116671

BCM

APPENDICES

BCM

APPENDIX A

RECONNAISSANCE BOREHOLE LITHOLOGIC LOGS

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: Oxychem RI/FS

Sheet 1 of 10

BCM Project No. 4064-13

Logged By: E. Schmidley/D. Funk D. Williams

Date(s): 4/1/91-

Well/Boring Location: Pottstown / TANK FARM

Drilling Method Compressed Air Hammer

Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks Drilling new hole adjacent (15-20') from core hole (TB-1 core 0-400')
12" borehole to 100'; 8" ID steel casing to 100'

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				Sand and Gravel: coarse to med. Sand, ½-1" gravel, well graded dry, red brown.				
5				Sand and Gravel: as above				
10				Sand and Gravel: as above				
15				Sand and Gravel: as above				
17				Siltstone and Shale: red brown, dry, weathered				
20								
25				Siltstone and Shale: red brown, dry, angular clasts, ½-2"				
30				Siltstone and Shale: as above				
31								
33				Sandstone: med. to fine sand, dry, red-brown				
35				Siltstone: red-brown, dry				

AR302611

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: Oxychem RI/FS

Sheet 2 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
40				Sandstone: med red brown, med. sand				
45				Sandstone: red brown, v.f to fine sand, some shale				
50				Sandstone: fine sand, med. red brown				
55				Sandstone: med red. brown, v.fine sand, mica flake and calcite.				
60				Sandstone: as above				
65				Sandstone: as above				
70				Sandstone: as above				
75				Sandstone: med red brown f. sand				

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OXYCHEM RI/FS

Sheet 3 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
80				Sandstone: med grey brown, f. Sand				
85				Sandstone: as above, w/ some calcite				
90				Sandstone, as above				
95				Sandstone: med. grey brown, f-med. Sand, hard				
100				Sandstone: as above.				
105				Sandstone: as above:				
110								
113				Sandstone: brown, fine sand, thinly bedded, moist				
115								

AR302613

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: Oxychem RI/FS

Sheet 4 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
120				Sandstone: as above, moist				
125				Sandstone: as above				
130				Sandstone: as above, red brown				
135				Sandstone: as above				
140				Sandstone: red brown, f. sand calcite veined.				
145				Sandstone: as above				
153				Sandstone: red brown, f.-med sand, soft, moist, thickly bedded.				
155								

AR302614

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OKUCHEM RI/FS

Sheet 5 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
160				Sandstone: grey-brown, f. sand, micaceous, wet (WATER)				
165				Sandstone: med gray brown, f.-med sand, micaceous.				
170				Sandstone: as above				
175				Sandstone: as above, w/ interbeds and calcite veins				
180				Sandstone: v. fine, red and med. red brown fine sand w/ calcite vein and mineralized surface				
185				Sandstone: red brown, v. fine - fine sand, thinly bedded				
190				Sandstone: red brown, f. sand, calcite veining, thin beds.				
195				Sandstone: as above, less calcite, platy frags				

AR302615

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OXYCHEM RI/FS

Sheet 6 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
200				Sandstone: as above, w/ v. fine gravel				
205				Sandstone: as above				
210				Sandstone: as above, abund. calcite veining, some weather fractured surfaces				
215				Sandstone: v.f-fine gravel, med red brown, calcite, platy frags				
220				Sandstone: red brown, v. fine sand, w/ interbed siltstone.				
225				Sandstone: as above				
230				Sandstone: red brown, v. fine sand, thinly laminated-platy frags, calcite veining.				
235				Sandstone: brown, f. sand, micaceous +3-5 gpm				

AR302616

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OXYCHEM RI/FS

Sheet: 7 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
240				Sandstone: v.f.-fine sand				
250				Sandstone: as above.				
255				Sandstone: brown, f.-med sand, micaceous, some calcite vein.				
265				Sandstone: v.f-fine sand, red-brown, calcite veining				
275				Sandstone: f-med sand, brown, micaceous, pickup 3-5 gpm, total= 12-15 gpm				
285				Sandstone: v.fine-fine sand, micaceous, thinly lamin.-platy frags., calcite veining				
295				Sandstone: as above				
300				Sandstone: f sand, red-brown, +30 gpm total 50 gpm				

AR302617

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: DuyChem RI/FS

Sheet 8 of 10

BCM Project No. 4064.13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
305				Sandstone: f.-med sand, grey brown, micaceous, fract zone @ 304				
310				Sandstone: as above				
320				Sandstone: as above, med sand.				
325				Siltstone and Sandstone: v.fine sand, red brown, micaceous				
330				Sandstone: red brown, v.f-fine sand, mineralized surfaces				
335				Sandstone: v.fine sand, med red brown, micaceous				
345				Sandstone: as above				
350				Sandstone: red brown, f.sand, calcite vein, micaceous,				

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OxyChem RI/FS

Sheet 9 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
355				Sandstone: red brown, f. sand, micaceous, calcite veins 80-100 gpm yield				
360				Sandstone: red brown, f.-med sand, calcite vein				
365				Sandstone: red brown, v. fine sand thinly laminated-platy, micaceous, calcite veining				
370				Sandstone: as above, no calcite				
375				Sandstone w/ Siltstone: red brown, v. fine sand, thinly laminated.				
380				Sandstone: red brown, v. fine sand, some mineralized bedding planes				
385				Sandstone: fine sand, mineralized surfaces, calcite veining				
390				Sandstone: med red brown, v. f. sand calcite veining				

AR302619

WELL DRILLING LOG

BCM

Well/Boring No.: TB-1

Project: OXYCHEM RI/FS

Sheet 10 of 10

BCM Project No. 4064-13 Logged By: " Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soil Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
395 to 455				Sandstone: as above to				
455 to 485				Sandstone: med. red brown, med sand, calcite veining. to				
485				Sandstone: med. red brown, f.-med sand, some calcite				
490				Sandstone: as above				
495				Sandstone: med. red brown, med. sand, some calcite				
500				Sandstone: as above				
				Bottom of Boring				

AR302620

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OXYCHEM

Sheet 1 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 2-5-91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				Soil: med. brown, f. sand, silty, weathered frags.				
5				Soil: Same as above				
10				Shale: med. red brown, weathered				
15				Shale: as above				
20				Siltstone: dark red brown, almost v. fine sand				
30				Siltstone: as above				
40				Sandstone: med. red brown and dark brown; v. fine sand				
45				Sandstone: as above				

AR302621

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: Oxychem

Sheet 2 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
50				Sandstone: med. red brown, f. sand.				
60				Sandstone: as above				
65				Sandstone: med. grey, f sand SOFT @ 66-68				
70				Siltstone: dark red brown, MOIST CUTTINGS @ 69'				
80				Siltstone: as above				
85				Sandstone: med. red brown, f.-med sand 1-2gpm				
90				Sandstone: med. red brown, f. sand, calcite veining				
100				Sandstone: med red brown m. sand				

