1R - 1753

REPORTS

DATE:

6-24-08

June 24, 2008

Mr. Wayne Price
New Mexico Oil Conservation Division
Environmental Bureau
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

Re: Groundwater Monitoring Report
Apache Corporation, Hawk A-5 #3 (1RP #1753)
Unit Letter O (SW/4, SE/4), Section 5, Township 21 South, Range 37 East,
Lea County, New Mexico
(Latitude: N 32 deg. 30.095' / Longitude: W 103 deg. 10.932')

Dear Mr. Price:

On behalf of Apache Corporation (Apache), Ocotillo Environmental, LLC (Ocotillo) began closure activities at the Hawk A-5 #3 drilling pit on January 25, 2007. The site is located in the southwest quarter (SW/4) of the southeast quarter (SE/4), Section 5, Township 21 South, Range 37 East, Lea County, New Mexico. Figure 1 shows the site location.

Following the collection of soil samples below the pit liner, the installation of soil borings inside and outside of the pit, and the installation of one (1) temporary monitoring well (MW-1) approximately fifteen feet southwest of the southwest corner of the pit, a Request for Approval was submitted via email to Larry Johnson on August 31, 2007, proposing the installation of a clay liner at the depth of the pit excavation (12' bgs), and backfilling of the remaining excavation in order to obtain closure of the pit, along with quarterly monitoring of the groundwater from well MW-1.

Mr. Johnson granted verbal approval of the pit closure on September 19, 2007, using a 40 mil plastic liner instead of clay. It was also agreed that the monitoring well MW-1 would be periodically pumped in order to draw any nearby impacted groundwater to the well, and sampled quarterly for four (4) consecutive quarters.

The pit was backfilled on October 10, 2007 and efforts were made to pump groundwater from monitoring well MW-1. Since the monitoring well was originally constructed as a temporary well and of two-inch casing, pumping efforts were unsuccessful. On November 28, 2007, a replacement well (MW-1R) was installed ten feet east of well MW-1, and constructed with four-inch casing. Pumping of the groundwater from well MW-1R commenced on December 3, 2007, and the first groundwater sample from that well was collected on December 7, 2007. Chloride concentrations in the groundwater sample were reported at 252 mg/L.

A final Pit or Below-Grade Tank Registration or Closure (Form C-144) and an initial Release Notification and Corrective Action (Form C-141) for the Hawk A-5 #3 site, was filed and approved by the NMOCD on January 23, 2008.

Following the December 7, 2007 groundwater monitoring event, approximately 150 gallons of water per week was pumped from the well and stored in an open-topped tank for livestock usage. Groundwater monitoring activities were conducted on March 7, 2007. Depth to groundwater in monitoring well MW-1R was measured at 95.3 feet bgs and the concentration of chloride was reported at 300 mg/L. Since the chloride concentration exceeded the New Mexico Water Quality Control Commission (NMWQCC) standard of 250 mg/L, notification was given to Mr. Johnson of the increased chloride concentration in groundwater at the site on March 27, 2008. At the request of Mr. Johnson, all site specific information was forwarded to your office at that time for a determination of further action.

On April 3, 2008, via email, you directed the installation of a down gradient and a side gradient monitoring well in order to determine if the contamination had moved off-site.

Monitoring Well Installations

On May 14 and 15, 2008, monitoring well MW-2 was installed approximately 260 feet southeast of well MW-1R, and well MW-3 was installed approximately 240 feet northeast of well MW-1R. The wells were installed by Scarborough Drilling of Lamesa, Texas, using an air-rotary drilling rig. Using a split-spoon sampling device, soil samples were collected at five-foot intervals, from a depth of approximately five (5) feet below ground surface (bgs) to a depth of approximately 40 feet bgs, and at ten-foot intervals from a depth of 50 feet bgs to 90 feet bgs. The samples were labeled and delivered to Environmental Lab of Texas (ELOT), where they were analyzed for chlorides using EPA method 300. Figure 2 shows the monitoring well locations. Table 1 presents a summary of drilling and completion details. Table 2 provides a summary of the laboratory analyses. Appendix A presents the boring logs and well construction diagrams and Appendix B provides the laboratory and chain of custody documentation.

Referring to Table 2, chloride concentrations in all soil samples collected from the installation of monitoring wells MW-2 and MW-3 were reported below 250 milligrams per kilogram (mg/kg).

