Regulatory

A risk-based evaluation was performed for the Site in accordance with the New Mexico Oil Conservation Division (NMOCD) Guidelines for Remediation of Leaks, Spills and Releases, dated August 13, 1993. The guidelines require a risk-based evaluation of the site to determine recommended remedial action levels (RRAL) for benzene, toluene, ethylbenzene and xylene (collectively referred to as BTEX) and total petroleum hydrocarbons (TPH) in soil. The proposed RRAL for benzene was determined to be 10 parts per million (ppm) or milligrams per kilogram (mg/kg) and 50 ppm for total BTEX (sum of benzene, toluene, ethylbenzene, and xylene). Based upon the depth to groundwater, the proposed RRAL for TPH is 1,000 mg/kg.

Soil Assessment and Analytical Results

On October 2, 2012, Tetra Tech personnel inspected and sampled the spill area. Twenty (20) auger holes (AH-1 through AH-20) were installed using a stainless steel hand auger to assess the impacted soils. Selected samples were analyzed for TPH analysis by EPA method 8015 modified, BTEX by EPA Method 8021B and chloride by EPA method 300.0. Copies of laboratory analysis and chain-of-custody documentation are included in Appendix C. The sampling results are summarized in Table 1. The auger hole locations are shown on Figure 3.

Referring to Table 1, all of the auger hole samples were below the RRAL for TPH and BTEX. The chloride concentrations showed a shallow impact (0 to 2.0') to the soils at majority of the auger hole locations. Auger holes (AH-1, AH-2, AH-7, AH-8, AH-13, AH-19 and AH-20) were not vertically defined during the assessment.

The areas of AH-3 and AH-15 did not show a chloride impact to the soils. Auger holes (AH-9 and AH-10) detected chloride concentrations of 1,040 mg/kg (0-1') and 1,440 mg/kg (0-1'), respectively. The deeper samples (1-1.5') declined with depth to 293 mg/kg (AH-9) and 375 mg/kg (AH-10). Auger hole (AH-5) exhibited the highest chloride concentration of 10,600 mg/kg at 1-1.5', but declined to 571 mg/kg at 2-2.5' below surface. All chloride concentrations declined with depth, with the exception of AH-19 and AH-20. These two auger holes exhibited chloride concentrations of 2,080 and 604 mg/kg respectively at 1-1.5' below surface and increased to 5,950 and 3,320 mg/kg at 2-2.5' below surface.

TETRA TECH

Work Plan

COG proposes to remove impacted material as highlighted (green) in Table 1 and shown on Figure 4. Majority of the impacted areas will be excavated to a depth of 1.0' to 2.0' below surface. Based on the results, a surficial scrape will be performed in the areas of AH-9 and AH-10. The areas of AH-1, AH-2, AH-7, AH-8, AH-13, AH-19 and AH-20 will be trenched with a backhoe to define vertical extents. Based on the field data, these areas will be excavated to the appropriate depths. Due to the size of the area, Tetra Tech will field screen (chlorides) the soils for proper removal or to limit the excavation areas or depths.

All of the excavated material will be transported offsite for proper disposal. Once final excavation depths are achieved, the site will be backfilled with clean material and brought to grade.

Due to the location of the spill, the proposed excavation depths or deeper excavation may not be achieved due to wall cave ins, limited access, oil and gas equipment, electrical, structures or lines which may not be feasible or practicable to be removed due to safely concerns. As such, Tetra Tech will excavate the soils to the maximum extent practicable.

Upon completion, a final report will be submitted to the NMOCD. If you have any questions or comments concerning the assessment or the proposed remediation activities for this site, please call me at (432) 682-4559.

Respectfully submitted,
TETRA TECH

Ike Tavarez, PG
Senior Project Manager

cc: Pat Ellis - COG

TETRA TECH

December 14, 2012

Mr. Mike Bratcher
Environmental Engineer Specialist
Oil Conservation Division, District 2
811 S. First Avenue
Artesia, New Mexico 88210

Re: Work Plan for the COG Operating LLC., Aid State SWD, Unit O, Section 14, Township 17 South, Range 28 East, Eddy County, New Mexico.

