

4 Location El Dorado Refinery Date 10/27/08

Project / Client El Paso

B. Burton & Matt W. Pond Soil Borings

Arrive on-site @ 10:00 A.M. (- Jerold already on-site)

Setup boat & sampling material, (boat in Pond @ 10:15)
Pony M. on-site @ ~ 10:30

Plain Enviro on-site @ 14:00 ^{DB} pm.

Safety tailgate meeting w/ Plains Enviro.
@ 14:15 conducted by Pony M.

13:00 start PSB-01 Boring

^{Bj}
Rods left in boring b/c couldn't pull out.
PSB-01 sampled @ 17:20

OFF-SITE @ 18:00

~~Paul Bart
10/27/08~~

5 Location El Dorado Refinery Date 10/28/08

Project / Client El Paso

B. Burton & Matt W. Pond Soil Borings

- Arrive on-site @ 0750

→ Safety tailgate meeting conducted by
Pony M. @ 0800 w/ Plains Enviro +
Savage

- Savage on-site to pull out rods, easily done

Jerold on-site @ 830

- meeting to discuss possible alternatives
to add more measures to boat to allow
to pull augers out of borings

- Pony to hardware for drum materials +
weld materials to fix hole in pontoon.

- Plains + Matt to pick up drums

- Brad to get more supplies

- attached 4 drums to boat @ 1000 Lunched @ 10:45

- 1130 repositioned over PSB-01
filled boring w/ coated bentonite chips

- 1200 Break for Lunch

- 1230 Back on-site, prep for sampling PSB-02

- 1250 Plains Enviro back from lunch

- Mob to other side of Marley Pond

- 1330 Begin drilling on PSB-02

- Pony calibrated PIP w/ Isobutylene @ 1530

- Next pg.

Location _____

Cont. from other side

Date 10/28/08

Project / Client _____

- pulled up augers/rods, docked boat @ 1430
- PSB-02 sampled @ 1450 11-13' logs
- Plains Envir. down & left site @ 1530
- Boat pontoon has leak, Savage on-site w/ track-hoe to lift & put on ^{boat} trailer off site @ 1615
- Staff Gauge reading @ 0.50' for 10/28/08 @ 1620
- ⁷³³ ~~drive~~ off to Fed Ex to drop off samples PSB-01 & PSB-02 @ 1630

Paul But
10/28/08

Location EL Peranda Date 10/29/08

Project / Client El Dorado Refinery El Paso

B. Burton & Matt W.

Paul Soil Borings
Sunny breezy

- 0805 Arrive onsite
Rex w/ Savage already on-site
Plains Envir already on-site
- 0810 safety tailgate meeting conducted by Matt W. - staff gauge reading 0.54'
- 0910 Boat loaded onto Polishing Pond
- 1020 Boat positioned, Ti to sediment from top
- 1030 Rev site of H₂O, 1' from deck to water, start PSB-03
- Boring completed @ 1125
- calibrated PID w/ Tsubutylene @ 1115
B. Burton calibrated
- sample of PSB-03 @ 1130 from 8.5' core
- Break for Lunch @ 1155
- Back on-site @ 1230 w/ Plains Envir
- repositioned boat over PSB-04, 6' from water to sediment @ 1330, start w- PSB-04
- PSB-04 total depth 12.0' bore (below water surface)
- PSB-04-6-8 - 1420 sample time
- PSB-04-10-12 - 1440 sample time
- reposition boat over PSB-05
- start drilling PSB-05 @ 1505
- Sampled PSB-05-6-8 @ 1600
- Sampled PSB-05-9-11 @ 1610

Location EDR Date 10/29/08

Project / Client El Paso

- Rex w/ Savage on-site to put boat into Acreation Pond #3 @ 1600
- off-site @ 1630
- Plains Envir off-site @ 1630
- Prep samples for Fed-Ex
- Off-site @ 1705 to Fed-Ex

~~Bertin
Matt
10/29/08~~

Location EDR Date 10/30/08

Project / Client El Paso Rock Soil Borings

B. Bertin + Matt W. Sunny + Windy

- Arrive on-site @ 0740
- Construct staff gauge for Aerators Pond #3
- Matt W. Conducted safety tailgate meeting
- Plains Envir on-site @ 0800 @ 0805 w/ Plains Envir.
- 0820 staff gauge in place reading 0.61'
- 0855 Begin PSB-06 boring
- 0915 calibrate PTO - B. Bertin
- Sampled PSB-06-9.5-10.5 @ 1000
- Sampled PSB-06-12.5-14.5 @ 1010
- plugged PSB-06 and repositioned to PSB-07 @ 1030.
- positioned over PSB-07 @ 1045
- sample PSB-07-14.6 @ 1145
- Break for lunch @ 1235 Plains Envir lunch @ 1240
- Back on-site @ 1255, Plains Envir lunch on-site @ 1300
- reposition boat over PSB-08 start drilling @ 1350
- PSB-08-15.5-17.5 @ 1500 sample + plugged
- Rex w/ Savage on-site to move boat from A.P.#3 to A.P.#2 @ 1505 off-site @ 1520
- Reposition boat over PSB-09 @ 1550
- start drilling PSB-09 @ 1600

-> next pg.

Location EDR Date 10/30/08
 Project / Client El Paso

- sample PSB-09-12.5-14.5 @ 1700 + plugged
- Plans Envir. off-site @ 1705 - start gauge reading = 0.50
- Prep samples for delivery
- off-site @ 1730 to Fed Ex

~~Paul Bat~~
 10/30/08

Location EDR Date 10/30/08
 Project / Client El Paso
B. Burton & Matt W. Sunny & breezy

- Arrive on-site @ 0750
- Matt W. conducted safety fence meeting @ 0805 Plans Envir. on-site @ 0750
- reposition boat over PSB-10 @ 0845
- calibrated PID @ 0855 by B. Burton
- start drilling PSB-10 @ 0855
- Sampled PSB-10-12.5-14.5 @ 0930 (lamp light suspect)
- Rex w/ savage on-site @ 1005
 to move boat from A.P #2 to A.P #1 w/ track-hoe. off-site @ 1045
- Reposition boat over PSB-11 start drilling @ 1040
 sample PSB-11-14.5-16.5 @ 1110
 Sample PSB-11-19.0-21.0 @ 1120
- repositioned boat over PSB-12 @ 1145
- start drilling @ 1155 on PSB-12
- Plans Envir. off-site @ 1330
- Break for lunch @ 1330 - to hardware store for supplies
- Back on-site @ 1420
- instruct staff gauges for Equal. Pond + A.P #1 + put in place
 A.P #1 = 1.30 E.P. = 0.60
- clean-up - get samples ready for delivery
- off-site @ 1600 for Fed Ex

~~Paul Bat~~ 10/31/08

Location EDR Date 11/3/08Project / Client El Paso Pond Soil BoringsB. Burton + M. Warner, + B. Grinn Sunny + Windy e

- Arrive on-site @ 0805
- Alan w/ USA on-site @ 0810
- Rex w/ Savage on-site @ 0820
- moved boat from A.E. Pond to Equal Pond
- Rex off-site @ 0855
- Jason + Troy w/ Plains on-site @ 0850
- Matt W. conducted Tailgate safety meeting @ 0855
- reposition boat over PSB-13 @ 0945
 - staff gauge reading = 0.60'
 - calibrated PZO @ 0915 - B. Burton Lamp light is shipped but working just fine
- start drilling PSB-13 @ 1000
- Sample PSB-13-11-13 @ 1050
- Sample PSB-13-14-16 @ 1100
- break for lunch @ 1200
- back on-site @ 1230 construct staff gauges for rest of Ponds, put in Southwest, W.O. + Primary Ponds
- Plains Envia break for lunch @ 1145
- back @ 1300
- Brad G. on-site @ 1310
- Rex w/ Savage on-site @ 1330 moved boat from E.P. to Southwest Pond off-site @ 1355
- move boat over PSB-15 @ 1405

drilled PSB-14
* script @ 1140

Location EDR Date 11/3/08Project / Client El Paso

- started drilling PSB-15 1415
- sampled PSB-15-6-8 @ 1305
- sampled PSB-15-19-21 @ 1335
- reposition boat over PSB-16
- start drilling @ 1625
- Plains Envia off-site @ 1730
- sample PSB-16-7-9 - @ 1720
- sample PSB-16-19-21 @ 1730
- Prep samples for Fed Ex
- off-site @ 1800 + Fed Ex

Paul But
11/3/08

Location EOR Date 11/4/08
 Project / Client EI Paso

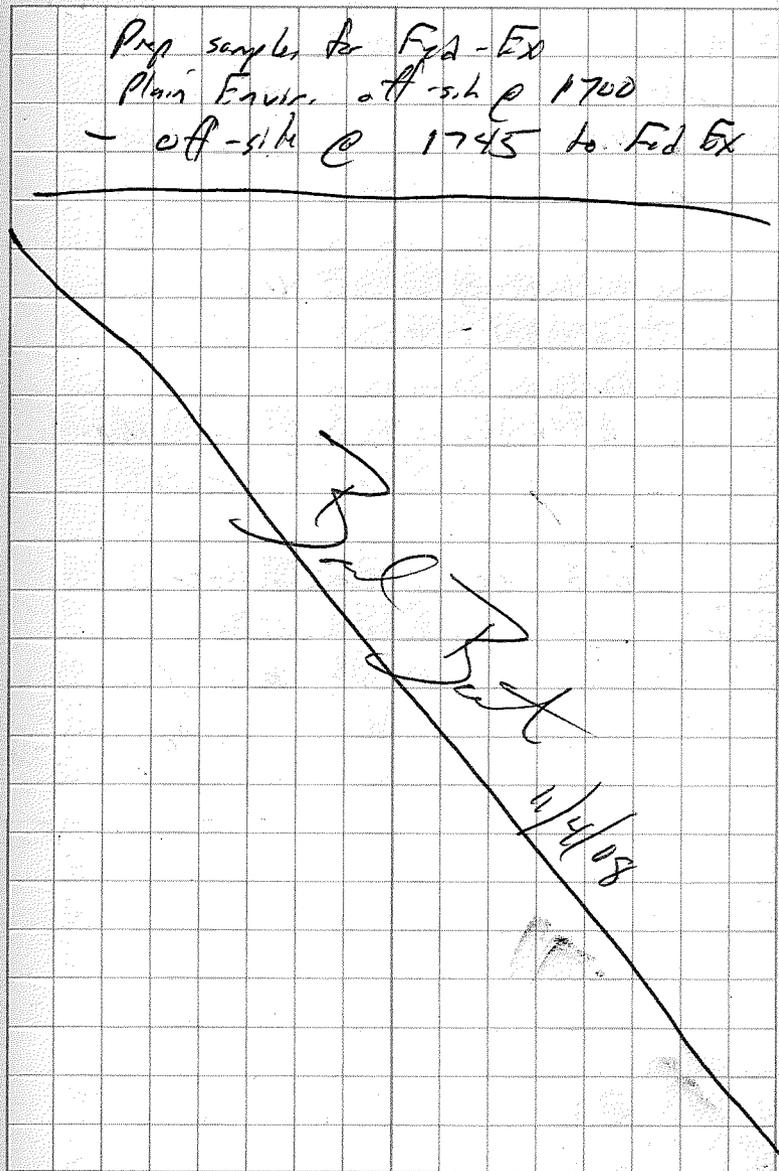
B. Berber, M. Wether, + B. Corra Prod Soil Borings

Sunny + Windy
30-40mph

- Arrive on-site @ 0745
- Plains Enviro. arrived @ 0755
- Matt W. conducted Safety tailgate meeting @ 0805
- reposition boat over - PSB-17 @ 0840
- Start drilling PSB-17 @ 0850
- calibrated PID by B. Berber @ 0900 ^{long light} began
- core got stuck in clay on way up - offset after 10.5 hrs to ~ $\frac{9}{(one)}$ west of original boring PSB-17 + redrill.
- sample PSB-17-6.5-8.5 @ 0850
- Plains break for lunch @ 1055 sample PSB-17-18.0-20.0 @ 1040
- Rex w/ Savage on-site @ 1120
- to move boat from S.E. Pond to W.C. Pond off-site @ 1145
- Break for lunch @ 1150
- back on-site @ 1220 Plains already on-site
- start drilling PSB-18 @ 1305
- sample PSB-18-6.5-8.5 @ 1340
- sample PSB-18-16.0-18.0 @ 1410
- reposition boat over PSB-19
- Brad Corra start drilling @ 1530
- off-site @ 1545 sample PSB-19-7.9 @ 1640
- sample PSB-19-19.2 @ 1650

Location EOR Date 11/4/08 (cont)
 Project / Client EI Paso

- Prep samples for Fgd-Ex
 Plains Enviro. off-site @ 1700
- off-site @ 1745 to Fed Ex



Location EOR Date 11/5/08Project / Client EI Paso Pond Soil BoringsM. Warner + B. Birtan Rain + Wind
(Thunderstorms)

- Arrive on-site @ 0755
Plains Envis + Jerald already on-site
- M. Warner conducted Safety Tailgate meeting @ ~ 0805
- Lightning spotted in area shut down due to lightning @ 0830
 - to get rope to tie off across big pond.
- ~~break~~ meet w/ Southern Star Appliances to locate pipeliner @ 1145
- Break for lunch @ 1200
- back on-site @ 1230
- set up rope on boat & across pond.
- off-site @ 1315 to office

Paul Bat

11/5/08

Location EOR W Date 11/6/08Project / Client EI Paso Pond Soil BoringsMatt W. + B. Birtan Cloudy + Windy
(30-45 mph)

- Arrive on-site @ 0740
- Plains Envis on-site @ 0815
- Matt W. conducted Safety Tailgate meeting @ 0820
- Ray on-site @ 0830 - calibrated PIP @ 0845 by B. Birtan
- position boat over PSB-20 start drilling @ 0900
 - sample PSB-20-8-10 @ 0950
 - sample PSB-20-16-18 @ 1025
- reposition boat over / near PSB-21
- Break for lunch @ 1125
- Back on-site @ 1155
- Doug on-site already in front of wind could cause us to shut down.
- Start drilling PSB-21 @ 1250
 - sample PSB-21-7.5-9.5 @ 1314
 - sample PSB-21-16-12 @ 1330
- reposition boat over PSB-22
- start drilling PSB-22 @ 1500
 - sample PSB-22-8-10 @ 1550
 - sample PSB-22-16.5-12.5 @ 1600
- Plains off-site @ 1615
- Prep samples for delivery
- off-site @ 1640 to Fed Ex

Paul Bat 11/6/08

Location EOR Date 11/7/08Project / Client EI Paso Pond Soil Barriers

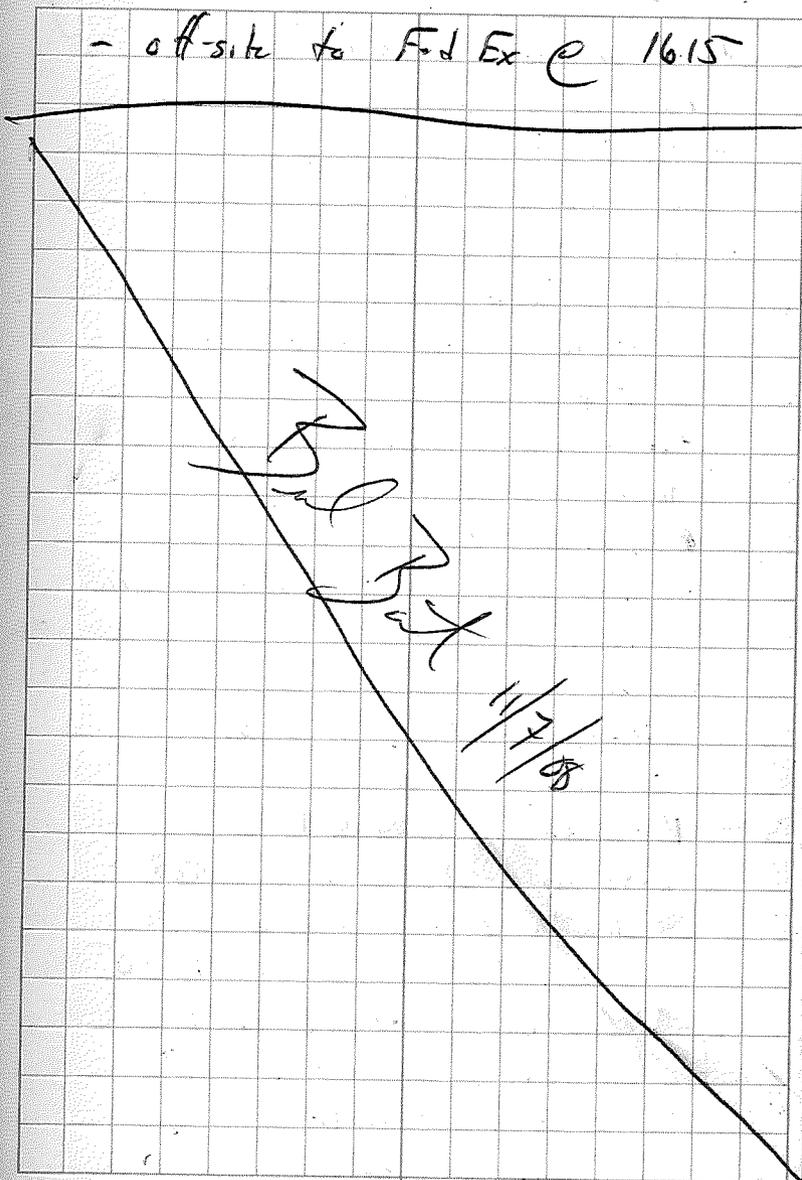
B. Barton + M. Warner + B. Grim (cloudy & windy 55°F)

- Arrive on-site @ 0740
- Matt W. conducted safety tail gate meeting @ 0815
- Plains on-site @ 0800
- reposition boat over PSB-23 @ 0850
- Plains fished for rods got them
- sample PSB-23-8-10 @ 0950
- sample PSB-23-11-13 @ 1000
- fax w/ Savage on-site @ 1015 moved boat from W. O. Pond to Primary Pond
- off-site @ 1040
- reposition boat over PSB-24 + start drilling @ 1050
- sample PSB-24-6-8 @ 1120
- sample PSB-24-10-12 @ 1130
- Plains break for lunch @ 1135
- Break for lunch @ 1200
- Back on-site from lunch @ 1230
- reposition boat over PSB-25
- start drilling @ 1315 on PSB-25
- sample PSB-26-8.5-8.5 @ 1440
- sample PSB-26-10.0-12.0 @ 1450
- Plains Envir off-site @ 1515
- prep samples for delivery

- calibrated PCO by B. Barton tonight

Location EOR Date 11/7/08Project / Client EI Paso

- off-site to FedEx @ 1615

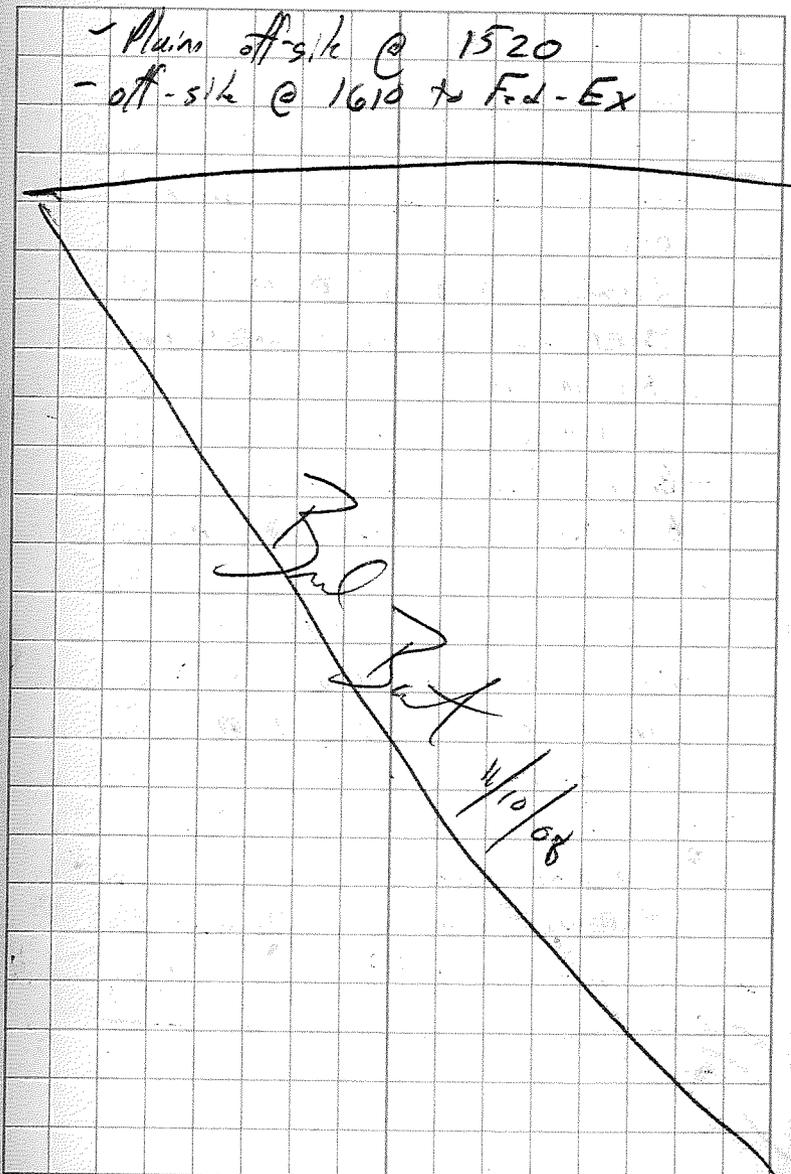


Location EAR Date 11/10/08Project / Client El PasoB. Burton & M. Warner (Rain + windy)
45°F

- Arrive on-site @ 0820
- Construct staff gauge for Spray Pond
- 0840 Rev w/ Savage on-site moved boat from Primary Pond to Spray Pond
- Riv. off-site @ 0930
- Plains Enviro on-site @ 0945
- Matt W. conducted Safety tailgate meeting @ 0950
- start drilling PSB-27 @ 1020 * Long Pipe
- calibrated PIA @ 1050 performed by B. Burton
- Sample PSB-27-8-10 @ 1200
- sample PSB-27-15-5-17.5 @ 1210
- sample PSB-27-10-12 @ 1220
- Plains break for lunch @ ~ 1140
- Break for lunch @ 1230
- Bull from lunch @ 1300
- Beg. drilling PSB-28 @ 1320
 - sample PSB-28-8-10 @ 1500
 - sample PSB-28-18-20 @ 1510
 - sample PSB-28-10-12 @ 1520
- Moved boat ~ 2 feet and drilled for duplicate sample PSB-28-Duplicate @ 1530 is the interval of 8-10' bars
- Prep samples for delivery

Location EAR Date 11/10/08Project / Client El Paso

- Plains off-site @ 1520
- off-site @ 1610 to Fed-Ex



Location EPR Date 11/11/08Project / Client EI ParaB. Burton & M. Warner Waste Pit Borings

- Arrive on-site @ 0815
- Doug already on-site
- Plans, Envir on-site @ 0855
- Doug M. conducted safety tailgate meeting @ 0900
- Calibrated PID @ 0915 by P. Burke
- STEPSB-02 drilled + completed by 1020PM
- STEPSB-01 " " by 1040
- STEPSB-03 thru 08 by 1145
- Break for Lunch @ 1200
- Back on-site @ 1300, Bill Picken on-site already
- Start drilling STEPSB-09 @ 1315
- STEPSB-10 thru 16 by 1530
- sample near STEPSB-02 @
 - sample STEPSB-02-2-4 @ 1540
 - sample STEPSB-02-5-7 @ 1550
- prep samples for delivery
- Matt W. tremble boring locations @ 1610
- off-site @ 1630 to Fed Ex

Bill Burton
11/11/08

Location EPR Date 11/13/08Project / Client EI ParaB. Burton & M. Warner - utility locations + cloudy
Sample stream sediment

- B. Burton arrived on-site @ 0950
- meet w/ Shane w/ consolidated @ 1000
- said truck on road 1665 lines
- M. Warner on-site @ 1050
- Jim w/ Muster cleared his pipeline w/ B. Burton @ 1130
- Break for lunch @ 1145
- Back on-site @ 1215
- sample STF-CR-W-0-6 @ 1300
- 16' across at STF-CR-W-0-6 sampled @ 8' in creek bottom.
- sample STF-CR-E-0-6 @ 1335
- 14' across at STF-CR-E-0-6 sampled @ 7' in creek bottom.
- Matt W. trembled orange well stick ups
- staked last temp-well location
- prep samples for delivery
- off-site @ 1500 to Fed Ex

Bill Burton
11/13/08

Location EDR

Date 11/17/08

Project / Client El Paso

B. Burton + B. Grimm

Drilling of Well Jurbell

- Arrive on-site @ 1220, Brad G. already on-site.

- Doug on-site @ 1240

- Doug conducted Safety tailgate meeting w/ Brad B. + Brad G.

- Brad B. + Brad G. got supplies

- Drillers called Brad B. @ ~ 1300 to inform of having to leave drill rig

@ weigh station near KS-OK border due to KS state laws.

- Drillers arrived w/ Doug @ ~ 1700
Went back to weigh station to get drill rig.

- Drillers called Brad B. @ ~ 1700
got drill rig & on their way to EDR.

- Brad B. + Brad G. off-site @ 1640.

~~Paul Bet~~
11/17/08

Location EDR

Date 11/18/08

Project / Client El Paso

B. Burton, B.G., + M.W. w/ Doug M.

- Arrive on-site @ 0730 Doug M. already on-site

- B.G. arrive on-site @ 0735

- Drillers, AET on-site @ 0740

- Doug M. conducted Safety Tailgate meeting @ 0745

- Drillers fix K.O. switch on rig

- Mob to TW-111, set up @ 1000

- Calibrated PIP reading = 116ppm by B. Burton @ 1005

- Drilling down on TW-111 @ 11:30

mob to TW-112

- Drillers break for lunch @ 1145

- Break for lunch @ 1200

Back on site @ 1230

- Drillers back @ 1245

- Begin drilling TW-112 @ 1305

- done @ 1350

- mob to TW-113 @ 1415

finish TW-113 @ 1515

- Mob to TW-114 @ 1530

Start drilling @ 1540

stop @ 1630

Drillers to Decon -

off-site @ 1730

~~Paul Bet~~
11/18/08

Location EORDate 11/19/08Project / Client EI Paso

B. Barber, B. Green, + M. Werner w/ D. Minto

- Arrive onsite @ 0700 B. Green check on-site M. Werner on-site @ 0700
- Drillers on-site @ 0700
- B. Barber contacted Tailgate Safety meeting @ 0705
- Mob to TW-111A drill boring to check for H₂O levels, start @ 0730 finish 0745
- B. Barber calibrate PIP @ 0730 reading = 108 ^{ppm}
- B. Barber re-calibrate PIP @ 0930 reading = 104
- M. Werner got H₂O + supplies
- Mob to TW-89 start drilling @ 0940
 - stop drilling check for H₂O @ 15' bgs
 - resume drilling to 20' bgs
 - stop drilling + set TW-89 @ 1145
- mob to TW-90 @ 1200
 - Lisa D. on-site to drop off logs
 - Break for lunch @ 1210
 - Back onsite @ 1240
 - start drilling @ 1305
 - stop @ 1405
- Mob to TW-91 @ 1420
 - start drilling @ 1435
 - stop drilling @ 1530
 - Mob to TW-93 →

Location EORDate 11/19/08Project / Client EI Paso

- Rig got a hole in the water tank due to tree under Rig, broke down - Drillers Proven Augers + fix rig @ 1600.
- B. Green off-site @ 1615
- B. Barber helped M. Werner develop TW-91.
- off-site @ 1745

Paul Bat

11/19/08

Location EDR Date 11/20/08
 Project / Client F1 Pass

- B. Burton + B. Grim + M. Warner
 = Arrive on-site @ 0705
 - B. Burton conducted Tailgate safety meeting @ 0715
 - Mob to TW-93 @ 0800
 - Rig struck w/ mud @ 0805
 - Tow truck on-site @ 0915
 Rig un-struck @ 1100
 - start drilling @ 1140 on TW-93, moved location next to gravel road
 - stop drilling @ 1215 set well TW-93
~~stop to~~ break for lunch @ 1230
 Back from lunch @ 1300
 Mob to TW-85 @ 1345
 Start drilling TW-85 @ 1405 - ^{dry} ^{discuss logs} ^{@ 1500}
 stop drilling @ 1520 leave hole open
 Mob to TW-86 @ 1530
 start drilling TW-86 @ 1545
 - stop @ 1645
 mob back to TW-85, still dry, continue drilling @ 1700, drilled 5 more feet still dry
 left open for tomorrow,
 drillers to dinner @ 1730
 Driller off-site @ 1745
 off-site @ 1745

Paul Bat
 11/20/08

Location EDR Date 11/21/08
 Project / Client F1 Pass

- B. Burton, B. Grim, + M. Warner
 - Arrive on-site @ 0630
 - Driller already here
 - conduct Safety Tailgate meeting by B. Burton @ 0635
 - Mob to TW-85 to finish set @ 0805
 - collaborate PIV by B. Grim @ 0810
 PIV = 102PPM
 - re-drill TW-85 to 32.68'
 - done @ 1045 w/ TW-85
 - set TW-85
 - mob to TW-103
 start drilling @ 1200
 - stop @ 1230
 Driller to dinner
 - Driller off-site @ 1345
 - off-site @ 1415 - [✓] TW-111A
 - Met. w/ still on-site no water @ 1415

Paul Bat
 11/21/08

Location EAR

Date 11/24/08

Project / Client E1 Peru

B. Barker & Doug Mills Sunny 55°F

- arrive on-site @ 0900

- TW-103 ↓ 7.00 = 10.02'

- Driller on-site @ 1000

- B. Barker conducted Tailgate safety meeting @ 1005

- B. Barker calibrated LID @ 1015 ready = 102

- Driller prep for drilling @ 1015 D. Mills on-site @ 1140

- Driller's move to TW-104 @ 1125

- break for lunch @ 1130 Driller

- Break for lunch @ 1130

- start drilling TW-104 @ 1215
stop @ 1325

- move to TW-105 start @ 1345

stop @ 1435

move to TW-100 start @ 1510

stop @ 1555

Drillers to dinner

- Driller off-site @ 1730

- off-site @ 1720

- Doug M. still on-site

Bul Bat 11/24/08

Location EAR

Date 11/25/08

Project / Client E1 Peru

B. Barker Sunny 55°F

Arrive on-site @ 0635, Driller already here

- 0640 B. Barker conducted Safety Tailgate meeting.

- Driller set-up

- D. Mills + M. Warner on-site @ 0700

- B. Barker on-site @ 0720

- M. L. to TW-102A start @ 0830

set TW-102A by 0930

- Drilled TW-102B ~ 5' south of TW-102A

to 30.5' bgs couldn't set well in auger or out of auger, Driller bailed to clean water, set well off by 1245.

Break for lunch @ 1300

Back on-site from lunch 1345

Move to TW-92

start drilling 1505 on TW-92

stop drilling @ 1550

- Driller to dinner @ 1620

- Driller off-site @ 1750

off-site @ 1800

Bul Bat 11/25/08

Location EPR Date 11/26/09Project / Client EI PassB. Burton

- Arrive on-site @ 0630, AEI, check + Butch already on-site
- B. Burton conducted Safety Tailgate meeting @ 0635
- B. Burton calibrated PSD @ 0655
- start drilling TW-83 @ 0815
- stop @ 0850 set well
- move to TW-109 @ 0940
- start drilling TW-109 @ 1025
- stop @ 1200
- Drillers to dinner
- B. Burton to check water level in all TW's
- Checked TW-116A - dry

TW-102A = 9.13 T.O.C., TW-102B = 8.90 T.O.C.

TW-111 = 6.92 T.O.C., TW-112 = 4.51 T.O.C.

~~check~~ TW-113 = 4.64, TW-114 = 4.35

TW-89 = 18.15, TW-92 = 16.01

TW-90 = 13.74, TW-91 = 9.05

TW-93 = 5.97, TW-85 = 25.25

TW-86 = 14.90, TW-83 = 7.72

TW-100 = 15.61, TW-103 = 9.62

TW-104 = 16.10, TW-105 = 17.16

Location EPR Date 11/26/09Project / Client EI Pass

- check + Butch w/ AEI off-site @ 1330
- off-site @ 1445

B. Burton
11/26/09

Location EDR Date 12/1/08
 Project / Client El Paso

B. Burton

- Arrive on-site @ 0800
- B. Burton calibrated PIP reading = 101 PPM @ 0825
- Found already on-site
- Doug M. & Christian from Denver on-site @ 0830
- Doug M. conducted Tailgate safety meeting @ 1015
- Drillers on-site @ 1000
- Mob to TW-88 @ 1030
 start @ 1110 end @ 1200
- Break for lunch @ 1300
- Back from lunch @ 1345
- Mob to TW-124 @ 1350
- Start drilling @ 1405
- Stop @ 1425
- Mob to TW-118 @ 1530
- start drilling @ 1555
- stop @ 1425 due to Rig malfunction
- Drillers field fix rig
- Drillers get flat fixed on-site @ 0630
- off-site @ 0625 Doug & Drillers still on-site.

Dal Bat 12/1/08

Location EDR Date 12/2/08
 Project / Client El Paso

B. Burton, Todd L., Christian, D., & Doug M.

- Arrive on-site @ 0830
- Drillers field fixing rig
- Todd & Christian & Doug already on-site
- Doug M. conducted Tailgate safety meeting @
- B. Burton calibrated PIP @ 1020 reading = 99.8 PPM
- Rig working @ 1150
- Break for lunch @ 1210
- Back on-site @ 1245
- ~~Rig broke down again @ 1300~~ - B13
- Rig broke down again @ 1300
- Fix Rig will take long time, Doug called
- Leave off-site @ 1520 w/ Todd
- Christian & Doug still on-site

Dal Bat 12/2/08

Location EAR Date 12/3/08Project / Client EI Paso

B. Barkat Todd L.

- Drillers getting new Rig on-site called Chuck to confirm when Rig arrives
- Rig to arrive @ ~ 1130
- Arrive on-site @ 1230
Drillers already drilling TW-118 reamers w/ F-6 Rig B. Barkat called P30 @ 1340 ready = 99.6%
- end of
- mob to TW-119 start drilling @ 1535 end @ 1645 set well TW-119
- Driller to Decon (no power washer) fix in morning
- off-site @ 1830

Bul Bark

12/3/08

Location EAR Date 12/4/08Project / Client EI Paso

B. Barkat, Christian B., & Todd L.

- Drillers need to get to Wichita to get parts for power washer - (late start)
- arrive on-site @ 0900.
- B. Barkat conducted safety Tailgate meeting @ 0920
- Christian & Todd arrive on-site ~ 1010
- B. Barkat called P30 reading = 102 ppm @ 1020
- Drillers had trouble decoring auger (chases frozen)
- mob to TW-121 @ 1200
- Break for lunch @ 1210
- start drilling TW-121 @ 1250 stop @ 1355
- Drill Rig has hydraulic leak drillers to fix 1445
- Christian & Todd off-site @ 1500 -BB
- Drillers fixed hydraulic leak @ 1630
- Driller Decon auger
- off-site @ 1720

Bul Bark 12/4/08

Location EPR Date 12/5/08Project / Client El PasoB. Burke, Christopher B., Todd L.

Arrive on-site @ 0630

B. Burke conducted Safety Tailgate meeting @ 0640

- Driller on-site @ 0635

- B. Burke calibrated PTO @ 0650 reading = 101 ppm

- start on TW-122 @ 0805

end @ 0920

- mob to TW-108

start @ 1030

end @ 1130

- Driller to Decon @ 1145

- off-site @ 1245

Bul Bur
12/5/08

Location EPR Date 12/8/08Project / Client El PasoB. Burton + R. Gann

Arrive on-site @ 0850, Driller on-site @ 0930

B. Burton conducted Safety Tailgate meeting

@ 0945

B. Burke calibrated PTO @ 0920 reading = 103 ppm

Mob to TW-98 start @ 1400

end @ 1120

Break & Lunch @ 1240

Back from lunch 1310

start TW-97 @ 1320

end @ 1340

Mob to TW-94

start @ 1435

end @ 1448

Mob to MW-99

start @ 1540

end @ 1600

Driller to Decon

- off-site @ 1745

Bul Bur
12/8/08

Location EPRDate 12/9/09Project / Client El PasoB. Barton

- Arrive onsite @ 0635
- Driller arrive @ 0645
- B. Barton conducted Safety tailgate meeting @ 0650
- B. Barton calibrated PID @ 0655 $reading = 107 \frac{ppm}{in}$
- mud to TW-96 (mud matts from 2745-0915) to TW-96
- start @ 0915
- end @ 0940
- Stack Fuelift & segment in mud
- Get out by 1145
- Break for lunch @ 1200
- Back @ 1235
- Mud to TW-101
- start @ ~~1300~~ 1333 Rig broke down
- Quick fix up @ 1550 start again
- end @ 1440
- Driller can't decou from lines
- off-site @ 1500

End Day 12/9/09

Location EPRDate 12/10/09Project / Client El PasoB. Barton

- Arrive onsite @ 0700
- Drillers called, to Super 8 Motel to jump their truck back onsite @ 0900
- Drillers onsite @ 0925
- * Was w/ USA onsite @ 0900 said lock was done wrong couldn't get in @ 0700
- to get fuel cleaner to truck
- B. Barton calibrated PID @ 1030 $reading = 103 \frac{ppm}{in}$
- B. Barton conducted Safety tailgate meeting @ 0935
- Driller Rig up @ 1200
- Mud to TW-129
- start @ 1235
- end @ 1400
- Mud to TW-84 @ 1430
- Mud matt to TW-84 1450 - 1700
- ~~Driller~~ set up on TW-84 left rig on TW-84 for tomorrow, no decou
- off-site @ 1745

End Day 12/10/09

Location EPR Date 12/11/08Project / Client EI Paso

B. Barton + B. Green

- Arrive on-site @ 0630, went to Rig set-up on TW-84 to start up & warm up
- B. Barton conducted Safety Tailgate meeting @ 0655
- B. Barton calibrated PID @ 0730 reading = 102
- Was on-site @ 0715 to help w/ Rig in and
- ~~Start~~ Start drilling @ 0850 B. Green on-site @ 0845
- Finish @ 1130
- ~~Move~~ Driller to down @ 1200
- Break for lunch @ 1215
- Back from lunch @ 1245
- check shaft gauges per Doug
- check stop out locations per Doug
- Driller ready @ 1330
- Move to TW-87 start @ 1410
- Finish @ 1500
- Move to TW-130 start @ 1610
- Finish @ 1705
- Driller to down
- Brad G. off-site @ 1700
- off-site @ 1820

Brad G. 12/11/08

Location EPR Date 12/12/08Project / Client EI Paso

B. Barton +

- Arrive on-site @ 0630
- AFE on-site @ 0640
- B. Barton conducted Safety Tailgate meeting @ 0650
- B. Barton calibrated PID @ 0705 reading = 102
- Move to TW-106B
- Start @ 0825
- end @ 1000
- Move 8' North to TW-106A
- Start @ 1025
- End @ 1130
- Driller to down + off-site @ 1215
- Run & of water levels
- ~~Start~~ off-site @ 1510

Brad G. 12/12/08

Location EDR Date 12/15/08Project / Client F1 PasoB. Burton

- Drilling activities postponed due to extreme cold weather conditions.
- ~~Drillers mob to site to prep for tomorrow's drilling activities.~~ ^{BB}
- Drillers called & cancelled mob to site due to weather conditions through tomorrow morning.

~~Burton~~~~Burton~~~~12/15/08~~Location EDR Date 12/16/08Project / Client F1 PasoB. Burton & M. Warner

- Drillers mob to site in morning / Drillers can't drive due to icy roads today
- Arrive on-site @ 1105 informed drillers can't mob due to weather conditions
- went to lunch @ 1200
- got supplies @
- put locks on all the previously installed
- off-site @ 1500

* All drilling postponed until January 5th

~~Burton~~~~Burton~~~~12/16/08~~

Location EOR Date 1/5/09Project / Client El Paso

B. Burton (Drillers on-site in morning)

Arrive on-site @ 1000

Drillers on-site @ 1015

conduct Tailgate Health + Safety Meeting @ 1020
by B. Burton

- Tie up loose ends on notes w/ Chuck @ 1030
- calibrate PID @ 1115 by B. Burton reading = 101 ppm
- Break for lunch @ 1130
- Back from lunch @ 1200
- Drillers getting more grout cement for deeper wells

- Set up on TW-103B @ 12:30

begin drilling @ 12:45

- TD @ 1400, set well by 1500
- Mob to TW-105B @ 1510

start drilling @ 1520

TD @ 1710, set well by 1840

Drillers to Decon

off-site @ 1945

~~Deal But 1/5/09~~

Location EOR Date 1/6/09Project / Client El Paso

B. Burton

Arrive @ 0635

Drillers on-site @ 0645

B. Burton conducted safety Tailgate meeting @ 0650

B. Burton calibrated PID @ 710 reading = 100 ppm

- Drillers to get more grout (grout) @ 0700
- Mob to TW-131

start drilling @ 830

TD @ 0910, set well by 0940

- Mob to TW-125 @ 1015

start drilling @ 1030

TD @ 1100, set well by 1140

- Break for lunch @ 1150
- Back on-site @ 1240

- Mob to TW-128 @ 1245

start drilling @ 1320

TD @ 1355 set well by 1430

Mob to TW-126

start drilling @ 1505

TD @ 1530 set well by 1600

Drillers to Decon @ 1600

off-site @ 1800

~~Deal But 1/6/09~~

Location EOR Date 1/7/09
 Project / Client EI Paso

B. Burton

Arrive on-site @ 0630, Drillers already here
 B. Burton conducted Tailgate safety meeting @ 0645
 B. Burton calibrated PTO @ 0700 PTO reading = 101 ppm
 - Drillers to get supplies @ 0710 break @ 0730
 - Mob to TW-120 @ 0745
 start drilling @ 0800-33
 TP @ 0910 set well by 1000
 Mob to TW-87 then to TW-24B @ 1130
 Mud Matt + TW-84D ~ 10-15' east of TW-24
 from 130-1300 Mud Matt
 Break for lunch @ 1310
 Back from lunch @ 1320
 start drilling on TW-24B @ 1330
 TN @ 1450 set well by 1550
 Mud Matt out of area by 1640
 Drillers to Decon + dump bin
 off-site @ 1750.