AR302622

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OxyChem

Sheet 3 of 9

BCM Project No. 00-4064-13 Logged By: Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
105				Sandstone: med red brown, fine sand. ~5gpm				
115				Sandstone: as above, 10gpm @ 113'				
120				Sandstone: med red brown, med. sand, some med. grey med sand.				
125				Sandstone: as above, water foams and dissapeurs				
130				Sandstone: med red brown, f. sand,				
135				Sandstone: as above, product sheen, possible styrene				
145				Sandstone: as above				
150				Sandstone: med red brown, f-med sand				

AR302623

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OXYCHEM

Sheet 4 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 3/6/91 - 3/14/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
155				Sandstone: as above				
160				Sandstone: med. red brown, v.fine sand, some mica flake				
175				Sandstone: med. red brown, med. sand				
180				Sandstone: med. red brown, v.f. sand				
185				Sandstone: as above, ~15gpm				
190				Sandstone: med red brown, f. sand, calcite veining				
195				Sandstone: as above				
200				Sandstone: med red brown f-med sand calcite		15-20gpm		

AR302624

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OXYCHEM

Sheet 5 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 3/6/91 - 3/14/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
205				Sandstone: as above				
210				Sandstone: med. red brown, f. sand, ~25gpm total				
220				Sandstone: med red brown, f.-med sand, micaceous				
225				Sandstone: as above, 40-50gpm				
235				Sandstone: as above, 50+gpm				
245				Sandstone: as above, 75+ gpm				
255				Sandstone: med red brown, v. fine sand, micaceous, calcite				
265				Sandstone: as above				

AR302625

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OXYCHEM

Sheet 6 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 3/6/4 - 3/14

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soil Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
270				Sandstone: med red brown, f. sand				
280				Sandstone: med red brown, f-med sand, calcite				
285				Sandstone: med red brown, f. sand				
300				Sandstone, med. red brown, f. sand, calcite				
310				Sandstone: as above				
315				Sandstone: as above, platy frags, thinly laminated.				
320				Sandstone: med red brown, vf sand, calcite fractures				
325				Sandstones med red brown micaceous				

AR302626

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OxyChem

Sheet 7 of 9

BCM Project No. 00-4064-13 Logged By: DAVE WILLIAMS/ERIC [illegible] Date(s): 3/6/9 - 3/14/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
330				Sandstone: as above, f-med sand				
335				Sandstone: med. red brown, f. sand, mineralization, calcite				
340				Sandstone: med red brown, v.f-fine sand, calcite.				
345				Sandstone: med red brown, f-med sand, micaceous, soft zone				
350				Sandstone: grey-red brown, f-med. sand, micaceous, large frags w/ weathered surfaces				
358				Sandstone: grey-brown, med sand, graywacke?				
360								
370				Sandstone: gray, f-med sand				
				Sandstone: red brown, v.f. sand				
375				Sandstone: grey + red brown f-med sand, weathered				

AR302627

WELL DRILLING LOG

BCM

Well/Boring No.: T13-2

Project: OXYCHEM

Sheet 8 of 9

BCM Project No. 00-4064-13 Logged By: Eric Semidley Date(s): 3/11/91 - 3/1

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
380				Sandstone: red brown, f.-med sand, calcite veining				
385				Sandstone. as above				
395				Sandstone: as above				
400				Sandstone: as above, f. sand, qtz. veins				
405				Sandstone: red brown, f.-med. sand, no qtz.				
410				Sandstone: red brown, f. sand, qtz. vein.				
415				Sandstone: as above				
420				Sandstone: as above				

AR302628

WELL DRILLING LOG

BCM

Well/Boring No.: TB-2

Project: OXYCHEM

Sheet 9 of 9

BCM Project No. 00-4064-13 Logged By: E. Smidley Date(s): 3/14/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soil Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
425				Sandstone: as above				
430				Sandstone: as above qtz + calcite veinlet 35°				
440				Sandstone: as above				
445				Sandstone: f-med sand, trace grey f. sand, little calcite vein				
450				Sandstone: red brown, f. sand Bottom of boring				

AR302629

WELL DRILLING LOG

BCM

Well/Boring No.: TB-3

Project: OXYCHEM - Pottstown

Sheet 1 of 2

BCM Project No. 00-4064-B Logged By: E. Schmidley Date(s): 6/26/90-7/5/90

Well/Boring Location: Vinyl chloride handling area, adjacent to BR-A

Drilling Method Air percussion Drilling Contractor: Empire Soil Investigations

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks 0-8' 10 inch hole, 10" I.D. casing removed after borehole reamed to 101' and 8" casing installed and grouted from surface to 101'

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION	2' protective casing stick up	ELEVATION
0				Shale and Siltstone, some very fine sandstone, weathered, red			5" steel casing 0-101' 10" borehole 0-8' Tremie grout 0-101' 95% Neat Cement 5% Bentonite	
10'								
20'								
30'				Siltstone and Sandstone, very-fine grained sandstone, little to some shale, slightly moist cuttings @ 41', red				
40'				Siltstone and Shale, red				
50'								
60'				Sandstone, fine grained, grey, no shale wet @ 58'				
				Sandstone and minor siltst				

NOTE: THIS LOG REPRESENTS A TEMPORARY COMPLETION OBTAINED DURING THE SUMMER 1990 PLANT MAINTENANCE PERIOD. THIS BORING WILL BE DEEPENED AND COMPLETED DURING A SUBSEQUENT STAGE OF THE INVESTIGATION

WELL DRILLING LOG

BCM

Well/Boring No.: TB-3

Project: OXYCHEM : POTTSTOWN

Sheet 2 of 2

BCM Project No. 00-4064-11 Logged By: E. Schmelley Date(s): 6/26/90-7/5/90

Well/Boring Location: Vinyl chloride handling area; adjacent to BR-A

Drilling Method Air percussion Drilling Contractor: Empire Soil Investigations

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
70				fine gravel, med. gray-red-brown @71-73' Fracture zone, angular cuttings, separate thinly along bedding planes, minor calcite veins			10" Borehole 0-101'	
							8" steel casing 0-101'	
				Sandstone, fine grained, trace v. well rnd. qtz pebbles 1/8-1/2", dark reddish brown			Tremie grout 0-101' 95% Neat cement 5% Bentonite	
80								
				Sandstone fine grained with white qtz clasts 1/8" well rnd primarily grey				
90				Sandstone fine to v. fine grained, reddish brown with grey clasts, no visible quartz clasts				
100							101' END OF BORING	

AR302631

WELL DRILLING LOG

BCM

Well/Boring No.: TB-4

Project: OxyChem RI/FS

Sheet 1 of [illegible]

BCM Project No. 4064-13 Logged By: D Williams Date(s): 12/17-[illegible]0 1/8-1/10/90

Well/Boring Location: In floodplain, about 20 feet from OW-20

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Investigat.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks 12" borehole to 39'; 8" I.D. casing to 39'

DEPTH (ft.)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
1				silt: coal fines, black				
				silty clay: red-brown				
3				Silty Clay: some gravel, brown				
7				Clayey Gravel: some clay well rounded pebbles (1/2 - 1in) moist				
10				sandstone and shale: weathered, red brown dry				
35				sandstone and shale: competent, red-brown				
39				Siltstone: some very fine sand grains, dry red-brown				
54				sandstone. fine grained, thin shale interbeds; dry red-brown				
62				Siltstone: grey brown, dry.				
70				sandstone: fine grained, red brown, first water, soft drilling				