Monitoring wells MW-2 and MW-3 were constructed with threaded 4-inch schedule 20 PVC well screen and riser. The well screens, approximately 20 feet in length, were placed above and below the groundwater level observed during drilling. Graded silica sand was placed around the well screen to approximately 3 feet above the screen. Approximately 3 feet of bentonite chips was placed above the sand, and hydrated with potable water. The remainder of the annulus was filled with cement and bentonite grout to about 2 feet BGS. Each well is secured with a locking above-grade cover, and anchored in a concrete pad measuring approximately 3 x 3 feet. On June 5, 2008, Piper Surveying Company surveyed the wells for top-of-casing and ground elevations.

On May 16, 2008, the monitoring wells were developed by pumping with an electric submersible pump until groundwater was visibly clear of fine grained sediment.

Groundwater Monitoring

Depth to groundwater was measured in the monitoring wells on May 19, 2008, and ranged from 91.63 feet bgs at well MW-3, to 96.41 feet bgs at well MW-2. The groundwater

elevation ranged from 3410.66 feet above mean sea level (AMSL) at MW-1 to 3410.06 feet AMSL at MW-2. Groundwater flow was to the southeast at approximately 0.0026 feet per foot. Table 3 presents a summary of depth to groundwater measurements on May 19, 2008. Figure 3 presents a groundwater potentiometric surface map for May 19, 2008.

After purging the monitoring wells of three casing volumes, groundwater samples were collected using dedicated disposable polyethylene bailers. The samples were carefully poured into laboratory prepared containers, chilled in an ice chest and delivered under chain of custody control to Cardinal Laboratories (Cardinal), in Hobbs, New Mexico, where they were analyzed for chlorides by EPA method 4500. Table 3 presents a summary of the chloride analyses of groundwater samples. Appendix B presents the laboratory reports and chain of custody documentation.

Referring to Table 3, the chloride concentrations from samples collected at well MW-1R (116 mg/L), MW-2 (116 mg/L) and well MW-3 (92 mg/L) were all below the NMWQCC standard of 250 milligrams per liter (mg/L).

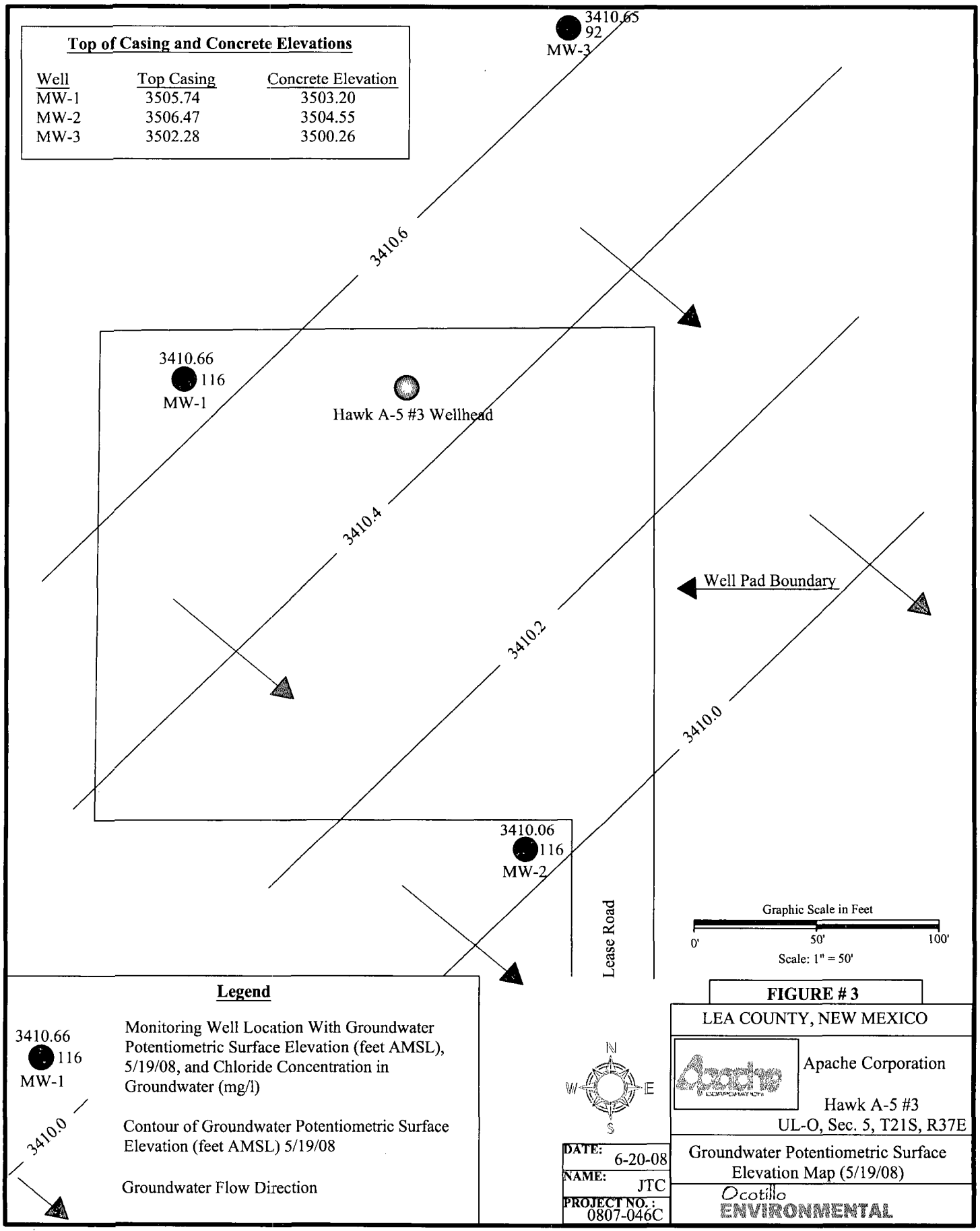
As chloride concentrations in groundwater at the site are well below 250 mg/L, Apache respectfully requests that closure of the site be granted by the NMOCD. If you have any questions or need additional information, please call Mr. Harold Swain at (432) 527-3311 or myself at (505) 441-7244. We may also be reached by email at Harold.Swain@usa.apachecorp.com or Cindy.Crain@gmail.com.