Mr. Bratcher:

Tetra Tech, Inc. (Tetra Tech) was contacted by COG Operating LLC. (COG) to assess a spill from the Aid State SWD located in Unit O, Section 14, Township 17 South, Range 28 East, Eddy County, New Mexico (Site). The spill site coordinates are N 32.82873°, W 104.14433°. The site location is shown on Figures 1 and 2.

Background

According to the State of New Mexico C-141 Initial Report, the leak was discovered on September 22, 2012 and released approximately 700 barrels of produced water from the SWD storage tanks. The leak was caused by a plugged equalizer line and alarm failure. Approximately 650 barrels of fluids were recovered. The spill originated on the pad, flowed into the neighboring pad and onto the pasture. The initial C-141 form is enclosed in Appendix A.

Groundwater

No water wells were listed within Section 14. According to the NMOCD groundwater map, the average depth to groundwater in this area is approximately 75' below surface. The groundwater data is shown in Appendix B.

Tetra Tech
Tel [illegible] Fax [illegible]

Table 1
COG Operating LLC.
Aid State Salt Water Disposal
Eddy County, New Mexico

Sample ID	Sample Date	Sample Depth (ft)	Soil Status		TPH (mg/kg)			Benzene (mg/kg)	Toluene (mg/kg)	Ethlybenzene (mg/kg)	Xylene (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)
			In-Situ	Removed	GRO	DRO	Total						
AH-1	10/2/2012	0-0.5	X		173	142	315	<0.100	<0.100	0.972	2.24	3.21	5,100
AH-2	10/2/2012	0-1	X		<1.00	<50.0	<50.0	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	2,560
	"	1-1.5	X		-	-	-	-	-	-	-	-	1,100
AH-3	10/2/2012	0-1	X		20.2	<50.0	20.2	<0.100	<0.100	<0.100	<0.100	<0.100	495
	"	1-1.5	X		-	-	-	-	-	-	-	-	605
	"	2-2.5	X		-	-	-	-	-	-	-	-	24.0
AH-4	10/2/2012	0-1	X		3.25	<50.0	3.25	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	2,400
	"	1-1.5	X		-	-	-	-	-	-	-	-	413
	"	2-2.5	X		-	-	-	-	-	-	-	-	81.7
AH-5	10/2/2012	0-1	X		4.16	<50.0	4.16	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	5,870
	"	1-1.5	X		-	-	-	-	-	-	-	-	10,600
	"	2-2.5	X		-	-	-	-	-	-	-	-	571
AH-6	10/2/2012	0-1	X		<1.00	<50.0	<50.0	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	833
	"	1-1.5	X		-	-	-	-	-	-	-	-	378
	"	2-2.5	X		-	-	-	-	-	-	-	-	692
	"	3-3.5	X		-	-	-	-	-	-	-	-	857
	"	4-4.5	X		-	-	-	-	-	-	-	-	561
AH-7	10/2/2012	0-1	X		263	95.7	359	<0.100	0.516	1.22	2.54	4.28	6,720
	"	1-1.5	X		-	-	-	-	-	-	-	-	2,410
AH-8	10/2/2012	0-1	X		165	159	324	<0.100	0.412	2.35	6.07	8.83	2,220