AR302632

WELL DRILLING LOG

BCM

Well/Boring No.: TB-4

Project: OxyChem RI/FS

Sheet 2 of 6

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
90				Sandstone: medium to fine				
102				Sandstone and Clay: weathered zone with clay filled fractures WATER: 1gpm @ 100-102'				
105				Sand stone and siltstone: medium to coarse sandstone interbed, red-brown				
110				Sandstone and siltstone: red-brown, hard drilling, some mica				
115				water: approximately 5-10 gpm.				
120				Sandstone: fine grained, micaceous, red-brown, thinly bedded, mineralized on fracture planes				

AR302633

WELL DRILLING LOG

BCM

Well/Boring No.:

Project: OxyChem 21/FS

Sheet 3 of 6

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
130				Water: additional 3-5gpm Sandstone: fine-medium grained, red-brown, micaceous, yield = 15-20gpm total				
135				sandstone: fine to medium grained, yellow brown, interbedded with brown shale				
150				sandstone or siltstone: fine grained, red, yield 30-40gpm				
160				siltstone: red-brown, massive				
165				siltstone: as above, increasing sand				
175				sandstone: fine grained, micaceous, red thin fragmented cuttings.				

AR302634

WELL DRILLING LOG

BCM

Well/Boring No.: _____

Project: OxyChem RI/FS

Sheet 4 of 6

BCM Project No. 4064-13 Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
185				sandstone: very fine grained, red				
205				sandstone: as above thinly bedded				
208				sandstone: very fine grained, red				
215				sandstone: very fine to fine sandstone, red, thin to medium bedded				
235				sandstone: as above, platy fragments, large 1/2-1"				
237				sandstone: very fine grained, small fragments, drilling hard, water clears				

AR302635

WELL DRILLING LOG

BCM

Well/Boring No.: 7[illegible]

Project: Oxychem RI/FS

Sheet 5 of 6

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
245				sandstone: as above with calcite infilling of fractures				
247				sandstone: medium to fine grained, medium brown, weathered facture surfaces, calcite coating on facture surfaces.				
250				sandstone: very fine to fine grained, red, massive				
237				sandstone: coarse grained				
260				sandstone: very fine to fine grained, weathered fractures, mineralized surfaces				
265				sandstone: interbedded massive with thinly bedded				
275				sandstone: very fine to fine grained, red, some bedding plane				

AR302636

WELL DRILLING LOG

BCM

Well/Boring No.: MB-4

Project: OxyChem SI/FS

Sheet 6 of 6

BCM Project No. 4064-13 Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
280				Sandstone: very fine to fine grained, red, fairly hard drilling				
285				Sandstone: as above				
295				Sandstone: as above				
298				Sandstone: fine to medium grained, red-brown				
300				end of boring				

AR302637

WELL DRILLING LOG

BCM

Well/Boring No.: T[illegible]

Project: OxyChem RI/FS

Sheet 1 of [illegible]

BCM Project No. 4064-13

Logged By: D. Williams, E. Pinto, E. Smedley

Date(s): 1-28-91 / 2-1-91, 1-4-91

Well/Boring Location:

Drilling Method: Compressed Air Hammer

Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks: 12" borehole to 37'; 8" I.D. casing to 37'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION
0				gravel. crushed stone		
5				Silty Sand: brown to yellow brown		
7				silty sand: rock fragments of quartz grains, little gravel, dry, hard drilling		
12				silt and clay: moist, soft spot		
14				silty sand: harder, rock fragments in cuttings		
16				gravelly clay: little sand and silt, medium brown		
27				sandstone: fine to very fine grained, red, thin siltstone interbeds, weathered bedrock		
28.5				sandstone: some grey shale		

AR302638

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: Oxychem RI/FS

Sheet 2 of 10

BCM Project No. 4064-13

Logged By: D. Williams, E. Pazto, E. Schmidley

Date(s): 1-28-91/2-1-91, 1-4-91

Well/Boring Location:

Drilling Method: Compressed Air Hammer

Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
35				sandstone: very fine grain, some silt, red-brown, dry, very compact				
45				sandstone: with silt, dry				
				sandstone: as above				
50								
60				sandstone: very fine grain, some silt, dark red, dry, hard drilling				
				sandstone: as above				
65								
70				sandstone: with silt, finer grain				
				sandstone: as above				

AR302639

WELL DRILLING LOG

BCM

Well/Boring No.: TP-15

Project: Oxychem RI/FS

Sheet 3 of [illegible]

BCM Project No. 4064-13 Logged By: D. Williams, E. Pinto, E. Smedley Date(s): 1-28-91/2-1-91 1-4-91

Well/Boring Location:

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION	
76				sandstone: less silt, very hard drilling			
80				sandstone: silt, red-brown, wet, first-water.			
85				sandstone: as above			
90				sandstone: as above			
95				sandstone: as above			
100				sandstone: as above. low water production, hard drilling.			
108				soft pocket			
110				sandstone medium grain			
115				sandstone: as above			

AR302640

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: _____ Sheet 4 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
130				sandstone: as above				
135				sandstone: as above				
140				sandstone: as above				
145				sandstone: as above				
150				sandstone: as above				
155				sandstone: as above				
160				sandstone: as above				
165				sandstone: as above				
170				sandstone: as above				
180								
190				sandstone: as above				
200				sandstone: as above				
210				sandstone: very fine grain, some silt, red-brown				
215				sandstone: fine-grain, little medium grain, red-brown				

AR302641

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: _____ Sheet 5 of [illegible]

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
220				sandstone: very fine grained, some silt, red-brown				
225				sandstone: fine grained, red-brown				
230				sandstone: fine grained, red brown, trace calcite veining				
235				sandstone: fine grained, red brown				
240				sandstone very fine grained, red brown				
245				sandstone: fine grained, very well rounded pebbles (1/8-1/4"), red-brown				
250				sandstone: very fine grained, micaceous, trace calcite veining				
				sandstone [illegible]				

AR302642

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: _____ Sheet 6 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
260				Sandstone as above				
265				Sandstone: fine grained, trace micaceous, trace calcite veining				
270				Sandstone: as above				
275				Sandstone: as above				
276				Sandstone: coarse grained, some very coarse, grey-red-brown				
280				Sandstone: coarse grained, mottled grey-brown color				
285				Sandstone: coarse grained, as above				
290				Sandstone: coarse				

AR302643

WELL DRILLING LOG

BCM

Well/Boring No.: [illegible]

Project: _____ Sheet 7 of [illegible]

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION	
295				Sandstone: fine grained little medium, trace coarse sand, well rounded, light reddish brown			
300				Sandstone: as above, trace micaceous, red-brown			
305				Sandstone: very fine grained, some silt, trace mica, red brown, trace calcite veining			
310				Sandstone: as above			
315				Sandstone: as above			
318				Sandstone: fine to medium grained, red-brown, coarser than above			
320				Sandstone: fine grained, trace mica, trace calcite veining, one inch diameter very angular calcite fragment			
330				Sandstone: fine grained, trace mica, trace calcite, angular calcite fragments.			