Sincerely,
Ocotillo Environmental, LLC

Cindy K. Crain, P.G.
Environmental Manager

cc: Harold Swain, Apache
Natalie Gladden, Apache

FIGURES


Top of Casing and Concrete Elevations
Well | Top Casing | Concrete Elevation
MW-1 | 3505.74 | 3503.20
MW-2 | 3506.47 | 3504.55
MW-3 | 3502.28 | 3500.26
3410.65
92
MW-3
3410.6
3410.66
116
MW-1
Hawk A-5 #3 Wellhead
3410.4
Well Pad Boundary
3410.2
3410.0
3410.06
116
MW-2
Lease Road
Graphic Scale in Feet
0'
50'
100'
Scale: 1" = 50'
Legend
3410.66
116
MW-1
Monitoring Well Location With Groundwater Potentiometric Surface Elevation (feet AMSL), 5/19/08, and Chloride Concentration in Groundwater (mg/l)
3410.0
Contour of Groundwater Potentiometric Surface Elevation (feet AMSL) 5/19/08
Groundwater Flow Direction
N
W
E
S
DATE: 6-20-08
NAME: JTC
PROJECT NO.: 0807-046C
FIGURE # 3
LEA COUNTY, NEW MEXICO
Apache Corporation
Hawk A-5 #3
UL-O, Sec. 5, T21S, R37E
Groundwater Potentiometric Surface Elevation Map (5/19/08)
Ocotillo ENVIRONMENTAL

TABLES

Table 2: Summary of Laboratory Analysis of Soil from Monitoring Wells
Apache Hawk A-5 #3
Unit Letter O, Section 5, Township 21 South, Range 37 East
Lea County, New Mexico

Sample Date	Soil Sample Number	Sample Depth (feet BGS)	Chloride (mg/kg)
WQCC Standard			250
4/3/07	MW-1	0-2	213.0
		5-7	160.0
		10-12	85.1
		15-17	85.1
		20-22	85.1
		25-27	117.0
		30-32	95.7
		35-37	117.0
		40-42	106.0
		45-47	234.0
		50-52	42.5
		55-57	42.5
		60-62	31.9
		65-67	21.3
		70-72	21.3
		75-77	<20
		80-82	31.9
		85-87	31.9
		90-92	42.5
		95-97	21.3
		100-102	31.9
5/14/08	MW-2	5-7	19.1
		10-12	101.0
		15-17	69.0
		20-22	40.6
		25-27	62.7
		30-32	48.7
		35-37	48.8
		40-42	63.3
		50-52	25.7
		60-62	<5.0
		70-72	<5.0
		80-82	<5.0
		90-92	<5.0

Sample Date	Soil Sample Number	Sample Depth (feet BGS)	Chloride (mg/kg)
WQCC Standard			**250**
5/15/08	MW-3	5-7	<5.0
		10-12	40.5
		15-17	30.6
		20-22	76.8
		25-27	72.4
		30-32	68.1
		35-37	47.0
		40-42	54.6
		50-52	81.5
		60-62	<25.0
		70-72	<25.0
		80-82	<25.0
		90-92	<25.0

Analysis conducted by Environmental Lab of Texas, Odessa, TX

Notes:

1. BGS: Depth in feet below ground surface
2. mg/kg: Milligrams per kilogram