Burton
 1/7/09

Location EOR Date 1/8/09
 Project / Client EI Paso

B. Burton + M. Warner

Arrive on-site @ 0630
 B. Burton conducted Tailgate safety meeting
 @ 0640
 B. Burton calibrated PTO @ 0700 PTO reading = 101 ppm
 Mob to TW-107 @ 750
 start drilling @ 0820
 TN @ 0920 set well by 0950
 - Drillers to get more chips @ 1000
 - ~~Mud Matt~~ -33 + dump bin
 - Mob to TW-127 @ 1010
 start drilling @ 1025
 TN @ 1100 set well by 1120
 Break for lunch @ 1140
 Back from lunch @ 1210
 Mob to SB-43 begin drilling @ 1240
 TD 16' @ 1315 plug until 1350
 Mob to SB-44 start drilling @ 1410
 TD 15' @ 1430 plug until 1450
 Mob to SB-42 start drilling @ 1510
 TD 15' @ 1530 plug until 1600
 Drillers to decon + matt w. pack samples
 for shipping
 Drillers off-site ~~at 1800~~ @ 1800
 off-site @ ~~1830~~ 1830

Location EDR Date 1/9/09
 Project / Client EI Paso

B. Barton & M. Warner

Arrive on-site @ 0640

B. Barton conducted Tailgate safety meeting @ 0645

B. Barton calibrated PFD @ 0700 reading = 104 ppm

- Drillers do get water @ 0700

- Mob to SB-39, start drilling @ 0800
 (wanted for Terold to locate pipelines)

TD 20' @ 0830, plug hole w/ bentonite grout

Mob to SB-40 @ 0850, start drilling @ 0900

FP 20' @ 0930, plug hole w/ bentonite grout

Mob to SB-41 @ 0950, start drilling @ 1005

TD 20' @ 1030, plug hole w/ bentonite grout

Drillers to decan @ 1115

Drillers off-site @ 1300

Break for lunch @ 1230

Back @ 1315

off-site @ 1330 (M. Warner to develop wells)

Bul Bart 1/9/09

Location EDR Date 1/12/09
 Project / Client EI Paso

B. Barton

Cloudy
 Windy 48-F

- Arrive on-site @ 1000

- B. Barton calibrated PFD @ 1010, reading = 104 ppm

- Drillers arrive on-site @ 1020

- B. Barton conducted Tailgate safety meeting @ 1040

- Drillers load @ 1030

Mob to TW-25B @ 1100

Rig stuck @ 1120, Mud matt @ 1130

TD TW-25B @ 1210

Break for lunch @ 1215

Back from lunch @ 1245

Start drilling TW-25B @ 1245

TD 30' @ 1330, set well log 1425

Mud matt got til 1445

Mob to TW-104B

Start drilling @ 1530,

stopped @ 15' log due to losing light @ 1600

Drillers to decan @ 1605

off-site @ 1710

Bul Bart 1/12/09

Location E DR Date 1/13/09
 Project / Client E 1 Paso
B. Burton Sunny 200F

Arrive on-site @ 0630

Drillers on-site @ 0630

B. Burton conducted Tailgate Safety meeting @
0640

B. Burton calibrated PID @ 0700 Reading = 101 ppm

- Too cold for Rig's hydraulics to work

Drillers set up on TW-104B @ 0830

Hydraulics still don't work due to cold weather

- Resume drilling @ 1000 on TW-104B

TD 40' @ 1100, set well by 1200

Mob to TW-23B @ 1200-1220

Break for lunch @ 1220

Back from lunch @ 1250

Start drilling TW-23B @ 1305

TD 25' @ 1340, set well by 1420

- Drillers to decon enough auger to do TW-27B

- Mob to TW-27B by 1500

Start drilling TW-27B @ 1500

TD 35' @ 1615, set well by 1700

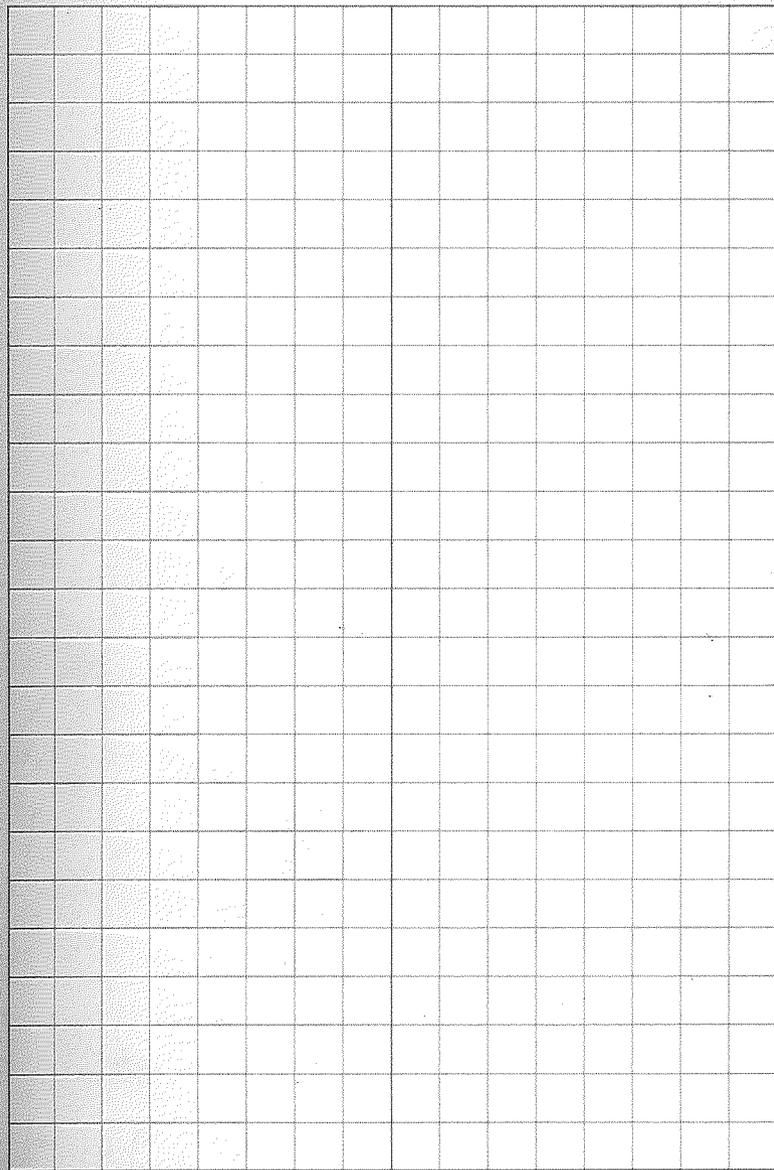
Drillers to decon

off-site by 1820

~~Bul Bar 1/13/09~~

Location _____ Date _____

Project / Client _____



PAGE NOT USED

5/26/09

E1 Do - Pond Sampling ^{Sunny} D. Mick, M. Warner
& off-site Well Installation B. Bartoni

- 0800 Arrive on-site, D. Mick already on-site
- 0815 Safety Tailgate meeting w/ P. Mick
- 0830 Mob to off-site well location & set-up, Matt W + D. Mick work on boat
- 0945 Drillers on-site, Safety Tailgate meeting, Calibrate PID
- 0950 Begin drilling TW-132
- 1130 At TD = 20' bgs on TW-132 set well & surface completion
- 1230 Break for Lunch
- 1330 Back at well location, check for water in hole, water @ ~ 18.72' TD in well = ~ 19.41' bgs
- 1430 Drillers off-site, done w/ well installation

~~End Part 5/26/09~~

Pond Sampling

- 1045 Jason + Chris w/ Plain's Envir. on-site & setting up GeoProbe on boat
- 1130 Plain's Envir off-site to get supplies for Pond Sampling
- 1230 Break for Lunch

5/26/09

Pond Sampling - El Paso

M. Werner
B. Bester
D. Mick

- 1330 Back on-site
 1345 Safety Tailgate meeting by D. Mick
 w/ Plains Envir. (Jason, Chris & Lynn (owner))
 & Brad B. & Matt W.
 1400 Begin setting up for sampling in Marley Pond
 1405 Rex w/ Savage on-site to move back w/
 Track-hue into Marley Pond.
 1410 Lynn off-site (owner of Plains Envir.)
 1440 Boat in Marley Pond & Rex w/ Savage
 off-site
 1500 Boat in position & begin drilling on
 PSB-27
 1600 Rex³³ Finished drilling
 1615 Boat docked on M.P. shore,
 - Logged & sampled PSB-27 (2-4)
 - Prep boat for transport, ship & pack sample
 1800 Off-site to Fed-Ex

→
 5/26/09
 →

5/27/09

Pond Sampling - El Paso

Mick D. M. Werner
B. Bester
D. Mick

- 0720 Arrive on-site D. Mick already on-site
 0750 Plains Envir. (Jason & Chris) arrive
 on-site
 0800 D. Mick conducted Safety Tailgate
 meeting, calibrated IED by B. Bester
 0805 Rex w/ Savage on-site
 0820 Call K&D to shut off power
 0820 Begin moving boat to Spray Pond
 0840 R&D on-site, shut off power
 to facility
 0850 Boat in Spray Pond
 0900 Run R & D off-site
 0910 Rex w/ Savage off-site
 1000 Boat in position & begin drilling
 on PSB-28 in Spray Pond
 1110 Boat³³ Finished drilling & boat
 docked
 1120-1140 Sample & log PSB-28
 1200 Break for lunch, Doug M. off-site
 1230- Back on-site, Rex w/ Savage on-site
 1330 to transport boat from Spray Pond to
 Southeast Pond w/ Track-hue.
 1300 Mick D. on-site
 1400 - Rex w/ Savage off-site

→

5/27/09

Pond Sampling - E100

Mike D. M. Warner
B. Burton
D. Grinn

- 1500 Boat in position, begin drilling on PSB-29
 1600 Drilling finished, shaker returned couldn't
 get to 10' below soil/sediment interface called
 Doug M. to notify.
 1630 Sample + log PSB-29.
 1645 Mike D. off-site
 * - Matt W. noted that civilian showed up
 at SE Pond asking for info. about helping
 out w/ Demo at Refinery, gave person ^{BB}
 Doug M. contact info, happened @ ~ 1500.
 1650 Drillers got flat on truck.
 1700 Pack + ship samples.
 1715 Drillers off-site
 1800 off-site to Fed-Ex.

~~Paul But 5/27/09~~

5/28/09

Pond Sampling - E100

M. Warner
B. Burton
D. Grinn

- 0720 Arrive on-site
 0740 Drillers on-site
 0800 B. Burton conducted Safety Tailgate
 meeting + Calibrated PTO
 0830 B. Grinn on-site to Develop TW-132
 + help tie-off on W. Oxidation Pond.
 0810 Rex / W. Savage on-site to move boat
 from SE Pond to W. Oxidation Pond
 0845 Rex w/ Savage off-site
 0930 Boat in position on PSB-30
 (South Location on W. Oxidation Pond)
 1030 Drilling finished, boat docked @
 1100 Boat docked, logged + sampled
 PSB-30 (2-4), Drillers repositioned
 boat near PSB-31.
 1115 Drillers to lunch
 1145 Break for lunch
 1215 Back on-site
 1300 Boat in position on PSB-31
 (North location - W. Oxidation Pond)
 1430 Drilling finished + boat docked
 VM-33 Logged + sampled PSB-31 (2-4) (5-7)
 + (8-10)
 1450 Rex w/ Savage on-site to transport
 boat from W. Oxidation Pond to A.E.#3

5/28/09

Pond Sampling - E100

M. Werner
B. Barton
B. Grim

- 1530 Rex w/ Savage off-site
 1545 Boat positioned over PSB-32 in
 AE Pond #3
 1630 Finished Drilling on PSB-32, decked
 & logged & sampled PSB-32 (2-4)
 1700 Drillers off-site B. Grim to finish
 developing TW-132.
 1710 Park & ship samples.
 1745 B. Grim, M. Werner, & B. Barton off-site
 M. Werner & B. Barton to Fed-Ex

~~3
 Boat 5/28/09~~

5/29/09

Pond Sampling & Sample TW-132
E100M. Werner
B. Barton

- 0715 Arrive on-site
 0740 Drillers on-site
 0800 B. Barton conducted safety tailgate
 meeting & Calibrated PID.
 0800 Rex w/ Savage on-site to transport
 boat from AE Pond #1 to AE Pond
 #3.
 0800 Called Doug to confirm that
 we sampled wrong AE Pond yesterday
 it was confirmed we did AE Pond #1
 need to do AE Pond #3.
 0845 Rex w/ Savage off-site
 0915 Boat positioned over PSB-33 in
 AE Pond #3, correct Pond.
 0920 Chris F. on-site
~~0930~~⁰⁹³⁵ Chris F. off-site
 0940¹⁰⁰⁰ Chris F. off-site
 1000
~~1015~~¹⁰³⁵ Drillers finished w/ PSB-33
~~1050~~¹⁰⁵⁵ Sampled & logged PSB-33 (2-4)
 1050 Rex w/ Savage on-site to move
 Boat from AE Pond #3 to Primary Pond
 1120 Rex w/ Savage off-site
 1130 Boat positioned over PSB-34 in
 Primary Pond
 1240 Drilling finished on PSB-34
 sampled & logged PSB-34 (2-4)
 1250 Rex w/ Savage on-site to move
 Boat from Primary Pond onto trailer.

5/29/09 Pond Sampling & Well sample TW-132
B. Bate M. Werner

- 1330 Boat on trailer, Drillers loading up their stuff, Rex w/ Savage to dock the truck-ho at front gate
- 1345 Drillers off-site, Rex w/ Savage off-site
- 1400 Break for lunch
- 1430 Back on-site to sample TW-132 low-flow sampling
- 1430 Matt We set-up on TW-132 to collect parameters, Brad B. to Potwin to pick up bottles (VOR's) for sampling
- 1540 Brad B. back on-site
- 1545 Sampled TW-132
- 1600 Pack & ship samples in same cooler per Pong M.
- 1630 off-site to Fed-Ex

~~Brad Bate
5/29/09~~

Appendix D

ProUCL

APPLICATION OF PROUCL FOR EL DORADO PROJECT

Assumptions

1. The samples represent one complete dataset for the background and site area, although the sampling dates are varied (with a timeframe spanning greater than one year).
2. The site data does not represent a mixture sample, but a single individual population.
3. Data that was reported in the RESULT Field Name was applied for the analysis. ProUCL has internal capabilities to replace non-detect (ND) values with one-half of the detection limit (DL/2); however, the authors do not recommend this method to perform hypothesis testing approaches. As a result, the RESULTCorr values were not applied (since these include ND values already replaced with DL/2) in order to avoid problems with applying this correction twice and biasing results.
4. Non-detect (samples with a qualifier flag of U) values were included in the program file and statistics where they were applicable. Each Metal has an associated column called D_Metal which includes information on ND (0 = ND value, 1 = detect value).
5. Samples with a qualifier flag of J (Estimated) and E (Concentration Exceeded Equipment Calibration) were included in the analysis as detect values.
6. Duplicate samples were not included in the analysis. Since there are only a few duplicate samples, including them in the statistical analysis may skew the results. It was assumed that their purpose was for verification of sampling precision only.

Method

The method applied with the ProUCL software is as follows.

1. *Characterization of background and site data sets.* The data were extracted, compiled and separated into detect and non-detect values based on the qualifier flags. Duplicate samples were removed. Data was input into the ProUCL format.
2. *Calculate Summary Statistics.* Basic statistics were estimated for both the background and site data sets. These help to characterize the data available; however, they only apply statistics to detect values.
3. *Goodness-of-Fit (GOF) Tests.* The background and site datasets were tested for goodness of fit to see if they followed a normal, log-normal or gamma distribution. This is important since the outlier tests and methods to estimate ND values using regression on order statistics (ROS) methods require that the data follow a normal distribution.
4. *Outlier Tests.* Require that data follow a normal distribution. Box Plots were considered as a method to identify outliers.
5. *Estimating ND Values with ROS methods.* This involves extrapolating non-detects based upon certain distributional assumptions about detected and nondetected observations.
6. *Two-sample Hypothesis Testing.* Approach to compare the parameters and distributions of two populations based upon data sets collected from each.

Background Data

The background data included information from sites BG-01 through BG-15. Summary statistics describing the dataset available for this area are presented in the table below.

	A	B	C	D	E	F	G	H	I	J	K	L	M
3	Summary Statistics for Raw Data Sets with NDs using Detected Data Only												
4													
5	Raw Statistics using Detected Observations												
6	Variable	Num Ds	NumNDs	% NDs	Minimum	Maximum	Mean	Median	SD	MAD/0.675	Skewness	CV	
7	Antimony	0	15	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
8	Arsenic	15	0	0.00%	4.7	6	5.173	5	0.394	0.445	0.797	0.0761	
9	Barium	15	0	0.00%	116	298	163.4	146	53.24	32.62	1.643	0.326	
10	Beryllium	15	0	0.00%	0.79	1.2	0.925	0.87	0.12	0.0593	1.261	0.129	
11	Cadmium	1	14	93.33%	0.3	0.3	0.3	0.3	N/A	0	N/A	N/A	
12	Chromium	15	0	0.00%	16	25.3	18.49	17.3	2.727	1.483	1.559	0.148	
13	Cobalt	15	0	0.00%	6	15.2	8.507	8.3	2.207	1.334	2.084	0.259	
14	Lead	15	0	0.00%	12.9	19.9	15.67	15.4	1.629	1.186	0.883	0.104	
15	Magnesium	15	0	0.00%	1670	3680	2247	1940	614.5	237.2	1.42	0.273	
16	Manganese	15	0	0.00%	300	658	384.6	368	93.4	60.79	2.007	0.243	
17	Mercury	0	15	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
18	Nickel	15	0	0.00%	12.6	23.9	16.34	15.6	2.912	1.631	1.336	0.178	
19	Potassium	15	0	0.00%	1820	2670	2080	2020	252.6	207.6	1.324	0.121	
20	Selenium	0	15	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
21	Silver	0	15	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
22	Vanadium	15	0	0.00%	32.4	45.9	36.59	35.5	3.846	2.965	1.268	0.105	
23	Zinc	15	0	0.00%	31.1	53	39.64	38.5	6.676	6.523	0.811	0.168	

GOF Tests

The goodness of fit test for the background data set was somewhat inconclusive, as most of the variables did not fit a specific type of distribution. The following tables show the results for variables that had more than one detect observation to test. Based on the GOF statistics, many of the metals fit several or all types of distributions since the test values were above the default ProUCL critical values. The variables with all non-detects were not tested since there were not sufficient data.

Variable	Type of Distribution
Antimony	N/A, all non-detects
Arsenic	Normal, Gamma, Lognormal
Barium	Lognormal
Beryllium	Lognormal
Cadmium	N/A, only one detect value
Chromium	None
Cobalt	Gamma, Lognormal
Lead	Normal, Gamma, Lognormal
Magnesium	Lognormal
Manganese	Gamma, Lognormal
Mercury	N/A, all non-detects
Nickel	Normal, Gamma, Lognormal

Potassium	Normal, Gamma, Lognormal
Selenium	N/A, all non-detects
Silver	N/A, all non-detects
Vanadium	Gamma, Lognormal
Zinc	Normal, Gamma, Lognormal

Outlier Tests

The main objective is to model the data representing the main dominant population and not accommodate a few outliers, which could be naturally occurring. However; outliers may also represent true extreme values of a population. The outlier tests included in ProUCL assume that the data are normally distributed, which is not necessarily the case for the background data set. As a result, box plots with whiskers were used to look for possible outliers, since they can give a good indication of the extreme observations that may be present in a data set. The statistics that are used in the construction of the box plot include the lower quartile, median, upper quartile and interquartile range (IQR) and these statistics do not get distorted by outliers. Observations that are located beyond the two whiskers may be considered as candidates for potential outliers. Several metals had values that were located outside the whiskers on the box plot, but there are often several samples that fall in this range. These samples were not eliminated, as additional information would be required in order to characterize them as outliers. As a result, outliers were not removed from this dataset at this time.

Estimating ND Values

This is not the preferable option to supplement the dataset, specifically since the samples that have ND values for a specific metal generally have a high percentage of ND values, which would make extrapolation difficult and unreliable.

Site Data

The site data included information from all sites available in the database for the 0 to 2 foot depth level. Samples with a prefix of PSB (Pond Soil Boring) and TR (located in the AHA area) were removed. Duplicate samples were also removed from the dataset.

It is assumed that the site data does not represent a mixture sample, but a single individual population. Multi Q-Q plots can be a helpful tool to estimate whether this assumption is correct. A normal Q-Q plot can help identify multiple populations in a dataset, since the occurrence of obvious breaks and jumps in the data in a Q-Q plot may suggest the presence of multiple populations in the mixture data set. Normal Q-Q plots are included in this word document for each metal in the site data set. There are some jumps in the dataset for Beryllium; however, separating the site into two areas does not show an improvement. Most other plots do not include jumps that would indicate multiple populations. There are a few values located outside the range of data for many of the metals, which may represent outliers.

In order to analyze whether separation of the data set into multiple populations may alter the results, the site data were broken into two separate areas; the South Tank Farm and the Main Process Area (MPA)/Wastewater/Stormwater Pond Area. The GOF tests and two-sample hypothesis tests were run separately for these two areas to see if there was a difference in the results. The sample locations for each area are described in the table below.

	A	B	C	D	E	F	G	H	I	J	K	L	M
3	Summary Statistics for Raw Data Sets with NDs using Detected Data Only												
4													
5	Raw Statistics using Detected Observations												
6	Variable	Num Ds	NumNDs	% NDs	Minimum	Maximum	Mean	Median	SD	MAD/0.675	Skewness	CV	
7	Antimony	0	258	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
8	Arsenic	251	7	2.71%	2.7	20	6.025	5.7	2.101	1.334	2.657	0.349	
9	Barium	258	0	0.00%	21.1	766	200.6	182.5	107.3	78.58	1.748	0.535	
10	Beryllium	255	3	1.16%	0.22	1.4	0.857	0.89	0.239	0.178	-0.541	0.278	
11	Cadmium	62	196	75.97%	0.25	3.4	0.563	0.395	0.484	0.17	3.847	0.86	
12	Chromium	258	0	0.00%	2.6	703	23.7	18	50.75	4.151	11.36	2.141	
13	Cobalt	258	0	0.00%	1.6	34.2	8.106	8.2	3.094	1.631	2.469	0.382	
14	Lead	264	0	0.00%	2.4	5840	163.7	21.65	474.2	14.75	7.71	2.897	
15	Magnesium	258	0	0.00%	385	92300	4488	2895	7340	1001	8.01	1.636	
16	Manganese	258	0	0.00%	34.5	3120	367.2	330.5	282.8	151.2	5.652	0.77	
17	Mercury	107	151	58.53%	0.021	2	0.168	0.047	0.351	0.0326	3.672	2.097	
18	Nickel	258	0	0.00%	3.1	40	17.11	16.4	5.962	4.003	1.171	0.348	
19	Potassium	258	0	0.00%	286	5150	1913	1860	638.5	355.8	1.062	0.334	
20	Selenium	0	258	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
21	Silver	0	258	100.00%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
22	Vanadium	258	0	0.00%	4.8	78.1	31.89	33.55	9.884	6.449	-0.354	0.31	
23	Zinc	258	0	0.00%	7.9	548	54.59	42.4	58.36	14.31	5.337	1.069	

Area	Sample Locations
South Tank Farm	BH-001 - BH-058 BH-143 - BH-145 TW-01 – TW-43 TW-72 – TW-80
MPA/Wastewater/Stormwater Pond Area	BH-059 – BH-142 SB-01 – SB-44 TW-44 – TW-71 TW-123

GOF Tests

As observed in the background data, most of the variables did not fit a specific type of distribution for the site data. The following table shows the results for variables that had more than one detect observation to test. Based on the GOF statistics for the entire site, many of the metals fit did not fit any type of distribution since the test values were below the default ProUCL critical values. The variables with all non-detects were not tested since there were not sufficient data.

The data were separated into the South Tank Farm and the MPA/Wastewater/Stormwater Pond Area and the GOF tests were run separately on these data sets to see if specific areas of the site followed a distribution better than the overall site data. The results were very similar, with a few variables fitting distributions in the separate data sets that did not for the overall combined data.

GOF Testing for Site Data			
Variable	Type of Distribution (All Site Data)	Type of Distribution (MPA/Wastewater/Stormwater Pond)	Type of Distribution (South Tank Farm)
Antimony	N/A, all non-detects	N/A, all non-detects	N/A, all non-detects
Arsenic	None	None	None
Barium	Approximate Gamma	Approximate Gamma	Gamma, Lognormal
Beryllium	None	None	None
Cadmium	Lognormal	Lognormal	Normal, Gamma, Lognormal
Chromium	None	None	None
Cobalt	None	None	None
Lead	None	None	None
Magnesium	None	None	None
Manganese	None	Lognormal	None
Mercury	None	Lognormal	Normal, Lognormal
Nickel	None	None	None
Potassium	None	None	None
Selenium	N/A, all non-detects	N/A, all non-detects	N/A, all non-detects
Silver	N/A, all non-detects	N/A, all non-detects	N/A, all non-detects
Vanadium	None	None	None
Zinc	None	None	None

Outlier Tests

The outlier tests included in ProUCL assume that the data are normally distributed, which is not the case for the site data set. As a result, box plots with whiskers were used to look for possible outliers by comparing side-by-side box plots of the background and site data for each metal. These box plot comparisons are included in this word document for each metal. All plots include ND observations if they exist. Several metals had values that were outside of the whiskers on the box plot, yet these were generally on the same order of magnitude as other samples and there were often several measurements, suggesting that these may not be outliers.

For cadmium, there was one value outside of the whiskers (sample SB-31) that is an order of magnitude higher than the other data. For chromium, samples SB-37 and SB-38 had values that were much larger than the other data and may be outliers. These samples were not eliminated, as additional information and consideration of site characteristics would be required in order to characterize them as outliers. As a result, outliers were not removed from this dataset at this time.

Estimating ND Values

This is not the preferable option to supplement the dataset, specifically since the variables that have ND values for a specific metal generally have a high percentage of ND values, which would make extrapolation difficult and unreliable.

Two-sample Hypothesis Testing

When underlying assumptions for the parametric tests are not met (e.g. normality) or outliers are present, the parametric test can provide incorrect conclusions. In addition, it is preferable to use

nonparametric methods to compute statistics of interest using data sets with ND observations. Since the GOF tests did not show that the data sets followed the normal distribution and ND observations are present, nonparametric tests were applied for two-sample hypothesis testing.

The first step to apply the two-sample hypothesis testing approach is to develop a null hypothesis (H_0), which will either be accepted or rejected by the hypothesis test. For this analysis, the null hypothesis is that the metal concentrations in the Area of Concern (AOC) are less than in the background area. The AOC is the site. When the hypothesis is rejected, then we conclude that the site concentration is higher than the background level for the specific variable that is being tested; when it is accepted, then the conclusion is that the site concentration is lower than the background level.

An action level can be specified as the largest difference in means that is acceptable to the decision maker. The action level is defined as the substantial difference (S) value, which is the difference between the site and background mean values (site mean – background mean). For this analysis, it is assumed that S is 0, but this can be varied based on the analyte under comparison.

Three different types of nonparametric tests were considered.

Wilcoxon-Mann-Whitney (WMW) Test

The WMW test should not be used if more than 40% of the data from either the background or site are ND values. As a result, this was not completed on several of the variables. This method limits the influence of outliers. This test considers ALL measurements and does not place enough weight on larger measurements, so it could conclude that two populations are comparable even if the observations of the right tail are significantly larger than those on the right tail of the other distribution. This test assumes that the underlying probability distributions are similar (including shape and spread) and that the two regions have equal variances.

Inputs for the WMW Test:

- $S = 0$
- 95% confidence
- Null Hypothesis (AOC \leq Background)

Gehan Test

This method is preferable for situations where there are a large number of ND values (such as > 40% of the observations). This test can be used when data sets have multiple censoring points and detection limits.

Inputs for the Gehan Test:

- $S = 0$
- 95% confidence
- Null Hypothesis (AOC \leq Background)

Quantile Test

This test compares the upper tail of the distributions and should be used with the WMW test. This test can detect a shift to the right in the right-tails of the site and background distributions. The presence of

large outliers will bias results. This test may give unreliable results if ND values are present in the largest detected observations.

Inputs for the Quantile Test:

- 95% confidence

Variable	Background % ND	Site % ND	Tests	Results	Comments
Antimony	100	100	WMW	Not Completed Since > 40% ND	The Gehan test was the only applicable test. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Non-Detect Values in the 'R' Largest - Cannot complete Quantile Test	
Arsenic	0	3	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test, so the Gehan and Quantile tests are more appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Reject H0, Conclude Site > Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Barium	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Beryllium	0	1	WMW	Do Not Reject H0, Conclude Site <= Background	All tests accepted the hypothesis. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test	
Cadmium	93	76	WMW	Not Completed Since > 40% ND	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Chromium	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Cobalt	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	All tests accepted the hypothesis. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Do Not Reject H0, Perform WMW or Gehan Test	
Lead	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test, so the Gehan and Quantile tests are more appropriate. Test results conclude that the concentration exceeds the background level.
			Gehan	Reject H0, Conclude Site > Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Magnesium	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test, so the Gehan and Quantile tests are more appropriate. Test results conclude that the concentration exceeds the background level.
			Gehan	Reject H0, Conclude Site > Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Manganese	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	All tests accepted the hypothesis. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Do Not Reject H0, Perform WMW or Gehan Test	
Mercury	100	59	WMW	Not Completed Since > 40% ND	The assumptions are not met for the WMW test, so the Gehan and Quantile tests are more appropriate. Test results conclude that the concentration exceeds the background level.
			Gehan	Reject H0, Conclude Site > Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Nickel	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Potassium	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	
Selenium	100	100	WMW	Not Completed Since > 40% ND	The Gehan test was the only applicable test. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Non-Detect Values in the 'R' Largest - Cannot complete Quantile Test	
Silver	100	100	WMW	Not Completed Since > 40% ND	The Gehan test was the only applicable test. Test results conclude that the

			Gehan	Do Not Reject H0, Conclude Site <= Background	concentration at the site is less than the background level.
			Quantile	Non-Detect Values in the 'R' Largest - Cannot complete Quantile Test	
Vanadium	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	All tests accepted the hypothesis. Test results conclude that the concentration at the site is less than the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test	
Zinc	0	0	WMW	Do Not Reject H0, Conclude Site <= Background	The assumptions are not met for the WMW test. The distribution includes large values on the right tail so the Quantile test is the most appropriate. Test results conclude that the concentration at the site exceeds the background level.
			Gehan	Do Not Reject H0, Conclude Site <= Background	
			Quantile	Reject H0, Conclude Site Concentration > Background Concentration	

Note: Hypotheses that were rejected by two-sample hypothesis tests are highlighted in red.

Results

The results of hypothesis testing are presented in the table included above. For several variables, the hypothesis was rejected by multiple tests; arsenic, lead, magnesium and mercury. Rejection of the hypothesis leads to the conclusion that the concentration at the site exceeds the background level. For mercury the hypothesis was rejected by both applicable tests; however, this metal has nearly all non-detect values present in the background data. The hypothesis was accepted by the WMW test for arsenic, lead and magnesium, but was rejected by the other two tests. The WMW test requires that the distributions are similar in shape and spread. The box plot shows that this assumption is not true for these metals; therefore, the WMW test is not applicable. In addition, the site distributions for these metals include large values on the right tail, and the Quantile test is better at considering large values than the WMW test. The assumptions are not met for the WMW test, so test results conclude that the concentration of arsenic, lead, magnesium and mercury at the site exceeds the background level.

For several variables, the hypothesis was accepted by both the WMW and Gehan tests and rejected by the Quantile test. These consist of barium, cadmium, chromium, nickel, potassium and zinc. The site and background distributions for barium, nickel and zinc have a much different shape and spread and the right tail values for the site data are much larger, suggesting that the assumptions are not met for the WMW test and that the Quantile test is more appropriate. Similarly, the site data distributions for cadmium and chromium include large values on the right tail of the distribution, which makes them better suited to the Quantile test. The site and background distributions for potassium have a much different shape and spread, which is not ideal for the WMW test. For all of these variables, the Quantile test is the most appropriate based on the data distributions, so the test results conclude that the concentration of the metals at the site exceeds the background level.

Based on the test results described here and the box plot comparisons, the concentration of the following metals at the site exceeds the background level; arsenic, barium, cadmium, chromium, lead, magnesium, mercury, nickel, potassium and zinc.

It is recommended to avoid statistical methods on data sets with less than 4-5 detected values. Several variables have 100% or nearly 100% non-detect values in the site and/or background data sets and do not meet this criterion; antimony, cadmium, mercury, selenium and silver. The ProUCL documentation states that when very few detected values are present, it is not appropriate to use substitution methods (i.e. DL/2) to replace the rest of the ND data and compute estimates based upon the resulting data set. Ad hoc estimation methods may be applied in this case. Antimony, selenium and silver have 100% non-detect values in both the site and background datasets. These metals are not a concern since they were not detected at either location and do not need to be studied in further detail. Both mercury and cadmium have less than 4 detect values in the background dataset, but have detected values at the site. Hypothesis testing concluded that the concentration of both mercury and cadmium at the site exceeded the background concentration.

Separate Site Areas

In order to analyze whether separation of the data set into multiple populations may alter the results, the site data were broken into two separate areas and two-sample hypothesis tests were run separately for these two areas to see if there was a difference in the results. The two areas were the South Tank Farm and the MPA/Wastewater/Stormwater Pond Area. There were a few tests that had different results with this separation, resulting in different conclusions for those metals in the specific area. For some variables, the hypothesis was accepted for one area and rejected for the other, suggesting that the

concentration for this metal is localized within the site. The table below describes the results of the two-hypothesis testing for both areas versus the overall site by showing the metals that had a site concentration exceeding the background. The results suggest that barium, cadmium, vanadium and zinc exceed the background concentration in the MPA/Wastewater/Stormwater Pond Area but not at the South Tank Farm. Test results suggest that chromium, nickel and potassium all exceed the background concentration based on data from the entire site; however, the null hypothesis was accepted by all three tests based on the two separated data sets. For the overall site data, only the quantile test rejected the null hypothesis. Further analysis may be required to consider whether the concentration of these metals at the site exceeds the background, or whether test results may have been biased by outliers or characteristics of the data.

Two-Hypothesis Testing for Site Data			
Variable	Results (All Site Data)	Results (MPA/Wastewater/ Stormwater Pond)	Results (South Tank Farm)
Antimony			
Arsenic	Site > Background	Site > Background	Site > Background
Barium	Site > Background	Site > Background	
Beryllium			
Cadmium	Site > Background	Site > Background	
Chromium	Site > Background		
Cobalt			
Lead	Site > Background	Site > Background	Site > Background
Magnesium	Site > Background	Site > Background	Site > Background
Manganese			
Mercury	Site > Background	Site > Background	Site > Background
Nickel	Site > Background		
Potassium	Site > Background		
Selenium			
Silver			
Vanadium	Site > Background	Site > Background	
Zinc	Site > Background	Site > Background	

Project Information

The project files and information are stored at J:\NRII\Clients_A-H\EPC\El_Dorado_Projects\El Dorado Third Phase\ProUCL Files\. A description of the files is included below.

Background Data_rev1.xls	Background Data in Excel Format (from DB)
Site Data_rev1.xls	Site Data in Excel Format
El Dorado All Data.xls	Combined Site and Background
El Dorado South Tank Farm.xls	South Tank Farm Data in Excel Format
El Dorado Main Process Area.xls	MPA/Wastewater/Stormwater Pond Data in Excel Format
El Dorado Background Data.wst	Background Data file in ProUCL format
El Dorado Site Data.wst	Site Data file in ProUCL format
El Dorado All Data.wst	Combined Data file in ProUCL format
El Dorado South Tank Farm.wst	South Tank Farm Data in ProUCL Format

El Dorado Main Process Area.wst

Background Summary Stats.ost

Background Summary Stats.xls

Site Summary Stats.ost

Site Summary Stats.xls

Background GOF Stats.ost

Site GOF Stats.ost

El Dorado Box Plot Comparisons.docx

El Dorado Normal Q-Q Plot Comparisons.docx

MPA/Wastewater/Stormwater Pond Data in
ProUCL Format

Background Summary Stats in ProUCL format

Background Summary Stats in Excel format

Site Summary Stats in ProUCL format

Site Summary Stats in Excel format

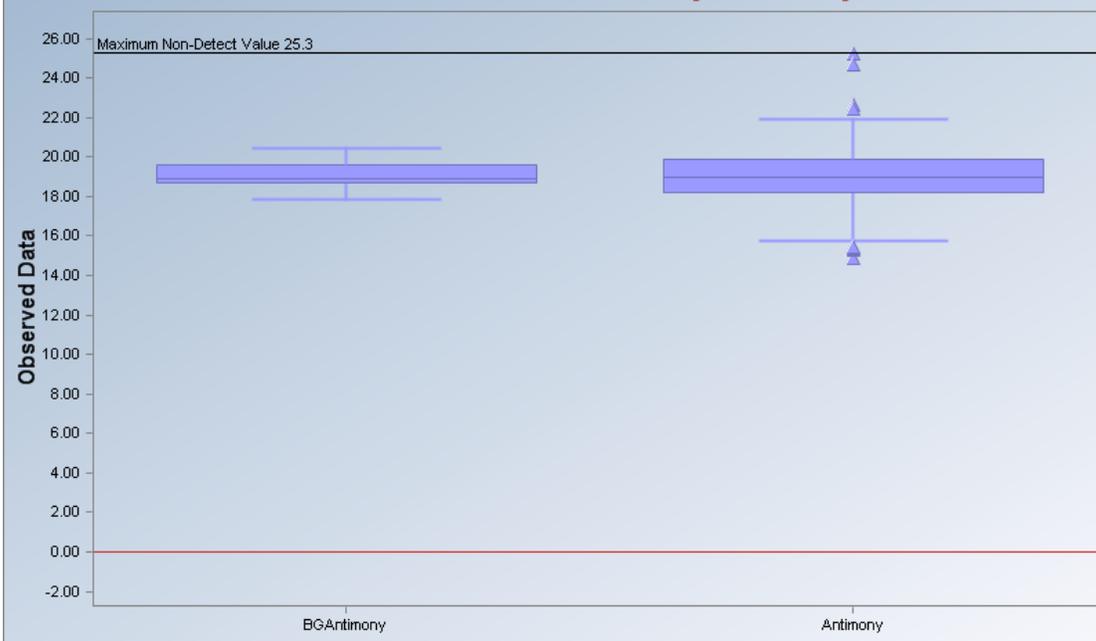
GOF Results for Background in ProUCL format

GOF Results for Site in ProUCL format

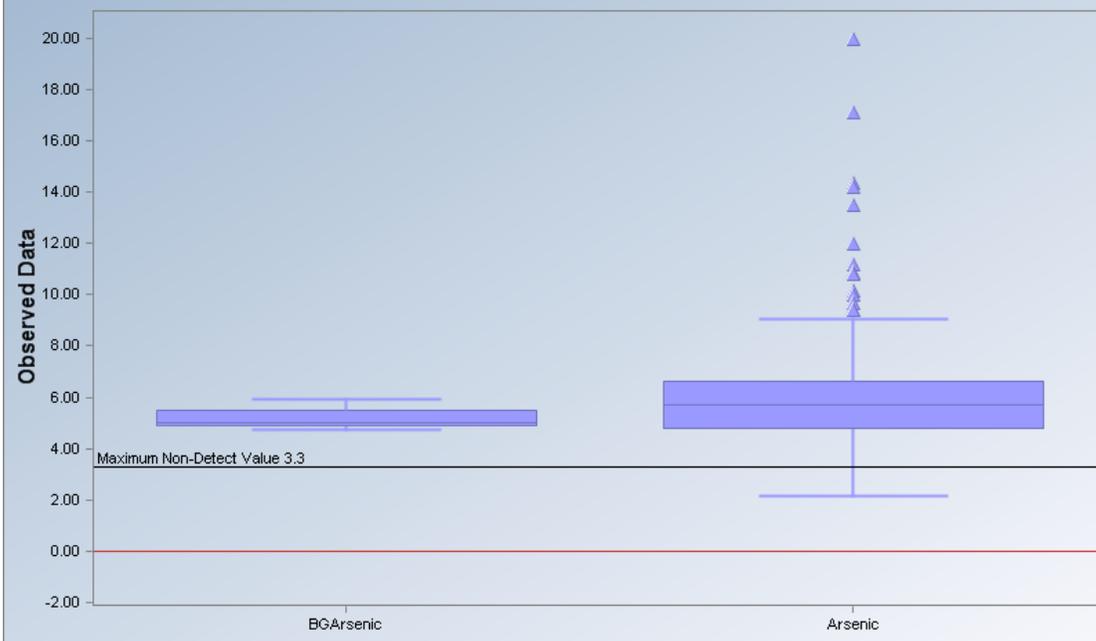
Box plot Comparisons for each Metal in Analysis

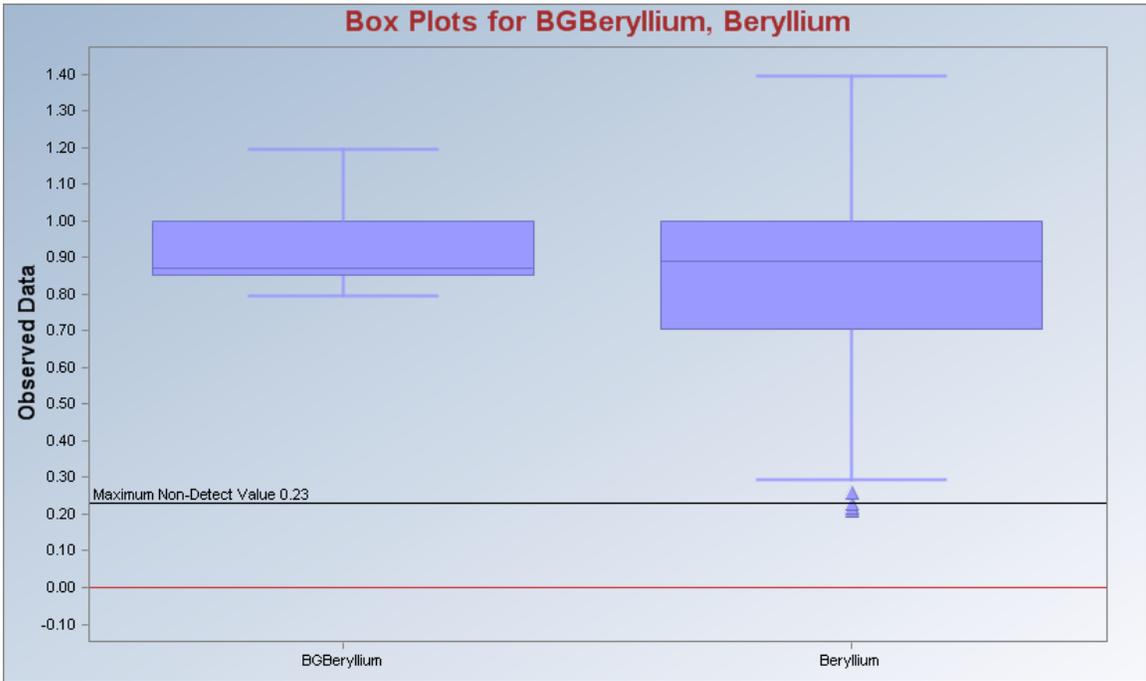
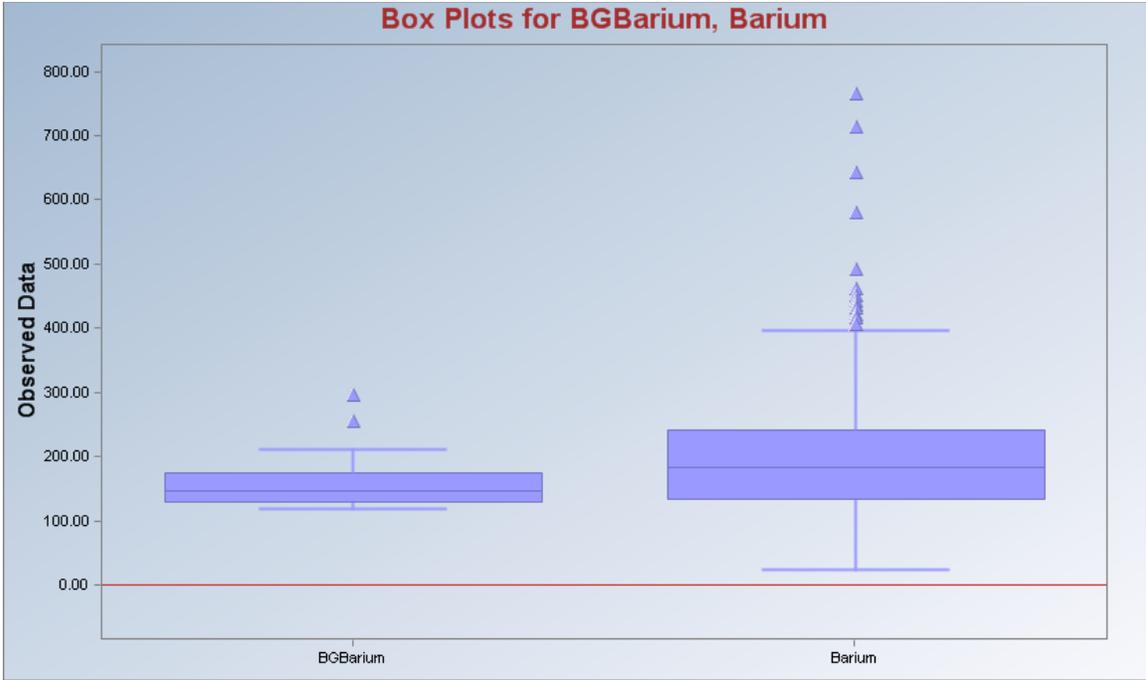
Normal Q-Q plots for Site Data for each Metal in
Analysis