AR302644

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: _____ Sheet 8 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Referenc

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION	
335				sandstone: as above with thin beds medium grained, yellow-brown sandstone			
340				sandstone: medium grained, trace mica, red-brown			
345				sandstone: fine to medium grained, medium red-brown, trace mica flake.			
350				sandstone: fine grained, trace mica, mineralized and weathered surface on cuttings, soft spot 352-353			
355				sandstone: as above			
360				sandstone: fine grained, micaceous, red-brown, mineralized surfaces			
365				sandstone: as above			
370				sandstone: fine grained, medium red-brown, ~~with~~ trace medium grained sandstone, grey-brown			

AR302645

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: _____ Sheet 9 of [illegible]

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION	
375				sandstone: fine grained, medium red-brown			
380				sandstone: medium grained, medium red-brown, very micaceous, soft spot 379-380			
385				sandstone: very fine grained, medium red-brown, micaceous			
390				sandstone: as above with calcite filled fractures and some mineralized surface on partings			
395				sandstone: ~~as above~~ very fine grained, oil sheen			
400				sandstone: as above, thin interbed siltstone			
410				sandstone: as above			

AR302646

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: OxyChem RI/FS

Sheet 10 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
420				siltstone: some very fine sand, red-brown				
425				siltstone: as above				
430				siltstone: as above, yield over 150 gpm				
435				sandstone: fine grained, trace well rounded gravel (1/8"), red-brown				
440				sandstone: as above				
445				sandstone: medium grained, trace mica, red-brown, yield over 150 gpm				
450				sandstone: fine grained, trace mica, red-brown. Bottom of boring				

AR302647

WELL DRILLING LOG

BCM

Well/Boring No.: IB-1e

Project: OxyChem RI/FS

Sheet 1 of [illegible]

BCM Project No. 4064-13 Logged By: D. Williams / D Funk Date(s): 1-25-91 / 1-31-91 / 1-7-91

Well/Boring Location:

Drilling Method: Compressed Air Hammer Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks: 12" borehole to 40'; 8" I.D. casing to 40'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				gravel: with sand and silt, little clay, rounded pebbles (up to 1"), moist				
5				gravel: as above				
9				silt: with clay and gravel, little sand, dry, brown to light brown.				
25				silt: as above, more gravel				
32				shale or siltstone: dark grey, weathered				
34				Siltstone: grey to black, some brown silt interbeds				

AR302648

WELL DRILLING LOG

BCM

Well/Boring No.: TB-6

Project: OxyChem RI/FS

Sheet 2 of 9

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
37				Shale: dry, grey to olive brown			OVA READINGS	
40				Shale: dry, grey-brown, weathered and fractured			Background = 0 ppm BZ = NIR	
47				Siltstone: gray-brown to red brown, dry, easy drilling				
55				Siltstone: as above				
60				Sandstone: fine sand, blue-grey, wet and dry cuttings				
62				Sandstone: Brown to red brown, fine sand, cemented fractures				
80				Sandstone: as above.			BZ @ 85' = NIR	
90				Siltstone: medium brown, and very fine sand and black silt interbeds Water: 3-4 gpm				
95				Sandstone: chocolate brown to red brown, v. fine sand, massive,			BZ @ 105' = NIR	

WELL DRILLING LOG

BCM

Well/Boring No.: I

Project: OxyChem RI/FS

Sheet 3 of

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
107				Sandstone: micaceous, brown-red, yield 5-10 gpm, drilling speed medium				
110				Siltstone: alternating beds of red-brown, grey, green.				
111				Sandstone: argillite, w/ calcite fill				
118				Water: water grey, black on surface				
120				Sandstone: as above, with thin beds of f-med. sandstone				
122				Shale: greenish grey				
127				Shale: red brown, with mica partings.				

AR302650

WELL DRILLING LOG

BCM

Well/Boring No.: TB-6

Project: Oxychem RI/FS

Sheet 4 of 9

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
130				sandstone: fine grained, medium brown				
135				sandstone: as above				
140				sandstone: fine to medium grained, medium red-brown				
145				sandstone: as above				
150				sandstone: fine grained, medium red-brown				
155				sandstone: as above				
160				sandstone: fine grained, medium red-brown, calcite weathering				
165				sandstone: as above, yield approximately 10 gpm				
170				sandstone: as above				
175				sandstone: fine to medium grained, yield approximately 15-20 gpm				
180				sandstone: as above, yield approximately				

AR302651

WELL DRILLING LOG

BCM

Well/Boring No.: TB-6

Project: OxyChem RI/FS

Sheet 5 of

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
185				sandstone: as above, yield 50 gpm				
190				sandstone: medium grained, medium red-brown, calcite				
195				sandstone: as above				
200				sandstone: as above				
205				sandstone: as above				
210				sandstone: fine grained medium red-brown, calcite weathering				
215				sandstone: as above, drilling hard				
220				sandstone. as above				
225				sandstone: as above				
230				sandstone: as above, no calcite				
235				sandstone: as above				
240				sandstone: fine to medium grained, medium red-brown				
245								

AR302652

WELL DRILLING LOG

BCM

Well/Boring No.: TB-6

Project: Oxychem RI/FS

Sheet 6 of 9

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
245				sandstone: as above				
250				sandstone: medium grained, medium red-brown				
255				sandstone: as above				
260				sandstone: fine grained, medium red-brown				
265				sandstone: as above				
270				sandstone: as above, micaceous, calcite				
275				sandstone: as above				
280				sandstone: medium grained, medium red-brown, yield approximately 80-90 gpm				
285				sandstone: as above				
290				sandstone: fine grained, medium red-brown, calcite				
295				sandstone: as above				
300								

AR302653

WELL DRILLING LOG

BCM

Well/Boring No.: [illegible]

Project: OxyChem RI/FS

Sheet 7 of [illegible]

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
300				sandstone: fine grained, medium red brown and olive brown fined grained sandstone				
305				sandstone: as above				
310				sandstone: fine grained, micaceous, medium red brown.				
315				sandstone: as above				
320				sandstone: medium grained, micaceous, medium red brown				
325				sandstone: as above				
330				sandstone: fine grained, medium red-brown				
335				sandstone: as above				
340				sandstone: as above, micaceous				
345				sandstone: as above				
350				sandstone: as above				
355				sandstone: as above				

AR302654

WELL DRILLING LOG

BCM

Well/Boring No.: TB-6

Project: OxyChem RI/FS

Sheet 8 of 9

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
360				sandstone: as above, yield approximately 150-175 gpm				
365				sandstone: fine grained, medium red-brown				
370				sandstone: as above				
375				sandstone: as above				
380				sandstone: as above				
385				sandstone: as above				
390				sandstone: as above				
395				sandstone: as above				
400				sandstone: as above				
405				sandstone: as above				
410				sandstone: as above, micaceous				
415				sandstone: as above				
420				sandstone: as above				
425				sandstone: as above				
430				sandstone: as above				

AR302655

WELL DRILLING LOG

BCM

Well/Boring No.: T[illegible]

Project: Oxychem RI/FS

Sheet 9 of [illegible]

