1) were collected from an open stretch of water just west of the soil sampling area (Map 1. Red Bluff Draw – Reference Sample Area).

Three soil cores, collected from the COG Operating LLC Crossman 25 State #1H well pad, were composited into single soil samples from each of the corresponding depths (Soil 5). Three soil samples were collected in a cross-section directly down-gradient of the well pad (Soil 6 - Soil 8) and one soil sample (Soil 9) was collected from the braided channels 200ft further down-gradient.

A surface water and sediment sample (SW 2 and Sed 2) were collected from the pool immediately west (up-gradient) of the well pad. A surface water sample and sediment sample (SW 3 and Sed 3) were also collected at the nearest downstream surface water location, approximately 3,500ft to the east of the well pad (Map 2. Red Bluff Draw – COG Operating Well Pad Sample Area).

One soil sample was collected directly up-gradient of the tank #1 location (Soil 19), one in between the tank #1 and tank #2 locations (Soil 18) and one down-gradient of the tank #2 location (Soil 17). Four additional soil samples were collected at Soil 13, Soil 14, Soil 15, and Soil 16 in order to characterize soil conditions in cross-section across the draw below the two tanks (Map 3. Red Bluff Draw – Tanks Sample Area).

One soil sample was collected directly up-gradient of the tank #3 site and one down-gradient (Soil 12 and Soil 11 respectively). A third soil sample (Soil 10) was collected within the channel bottom just south of a buried pipeline.

A surface water, sediment and soil sample (SW 4, Sed 4 and Soil 21) were collected within the channel bottom west (up-stream) of where the Yates release entered into the draw. Two soil samples (Soil 22 and Soil 23) were collected outside of the draw between the Yates release location and the earthen berm along the south bank of the draw. A surface water, sediment and soil sample (SW 6 and Sed 6 and Soil 20) were collected from within the bermed area in the channel bottom north of the Yates release site. One surface water and sediment sample were collected in the canal south of the bermed area (SW 5, Sed 5) (Map 4. Red Bluff Draw – Highway 285 Bridge).

Six soil samples and three sediment samples were collected downstream of the Highway 285 bridge (Soil 24-29 and Sed 6-8). Three of the soil samples (Soil 25, Soil 26, and Soil 27) were collected in order to characterize soil conditions in cross-section across the draw just east of the bridge. A water sample was collected at a relatively large pool of open water 0.5 miles east of the bridge (SW 6) and at a second location an additional 1.75mi downstream above the confluence of Red Bluff Draw and the Pecos River (SW 8, Map 4. Red Bluff Draw – Highway 285 Bridge).

of nearly all of the sample cores collected within the channel were completed in a weakly cemented gypsiferous layer mixed with pebbles of siltstone and limestone or terminated upon encountering a consolidated gypsum layer. The thickness of the silty sandy soils overlying the gypsum material generally increased in depth in the downstream direction.

4.1.3 Geology

Surface deposits within the draw channel and adjacent flood plains are mapped as Pleistocene to Holocene aged alluvial sediments. Areas surrounding and directly underlying the draw are mapped as the Permian Rustler Formation which can attain a thickness of several hundred feet in the area. Just west of the project area, the Permian Salado Formation may be exposed at the surface within the draw and surrounding uplands. The Salado consists of halite and anhydrite with subordinate potash salts, dolomite and claystone to siltstone. The Salado can attain a thickness of over 1,000 ft (USGS 2003).

Observed alluvial deposits within the channel and floodplain are described in the soils section of this report. Outcrops of Rustler Formation were observed throughout the project area along the banks of the draw and within the channel bottom. The outcrops consisted of white/cream colored dolomite, orange-red siltstone to fine sandstone and gypsum. Sections of Rustler exposed in the banks of the draw were often capped with 3 – 6 ft of calcrete. The Salado Formation was not observed at the surface within the immediate project area.

4.1.4 Hydrology

Surface water

Surface water within the channel is intermittent with pools of water separated by dry stretches. Several of the pools in the project area are somewhat large ranging up to 50ft wide, hundreds of feet in length and several feet in depth. The stretches of surface water are likely interconnected by subsurface flows through the shallow alluvial deposits as evidenced by the occurrence of springs and low velocity flow within the pools. Additionally, saturated soils were observed in most cores collected within the draw channel above unconsolidated to consolidated gypsum. Continuous surface flows through the length of the draw appear to occur only in response to large storm events.