Box Plots for BGAntimony, Antimony

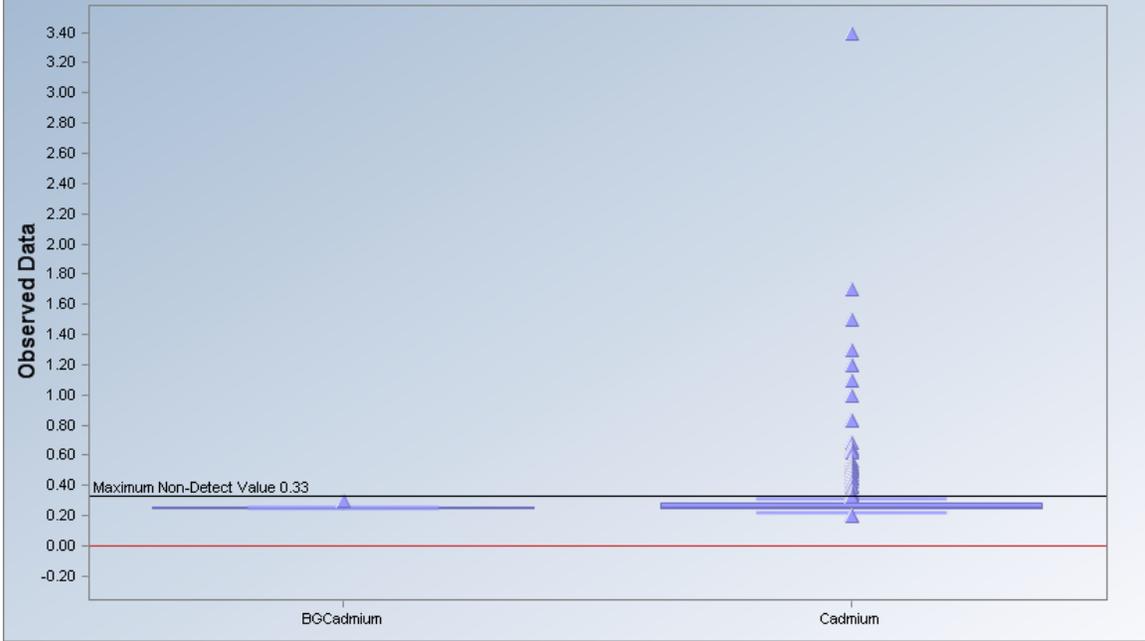


Box Plots for BGArsenic, Arsenic

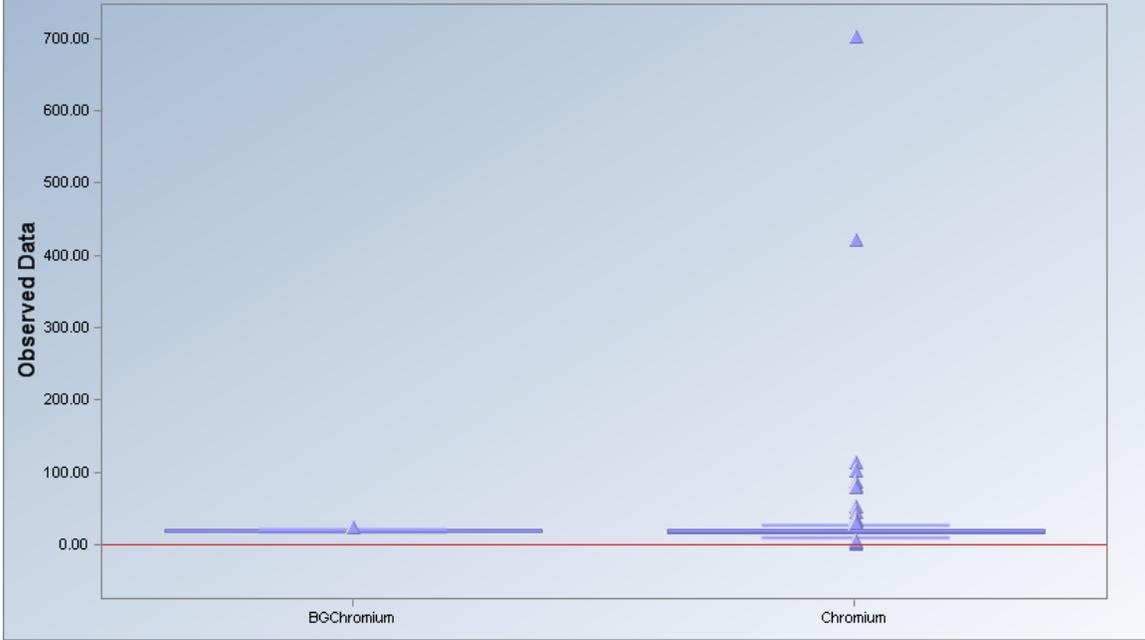




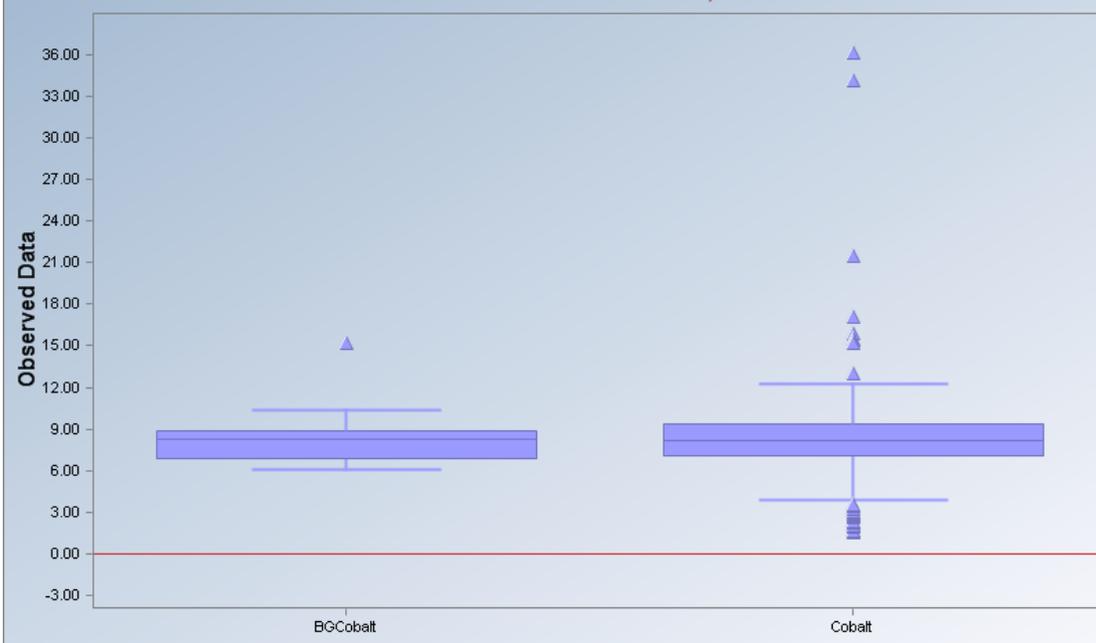
Box Plots for BGCadmium, Cadmium



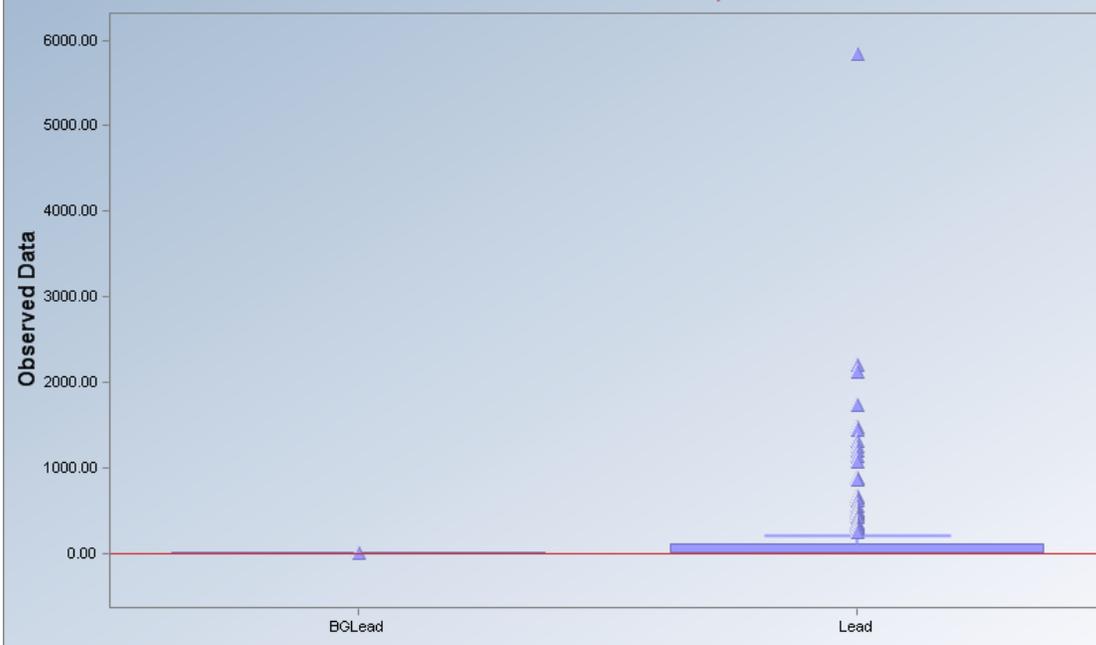
Box Plots for BGChromium, Chromium



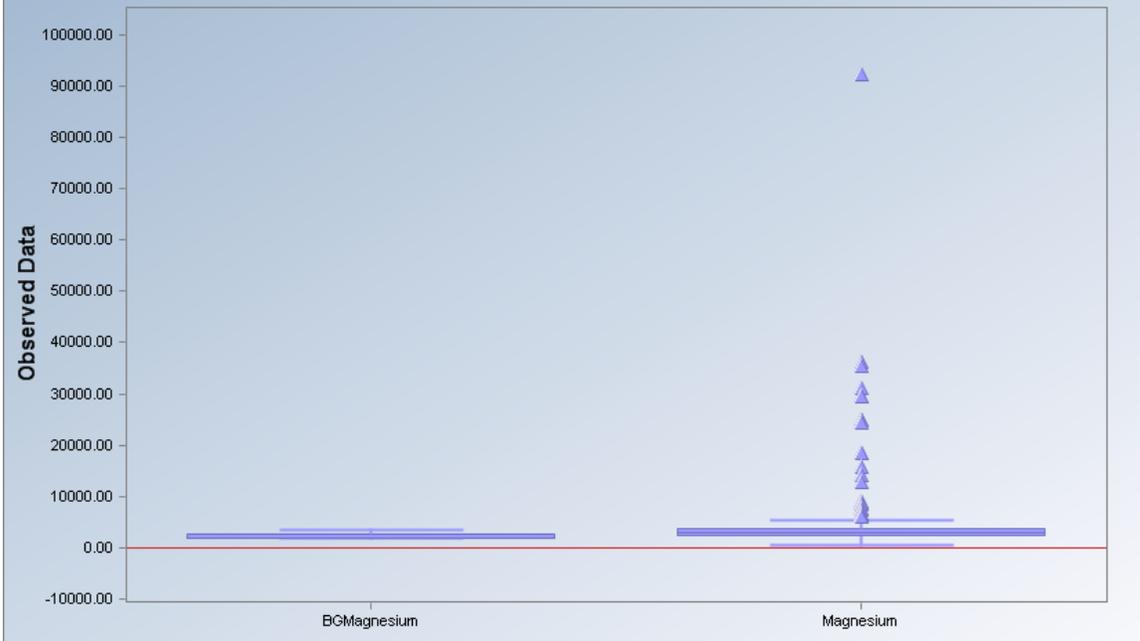
Box Plots for BGCobalt, Cobalt



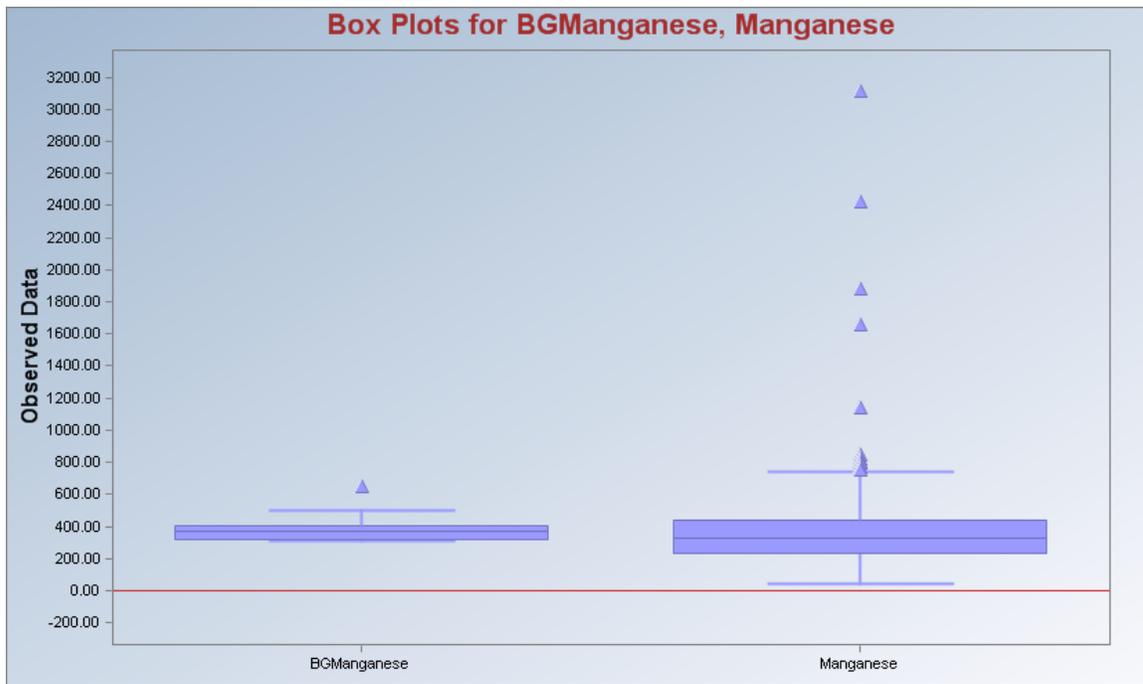
Box Plots for BGLead, Lead



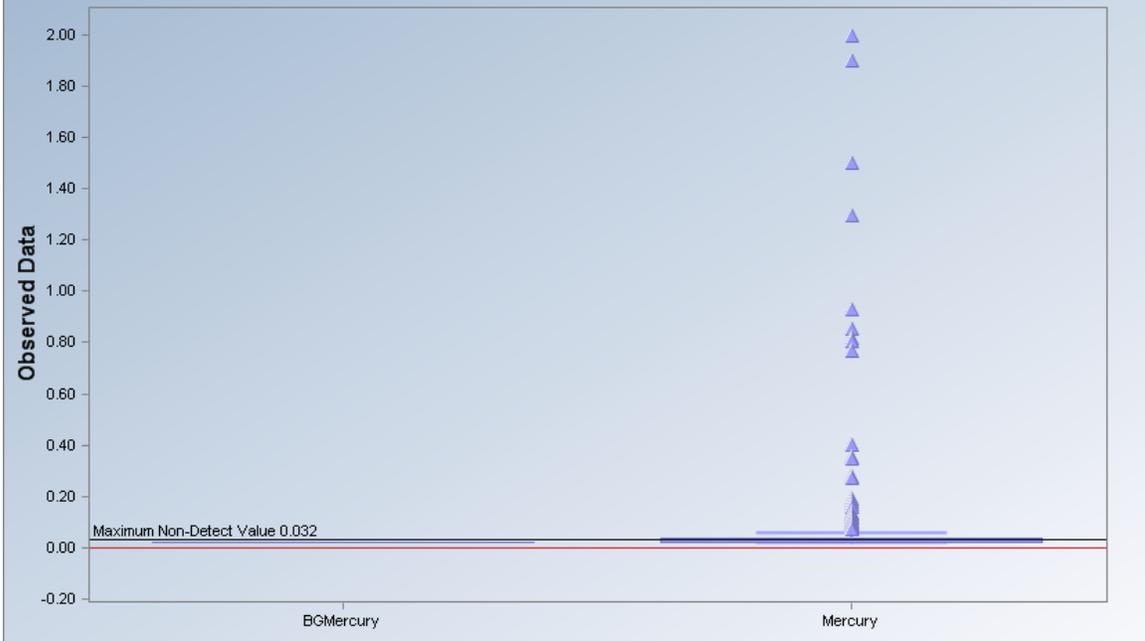
Box Plots for BGMagnesium, Magnesium



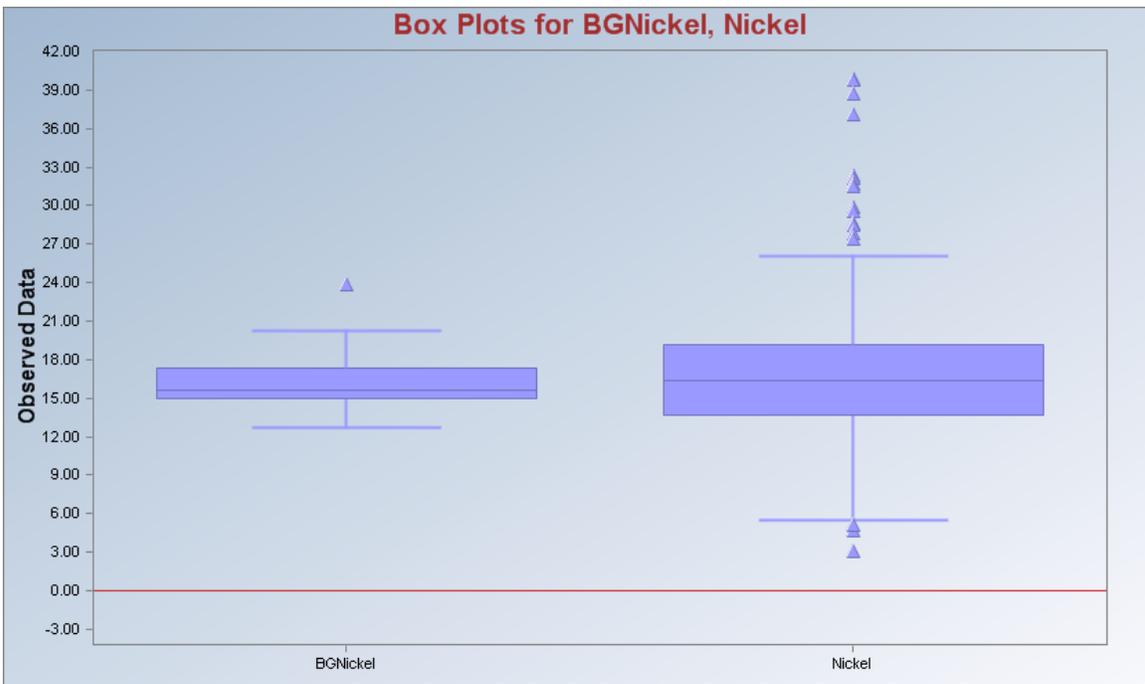
Box Plots for BGManganese, Manganese



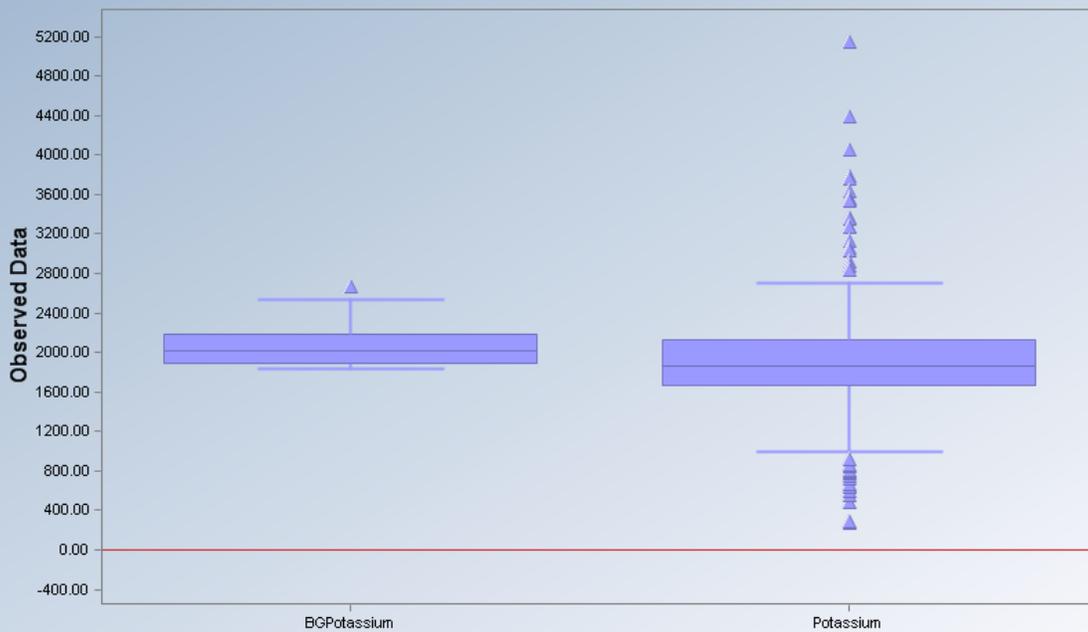
Box Plots for BGMercury, Mercury



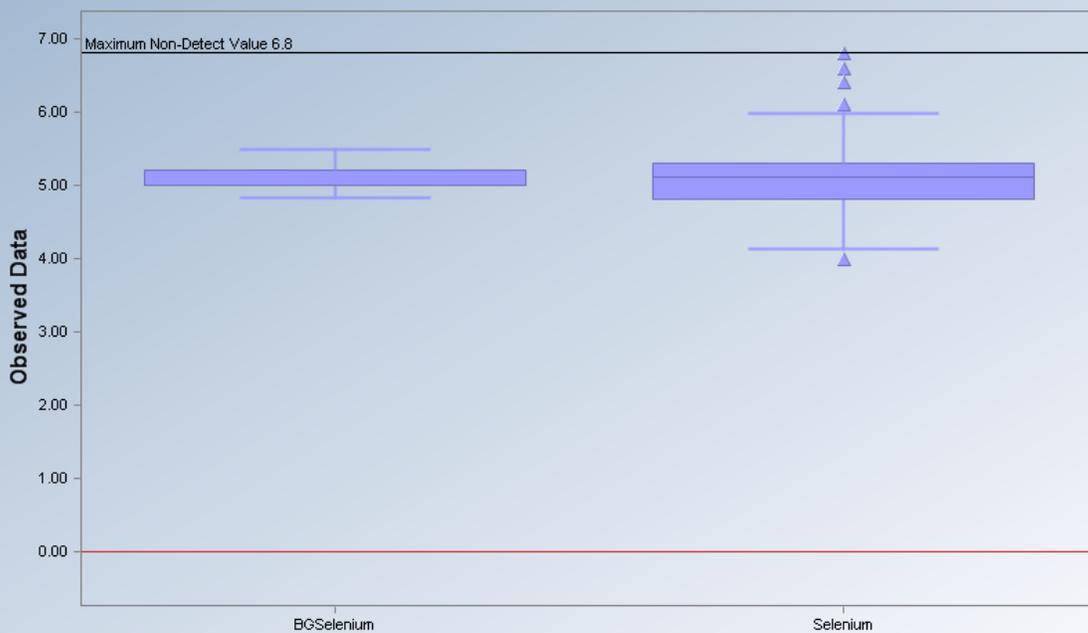
Box Plots for BGNickel, Nickel



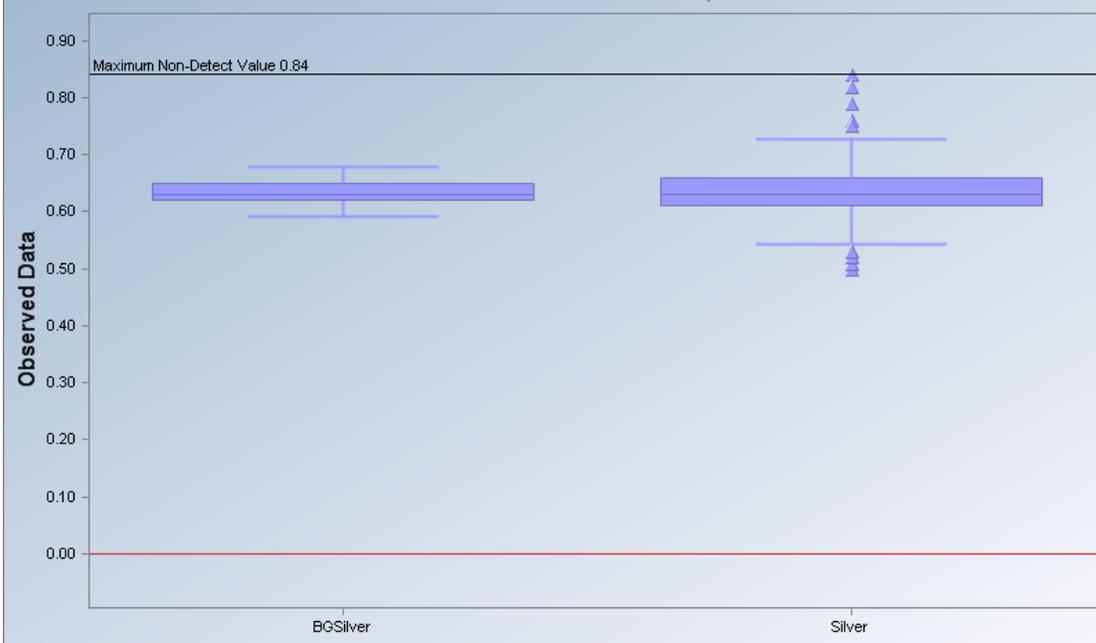
Box Plots for BGPotassium, Potassium



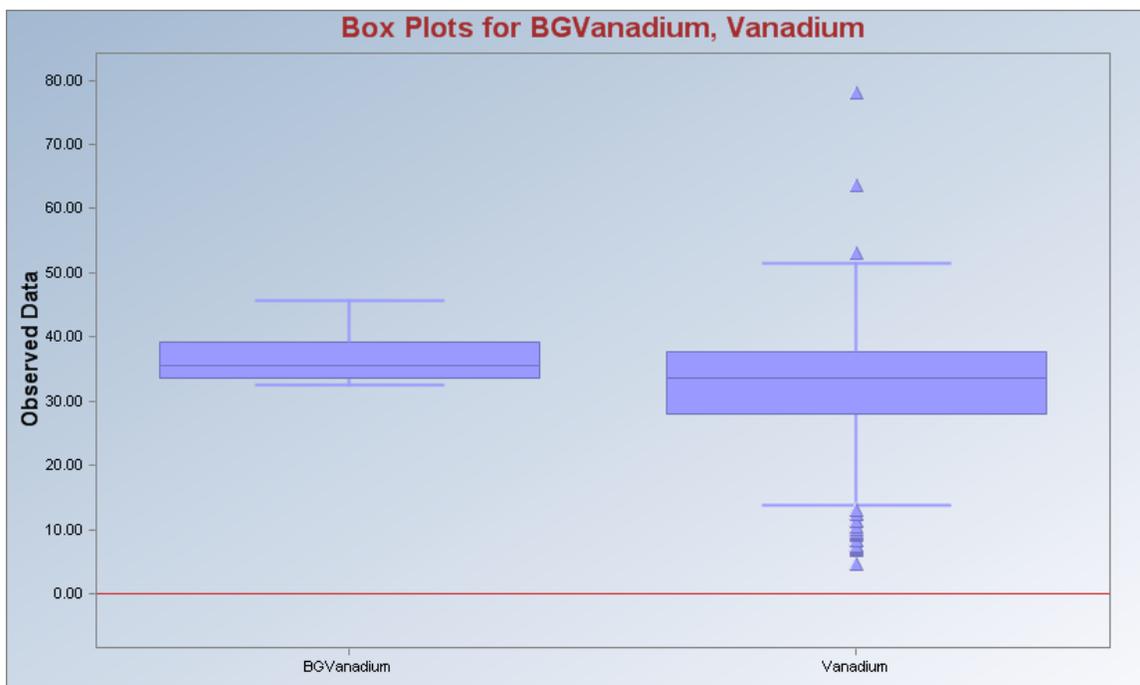
Box Plots for BGSelenium, Selenium



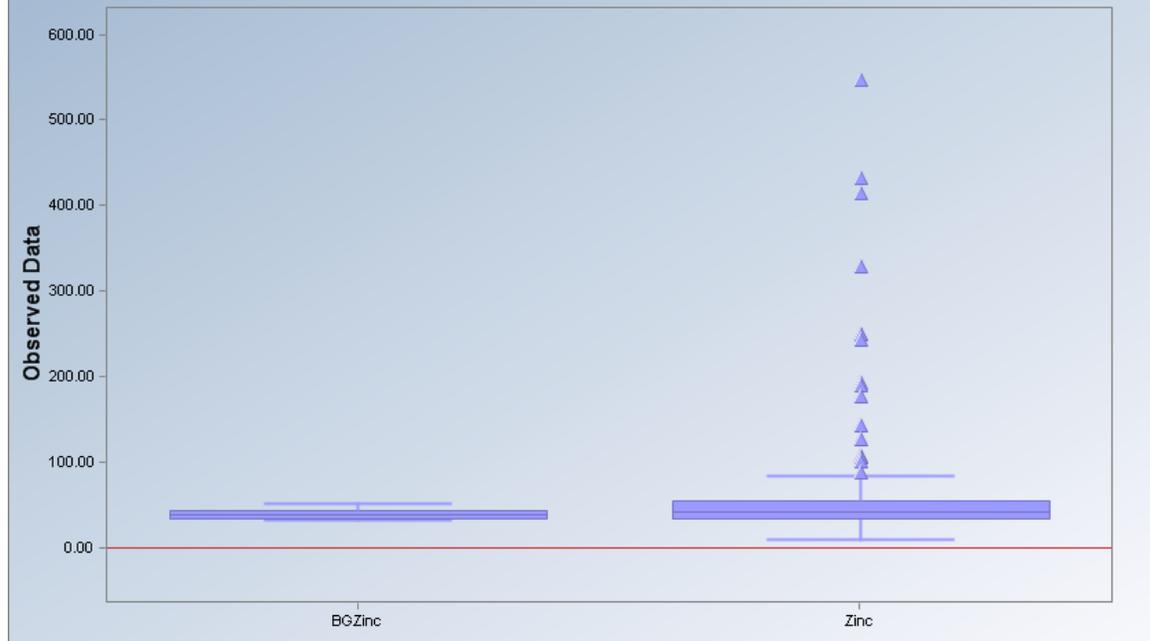
Box Plots for BGSilver, Silver

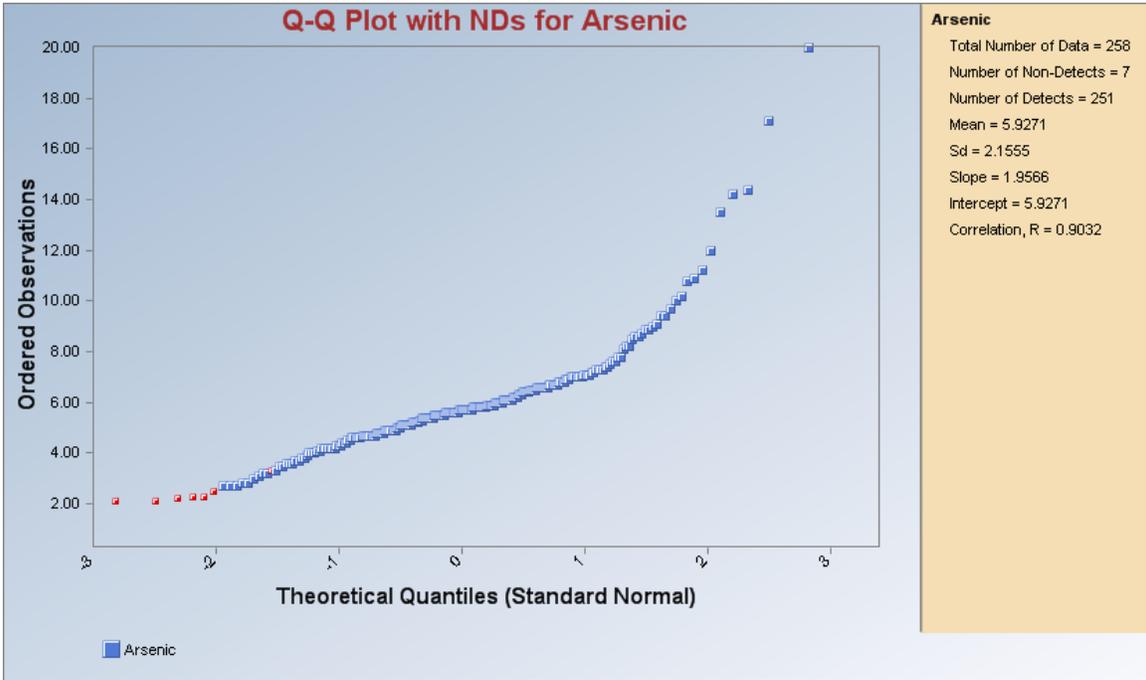
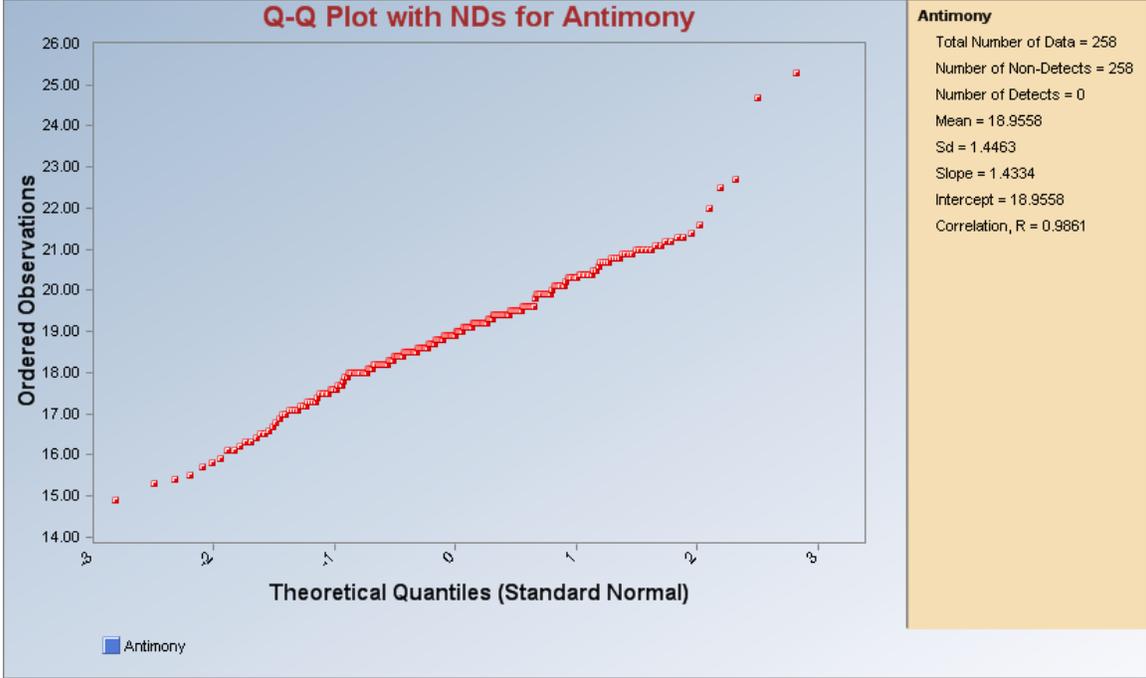


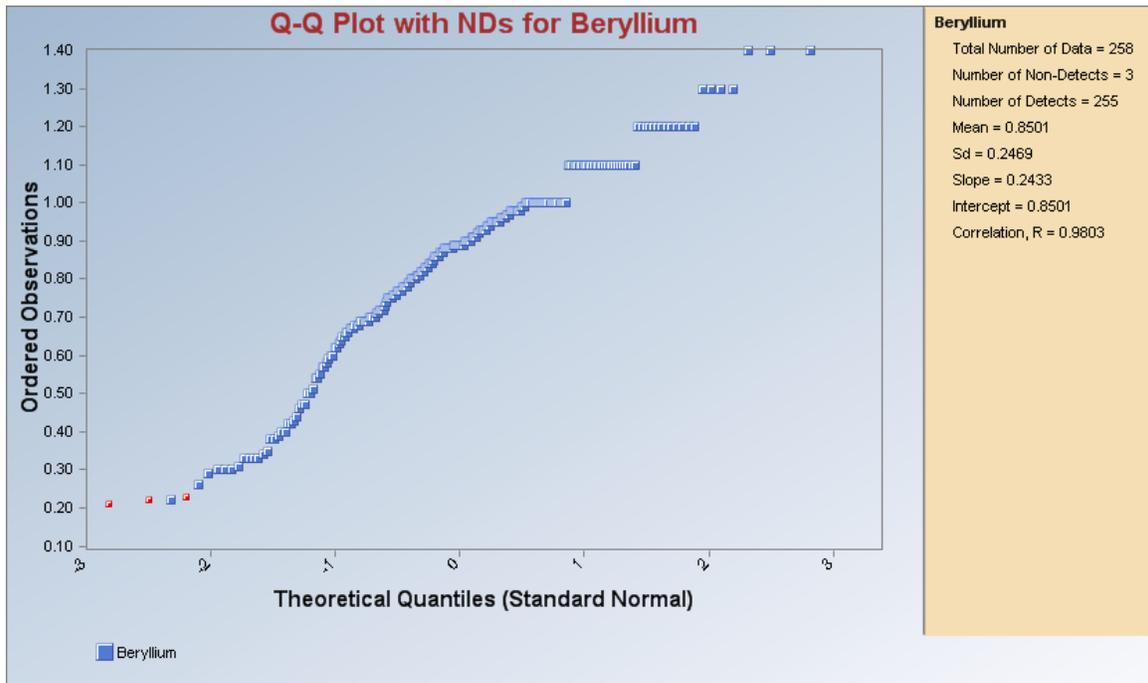
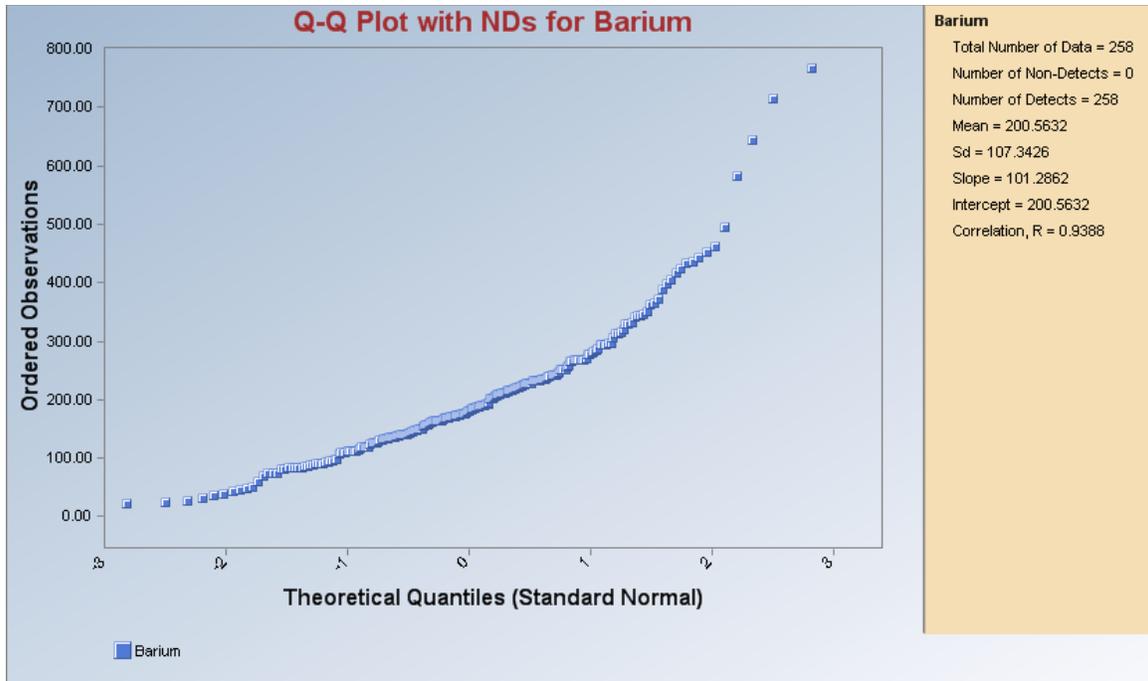
Box Plots for BGVanadium, Vanadium

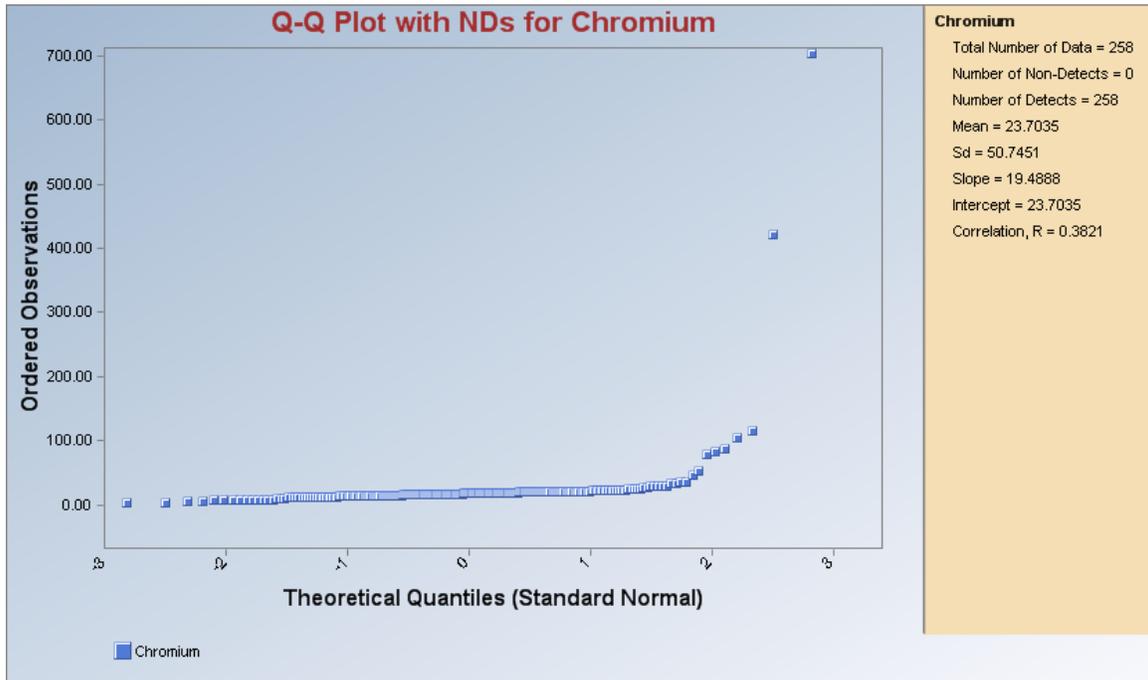
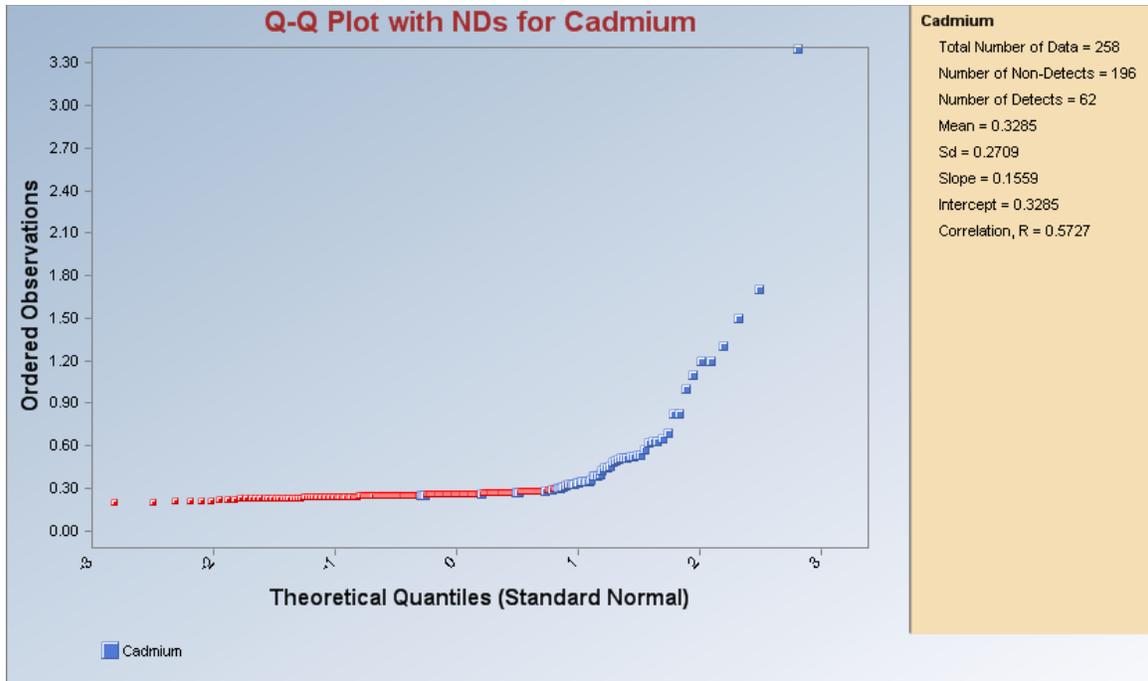