Table 1
COG Operating LLC.
Aid State Salt Water Disposal
Eddy County, New Mexico

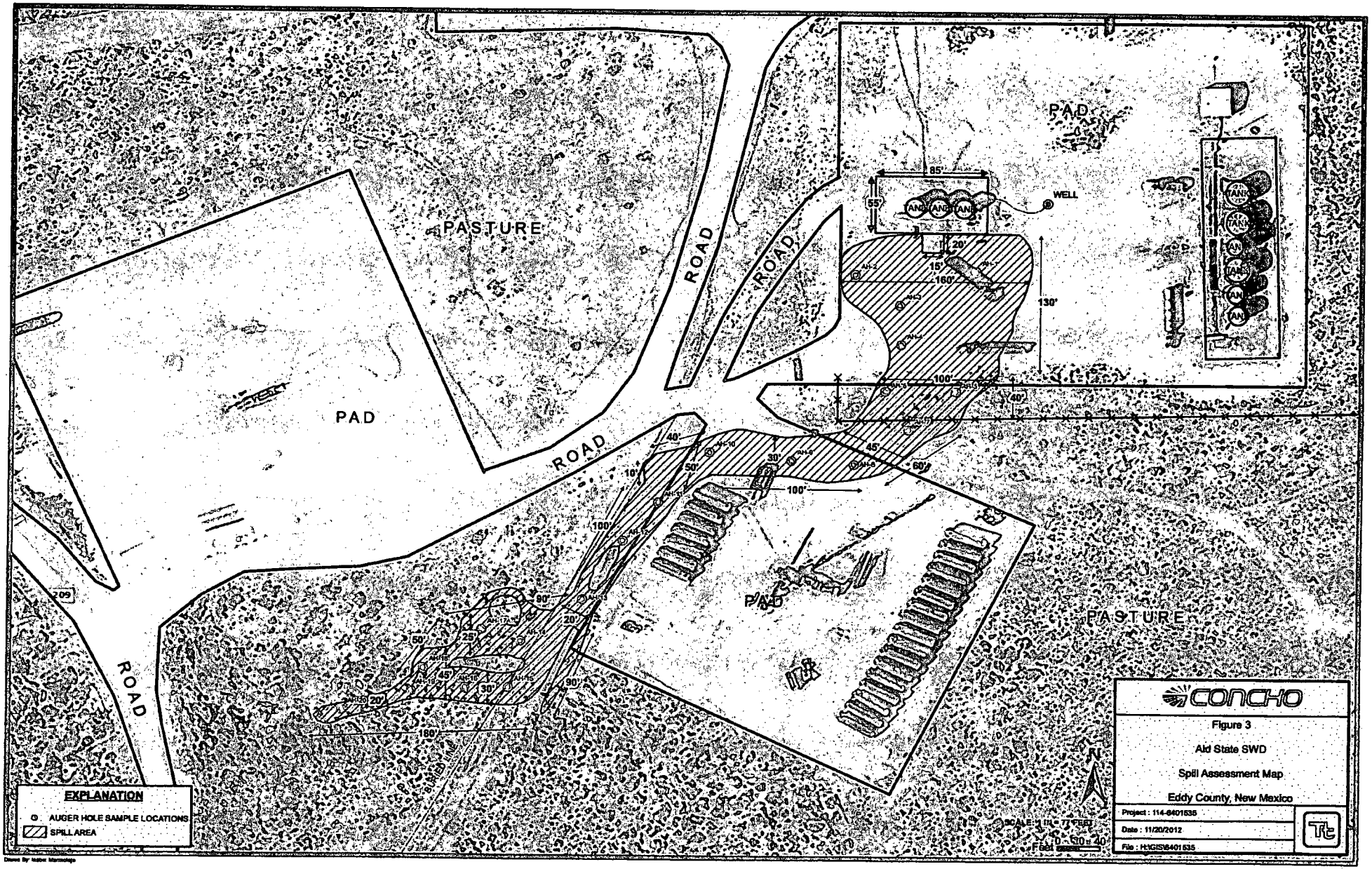
Sample ID	Sample Date	Sample Depth (ft)	Soil Status		TPH (mg/kg)			Benzene (mg/kg)	Toluene (mg/kg)	Ethlybenzene (mg/kg)	Xylene (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)
			In-Situ	Removed	GRO	DRO	Total						
AH-9	10/2/2012	0-1	X		27.9	<50.0	27.9	<0.0200	<0.0200	<0.0200	0.0690	0.0690	1,040
	"	1-1.5	X		-	-	-	-	-	-	-	-	293
AH-10	10/2/2012	0-1	X		174	95.6	270	<0.100	<0.100	1.70	5.02	6.72	1,440
	"	1-1.5	X		-	-	-	-	-	-	-	-	376
	"	2-2.5	X		-	-	-	-	-	-	-	-	29.3
	"	3-3.5	X		-	-	-	-	-	-	-	-	185
	"	4-4.5	X		-	-	-	-	-	-	-	-	161
AH-11	10/2/2012	0-1	X		1.36	<50.0	1.36	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	3,400
	"	1-1.5	X		-	-	-	-	-	-	-	-	1,350
	"	2-2.5	X		-	-	-	-	-	-	-	-	<20.0
	"	3-3.5	X		-	-	-	-	-	-	-	-	190
AH-12	10/2/2012	0-1	X		2.15	<50.0	2.15	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	472
	"	1-1.5	X		-	-	-	-	-	-	-	-	2,970
	"	2-2.5	X		-	-	-	-	-	-	-	-	73.1
AH-13	10/3/2012	0-1	X		7.25	<50.0	7.25	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	1,800
AH-14	10/3/2012	0-1	X		8.50	<50.0	8.50	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	5,730
	"	1-1.5	X		-	-	-	-	-	-	-	-	857
	"	2-2.5	X		-	-	-	-	-	-	-	-	166
	"	3-3.5	X		-	-	-	-	-	-	-	-	156
	"	4-4.5	X		-	-	-	-	-	-	-	-	151