Groundwater

Depth to groundwater within the broader project area outside of the draw channel is approximately 80 - 100 feet. Depth to groundwater was approximated after a review of near-by well logs filed with the New Mexico Office of the State Engineer. According to the well logs groundwater was present within fine sandstone layers ranging from 10 – 35ft in thickness which are likely part of the Rustler Formation.

Local groundwater gradients could not be determined due to a lack of contemporaneous measurements within local wells, however a review of the ChevronTexaco 2005 Eddy Co. Depth to Groundwater map suggests the regional groundwater gradient follows the surface gradient and slopes to the east.

Table 1. Surface water and sediment analytical results

Sample ID	Chloride (mg/L)	Diesel Range Organics - DRO (mg/L)
SW 1	3200	< 1.0
SW 2	1800	< 1.0
SW 3	760	< 1.0
SW 4	670	< 1.0
SW 5	1100	< 1.0
SW 6	1800	1.2
SW 7	1100	< 1.0
SW 8	2300	< 1.0
Sed 1	720	< 9.9
Sed 2	410	< 9.9
Sed 3	240	< 9.7
Sed 4	440	15
Sed 5	220	< 9.6
Sed 6	350	210
Sed 7	190	< 9.6
Sed 8	380	53
Sed 9	170	78

Table 2. Soil analytical results

Sample ID	Chloride (mg/L)	Diesel Range Organics - DRO (mg/L)	Sample ID	Chloride (mg/L)	Diesel Range Organics - DRO (mg/L)
Soil 1, 0 - 0.5ft	1600	< 10	Soil 4, 0 - 0.5ft	54	< 9.9
Soil 1, 0.5 - 1.5ft	200	< 10	Soil 4, 0.5 - 1.5ft	130	< 9.8
Soil 1, 1.5 - 2.5ft	190	< 9.8	Soil 5, 0 - 0.5ft	5500	1200
Soil 1, 2.5 - 3.5ft	70	< 9.9	Soil 5, 0.5 - 1.5ft	4600	< 10
Soil 2, 0 - 0.5ft	210	< 10	Soil 5, 1.5 - 2.5ft	3400	< 9.9
Soil 2, 1.0 - 1.5ft	46	< 10	Soil 5, 2.5 - 3.5ft	1900	< 9.8
Soil 2, 1.5 - 2.0ft	63	< 0.10	Soil 5, 3.5 - 4.0ft	2600	< 9.8
Soil 3, 0 - 0.5ft	39	< 9.9	Soil 6, 0 - 0.5ft	35	37
Soil 3, 0.5 - 1.5ft	78	< 10	Soil 6, 0.5 - 1.5ft	77	< 10
Soil 3, 1.5 - 2.5ft	260	< 9.8	Soil 6, 1.5 - 2.5ft	80	< 4.7
Soil 3, 2.5 - 3.5ft	280	< 9.9	Soil 6, 2.5 - 3.5ft	88	< 10
Soil 3, 3.5 - 4.0ft	210	< 10			

Table 2. Soil Analytical Results (Continued)

Sample ID	Chloride (mg/L)	Diesel Range Organics - DRO (mg/L)	Sample ID	Chloride (mg/L)	Diesel Range Organics - DRO (mg/L)
Soil 24, 0 - 0.5ft	85	< 10	Soil 27, 0 - 0.5ft	310	< 9.8
Soil 24, 0.5 - 1.5ft	58	< 9.8	Soil 27, 0.5 - 1.5ft	170	< 10
Soil 24, 1.5 - 2.5ft	64	< 9.5	Soil 27, 1.5 - 2.5ft	140	< 9.9
Soil 24, 2.5 - 3.5ft	85	< 9.7	Soil 27, 2.5 - 3.5ft	160	< 10
Soil 24, 3.5 - 4.0ft	88	< 10	Soil 28, 0 - 0.5ft	260	< 9.9
Soil 25, 0 - 0.5ft	220	< 9.7	Soil 28, 0.5 - 1.5ft	210	< 9.9
Soil 25, 0.5 - 1.5ft	81	< 9.7	Soil 28, 1.5 - 2.5ft	120	< 9.7
Soil 25, 1.5 - 2.5ft	98	< 9.4	Soil 29, 0 - 0.5ft	530	< 9.9
Soil 25, 2.5 - 3.5ft	70	< 9.8	Soil 29, 0.5 - 1.5ft	140	< 9.9
Soil 25, 3.5 - 4.0ft	70	< 9.9	Soil 29, 1.5 - 2.5ft	130	< 9.5
Soil 26, 0 - 0.5ft	180	< 9.8	Soil 29, 2.5 - 3.5ft	120	< 9.9
Soil 26, 0.5 - 1.5ft	170	< 9.4			
Soil 26, 1.5 - 2.5ft	110	< 9.6			
Soil 26, 2.5 - 3.5ft	66	< 10			