Box Plots for BGZinc, Zinc

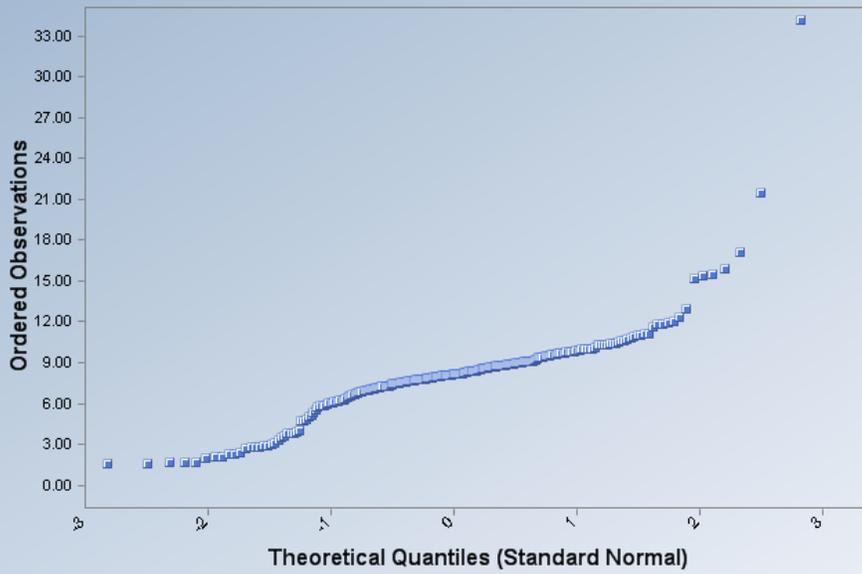








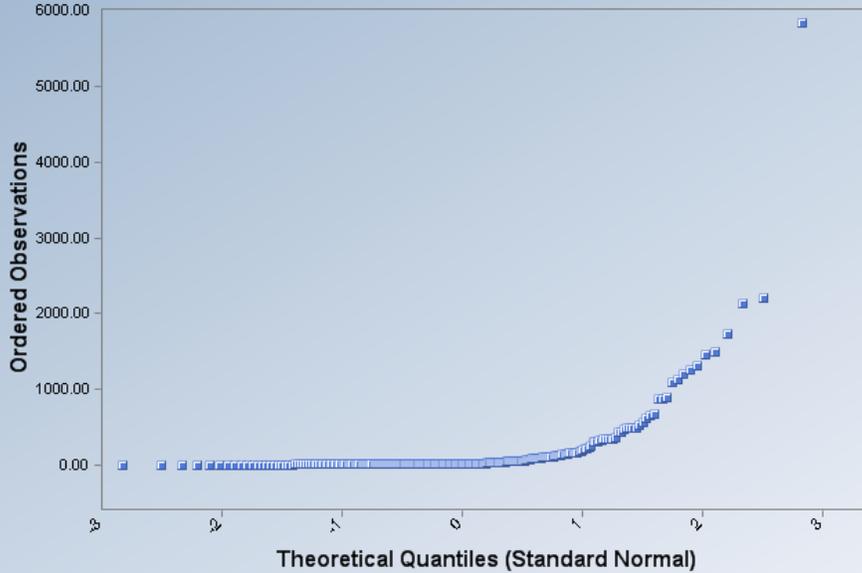
Q-Q Plot with NDs for Cobalt



Cobalt

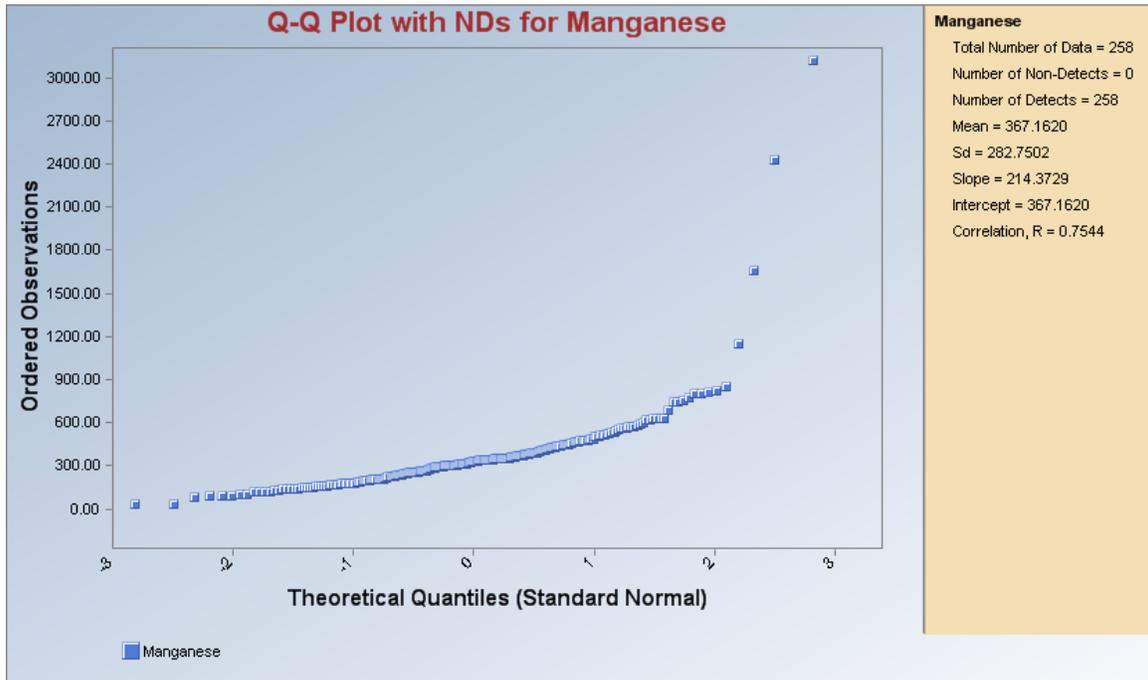
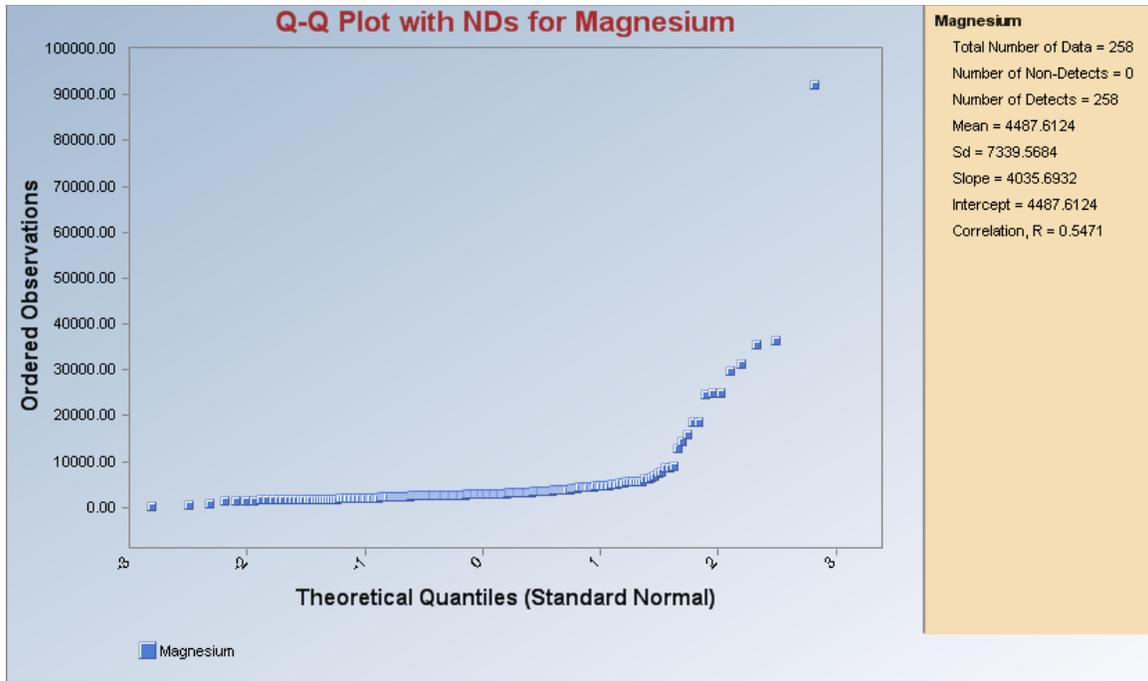
Total Number of Data = 258
Number of Non-Detects = 0
Number of Detects = 258
Mean = 8.1058
Sd = 3.0942
Slope = 2.7622
Intercept = 8.1058
Correlation, R = 0.8882

Q-Q Plot with NDs for Lead

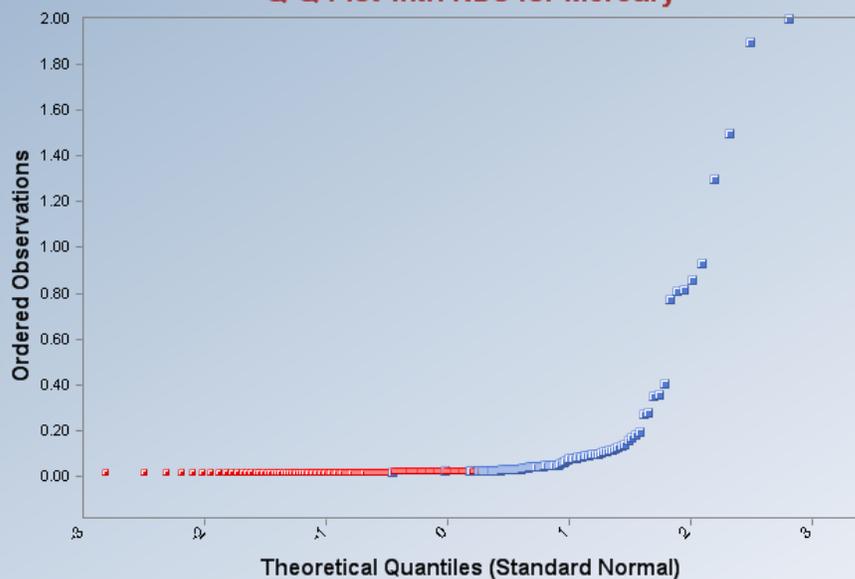


Lead

Total Number of Data = 264
Number of Non-Detects = 0
Number of Detects = 264
Mean = 163.6561
Sd = 474.1602
Slope = 269.9952
Intercept = 163.6561
Correlation, R = 0.5666



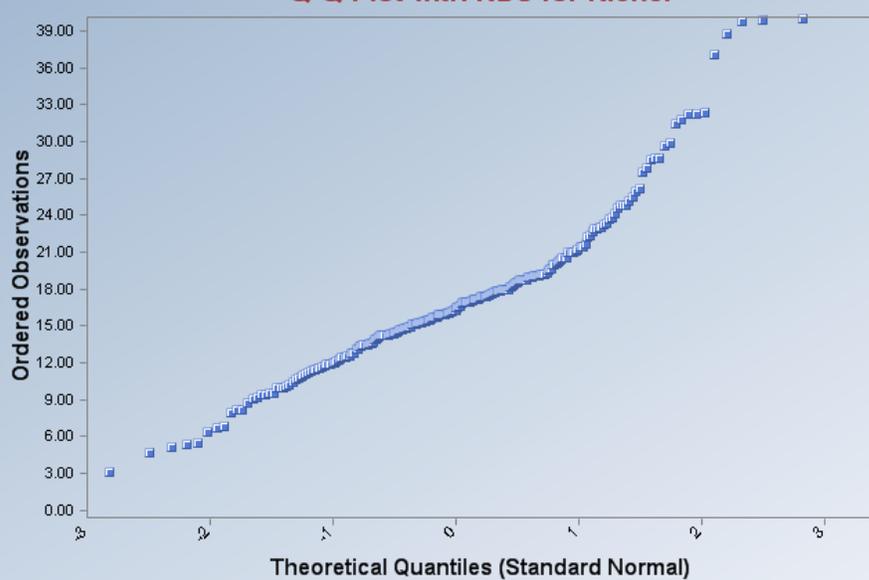
Q-Q Plot with NDs for Mercury



Mercury

Total Number of Data = 258
Number of Non-Detects = 151
Number of Detects = 107
Mean = 0.0819
Sd = 0.2369
Slope = 0.1228
Intercept = 0.0819
Correlation, R = 0.5156

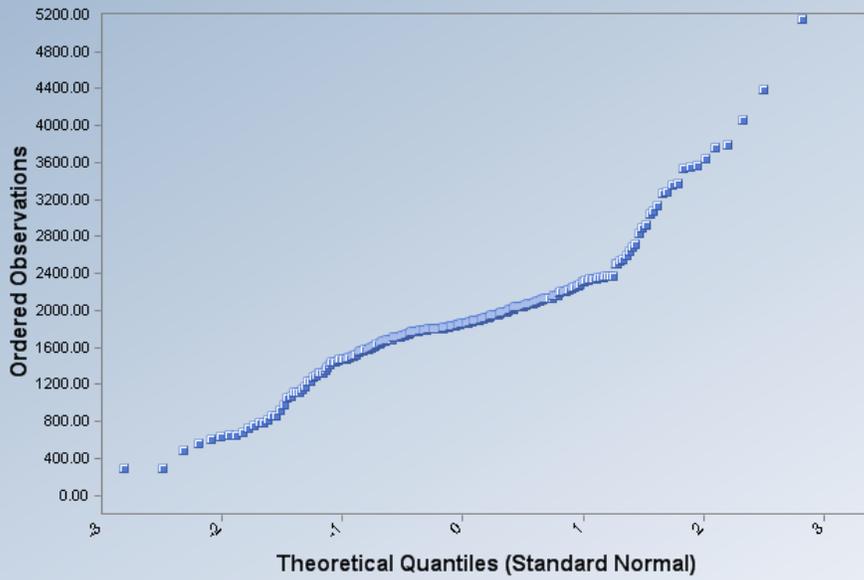
Q-Q Plot with NDs for Nickel



Nickel

Total Number of Data = 258
Number of Non-Detects = 0
Number of Detects = 258
Mean = 17.1085
Sd = 5.9617
Slope = 5.7518
Intercept = 17.1085
Correlation, R = 0.9600

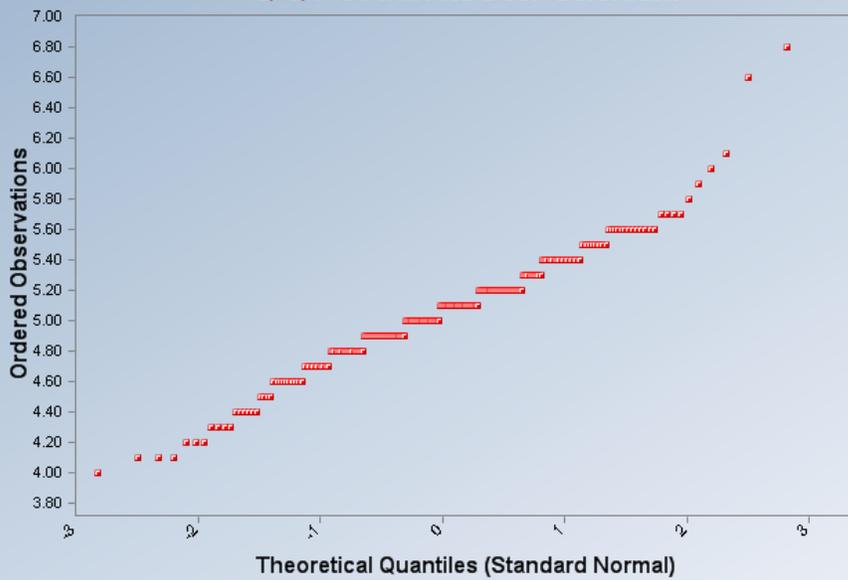
Q-Q Plot with NDs for Potassium



Potassium

Total Number of Data = 258
Number of Non-Detects = 0
Number of Detects = 258
Mean = 1912.7946
Sd = 638.5339
Slope = 607.4653
Intercept = 1912.7946
Correlation, R = 0.9466

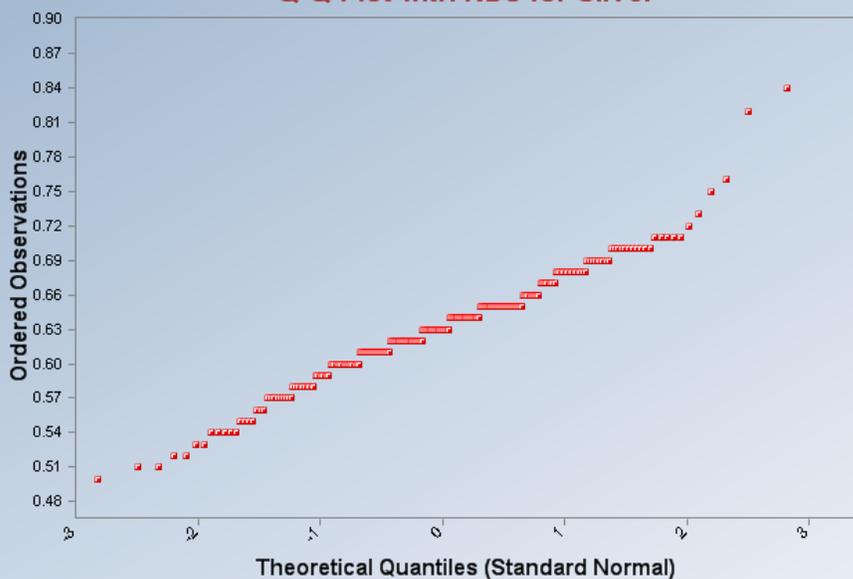
Q-Q Plot with NDs for Selenium



Selenium

Total Number of Data = 258
Number of Non-Detects = 258
Number of Detects = 0
Mean = 5.0547
Sd = 0.3876
Slope = 0.3827
Intercept = 5.0547
Correlation, R = 0.9822

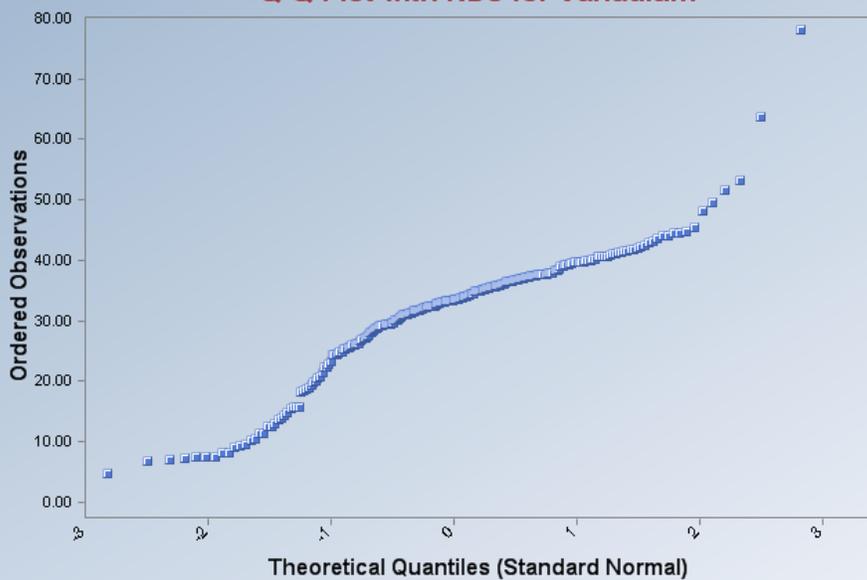
Q-Q Plot with NDs for Silver



Silver

Total Number of Data = 258
Number of Non-Detects = 258
Number of Detects = 0
Mean = 0.6320
Sd = 0.0480
Slope = 0.0475
Intercept = 0.6320
Correlation, R = 0.9847

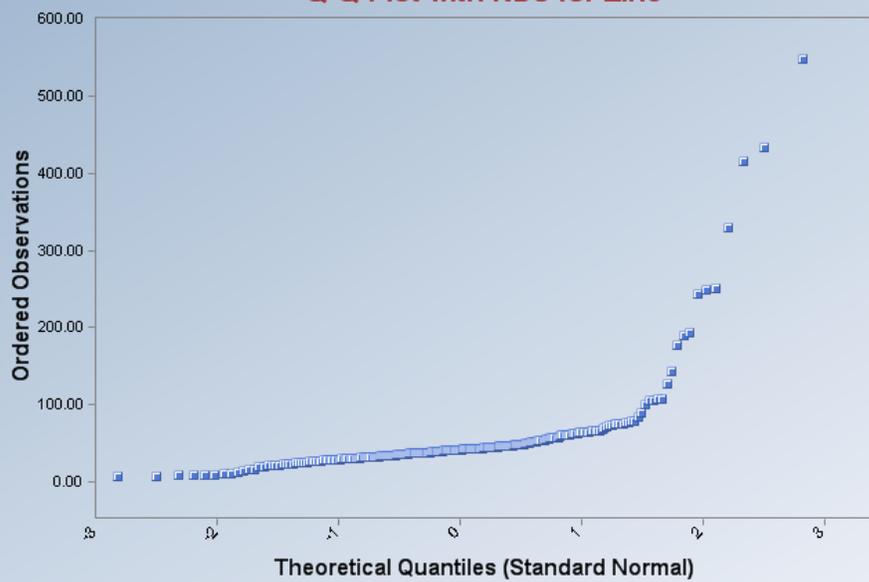
Q-Q Plot with NDs for Vanadium



Vanadium

Total Number of Data = 258
Number of Non-Detects = 0
Number of Detects = 258
Mean = 31.8876
Sd = 9.8841
Slope = 9.5038
Intercept = 31.8876
Correlation, R = 0.9567

Q-Q Plot with NDs for Zinc



Zinc

Zinc

Total Number of Data = 258
Number of Non-Detects = 0
Number of Detects = 258
Mean = 54.5884
Sd = 58.3600
Slope = 38.8958
Intercept = 54.5884
Correlation, R = 0.6631

Appendix E

Borehole Logs / Well Completion Forms



MWH

Drilling Log

Soil Boring **SB-01**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.51 ft North 1743536.84 ft East 1785536.00 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 10.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/20/2007 Completion Date 11/20/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1309.5
0.5		SB-01 (0.5-2.0)			CL	Silty CLAY, medium brown w/black staining, abundant roots, low plasticity, stiff, slightly moist, strong odor.	1308
2						Weathered LIMESTONE, very pale orange w/minor light grey, fractured, moist w/pockets of water, strong odor.	1306
4							1304
6							1302
8					CH	CLAY, reddish brown to grey, soft, moist, very strong odor at 7' and declining w/depth, medium plasticity.	1300
10						Weathered LIMESTONE, w/firm limestone at 10', very pale orange.	1298
10						End of boring = 10'	1296
12							1294
14							1292
16							1290
18							1288
20							1286
22							
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.98 ft North 1743562.98 ft East 1785899.10 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 12.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/26/2007 Completion Date 11/26/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1306.0
0.4		SB-02 (0.5-2.0)			CL	Silty CLAY w/gravel, dark brown, loose, roots, soft rubble, dry to moist w/depth, less silt w/depth.	
2							1304
9.6					CH	CLAY, stiff, dark brown, oxidation staining, moist, plastic. No recovery.	1302
4							
6					CH	CLAY, stiff, dark brown, moist, slight odor, plastic, five gravel zones, oxidation staining.	1300
104							1298
8						At 8', becomes grey/brown, odor.	
373		SB-02 (8-9.5)			CH	At 9.5' becomes soft.	1296
10						CLAY, brown/grey, medium soft, strong odor, saturated, possible product sheen.	
342		SB-02 (10-12)			CH		1294
12						LIMESTONE at 12'. Refusal at 12'.	
14							1292
16							1290
18							1288
20							1286
22							1284
24							1282

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-03**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1307.50 ft North 1743578.68 ft East 1785703.98 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 12.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/20/2007 Completion Date 11/20/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1307.5
0 - 2.5	2.5	SB-03 (0.5-2.0)			GP	GRAVEL (1/4-3/4"), brown & black, angular to subrounded, no odor, moist at 1' on top of clay.	
2 - 4.2	4.2					Silty CLAY, olive grey grading to olive black, slightly moist, stiff, low to medium plasticity, minor organics, faint odor.	1306
4.2 - 134							1304
6 - 4.2					CL		1302
4.2 - 8	476	SB-03 (6-8)					1300
8 - 112							1298
10 - 112					CL	Silty CLAY, dark yellowish brown, slightly moist, soft, medium plasticity, moderate odor, black staining, limestone fragments in pockets w/moisture.	1296
112 - 12	313					At 12' LIMESTONE, very pale orange, hard. Refusal at 12'	1294
12 - 14							1292
14 - 16							1290
16 - 18							1288
18 - 20							1286
20 - 22							1284
22 - 24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-04
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>November 26, 2007</u>	Northing <u>1743635.1</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786149.6</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>18'</u>	Surface Elev. (ft) <u>1302.0</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1304.43</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>4.34' February 14, 2008</u>
			DTW (btoc) <u>4.4' February 14, 2008</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>18'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 6'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.42'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>6' - 18'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.0			(0-2)	Bentonite	CL	(0' - 2') Silty CLAY (CL), dark brown, moist , loose	Sample SB-04 (0-2) taken 1030
12.5		2/5			CH	(2' - 10') CLAY (CH), plastic, dark brown, wet, saturated	
5		NR		Sand		4' - Few pieces of gravel, slight odor (4' - 5') No Recovery	Slight odor
458.0			(6-8)			5.5' - Becoming grey, dense 6' - Black concretions, black staining, odor, moist	Odor Sample SB-04 (6-8) taken 1100
66.0							
10					CL	(10' - 15') CLAY (CL) with increasing silt with depth, slightly plastic, dark brown, moist to wet	
15			(14-16)		CLg CHg	14.5' - Gravel (15' - 18') CLAY (CH) with a lot of weathered limestone and gravel, plastic, dark to light brown, saturated	Sample SB-04 (14-16) taken 1130
18						18' - Bottom of borehole	



MWH

Drilling Log

Soil Boring **SB-05**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1307.50 ft North 1743645.96 ft East 1785706.23 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 12.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/20/2007 Completion Date 11/20/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1307.5
0.4		SB-05 (0.5-2.0)			CL	Silty CLAY, grey, soft, moist, medium odor, minor red staining, minor root fragments, grades to sight grey firm clay.	1306
1.1							
1.1					CL	Silty CLAY, light olive grey w/yellowish-red staining, firm, slightly moist, low plasticity.	1304
1.1							
1.1					CL	Silty CLAY, light olive grey, very stiff, limestone gravel in pockets, moist, very strong odor, low plasticity.	1302
1.1							
1.1					CL		1300
1.1							
1.1					CL		1298
1.1							
1.1					CL	CLAY, yellowish brown, very firm, abundant limestone gravel, slightly moist, strong odor, low plasticity.	1296
1.1							
1.1						End of boring = 12'	1294
1.1							1292
1.1							1290
1.1							1288
1.1							1286
1.1							1284

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-06**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.61 ft North 1743661.66 ft East 1785885.65 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 11.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/26/2007 Completion Date 11/26/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1305.6
0.1		SB-06 (0.5-2.0)			CL	Silty CLAY, dark brown, loose, soft, gravel & rubble, crumbles.	
2					CH	CLAY, dark brown to grey, soft, black staining, slight odor, plastic.	1304
5.8						No recovery.	1302
4							
52.6					CH	CLAY, grey/brown, soft, black staining, slight odor, plastic.	1300
6							
321					CH	CLAY, grey, medium stiff, plastic, black staining, odor, limestone fragments at 8.5&9'.	1298
8							
1201		SB-06 (8-9.5)			CH	At 9.5' becomes dark grey, saturated, soft.	1296
10						At 10' becomes grey, medium stiff.	
1015		SB-06 (9.5-11)			CH	Refusal at 11'	1294
12							1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-07**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.67 ft North 1743746.89 ft East 1785991.05 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 5.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/26/2007 Completion Date 11/26/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1304.7
0	10.5	SB-07 (0.5-2.0)			CL	Silty CLAY w/gravel, dark brown, loose, soft.	1304
2	118				CH	CLAY, brown/grey, stiff, slight odor, plastic, some silt, turning grey w/depth.	1302
4						No recovery.	1300
4	116				CH	CLAY, brown/grey, stiff, slight odor, plastic, some silt, turning grey w/depth.	1300
5.5						LIMESTONE, grey, hard, cracks at 5.5' Refusal at 5.5'	1298
8							1296
10							1294
12							1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-08
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>November 26, 2007</u>	Northing <u>1743746.9</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786170.9</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>19'</u>	Surface Elev. (ft) <u>1302.8</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1305.15</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>4.95' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>19'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.4'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 19'</u>	Development <u>Five well volumes</u>
	Screen Length <u>13'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	5.9	3/5	(0-2)		CLg	(0' - 5') Silty CLAY (CL) with lots of limestone gravel up to 44 mm, brown to dark brown, black staining, slight odor, saturated from surface water	Slight odor Sample SB-08 (0-2) taken 1145	
	4.4						(3' - 5') No Recovery	
5	NR	NR				CH	(5' - 19') CLAY (CH), plastic, soft, dark brown, saturated	Slight odor Sample SB-08 (6-8) taken 1200
	47.8		(6-8)				5.5' - Increased silt, stiff to very stiff, brown, slight odor, moist to very moist	
	428.0	5/5					9' - Few limestone gravel with fossils	
10	111.0						10' - Wet	
	219.0							
	735.0	5/5	(12-14)					Sample SB-08 (12-14) taken 1220
15	86.0						15.5' - Becomes soft	
	25.6	4/4				CHg	16' - Dark brown, saturated, slightly loose	
							17.5' - Increased gravel, stiff, light brown	
20							19' - Limestone pieces	
							19' - Bottom of borehole (terminated due to refusal)	

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-09
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>November 27, 2007</u>	Northing <u>1744054.7</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786168.4</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1304.2</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1306.5</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>4.84' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>20'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.31'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 20'</u>	Development <u>Five well volumes</u>
	Screen Length <u>14'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	906.0		(0-2)	Bentonite	GP	(0' - 1') Poorly graded GRAVEL (GP) with some clay, brown and tan, clay is stiff	Sample SB-09 (0-2) taken 0840 Asphalt odor
		4/5			CLg	(1' - 6') Silty CLAY (CL) with high silt content and some gravel, black, saturated, asphalt odor	Sample SB-09 (2-4) taken 0900 Asphalt odor
	962.0		(2-4)		CL	3' - Soft, asphalt odor	
5	NR	NR				(4' - 5) No Recovery	
	570.0					5' - Asphalt stains	
	236.0	5/5		Sand	CH	(6' - 20') Silty CLAY (CH), plastic, med. soft becoming stiff with depth, dark gray, product or asphalt stained, moist	Product or asphalt staining
10	21.0					10' - Trace silt, stiff, odor	Odor
	24.6	4/5				10.5' - Brown / red, black staining, slight odor	
	8.0						
15	NR	NR				(14' - 15') No Recovery	
	131.0		(15-17)			15' - Odor, saturated to very moist, product in voids	Odor, product Sample SB-09 (15-17) taken 0940
	100.0	5/5					
	56.0				CHg	18' - Some limestone fragments as large as 30 mm	
20						20' - Limestone gravel 20' - Bottom of borehole (terminated due to refusal)	



MWH

Drilling Log

Soil Boring SB-10

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1300.40 ft North 1744048.25 ft East 1786369.78 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 17.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1300.4
0	9.0	SB-10 (0.5-2.0)	CL		CL	CLAY w/some sand and gravel, brown w/black stains, soft, moist, slight odor.	1300
2	8.0		CL		CL	Silty CLAY, brown w/black stains, soft, moist, slight odor.	1298
4						No recovery.	1296
4	49.3		CH		CH	Silty CLAY, brown/grey, stiff, plastic, slight odor, moist, black stains.	1294
6	543		CH		CH	At 8' becomes soft.	1292
8	1463	SB-10 (8-10)	CH		CH	CLAY, brown w/few black stains, soft, plastic, saturated, odor, possible product.	1290
10	409		CH		CH		1288
12	325		CH		CH	At 14' some weathered limestone gravel.	1286
14	281		CH		CH	At 16' becomes grey.	1284
16	781	SB-10 (15-17)				At 17.5 limestone gravel. Refusal at 17.5'	1282
18							1280
20							1278
22							
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-12**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.47 ft North 1744206.19 ft East 1786179.51 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 8.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1304.5
0	23.8	SB-12 (0.5-2.0)			CL	Silty CLAY w/gravel, brown, loose, dry.	1304
2					GC	GRAVEL <50mm, road fill, tan/white.	1302
4	96.9				CH	CLAY, black/dark grey, stiff, plastic, slight odor.	1300
6	63.3				CH	No recovery. CLAY, dark grey, stiff, plastic, slight odor, slightly moist. At 6'-8' many intervals of limestone.	1298
8	92.7					Refusal at 8'	1296
10							1294
12							1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-13**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1306.04 ft North 1744209.83 ft East 1786036.26 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 7.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1306.0
0	7.2	SB-13 (0.5-2.0)			CL	Very silty sandy CLAY, dark brown, loose, slightly moist, lots of gravel & glass.	
2					CH	Silty CLAY, black, soft, moist, odor (possibly asphalt).	1304
4	161				CH	CLAY, brown w/black staining, stiff, plastic, moist, slight odor.	1302
6	182				CH	2" of black loose clay, very moist, soft, odor.	1300
6	938				CH	Silty CLAY, black, stiff, moist, black stains.	
7						Refusal at 7'	
8							1298
10							1296
12							1294
14							1292
16							1290
18							1288
20							1286
22							1284
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-14
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>November 27, 2007</u>	Northing <u>1744258.2</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1785782.5</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>17'</u>	Surface Elev. (ft) <u>1312.6</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1315.05</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>11.33' February 10, 2009</u>
			DTW (btoc) <u>11.35' February 10, 2009</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>17'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.48'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 17'</u>	Development <u>Five well volumes</u>
	Screen Length <u>12'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	26.3		(0-2)	Bentonite	CL	(0' - 2') Silty CLAY (CL) with sand and asphalt material, stiff, dark brown, slight odor, slightly moist, loose	Slight odor Sample SB-14 (0-2) taken 1510
	40.0	5/5		Bentonite	CH	(2' - 17') Silty CLAY (CH), plastic, med. stiff, dark brown, slight odor, slightly moist	Slight odor
5	35.3			Bentonite		5' - Very stiff, slight odor	Slight odor
	71.6	5/5		Bentonite			
▽	299.0		(8-11)	Sand		10' - Becomes softer with depth	Sample SB-11 (8-11) taken 1545
10	1202.0	5/5	(11-13)	Sand		11' - Gray with some staining, possible product odor, very moist to wet (water level??)	Possible product odor
15	115.0			Sand			
	108.0	2/2		Sand	CHg	16' - 2" limestone stringer	Sample SB-14 (11-13) taken 1600
				Sand		17' - Hit limestone 17' - Bottom of borehole (terminated due to refusal)	
20				Sand			
25				Sand			



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.58 ft North 1744311.59 ft East 1786179.51 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 12.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1304.6
0		SB-15 (0.5-2.0)			CL	Silty CLAY, dark brown, wood.	1304
2	36.3					GRAVEL, road fill, tan/white/grey.	1302
2					GC		1302
4	14.6					CLAY, dark brown/grey, stiff, plastic, moist, odor, possible product, stain.	1300
4						At 5' becomes grey.	1300
6	113						1298
6							1298
8	197						1296
8					CH		1296
10	45.9						1294
10							1294
12	45.2					At 12.5' LIMESTONE, grey.	1292
12						Refusal at 12.5'	1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							1282

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.72 ft North 1744315.23 ft East 1786038.26 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 14.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1305.7
0	34.2	SB-16 (0.5-2.0)			CL	Silty sandy CLAY w/gravel, dark brown, medium stiff, loose, slightly moist.	1304
2	27.1				CH	CLAY, dark grey to black, soft, moist, plastic.	1302
4	18.1				SP	SAND, black/grey, coarse grained, loose, poorly sorted, saturated.	1300
6	153				SP	No recovery. SAND, black/grey, coarse grained, loose, poorly sorted, saturated, odor.	1298
8	150					CLAY, dark brown/grey, stiff, plastic, moist.	1296
10	649	SB-16 (10-12)			CL	At 8' small gravel <10mm. At 10' becomes medium soft, saturated.	1294
12	328						1292
14						LIMESTONE at 14'. Refusal at 14'.	1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.79 ft North 1744423.12 ft East 1786179.51 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 18.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1304.8
0	230	SB-18 (0.5-2.0)			GC	2" of brown clay, then FILL, gravelly clay, tan/white/brown, loose, moist.	1304
2	760	SB-18 (2-4)			CH	Silty CLAY, black to dark grey, soft, plastic, odor, very moist to saturated, sand zones.	1302
4						No recovery.	
6	315				CH	Silty CLAY, black to dark grey, soft, plastic, odor, very moist to saturated, sand zones.	1300
6					GP	1" of GRAVEL.	1298
8	170				CL	CLAY, brown, stiff, plastic, odor, slightly moist, to very moist,	1296
10	145					At 10' silty, oxidation staining, black stains.	
12	193	SB-18 (10-12)			CL	CLAY, slightly silty, brown, soft, plastic, slight odor, saturated. At 10.5' becomes grey.	1294
14	65				CL	CLAY, grey/brown, stiff, plastic, oxidation stains, moist, slight odor.	1292
16	70				CH	CLAY, brown/grey, stiff, plastic, slight odor, oxidation stains, few black stains, moist.	1290
18	82				CH	CLAY, brown/grey, stiff, plastic, slight odor, oxidation stains, few black stains, moist.	1288
18						At 18-18.5' gravel pieces. At 18.5' weathered LIMESTONE, grey.	1286
20						Refusal at 18.5'	
22							1284
24							1282

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-19**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.90 ft North 1744426.76 ft East 1786038.26 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 13.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1304.9
0	1355	SB-19 (0.5-2.0)	█	▨	CL	Silty sandy CLAY w/gravel, loose, slightly moist.	1304
2					CL	Silty CLAY, dark grey to black, soft, plastic, saturated, odor.	1302
2	558	SB-19 (2-4)	█	▨	CL	Silty CLAY, grey/brown, stiff, moist, odor, black stains, oxidation stains.	1300
4						No recovery.	1300
6	12.8		█	▨		CLAY, slightly silty, grey/brown, stiff, plastic, odor, black stains, oxidation stains.	1298
6	76.4						1298
8						At 8' medium stiff.	1296
8	25.5				CL		1296
10						At 10' few limestone fragments, odor.	1294
10	252						1294
12						At 12' product showing (dark brown), stiff to medium stiff.	1292
12	700	SB-19 (12-13)	█	▨		At 12.5' limestone gravel stringer, clay is soft, odor.	1292
14						Refusal at 13'	1290
14							1290
16							1288
18							1286
20							1284
22							1282
24							1282

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1308.88 ft North 1744423.95 ft East 1785910.19 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 15.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Concrete	1308.9
0	1487	SB-20 (0.5-2.0)			GP	Concrete. Concrete rubble and gravel.	1308
2						FILL, gravel, road base, white/tan, loose, wood chips, wet, slight odor.	1306
4	36.4				CH	Silty CLAY w/gravel, brown to green, soft, plastic, moist to very moist.	1304
6	22.0				CL	CLAY w/gravel, black, stiff, plastic, odor.	1302
8	45	SB-20 (8-10)			CL	Silty CLAY, brown, stiff, plastic, moist, odor.	1300
10	782				CL	At 11' becomes soft.	1298
12	950				CL	CLAY, grey/green, soft, plastic, odor.	1296
14	170				CL	CLAY, brown/grey, w/limestone fragments.	1294
16	106				CL	End of boring = 15'	1292
18							1290
20							1288
22							1286
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-21**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1311.60 ft North 1744524.45 ft East 1785788.40 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 5.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1311.6
0.5 - 2.0		SB-21 (0.5-2.0)				Silty sand, clay, gravel FILL, brown, loose, slightly moist.	
2 - 4		SB-21 (2-4)			CL	Silty CLAY, soft to medium stiff, few gravel zones, plastic, moist.	1310 1308
4 - 5						Weathered LIMESTONE, grey, Refusal at 5'	1306
5 - 6							1304
6 - 8							1302
8 - 10							1300
10 - 12							1298
12 - 14							1296
14 - 16							1294
16 - 18							1292
18 - 20							1290
20 - 22							1288
22 - 24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-22**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.89 ft North 1744524.85 ft East 1786188.09 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 20.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1304.9
1611		SB-22 (0.5-2.0)				Road base, gravel w/fines, some clay, white/tan.	1304
2						CLAY w/gravel, black, soft, plastic, very moist to wet, strong odor.	
1960		SB-22 (2-4)			CL	At 3' no gravel.	1302
4						No recovery.	
1785						CLAY, slightly silty, black, soft, plastic, wet, strong odor.	1300
6					CL		
115.2						Red fragments, possibly brick, tar holding pieces, strong odor.	1298
8					CL	CLAY, brown/grey, stiff, plastic, moist, odor.	
24.5						No recovery.	1296
10						CLAY, slightly silty, brown/grey, stiff, plastic, slightly moist, slight odor, oxidation and black stains.	1294
55.5					CL		1292
47.8							
14					CL	CLAY, brown/grey, soft to medium stiff, plastic, wet, odor.	1290
78.9						No recovery.	
16						CLAY, brown, soft, saturated, slight odor, product (black), oxidation stains.	1288
673		SB-22 (16-18)			CL		1286
18						At 18' limestone fragments.	
136							1284
20						At 20' weathered LIMESTONE, grey.	1284
						End of boring = 20'	
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-23**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1306.76 ft North 1744528.48 ft East 1786046.84 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 14.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1306.8
0	141	SB-23 (0.5-2.0)	█	▨	CL	Sandy silty gravelly CLAY w/rubble, dark brown, loose, no odor, slightly moist.	1306
2	146		█	▨	CL	Silty CLAY, black, sticky, plastic, medium soft, odor, mery moist to saturated, gravel <40mm.	1304
4						No recovery.	
4	15.2		█	▨		CLAY, slightly silty, brown, stiff, plastic, odor, moist, oxidation stains.	1302
6	40.6		█	▨			1300
8						At 7.5' medium soft.	
8	22.9	SB-23 (8-10)	█	▨	CL		1298
10	17.5		█	▨			1296
12							1294
12	98	SB-23 (12-14)	█	▨	CL	CLAY, grey, soft, odor, limestone gravel.	1294
14						At 14' weathered LIMESTONE, grey. Refusal at 14'	1292
16							1290
18							1288
20							1286
22							1284
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-24**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.64 ft North 1744529.67 ft East 1785918.77 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 3.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1309.6
0	22.8	SB-24 (0.5-2.0)			CL	Gravel, silt, sand, clay, loose, slightly moist.	
2					CL	CLAY, black/grey, soft, plastic, moist, slight odor, grey areas have black staining, gravel.	1308
4						At 3' Concrete. Refusal at 3'	1306
6							1304
8							1302
10							1300
12							1298
14							1296
16							1294
18							1292
20							1290
22							1288
24							1286

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-25**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.02 ft North 1744630.24 ft East 1786188.09 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 13.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1305.0
0	212	SB-25 (0.5-2.0)				Gravel, sand FILL, white/tan, clayey zones.	1304
2						At 1.5' becomes black.	
2	197					Silty CLAY, dark brown to black, soft to medium soft, plastic, odor, very moist.	1302
4					CL		
4	2420	SB-25 (4-6)				At 5', black, strong odor.	1300
6					CL	CLAY, brown, stiff, plastic, moist.	
6	1915					Red fragments, possibly brick, bounded by tar, wet, odor.	1298
8						CLAY, brown, stiff, moist, oxidation staining.	
8	189				CL		1296
10						At 10', gravel, slight odor.	
10	136						1294
12						Weathered LIMESTONE and grey clay, wet, slight odor.	
12	178					Refusal at 13'	1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.15 ft North 1744628.40 ft East 1785925.45 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 8.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1309.2
0		SB-26 (0.5-2.0)			GP	1" silty brown topsoil.	
0						Gravel.	
2	155				CL	CLAY, black, very soft, plastic, odor, wet.	1308
4						No recovery.	1306
6	730	SB-26 (5-8)			CL	CLAY, brown, soft, plastic, wet, odor.	1304
6						Weathered LIMESTONE, grey, hard, odor.	
8					CL	CLAY, brown, medium stiff, plastic, moist, odor.	1302
8						At 8' LIMESTONE, grey, odor.	
8						Refusal at 8'	1300
10							1298
12							1296
14							1294
16							1292
18							1290
20							1288
22							1286
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-27**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1307.17 ft North 1744632.65 ft East 1786049.29 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 15.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Concrete	1307.2
0	997	SB-27 (0.5-2.0)	100%		CL	Concrete. Silty CLAY, black, soft, plastic, wet, odor.	1306
2	182		100%		CL	Silty CLAY, brown, medium stiff to stiff, plastic, moist, odor, black stains. No recovery.	1304
6	502	SB-27 (5-7)	100%		CL	CLAY, brown, medium stiff to stiff, plastic, moist, odor, black stains.	1302
8	271		100%		CL		1300
10	54.6		0%			No recovery.	1298
12	190		100%		CL	CLAY, brown, stiff, plastic, moist, slight odor.	1296
14	119		100%		CL	At 12' saturated, oxidation stains, some gravel.	1294
16			0%			Limestone at 15'. Refusal at 15'	1292
18							1290
20							1288
22							1286
24							1284

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-28**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1311.12 ft North 1744727.89 ft East 1785792.07 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 3.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1311.1
0.5 - 2.0	1.1	SB-28 (0.5-2.0)			CL	Topsoil, gravel. Silty CLAY, brown, stiff, plastic, slightly moist, slight odor, black stains.	1310
2.0 - 3.0	0.8					At 3' LIMESTONE, grey, crystalline. Refusal at 3'	1308
4							1306
6							1304
8							1302
10							1300
12							1298
14							1296
16							1294
18							1292
20							1290
22							1288
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