BCM Project No. 4064-13 Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
435				sandstone: as above				
440				sandstone: medium grained, grey-brown				
445				sandstone: as above				
450				sandstone: medium grained, medium red-brown				
				Bottom of boring				

AR302656

WELL DRILLING LOG

BCM

Well/Boring No.: TB-7

Project: OxyChem RI/FS

Sheet 1 of

BCM Project No. 401,4-13

Logged By: D. Williams / D. Funk

Date(s): 1-2-91

Well/Boring Location:

Drilling Method: Compressed Air Hammer

Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks: 12" borehole to ; 8" I.D. casing to 64'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				clayey silt: some sand, gravel and cobbles, moist				
5				clayey silt: as above increasing sand and pea gravel				
8				sandy clay: medium grained, wet, brown, some to little pebbles.				
18				sandy silt: some clay, little to trace pebbles				
30				sandy silt: as above				
41				silty loam: little clay, dry to damp, reddish brown				
50				silt, sand and gravel reddish brown				

AR302657

WELL DRILLING LOG

BCM

Well/Boring No.: I

Project: _____ Sheet 2 of _____

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
53				sand and gravel: round pebbles (1/2"), some silt, reddish brown				
64				sandstone: red brown				
65				sandstone: very fine grained, medium red brown				
70				sandstone: as above				
75				sandstone: as above				
80				sandstone: fine to medium grained, medium red brown				
85				sandstone: as above				
90				sandstone: fine grained, medium red brown				
95				sandstone: as above				

AR302658

WELL DRILLING LOG

BCM

Well/Boring No.: TB-7

Project: _____ Sheet 3 of _____

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
100				sandstone: medium grained, medium red brown				
105				sandstone: as above				
110				sandstone: fine grained, grey brown, micaceous surface, yield 1-2 gpm				
115				sandstone: as above				
120				sandstone: fine to medium grained, medium red brown				
125				sandstone: as above				
130				sandstone: fine grained, medium red brown				
135				sandstone: fine grained, medium red brown				
140				sandstone: as above				

AR302659

WELL DRILLING LOG

BCM

Well/Boring No.: [illegible]

Project: _____ Sheet 4 of [illegible]

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference:

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
145				sandstone as above				
150				sandstone - as above				
155				sandstone - as above				
160				shale : medium red brown				
165				shale : as above				
170				sandstone : very fine grained, silty, medium red brown, micaceous				
180				sandstone : fine to medium grained, medium red brown				
185				sandstone : as above				
190				sandstone : very fine grained, medium red brown				
195				sandstone : as above				

AR302660

WELL DRILLING LOG

BCM

Well/Boring No.: TB-7

Project: _____ Sheet 5 of _____

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
200				sandstone: as above				
205				sandstone: as above				
210				sandstone: fine grained, medium red brown				
215				sandstone: as above				
220				sandstone: as above				
225				sandstone: as above				
230				sandstone: fine to medium grained, medium red brown, hard				
235				sandstone: as above, soft spot 235-237				
240				sandstone: as above				
245				sandstone: as above				

AR302661

WELL DRILLING LOG

BCM

Well/Boring No.: TE[redacted]

Project: _____ Sheet 6 of [redacted]

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
250				sandstone: fine grained medium red brown				
252				siltstone and shale: grey to greybrown, hard				
260				siltstone and shale: as above, 1/4" platy fragments, dark grey siltstone-				
270				siltstone and shale: shale has very fine sand				
275				shale: thinly laminated, grey-black				
280				Argillite: thinly plated shale; grey-black, calcite cement, angular fragments, breccia zone 279				

AR302662

WELL DRILLING LOG

BCM

Well/Boring No.: TB-7

Project: _____ Sheet 7 of 7

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
282				Argillite: black, angular fragments, hard drilling.				
285				Argillite: grey to black, laminated w/ pyrite, platy fragments (1/8") thick, hard drilling				
300				As above, hard drilling				
305				As above, some medium brown shale interbeds				
310				Shale: fine, 1/4 to 1/8" laminated, some pyrite on partings				
315				Shale: as above w/ some interbeds of shale and argillite				
320				Sandstone: v. fine sand, grey-brown, hard drilling, sub platy frags. alternating with grey-brown siltstone.				
325				Shale: green into red, soft drilling				
327				Sandstone and Shale: red, very fine to fine sand w/ shale				
330				Shale: red, (1/8") partings, mica, easy drilling				
335				Sandstone: v. fine-fine, thin bedded				
340				[illegible] laminated				

AR302663

Bottom of boring

WELL DRILLING LOG

BCM

Well/Boring No.: I[illegible]

Project: OxyChem RI/FS

Sheet 1 of 10

BCM Project No. 4064-13

Logged By: S. Olds, D. Williams, D. Funk, K. Clinkus

Date(s): 12/20/90 - 12/21/9[illegible] 1/4/90 - 1/4/9[illegible]

Well/Boring Location:

Drilling Method: Compressed Air Hammer

Drilling Contractor: Empire Soils Investigatio[illegible]

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks: 12" borehole to 29'; 8" I.D. casing to 29'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				loam: silt and some clay, little sand, moist, black				
1				loam: as above, light brown-brown				
10				gravel: semiround to semiangular				
10.4				sandstone and shale: weathered, wet, red-brown				
19				shale: dry, red-brown				
29				sandstone: very fine ~~sand~~ grained, medium red brown, fracture zone 34 feet				
40				sandstone: very fine grained, grey brown, thin bed micaceous				

AR302664

WELL DRILLING LOG

BCM

Well/Boring No.: TB-8

Project: Oxychem RI/FS

Sheet 2 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
42				Sandstone: medium red brown				
44				siltstone: dark brown				
50				Sandstone: very fine grained, dark red brown				
55				Sandstone: as above, some calcite on fractures, yield 1/2-1 gpm				
58				Sandstone: as above, drilling rate slow				
60				Sandstone: medium red brown, weathered				
67				Sandstone: very fine grained, medium red brown				
70				Sandstone: med red brown				
				Sandstone:				

AR302665

WELL DRILLING LOG

BCM

Well/Boring No.: TB-8

Project: Oxychem RI/FS

Sheet 3 of

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
76				siltstone: medium red brown				
80				siltstone and Sandstone: very fine sand, some mica, some massive beds, calcite in fractures.				
85				As above: soft zone, soft drilling				
88				sandstone: fine grained, medium red brown: platy				
90				sandstone: fine grained, medium red brown, weathered zone, mineralized fract.				
91				sandstone: as above micaceous, yield 45gpm				
95				sandstone: medium red brown				

AR302666

WELL DRILLING LOG

BCM

Well/Boring No.: TB-8

Project: Oxychem RI/FS

Sheet 4 of

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
100				Sandstone: fine grained, dark red				
105				Sandstone: as above				
110				Sandstone: as above				
115				Sandstone: as above, micaceous				
118				Sandstone and Siltstone: very micaceous, grey brown				
120				Sandstone: micaceous, medium grey brown				
125				Sandstone: medium to fine grained, water increasing, grey brown				
130				Sandstone: as above, weathered and fractured				
135								