5 DISCUSSION

5.1 Vegetation

Because vegetation within the entire release area appeared healthy and not stressed overall, it was not inventoried by quantitative methods. None of the vegetation observed is particularly salt-tolerant; no obligate halophiles were observed. Very few burned and/or uprooted individuals appeared dead, and saltcedar, mesquite, and sand dropseed within the release area was leafing out at the time of the surveys.

5.2 Sampling Results

The sampling analytical results are discussed below and depicted on Maps 6 through 16.

5.2.1 Reference Area

Chlorides within the surface water and sediments in the reference area were the highest of any surface water or sediment location sampled at 3,200 mg/l and 720 mg/kg respectively (SW 1 and Sed 1). These concentrations likely reflect high natural salinities in the Red Bluff Draw environment and are possibly related to the near surface presence of the Salado Formation upstream of the reference area as indicated in geologic mapping (USGS 2003).

Chloride concentrations in soil samples collected along a transect perpendicular to the channel (Soil 1 – Soil 3) ranged from 1,600 mg/kg at the surface on the south side of the channel to 39 mg/kg at the surface on north side of the channel. A fourth soil sample (Soil 4), collected

downstream within the channel bed had relatively low chloride concentrations. (Map 2. Red Bluff Draw – Reference Area Sampling).

No DRO was detected in the reference area surface water, sediment or soil samples. No surface deposits of petroleum products were observed.

5.2.2 COG Operating LLC Crossman 25 State #1H Well Pad

The well pad was partially built in the channel bottom and appears to be constructed from imported material (observed gravel and cobble are rock types that do not occur locally). The remnants of the pad are highly eroded with ongoing erosion as a result of storm events. No obvious petroleum deposits were observed on the pad or within its immediate vicinity.

A small body of open water, present within the channel immediately west (upstream) of the well pad, was sampled as well as the nearest downstream surface water location, which is approximately 3,500ft to the east of the pad. Chlorides within the surface water and sediment samples to the west of the pad (SW 2 and Sed 2) were 1,800 mg/l and 410 mg/kg respectively. Chlorides within the surface water and sediments at the downstream surface water location (SW 3 and Sed 3) were 760 mg/l and 240 mg/kg respectively. No DRO was detected in the surface water or channel sediments in the pad area.