MWH

Drilling Log

Soil Boring **SB-29**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.22 ft North 1744728.29 ft East 1786188.77 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 12.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2007 Completion Date 11/30/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1305.2
14.5		SB-29 (0.5-2.0)			CL	Silty CLAY mixed with road base gravel, red brick, sand, or other man-made substance mixed in, loose, slightly moist.	1304
2					CL	CLAY, dark brown/grey, medium soft to stiff, plastic, moist, odor, oxidation and black stains.	1302
4					CL		
6					CL	CLAY, brown, stiff, plastic, slightly moist, odor, black stains, few gravel pieces ~10mm, black stains.	1300
629		SB-29 (6-8)			CL	At 8' moist, slight odor.	1298
435		SB-29 (8-10)			CL	At 10' stiff to soft, gravel, odor.	1296
170					CL	CLAY w/limestone, grey, soft, plastic, very moist, odor.	1294
12					CL	At 12' LIMESTONE. Refusal at 12'	1292
14							1290
16							1288
18							1286
20							1284
22							1282
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-30
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>November 28, 2007</u>	Northing <u>1744731.9</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786050.5</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>13'</u>	Surface Elev. (ft) <u>1308.2</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1311.13</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>5.06' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>7'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 2'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.91'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>2' - 7'</u>	Development <u>Five well volumes</u>
	Screen Length <u>3'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
				Bentonite	Cement	(0' - 1') Cement	
12.2		4/5	(1-3)	Bentonite	SP	(1' - 3') SAND (SP), med. to coarse grained, tan turning black with depth, odor in black zone, moist, loose, (fill)	Sample SB-30 (1-3) taken 1530
17.3				Bentonite	CH	(3' - 13') CLAY (CH), plastic, stiff, black, very moist	Odor
5		NR		Sand		(4' - 5') No Recovery	Odor
32.5			(5-7)	Sand		5' - Some sand, coarse	Sample SB-30 (5-7) taken 1550
57.0		5/5	(7-9)	Sand		6' - Olive / brown, odor	Sample SB-30 (7-9) taken 1610
10				Sand		~7' - Saturated	
27.5				Sand		10' - Silty, brown, odor	Odor
11.0		3/3		Sand	CHg	12' - Limestone rubble	
15				Sand		13' - Limestone, weathered, hard, gray	
20				Sand		13' - Bottom of borehole	
25				Sand			



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.53 ft North 1744733.12 ft East 1785922.45 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 5.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1309.5
0		SB-31 (0.5-2.0)			GM GC	Topsoil, silt, sand, gravel.	
2	39.7					Gravel FILL, white/tan, <40mm.	1308
2						Silty CLAY, brown, medium soft to soft in zones, plastic, odor, black stains.	
4	104				CL		1306
4						At 4' some limestone gravel.	
5	118					At 5' LIMESTONE, grey, wet, odor.	1304
5						Refusal at 5'	
6							1302
8							1300
10							1298
12							1296
14							1294
16							1292
18							1290
20							1288
22							1286
24							



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.71 ft North 1744899.93 ft East 1785567.73 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 7.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2007 Completion Date 11/30/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1314.7
0	37.8	SB-32 (0.5-2.0)				CLAY, slightly silty, brown, stiff, plastic, slightly moist, odor, black stains.	1314
2	197				CL		1312
4	320	SB-32 (4-6)				At 5' becomes soft, very moist to wet, limestone gravel.	1310
6	71.8					Weathered LIMESTONE w/clay, grey, wet, odor, clay is plastic.	1308
7						Refusal at 7'	
8							1306
10							1304
12							1302
14							1300
16							1298
18							1296
20							1294
22							1292
24							



MWH

Drilling Log

Soil Boring **SB-33**

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1315.49 ft North 1745391.96 ft East 1785603.22 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 4.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2007 Completion Date 11/30/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1315.5
0.5 - 2.0	2.1	SB-33 (0.5-2.0)			CL	Gravelly sandy CLAY, very silty, brown, loose, dry.	
2.0 - 4.0	2.2	SB-33 (2-4)			CL	Silty CLAY, brown, stiff, plastic, slightly moist, no odor, oxidation stains.	1314
4.0					CL	Weathered LIMESTONE, grey, broken, powdery, no odor.	1312
4.0					CL	CLAY, slightly silty, brown, soft to medium soft, plastic, moist, no odor.	1312
4.0					CL	Limestone at 4'. Refusal at 4'	1310
6							1308
8							1306
10							1304
12							1302
14							1300
16							1298
18							1296
20							1294
22							1292
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.92 ft North 1745405.03 ft East 1785747.21 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 6.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2007 Completion Date 11/30/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Grass	1314.9
0.5 - 2.0	4.5	SB-34 (0.5-2.0)			CH CL	CLAY w/gravel, orange, hard, dry, oxidation stains, no odor.	
						Silty CLAY, brown, stiff, slightly moist, oxidation & black stains.	1314
						CLAY, brown/grey, stiff, slightly moist, oxidation & black stains.	
2 - 4	4.6	SB-34 (4-6)			CL		1312
5	3.6					At 5' becomes medium stiff to medium soft, slight odor.	1310
6						At 6' weathered LIMESTONE, grey, moist.	
6						Refusal at 6'	1308
8							1306
10							1304
12							1302
14							1300
16							1298
18							1296
20							1294
22							1292
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1316.69 ft North 1745549.02 ft East 1785608.30 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 6.0 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 2.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Direct Push (Geoprobe) Sand Pack NA
 Driller D. Freund Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2007 Completion Date 11/30/2007 Checked By N. Day

COMMENTS

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel	1316.7
0.5		SB-35 (0.5-2.0)	[Hatched Box]	[Hatched Box]	GC	GRAVEL, black, <40mm, some clay, very silty.	1316
2	CL				Very silty CLAY, dark brown to black, sandy, loose, dry, slight odor, oxidation.	1314	
3.4					CL	CLAY, brown, stiff, plastic, slightly moist, slight odor, oxidation & black stains.	1314
4							1312
5	2.1	SB-35 (4-6)	[Solid Black Box]	[Solid Black Box]		At 5' becomes medium soft, some limestone gravel.	1312
6						At 6' weathered LIMESTONE, grey, wet.	1310
6						Refusal at 6'	1310
8							1308
10							1306
12							1304
14							1302
16							1300
18							1298
20							1296
22							1294
24							

ELPASO-SB ELDORADO-LOGS.GPJ MWH IA.GDT 8/3/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-36
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>December 3, 2007</u>	Northing <u>1743686.8</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1787071.7</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>19'</u>	Surface Elev. (ft) <u>1292.0</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1294.58</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>5.88' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>19'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.55'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 19'</u>	Development <u>Five well volumes</u>
	Screen Length <u>15'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	2.3	1.5/3	(0-2)		CL	(0' - 3') Silty CLAY (CL), dark brown, moist, (grass, tree roots at 1.5' bgs)	Sample SB-36 (0-2) taken 1610	
	NR	NR			CH	(1.5' - 3') No Recovery		
▽								No odor ▽
	1.9	2/2					(3' - 19') Silty CLAY (CH), plastic, soft, dark brown, no odor, wet	
5							5' - Med. soft, black staining, very slight odor, wet to moist	Very slight odor
	3.1							
	2.7	3/5						
	NR	NR					(8' - 10') No Recovery	
10							10' - Med. stiff, dark brown / gray, black oxidation staining, slight odor, moist	Slight odor
	8.9							
	122.0	3/5					(13' - 15') No Recovery	
	NR	NR						
15							15' - Slightly silty, dark brown / brown, very slight odor, very moist	Very slight odor
	32.7							
	13.2	4.3/4.3						
	23.8						19' - Limestone, weathered, gray / yellow, black staining, odor	Odor
							19.3' - Bottom of borehole terminated due to refusal)	

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-37
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>December 3, 2007</u>	Northing <u>1744036.8</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786769.9</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>14.1'</u>	Surface Elev. (ft) <u>1295.0</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1297.77</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>5.45' February 10, 2009</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>14.1'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.76'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 14.1'</u>	Development <u>Five well volumes were removed following SOP-13</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	2.7		(0-2)	Bentonite	CL CH	(0' - 0.5') Silty CLAY (CL), stiff, dark brown, wet, loose, (grass) (0.5' - 14') Silty CLAY (CH), plastic, stiff, dark brown, very slight odor, moist, (rootlets)	Very slight odor Sample SB-37 (0-2) taken 1510 Odor
	1481.0	5/5		Sand		2' - Soft, odor, wet	
5	1531.0		(4-6)			4' - Med. stiff,	Sample SB-36 (4-6) taken 1545
	184.0	5/5				6' - Odor	Odor
10	148.0						
	741.0					10' - Med. stiff to stiff, brown with black staining, odor, moist	Odor
	752.0	4.1/4.1					
15	308.0				CHg	13.5' Some limestone gravel 14' - Limestone, gray / yellow, odor, wet 14.1' - Bottom of borehole (terminated due to refusal)	Odor

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-38
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Below Ground Surface</u>	Completion Date <u>December 3, 2007</u>	Northing <u>1744450.7</u>
	Drilled by <u>D. Freund</u>	Drilling Fluid <u>--</u>	Easting <u>1786506.0</u>
	Logged By <u>D. Bollenback</u>	Borehole Depth <u>20.8'</u>	Surface Elev. (ft) <u>1304.8</u>
	Drill Rig <u>Geoprobe</u>	Borehole Dia. <u>2"</u>	TOC Elev. (ft) <u>1307.58</u>
	Drilling Method <u>Direct Push (Geoprobe)</u>		

Samples	Sample Method <u>4' Core</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>12.8' February 10, 2009</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>20.8'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>1"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.76'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 20.8'</u>	Development <u>Five well volumes</u>
	Screen Length <u>15'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	2.2		(0-2)	Bentonite	CLg	(0' - 5') Silty to very silty CLAY (CL) with some gravel, brown, slightly moist to dry, (rootlets)	Sample SB-37 (0-2) taken 1350
		3.5/5				2' - Soft to hard, dark brown to black, odor, moist to wet	Odor
	178.0					(3.5' - 5') No Recovery	
	NR	NR					
5	1.4			Sand	CHg	(5' - 6.5') Silty CLAY (CH) with some gravel, plastic, hard to med. stiff, dark brown, slight odor, dry to slightly moist	Very slight odor
	1.8	5/5			CL	(6.5' - 17.5') Silty CLAY (CL), stiff, brown / red, black staining, no odor, moist	No odor
	2.1						
10	3.2	3/5				~11' - Soft, very moist	
	2.1					(13' - 15') No Recovery	
15	NR	NR				15' - Very moist to wet	
	3.0	3/5					
	2.8				CLg	17.5' - Limestone gravel (18' - 20') No Recovery	
20	NR	NR			LS	20' - Limestone, weathered, gray, odor wet	Odor
	101.0	0.8/0.8				20.8 - Bottom of borehole	
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-39
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 9, 2009</u>	Northing <u>1744357.9</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786518.4</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1300.5</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>-- --</u>
			DTW (btoc) <u>-- --</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 20'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
				Bentonite Grout	Fill	(0' - 5') No Recovery Cuttings - Black tar-like clay material, soft, strong HC odor, wet to very moist	Started drilling 0800	
	NR	NR	(2-4)				PID = 89.6 from cuttings	Strong HC odor Sample SB-39 (2-4) from cuttings
5	25.2		(4-6)		GM CL	(5' - 5.5') Silty GRAVEL (GM) with minor black HC stained clay (5.5' - 10') Lean CLAY (CL), med. plasticity, very stiff, no dilatancy, high toughness, black to dark brown, no odor 5.5' to 6.5' - minor gravels	No odor Sample SB-39 (4-6) Sample SB-39 (6-8)	
	2.4	4.2/5	(6-8)					Sample SB-39 (6-8)
	1.0		(8-10)					Sample SB-39 (8-10)
	0.5							
10	NR	NR			CL/CH	(9.2' - 10') No Recovery (10' - 19.75') Lean / Fat CLAY (CL/CH), transitions into med. to high plasticity, med. stiff		Sample SB-39 (10-12)
	0.6		(10-12)					Sample SB-39 (12-14)
	0.2	4.7/5	(12-14)					Sample SB-39 (14-16)
	0.0							Sample SB-39 (16-18)
15	NR	NR	(14-16)				14' - Very moist (14.7' - 15') No Recovery	Sample SB-39 (18-20)
	0.2							Sample SB-39 (18-20)
	0.0	4.9/5	(16-18)					Sample SB-39 (18-20)
	0.0		(18-20)					Sample SB-39 (18-20)
20	5.4	NR			LS	19.5' - Wet (19.75' - 20') LIMESTONE, highly fractured, wet, strong HCl rxn, slight HC odor, minor black HC staining, limestone fragments up to 2" in diameter (19.9' - 20') No Recovery 20' - Bottom of borehole	Slight HC odor Stopped drilling 0830	
	NR	NR						All samples tested for lead
25								Water level measured at time of drilling

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-40
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 9, 2009</u>	Northing <u>1744495.1</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786412.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1302.6</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>-- --</u>
			DTW (btoc) <u>-- --</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 20'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.2			(0-2)	Bentonite Grout	GM	(0' - 1.3') Silty GRAVEL (GM) with minor clays, 20-30% gravels, high silt content, loose, med. plasticity in clay, dark brown to black, no odor	Started drilling 0910 No odor Sample SB-40 (0-2)	
0.1		4.4/5			CL	(1.3' - 5') Lean CLAY (CL), med. plasticity, very stiff, no dilatancy, high toughness, reddish-brown (4/3 5YR), no odor	No odor	
0.0			(2-4)				Sample SB-40 (2-4)	
0.0								
5	NR	NR	(4-6)			CL/CH	(4.4' - 5') No recovery (5' - 19') Lean / Fat CLAY (CL/CH), transitions into med. to high plasticity, med. Stiff	Sample SB-40 (4-6)
0.0		4.6/5	(6-8)					
0.0			(8-10)				8' - Very moist	Sample SB-40 (8-10)
10	NR	NR					(9.6' - 10) No Recovery 10' - Very dark gray (3/1 5YR)	
0.0			(10-12)				11' - Wet	Sample SB-40 (10-12)
0.0		4.8/5	(12-14)					Sample SB-40 (12-14)
0.0								
15	NR	NR	(14-16)				(14.8' - 15') No Recovery	Sample SB-40 (14-16)
0.1								
0.3		4.5/5	(16-18)					Sample SB-40 (16-18)
0.3								
0.2			(18-20)				18' - Minor olive green color in with brown and gray color	
20	NR	NR				LS	(19' - 20') LIMESTONE, very pale brown, severely weathered, highly fractured, hard to mod. hard, wet, slight HC odor (19.5' - 20') No Recovery 20' - Bottom of borehole	Slight HC odor Sample SB-40 (18-20) Stopped drilling 0930
								All samples tested for lead
25								Water level measured at time of drilling

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-41
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 9, 2009</u>	Northing <u>1744646.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786363.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1302.4</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>-- --</u>
			DTW (btoc) <u>-- --</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 20'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.0			(0-2)	Bentonite Grout	ML	(0' - 1.6') Clayey SILT (ML), med. plasticity, med. stiff to soft, black to dark brown, no odor, moist, minor organic material (rootlets)	Started drilling 1005 No odor Sample SB-41 (0-2) No odor	
0.0	2.7/5		(2-4)		Lsg	(1.6' - 2') LIMESTONE gravels in a clay matrix, 90% gravel, sub-angular to angular, soft to med. stiff clay, no odor	Sample SB-41 (2-4) No odor	
		NR			CL	(2' - 5') Lean CLAY (CL), med. plasticity, med. stiff to stiff, no dilatancy, reddish-brown with minor black pigmentation, no odor, moist (2.7' - 5') No Recovery		
5		NR			CL/CH	(5' - 17') Lean / Fat CLAY (CL/CH), clay transitions to a softer clay, med. to high plasticity	Sample SB-41 (4-6)	
0.0			(4-6)					
0.0			(6-8)			5' to 5.25' - Minor limestone gravel	Sample SB-41 (6-8)	
0.0	4.8/5		(8-10)					
0.0			(8-10)			9' - Very moist	Sample SB-41 (8-10)	
10	NR	NR				(9.8' - 10') No Recovery		
0.0			(10-12)			10.5' - Wet	Sample SB-41 (10-12)	
0.0			(12-14)				Sample SB-41 (12-14)	
0.0	4.9/5		(12-14)					
0.0			(14-16)			14.5' - Some black staining in clay		
15	NR	NR				(14.9' - 15') No Recovery	Strong HC odor Sample SB-41 (14-16)	
28.1			(14-16)			15' - Limestone gravel in clay, strong HC odor, black HC staining		
22.3	3.5/5		(16-18)				Sample SB-41 (16-18)	
10.7			(16-18)			LS	(17' - 20') LIMESTONE, very pale brown, severely weathered, highly fractured, mod. hard to hard, competent rock	Sample SB-41 (16-18)
8.9			(18-20)				(18.5' - 20') No Recovery	Sample SB-41 (18-20)
20	NR	NR					20' - Bottom of borehole (terminated due to refusal)	All samples tested for lead
								Water level measured at time of drilling
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-42
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 8, 2009</u>	Northing <u>1744456.7</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786313.7</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15'</u>	Surface Elev. (ft) <u>1303.6</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 15'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.2		(0-2)	Bentonite Grout	MLg	(0' - 1.6') Clayey SILT (ML) with gravel, med. plasticity, dark brown to black, no odor, moist, soft to loose, minor organic material (rootlets)	Started drilling 1510 No odor Sample SB-42 (0-2) No odor	
	0.3	4/5			CL/CH	1' to 1.5' - Some black staining, no detectable HC odor		
	0.2		(2-4)			(1.6' - 14.2') Lean / Fat CLAY (CL/CH), med. to high plasticity, med. stiff to stiff, no dilatancy, med. toughness, dark brown to black, no odor, moist	Sample SB-42 (2-4)	
	0.3					(4' - 5') No Recovery		
5	NR	NR						
	0.4		(4-6)				Sample SB-42 (4-6)	
	0.0		(6-8)				Sample SB-42 (6-8)	
	0.0	4.8/5						
	0.2		(8-10)				9' - Wet Sample SB-42 (8-10)	
10	NR	NR					(9.8' - 10') No Recovery	
	0.5		(10-12)				Sample SB-42 (10-12)	
	0.1	4.5/5						
	0.6		(12-14)				Sample SB-42 (12-14)	
	0.5		(14-16)				No odor Sample SB-42 (14-16)	
15	NR	NR				LS	(14.2' - 15') LIMESTONE, severely to completely weathered, fragments in a sandy fat clay matrix, sub-angular to angular, hard to mod. hard, no odor, strong HCl rxn (14.5' - 15') No Recovery 15' - Bottom of borehole (terminated due to refusal)	Stopped drilling 1530 All samples tested for lead
								Water level measured at time of drilling
20								
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-43
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 8, 2009</u>	Northing <u>1744527.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786114.1</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>16'</u>	Surface Elev. (ft) <u>1305.8</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 16'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.3	2.5/5	(0-2)	Bentonite Grout	GM	(0' - 1.1') Silty GRAVEL (GM), gravels up to 2" in diameter (from road), fine silt with minor clay content (10-20%), dark brown to black, no odor, moist, loose (1.1' - 15.5') Lean / Fat CLAY (CL/CH), med. to high plasticity, med. stiff to stiff, no dilatancy, med. to high toughness, dark brown to black, strong HC odor, moist (2.5' - 5') No Recovery 5' - Very strong HC odor, black HC staining 7' to 8' - Wet, oily sediment 8' - Clay, highly impacted clay with oily product (9.9' - 10') No Recovery (14.9' - 15') No Recovery (15' - 16') LIMESTONE, very pale brown to white, severely weathered, highly fractured, somewhat platy, hard to mod. hard, competent rock, same free product sitting on top of the limestone 16' - Bottom of borehole (terminated due to refusal)	Started drilling 1240 No odor Sample SB-43 (0-2) Strong HC odor Sample SB-43 (2-4)	
	4.0				CL/CH			
	1.0		(2-4)					
	NR	NR						
5	302.0		(4-6)					
	432.0		(6-8)					Sample SB-43 (6-8)
	38.3	4.9/5						
	11.7		(8-10)					
10	4.6							
	NR	NR						
	10.3		(10-12)					
	9.8							sample SB-43 (10-12)
	14.6	4.9/5						
	25.1		(12-14)					
15	29.9							
	NR	NR	(14-16)					
	42.8	1/1			LS			
							Sample SB-43 (14-16) Stopped drilling 1315 All samples tested for lead	
20							Water level measured at time of drilling	
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID SB-44
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 8, 2009</u>	Northing <u>1744577.2</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786265.6</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15'</u>	Surface Elev. (ft) <u>1303.7</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite Grout</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 15'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.7		(0-2)	Bentonite Grout	GM	(0' - 1.7') Silt GRAVEL (GM) with clay, gravels 30-40%, minor clay content, med. plasticity, med. brown, no odor, very moist	Started drilling 1405 No odor SB-44 (0-2)	
	13.8	3/5	(2-4)		CL/CH	(1.7' - 13.2') Lean / Fat CLAY (CL/CH), med. to high plasticity, stiff to very stiff, no dilatancy, high toughness, dark brown to black, moist, highly impacted with HC (3' - 5') No Recovery	SB-44 (2-4)	
5	NR	NR						
	829.0		(4-6)					SB-44 (4-6)
	153.0		(6-8)					SB-44 (6-8)
	143.0	4.9/5	(8-10)					SB-44 (8-10)
10	NR	NR					(9.9' - 10') No Recovery	
	18.7		(10-12)				10' - Med. brown to reddish-brown color transition	SB-44 (10-12)
	11.9		(12-14)					
	18.9	4.5/5	(12-14)					SB-44 (12-14)
	236.0		(14-16)			LS	(13.2' - 15') LIMESTONE, very pale brown to grayish brown, completely weathered, highly fractured, hard to mod. hard, strong HCl rxn, fragments up to 2" in diameter	SB-44 (14-16)
15	NR	NR					(14.5' - 15') No Recovery 15' - Bottom of borehole (terminated due to refusal)	Stopped drilling 1430 All samples tested for lead
20								
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-01
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 12, 2007</u>	Northing <u>1739227.8</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1783806.6</u>
	Logged By <u>RM</u>	Borehole Depth <u>5'</u>	Surface Elev. (ft) <u>1327.4</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>--</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 5'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.0	2/2	(0-2)		Bentonite	CL	(0' - 2') Silty CLAY (CL) with low silt content (<15%), med. plasticity, brown, slightly moist	Sample taken at 1524
0.0	NR					(2' - 5') No Recovery	
5					LS	4.5' - Competent LIMESTONE, very hard	
						Refusal at 5' - Bottom of hole	Dry hole (2/29/2008)
10							
15							
20							
25							



MWH

Borehole / Well Completion Log

Monitoring Well

TW-02

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1328.10 ft North 1739285.67 ft East 1784418.48 ft
 Top of Casing 1331.47 ft Water Level Initial 1310.1 ^{11/15/07} 00:00 Static 1318.98 ^{02/14/08} 00:00
 Hole Depth 20.1 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 13.2 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/14/2007 Completion Date 11/15/2007 Checked By N. Day

COMMENTS
 LNAPL measured at 0.18" on
 2/14/08. Well stickup = 3.38"

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Topsoil		1328.1
0 - 2	126	TW-02 (0-2')			CH	FILL, silty clay, sand, gravel, slightly moist, soft, slight odor. Silty CLAY (low silt content), slightly moist, medium stiff, plastic, greenish grey, hydrocarbon odor. CaCO ₂ deposits present (~15%), increasing silt from 4' onward.		1326
2 - 4	124					No recovery.		1324
4 - 6	355					LIMESTONE, highly weathered, (silty clay & limestone), slightly moist, stiff to hard, greenish grey, odor. LIMESTONE, moderately competent, greenish white, dry.		1322
6 - 8								1320
8 - 10	345							1318
10 - 11'	358	TW-02 (10-11')				SILTSTONE: weathered to silty clay (high silt content), dry, stiff, greenish grey, odor. No recovery.		1316
11' - 12						LIMESTONE, highly weathered, (clay & limestone), dry, stiff, greenish grey, odor.		1314
12 - 14						LIMESTONE, moderately competent, hard.		1312
14 - 16	18.2							1310
16 - 18								1308
18 - 20	8.9					End of boring = 20.1'. Well TD = 20.1'.		1306
20 - 22								
22 - 24								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-03
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 20, 2007</u>	Northing <u>1739343.6</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1785873.9</u>
	Logged By <u>RM</u>	Borehole Depth <u>23.01'</u>	Surface Elev. (ft) <u>1326.6</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>1329.6</u>

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>18.76' February 10, 2009</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>23.01'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>2' - 6'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>16/31 Sand</u>	Stick-up/down <u>+3.03'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>6' - 23.01'</u>	Development <u>Five well volumes</u>
	Screen Length <u>15'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
0.6	2/2	2/2	(0-2)	Bentonite	CL	(0' - 2.2') Silty CLAY (CL), brown, slightly moist, soft	Started drilling 0736 TW-03 (0-2) : GRO, DRO, VOC, SVOC, metals, VPH, EPH / Duy-2 collect		
	auger				ML	(2.2' - 8') SILT (ML) white to gray, dry, hard ~3' - Increased clay content, brown to white, slightly moist, soft (4' - 5') No Recovery ~5' - Increased clay content (>30%), light brown			
1.0	1/2								
5	NR	NR							
1.4	2/2								
10	1.6	auger				CL		(8' - 19') Silty CLAY (CL), brown, moist, soft	
	2.4	2.5/2.5			Sand				
	5.9	0.5/2.5							(13' - 15') No Recovery
15	NR	NR							
	5.9	2/2	(15-17)						16.5' - Increased silt content (>30%), dry, hard
20	5.2	auger			LS	(19' - 23.01') LIMESTONE, brown to white, weathered, hard, slightly moist 20' - Saturated	Sample taken at 0945 TW-03 (15-17) : GRO, DRO, VOC, SVOC, metals, VPH, EPH / Duy-2 collect		
	5.0	auger				23.4' - Bottom of borehole			
25							Sump (22.61' - 23.01') Screen (7.61 - 22.61')		

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-04
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 13, 2007</u>	Northing <u>1739543.4</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1783945.6</u>
	Logged By <u>RM</u>	Borehole Depth <u>4'</u>	Surface Elev. (ft) <u>1323.0</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 4'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.0	1/2			Bentonite	CH	(0' - 2') Silty CLAY (CH) with low silt content (<10%), plastic, med. stiff, brown, slightly moist (1' - 2') No Recovery	Started drilling 0829 TW-04 (0-2): 2 Terra, 2 8oz - VOC, metal, DRO, GRO Sample taken at 0845 TW-04 (2-4): 2 Terra, 2 8oz - VOC, metal, DRO, GRO Dry hole (2/29/2008)	
	NR	NR	(0-2)		LS			(2' - 4') No Recovery Logged from cutting - LIMESTONE, weathered, gravel in silty clay matrix, strong HC odor, moist, soft PID = 1495 from cuttings Refusal at 4' - competent limestone, HC odor from cuttings
	NR	NR	(2-4)					
5								
10								
15								
20								
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-05
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 19, 2007</u>	Northing <u>1739699.1</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1785195.8</u>
	Logged By <u>RM</u>	Borehole Depth <u>11.4'</u>	Surface Elev. (ft) <u>1312.2</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>1314.67</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND</u> <u>February 10, 2009</u>
			DTW (btoc) <u>5'</u> <u>February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>11.4'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>2' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>16/31 Sand</u>	Stick-up/down <u>+2.46'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 11.4'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.0	2/2	(0-2)	Sand	CL	(0' - 1.1') Silty CLAY (CL), brown, moist, soft	Started drilling 1446 TW-05 (0-2): BTEX, GRO, DRO, metals	
					ML	(1.1' - 2') Clayey SILT (ML) with high clay content (>80%), grayish-white, dry, loose		
					CL	(2' - 7.2') Silty CLAY (CL), brown, moist, soft		
5	NR	NR				(3.5' - 4') No Recovery	HC odor TW-05 (5-7): BTEX, GRO, DRO, metals	
	NR	NR				(4' - 5') No Recovery		
						5' - High silt content, HC odor		
	1285.0	2/2	(5-7)			LS	(7.2' - 11.4') LIMESTONE, greenish-gray, highly weathered, hard, dry	Sump (11' - 11.4') Screen (6' - 11')
10	468.0	auger				9.4' - mod. competent		
	2.1	auger				Refusal at 11.4' - competent limestone, very hard		

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-06
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 13, 2007</u>	Northing <u>1739805.8</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1784249.5</u>
	Logged By <u>RM</u>	Borehole Depth <u>6.1'</u>	Surface Elev. (ft) <u>1317.0</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>--</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>--</u> <u>--</u>
			DTW (btoc) <u>--</u> <u>--</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 6.1'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
5	0.8	2/2	(0-2)	Bentonite	CL	(0' - 2') Silty CLAY (CL) with mod. silt content (~30%), med. plasticity, brown, slightly moist, soft	Started drilling 1118 TW-06 (0-2): DRO, GRO, BTEX, metals
	0.6	1.5/2				2' - reddish-brown mottling, stiff	
	NR	NR				(3.5' - 4') No Recovery	
	NR	NR				(4' - 5') No Recovery	
	0.4	1/1				6.1' - Refusal, bottom of borehole	
10							Dry hole
15							
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-07
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 19, 2007</u>	Northing <u>1739839.7</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1785022.1</u>
	Logged By <u>RM</u>	Borehole Depth <u>13.2'</u>	Surface Elev. (ft) <u>1318.8</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>1321.76</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>10.44' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>13.2'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>2' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>20/20 Sand</u>	Stick-up/down <u>+2.96'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 13.2'</u>	Development <u>Five well volumes</u>
	Screen Length <u>7'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	35.9	2/2	(0-2)	Sand	CH	(0' - 5') Silty CLAY (CH) with low silt content (<20%), med. stiff, greenish-gray, HC odor, slightly moist	Started drilling 1251 HC odor TW-07 (0-2): GRO, DRO, VOC, SVOC, metals, VPH, EPH Time: 1337
	0.9	2/2				(4' - 5') No Recovery	
5	NR	NR			ML	(5' - 6') SILT (ML), stiff, greenish-white, dry	
	1.0	2/2			CL	(6' - 7') Silty CLAY (CL) with high silt content (>30%), greenish-gray, moist, soft	
					LS	(7' - 13.2') LIMESTONE, greenish-gray, weathered	
10	45.0	auger				~10' - very hard	
	1.0	auger				13.2' - Bottom of hole	Sump (12.8' - 13.2') Screen (5.8' - 12.8')
15							
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-08
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 19, 2007</u>	Northing <u>1739930.7</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1784749.2</u>
	Logged By <u>RM</u>	Borehole Depth <u>10.4'</u>	Surface Elev. (ft) <u>1320.8</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>--</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>-- --</u>
			DTW (btoc) <u>-- --</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>--</u>	Slot Size (in) <u>--</u>	Seal Interval <u>--</u>
	Casing Type <u>--</u>	Backfill Material <u>Bentonite</u>	Surface Seal <u>--</u>
	Casing Joints <u>--</u>	Backfill Interval <u>0' - 10.4'</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>--</u>	Filter Material <u>--</u>	Stick-up/down <u>--</u>
	Screen Type <u>--</u>	Filter Interval <u>--</u>	Development <u>--</u>
	Screen Length <u>--</u>	Seal Material <u>--</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
1.3	2/2	2/2	(0-2)	Bentonite	Fill CH	(0' - 0.6') Fill, gravel and sand, black, slightly moist, loose (0.6' - 5') silty CLAY (CH) with low silt content (<20%), med. stiff, brown with greenish-gray mottling, slightly moist 2' - grades to greenish-brown (4' - 5') No recovery	Started drilling 1443 TW-08 (0-2): GRO, DRO, VOC, SVOC, metals, VPH, EPH (collected 11/16/2007) Time: 1135 HC odor TW-08 (0-2): GRO, DRO, VOC, SVOC, metals, VPH, EPH (collected 11/19/2007)
2.3	2/2				ML	(5' - 6.2') SILT (ML) with minor clay, stiff, greenish-gray, dry	
5	NR	NR			CL	(6.2' - 6.7') Silty CLAY (CL) with mod. silt content, (grades to) stiff, brown, HC odor, slightly moist	
41.2	2/2		(5-7)		LS	(6.7' - 10.4') LIMESTONE, grayish-white, weathered, hard, dry	
10	50.9	auger			LS	10' - competent limestone, very hard 10.4' - Refusal, bottom of borehole	
15							
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-09
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 14, 2007</u>	Northing <u>1739955.5</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1784013.3</u>
	Logged By <u>RM</u>	Borehole Depth <u>9.9'</u>	Surface Elev. (ft) <u>1320.0</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>1322.93</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>3.95' February 14, 2008</u>
			DTW (btoc) <u>3.97' February 14, 2008</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>9.9'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>1' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>16/30 Sand</u>	Stick-up/down <u>+2.97'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 9.9'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
▽							Started drilling 1020 ▽
	1580.0	2/2	(0-2)	[Hatched Box]	Fill CL	(0' - 0.3') Fill, silty CLAY with gravel, brown, HC odor, slightly moist, soft (0.3' - 3.3') Silty CLAY (CL) with mod. silt, brown, HC odor, slightly moist, soft	HC odor TW-09 (0-2): GRO, DRO, VOC, SVOC, EPH, VPH, metals HC odor
	112.0	1/1		[Dotted Box]			
5	96.0	auger		[Brick Box]	LS	(3.3' - 9.9') LIMESTONE, greenish-gray, highly weathered, slightly moist, HC odor, limestone fragments in a clay matrix	
	92.0	auger		[Brick Box]		Mod. competent	
10	88.0			[Brick Box]		9.9' - Competent limestone, very hard, Refusal - Bottom of borehole	Sump (9.5' - 9.9') Screen (5.5' - 9.5')
15							
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-10
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>Geo Core</u>	Completion Date <u>November 15, 2007</u>	Northing <u>1740045.7</u>
	Drilled by _____	Drilling Fluid <u>--</u>	Easting <u>1784515.4</u>
	Logged By <u>RM</u>	Borehole Depth <u>14.8'</u>	Surface Elev. (ft) <u>1315.0</u>
	Drill Rig <u>GP 1000L</u>	Borehole Dia. <u>8"</u>	TOC Elev. (ft) <u>1318.29</u>

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>8.68' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>14.8'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>1' - 3'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>16/30 Sand</u>	Stick-up/down <u>+3.33'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>3' - 15'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	0.5	2/2	(0-2)		CL	(0' - 2') Silty CLAY (CL) with mod. silt, med. plasticity, med. stiff, brown with reddish brown mottling, slightly moist	Started drilling 1119 TW-09 (0-2): BTEX, GRO, DRO, metals
	0.3	2/2			CH	(2' - 4') Silty CLAY (CH) (silt <20%), plasticity, stiff, brown with reddish brown mottling, slightly moist	
	NR	NR				(4' - 5') No Recovery	
	69.9	2/2				6.5' - light gray, soft, visible HC impacts, strong HC odor	Visible HC impacts, HC odor Time: 1321 TW-09 (7-8): VOC, SVOC, GRO, DRO, VPH, EPH, metals, TCLP-VOC, TCLP metals, TCLP-SVOC ~8.2' - HC odor
	1612.0	1/1	(7-8)		LS	(8.2' - 14.8') LIMESTONE, greenish-gray, hard, dry, HC odor	
10	922.0	auger					
	47.0	auger					
15	77.0						
						14.8' - Bottom of borehole	Sump (14.4' - 14.8') Screen (4.4 - 14.4')



MWH

Borehole / Well Completion Log

Monitoring Well TW-11

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.76 ft North 1740058.69 ft East 1784145.72 ft
 Top of Casing 1317.57 ft Water Level Initial 1307.26 ^{11/14/07} 00:00 Static 1314.48 ^{02/14/08} 00:00
 Hole Depth 10.0 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 7.9 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/14/2007 Completion Date 11/14/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.81'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.8
0.5		TW-11 (0-2)			CL	Silty CLAY (moderate silt content), slightly moist, soft, dark brown.		1314
2					CH	Silty CLAY (low silt content), slightly moist, medium stiff, brown w/reddish brown mottling.		1312
4						No recovery.		1310
6	32					LIMESTONE, weathered, dry, hard, greenish white.		1308
8	102					At 7.5' becomes moist.		1306
10						End of boring = 10'. Well TD = 10.0'.		1304
12								1302
14								1300
16								1298
18								1296
20								1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-12

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.58 ft North 1740189.28 ft East 1784566.32 ft
 Top of Casing 1317.96 ft Water Level Initial 1300.58 ^{11/15/07} 00:00 Static 1305.61 ^{02/14/08} 00:00
 Hole Depth 20.0 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.1 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/15/2007 Completion Date 11/15/2007 Checked By N. Day

COMMENTS
Well stickup = 3.38'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.6
0.2		TW-12 (0-2)				Silty CLAY (moderate silt), slightly moist, medium stiff, medium plastic, brown.		1314
2					CL			1312
0.6								
4						No recovery.		1310
6					CL	Silty CLAY (moderate silt), slightly moist, medium stiff, medium plastic, brown, slight hydrocarbon odor.		1308
259						No recovery.		
8					CL	Silty CLAY (less silt), slightly moist, medium stiff, medium plastic, brown.		1306
403					CH	Fat CLAY, slightly moist, stiff, dark brown, highly plastic.		
10		TW-12 (10-11.5)				Highly weathered LIMESTONE, moist, hard, greenish grey, hydrocarbon odor.		1304
1358						Weathered LIMESTONE, wet, hard, grey, hydrocarbon odor.		1302
12								
115								1300
14								
159								1298
16								
18						Becomes moderately competent limestone at 17.5'.		1296
126								
20						End of boring = 20'. Well TD = 20.0'.		1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-13

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.57 ft North 1740196.28 ft East 1784765.65 ft
 Top of Casing 1317.44 ft Water Level Initial 1297.57 ^{11/16/07} 00:00 Static 1305.29 ^{02/14/08} 00:00
 Hole Depth 20.2 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 7.6 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/16/2007 Completion Date 11/16/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.88'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.6
0	0.0	TW-13 (0-2)			CH	Silty CLAY (low silt content), slightly moist, medium stiff, brown.		1314
2	0.3				ML	SILT w/minor clay, soft, dry, white w/brown mottling.		1312
4						No recovery.		1310
6	0.3				ML	SILT w/minor clay, soft, dry, white w/brown mottling.		1308
8	0.4				CL	Clayey SILT, moist, soft, brownish white. Becomes stiff to hard at 7.5'.		1306
10	0.6				CL			1304
12						Weathered LIMESTONE, dry, hard, grey.		1302
14	11.4							1300
16	1.0							1298
18	1.4					Becomes wet at 17.5'.		1296
20						End of boring = 20.2'. Well TD = 20.2'.		1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-14

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1317.37 ft North 1740308.97 ft East 1784188.80 ft
 Top of Casing 1320.69 ft Water Level Initial 1301.37 ^{11/14/07} 00:00 Static 1312.25 ^{02/14/08} 00:00
 Hole Depth 20.0 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 12.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/14/2007 Completion Date 11/14/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.32'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel		1317.4
0 - 2	47	TW-14 (0-2)			CL	Silty CLAY (moderate silt content), slightly moist, medium stiff, medium plastic, brown, black staining throughout, slight hydrocarbon odor.		1316
2 - 4	18					No recovery.		1314
4 - 6					ML	SILT, highly compacted, stiff, to hard, greenish grey, slightly moist, slight hydrocarbon odor.		1312
6 - 10	157							1310
10 - 12	69.9					LIMESTONE, hard, greenish white, dry, no odor.		1308
12 - 14	59.1							1306
14 - 16	9.6							1304
16 - 18	0.1					Becomes brown at 16'. Becomes wet at 17'.		1302
18 - 20	0.1							1300
20						End of boring = 20'. Well TD = 20.0'.		1298
22								1296
24								1294

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-15

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1304.57 ft North 1740385.48 ft East 1785187.51 ft
 Top of Casing 1307.48 ft Water Level Initial 1292.57 ^{11/20/07} 00:00 Static 1303.38 ^{02/14/08} 00:00
 Hole Depth 17.3 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 9.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/20/2007 Completion Date 11/20/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.91'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1304.6
1.82	182	TW-15 (0-2)			CL	Silty CLAY (moderate silt content), slightly moist, soft, dark brown, hydrocarbon odor.		1304
2					CH	Silty CLAY (low silt content), slightly moist, soft, dark brown, hc odor.		1302
4	210					No recovery.		1300
6		TW-15 (5-7.5)			CH	Silty CLAY (low silt content), slightly moist, soft, dark brown, hc odor.		1298
8	314					No recovery.		1296
10						Highly weathered LIMESTONE, hard, brownish white, slightly moist.		1294
12	204					Becomes moist at 12.5'.		1292
14	7.3					Becomes moderately competent limestone at 15'.		1290
16	5.3							1288
18						End of boring = 17.5'. Well TD = 17.3'.		1286
20								1284
22								1282
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-16

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.23 ft North 1740388.61 ft East 1784762.15 ft
 Top of Casing 1312.06 ft Water Level Initial 1297.23 ^{11/16/07} 00:00 Static 1302.66 ^{02/14/08} 00:00
 Hole Depth 17.2 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 9.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/16/2007 Completion Date 11/16/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.83'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1309.2
0.4		TW-16 (0-2)			CL	Silty CLAY (high silt content), dry, soft, brown, very little plasticity.		1308
2					CL	Silty CLAY (moderate silt content), slightly moist, medium stiff, brown w/reddish brown mottling.		1306
4						No recovery.		
6	0.6					Silty CLAY (moderate silt content), slightly moist, medium stiff, brown w/reddish brown mottling.		1304
6	164							1302
8					CL	Hydrocarbon odor 8-10'.		1300
10						Becomes light grey, strong hc odor.		
10		TW-16 (10-12)						
12	123					Weathered LIMESTONE, moist to wet, hard, strong hc odor.		1298
12						Becomes saturated at 12'.		1296
14	173							1294
16	132							1292
18						End of boring = 17.2'. Well TD = 17.2'.		1290
20								1288
22								1286
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-17

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1299.53 ft North 1740515.59 ft East 1785999.59 ft
 Top of Casing 1302.34 ft Water Level Initial 1287.53 ^{11/27/07} 00:00 Static 1292.5 ^{02/14/08} 00:00
 Hole Depth 17.3 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 9.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.81'



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1299.5
0 - 2	1.0	TW-17 (0-2)			CL	Topsoil, silty CLAY, roots, slightly moist, soft, dark brown. Silty CLAY (moderate silt content), slightly moist, medium stiff, dark brown. Becomes brown at 2'.		1298
2 - 4	1.0					No recovery.		1296
4 - 6	1.3				CL	Silty CLAY (low silt content), slightly moist, medium stiff, dark brown.		1294
6 - 8	1.8							1292
8 - 10	1.8							1290
10 - 12	2.4	TW-17 (10-12)				Highly weathered LIMESTONE, hard, white to grey, moist, hydrocarbon odor.		1288
12 - 14	1.5					No odor at 14'.		1286
14 - 16	1.1							1284
16 - 18						End of boring = 17.3'. Well TD = 17.3'.		1282
18 - 20								1280
20 - 22								1278
22 - 24								1276

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-18

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1297.23 ft North 1740461.32 ft East 1786216.34 ft
 Top of Casing 1300.48 ft Water Level Initial 1287.23 11/19/07 00:00 Static 1293.06 02/14/08 00:00
 Hole Depth 14.7 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.5 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Freund Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/19/2007 Completion Date 11/19/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.25'



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1297.2
0	0.0	TW-18 (0-2)				Silty CLAY, moderate brown, trace fine sand, minor rock fragments, firm, dry, non-plastic, no odor.		1296
2	0.0				CL			1294
4	0.0							1292
6	0.0				CL	Silty CLAY, moderate brown, abundant limestone throughout, small chert-like gravel, iron staining and black staining throughout, low plasticity grading to medium at 8', slightly moist, moderately firm, plant roots throughout, no odor.		1290
8	0.0				CL	Silty CLAY, moderate brown, slightly moist w/pockets of water at 10', medium plasticity, minor rock fragments, firm, black staining, small gravel becoming more abundant w/depth, earthy odor.		1288
10	0.0							1286
12	0.0					Weathered LIMESTONE, moist, fractured, very pale orange, no odor.		1284
14	0.0							1282
16						End of boring = 14.67'. Well TD = 14.67'.		1280
18								1278
20								1276
22								1274
24								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-19

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1312.27 ft North 1740600.48 ft East 1784327.51 ft
 Top of Casing 1314.72 ft Water Level Initial 1304.77 ^{11/15/07} 00:00 Static 1311.23 ^{02/14/08} 00:00
 Hole Depth 12.0 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 6.6 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/14/2007 Completion Date 11/15/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.45'