AR302667

WELL DRILLING LOG

BCM

Well/Boring No.: TB-5

Project: OxyChem RI/FS

Sheet 5 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
135				Sandstone: fine grained, medium red brown				
142				Sandstone. very fine grained, medium red brown				
150				Sandstone as above				
160				Sandstone: fine to medium grained, red-grey				
165				Sandstone: fine to very fine grained, medium red brown, some orange brown				
170				Sandstone: fine grained, micaceous, medium red brown				

AR302668

WELL DRILLING LOG

BCM

Well/Boring No.: 7[illegible]

Project: OxyChem RI/FS

Sheet 6 of [illegible]

BCM Project No. 4064-13 Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
175				Sandstone: fine grained, medium red brown, fine partings				
180				Sandstone: fine to medium grained, micaceous, medium red brown				
185				Sandstone: fine to medium grained, medium red brown				
190				Sandstone: fine to medium grained, medium red brown, calcite filled fractures,				
195				Sandstone: very fine grained, less micaceous, medium red brown				
200				Sandstone: as above				
205				Sandstone: very fine grained, interbedded grey brown				

AR302669

WELL DRILLING LOG

BCM

Well/Boring No.: TB-8

Project: Oxychem RI/FS

Sheet 7 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
210				Sandstone: fine grained, medium red brown, thinly bedded				
220				Sandstone: very fine grained, medium red brown				
225				Sandstone: as above				
230				Sandstone: as above, with calcite filled fractures				
235				Shale: red brown, weathered surfaces				
240				Sandstone: very fine grained, silty, medium red brown				
245				Sandstone: as above				
250				Sandstone: fine to medium grained, medium red brown				

AR302670

WELL DRILLING LOG

BCM

Well/Boring No. TB-8

Project: OxyChem RI/FS

Sheet 8 of

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
255				sandstone: as above				
260				sandstone: fine grained, medium red brown				
270				sandstone: fine grained, micaceous, medium red brown				
280				sandstone: fine grained, medium red brown, calcite weathering				
285				sandstone: fine to medium grained, medium red brown				
290				sandstone: fine grained, medium red brown				
295				sandstone: fine grained, medium red brown				
300				sandstone: as above				
305				sandstone: as above yield 40gpm				

AR302671

WELL DRILLING LOG

BCM

Well/Boring No.: TB-8

Project: OxyChem RI/FS

Sheet 9 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
310				Sandstone: fine to medium grained, medium red brown				
315				Sandstone: as above				
320				Sandstone: as above				
325				Sandstone: medium grained, medium orange brown, weathered				
330				Sandstone: medium grained, medium red brown				
335				Sandstone: as above				
340				Sandstone: very fine grained, medium red brown				

AR302672

WELL DRILLING LOG

BCM

Well/Boring No.: TB8

Project: OxyChem RI/FS

Sheet 13 of 13

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
345				Sandstone: very fine grained, medium red brown				
350				Sandstone: very fine grained, medium red brown				
				Bottom of Boring				

AR302673

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: OxyChem RI/FS

Sheet 1 of 7

BCM Project No. 4064-13

Logged By: R. Clickner, D. Williams, D. Funk

Date(s): 1-15-91/1-25-91

Well/Boring Location:

Drilling Method: Compressed Air Hammer

Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks: 12" borehole to 39'; 8" I.D. steel casing to 39'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				Clayey silt: moist, brown-black				
7				Silt: little fine grained sand, moist, unsaturated, brown				
10				Sandy silt: fine grained, some subangular gravel and rock fragments, moist, unsaturated, red-brown				
20				Silty sand: medium to fine grained sand, subangular rock fragments, some silt, red-brown. drilling speed moderate				
25				Silty sand: as above with cobbles				
27				Silty sand: medium to fine grained, some weathered rock, round to subangular, moist, brown-red, drilling speed reduced				
29				Silty sand: as above with weathered crushed ~~gravel~~ gravel and small cobbles, rounded				

AR302674

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: OxyChem RI/FS

Sheet 2 of 7

BCM Project No. 4004-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
32				rock fragments: weathered, round to subangular, red-brown, drilling hard				
37				rock fragments: fine grained, platy, subangular, red-brown, drilling hard				
40				sandstone: fine grained, reddish brown, drilling speed moderate				
50				sandstone: fine to very fine grained, reddish brown				
55				siltstone: very fine to fine grained, platy, reddish-brown, drilling smooth to moderate				
60				siltstone: as above, fine to medium grained				
70				siltstone: as above				

AR302675

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: OxyChem RI/FS

Sheet 3 of 7

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
75				siltstone: as above, no fracturing apparent				
80				siltstone: fine grained, thinly plated, reddish-brown				
90				sandstone: medium grained, reddish-brown, massive				
95				sandstone: as above, more platy				
100				sandstone: fine to medium grained, platy, reddish-brown				
110				siltstone: fine grained, thinly plated, reddish-brown				
120				siltstone: fine grained, thinly plated, reddish-brown				

AR302676

WELL DRILLING LOG

BCM

Well/Boring No.: TB4

Project: OxyChem RI/FS

Sheet 4 of 7

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
130				siltstone: as above with fine grained sand, drilling speed medium, yield 25gpm				
140				As above: very platy partings, carbonaceous mineralization on partings				
145				sandstone: fine to very fine grained				
150				sandstone and siltstone interbedded, fine grained, red, mica				
156				Siltstone: red				
160				sandstone: fine grained, mineral filled fractures				
170				sandstone: as above				

AR302677

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: OxyChem RI/FS

Sheet 5 of 7

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
180				sandstone: medium to fine grained, micaceous, brown-red, fractured, drilling easy 177-180 yield 30-50gpm				
185				sandstone: very fine grained, red, angular cuttings				
205				sandstone: very fine grained, red, angular cuttings				
206				sandstone: fine grained, red, platy				
210				sandstone: as above				
220				sandstone: very fine to fine grained, red, thinly bedded, large cobbles in tailings				
225				siltstone: very fine to fine grained, red				

AR302678

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: OxyChem RI/FS

Sheet 6 of 7

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
227				siltstone: as above, drilling harder				
230				siltstone: very fine grained, red, thinly plated				
240				sandstone: pebble zone 240-242, yield 100gpm				
250				sandstone: very fine to fine grained, red, thinly bedded				
254				sandstone: as above				
260				sandstone: as above				
270				sandstone: very fine to fine grained, red, platy				
280				sandstone: as above				

AR302679

WELL DRILLING LOG

BCM

Well/Boring No.: TB-9

Project: Oxychem RI/FS

Sheet 7 of 7

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
286				sandstone: as above				
290				sandstone: very fine to fine grained, red very thinly bedded yield >100 gpm				
300				sandstone: as above				
				Bottom of boring				

AR302680

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: OxyChem RI/FS

Sheet 1 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Investigation

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks 12" borehole to 28'; 8" I.D. casing to 28'

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				Clayey Silt: trace fine sand, red brown, dry.				
5				clayey silt: trace very fine sand, red-brown, dry, moderately plastic				
10				clayey silt: as above				
11				gravel: 1/4-3/4", very well rounded, some silt and clay, little sand				
14				gravel: 1/8-1 1/2", little coars to fine sand, minor clay, wet				
17				gravel: as above, wet				
20				gravel: as above, wet				
20.5				sandstone and shale: fine grained, red, dry, weathered, bedrock				
24.5				sandstone and shale: as above				