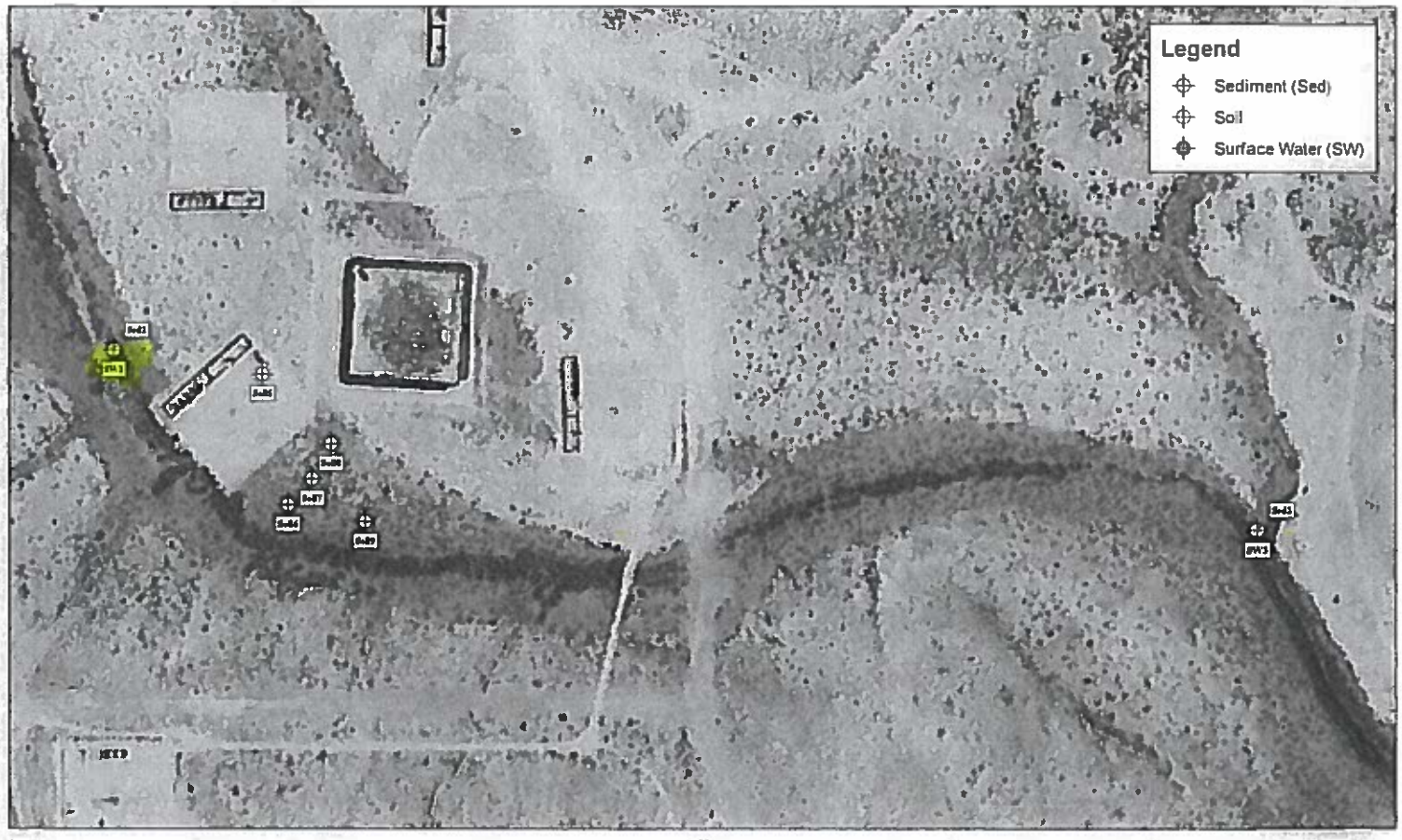
One soil sample (Soil 5) was composited from each of the corresponding depths of three cores collected from well pad. Reported chloride concentrations ranged from 5,500 mg/kg at the surface to 1,900 mg/kg at 2.5 to 3.5ft bgs. DRO results from the surface soil sample were 1,200 mg/kg. The elevated concentration of chlorides throughout the soil column and high concentration of DRO at the surface appear to reflect contamination within the pad material from releases associated with the site.

Four soil samples (Soil 6 – Soil 9) were collected from the braided channels east and directly down-gradient of the well pad, including three arranged in a cross-section perpendicular to the draw. Reported chloride concentrations ranged from less than 7.5 mg/kg to 190 mg/kg. Three soil samples (Soil 6, Soil 8 and Soil 9) reported detectable concentrations of DRO at the surface at 37 mg/kg, 10 mg/kg and 14 mg/kg respectively. Although detectable amounts of DRO were identified down-gradient of the well pad, the concentrations were low and appear to be confined to the surface.