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1312.3
0.0		TW-19 (0-2)			CL	Silty CLAY (moderate silt content), slightly moist, medium stiff, medium plasticity, brown w/black mottling.		1312
0.3								1310
4						No recovery.		1308
6	1508	TW-19 (5-6)				LIMESTONE, hard, greenish grey, moist, strong hydrocarbon odor.		1306
						No recovery.		1304
8	1002					Weathered LIMESTONE, moist, soft, greenish grey, hc odor.		1304
10	259					Less odor at 10'.		1302
12						End of boring = 12'. Well TD = 12.0'.		1300
14								1298
16								1296
18								1294
20								1292
22								1290
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-20

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.26 ft North 1740832.01 ft East 1785650.59 ft
 Top of Casing 1308.45 ft Water Level Initial 1294.45 ^{11/26/07} 00:00 Static 1295.33 ^{02/14/08} 00:00
 Hole Depth 20.4 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 7.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/26/2007 Completion Date 11/26/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.19'
 Well Sump = 19.47-19.87'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1305.3
0	1.0	TW-20 (0.5-2.0)			CL	Topsoil, silty CLAY and organic matter, slightly moist, soft, brown. Silty CLAY (moderate silt), soft, brown, slightly moist.		1304
2	0.7				CL	Decrease in silt w/depth.		1302
4						No recovery.		
6	5.2				CL	Silty CLAY (moderate silt), soft, brown, slightly moist. Increase in silt w/depth.		1300
8						No recovery.		1298
10	163	TW-20 (10-12)			CL	Silty CLAY (moderate silt), soft, brown, slightly moist, hydrocarbon odor.		1296
12						Limestone fragments present at 11.5' (<1/4" size).		1294
14						No recovery.		1292
16	24.1				CL	Silty CLAY (moderate silt), soft, brown, wet, hc odor.		1290
18	12.6					Weathered LIMESTONE, hard, wet, brownish white.		1288
20	10.2							1286
22						End of boring = 20.4'. Well TD = 19.87'.		1284
24								1282

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-21

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.20 ft North 1740906.44 ft East 1785352.90 ft
 Top of Casing 1308.31 ft Water Level Initial 1294.31 ^{11/26/07} 00:00 Static 1296.29 ^{02/14/08} 00:00
 Hole Depth 19.9 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 7.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/26/2007 Completion Date 11/26/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.11'
 Well sump = 19.5-19.9'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1305.2
0.5		TW-21 (0.5-2.0)			CL	Topsoil, clay and silt, organics, moist, soft, dark brown. Silty CLAY (moderate silt), slightly moist, medium stiff, brown.		1304
2								1302
4						No recovery.		
6					CL	Silty CLAY (moderate silt), slightly moist, medium stiff, brown. Decrease in silt w/depth.		1300
8						No recovery.		1298
10								1296
10		TW-21 (10-12)			CL	Silty CLAY (moderate silt), slightly moist, some limestone deposits present (<5%), medium stiff, Hc odor, brown.		1294
12						Weathered LIMESTONE, hard, white, moist, hydrocarbon odor. Highly weathered 12-14'.		1292
14						No recovery.		
14								1290
16		TW-21 (15-17)				Moderately competent LIMESTONE, hard, white, very moist, hydrocarbon odor. Wet at 15.5'.		1288
18								1286
20						End of boring = 19.9'. Well TD = 19.9'.		1284
22								1282
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-22

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1308.19 ft North 1740972.59 ft East 1784765.78 ft
 Top of Casing 1311.04 ft Water Level Initial 1299.04 ^{11/20/07} 00:00 Static 1302.7 ^{02/14/08} 00:00
 Hole Depth 16.2 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/20/2007 Completion Date 11/20/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.85'.
 Well sump = 15.8-16.2'.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1308.2
0.5		TW-22 (0.5-2.0)			CL	Topsoil, silt and clay, roots, moist, soft, dark brown. Silty CLAY (moderate silt), moist, soft, dark brown.		1308
2						Decrease in silt w/depth after 3.1'.		1306
4						No recovery.		1304
6					CL	Silty CLAY (moderate silt), moist, soft, dark brown.		1302
8						No recovery.		1300
10		TW-22 (10-12)			CL	Silty CLAY (moderate silt), moist, soft, dark brown, hydrocarbon odor.		1298
12						Weathered LIMESTONE, hard, grey, moist, hydrocarbon odor. Decrease in odor w/depth.		1296
14								1294
16						Moderately competent at 15.2'. End of boring = 16.2'. Well TD = 16.2'.		1292
18								1290
20								1288
22								1286
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-23

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.57 ft North 1741634.13 ft East 1785228.86 ft
 Top of Casing 1317.21 ft Water Level Initial 1306.21 ^{11/27/07} 00:00 Static 1297.21 ^{02/12/09} 00:00
 Hole Depth 17.5 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 9.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.64'
 Well sump = 17.1-17.5'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.6
0	1.5	TW-23 (0.5-2.0)				Topsoil, silty clay w/roots, slightly moist, soft, dark brown.		1314
2	1.1				CL	Silty CLAY (moderate silt), slightly moist, stiff, dark brown. Less silt 2.3-4'.		1312
4						No recovery.		1310
6	1.0				CH	CLAY (minor silt), high plasticity, slightly moist, stiff, reddish brown.		1308
8	0.9					No recovery.		1306
10	0.7	TW-23 (10-11)				Highly weathered LIMESTONE, hard, moist, light brown.		1304
12	0.8					Less weathered after 11'.		1302
14	1.1					Moderately competent LIMESTONE at 12.6'.		1300
16	0.9							1298
18						End of boring = 17.5'. Well TD = 17.5'.		1296
20								1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/30/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-23D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 13, 2009</u>	Northing <u>1741640.9</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785230.9</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>25'</u>	Surface Elev. (ft) <u>1314.7</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1317.55</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>22.90' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>25'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 12'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 12'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.9'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>14' - 25'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.1					ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, soft, black, earthy odor, moist, organic (rootlets)	Started drilling 1305 No odor
0.0					CL/CH	(0.5' - 10.6') Lean / Fat CLAY (CL/CH), med. to high plasticity, stiff to very stiff, no dilatancy, high toughness, reddish-brown, no odor	
0.0		4.9/5					
0.0							
5						(4.9' - 5') No Recovery	
0.0		NR					
0.0							
0.0							
1.2		4.9/5					
0.0							
10						(9.9' - 10') No Recovery	
NR		NR					
1.1					CL/CHg LS	10' - Limestone fragments in clay, up to 1/2" in diameter (10.6' - 25') LIMESTONE, very pale brown, completely weathered (residual bedrock), fragments in a sandy fat clay matrix, up to 2" in diameter, hard to mod. hard, strong HCl rxn, clay is soft, no odor, moist to very moist	No odor
1.5						12.5' to 13' - Wet	
1.8		4.6/5		NA			Driller reports hard drilling at 12' bgs
1.0							
15						(14.6' - 15') No Recovery	
NR		NR					
1.5						16' to 16.8' - Wet	
1.8		1.9/5				(16.9' - 20') No Recovery	
NR		NR					
20						20' to 20.1' - Wet	Driller reports soft drilling at 19' - 20' bgs
0.6						20.1' - Dry	Hard drilling from 20' - 25' bgs
0.2		3.1/5					
0.9							
25						(23.1' - 25') No Recovery	
NR		NR					
						25' - Bottom of borehole	Stopped drilling 1340



MWH

Borehole / Well Completion Log

Monitoring Well

TW-24

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1313.82 ft North 1741683.75 ft East 1784765.78 ft
 Top of Casing 1316.72 ft Water Level Initial 1306.72 ^{11/27/07} 00:00 Static 1307.29 ^{02/14/08} 00:00
 Hole Depth 12.8 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.3 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.90'
 Well sump = 12.4-12.8'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1313.8
0.7		TW-24 (0.5-2.0)				Topsoil, silty clay w/roots, slightly moist, soft, dark brown.		
2					CL	Silty CLAY (moderate silt), slightly moist, soft, dark brown.		1312
4						Decrease in silt content after 3.2'. No recovery.		1310
6	958	TW-24 (6-7.5)			CL	Silty CLAY (moderate silt), slightly moist, medium stiff, dark brown, slight hydrocarbon odor.		1308
8	67.9					Weathered LIMESTONE, hard, white to grey, moist, hydrocarbon odor, free product present. No product visible after 7.5'.		1306
10								1304
12	105					Compentent LIMESTONE, very hard, white, moist.		1302
14						End of boring = 12.8'. Well TD = 12.8'.		1300
16								1298
18								1296
20								1294
22								1292
24								1290

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-24D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 7, 2009</u>	Northing <u>1741685.8</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784788.8</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>23'</u>	Surface Elev. (ft) <u>1313.8</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1316.3</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>8.15' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>23'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>10' - 12'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 10'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.52</u>
	Screen Type <u>PVC</u>	Filter Interval <u>12' - 23'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.1					ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, black, earthy odor, moist to very moist, soft, organic (rootlets)	Started drilling 1330 No odor
0.2					CL/CH		
0.1		4.9/5					
0.5							
0.4							
5	NR	NR		Grout		4.5' - Slight HC odor (4.9' - 5') No Recovery 5' - Strong HC odor	Slight HC odor Strong HC odor
53.1					LS	(7' - 23') LIMESTONE, very pale brown (8/2 10YR), severely weathered, mod. strong, intact, competent rock, strong HC odor, free product on top and in limestone, oily	Strong HC odor, free product
44.7		4.8/5					
57.7							
294.0	NR	NR					
155.0							
10				NA		(9.8' - 10) No Recovery	
95.4		4/5					
35.9							
1.7							
15	NR	NR			LS	(14' - 15') No Recovery (15' - 20') No Recovery	
				Sand		16.5' - Free product on sample barrel	Free product * Bottom 3' of sample barrel wet with mud
20						20' - Completely weathered, limestone fragments in a sandy fat clay matrix, sub-angular to angular, wet	
8.2		2.5/3				21.3' - Moist	
6.7							
3.0							
25	NR	NR				(22.5' - 23') No Recovery 23' - Bottom of borehole	Stopped drilling 1450



MWH

Borehole / Well Completion Log

Monitoring Well

TW-25

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1318.04 ft North 1741749.51 ft East 1784396.47 ft
 Top of Casing 1321.26 ft Water Level Initial 1310.26 11/27/07 00:00 Static 1310.84 02/14/08 00:00
 Hole Depth 15.0 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 5.9 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.22'
 Well sump = 12.69-13.09'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1318.0
0.6		TW-25 (0.5-2.0)				Topsoil, silty clay and organics, slightly moist, soft, dark brown.		
2		TW-25 (2-4)			CL	Silty CLAY (moderate silt), slightly moist, medium stiff, dark brown.		1316
4						Decreasing silt after 2'. No recovery.		1314
6					ML	SILT, highly compacted, hard, brownish white, dry.		1312
8					CL	Silty CLAY (moderate silt), moist, soft, brown.		1310
10								1308
12						Weathered LIMESTONE, hard, brown to white.		1306
14								1304
15						End of boring = 15'. Well TD = 13.09'.		
16								1302
18								1300
20								1298
22								1296
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-26

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1318.40 ft North 1742014.51 ft East 1785642.32 ft
 Top of Casing 1320.94 ft Water Level Initial 1302.94 ^{11/28/07} 00:00 Static DRY
 Hole Depth 20.5 ft Screen: Diameter 2 in Length 13.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 9.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/28/2007 Completion Date 11/28/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.54'
 Well sump = 20.1-20.5'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1318.4
0.3		TW-26 (0.5-2.0)			CL	Topsoil, silty clay w/organics, roots.		1318
2					ML	Silty CLAY (moderate silt), moist, soft, dark brown, decreasing silt w/depth.		1316
0.5					CL	SILT w/minor clay, slightly moist, brownish grey.		1316
4						Silty CLAY (high silt), stiff, brown, slightly moist.		1314
6						SILT, very well compacted to moderately competent and siltstone, very hard, greyish white, dry.		1312
8					ML	Brownish white at 8'.		1310
10						Light brown at 9'.		1308
12		TW-23 (12-12.5)			ML	SILT, compacted, stiff, light brown, dry.		1306
14						No recovery.		1306
16					ML	SILT, well compacted, hard, moist, brown.		1304
15						Very moist at 15'.		1302
18						Weathered LIMESTONE, hard, brownish white, very moist.		1300
20						Competent LIMESTONE at 20'.		1298
20.5						End of boring = 20.5'. Well TD = 20.5'.		1298
22								1296
24								1296

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-27

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1324.18 ft North 1742163.36 ft East 1785270.21 ft
 Top of Casing 1327.15 ft Water Level Initial 1309.15 ^{11/27/07} 00:00 Static 1302.96 ^{02/14/08} 00:00
 Hole Depth 23.5 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 7.3 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/27/2007 Completion Date 11/27/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.97'
 Well sump = 23.1-23.5'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1324.2
0	0.0	TW-27 (0.5-2.0)				Topsoil, silty clay and organics, roots, slightly moist, soft, brown.		1324
2	0.3				CL	Silty CLAY (moderate silt), moist, stiff, brown, CaCO ₂ deposits 0.5-0.7'.		1322
4						No recovery.		1320
6	0.9					SILT, very highly compacted, dry, greyish white.		1318
8	2.3				ML			1316
10	1.9							1314
12					CL	Silty CLAY (high silt), moist, soft, brown.		1312
14	1.8							1310
16	0.7				ML	SILT, very well compacted, and siltstone, moist, soft, brown.		1308
18					CL	Silty CLAY (high silt), moist, soft, brown.		1306
20	0.8					Wet at 18'. Weathered LIMESTONE, very hard, brownish white.		1304
22								1302
24						End of boring = 23.5'. Well TD = 23.5'.		

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-27D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 13, 2009</u>	Northing <u>1742170.8</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785273.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>34.99'</u>	Surface Elev. (ft) <u>1324.4</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1326.91</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>23.99' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>34.99'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>22' - 24'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 22'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.52</u>
	Screen Type <u>PVC</u>	Filter Interval <u>24' - 34.99'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
1.4				Grout	ML	(0' - 1.2') Clayey SILT (ML), med. Plasticity, black to dark brown, earthy odor, soft, organic (rootlets)	Started drilling 1500
2.1			CL		(1.2' - 5.9') Lean CLAY (CL), med. plasticity, med. stiff to stiff, no dilatancy, high toughness, dark brown, no odor	No odor	
1.9		4.7/5					
1.7							
0.4							
NR		NR				(4.7' - 5') No Recovery	
0.3					CLg	5.5' - Limestone gravel in clay, up to 1/2" in diameter	No odor
0.0		1.9/5			LS	(5.9' - 34.99') LIMESTONE, very pale brown, weak HCl rxn, limestone fragments in a sandy fat clay matrix, up to 1" in diameter, sub-angular to angular, pale brown to olive brown, no odor	
NR		NR				(6.9' - 10') No Recovery	
10							
1.5							
12.4		2.5/5					
2.7							
NR		NR				(12.5' - 15') No Recovery	
15							
1.0							
0.6		1.6/5					
NR		NR				(16.6' - 20') No Recovery	
20							
2.1							
8.8		3/5			LS	20.5' to 21.4' - Wet	
226.0						21.4' to 25.5' - Competent limestone rock, very pale brown to white, strong HCl rxn	
NR		NR				23' - Minor HC odor (23' - 25') No Recovery	Minor HC odor
25							
2.0					LS	25' - No odor	No odor
2.0		2.3/5				25.5' - Completely weathered	
3.0						(27.3' - 30') No Recovery	
NR		NR					

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-27D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
3.0		1.9/4.99		Sand	LS	30' - Dark gray, platy 30' to 30.25' - Wet	
6.6			(31.9' - 34.99') No Recovery				
35	NR	NR				34.99' - Bottom of borehole	Stopped drilling 1615
40							
45							
50							
55							
60							
65							
70							



MWH

Borehole / Well Completion Log

Monitoring Well TW-28

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1326.94 ft North 1742518.94 ft East 1784509.44 ft
 Top of Casing 1330.17 ft Water Level Initial 1308.17 ^{12/04/07} 00:00 Static 1313.86 ^{02/14/08} 00:00
 Hole Depth 30.6 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 4.0 in Casing: Diameter 2 in Length 15.6 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/4/2007 Completion Date 12/4/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.23'
 Well sump = 30.15-30.55'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel		1326.9
0.5 - 2.0	30.7	TW-28 (0.5-2.0)			CL	FILL, silty clay and gravel, medium stiff, plastic, (5YR 3/4), odor, slightly moist.		1326
2 - 2.5		TW-28 (2-2.5)			CL	Silty CLAY (moderate silt), stiff.		1324
2.5 - 4.6	14.5					Silty CLAY (higher silt content), moderate brown (5YR 4/4). No recovery.		1322
4.6 - 5.7	4.6					Weathered LIMESTONE, hard, very pale orange (10YR 8/4), hydrocarbon odor, slightly moist. Moderately competent LIMESTONE at 5.7'.		1320
5.7 - 12.1								1318
12.1 - 12.5	12.1							1316
12.5 - 14.5	3.3							1314
14.5 - 15.7	15.7					At 12.5' hydrocarbon odor, moist, greyish orange (10YR 7/4).		1312
15.7 - 16.0								1310
16.0 - 18.0	160							1308
18.0 - 20.9								1306
20.9 - 21.1	325					At 20.9' slightly less hard. At 21.1' hard, hydrocarbon odor.		1304
21.1 - 22.9								
22.9 - 24.0						At 22.9' less hard, wet, strong hydrocarbon odor, increase in clay, silty.		

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-28

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	101					<i>Continued</i>		1302
26	1938	TW-28 (25-27.5)				At 26' free product visible.		1300
28	888							1298
30						End of boring = 30.6' Well TD = 30.56'		1296
32								1294
34								1292
36								1290
38								1288
40								1286
42								1284
44								1282
46								1280
48								1278
50								1276
52								1274
54								1272
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-29

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1322.02 ft North 1742543.75 ft East 1784906.36 ft
 Top of Casing 1324.93 ft Water Level Initial 1317.93 ^{12/05/07} 00:00 Static 1316.57 ^{02/14/08} 00:00
 Hole Depth 10.5 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 6.0 in Casing: Diameter 2 in Length 7.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/5/2007 Completion Date 12/5/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.91'
 Well sump = 10.09-10.49'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0								1322.0
0.9		TW-29 (0.5-2.0)				FILL, silty clay and gravel, loose, non-plastic, low density, greyish orange (10YR 7/4), slightly moist.		
2					CL	Silty CLAY, very stiff, plastic, high density, high toughness, dark brown (5YR 2/2). At 2-2.8' black iron staining. At 2.6' moderate brown (5YR 4/4).		1320
4						No recovery.		1318
6					CL	Silty CLAY, very stiff, plastic, high density, high toughness, moderate brown (5YR 4/4), hydrocarbon odor.		1316
8		TW-29 (6.5-8)				Weathered LIMESTONE, hard, high density, high toughness, light olive brown (5Y 5/6), hydrocarbon odor, staining, free product visible in fractures.		1314
10						End of boring = 10.52'. Well TD = 10.44'.		1312
12								1310
14								1308
16								1306
18								1304
20								1302
22								1300
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-30A

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1320.40 ft North 1742609.90 ft East 1785769.01 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 4.9 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS
 Well stickup = N/A
 Well sump = N/A

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1320.4
0.8		TW-30 (0.5-2.0)			CL	Topsoil, silty clay (moderate silt), roots, soft, brown, slightly moist. Wilty CLAY (moderate silt), moist, medium stiff, brown.		1320
2						SILTSTONE, competent, hard, greyish brown to white.		1318
4	1.3					Refusal at 4.9'.		1316
6								1314
8								1312
10								1310
12								1308
14								1306
16								1304
18								1302
20								1300
22								1298
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-30B

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1320.40 ft North 1742609.90 ft East 1785769.01 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 3.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.0 in Casing: Diameter NA Length NA Type NA
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS
 44' east of TW-30A

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1320.4
0.1						Topsoil, silty clay, slightly moist, soft, brown.		1320
2					CL	Silty CLAY (moderate silt), slightly moist, soft, brown.		1318
4						SILTSTONE, competent, very hard, light brown, dry.		1316
4						End of boring = 3.5'		1314
6								1312
8								1310
10								1308
12								1306
14								1304
16								1302
18								1300
20								1298
22								
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

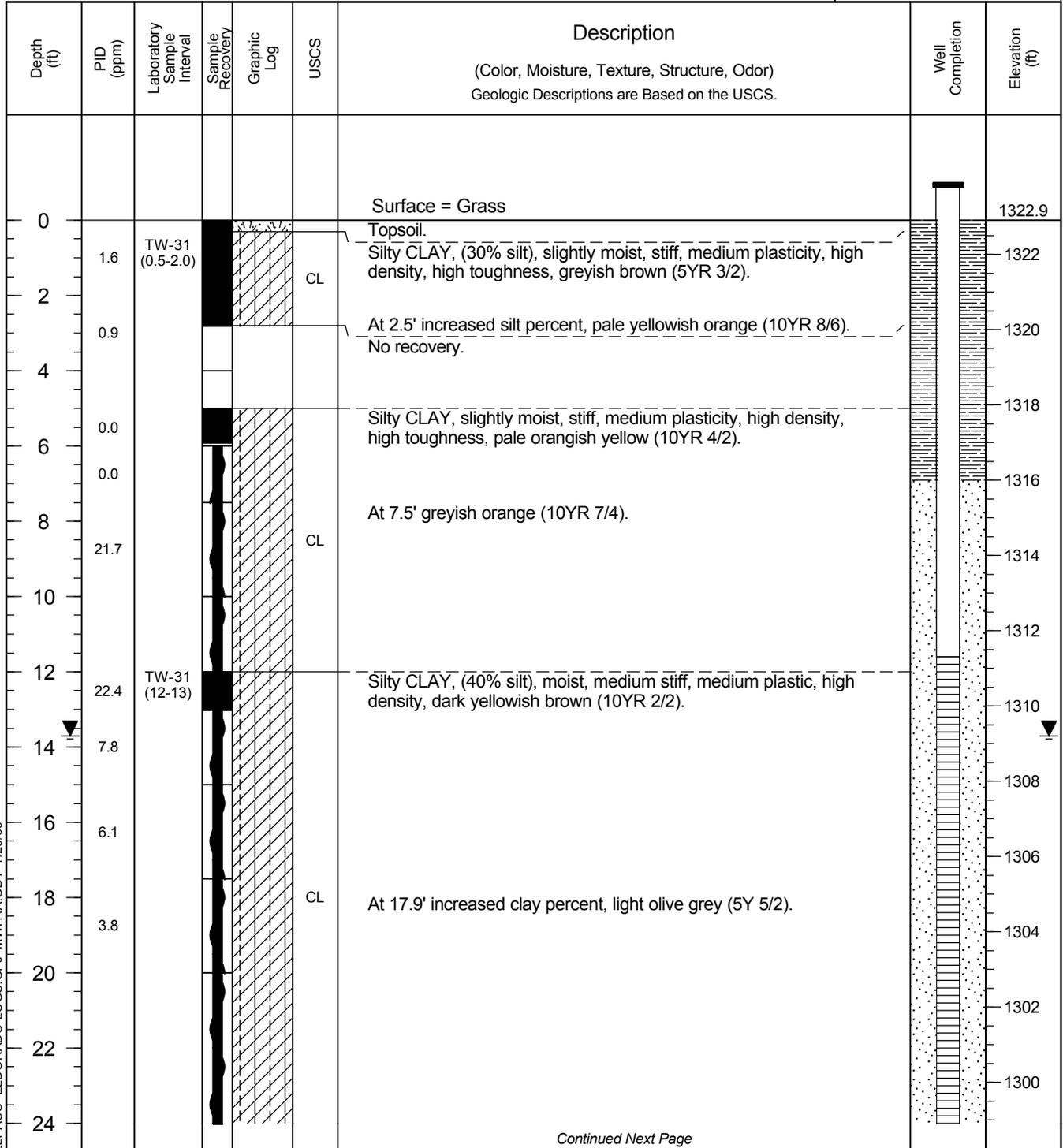
Monitoring Well TW-31

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1322.91 ft North 1742667.70 ft East 1785112.45 ft
 Top of Casing 1325.59 ft Water Level Initial DRY Static 1309.2 02/14/08 00:00
 Hole Depth 26.9 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 14.5 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.68'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack



ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

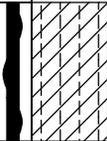
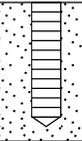
Monitoring Well

TW-31

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
<i>Continued</i>								
24					CL			1298
26						End of boring = 26.9' Well TD = 26.6'		1296
28								1294
30								1292
32								1290
34								1288
36								1286
38								1284
40								1282
42								1280
44								1278
46								1276
48								1274
50								1272
52								1270
54								1268
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-31D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 14, 2009</u>	Northing <u>1742458.5</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785271.4</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>34.94'</u>	Surface Elev. (ft) <u>1323.0</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1325.8</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>19.49' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>34.94'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>22' - 24'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 22'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.76</u>
	Screen Type <u>PVC</u>	Filter Interval <u>24' - 34.94'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.9				ML	(0' - 1') Clayey SILT (ML), med. plasticity, soft to med. stiff, black to dark brown, earthy odor, moist, organic (rootlets)	Started drilling 0750	
	1.0	3.9/5			CL	(1' - 2.4') Lean CLAY (CL), med. plasticity, med. stiff to stiff, no dilatancy, med. toughness, dark brown (3/4 7.5YR) to reddish brown, no odor, moist	No odor	
	2.0				LS	(2.4' - 34.94') LIMESTONE, very pale brown (8/2 10YR), completely weathered, highly fractured, strong HCl rxn, fragments in a sandy fat clay matrix, up to 1" in diameter, sub-angular to angular, clay matrix is soft, no odor	No odor	
	1.6							
5	NR	NR						
	1.5							
	0.9	2.6/5						
	2.7							
	NR	NR						
10	NR	NR					(7.6' - 10') No Recovery	
	0.8							
	1.0	2.2/5					10' - Hint of strange odor?	Hint of strange odor?
	0.1							
	NR	NR						
15	NR	NR					(12.2' - 15') No Recovery	
	0.3							
	1.8	2.3/5					16.1' to 16.4' - Black staining, no detectable HC odor, wet	No odor
	0.9						16.4' to 17.2' - Wet	
	NR	NR					(17.3' - 20') No Recovery	
20	NR	NR						
	2.3					20' - No odor, fragments up to 2" in diameter in clay matrix	No odor	
	3.1							
	2.0	4.3/5						
	1.4							
25	NR	NR				(24.3' - 25') No Recovery		
	2.3					25' to 26' - Fairly competent limestone		
	2.7	2/5						
	NR	NR				26.25' - Dark gray (6/1 7.5YR)		
						(27' - 30') No Recovery		

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-32D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
5.7				Grout		30' - Dark gray (4/1 2.5Y)	
7.2		3/5				30' to 32.5' - Wet	
5.9						32.5' - Dry	
NR		NR				(33' - 35') No recovery	
35				Sand	LS	35' - Dark gray, fractured, wet, strong HC odor, free product - oily black	Strong HC odor, free product
19.6							▽
18.3		3.4/5					
9.1						~37.2' - Dry	
2.9						(38.4' - 40') No Recovery	
40		NR				40' - Bottom of borehole	Stopped drilling 1235
45							
50							
55							
60							
65							
70							



MWH

Borehole / Well Completion Log

Monitoring Well

TW-32

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1329.23 ft North 1742824.90 ft East 1784501.17 ft
 Top of Casing 1332.47 ft Water Level Initial 1304.47 12/05/07 00:00 Static 1324.97 02/14/08 00:00
 Hole Depth 30.9 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 18.5 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/5/2007 Completion Date 12/5/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.24'
 Well sump = 29.1-30.3'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0	0.0	TW-32 (0.5-1.0)			CL	Silty CLAY w/gravel (10% silt, 10% gravel), medium stiff, plastic, hard, moderate brown (5YR 4/4), angular gravel (1/4"d), slightly moist, high toughness.		1329.2
2	0.0					Weathered LIMESTONE, hard, high toughness, very tough, very pale orange (10YR 8/2).		1328
4	1.9							1326
6	2.5							1324
8						At 7.2' dry, 60% silt and 40% clay, harder, slight hydrocarbon odor.		1322
10	0.6					At 10' increase in silt percent.		1320
12								1318
14	0.7					At 13.1' less hard, slight moist. At 13.4' harder, greyish orange (10YR 7/4).		1316
16	0.0							1314
18	0.1							1312
20								1310
22	2.6							1308
24								1306

ELPASO ELDORADO-LOGS GPJ_MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-32

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24						<i>Continued</i>		
26	2.6					At 25' pale yellowish brown (10YR 2/2).		1304
28	63.8					At 28' wet.		1302
30								1300
32						End of boring = 30.9' Well TD = 30.3'		1298
34								1296
36								1294
38								1292
40								1290
42								1288
44								1286
46								1284
48								1282
50								1280
52								1278
54								1276
56								1274

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-32D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 14, 2009</u>	Northing <u>1742840.1</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784495.6</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>40'</u>	Surface Elev. (ft) <u>1329.5</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1332.17</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>38.96' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>40'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>32' - 34'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 32'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.65</u>
	Screen Type <u>PVC</u>	Filter Interval <u>34' - 40'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
6.7				Grout	GC	(0' - 1.5') Clayey GRAVEL (GC) with silt, ~20-30% gravels, sub-angular, minor silt content, 30-40% clay, med. plasticity, loose to soft, black, slight HC odor, moist (1.5' - 40') LIMESTONE, very pale yellow (8/2 2.5Y), completely weathered, fragments in a sandy fat clay matrix, up to 2" in diameter, hard to mod. hard, no odor, strong HCl rxn, clay matrix is soft (2.7' - 5') No Recovery (7.5' - 10') No Recovery (12.6' - 15') No Recovery 15' - Slight color change to grayish orange (olive yellow) (6/6 2.5Y) 16' to 16.3' - Slight HC odor (17.1' - 20') No Recovery 22.4' - Dark gray (22.5' - 25') No Recovery 25' - Very pale brown 26.25' - Slight HC odor, some minor HC staining in clay matrix (26.8' - 30') No Recovery	Started drilling 1050 Slight HC odor
4.9	2.7/5				LS		No odor
8.8							
NR	NR						
5							
0.7							
0.1	2.5/5						
1.0							
10							
NR	NR						
2.1							
18.3	2.6/5						
22.6							
15							
NR	NR						
4.4	2.1/5						
53.5							
20							
NR	NR						
2.5	2.5/5						
1.5							
3.3							
25							
NR	NR						
3.5	1.8/5						
12.7							
	NR	NR				Slight HC odor Free product on bottom of sample barrel at 25' - 30' sample interval	

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-32D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
5.7						30' - Dark gray (4/1 2.5Y)	
7.2		3/5				30' to 32.5' - Wet	
5.9						32.5' - Dry	
	NR	NR				(33' - 35') No recovery	
35						35' - Dark gray, fractured, wet, strong HC odor, free product - oily black	Strong HC odor, free product
19.6							
18.3		3.4/5					
9.1						~37.2' - Dry	
2.9						(38.4' - 40') No Recovery	
40	NR	NR				40' - Bottom of borehole	Stopped drilling 1235
45							
50							
55							
60							
65							
70							



MWH

Borehole / Well Completion Log

Monitoring Well

TW-33

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1322.52 ft North 1742824.90 ft East 1784881.55 ft
 Top of Casing 1325.58 ft Water Level Initial 1299.58 12/06/07 00:00 Static 1301.07 02/14/08 00:00
 Hole Depth 30.2 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 18.1 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/6/2007 Completion Date 12/6/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.06'
 Well sump = 29.66-30.06'



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel		1322.5
2	998	TW-33 (0.5-2.0)			CL	Silty CLAY (30% silt), stiff, plastic, very hard, very tough, moderate brown (5YR 4/4), hydrocarbon odor, slightly moist. At .6' dark yellowish brown (10YR 2/2).		1322
4	529							1320
4	1003	TW-33 (4-4.5)				At 4' wet. Weathered LIMESTONE, hard, very high density, very tough, very pale orange (10YR 8/2), very moist.		1318
6	980							1316
8	101							1314
10	67.9					At 10' dry.		1312
12	263							1310
14	241							1308
16	12.4							1306
18								1304
20								1302
22						At 21' moderately competent LIMESTONE.		1300
24	27.8					At 23' dusky yellowish brown (10YR 2/2).		1300

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-33

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	27.8					<i>Continued</i>		1298
26	51.8					At 26' wet.		1296
28								1294
30	201					End of boring = 30.22' Well TD = 30.06'		1292
32								1290
34								1288
36								1286
38								1284
40								1282
42								1280
44								1278
46								1276
48								1274
50								1272
52								1270
54								1268
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-34

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1335.08 ft North 1742852.75 ft East 1784293.00 ft
 Top of Casing 1338.29 ft Water Level Initial NDA Static 1327.14 02/14/08 00:00
 Hole Depth 33.8 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 21.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/4/2007 Completion Date 12/4/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.21'
 Well sump = 32.96-33.36'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel		1335.1
0	2.0	TW-34 (0.5-2.0)			CL	FILL, gravel and silty clay, soft, low plasticity, dry, very pale orange (10YR 8/2), angular gravel (<1/8"d). Silty CLAY (30% silt), stiff, greyish brown (5YR 3/2), slightly moist, high toughness.		1334
2						No recovery.		1332
4	1.4							1330
6	2.6					Weathered LIMESTONE, hard, very pale orange (10YR 8/3), dry, dense, trace fine sand.		1328
8								1326
10	1.5							1324
12	1.4							1322
14	0.8					At 12.6' increase in hardness.		1320
16	0.6							1318
18	0.8					At 18.1' pale yellowish orange (10YR 8/6). At 19' greyish yellow (5Y 8/4), slightly moist.		1316
20						At 20' very pale orange (10YR 8/2).		1314
22	0.9					At 22.5' greyish orange (10YR 7/4).		1312
24								

ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/29/09

Continued Next Page



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	0.9					<i>Continued</i>		1310
26	0.8					At 25.8' slightly less hard. At 26' harder.		1308
28	1.4					At 29' slightly less hard.		1306
30								1304
32	2.5							1302
34						End of boring = 33.8' Well TD = 33.36'		1300
36								1298
38								1296
40								1294
42								1292
44								1290
46								1288
48								1286
50								1284
52								1282
54								1280
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-35

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1316.36 ft North 1743002.22 ft East 1785293.03 ft
 Top of Casing 1319.39 ft Water Level Initial 1308.59 12/03/07 00:00 Static 1298.14 02/14/08 00:00
 Hole Depth 20.5 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 12.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/3/2007 Completion Date 12/3/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.03'
 Well sump = 19.65-20.5'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1316.4
0.0		TW-35 (0.5-2.0)			CL	Topsoil, silty clay and organics, soft, brown, slightly moist. Silty CLAY (low silt), slightly moist, stiff, brown.		1316
2					CL	Increased silt w/depth.		1314
0.3								
4					ML	SILT w/minor clay, slightly moist, soft light brown. No recovery.		1312
0.4								
6						SILT w/minor clay, loose, slightly moist, light brown. At 5.4' SILTSTONE and well compacted silt, very hard, light brown, dry. Lighter color w/depth.		1310
8					ML			1308
0.2								
10								1306
0.3								
12						Weathered LIMESTONE, very hard, greyish white, moist.		1304
0.1								
14						At 14.2' moderately competent LIMESTONE.		1302
0.0								1300
16								1298
0.5								
18								1296
0.5								
20						End of boring = 20.5'. Well TD = 20.5'.		1296
22								1294
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-36

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.80 ft North 1743020.42 ft East 1786151.70 ft
 Top of Casing 1312.82 ft Water Level Initial 1288.82 ^{11/29/07} 00:00 Static 1304.11 ^{02/14/08} 00:00
 Hole Depth 30.0 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 16.9 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.02'
 Well sump = 28.9-29.3'



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1309.8
0	1.1	TW-36 (0.5-2.0)			CL	Topsoil, silty clay and roots, brown, soft, slightly moist. Silty CLAY (moderate silt), slightly moist, soft, dark brown.		1308
2	3.0					At 3.2' grades to reddish brown.		1306
4						No recovery.		
6	4.4				CH	Silty fat CLAY (low silt content), stiff.		1304
8								1302
10								1300
12	4.8				CL	Silty CLAY (increasing silt w/depth), stiff, reddish brown. At 11.3' medium stiff, brown.		1298
14	20.2	TW-36 (14-15)				Highly weathered LIMESTONE, moist, very stiff, greenish brown and white, hydrocarbon odor.		1296
16	19.8					At 17' black, hydrocarbon odor.		1294
18	38.2					At 19' grades to brownish white.		1292
20	6.0							1290
22								1288
24								1286

ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-36

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	4.7					<i>Continued</i>		
26	3.0					At 24' increase in moisture to very moist.		1284
28	2.1					At 27' wet.		1282
30						End of boring = 30'. Well TD = 29.3'.		1280
32								1278
34								1276
36								1274
38								1272
40								1270
42								1268
44								1266
46								1264
48								1262
50								1260
52								1258
54								1256
56								1254

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-37

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1320.62 ft North 1743077.01 ft East 1785078.01 ft
 Top of Casing 1323.83 ft Water Level Initial 1295.83 12/05/07 00:00 Static 1302.11 02/14/08 00:00
 Hole Depth 30.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 18.6 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/5/2007 Completion Date 12/5/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.21'
 Well sump = 29.6-30.0'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1320.6
0 - 1.3	1.3	TW-37 (0.5-2.0)				Topsoil, silty clay w/roots, soft, medium density, low toughness, light brown (5YR 5/6), slightly moist.		1320
1.3 - 2					CL	Silty CLAY, no roots, medium stiff.		
2 - 4	1314	TW-37 (2-4)				At 2.3' stiff, high toughness, moderate brown (5YR 4/4), hydrocarbon odor.		1318
4 - 6						At 3.5' dusky yellowish brown (10YR 2/2). No recovery.		1316
6 - 8	389					Silty CLAY, stiff, high toughness, dusky yellowish brown (10YR 2/2), hydrocarbon odor.		1314
8 - 10	121				CL			1312
10 - 12	268					At 10' very pale orange (10YR 4/2).		1310
12 - 14	36					Moderately competent LIMESTONE, very hard.		1308
14 - 16						At 13' pale yellowish brown (10YR 2/2).		1306
16 - 18	16.1							1304
18 - 20	16.1					At 17' very pale orange (10YR 8/2).		1302
20 - 22	10.4							1300
22 - 24								1298

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	2.4					<i>Continued</i>		1296
26	88.4							1294
28	357					At 28.5' wet.		1292
30						End of boring = 30'. Well TD = 30.0'		1290
32								1288
34								1286
36								1284
38								1282
40								1280
42								1278
44								1276
46								1274
48								1272
50								1270
52								1268
54								1266
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-38

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.88 ft North 1743118.32 ft East 1785808.12 ft
 Top of Casing 1317.66 ft Water Level Initial 1292.66 11/29/07 00:00 Static 1295.94 02/14/08 00:00
 Hole Depth 28.2 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 15.5 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 11/29/2007 Completion Date 11/29/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.78'
 Well sump = 27.8-28.2'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel and dirt		1314.9
0	1.1	TW-38 (0.5-2.0)				FILL, gravel silt and sand, loose, brown, dry.		1314
2	21.3				CL	Silty CLAY (moderate silt), moist, medium stiff, dark brown.		1312
4						No recovery.		1310
6	55.4				CL	Silty CLAY (moderate silt), moist, medium stiff, dark brown.		1308
8						Silty fat CLAY (low silt), plastic, reddish brown, moist.		1306
10	131	TW-38 (10-12.5)			CH	At 11-12.5' CaC deposits present.		1304
12	631							1302
14	421							1300
16	73					Weathered LIMESTONE, moist, very stiff to hard, brown.		1298
18	51							1296
20	32					At 21' hard, white.		1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-38

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	1.2					<i>Continued</i>		1290
26								1288
28						At 28.2' competent LIMESTONE, very hard. End of boring = 28.2'. Well TD = 28.2'.		1286
30								1284
32								1282
34								1280
36								1278
38								1276
40								1274
42								1272
44								1270
46								1268
48								1266
50								1264
52								1262
54								1260
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-39

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.12 ft North 1743128.06 ft East 1785390.44 ft
 Top of Casing 1317.27 ft Water Level Initial DRY Static 1310.69 02/14/08 00:00
 Hole Depth 23.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 17.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.15'
 Well sump = 22.5-22.9'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.1
2.1						Topsoil, silty clay w/organic matter, soft, slightly moist, moderate brown (5YR 3/4).		
2					CL	Silty CLAY (40% silt), stiff, moderate brown, slightly moist, high toughness.		1312
3.4								
4						No recovery.		1310
56.4					CL	Silty CLAY (40% silt), stiff, black, slightly moist, high toughness.		1308
6						Weathered LIMESTONE, hard, moderate brown, slightly moist, high toughness.		1306
8						At 8.5' greyish olive (10Y 4/2).		1304
5.2								1302
10								1300
5.0								1298
12								1296
14								1294
4.0								1292
16								
3.7								
18								
2.8								
20								
5.6								
22								
24						End of boring = 23.1'. Well TD = 29.9'.		