AR302681

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: Oxychem RI/FS

Sheet 2 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
28				sandstone: very fine grained, competent.				
29				sandstone: very fine grained, dry, red-brown				
31				sandstone: as above, wet, yield 3-5 gpm				
33				sandstone: fine to medium grained, wet, grey-brown				
44				sandstone: fine to medium grained, wet, grey-brown, yield 5-7 gpm				
49				sandstone: fine to medium grained, wet, red-brown, yield 5-7 gpm				
52				sandstone: as above				
56				sandstone: as above, trace fine gravel				
61				sandstone: as above, no gravel, wet, red brown, yield 5-7 gpm				

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: Oxychem RI/FS

Sheet 3 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
64				sandstone: fine to medium grained, red-brown				
68				sandstone: fine grained, wet, red-brown, yield 10gpm				
74				sandstone: fine grained, wet, red-brown, yield 10gpm				
77				sandstone: fine grained, red-brown				
80				sandstone: as above yield 15gpm				
84				sandstone: as above, red-brown, yield 15gpm				
89				sandstone: as above, red-brown, yield 15 gpm				
94				sandstone: fine-grained, red-brown, yield 15-18gpm				
100				sandstone: as above				

AR302683

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: OxyChem RI/FS

Sheet 4 of 10

BCM Project No. 4064-13 Logged By: Date(s):

Well/Boring Location:

Drilling Method Drilling Contractor:

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
105				sandstone: fine grained red-brown, yield 15-18 gpm				
110				sandstone: fine to medium grained, trace fine very well rounded gravel				
115				sandstone: fine to medium grained, no gravel, red brown, yield 15-18 gpm				
120				sandstone: as above				
125				sandstone: as above, finer grained, yield 15-18 gpm				
130				sandstone: very fine grained, some siltstone red-brown, yield rate 15-18 gpm				
135				sandstone: as above				
140				sandstone: as above, red-brown, yield 20 gpm, soft				
145				sandstone: as above, yield 20-25 gpm				

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 5 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference:

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
150				sandstone: very fine grained, red-brown, trace calcite veining (1-2mm width), yield 20-25 gpm				
155				sandstone: very fine grained, red-brown, yield 20-25 gpm				
160				sandstone: very fine grained, red-brown, yield 20-25 gpm				
165				sandstone: as above				
170				sandstone: fine to medium grained, red-brown, yield to 25 gpm				
175				sandstone: medium to coarse grained, red-brown, yield 30-35 gpm				
180				sandstone: medium to coarse, red-brown, poorly cemented, yield 50-60 gpm				

AR302685

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 6 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
185				sandstone: medium to coarse grained, wet, red-brown, poorly cemented, yield 60 gpm				
190				sandstone: medium to coarse grained, light red-brown, poorly cemented, yield over 60 gpm				
195				sandstone: fine to very fine grained, and siltstone, red brown, yield over 60 gpm				
200				sandstone: very fine grained, wet, red-brown, yield over 80 gpm				
205				siltstone: and very fine grained sandstone, red-brown, yield 80-100 gpm				
210				siltstone: and very fine grained sandstone red brown, yield 80-100 gpm				

AR302686

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 7 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
215				Sandstone: very fine to fine grained, red-brown, yield over 100 gpm				
220				Siltstone and very fine grained sandstone, trace mica flakes, red-brown, trace calcite veinings, yield over 100 gpm				
225				Sandstone: medium to coarse grained, red-brown, yield over 100 gpm				
230				Sandstone and siltstone very fine grained, red-brown, yield over 100 gpm				
235				Sandstone: fine grained, red-brown, yield 100 gpm				
240				Sandstone: as above				
245				Sandstone: very fine grained, red-brown, yield 100 gpm				

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 8 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference: _____

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
250				sandstone: as above, yield over 100 gpm				
255				siltstone: red-brown, yield over 100 gpm				
260				sandstone: very fine grained, trace well rounded gravel, red-brown, yield 110-120 gpm				
265				sandstone: very fine grained, some silt, trace mica, yield 100-120 gpm				
270				sandstone: fine to medium grained, red-brown, yield 120 gpm				
275				sandstone: fine grained, red-brown, calcite veining, yield 120 gpm				
280				sandstone: fine to medium grained, red-brown, yield 120 gpm				

AR302688

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 9 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference:

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
285				sandstone: medium grained, red-brown, yield 120 gpm				
290				siltstone: some very fine grained sand, red-brown, yield 120 gpm				
295				siltstone: some very fine grained sand, red-brown, yield 120 gpm				
300				sandstone: very fine grained, red-brown, yield 120 gpm				
305				siltstone some very fine grained sand, red-brown, yield 120 gpm				
310				siltstone: as above				
315				sandstone: very fine grained, red-brown, yield 120 gpm				

AR302689

WELL DRILLING LOG

BCM

Well/Boring No.: TB-10

Project: _____ Sheet 10 of 10

BCM Project No. _____ Logged By: _____ Date(s): _____

Well/Boring Location: _____

Drilling Method _____ Drilling Contractor: _____

Depth to Groundwater: _____ Date: _____ Reference: _____

Elevations: Ground Surface: _____ Inner Casing: _____ Outer Casing: _____

Water Table: _____ Date: _____ Reference:

Remarks _____

DEPTH (ft)	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
320				sandstone: fine to medium grained, red-brown, yield over 120 gpm				
325				sandstone: fine to medium grained, red-brown, yield over 120 gpm				
330				sandstone: coarse grained, light purple-brown, poorly cemented, yield 150 gpm				
335				sandstone: as above, trace very well rounded medium gravel, yield 150 gpm				
340				sandstone: coarse to very coarse grained, trace fine gravel grey-brown, well cemented, yield 150 gpm				
345				sandstone: medium to coarse grained, grey-brown, well cemented.				
346				sandstone: fine grained, medium brown.				
350				Bottom of Boring				

AR302690

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OxyChem

Sheet 1 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/9-

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
0				Silty Clay: orange brown, some organic material				
5				Silty Clay: as above				
10				Silty Clay: as above				
15				Silty Clay: med. red brown				
20				Silty Clay: as above				
25				Silty Clay: as above, weathered rock @ 27'				
30				Shale: med. red brown, compet. rock @ 32'				
35				Shale: as above				

AR302691

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OXYCHEM

Sheet 2 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
40				Shale: med. red brown.				
50				Shale: as above				
60				Shale: as above				
70				Shale: as above				
80				Shale: as above, water @ 78'				
90				Shale: as above				
100				Shale: as above, gray brown, moist, 1/2 gpm @ 102'				
105				Shale: med red brown				

AR302692

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: DuPont

Sheet 3 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s):

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
110				Shale: as above				
120				Shale: as above				
130				Shale: as above				
140				Shale: med red brown, some gray brown				
145				Shale. med red brown				
150				Shale: as above, 1-2 gpm				
160				Sandstone: med. red brown, f. sand, micaceous				
170				Sandstone: as above				

