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Date: January 22, 2007

Client: Whiting Oil & Gas Corporation IRP-1089

Subject: Delineation and Scope of Work for Remediation of CW Shepherd Tank Battery. Lea County, New Mexico

Introduction

A crude oil release was discovered at the CW Shepherd A Federal tank battery on October 13, 2006 at approximately 7:30 a.m. The tank battery is located in Lea County, New Mexico within Unit I , SW ¼ of SW ¼, Section 22, Township 26S, Range 36E.

The release consisted of 230 barrels (bbls) of crude oil from an overflowing storage tank. A total of 10 bbls of crude oil was recovered from the spill site. Fluids from the release overflowed the secondary containment and covered the area in front of the tank battery extending to the west into a pool area measuring approximately 36 feet by 21 feet. Another section of the release extended southeast along a cattle trail for approximately 250 feet with the main width of the runoff being 3 foot wide. A small area measuring approximately 10 feet by 5 feet marked the end of the release runoff.

After initial notification was made by telephone to the Oil Conservation Division (OCD) and the Bureau of Land Management (BLM), a form C-141 was completed and sent to both agencies to complete the notification of the release.

During conversions with the OCD and BLM personnel, other areas of what appeared to be surface impacted soil were referenced. At the request of the both agencies an area north of the Shepherd tank battery was assessed at the time of the release delineation.

A review of published data from the United State Geological Survey and from the OCD has determined the depth to groundwater in the area was approximately 200 feet. A completed OCD form C-144 has been completed and included with this report. The results of the completed form indicate the site has a 0 point ranking score which would establish the remediation levels at:

Benzene (ppm)	-	10
BTEX (ppm)	-	50
Total TPH (ppm)	-	5,000
Chlorides (ppm)	-	250

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RP-1089

Delineation

To complete the delineation of impacted surface soils from the release, hand augers and geo-probe sampling was conducted. A total of 15 hand augers and 1 soil boring were completed. To complete the delineation of the secondary surface impacted area north of the tank battery, a total of 11 geo-probe borings were completed.

Delineation activities conducted on the new release site revealed hydrocarbon levels exceeding OCD remediation levels in all areas of near surface soil and in some areas extending to a depth of approximately 12 feet. Hand auger soil borings were completed in all areas of surface impacted soil completing the vertical and horizontal delineation of the new release area. Results of the delineation have be separated into sections of the release site and summarized in the following paragraphs:

- **Tank Battery storage tank area** – The delineation of the storage tank area of the tank battery was completed in two phases. The initial phase was used to determine if an impact to the soil existed above regulatory levels. One hand auger was completed to a total depth of 6 feet behind (north) the storage tanks. Results of the sample analyses are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
#10b (8')	1.62	17.28	16,028	<5

Values in Bold Red indicate levels above established cleanup values.

A complete delineation was performed on December 14, 2006 with the completion of five (5) additional hand augers along the backside to the storage tanks as indicated on the attached site map. Analytical results from the samples collected from the hand auger borings are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
HA -1 (12')	0.016	0.476	1,464	-
HA-1 (16')	0.24	7.65	1,410	-
HA-2 (8')	<0.0026	6.4	3,900	-
HA-3 (12')	<0.0028	0	39	-
HA-4 (10')	2.9	0.046	1,502	-
HA-5 (3')	0.12	20.9	11,700	-
HA-5 (8')	<0.0026	2.61	4,480	-

Values in Bold Red indicate levels above established cleanup values.

A review of the above referenced analytical data has revealed the soil impacted above the established regulatory levels were found to exist to a depth of approximately ten (10) feet in the central area behind the tanks and to a depth of approximately six (6) feet in the areas surrounding the central point.

- **Release area in front (south) of tank battery** – This area consists of the lease road in front of the tank battery and a small area south of the lease road. Four (4) hand auger borings were completed to delineate the extent of the release in this area.

To complete the delineation of the pooled area another hand auger and one (1) geo-probe soil borings were advanced. The geo-probe boring was completed on the west edge of the site and the hand auger was completed within the center of the site to complete the vertical delineation. Analytical results from the samples collected from the hand auger and geo-probe borings are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
SB-8 (6')	<0.0026	0.00	0.00	-
HA-7 (16')	<0.0026	0.2097	1,402	-

Reviewing all of the above referenced analytical data has revealed the soil impacted above the established regulatory levels were found to exist to a depth of approximately twelve (12) feet in the area of the pooled area.

The two (2) older areas of surface impacted soil observed north of the tank battery were delineated by the completion of seven (7) geo-probe soil borings in the first area and an additional four (4) geo-probe soil borings in the second area.