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-40

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1332.10 ft North 1743197.02 ft East 1784517.71 ft
 Top of Casing 1335.18 ft Water Level Initial 1308.18 ^{12/05/07} 00:00 Static 1316.26 ^{02/14/08} 00:00
 Hole Depth 29.3 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 22.4 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/5/2007 Completion Date 12/5/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.08'
 Well sump = 28.9-29.3'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1332.1
0.5		TW-40 (0.5-2.0)			CL	Topsoil, silty clay and gravel (30% silt, 10% gravel), soft, medium to low plasticity, low toughness, dark yellowish brown (10YR 4/2), slightly moist, angular gravel (<.25"d).		
2					CL	Silty CLAY (30% silt), soft, medium to low plasticity, low toughness, dark yellowish brown (10YR 4/2), slightly moist. No recovery.		1330
4	0.6				CL	Silty CLAY and limestone pieces (<.25"d), hard, plastic, low toughness, dark yellowish brown (10YR 4/2), slightly moist.		1328
6	1.7					Weathered LIMESTONE, hard, low toughness, very pale orange (10YR 8/2), slightly moist.		1326
8	3.3							1324
10	3.7							1322
12								1320
14	2.8							1318
16	3.4					At 15.2' greyish orange (10YR 7/4).		1316
18	5.5					At 18' very pale orange (10YR 8/2).		1314
20								1312
22	2.9					At 22' light grey.		1310
24	1.1							

ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-40

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	1.1					<i>Continued</i>		1308
26						At 26' very pale orange (10YR 8/2).		1306
28						At 27' moist.		1304
30						End of boring = 29.3'. Well TD = 29.3'.		1302
32								1300
34								1298
36								1296
38								1294
40								1292
42								1290
44							1288	
46							1286	
48							1284	
50							1282	
52							1280	
54							1278	
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-41

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1323.84 ft North 1743221.82 ft East 1784848.47 ft
 Top of Casing 1326.63 ft Water Level Initial 1306.63 12/20/07 00:00 Static 1318.34 02/14/08 00:00
 Hole Depth 22.1 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 15.4 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/20/2007 Completion Date 12/21/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.79'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel, tank scar		1323.8
0.5 - 2.0	2.5	TW-41 (0.5-2.0)			CL	Silty CLAY, medium stiff, high toughness and dry strength, no odor, moist, moderate brown (5YR 3/4).		
1.8						At 1.8' some gravel.		1322
3.4						LIMESTONE, very pale orange (10YR 8/2), no odor, wet.		1320
5						At 5' slightly moist.		1318
6	3.2							
8	3.9							1316
10								1314
12	2.8							1312
12.5						At 12.5' wet, slight odor.		
14	180							1310
15						At 15' slightly moist, no odor.		
16	42.6							1308
17								1306
18	68.1							
20								1304
22						End of boring = 22.1'. Well TD = 22.1'.		1302
24								1300

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-42

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.59 ft North 1743354.54 ft East 1785449.31 ft
 Top of Casing 1317.35 ft Water Level Initial 1293.68 ^{12/07/07} 00:00 Static 1310.97 ^{02/14/08} 00:00
 Hole Depth 28.4 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 16.2 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.76'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.6
0	2.1	TW-42 (0.5-2.0)				Topsoil, silty clay and organics, soft, moderate brown (5YR 3/4), slightly moist.		1314
2					CL	Silty CLAY (40% silt), stiff, moderate brown, slightly moist, low plasticity, high toughness, dense.		1312
2.4						At 3' silt 20%.		1310
4						No recovery.		1310
6	70					Silty CLAY (40% silt), stiff, moderate brown, slightly moist, low plasticity, high toughness, dense, hydrocarbon odor.		1308
8	266	TW-42 (7.5-10)						1306
10								1304
12	122							1302
14	86.8					At 13.2' increasing silt content.		1300
16	85.9				CL	At 14.6' some angular limestone gravel (very pale orange (10YR 8/2), .25"d), clay is dark yellowish brown (10YR 4/2), medium stiff. At 15' silty CLAY, soft, plastic, medium toughness, moderate brown (5YR 3/4), hydrocarbon odor, moist.		1298
18						At 17.5 dusky yellowish grey (10YR 2/2).		1296
20	109.3							1294
22	65.5							1292
24	68.5							

ELPASO ELDORADO-LOGS GPJ_MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-42

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	68.5				CL	<i>Continued</i>		1290
26	71.2					Weathered LIMESTONE.		1288
28						End of boring = 28.4'. Well TD = 28.4'.		1286
30								1284
32								1282
34								1280
36								1278
38								1276
40								1274
42								1272
44								1270
46								1268
48								1266
50								1264
52								1262
54								1260
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-43

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.85 ft North 1743361.41 ft East 1785662.59 ft
 Top of Casing 1313.11 ft Water Level Initial 1293.11 12/03/07 00:00 Static 1305.95 02/14/08 00:00
 Hole Depth 25.5 ft Screen: Diameter 2 in Length 20.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By Roy Morlan
 Start Date 12/3/2007 Completion Date 12/3/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.26'
 Well sump = 24.43-25.53'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1309.9
0.7		TW-43 (0.5-2.0)			CL	FILL, silty clay, sandy gravel, dry, stiff, brown & white. Silty CLAY (high silt content), slightly moist, dark brown.		
2						At 1.8' soft. No recovery.		1308
4								1306
0.3						Weathered LIMESTONE, very hard, greyish white, moist.		1304
0.7								1302
0.2						At 11' hard. At 11.6' very hard.		1298
0.0								1296
0.0								1294
0.3								1292
0.0						At 20' moderate competent.		1290
								1288
								1286

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-43

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	0.1					<i>Continued</i>		
26						End of boring = 25.53' Well TD = 25.53'		1284
28								1282
30								1280
32								1278
34								1276
36								1274
38								1272
40								1270
42								1268
44								1266
46								1264
48								1262
50								1260
52								1258
54								1256
56								1254

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-45

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.23 ft North 1743497.94 ft East 1785896.86 ft
 Top of Casing 1307.66 ft Water Level Initial ▽1302.06 01/22/08 00:00 Static ▽1301.08 02/14/08 00:00
 Hole Depth 9.9 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 7.6 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/22/2008 Completion Date 1/22/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.43'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Soil		1305.2
0		TW-45 (0.5-2.0)				Topsoil, brown, frozen.		
2						Silty CLAY, medium stiff, high plasticity, slight odor - increasing w/depth, high dry strength, high toughness, dusty brown (5YR 7/7), some black staining, moist.		1304
4	58.0				CL			1302.0
4								1301.0
6	350					Silty CLAY, medium soft, high plasticity, high dry strength, medium toughness, odor, very moist to wet, dusky yellowish green (5Y 5/2),		1300
6		TW-45 (6-8)						1298
8	874				CH			1296
10	522					LIMESTONE, grey, moist, odor.		1294
10						End of boring = 9.9'. Well TD = 9.9'.		1294
12								1292
14								1290
16								1288
18								1286
20								1284
22								1282
24								1282

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-46

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1307.53 ft North 1743509.16 ft East 1785703.98 ft
 Top of Casing 1310.36 ft Water Level Initial 1304.86 01/23/08 00:00 Static 1303.45 02/14/08 00:00
 Hole Depth 10.0 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 8.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/23/2008 Completion Date 1/23/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.83'
 Well sump = NDA.
 Sampled with Macrocore.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Tank scar		1307.5
0.5 - 2.0	10.8	TW-46 (0.5-2.0)				FILL, gravel (<30mm), brown.		
2 - 4	815	TW-46 (2-4)				Silty CLAY, medium stiff, moist, high dry strength, dusky brown (5YR 2/2), medium high toughness, odor w/depth.		1306
4.6					CL	At 4.6' more silty.		1304
5.5	615					At 5.5' stiff, moist to wet, dusky blue (5PB 3/2).		1302
7.7						At 7.7' becomes gravelly, limestone fragments.		1300
10.0						Weathered LIMESTONE, grey, odor, few traces of product (dark brown, odor). End of boring = 10'. Well TD = 10.0'.		1298
12								1296
14								1294
16								1292
18								1290
20								1288
22								1286
24								1284

ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-47

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1303.45 ft North 1743547.28 ft East 1786060.58 ft
 Top of Casing 1306.23 ft Water Level Initial ∇NDA Static ∇1301.3 02/14/08 00:00
 Hole Depth 8.3 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.0 in Casing: Diameter 2 in Length 6.1 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/22/2008 Completion Date 1/22/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.78'
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0								1303.5
0.2		TW-47 (0.5-2)				FILL, gravel, angular, moist.		1302
2								
8.3								1300
4		TW-47 (4-6)			CH	Silty CLAY, moderate brown (5YR 3/4), high plasticity, moist, odor.		1298
6								
655						LIMESTONE, grey, odor, wet.		1296
8						End of boring = 8.3'. Well TD = 8.3'.		1294
10								1292
12								1290
14								1288
16								1286
18								1284
20								1282
22								1280
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-48

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.48 ft North 1743719.94 ft East 1785352.86 ft
 Top of Casing 1317.29 ft Water Level Initial 1293.79 ^{12/12/07} 00:00 Static 1314.11 ^{02/14/08} 00:00
 Hole Depth 28.4 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 16.5 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/12/2007 Completion Date 12/12/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.81'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Road, gravel		1314.5
0	2.0	TW-48 (0.5-2.0)				FILL, gravel.		1314
2					CL	Silty CLAY (5% gravel), stiff, medium plasticity, medium toughness, dusky yellowish brown (10YR 2/2), no odor, moist.		1312
4	4.1					No recovery.		1310
6	1.2				CL	Silty CLAY (5% gravel), stiff, medium plasticity, medium toughness, dusky yellowish brown (10YR 2/2), no odor, moist.		1308
6	3.2					Weathered LIMESTONE, greyish yellow (5Y 4/4), no odor. At 6' very pale orange (10YR 8/2).		1308
8	3.1							1306
10	2.1					At 10' slightly moist.		1304
12								1302
14	2.1							1300
16	4.1					At 15' dry.		1298
18	1.7					At 18.3 greyish blue (5PB 5/2).		1296
20						At 20' light blueish grey (5PB 7/11), dry to slightly moist.		1294
22	2.8							1292
24	1.4					At 22.5' wet, greyish orange (10YR 7/4).		1292

ELPASO ELDORADO-LOGS.GPJ MWH I.A.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-48

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	1.4					<i>Continued</i>		1290
26	2.0							1288
28						End of boring = 28.4'. Well TD = 28.4'.		1286
30								1284
32								1282
34								1280
36								1278
38								1276
40								1274
42								1272
44								1270
46								1268
48								1266
50								1264
52								1262
54								1260
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-49

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1306.14 ft North 1743739.13 ft East 1785880.40 ft
 Top of Casing 1309.63 ft Water Level Initial NA Static 1300.37 02/14/08 00:00
 Hole Depth 10.1 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/23/2008 Completion Date 1/23/2008 Checked By N. Day

COMMENTS
 Well stickup = 3.49'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass Topsoil, silty clay.		1306.1
0.5 - 2.0	3.9	TW-49 (0.5-2.0)				Silty CLAY, moderate brown w/black staining, odor increasing w/depth, medium soft to stiff w/depth, high dry strength, very moist to moist, high toughness.		1304
2.0 - 8.0	430				CL	At 7.8' 5% gravel (rounded limestone), clay pale green (56 7/2), stiff, moist, odor, high toughness.		1302
6.0 - 8.0	866	TW-49 (6-8)						1300
8.0 - 10.1	981					Weathered LIMESTONE, grey, moist. End of boring = 10.1'. Well TD = 10.1'.		1298
10.0 - 10.1	485							1296
12								1294
14								1292
16								1290
18								1288
20								1286
22								1284
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-50

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1305.53 ft North 1743828.20 ft East 1786109.50 ft
 Top of Casing 1309.13 ft Water Level Initial 1295.53 01/29/08 00:00 Static 1297.67 02/14/08 00:00
 Hole Depth 24.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/29/2008 Completion Date 1/29/2008 Checked By N. Day

COMMENTS
 Well stickup = 3.60'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Soil		1305.5
0	1.7	TW-50 (0.5-2.0)				Topsoil.		
2	78.4					Silty sandy CLAY (5% sand), soft to medium stiff, medium plasticity, moderate brown (5YR 3/4), medium to low toughness, slight odor, very moist, black stains.		1304
4								1302
6	75.6					At 5.5' no sand, high toughness, moist.		1300
8	53.7							1298
8	412	TW-50 (8-10)						
10						At 9.5' product sheen. At 10' wet, slight product show and sheen, water dark grey.		1296
12	156				CL			1294
14	398							1292
16	72.1							1290
18	74							1288
20	81							1286
22	157							1284
22						LIMESTONE, fissile, wet, grey, broken.		
24	57.2							1282

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-50

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24						<i>Continued</i> End of boring = 24.1'. Well TD = 21.3'		1280
26								1278
28								1276
30								1274
32								1272
34								1270
36								1268
38								1266
40								1264
42								1262
44								1260
46								1258
48								1256
50								1254
52								1252
54								1250
56								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

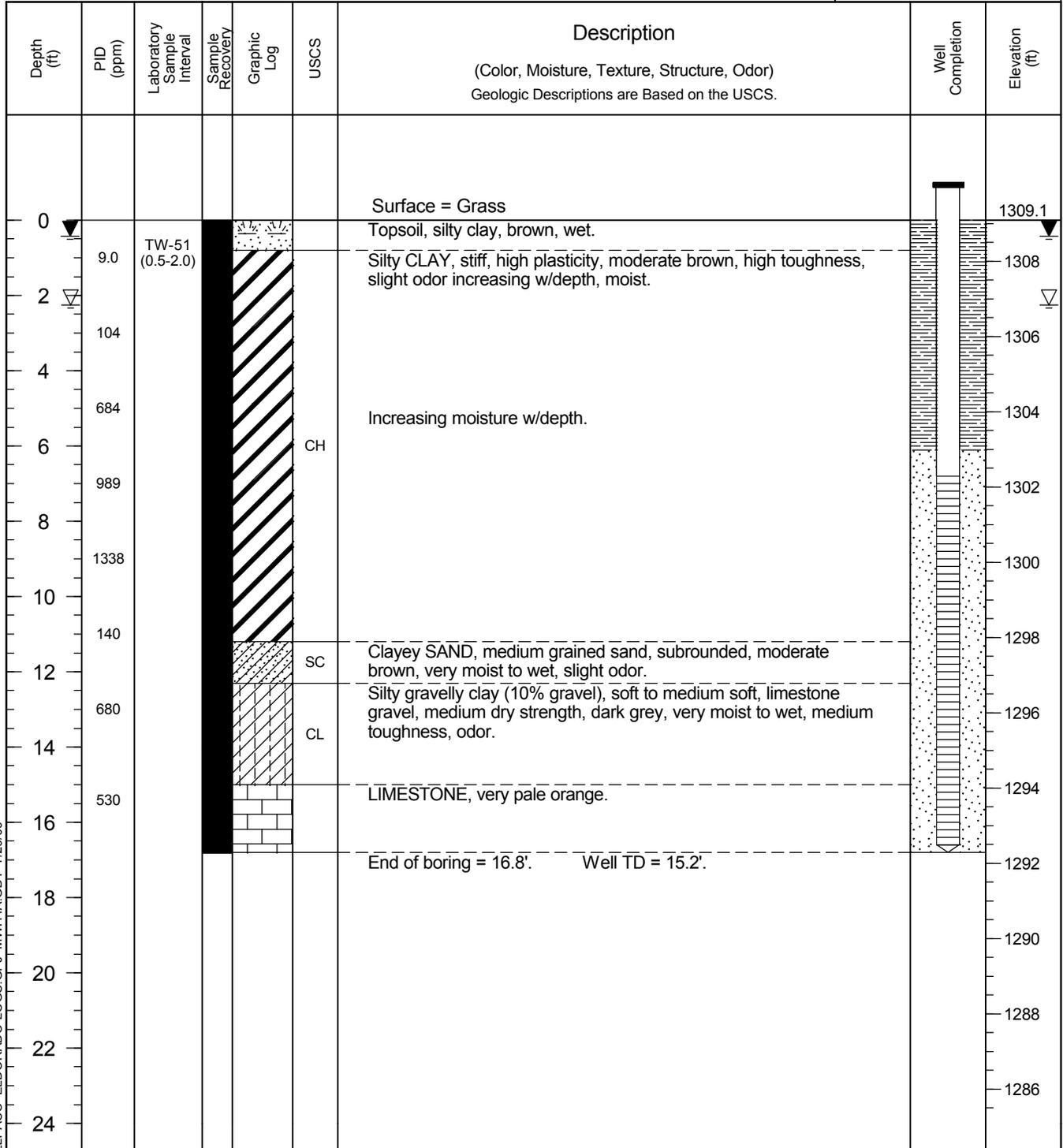
Monitoring Well TW-51

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1309.09 ft North 1743868.00 ft East 1785654.64 ft
 Top of Casing 1311.84 ft Water Level Initial ▽1306.84 01/23/08 00:00 Static ▽1308.67 02/14/08 00:00
 Hole Depth 16.8 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.2 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/23/2008 Completion Date 1/23/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.75'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack



ELPASO ELDORADO-LOGS GPJ_MWH IA_GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-52

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1307.06 ft North 1743888.18 ft East 1785885.65 ft
 Top of Casing 1310.06 ft Water Level Initial 1299.06 01/24/08 00:00 Static 1302.11 02/14/08 00:00
 Hole Depth 13.2 ft Screen: Diameter 2 in Length 8.1 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.1 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/24/2008 Completion Date 1/24/2008 Checked By N. Day

COMMENTS
 Well stickup = 3.00'.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1307.1
0	0.0	TW-52 (0.5-2.0)				Topsoil, silty clay.		1306
2						Silty CLAY, high plasticity, medium soft to medium stiff to stiff /depth, moderate brown, high dry strength, good toughness, very moist to moist.		1304
4						Slight odor after 3.1'.		1302
4.9								
8.2								
6					CH			
48.0						At 7.2' brownish grey (5G 8/1).		1300
8								
236								1298
10		TW-52 (10-12)						1296
1030								
12						At 11.6' moderate brown, odor, medium stiff, very moist.		1294
215								
14						LIMESTONE, very pale orange, weathered. End of boring = 13.2'. Well TD = 13.2'.		1292
16								1290
18								1288
20								1286
22								1284
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-53

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1306.88 ft North 1744009.29 ft East 1785878.92 ft
 Top of Casing 1311.46 ft Water Level Initial NDA Static 1302.43 02/14/08 00:00
 Hole Depth 13.4 ft Screen: Diameter 2 in Length 8.2 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 11.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/24/2008 Completion Date 1/24/2008 Checked By N. Day

COMMENTS
 Well stickup = 4.58'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1306.9
0		TW-53 (0.5-2.0)			CL	Topsoil, wet. Silty CLAY, medium soft to soft, medium dry strength, moderate brown (5YR 3/4) w/black stains, medium toughness, odor, very moist, medium plasticity.		1306
2	1095					No recovery.		1304
4								1302
4								1302
6	340					Silty CLAY, stiff, high dry strength, olive grey (5Y 3/2), oxidation stains, high toughness, slight odor, moist, high plastic.		1300
8	265							1298
10	210				CL			1296
10	316					At 10' 5% gravel, slight to moderat odor.		1294
12	395	TW-53 (12-13.4)						1294
14						LIMESTONE, very pale orange, slight odor. End of boring = 13.4'. Well TD = 13.4'.		1292
16								1290
18								1288
20								1286
22								1284
24								1284

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-54

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.03 ft North 1744074.33 ft East 1785580.63 ft
 Top of Casing NA Water Level Initial ∇NDA Static ∇NA
 Hole Depth 3.5 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/24/2008 Completion Date 1/24/2008 Checked By N. Day

COMMENTS
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel		1314.0
0.5 - 2.0	58	TW-54 (0.5-2.0)				GRAVEL (>40mm), stained black.		
2	169				CL	Silty to very silty CLAY w/trace sand, soft, black, medium plasticity, moist, odor. At 1.1' stiff, high dry strength, greyish brown (5YR 3/2), slight odor.		1312
4	395					LIMESTONE, very pale orange, very moist. Refusal at 3.5'.		1310
6								1308
8								1306
10								1304
12								1302
14								1300
16								1298
18								1296
20								1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-55

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.02 ft North 1744247.02 ft East 1785578.39 ft
 Top of Casing 1316.96 ft Water Level Initial NDA Static 1308.5 02/14/08 00:00
 Hole Depth 8.1 ft Screen: Diameter 2 in Length 3.1 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/24/2008 Completion Date 1/24/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.94'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1314.0
0.5 - 2.0	1.3	TW-55 (0.5-2.0)				Topsoil, wet.		
2 - 4	628				CL	Silty CLAY, soft to stiff w/depth, moderate brown, high dry strength, medium toughness, high plasticity, no odor to slight odor w/depth.		1312
4 - 6	705	TW-55 (4-6)				Weathered LIMESTONE, very pale orange, wet, slight to no odor.		1310
6 - 8	365							1308
8.1						End of boring = 8.1'. Well TD = 8.1'.		1306
10								1304
12								1302
14								1300
16								1298
18								1296
20								1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-56

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1319.52 ft North 1744331.49 ft East 1785392.34 ft
 Top of Casing 1322.53 ft Water Level Initial 1297.53 12/13/07 00:00 Static 1315.54 02/14/08 00:00
 Hole Depth 30.5 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 18.7 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/13/2007 Completion Date 12/13/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.01'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Road, gravel		1319.5
0	1.8	TW-56 (0.5-2.0)			CL	Gravel FILL for road.		
2					CH	Gravelly silty sandy CLAY (15% gravel, 5% sand), hard, low to medium plasticity, greyish brown (5YR 3/2), no odor, slightly moist, high toughness, limestone gravel very pale orange (10YR 8/2).		1318
4	2.1				CL	Silty CLAY w/trace gravel, stiff, medium to high plasticity, moderate brown (5YR 4/4), no odor, slightly moist.		1316
4						No recovery. Limestone gravel and clay.		
6	4.1				CL	Silty CLAY w/gravel (20% gravel), soft, medium to high plasticity, high dry strength, moderate brown (5YR 4/4), no odor, moist, weathered limestone gravel, very pale orange (10YR 8/2), moist.		1314
6	4.7					LIMESTONE, very pale orange (10YR 8/2), no odor, dry.		1312
8	1.4							1310
10	3.9							1308
12	1.9							1306
14						At 13.5' slightly moist.		1304
16	2.7							1302
18	2.3							1300
20	3.3					At 20' bluish white (5B 9/1), no odor, dry.		1298
22	2.0							1296

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-56

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	2.0					<i>Continued</i>		
26	49.8					At 25' medium light grey (N6), wet, slight odor.		1294
28	97.8							1292
30						End of boring = 30.5' Well TD = 30.5'		1290
32								1288
34								1286
36								1284
38								1282
40								1280
42								1278
44								1276
46								1274
48								1272
50								1270
52								1268
54								1266
56								1264

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-57

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1316.00 ft North 1744415.23 ft East 1785551.48 ft
 Top of Casing NA Water Level Initial ▽NA Static ▽NA
 Hole Depth 6.2 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D. Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/30/2008 Completion Date 1/30/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Gravel, tank scar	1316.0
0	66	TW-57 (0.5-2.0)				Gravel FILL.	
2					CH	Silty CLAY, medium stiff to soft at 4.2', high plasticity, dusky brown (5YR 2/2), high dry strength, high toughness, slight odor, moist to very moist at 4.5',	1314
4	80						1312
6	2.9					LIMESTONE, very pale orange, wet, no odor, fissile.	1310
6	8.7					End of boring = 6.2'	
8							1308
10							1306
12							1304
14							1302
16							1300
18							1298
20							1296
22							1294
24							1292

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-58

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1320.71 ft North 1744558.73 ft East 1785393.29 ft
 Top of Casing 1324.20 ft Water Level Initial NA Static 1313.41 02/14/08 00:00
 Hole Depth 30.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 18.5 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D. Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/13/2007 Completion Date 12/13/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.49'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel, tank scar		1320.7
0	1.1	TW-58 (0.5-2.0)				Gravel, road base.		1320
2					CL	Silty CLAY, stiff, high plasticity, high dry strength, medium high toughness, moderate reddish brown (10YR 4/6), no odor, slightly moist to moist. At 2' includes limestone gravel, very pale orange (10YR 8/2).		1318
4	2.5					No recovery.		1316
6	1.7					Weathered LIMESTONE, very pale orange (10YR 8/2), hard, dry, no odor.		1314
8	1.5							1312
10	1.7							1310
12	1.7							1308
14	31.6							1306
16	119					At 15' light grey (N7), slightly moist, slight odor.		1304
18	108							1302
20	48							1300
22	48							1298
24	48							

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-58

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	48					<i>Continued</i>		1296
26	401					At 25' moist, no odor.		1294
28	4.7							1292
30						End of boring = 30.1'. Well TD = 30.1'.		1290
32								1288
34								1286
36								1284
38								1282
40								1280
42								1278
44								1276
46								1274
48								1272
50								1270
52								1268
54								1266
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-59

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1315.47 ft North 1744563.25 ft East 1785551.48 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 2.8 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/29/2008 Completion Date 1/29/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Elevation (ft)
0						Surface = Soil, tank scar	1315.5
0.1		TW-59 (0.5-2.0)			CL	Clayey SILT w/trace fine sand, slightly moist, soft, non-plastic to low plasticity, moderate brown (5YR 3/4), low toughness, very slight odor to no odor.	1314
0.2						Weathered LIMESTONE, very pale orange, wet, very slight odor, fissil.	
						End of boring = 2.8'	1312
4							1310
6							1308
8							1306
10							1304
12							1302
14							1300
16							1298
18							1296
20							1294
22							1292
24							

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-60

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1311.80 ft North 1744631.07 ft East 1785787.17 ft
 Top of Casing 1315.10 ft Water Level Initial 1298.6 12/19/07 00:00 Static 1309.82 02/14/08 00:00
 Hole Depth 20.2 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 8.0 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/19/2007 Completion Date 12/19/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.30'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Soil, gravel		1311.8
2	3.6	TW-60 (0.5-2.0)			CL	Silty CLAY, stiff, high plasticity, medium toughness, high dry strength, moderate brown (5YR 3/4), no odor, moist. At 2' medium stiff.		1310
4	18.1					No recovery.		1308
6	12.4				CL	Silty CLAY w/gravel, medium stiff, high plasticity, medium toughness, high dry strength, moderate brown (5YR 3/4), slight odor, moist. LIMESTONE, very pale orange turning light medium grey, moist, slight odor. At 7.5' becomes very pale orange (10YR 8/2).		1306
8	57.6							1304
10	79.9							1302
12	141					At 11' soft zone.		1300
14	82.0							1298
16	140					At 16' saturated.		1296
18	251							1294
20						End of boring = 20.2'. Well TD = 20.2'.		1292
22								1290
24								1288

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-61

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1308.14 ft North 1744874.58 ft East 1786013.97 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 6.8 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 11/30/2008 Completion Date 11/30/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Rubble		1308.1
0	23.9	TW-61 (0.5-2.0)				Rubble, gravel.		
2	80				CL	Silty CLAY w/trace gravel, medium soft, high plasticity, dusky brown (5YR 2/2), high toughness, odor increasing w/depth, moist to slightly moist w/depth.		1306
4	16					At 4.3' greyish brown.		1304
6	5.5					LIMESTONE, very pale orange, slightly moist, slight odor.		1302
6.8						End of boring = 6.8'.		1300
10								1298
12								1296
14								1294
16								1292
18								1290
20								1288
22								1286
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-62

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1321.36 ft North 1744885.16 ft East 1785380.15 ft
 Top of Casing 1324.50 ft Water Level Initial 1299 ^{12/14/07} 00:00 Static 1312.42 ^{02/14/08} 00:00
 Hole Depth 30.2 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 18.2 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/14/2007 Completion Date 12/14/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.14'

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Road, gravel		1321.4
0.4		TW-62 (0.5-2.0)				Road gravel.		
2					CL	Silty CLAY, stiff to hard, medium high plasticity, high dry strength, moderate brown (5YR 3/4), no odor, slightly moist, roots.		1320
1.4								1318
4						No recovery.		
6					CL	Silty CLAY, stiff to hard, medium high plasticity, high dry strength, moderate brown (5YR 3/4), no odor, moist.		1316
8						LIMESTONE, very pale orange (10YR 8/2), no odor, slightly moist.		1314
2.1								1312
10								1310
12								1308
14								1306
16								1304
18								1302
20						At 19' slight clay, light brown (5YR 5/4). At 20' light grey (N7), slightly moist.		1300
6.1								1298
22						Slight odor arter 22.5'.		
531								
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-62

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	531					<i>Continued</i>		
26	426					At 25' product, wet, brown/dark brown.		1296
28	225							1294
30						End of boring = 30.2'. Well TD = 30.2'.		1292
32								1290
34								1288
36								1286
38								1284
40								1282
42								1280
44								1278
46								1276
48								1274
50								1272
52								1270
54								1268
56								1266

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-63

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.38 ft North 1745018.21 ft East 1785697.55 ft
 Top of Casing 1317.56 ft Water Level Initial 1296.06 12/19/07 00:00 Static 1311.83 02/14/08 00:00
 Hole Depth 25.0 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 13.1 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/19/2007 Completion Date 12/20/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.18'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass, soil, some gravel		1314.4
0.9		TW-63 (0.5-2.0)			CL	Gravelly silty clay, road base.		1314
2						Silty CLAY, stiff, medium plasticity, high dry strength, brownish black to moderate brown w/depth, no odor, slightly moist, high toughness.		1312
1.3						LIMESTONE, very pale orange (10YR 8/2), no odor, dry.		1312
4						No recovery.		1310
6						LIMESTONE, very pale orange (10YR 8/2), no odor, moist turning less moist w/depth.		1308
8								1306
10								1304
12								1302
14								1300
16								1298
18								1296
20						At 20' medium light grey (N7).		1294
22						At 21.5' wet.		1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-63

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	2.6					<i>Continued</i>		1290
26						End of boring = 25'. Well TD = 25.0'		1288
28								1286
30								1284
32								1282
34								1280
36								1278
38								1276
40								1274
42								1272
44								1270
46								1268
48								1266
50								1264
52								1262
54								1260
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-64

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1310.29 ft North 1745092.63 ft East 1786008.90 ft
 Top of Casing 1313.56 ft Water Level Initial 1302.56 ^{12/19/07} 00:00 Static 1306.85 ^{02/14/08} 00:00
 Hole Depth 14.9 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 8.2 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D. Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/19/2007 Completion Date 12/19/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.25'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Rubble, debris		1310.3
0 - 2	125	TW-64 (0.5-2.0)			CH	Silty CLAY, medium stiff, high plasticity, high toughness, dusky brown (5YR 2/2), high dry strength, odor, slightly moist.		1310
2						At 2' black, wet, odor.		1308
2 - 4	150					No recovery.		1306
4								1304
4 - 6	103				CH	Silty gravelly CLAY, soft, high plasticity, medium toughness, olive black (5Y 2/1), strong odor, very moist to saturated.		1304
6	39					LIMESTONE, medium grey (N5), odor, some clay zones.		1302
6 - 8	99.2							1300
8								1298
8 - 12	101					At 11' wet.		1296
12	140							1294
12 - 14.9						End of boring = 14.9'. Well TD = 14.9'.		1292
14.9								1290
16								1288
18								
20								
22								
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-65

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1314.07 ft North 1745172.20 ft East 1785713.93 ft
 Top of Casing 1317.06 ft Water Level Initial 1307.06 ^{12/18/07} 00:00 Static 1313.12 ^{02/14/08} 00:00
 Hole Depth 13.0 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 7.8 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/18/2007 Completion Date 12/18/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.99'
 Well sump = NDA.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel, rubble		1314.1
0 - 3.0	3.0					Gravel subangular FILL (<33mm), fill & rubble & concrete, slight asphalt odor.		
2 - 4	1.1	TW-65 (2-3)			CL	Silty CLAY, stiff, medium plasticity, medium toughness, greyish brown (5YR 3/2), very slight odor. No recovery.		1312
4 - 6					CL	Silty CLAY, stiff, medium plasticity, medium toughness, greyish brown (5YR 3/2), very slight odor.		1310
6 - 8	1.3					Weathered LIMESTONE, very pale orange (10YR 8/2), no odor, slight moist.		1308
8 - 10	0.8							1306
10 - 12	1.6					At 10' wet.		1304
12 - 13.0						End of boring = 13'. Well TD = 13.0'.		1302
14								1300
16								1298
18								1296
20								1294
22								1292
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-66

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1318.19 ft North 1745188.89 ft East 1785479.10 ft
 Top of Casing 1321.24 ft Water Level Initial 1299.24 12/18/07 00:00 Static 1314.54 02/14/08 00:00
 Hole Depth 27.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length NA Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/17/2007 Completion Date 12/18/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.05'
 Well sump = NDA.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Concrete		1318.2
0						Concrete.		1318
1.1		TW-66 (0.7-2.0)						
2					CL	Silty CLAY, stiff, medium to high plasticity, high dry strength, dusky yellowish brown (10YR 3/2), moist, no odor.		1316
2.1								
4						No recovery.		1314
4					CH	Silty CLAY, stiff, medium to high plasticity, high dry strength, dusky yellowish brown (10YR 3/2), moist, no odor. LIMESTONE, very pale orange, moist, no odor.		1312
6								1310
8								1308
10								1306
12								1304
14								1302
16						At 15' slightly moist, turning light grey (N7) w/depth.		1300
18								1298
20								1296
22						At 22' saturated, free product, brown, mild odor.		
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-66

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	1282					<i>Continued</i>		1294
26	870					At 25' dark brown product, odor.		1292
28						End of boring = 27.1' Well TD = 27.1'		1290
30								1288
32								1286
34								1284
36								1282
38								1280
40								1278
42								1276
44								1274
46								1272
48								1270
50								1268
52								1266
54								1264
56								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-67

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1312.28 ft North 1745204.19 ft East 1785968.34 ft
 Top of Casing 1314.69 ft Water Level Initial NA Static 1312.6 02/14/08 00:00
 Hole Depth 9.2 ft Screen: Diameter 2 in Length 4.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 12.3 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/30/2008 Completion Date 1/30/2008 Checked By N. Day

COMMENTS
 Well stickup = 3.09'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Gravel, hard pan		1312.3
0	92.3	TW-67 (0.5-2.0)				Hard pan FILL.		1312
2	262				SP	SAND, subrounded, medium to coarse, trace clay, dark grey (N3), loose, wet, strong odor.		1310
4	144				CH	Silty CLAY, medium stiff to stiff, high plasticity, moderate brown (5YR 4/4) w/black staining, high toughness, strong odor, very moist.		1308
6	136							1306
8						No recovery.		1304
10						End of boring = 9.2'. Well TD = 9.2'.		1302
12								1300
14								1298
16								1296
18								1294
20								1292
22								1290
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-68

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1313.58 ft North 1745325.90 ft East 1785897.34 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 7.1 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D. Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/30/2008 Completion Date 1/30/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Rubble, dirt		1313.6
0	120	TW-68 (0.5-2.0)				Gravelly soil.		
2	678					Silty CLAY, soft, high plasticity, dusky yellow green (5Y 5/2), medium toughness, odor, moist.		1312
4	1050	TW-68 (4-6)			CL	At 2.3' medium stiff to soft, dusky brown (5YR 2/2).		1310
6	3.4							1308
8						LIMESTONE, dry, light grey w/black staining, fissil, slight odor.		1306
8						End of boring = 7.1'.		
10								1304
12								1302
14								1300
16								1298
18								1296
20								1294
22								1292
24								1290

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-69

Page: 1 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1321.87 ft North 1745328.40 ft East 1785362.86 ft
 Top of Casing 1324.91 ft Water Level Initial 1301.41 ^{12/17/07} 00:00 Static 1321.15 ^{02/14/08} 00:00
 Hole Depth 30.1 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 18.1 ft Type PVC
 Drill Co. Geo Core Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 527 Log By D. Bollenback
 Start Date 12/17/2007 Completion Date 12/17/2007 Checked By N. Day

COMMENTS
 Well stickup = 3.04'
 Well sump = NDA.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass, soil		1321.9
0.9		TW-69 (0.5-2.0)			CL	Silty CLAY, soft, medium plasticity, high dry strength, moderate reddish brown (10YR 4/6), no odor, moist, roots. At 6" stiff.		1320
1.5								1318
4						No recovery.		1316
2.1					CL	Silty CLAY, stiff, medium plasticity, high dry strength, moderate reddish brown (10YR 4/6), no odor, moist.		1314
1.5						Weathered LIMESTONE, very pale orange (10YR 8/2), fossiliferous, no odor.		1312
1.9								1310
10						After 10' some clayey zones.		1308
1.1								1306
12								1304
14								1302
4.5								1300
1.4								1298
1.4								
18								
2.1								
20								
6.8								
22								
2.3								
24						At 23.5' wet.		

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09

Continued Next Page



MWH

Borehole / Well Completion Log

Monitoring Well

TW-69

Page: 2 of 2

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC

Location El Dorado, KS Project Number 1914029

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
24	2.3					<i>Continued</i>		
26	0.4							1296
28	0.5							1294
30						End of boring = 30.1'. Well TD = 29.77'.		1292
32								1290
34								1288
36								1286
38								1284
40								1282
42								1280
44								1278
46								1276
48								1274
50								1272
52								1270
54								1268
56								1266

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-70

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1323.19 ft North 1745503.38 ft East 1785435.88 ft
 Top of Casing NA Water Level Initial ▽NA Static ▽NA
 Hole Depth 7.3 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D. Graff Driller Reg. # 6494 Log By D. Bollenback
 Start Date 1/30/2008 Completion Date 1/30/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Sand fill, tank scar		1323.2
0.3		TW-70 (0.5-2.0)				FILL sand, medium grained, subangular, loose, no odor, moist.		1322
2						Silty CLAY, (very silty to 3.8'), dry to lightly moist, stiff to hard, moderate brown (5YR 4/4), high dry strength, high toughness, medium plasticity to high at 3.8', no odor.		1320
4					CL			1318
6								1316
8						LIMESTONE, dry, very pale orange. End of boring = 7.3'		1314
10								1312
12								1310
14								1308
16								1306
18								1304
20								1302
22								1300
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-71

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1319.74 ft North 1745731.57 ft East 1785517.02 ft
 Top of Casing NA Water Level Initial NA Static NA
 Hole Depth 7.2 ft Screen: Diameter NA Length NA Type/Size NA
 Hole Diameter 8.25 in Casing: Diameter NA Length NA Type NA
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack NA
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/10/2008 Completion Date 1/10/2008 Checked By N. Day

COMMENTS
 No well set.
 Sampled with Macrocore.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Soil, hardpan / tank scar, gravel		1319.7
0.1		TW-71 (0.5-2.0)				Gravel FILL, dry, no odor.		
2					CL	Very silty CLAY, slightly moist to dry, hard, moderate brown (5YR 5/4), high toughness, no odor, oxidation stains, low plasticity.		1318
0.3								
4					CL	Silty CLAY, stiff, medium high plasticity, moderate brown (5YR 3/4), no odor, slightly moist, high toughness.		1316
0.3								
6								1314
0.6						LIMESTONE, powdery, light grey, no odor, dry.		
8						End of boring = 7.2'		1312
10								1310
12								1308
14								1306
16								1304
18								1302
20								1300
22								1298
24								1296

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-72

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1297.64 ft North 1740563.40 ft East 1786214.40 ft
 Top of Casing 1300.29 ft Water Level Initial 1285.14 ^{11/19/07} 00:00 Static 1287.41
 Hole Depth 14.3 ft Screen: Diameter 2 in Length 8.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 7.3 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/19/2007 Completion Date 11/19/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.65'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1297.6
0.0		TW-72 (0.5-2.0)				Silty CLAY, dry, firm, non-plastic, roots abundant near surface, dark brown grading to light to moderate brown, no odor, black (organic) stains.		1296
2					CL			1294
4						No recovery.		1292
6						Silty CLAY, pale brown grading to brownish grey, slightly moist, medium plasticity, minor organics, soft, slight odor, rust staining throughout, increasing small limestone fragments w/depth, increasing odor w/depth.		1290
8					CL			1288
10	209							1286
12	245	TW-72 (11-12.5)				Weathered LIMESTONE, fractured, wet, sheen visible, strong odor.		1284
14						End of boring = 14.25'		1282
16								1280
18								1278
20								1276
22								1274
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/29/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-73

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1298.13 ft North 1740654.05 ft East 1786215.62 ft
 Top of Casing 1300.40 ft Water Level Initial 1286.63 ^{11/19/07} 00:00 Static 1293.72 ^{02/05/08} 00:00
 Hole Depth 14.0 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 10.3 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Mick
 Start Date 11/19/2007 Completion Date 11/19/2007 Checked By N. Day

COMMENTS
 Well stickup = 2.27'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1298.1
0 - 2	0.0	TW-73 (0.5-2.0)			CL	Silty CLAY, moderate brown, organics including small roots, minor black staining, minor small limestone fragments <1/4", moderately firm, dry, no odor, non-plastic.		1296
2 - 4	0.0							1294
4 - 6	0.0					Silty CLAY, light to moderate brown, firm, minor root fragments, minor small limestone gravel <1/4" throughout, black staining, slightly moist, grades from low to medium plasticity, no odor.		1292
6 - 8	0.0				CL			1290
8 - 10	0.0				CL			1288
10 - 11.5	43.5				CL	Silty CLAY, light brown w/red staining throughout, firm, low plasticity.		1286
11.5 - 12.5	4.0	TW-73 (11.5-12.5)			CL	Silty CLAY, brownish grey, abundant limestone fragments, soft, moist, strong odor, some black staining.		1286
12.5 - 14					CL	Weathered LIMESTONE, very pale orange, wet, fractured, strong odor.		1284
14 - 16					CL	CLAY, olive grey to olive black, wet at clay-limestone interface w/sheen present, very strong odor, soft, high plasticity.		1284
16 - 18						Weathered LIMESTONE, very pale orange, slightly moist, hard, slight odor.		1282
18 - 20						End of boring = 14'		1280
20 - 22								1278
22 - 24								1276

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-74

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1300.21 ft North 1740487.05 ft East 1786270.97 ft
 Top of Casing 1299.76 ft Water Level Initial 1284.76 12/07/07 00:00 Static 1290.55 02/14/08 00:00
 Hole Depth 15.1 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 5.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D. Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Flush-mount well.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1300.2
0.6		TW-74 (0-2)			CL	Sandy silty CLAY, loose, low plasticity, low toughness, dark brown, no odor, slightly moist, (FILL).		1300
2						Road base GRAVEL, no odor.		1298
1.3					CH	Silty CLAY, medium soft, high plasticity, medium toughness, dark brown, no odor, slightly moist. 100% fines.		1296
4						No recovery.		1296
1.1					CL	Very silty CLAY, stiff, low/medium plasticity, medium toughness, dark brown, no odor, slightly moist, very uniform.		1294
6					CL			1292
8					CL			1290
1.1					CL	Gravelly CLAY, stiff, medium plasticity, medium toughness, slight grey, no odor, slightly moist, 85% fines, gravel is subangular <10mm.		1290
1.1					CL	Silty CLAY, stiff to medium stiff, 99% fines, medium to high plasticity, medium toughness, light brown, no odor, slightly moist to moist at 13', oxidation stains, limestone gravel at 14.9'.		1288
12					CL			1286
1.5								1286
14		TW-74 (14-15)						1284
1.6						Weathered LIMESTONE, white, broken, no odor, wet.		1284
16						End of boring = 15.1'		1284
18								1282
20								1280
22								1278
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-75

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1298.77 ft North 1740410.43 ft East 1786270.70 ft
 Top of Casing 1298.38 ft Water Level Initial 1283.58 ^{12/07/07} 00:00 Static 1291.07 ^{02/14/08} 00:00
 Hole Depth 15.2 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 5.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Flush-mount well.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1298.8
0 - 1.4	1.4				CL	Sandy silty CLAY, loose, low plasticity, low toughness, dark brown, no odor, slightly moist.		1298
1.4 - 2.0					GC	Road base FILL, gravel.		
2.0 - 4.0	1.5				CL	Silty CLAY, medium soft, medium plasticity, medium toughness, dark brown, no odor, slightly moist, 100% fines.		1296
4.0 - 4.2						No recovery.		
4.2 - 6.0	2.2				CL	Silty CLAY, medium soft, medium plasticity, medium toughness, dark brown w/oxidation stains, no odor, slightly moist, 100% fines.		1294
6.0 - 7.5	1.9				CL	Gravelly CLAY, stiff, medium plasticity, low toughness, tan, no odor, slightly moist, 65% fines.		1292
7.5 - 10.0	1.5				CL	Silty CLAY, medium soft to soft, medium to high plasticity, medium toughness, light brown, no odor, moist, oxidation stains, 95% fines.		1290
10.0 - 12.0	7.5				CH			1288
12.0 - 14.0	1.8							1286
14.0 - 15.2	1.9	TW-75 (14-15)				Weathered LIMESTONE, grey, wet.		1284
15.2	5.7					End of boring = 15.2'		

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-76

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1297.48 ft North 1740561.23 ft East 1786270.73 ft
 Top of Casing 1297.07 ft Water Level Initial 1284.17 ^{12/07/07} 00:00 Static 1291.37 ^{02/14/08} 00:00
 Hole Depth 14.9 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 4.9 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Flush-mount well.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass		1297.5
0	1.4				CL	Soil, sandy silty CLAY, dark brown, no odor, 90% fines.		
2					GC	Road base FILL, gravelly CLAY, no odor, 90% gravel.		1296
4	1.5					Silty CLAY, medium stiff, medium plasticity, medium toughness, brown, no odor, roots 100% fines.		1294
6	1.2					Oxidation stains.		1292
8	2.1				CL			1290
10	2.1					At 10', medium soft to soft, plastic.		1288
12	1.0							1286
14	2.6							1284
14	217	TW-76 (13-15)			GC	Gravelly CLAY, soft, gravel in layers, high plasticity, medium toughness, dark grey to grey odor, moist to wet, black stains, angular gravel <20mm, 80% fines.		1284
16						Weathered LIMESTONE, grey, odor. End of boring = 14.9'		1282
18								1280
20								1278
22								1276
24								1274

ELPASO ELDORADO-LOGS GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-77

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1297.94 ft North 1740635.34 ft East 1786268.27 ft
 Top of Casing 1297.59 ft Water Level Initial NDA Static 1289.19 02/12/09 00:00
 Hole Depth 22.3 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 7.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Flush-mount well.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0					CL	Surface = Grass, soil		1297.9
1.0					GC	Soil, silty CLAY, roots, 100% fines. Road base FILL, gravel, grey/tan, subangular gravel <40mm, 50% fines.		1296
2								
0.7						Silty CLAY, medium stiff, medium to high plasticity, medium toughness, brown, no odor, slightly moist, oxidation stains.		1294
4								
1.2						At 5', medium soft.		1292
6					CL			1290
0.8								
8								1288
1.0								
10								1286
1.1					GC	Silty CLAY w/limestone gravel, yellow/tan, subangular gravel <10mm, 55% fines.		1284
12								
1.4						Gravelly CLAY, stiff, medium/high plasticity, high toughness, brown, slight odor especially near 15', slightly moist, oxidation stains.		1282
14					CL	At 14' grey stains.		1280
1.7								
16								1278
89					CL	Silty CLAY, soft, high plasticity, medium toughness, olive grey, odor, very moist, some oxidation staining, 100% fines.		1276
18								
2.0		TW-77 (18-20)				At 18.4' 90% fines, 10% sand.		
20					GC	Limestone GRAVEL, white/green, odor, rounded.		1274
18.4		TW-77 (20-22)			CL	Silty sandy gravelly CLAY, soft, high plasticity, medium toughness, grey/green, odor, saturated, sheen, visible product.		
22						End of boring = 22.3'		1272
24								1270

ELPASO ELDORADO-LOGS GPJ_MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-78

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1297.99 ft North 1740708.79 ft East 1786267.98 ft
 Top of Casing 1297.58 ft Water Level Initial NDA Static 1288.76 02/12/09 00:00
 Hole Depth 21.4 ft Screen: Diameter 2 in Length 15.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 6.4 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 12/7/2007 Completion Date 12/7/2007 Checked By N. Day

COMMENTS
 Flush-mount well.
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass, soil		1298.0
1.2					GC	Silty clay soil, loose, no odor. Road base fill, sand & gravel, brown/black, coarse rounded sand, subangular gravel <20mm, 60% fines.		
2					CL	Silty CLAY, medium stiff, medium/high plasticity, medium toughness, brown, no odor, slightly moist, 100% fines.		1296
3.4					CL			1294
4								
7.1								
6						Silty CLAY, stiff, medium/high plasticity, medium/high toughness, brown, no odor, slightly moist, oxidation stains, 100% fines.		1292
4.7								
8					CL			1290
4.4								
10						Few gravel after 9.5'.		1288
6.0								
12						Silty CLAY, medium stiff, high plasticity, medium/high toughness, olive brown, slight odor, slightly moist, green & black stains, oxidation stains, trace gravel, 100% fines.		1286
11.9					CH			
14						Turns medium soft at 14'.		1284
24.1								
16						Silty CLAY, medium soft to soft, high plasticity, medium toughness, olive grey, slight odor, moist, trace gravel, 100% fines.		1282
60.4								
18		TW-78 (16-18)			CH			1280
5.0								
20					GC CH	Limestone GRAVEL and clay as above, subangular weathered gravel, slight odor.		1278
5.6						Silty CLAY, soft, high plasticity, medium toughness, green to grey, slight odor, saturated, 100% fines. Gravel right above limestone. Weathered LIMESTONE, grey/white, broken.		1276
22						End of boring = 21.4'		1274
24								

ELPASO ELDORADO-LOGS.GPJ MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well

TW-79

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1311.07 ft North 1742776.01 ft East 1786162.29 ft
 Top of Casing 1314.17 ft Water Level Initial NDA Static 1293.64 02/14/08 00:00
 Hole Depth 18.3 ft Screen: Diameter 2 in Length 10.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.25 in Casing: Diameter 2 in Length 11.9 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/25/2008 Completion Date 1/25/2008 Checked By N. Day

COMMENTS
 Well stickup = 3.78'
 Well sump = NDA.
 Sampled with Macrocore.