Table 1
COG Operating LLC.
Aid State Salt Water Disposal
Eddy County, New Mexico

Sample ID	Sample Date	Sample Depth (ft)	Soil Status		TPH (mg/kg)			Benzene (mg/kg)	Toluene (mg/kg)	Ethlybenzene (mg/kg)	Xylene (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)
			In-Situ	Removed	GRO	DRO	Total						
AH-15	10/3/2012	0-1	X		<1.00	<50.0	<50.0	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<20.0
	"	1-1.5	X		-	-	-	-	-	-	-	-	63.5
	"	2-2.5	X		-	-	-	-	-	-	-	-	<20.0
AH-16	10/3/2012	0-1	X		3.52	<50.0	3.52	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	6,870
	"	1-1.5	X		-	-	-	-	-	-	-	-	420
	"	2-2.5	X		-	-	-	-	-	-	-	-	278
AH-17	10/3/2012	0-1	X		5.04	<50.0	5.04	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	6,760
	"	1-1.5	X		-	-	-	-	-	-	-	-	708
	"	2-2.5	X		-	-	-	-	-	-	-	-	381
AH-18	10/3/2012	0-1	X		9.81	<50.0	9.81	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	5,100
	"	1-1.5	X		-	-	-	-	-	-	-	-	667
	"	2-2.5	X		-	-	-	-	-	-	-	-	297
AH-19	10/3/2012	0-1	X		62.4	57.1	120	<0.0200	<0.0200	<0.0200	0.0427	0.0427	443
	"	1-1.5	X		-	-	-	-	-	-	-	-	2,080
	"	2-2.5	X		-	-	-	-	-	-	-	-	5,950
AH-20	10/3/2012	0-1	X		27.9	<50.0	27.9	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	102
	"	1-1.5	X		-	-	-	-	-	-	-	-	604
	"	2-2.5	X		-	-	-	-	-	-	-	-	3,320