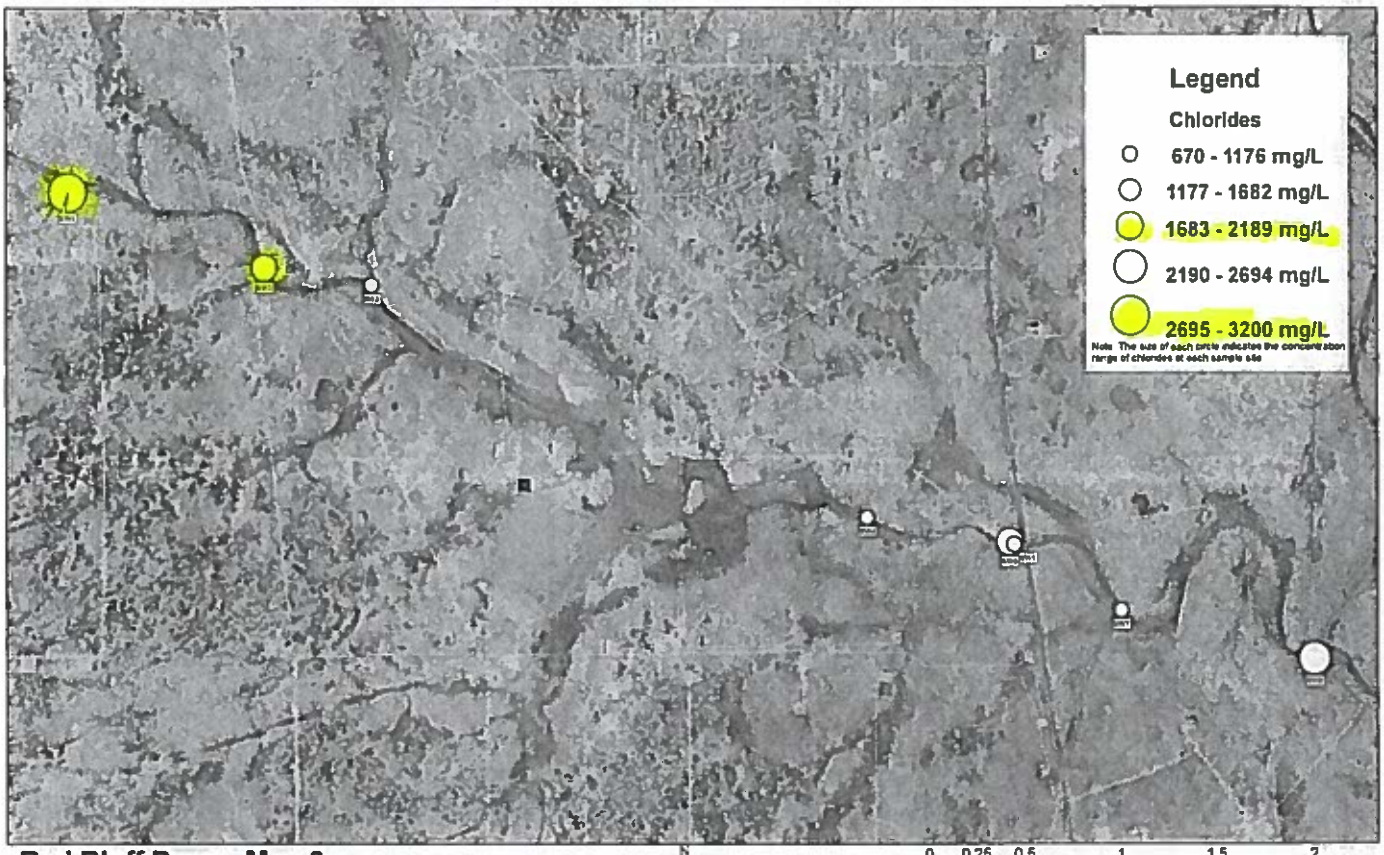
5.2.3 Tanks #1 and #2

Two of the three displaced COG Operating steel oil tanks came to rest within 550ft of each other within the floodplain approximately 1.8mi downstream of the well pad, but north and east of the deeper channel. Small amounts of petroleum product were observed at the tank locations as well as in vegetation down-gradient (downstream) of the tanks.

A total of six soil samples were collected from the area. One soil sample was collected directly up-gradient (northwest) of the tank #1 location (Soil 19) and one down-gradient (southwest, Soil 18). Chlorides concentrations were relatively low through the soil column at both locations ranging from less than 7.5 mg/kg to 77 mg/kg. DRO was not detected at either sample location.



Red Bluff Draw - Map 2
COG Operating Pad Sample Area



Red Bluff Draw - Map 6
Chlorides - Surface Water