Bentonite Grout (Chips) Sand Pack

Depth (ft)	PID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass, soil Silty soil, loose, very moist, roots.		1311.1
0.4		TW-79 (0.5-2)						1310
2								1308
4					CL			1306
6								1304
8						At 7.4', medium stiff, wet.		1302
10								1300
12						At 11.3', pale brown (5YR 5/2), very moist.		1298
14						At 12.8', light brown (5YR 5/6).		1296
16					GC	Gravelly CLAY, soft, plastic, medium toughness, brownish grey (5YR 4/1), no odor, very moist to wet, 90% fines. At 15', black & green staining, increasing gravel w/depth, slight odor in dark 1" zone.		1294
18						Weathered LIMESTONE, very pale orange to grey. End of boring = 18.3'		1292
20								1290
22								1288
24								

ELPASO ELDORADO-LOGS GPJ_MWH IA.GDT 7/30/09



MWH

Borehole / Well Completion Log

Monitoring Well TW-80

Page: 1 of 1

Project El Dorado Refinery - Third Phase Env. Investigation Owner EPME-PC
 Location El Dorado, KS Project Number 1914029
 Surface Elev. 1306.39 ft North 1742982.78 ft East 1786289.72 ft
 Top of Casing 1308.99 ft Water Level Initial ▼DRY Static ▼DRY
 Hole Depth 12.6 ft Screen: Diameter 2 in Length 5.0 ft Type/Size PVC/0.01 in
 Hole Diameter 8.28 in Casing: Diameter 2 in Length 10.0 ft Type PVC
 Drill Co. Below Ground Surface Drilling Method Hollow Stem Auger Sand Pack 16/30
 Driller D.Graff Driller Reg. # KS 710 Log By D. Bollenback
 Start Date 1/25/2008 Completion Date 1/25/2008 Checked By N. Day

COMMENTS
 Well stickup = 2.77'.
 Well sump = NDA.
 Sampled with Macrocore.



Bentonite Grout (Chips)



Sand Pack

Depth (ft)	PIID (ppm)	Laboratory Sample Interval	Sample Recovery	Graphic Log	USCS	Description (Color, Moisture, Texture, Structure, Odor) Geologic Descriptions are Based on the USCS.	Well Completion	Elevation (ft)
0						Surface = Grass, soil		1306.4
0.4		TW-80 (0.5-2)				Soil, very moist.		1306
2						Very silty CLAY, medium stiff, medium to high plasticity, moderate brown (5YR 4/4), high toughness, no odor, moist, 100% fines.		1304
4						At 3', becomes hard.		1302
6					CL	At 6' becomes dry, low plasticity.		1300
8								1298
10						At 10', slight odor.		1296
12	1201					Weathered LIMESTONE, dry to slightly moist, odor, grey, black stains.		1294
12.6						End of boring = 12.6'		
14								1292
16								1290
18								1288
20								1286
22								1284
24								

ELPASO ELDORADO-LOGS.GPJ_MWH IA.GDT 7/30/09

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-81
 Project Third Phase Investigation Project No. 1914352

Drilling	Drilling Contractor <u>GSI</u>	Completion Date <u>July 1, 2008</u>	Northing <u>1742843.1</u>
	Drilled by <u>Cory</u>	Drilling Fluid <u>--</u>	Easting <u>1786249.0</u>
	Logged By <u>Stuart Klaus</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1308.1</u>
	Drill Rig <u>CME-55</u>	Borehole Dia. <u>4 1/4"</u>	TOC Elev. (ft) <u>1310.9</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>17.16' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>20'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>2' - 9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Cement</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0' - 2'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>10/20 Silica Sand</u>	Stick-up/down <u>+2.81'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9' - 20'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	0.0	1.5/2.5			CL	(0' - 13') Very Silty CLAY (CL) 100% fines, med. to high plasticity, stiff to med. stiff, mod. brown, no odor	Started drilling 1000 No odor
	NR	NR					
	0.0	2/2.5					
5	NR	NR				4' - Hard	
	0.0	2/2.5				5' - Med. to dark brown, stiff	
	NR	NR					
	0.0	2/2.5				7.5' - Increasing moisture (damp)	
10	NR	NR	NA			10' - Light gray / tan, some broken rock fragments, up to 1/2" in diameter, angular, clay is soft	
	1.0	2.5/2.5					
	8.0	1.5/2.5				12.5' - Wet, saturated 13' - Broken rock with clay	
15	NR	NR			LS	(14' - 20') LIMESTONE, gray, solid competent rock, some breaks, some softer lenses (shale?), wet	Moist to wet PID sample Moist to wet PID sample 14' - Drilled without samples
	NR	NR					
	NR	NR					
20						20' - Bottom of borehole	Stopped drilling 1155
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-82
 Project Third Phase Investigation Project No. 1914353

Drilling	Drilling Contractor <u>GSI</u>	Completion Date <u>July 1, 2008</u>	Northing <u>1742850.5</u>
	Drilled by <u>Cory</u>	Drilling Fluid <u>--</u>	Easting <u>1786387.8</u>
	Logged By <u>Stuart Klaus</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1303.7</u>
	Drill Rig <u>CME-56</u>	Borehole Dia. <u>4 1/4"</u>	TOC Elev. (ft) <u>1306.56</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>14.53" February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>20'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>2' - 9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Cement</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0' - 2'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>10/20 Silica Sand</u>	Stick-up/down <u>+2.89'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9' - 20'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
	0.0	1.5/2.5		Bentonite	CL	(0' - 20') Very Silty CLAY (CL) 100% fines, med. to high plasticity, stiff to med. stiff, brown, no odor, moist	Started drilling 1400 No odor	
	NR	NR				2.5' - Less moisture		
	0.0	1.5/2.5				4' to 5' - Very stiff		
5	NR	NR				5' - Reddish-brown		
	0.0	2/2.5				7.5' - soft to slightly stiff, moist		
	NR	NR				10' - Tan to light brown, soft, damp		
10	NR	NR	NA			12.5' - Free water, saturated		
	0.0	2/2.5				15' - Increase in sand content, slight odor		Slight odor
	NR	NR				17.5' - Slight odor		Slight odor
	18.2	1.5/2.5				20' - Bottom of borehole		
15	NR	NR		Sand				
	123.0	2/2.5						
	NR	NR						
20	NR	NR						
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-83
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 26, 2008</u>	Northing <u>1739474.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1783882.5</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15.31'</u>	Surface Elev. (ft) <u>1328.8</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1331.42</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>11.81' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>15.31'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.6'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 15.31'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.1		1.7/5			Fill	(0' - 0.6') Fill, cobbles up to 4" in diameter, sub-rounded to rounded (fill material)	Started drilling 0815 Inside tank scar / pit area, rock, fill material No odor Rocks limited recovery in upper 5'	
2.4			CL		(0.6' - 7.9') Lean CLAY (CL) with silt and minor rocks, med. plasticity, stiff to very stiff, black, no odor, damp to moist (1.7' - 5') No Recovery			
	NR	NR						
5							5' - Black grades to dark brown	
	0.0							
	1.4	3.9/5					~7.1' - Limestone fragments in clay, up to 1" in diameter	
	0.0							
	1.0		NA			LS	(7.9' - 11') Limestone, light grayish-orange, severely to completely weathered, med. hard to hard, soft where completely weathered, highly fractured, wet, no odor (8.9' - 10') No Recovery	No odor
10	NR	NR						
	0.0							
	0.3	3.2/5				LS/SH	(11' - 12.6') Interbedded Limestone / Shale, limestone is severely to completely weathered, shale is platy, laminated, damp to dry, no odor	No odor
	3.2							
	1.2					LS	(12.6' - 15.31') Limestone, light grayish-orange, med. hard to hard, highly fractured, strong HCl rxn, no odor, competent rock (13.2' - 15') No Recovery	
15	NR	NR						
	NR	NR					(15' - 15.31') No Recovery 15.31' - Bottom of borehole	Stopped drilling 0850 Picture #168
20								
25								

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-84
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.9				Sand	LS	30.5' - Wet	Driller reports he hit water at 30.5' bgs Time: 1015 Stopped drilling 1040
1.2		2.8/4.6				(32.8' - 34.6') No Recovery	
1.0							
NR		NR					
35						34.6' - Bottom of borehole	
40							
45							
50							
55							
60							
65							
70							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-86
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 20, 2008</u>	Northing <u>1739473.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784401.4</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>25.11'</u>	Surface Elev. (ft) <u>1324.9</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1327.69</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>16.86' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>25.11'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 13.78'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.75'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>13.78' - 24.78'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	1.4			Bentonite	ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, black, earthy odor, moist, organic (rootlets, topsoil) (0.5' - 5') Lean CLAY (CL) with minor silt, med. plasticity, stiff to very stiff, grades from black to dark brown, no odor, moist 2' - Minor limestone gravels, <1/2" in diameter 3' - Grades from med. Brown to light olive gray, minor black blocky fragments (organic), minor limestone gravels increase with depth (4' - 5') No Recovery (5' - 6') LIMESTONE, light grayish-orange, severely to completely weathered, dry to damp, fragments in a sandy fat clay matrix, up to 2" in diameter, hard to mod. hard, sub-angular to angular, weak to strong HCl rxn, clay matrix is soft, no odor (6' - 10') SHALE layer, light gray, completely weathered (to clay), brittle, platy, soft, no HCl rxn, no odor	Started drilling 1545
	2.0	4/5			CL		No odor
	2.6						
	1.5						
5	NR	NR					
	8.4				LS		No odor
	3.6	3/5			SH		No odor
	1.2						
10	NR	NR					
	155.0	2/5			LS		(11' - 25.11') LIMESTONE, light gray, HC odor
	53.0				(12' - 15') No Recovery		
	NR	NR	NA				
15	NR	NR					
	3.1	1.5/5			15' - Slight HC odor	Slight HC odor	
	7.4				(16.5' - 20') No Recovery		
	NR	NR					
20	NR	NR					
	8.8				20' - HC odor, moist	HC odor	
	131.0				21.5' - Damp		
	7.6	5/5					
	4.5				23.5' - Black sediment, oily, strong HC odor (product)	Strong HC odor	
25	28.4				24.5' - Strong HC odor, moist	Strong HC odor	
	0.11/0.11				25.11' - Bottom of borehole	Stopped drilling 1645	
						Picture #136	

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-87
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 11, 2008</u>	Northing <u>1739906.8</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784199.0</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>24.83'</u>	Surface Elev. (ft) <u>1317.2</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1320.23</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>2.76' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>24.83'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 14'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+3.01'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>14' - 24.83'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
2.0		1.8/5		Bentonite	ML	(0' - 1') Clayey SILT (ML), med. plasticity, very dark brown (2/2 10YR), earthy odor, soft, (rootlets)	Started drilling 1410
0.6					CL	(1' - 6') Lean CLAY (CL), med. plasticity, soft to med. stiff, very dark brown (2.5/2 7.5YR), nor odor (1.8' - 5') No Recovery	No odor
5	NR	NR					
1.1		2.3/5		Bentonite	LS	5.5' - Limestone fragments in clay matrix, sub-angular, strong HCl rxn, slight odor	Slight HC odor
274.0					LS	(6' - 24.83') LIMESTONE, very pale brown (8/2 10YR), mod. weathered, mod. hard to hard, strong HCl rxn, HC odor	Strong HC odor
31.6						7' - Completely weathered to a sandy fat clay, moist to very moist	Driller reports hard drilling at 6' bgs
10	NR	NR				(7.3' - 10') No Recovery	
34.2		2/5		Sand		10' to 10.25' - Very moist to wet, HC odor	HC odor
353.0						(12' - 15') No Recovery	
15	NR	NR					
155.0		2.5/5				15' to 15.4' - Very moist to wet	
31.3						15.8' to 17' - fragments up to 3" in diameter	
56.7						(17.5' - 20') No Recovery	
20	NR	NR					
19.1		2.1/4.83				20' - Wet, strong HC odor, some black HC staining	Strong HC odor
28.8						21.3' - Gray (5/1 10YR), moist to dry	
						(22.1' - 24.83') No Recovery	
25	NR	NR				24.83' - Bottom of borehole	Stopped drilling 1450

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-89
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 19, 2008</u>	Northing <u>1739464.8</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786066.3</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>19.92'</u>	Surface Elev. (ft) <u>1328.4</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1331.25</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>19.18' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>19.92'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.82'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9' - 19.92'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
0.5				Bentonite	ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, black, earthy odor, moist, soft, organic (rootlets) (0.5' - 2') Lean CLAY (CL), med. plasticity, med. stiff to stiff, grades from black to med. brown, no odor, moist (minor rootlets) (2' - 10) LIMESTONE, light grayish- orange, completely weathered, highly fractured, dry to moist, no odor, limestone fragments in a sandy fat clay matrix 3' to 4' - Wet (4' - 5') No Recovery 5' - Moist (6' - 10') No Recovery	Started drilling 0940		
1.6		4/5			CL		No odor		
1.9					LS		No odor		
2.2									
5	NR	NR							
1.1		1/5							
	NR	NR							
10			NA		Sand		LS/SH	10' - Interbedded limestone and shale, limestone is light grayish-orange, shale is med. gray, minor coarse sand up to 1 mm in size	
3.4									
2.5		5/5							
3.5									
1.7									
15									
1.5									
2.6									
3.2		3/4.92					LS	15' - Shale, light olive gray, brittle, platy, minor light reddish-brown silt 16' - Limestone, light grayish-orange to white, completely weathered, wet (saturated), no odor, limestone fragments in a sandy fat clay matrix, fragments hard to med. hard, up to 1/2" in diameter, clay matrix is soft (18' - 19.92') No Recovery	No odor
3.7									
20	NR	NR				19.92' - Bottom of borehole (terminated due to refusal)	Stopped drilling 1145		
25							Pictures #123 (0-5, 5-10, 10-15) and #124 (15-20)		

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-90
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 19, 2008</u>	Northing <u>1739545.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785858.7</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20'</u>	Surface Elev. (ft) <u>1320.3</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1323.06</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>14.19' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>20'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.72'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9' - 20'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
1.8				Bentonite	ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, black, organic (0.5' - 20') Interbedded LIMESTONE / SHALE, limestone - light grayish-orange, severely weathered, strong HCl rxn, dry, no odor, limestone fragments in a sandy fat clay matrix, sub-angular to angular, clay is soft, shale is med. gray, severely to completely weathered to clay, med. stiff to soft, brittle, platy, dry, minor gravels, no odor (2.5' - 5') No Recovery	Started drilling 1305		
5.0	2.5/5		LS						
4.2			LS/SH						
NR		NR	LS						
3.4			LS/SH						
5.0									
3.9	5/5								
4.4									
10					SH			10' - Damp, minor limestone gravel ~1" in size, minor reddish-brown discoloration	Stopped drilling 1405 Picture #125 (0-5, 5-10, 10-15, 15-20)
5.0			NA		SH			11.5' - Completely weathered limestone	
2.6	4/5		LS	SH	12.5' - Dry, light gray				
3.7					(14' - 15') No Recovery				
3.9					15' - Wet				
15		NR		LS	16' - Moist				
5.6	2.5/5			SH	(17.5' - 20') No Recovery				
4.6									
5.1									
20		NR				20' - Bottom of borehole (terminated due to refusal)			

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-91
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 19, 2008</u>	Northing <u>1739482.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785701.0</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15'</u>	Surface Elev. (ft) <u>1316.1</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1318.61</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>10.08' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>15'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.48'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 15'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
3.2					ML	(0' - 0.5') Clayey SILT (ML), black, earthy odor, moist to very moist	No odor	
5.4		3.5/5			CL	(0.5' - 5.3') Silty CLAY (CL), med. plasticity, grades from med. brown to light olive gray, no odor, moist, no stratification 2' - Minor black stains		
4.7						(3.5' - 5') No Recovery		
7.1								
5	NR	NR						
4.4						SH	(5.3' - 15') Interbedded LIMESTONE / SHALE, limestone is light grayish-orange, severely to completely weathered, highly fractured, moist to wet, limestone fragments in a fat clay matrix, no odor, Shale is light olive gray with minor reddish-brown discolor	No odor
5.6						LS		
7.0		4.5/5	NA			SH		
7.6							7' to 8' - Wet	
6.0							8' - light gray, damp	
10	NR	NR					(9.5' - 10') No Recovery	
7.0		1/5					10' - Med. gray	
							10.8' - Light grayish-orange, dry	
	NR	NR					(11' - 15') No Recovery	
15							15' - Bottom of borehole (terminated due to refusal)	Picture #126 (0-5, 5-10, 10-15)

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-92
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 25, 2008</u>	Northing <u>1739241.6</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785828.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20.35'</u>	Surface Elev. (ft) <u>1324.1</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1326.95</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>16.34' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>20.35'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.88'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9' - 20.35'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
0.1				Bentonite	ML	(0' - 0.6') Clayey SILT (ML), med. plasticity, black, earthy odor, moist, soft, organic (rootlets, topsoil)	Started drilling 1505		
0.0		4/5			CL			(0.6' - 3.1') Lean CLAY (CL), med. plasticity, med. toughness, no dilatancy, med. stiff to stiff, dark brown, moist	
0.0								2' - Grades to grayish-orange, limestone and shale fragments	
0.4						SH		(3.1' - 20.35') Interbedded LIMESTONE / SHALE, shale is med. gray to dark gray, severely to completely weathered to clay when completely weathered, laminated layers, med. stiff to soft, wet to very moist, no odor, no HCl rxn	No odor
5	NR	NR				LS		(4' - 5') No Recovery	
0.6						SH		6' - Limestone is light grayish-brown, severely to completely weathered to clay, wet to very moist, limestone fragments up to 1" in diameter in a sandy fat clay matrix, sub-angular to angular, med. hard to hard, weak HCl rxn, clay is soft	
1.3		3.5/5				LS		~5.8' - Damp	
1.0								~5.8 to 7.2' - Minor black material in matrix (organic)	
10	NR	NR						7.25' - Dry to damp	
2.3						SH		(8.5' - 10') No Recovery	
1.8		3.9/5				10' - Shale, stiff to very stiff, med. grayish-brown, platy			
0.6									
15	NR	NR		Sand		(13.9' - 15') No Recovery	Stopped drilling 1550		
0.1									
0.7								15' - Shale, light grayish-orange with limestone fragments ~ 10-15%, wet, soft	
0.3		4.2/5				LS		16.3' - Limestone, pale yellowish brown, moist, strong HCl rxn	
0.3									
0.5								18.7' - Dry	
20	NR	NR				(19.2' - 20') No Recovery			
0.6						(20' - 20.35') No Recovery			
NR						20.35 - Bottom of borehole			
NR							Pictures #164 (0-4), #165 (5-8.5), #166 (10-13.9), and #167 (15-19.2)		

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-93
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 20, 2008</u>	Northing <u>1739848.7</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785361.8</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>10'</u>	Surface Elev. (ft) <u>1308.2</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1310.74</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>5.79' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>10'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 2.91'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.51'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>2.91' - 10'</u>	Development <u>Five well volumes</u>
	Screen Length <u>6'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	2.3			Sand	ML	(0' - 1') Clayey SILT (ML), med. plasticity, black, earthy odor, very moist to wet, organic (rootlets, topsoil)	Started drilling 1145
	2.8	4.1/5			CL		
	2.9					2' - Med. brown	
	3.4					(4.1' - 5') No Recovery	
	5	NR	NR			5' - Med. brown and light olive gray, slight odor	Slight odor
	33.8	1/5	NA		LS/SH	(5.5' - 10') LIMESTONE / SHALE, limestone - light gray, severely to completely weathered, soft when completely weathered, wet (5.5' - 5.8' bgs), Shale - med. Gray, platy, hard, competent layer (5.8' - 6' bgs)	
		NR	NR			(6' - 10') No Recovery	
10						10' - Bottom of borehole (terminated due to refusal)	Stopped drilling 1215
15							Picture #134
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-94
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 8, 2008</u>	Northing <u>1740450.5</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784564.8</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>10.1'</u>	Surface Elev. (ft) <u>1304.9</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1307.44</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>4.18' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>10.1'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.54'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 10.1'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
1.1					ML	(0' - 0.8') Clayey SILT (ML), med. plasticity, very dark brown (2/2 10YR), earthy odor, very moist, organic (rootlets) (0.8' - 5') Lean CLAY (CL) with limestone fragments up to 2" in diameter, med. plasticity, med. stiff to stiff, dark yellowish-brown, no odor, moist, no HCl rxn except limestone fragments 3.1' to 3.7' - Gravely limestone in a clay matrix, black oily staining, strong HC odor (3.7' - 5') No Recovery (5' - 10.1') LIMESTONE, very pale brown (7/2 10YR), severely weathered, fractured, med. hard to soft, wet, strong HCl rxn, HC odor 5' to 5.1' - Black HC staining, strong odor 7.1' to 7.25' - Black HC staining, strong HC odor 7.25' to 7.75' - Platy 8.25' - Limestone in a clayey silt matrix, completely weathered, wet, slight HC odor, limestone fragments hard, matrix soft 9.45' - Moist (9.6' - 10.1') No Recovery 10.1' - Bottom of borehole	Started drilling 1425
1.8		3.7/5			CL		No odor
1.7							Hard drilling at 2.5' bgs
53.7							Strong HC odor
5	NR	NR					Strong HC odor
1122.0			NA				Driller reports wet at 5' bgs
10.0					LS		Wet cuttings
1040.0		4.6/5					Strong HC odor
11.6					LS		Driller reports hard drilling at 7.5' bgs
137.0							Slight HC odor
10	NR	NR			Stopped drilling 1448		
15						Pictures # 201 and # 202	
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-96
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 9, 2008</u>	Northing <u>1740761.2</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784382.3</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>9.9'</u>	Surface Elev. (ft) <u>1310.0</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1312.73</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>4.68' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>9.9'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 9.9'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.71'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 9.9'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
▽	0.2	2.7/5	NA	Bentonite	ML	(0' - 0.7') Clayey SILT (ML) with fines ~40-50%, silt ~50-60%, and minor limestone fragments <10%, black to dark brown, earthy odor, moist to very moist, soft, (rootlets, topsoil)	Started drilling 0915 No odor		
▽	0.2				CL			(0.7' - 5') Lean CLAY (CL), med. plasticity, med. stiff to stiff, no dilatancy, med. toughness, dark brown, no odor, moist (alluvium)	
▽	0.4								
5	NR	NR			Sand		LS	~2.6' - Limestone fragments up to 1" in diameter in clay matrix (2.7' - 5') No Recovery	Cuttings balling up (0' - 5')
5	0.7					LS	(5' - 10') LIMESTONE, very pale brown, mod. sever weathering, mod. hard to med. hard, strong to med. strong, strong HCl rxn, (bedrock)		
5	1.8	3.3/4.9				LS	6.5' - Severely to completely weathered, limestone fragments in a sandy fat clay,		
5	1.0						7' to 7.5' - Possible slight HC odor?		
5	1.3					8' - Wet		8' - Wet	Possible slight HC odor
5	NR	NR				(8.3' - 9.9') No Recovery		(8.3' - 9.9') No Recovery	
10								9.9' - Bottom of borehole	Driller reports hard drilling at ~9' bgs Stopped drilling 0940

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-97
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 8, 2008</u>	Northing <u>1740385.4</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785080.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>14.9'</u>	Surface Elev. (ft) <u>1305.2</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1308.33</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>7.01' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>14.9'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+3.11'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 14.9'</u>	Development <u>Five well volumes</u>
	Screen Length <u>5'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	1.2				CL	(0' - 10') Lean CLAY (CL), med. plasticity, soft to med. stiff, very dark brown (2/2 10YR), earthy odor (top 6") very moist, organic (top 6") (rootlets) ~1.55' - Dark yellowish-brown (3/6 10YR), moist	Started drilling 1320
	1.0						
	1.8	4.9/5					
▽	0.2						
5	0.5						
	NR	NR					
	1.2						
	3.0						
	66.2	4.8/5	NA				
	293.0						
10	180.0				LS	(9.8' - 10') No Recovery (10' - 14.9') LIMESTONE, light gray (7/2 10YR), completely weathered to a clay matrix, strong HCl rxn, slight odor 10.5' to 10.75' - Wet	Slight HC odor Driller reports soft drilling at 10.5' to 11.5' bgs
	NR	NR					
	45.9						
	3.5	3/4.9					
	3.7						
15	NR	NR				12.5' - Gray (5/1 10YR), slight to no HC odor, wet (13' - 14.9') No Recovery	Slight to no HC odor
						14.9' - Bottom of borehole	Stopped drilling 1340 Pictures #199 and #200
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-100
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 24, 2008</u>	Northing <u>1741442.7</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785170.9</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15.5'</u>	Surface Elev. (ft) <u>1309.8</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1312.66</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>15.55' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>15.5'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4.5'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.81'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4.5' - 15.5'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.1					ML	(0' - 0.6') Clayey SILT (ML), med. plasticity, black, earthy odor, moist, soft, organic (rootlets)	Started drilling 1510 No odor	
0.1			CL		(0.6' - 8.2') Lean CLAY (CL), med. plasticity, soft to med. stiff, slow dilatancy, black grades to med. brown, no odor, moist			
0.1		4.8/5						
0.1								
5						CLg	3.7' - Minor limestone gravels, up to 1/2" in diameter	
0.1							(4.5' - 5') No Recovery	
NR		NR					5' - Med. stiff to stiff, slightly moist, minor black blocky fragments and minor limestone gravels up to 1" in diameter	
0.1								
0.1		4.9/5						
0.1								
10						LS	(8.2' - 15.5') LIMESTONE, completely weathered, moist to very moist, limestone fragments in a sandy fat clay matrix, up to 1" in diameter, mod. hard to hard, clay matrix is soft, no odor, weak HCl rxn	No odor
0.1							9' to 9.8' - Med. gray, dry to damp	
NR		NR					(9.9' - 10') No Recovery	
0.1							11' - Wet	
0.1		3.5/5				LS	~11.4' - Moist	Cutting dry and driller reports hard drilling at ~11' bgs
0.1						12' - Pale yellowish brown, mod. hard to hard, minor white streaks, strong HCl rxn, more competent rock		
15						(13.5' - 15') No Recovery		
NR		NR				PID = 0.1 from cuttings		
NR		NR				(15' - 15.5') No Recovery	Stopped drilling 1555	
						15.5' - Bottom of borehole	Pictures #157 (0-5) and #160 (5-10, 10-15)	

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-101
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 9, 2008</u>	Northing <u>1742269.2</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785030.5</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>14.92'</u>	Surface Elev. (ft) <u>1319.8</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1323.1</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>13.01' February 10, 2009</u> <small>* DTP & DTW measured after well development</small>

Well	Total Depth (bgs) <u>14.92'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 4'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+3.33'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 14.92'</u>	Development <u>Five well volumes were removed following SOP-13</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
	0.4				ML	(0' - 0.9') Clayey SILT (ML), med. plasticity, soft to med. stiff, black to dark brown, earthy odor, moist, organic (rootlets, topsoil)	Started drilling 1350 No odor
	0.8				CL/CH	(0.9' - 9.3') Lean / Fat CLAY (CL/CH), med. to high plasticity, med. stiff to stiff, no to low dilatancy, med. to high toughness, dark brown, no odor, no HCl rxn, minor black stains (organic) (colluvium)	
	0.2	4.5/5					
	0.6						
	0.4						4' to 4.5' - Slight HC odor
5	NR	NR					(4.5' - 5') No Recovery
	30.9						5' - Slight HC odor
	43.9						
	46.8	4.9/5	NA				
	61.3						
10	NR	NR			LS	(9.3' - 14.92') LIMESTONE, very pale brown, completely weathered to clay (residual bedrock), composed of limestone fragments in a sandy fat clay, clay is soft, strong HC odor, minor black staining	Strong HC odor ▽ Free product
	113.0	2.1/4.92				(9.9' - 10') No Recovery	Free product
	83.2					10.1' to 10.25' - Free product, sheen	Wet cuttings from 10' - 15' bgs
	NR	NR				11.4' to 11.6' - Free product, sheen	Driller reports hard drilling from 11' to ~15' bgs
15						14.92' - Bottom of borehole	Stopped drilling 1440
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-102S
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 25, 2008</u>	Northing <u>1742719.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784720.9</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>15'</u>	Surface Elev. (ft) <u>1327.2</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1329.59</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>8.12' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>15'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 15'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.39'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>4' - 15'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS			
0.2					ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, black, earthy odor, moist, soft, organic (rootlets) (0.5' - 6.2') Lean CLAY (CL) with gravel (10-15%), gravels sub-rounded, up to 1" in diameter (from gravelly road nearby), med. plasticity, soft to med. stiff, low dilatancy, med. to high toughness, black to dark brown, no odor 1.2' - Med. stiff to stiff, no gravel, minor black blocky fragments (<5%, organic)	Started drilling 0830 No odor			
0.2					CL					
0.3		4.7/5								
0.3										
0.3										
5	NR	NR						(4.7' - 5') No Recovery		
0.3										
0.3		2.9/5						LS	(6.2' - 15') LIMESTONE, very pale brown, severely to completely weathered, fractured, low dry strength, intact fragments in a sandy fat clay matrix, up to 2" in diameter, strong HCl rxn, hard, wet, no odor (7.9' - 10') No Recovery 10.5' - completely weathered to a sandy fat clay matrix with minor limestone fragments up to 1" in diameter 11' - Decreased moisture content to moist (13.1' - 15') No Recovery	No odor Cuttings wet ~10'-15' bgs
0.3										
10	NR	NR								
0.4										
0.5		3.1/5								
1.5										
15	NR	NR								
					15' - Bottom of borehole	Stopped drilling 0930 Picture #161 (0-5, 5-10, 10-15)				

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-103S
 Project Third Phase Investigation Project No. 1914350

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>November 21, 2008</u>	Northing <u>1742207.1</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784548.7</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>20.25'</u>	Surface Elev. (ft) <u>1322.2</u>
	Drill Rig <u>Failing-10</u>	Borehole Dia. <u>7 3/4"</u>	TOC Elev. (ft) <u>1324.73</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>8.12' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>20.25'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 9.25'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.54'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>9.25' - 20.25'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
1.8				Bentonite	ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, soft to med. stiff, black, earthy odor, moist, organic (rootlets, topsoil)	Started drilling 1200 No odor	
1.7		3/5	CL		(0.5' - 2.5') Lean CLAY (CL), med. plasticity, low dry strength, med. stiff, med. brown, no odor, moist, no stratification, no cementation			
1.2					LS	(2.5' - 20.25') LIMESTONE, light grayish orange with red brown discoloration, severely to completely weathered, dry to slightly moist, strong HCl rxn, no odor, fragments in a sandy fat clay matrix, up to 2" in diameter, angular to sub-angular	No odor	
NR		NR			(3' - 5') No Recovery			
5							~5' - No red-brown discoloration	▽
2.6							(7.5' - 10') No Recovery	
1.4		2.5/5						
3.6								
10					Sand			
NR		NR						
6.2			NA	LS		10.5' to 10.7' - Med. gray layer, hard, intact limestone		
2.6		2.5/5		LS		12.1' to 12.5' - Med. gray, hard, intact limestone		
15						(12.5' - 15') No Recovery		
NR		NR						
6.4					LS	15' - Very pale brown	Slight HC odor	
3.4		2/5				15.2' to 15.8' - Wet		
NR		NR				16.2' to 16.3' - Light orangish-brown, slight HC odor, very moist		
20						(17' - 20') No Recovery		
NR		NR						
						(20' - 20.25') No Recovery	Stopped drilling 1230	
						20.25' - Bottom of borehole		
25							Picture #139 (0-5, 5-10, 10-15, 15-20)	

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-103D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
114.0				Sand	LS	(30' - 31') Free Product, oily, wet (6/0 GREY I) (31' - 31.5') Wet ~31.5' - Moist to dry (32.5' - 35') No Recovery	Free Product
19.5		2.5/4.74					
3.9							
NR		NR					
35						34.74' - Bottom of borehole	Stopped drilling 1400
40							
45							
50							
55							
60							
65							
70							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-104D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 13, 2009</u>	Northing <u>1742256.5</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784299.9</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>39.82'</u>	Surface Elev. (ft) <u>1326.0</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1328.88</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>16.13' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>39.82'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>27' - 29'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 27'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.88'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>29' - 39.82'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.6				GROUT	ML	(0' - 0.5') Clayey SILT (ML), med. plasticity, soft to med. stiff, black to dark brown, earthy odor, very moist to moist, organic (rootlets)	Started drilling 1530 No odor
1.1		3/5			CL	(0.5' - 2.8') Lean CLAY (CL), med. plasticity, med. stiff to stiff, no dilatancy, dark brown, no odor, moist	
0.8					LS	(2.8' - 39.82') LIMESTONE, very pale brown, completely weathered, limestone fragments in a sandy fat clay matrix, up to 2" in diameter, sub-angular to angular, soft clay matrix, dry, no odor	No odor
5	NR	NR				(3' - 5') No Recovery	
1.1							
1.0		2.5/5					
0.8						(7.5' - 10') No Recovery	
10	NR	NR					
0.6		1.4/5					
0.7						(11.4' - 15') No Recovery	
15	NR	NR					
0.0		1.3/5				15' to 16.3' - Wet, no odor	Stopped at 15' bgs due to not enough daylight to finish 1/12/09 1600, started drilling again 1/13/09 1000
0.0						(16.3' - 20') No Recovery	
20	NR	NR					
0.0						20' - Dry	
0.0		2.3/5					
0.0					(22.3' - 25') No Recovery		
25	NR	NR					
0.0					25' to 25.8' - Wet from above water		
0.0		3/5			25.8' - Very moist		
0.0					27' - Dark gray		
NR	NR				(28' - 30') No Recovery	Very hard drilling at 28' bgs	

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-104D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
0.0		1.5/5		Sand	LS	30' to 31.5' - Wet	Driller reports softer drilling at 32' - 34' bgs Driller reports very hard drilling at 35' - 40' bgs Stopped drilling 1100
0.0						(31.5' - 35') No Recovery	
NR		NR					
35							
0.1						35' - Very moist	
0.0		2.4/4.82					
0.0						(37.4' - 39.82') No Recovery	
NR		NR					
40						39.82' - Bottom of borehole	
45							
50							
55							
60							
65							
70							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-105D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 5, 2009</u>	Northing <u>1742475.5</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1784269.5</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>44.93'</u>	Surface Elev. (ft) <u>1328.8</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1331.16</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>18.06' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>44.93'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>27' - 29'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 27'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.46'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>29' - 44.93'</u>	Development <u>Five well volumes</u>
	Screen Length <u>15'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
1.5				GROUT	ML	(0' - 0.5') Clayey SILT (ML), med plasticity, soft to med. stiff, dark brown, moist earthy odor, organic (rootlets, topsoil)	Started drilling 1520	
1.4			CL		(0.5' - 2.75') Lean CLAY (CL), med plasticity, med. stiff to stiff, med. Brown, no odor, moist			
0.9		4.6/5			LS	2.5' - Limestone fragments intermixed in clay matrix, up to 1" in diameter		
0.5								(2.75' - 44.93') LIMESTONE, severely to completely weathered (residual bedrock), light grayish orange with clay intermixed, strong HCl rxn,
0.4		NR				~3.5' - Limestone fragments in a sandy fat clay matrix, up to 2" in diameter, sub-angular to angular, dry to slightly moist, no odor		
0.4		1.3/5			(4.6' - 5') No Recovery			
0.3								
		NR						
10								
0.4		1.5/5				10' - light yellowish brown (6/4 10YR), (10' - 10.3') wet		
0.4						10' to 10.3' - Wet		
						(11.5' - 15') No Recovery		
		NR						
15								
0.5		2.2/5						
0.3					~16.4' - Color change to yellow (7/8 10 YR), increased sand content			
					(17.2' - 20') No Recovery			
		NR						
20								
1.6		1.3/5						
0.5					(21.3' - 25') No Recovery			
		NR						
25								
0.6		2/5			26' - Pale yellow (7/2 2.5Y)			
0.5					(27' - 30') No Recovery			
		NR						

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-105D
 Project Third Phase Investigation Project No. 1914351

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS		
30.4	0.8	2.8/5		Sand	LS	30.4' - Light yellow brown (6/4 10YR)	~Possible wet cuttings from/between 37' - 40' Wet cuttings 40' - 45' Stopped drilling 1710		
32.1	0.5					32.1' - Light gray (7/0 GREY I)			
32.8	0.7					(32.8' - 35') No Recovery			
35	NR	NR							37' - Pale yellow (8'3 2.5Y)
37.1	0.6	2.1/5							(37.1' - 40') No Recovery
40	0.6								
42.1	NR	NR							
44.93	1.7	2.1/4.96							
44.96	1.6								
45	NR	NR				44.96' - Bottom of borehole			
50									
55									
60									
65									
70									

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-106S
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 12, 2008</u>	Northing <u>1742900.0</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785085.1</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>10'</u>	Surface Elev. (ft) <u>1318.2</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1320.76</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>3.78' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>10'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.5' - 2.5'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.52'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>2.5' - 9'</u>	Development <u>Five well volumes</u>
	Screen Length <u>6'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
▽	2.0				CL/CH	(0' - 3.7') Lean / Fat CLAY (CL/CH), med. to high plasticity, soft to med. stiff, high toughness, dark brown to med. brown, slight HC odor, moist to very moist	Started drilling 1023 Slight HC odor ▽
1.6							
19.4		4.8/5				2.3' - Limestone fragments in clay, up to 1" in diameter, increasing HC odor	
100.0							
5			NA		LS	(3.7' - 10') LIMESTONE, pale brown, mod. to severely weathered, wet, HC odor, strong HCl rxn, limestone fragments up to 2" in diameter, angular to sub-angular, hard to mod. hard, in a sandy fat clay matrix	HC odor
578.0						4' to 4.8' - Black HC staining	Slight HC odor
NR		NR				(4.8' - 5') No Recovery	Driller reports hard drilling at 5' - 10' bgs
16.7						5' - Limestone fragments up to 3" in diameter, slight HC odor, moist, no black staining	
16.2		2.3/5				(7.3' - 10') No Recovery	
5.8							
10						10' Bottom of borehole	Stopped drilling 1040
						NOTE: * Boring terminated at 10' bgs and pulled auger out to check for water in the borehole. Cuttings back filled borehole to 9' bgs before the well was set.	
15							
20							
25							

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-106D
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>December 12, 2008</u>	Northing <u>1742891.3</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1785084.6</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>30'</u>	Surface Elev. (ft) <u>1318.5</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1321.33</u>
Drilling Method <u>Hollow Stem Auger</u>			

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>4.22' February 10, 2009</u>
* DTP & DTW measured after well development			

Well	Total Depth (bgs) <u>30'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>14' - 19'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>Grout</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>0.5' - 14'</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.84'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>19' - 30'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS
▽	5.6				CL/CH	(0' - 5.4') Lean / Fat CLAY (CL/CH), med. to high plasticity, very stiff, no dilatancy, high toughness, black to dark brown, no odor, no HCl rxn, (rootlets)	Started drilling 0815 No odor ▽
	3.8						
	11.6	5/5				3' - Strong HC odor	Strong HC odor
	23.0					4.1' - Very moist	
5	89.3				LS	5' to 5.4' - Limestone fragments up to 2", very moist to wet, black HC staining	Slight to no HC odor
	889.0					(5.4' - 30') LIMESTONE, very pale brown (7/3 10YR), completely weathered to a sandy fat clay with limestone fragments up to 2" in diameter, hard to mod. hard, strong HCl rxn, clay is soft, slight to no HC odor	
	10.5	2.4/5		Grout		(7.4' - 10) No Recovery	
	9.4						
	NR	NR					
10	3.5	1.8/5				(11.8' - 15') No Recovery	
	2.8						
	NR	NR					
15	2.5	1.8/5		NA		(16.8' - 20') No Recovery	
	1.0			Bentonite			
	NR	NR					
20	1.2	2/5				21.2' - Dark fray (4/0 GREY I), dry	
	1.3					(22' - 25') No Recovery	
	NR	NR					
25	245.0	2/5		Sand		25' - Wet, strong HC odor, free product	Free product, strong HC odor
	80.4					~26.8' - Pale brown, moist, slight HC odor	Slight HC odor
	NR	NR				(27' - 30') No Recovery	
	NR					30' - Bottom of borehole	Stopped drilling 0925

Borehole / Well Completion Log



Client El Paso Corporation Well ID TW-107
 Project Third Phase Investigation Project No. 1914351

Drilling	Drilling Contractor <u>AEI</u>	Completion Date <u>January 8, 2009</u>	Northing <u>1743011.6</u>
	Drilled by <u>Charles Clark</u>	Drilling Fluid <u>--</u>	Easting <u>1786100.2</u>
	Logged By <u>Brad Barton</u>	Borehole Depth <u>29.85'</u>	Surface Elev. (ft) <u>1311.1</u>
	Drill Rig <u>Failing-6</u>	Borehole Dia. <u>8 3/4"</u>	TOC Elev. (ft) <u>1314.07</u>
	Drilling Method <u>Hollow Stem Auger</u>		

Samples	Sample Method <u>Split Spoon</u>	Sample Interval <u>Continuous</u>	DTP (btoc) <u>ND February 10, 2009</u>
			DTW (btoc) <u>21.28' February 10, 2009</u>

* DTP & DTW measured after well development

Well	Total Depth (bgs) <u>29.85'</u>	Slot Size (in) <u>0.010</u>	Seal Interval <u>0.05' - 17'</u>
	Casing Type <u>PVC</u>	Backfill Material <u>--</u>	Surface Seal <u>--</u>
	Casing Joints <u>Threaded / Flush</u>	Backfill Interval <u>--</u>	Surface Seal Interval <u>--</u>
	Casing Dia. <u>2"</u>	Filter Material <u>12/20 Silica Sand</u>	Stick-up/down <u>+2.81'</u>
	Screen Type <u>PVC</u>	Filter Interval <u>19' - 29.85'</u>	Development <u>Five well volumes</u>
	Screen Length <u>10'</u>	Seal Material <u>Bentonite</u>	<u>were removed following SOP-13</u>

DEPTH (ft)	PID	RECOV	LAB SAMPLE	WELL	ASTM CLASS	SOIL / ROCK DESCRIPTION	REMARKS	
0.7	NR	0.4/5			ML	(0' - 0.6') Clayey SILT (ML) with minor gravel, med. plasticity, black, earthy odor, no cementation, organic (rootlets, topsoil) (0.6' - 5') No Recovery	Started drilling 0820 Driller reports possible rock in shoe caused small recovery (0.4' - 5')	
1.1	NR	NR			CL	(5' - 16.5') Lean CLAY (CL), med. plasticity, stiff to very stiff, no dilatancy, dark reddish-brown (3/4 5YR), no odor, no cementation	No odor	
0.4		4.7/5			CLg	~9.25' - Minor limestone gravels in clay, up to 1/4" in diameter (9.7' - 10') No Recovery 10' - Dark gray (4/1 7.5YR)		
0.6		4.7/5						
0.6								
0.5	NR	NR						
2.8								
2.6								
2.7		4.7/5						
2.1								
1.7	NR	NR						
3.3								
17.2		3.2/5	(16-17)			LS	16.25' to 16.5' - Minor black staining in clay with limestone fragments, no detectable odor (16.5' - 29.85') LIMESTONE, completely weathered, fragments up to 2" in diameter in a sandy fat clay matrix, fragments mod. hard, very pale brown (7/3 10 YR), strong HCl rxn, clay matrix is soft, light brown, no odor (18.2' - 20') No Recovery	No odor Lab sample taken at highest PID reading - TW-107 (16-17) at 0940, tested for terra core, VOC, and total lead
10.0	NR	NR						
2.8								
1.9		2.9/5						
1.4								
2.9	NR	NR						
10.5								
2.6		2.7/4.85						
1.9								
2.9	NR	NR						
29.85						29.85' - Bottom of borehole	Stopped drilling 0920	