(-) Not Analyzed

Proposed excavation areas and depths


PASTURE
ROAD
ROAD
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209
WELL
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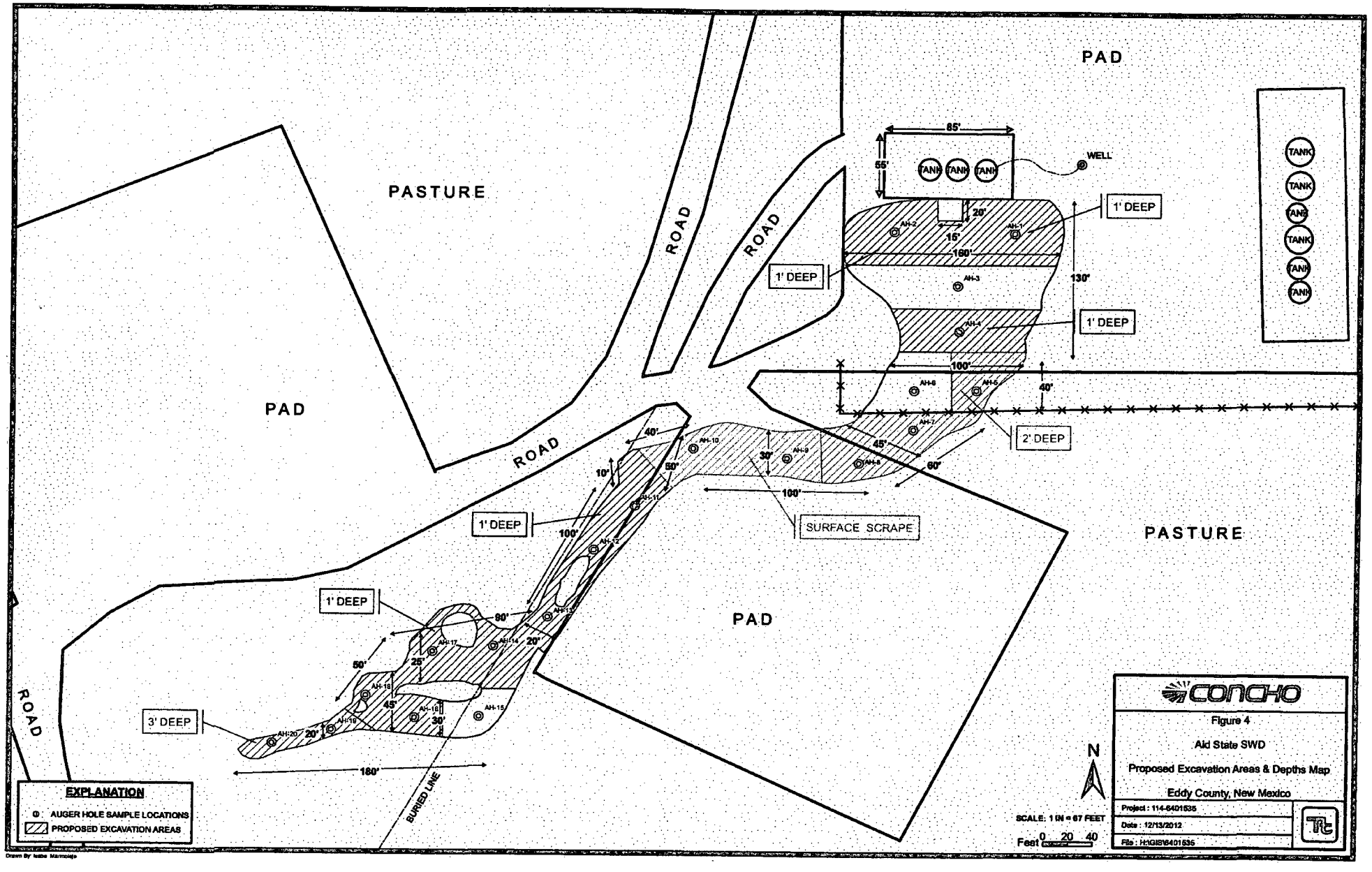
50'
25'
45'
30'
90'
20'
160'
EXPLANATION
AUGER HOLE SAMPLE LOCATIONS
SPILL AREA
CONCHO
Figure 3
Ald State SWD
Spill Assessment Map
Eddy County, New Mexico
Project : 114-8401535
Date : 11/20/2012
File : H:\GIS\8401535
SCALE: 1 INCH = 7 FEET
0 30 60
Feet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2' DEEP
45'
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50'
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AH-9
AH-8
10'
AH-11
100'
SURFACE SCRAPE
1' DEEP
100'
AH-12
PASTURE
1' DEEP
80'
AH-13
AH-17
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20'