- The first area is located north of the tank battery approximately 60 feet and covers an area measuring approximately 160 feet by 140 feet. Geo-probe soil borings were advanced to a maximum depth of 13 feet before encountering refusal with most of the geo-probe borings being completed between a depth of 6 and 8 feet. The seven (7) borings completed in this area were sampled and submitted for laboratory analyses with the results presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
SB-1 (3')	0.019	3.749	3,190	-
SB-1 (7')	<0.0030	0.197	183	-
SB-1 (13')	<0.0026	0.00	9	-
SB-2 (5')	<0.0029	0.45	47	-
SB-2 (6')	0.013	0.013	1	-
SB-3 (3')	<0.0029	0.00	5	-
SB-4 (3')	<0.0028	0.00	27	-
SB-5 (8')	<0.0029	0.244	99	-
SB-5 (13')	<0.0028	0.00	8	-
SB-6 (6')	<0.0026	0.00	5	-
SB-7 (3')	<0.0029	0.00	0	-

A review of the above referenced analytical data has revealed no soil impacted above the established regulatory levels was found. It appears the stressed vegetation in the area is confined to the near surface soil.

Analytical results from the samples collected from the hand auger borings are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
#1 (6')	<0.0250	<0.0250	2,564	<10
#2b (6')	<0.0250	<0.0250	402	7.99
#3b (6')	<0.0250	<0.0250	16	<5
#5a (3')	0.171	10.721	32,550	<5
#5b (6')	<0.0250	<0.0250	154	12.7

Values in Bold Red indicate levels above established cleanup values.

A review of the above referenced analytical data has revealed the soil impacted above the established regulatory levels were found to exist to a depth of approximately four (4) feet in the area in front of the storage tanks of the tank battery.

- **Southeast release runoff area** – This area is a narrow release pathway leading southeast from the tank battery into blow sand extending approximately 170 feet to a small depression where the oil pooled. Four (4) hand auger borings were completed in this area during the delineation.

  Due to the narrow dimension of the release pathway, only two (2) of the four (4) hand auger samples were submitted for laboratory analyses. Analytical results from the samples collected from the hand auger borings are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
#6a (3')	0.206	9.646	30,340	<5
#6b (6')	<0.0250	0.55	112	<5
#9a (3')	0.0289	4.0569	7,983	<5
#9b (6')	<0.0250	1.156	1,073	<5

Values in Bold Red indicate levels above established cleanup values.

A review of the above referenced analytical data has revealed the soil impacted above the established regulatory levels were found to exist to a depth of approximately four (4) feet in the area of the release runoff.

- **West pooled area** - The final area involved in the delineation of the new release area was the large pooled area west of the tank battery. Three (3) hand auger & geo-probe soil borings were completed within this area during both phases of the delineation. During the first phase one (1) hand auger is completed. Results of the sample analyses are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
#4a (3')	0.128	5.958	16,724	<5
#4c (10')	1.54	42.92	21,370	<5

Values in Bold Red indicate levels above established cleanup values.

- The second area is located to the northeast of the tank battery in a long narrow pathway with a large end area. This area measured approximately 250 feet by 35 feet in the long area and approximately 140 feet by 120 feet in the large end area. Four (4) geo-probe soil borings were completed within this area. Analytical results from the samples collected from the hand auger and geo-probe borings are presented in the following table:

ANALYTICAL RESULTS OF THE INITIAL SAMPLING OF TANK BATTERY – 11/08/2006 (mg/kg)				
Sample ID	**Benzene**	**Total BTEX**	**Total TPH**	**Chlorides**
SB-10 (6')	<0.0027	0.00	5.00	-
SB-11 (6')	<0.0028	0.00	0.00	-
SB-12 (6')	<0.0030	0.00	0.00	-
SB-13 (6')	<0.0026	0.00	6.00	-

A review of the above referenced analytical data has revealed no soil impacted above the established regulatory levels was found. It appears the stressed vegetation in the area is confined to the near surface soil.

Remediation Scope of Work

To complete the remediation of the soil impacted above established regulatory levels Whiting is proposing to relocate the tank battery in order to get to the impacted soil under the production equipment. This tank battery will be moved to the south and commingled with the Whiting CW Shepherd A Federal salt water disposal well tank battery.

The remediation will be conducted in stages with the new release and historic areas being broken into 6 stages. The stages will consist of the tank battery area, lease road area, southeast release runoff area, west pooled area, north historic area and the northeast historic area.

All impacted soil will be excavated and samples will be collected from the bottom and side walls of the excavations to document the soil impacted above established regulatory levels have been removed.

The excavated soil will be aerated, blended with the surrounding soil impacted with hydrocarbon levels below the established cleanup levels and stock piled for sampling. Samples will be collected of the stockpiled soil to ensure hydrocarbon levels are within the established cleanup levels prior to placing the remediated soil back into the excavations.

Samples will be collected for every 100 cubic yards of remediated soil for submission to the laboratory to document remediation of the soil. All analytical data will be summarized and included in the final report for closure of the site.

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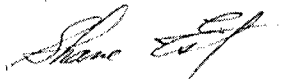

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