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45'
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30'
AH-15
3' DEEP
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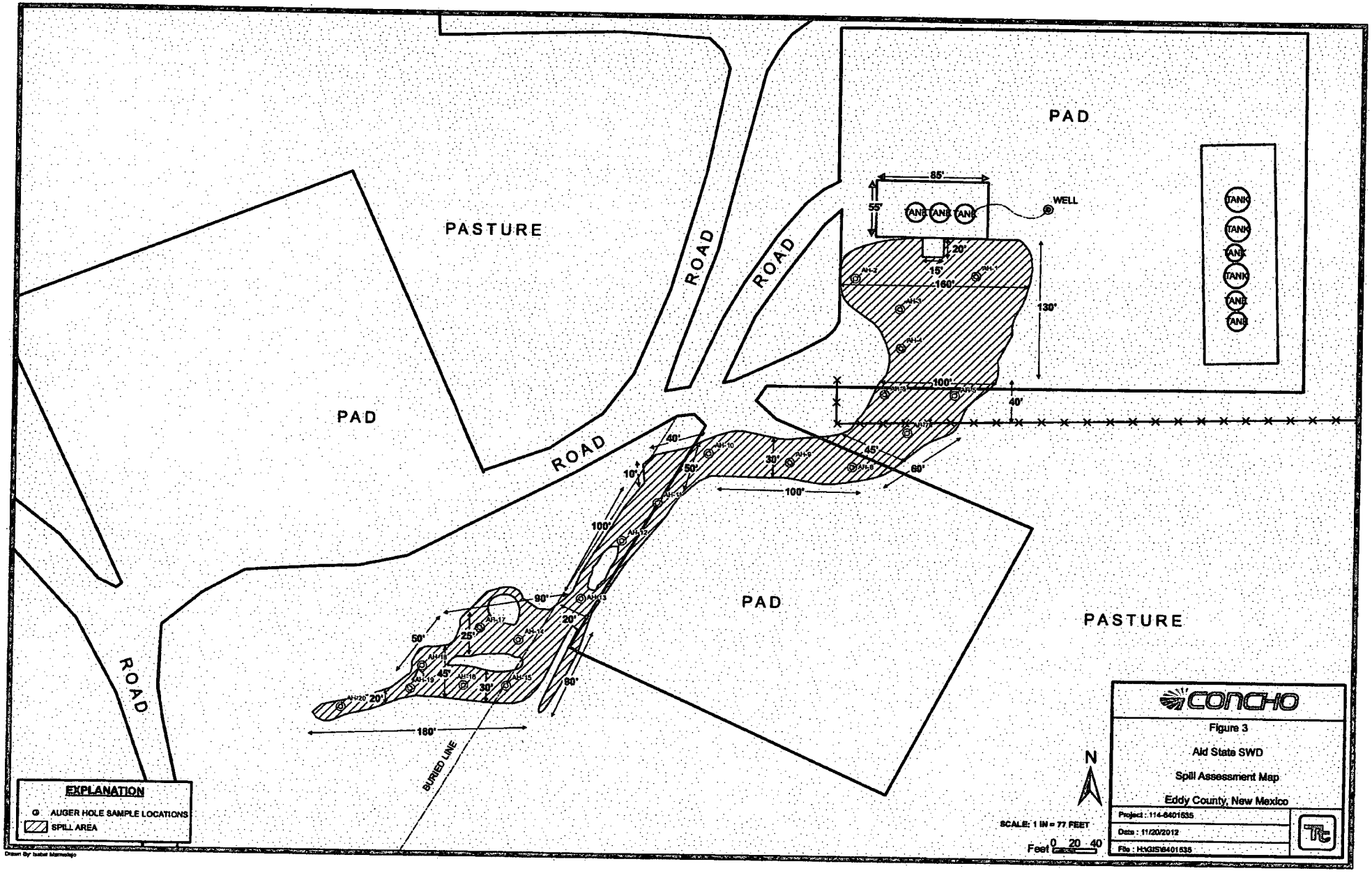
BURIED LINE
ROAD
PAD
EXPLANATION
AUGER HOLE SAMPLE LOCATIONS
PROPOSED EXCAVATION AREAS
N
SCALE: 1 IN = 67 FEET
Feet 0 20 40
CONCHO
Figure 4
Aid State SWD
Proposed Excavation Areas & Depths Map
Eddy County, New Mexico
Project : 114-6401535
Date : 12/13/2012
File : H:\GIS\6401535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AH-19
AH-20
EXPLANATION
AUGER HOLE SAMPLE LOCATIONS
SPILL AREA
N
SCALE: 1 IN = 77 FEET
Feet 0 20 40
CONCHO
Figure 3
Aid State SWD
Spill Assessment Map
Eddy County, New Mexico
Project : 114-6401535
Date : 11/20/2012
File : H:\GIS\6401535
Drawn By: Isabel Marroquin