AR302693

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OxyChem

Sheet 4 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/9 -

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
175				Sandstone: med. red brown, f.-med sand, micaceous, ~5gpm				
185				Sandstone · as above				
190				Sandstone: med red brown, f. sand				
200				Sandstone: as above, micaceous calcite				
210				Sandstone: as above				
220				Sandstone as above				
230				Sandstone: med red brown, med sand				
240				Sandstone: med red brown f. sand				

AR302694

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OXYCHEM

Sheet 5 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/91

Well/Boring Location: Pottstown

Drilling Method Comp. Air Hammer Drilling Contractor: Empire Soils Invest

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
250				Sandstone: med red brown, v.f. Sand, some weathered gray-brown sandstone.				
260				Sandstone: gray brown, med. sand ~10gpm				
270				Sandstone: med red brown, med. sand, weathered				
280				Sandstone: med. red brown, f. sand, gray brown s.s @ 285				
290				Sandstone: as above				
300				Sandstone: med red brown, f. sand				
310				Sandstone: as above				
315				Sandstone: med red brown, med sand calcite, weathered				

AR302695

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OxyChem

Sheet 6 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/4: –

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
320				Sandstone: as above				
325				Sandstone: med. red brown, f. sand, micaceous				
330				Sandstone: as above				
340				Sandstone: as above				
350				Sandstone: med. grey, med. sand				
355				Sandstone: med red brown, med. sand, some light grey med sandstone.				
360				Sandstone: as above				
370				Sandstone: med red brown, f. sand.				

AR302696

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OXYCHEM

Sheet 7 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/7/91 –

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
380				Sandstone. med. red brown, med. sand				
385				Sandstone: med red brown, f. sand, micaceous				
390				Sandstone: as above				
400				Sandstone: med red brown, f.-med sand				
410				Sandstone: med red brown, f. sand				
420				Sandstone: as above				
430				Sandstone: med red brown, med. sand, more water, ~20gpm total				
440				Sandstone: as above				

AR302697

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: Oxychem

Sheet 8 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/91

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
450				Sandstone: as above				
				water @ 455, ~30gpm total				
460				Sandstone: med. red brown, f. sand				
470				Sandstone: as above				
480				Sandstone: med red brown, med. sand, micaceous				
490				Sandstone: med red brown, f. sand micaceous				
500				Sandstone: as above				
510				Sandstone: light to dark grey, f. sand				
520				Sandstone: as above				

AR302698

WELL DRILLING LOG

BCM

Well/Boring No.: PW-1R

Project: OXYCHEM

Sheet 9 of 9

BCM Project No. 00-4064-13 Logged By: Dave Funk Date(s): 1/17/91 -

Well/Boring Location: Pottstown

Drilling Method Compressed Air Hammer Drilling Contractor: Empire Soils Invest.

Depth to Groundwater: Date: Reference:

Elevations: Ground Surface: Inner Casing: Outer Casing:

Water Table: Date: Reference:

Remarks

DEPTH	SAMPLE NO.	RECOVERY	BLOWS		GRAPHICAL LOGS: STRATA	GRAPHICAL LOGS: WELL CONSTRUCTION		ELEVATION
530				Sandstone: black, v.f sand				
535				Sandstone: as above				
540				Sandstone: black and light grey, f. sand				
550				Sandstone: as above Bottom of boring				

AR302699

BCM WELL DRILLING LOG			WELL NO: TB-1 (CORE)
			SHEET 1 OF: 13
PROJECT: OXYCHEM RI/FS POTTSTOWN PLANT			PROJECT NO.: 4064-13
WELL LOCATION: TANK FARM, APPROX 40' SW OF BR-B			DATE(S) DRILLED: 1/24/91 - 1/29/91
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATION, INC.			DRILLING METHOD: MOBILE B-61 WIRE LINE CORE
BORING DIAMETER: 4"	SAMPLING METHOD: WIRE LINE CORE		SAMPLE INTERVAL: 5 ft. barrel
LOGGED BY: EBS / DMW			TOTAL DEPTH: 405'
SCREEN SIZE AND MATERIAL: NA			SCREENED INTERVAL: —
CASING SIZE AND MATERIAL: NA			CASED INTERVAL: —
GRAVEL PACK SIZE: NA			PACKED INTERVAL: —
GROUT TYPE: 95% NEAT CEMENT; 5% BENTONITE			GROUTED INTERVAL: 0 - 405'
GROUTING METHOD: TREMIE			BENTONITE SEAL: —
DEVELOPMENT METHOD: NA	TIME: —		ESTIMATED YIELD: —
STATIC WATER DEPTH: —	DATE: —	REFERENCE: —	

REMARKS: 0-32' Drilled with hollow stem auger, 0-100' CORED then reamed to 8", 8" hole grouted, 100'-405' CORED (NOTE UPPER 100' NOT REPORTED ON THIS LOG)
BPF - Bedding Plane Fracture (OPEN) VF - Vertical Fracture (OPEN)

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY SPOON BLOWS (RQD)	RECOVERY	CLASSIFICATION OF MATERIALS
0-10'	—	CUTTINGS	—	Overburden: SILTY SAND - fine to v. fine sand, some clay and rnd. gravel, red-brown, dry.
10-32'	—	CUTTINGS	—	Weathered Bedrock: SILT, SANDSTONE AND SHALE Very fine grained sandstone, red-brown, dry
	—	CORE	—	
32'-32.5'	32-37'	24.2%	60"	SANDSTONE: medium - fine grained, red-brown @ 32.5' BPF @ 32.4-32.9 VF
32.5'-33'				SANDSTONE: Very fine grained, thinly laminated red-brown
33'-34.4'				SANDSTONE: Medium grained, cross-bedded, red-brown

WELL NO. TB-1 SHEET 2 OF

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
33.4'-35.1'				SILTSTONE AND SANDSTONE: Very fine grained, thinly laminated, red-brown
				BPF are 1 to 2" apart with mineralization along fracture surfaces
35.1'-36.3'				SANDSTONE: Medium-grained, red-brown
36.3'-37.0'				SANDSTONE: Very fine grained, red brown
				@ 36.3-36.6' VF oblique to core
37.0-39.7'	37'-42'	60%	60"	SANDSTONE: VF grained, red-brown, v competent
				BPF @ 39.3'
39.7'-40.7'				SILTSTONE: laminated with some VF sandstone weathered, bedding plane separations 0.1" apart, red-brown
40.7'-42.0'				SANDSTONE: Very fine grained, micaceous, thinly laminated calcite infilling
42.0'-47.3'	42'-47	78%	60"	SANDSTONE: Very fine grained, some silt, red-brown; very competent bedding plane separations at: 42.6', 43.6', 44.8'
				Calcite filled lamminations @ 42-42.3' and 46.7'
47.3'-48.6'	47'-52'	72.5%	60"	SILTSTONE: with some v. fine sand laminations some clay, trace calcite infilling along bedding plane separations @ 47.4', 47.8' and every 0.1" to 48.6'.
48.6'-48.8'				SANDSTONE: Coarse grained, red-brown
48.8'-58.6	52'-57'	75.0%	60"	SANDSTONE: Very fine grain sand, some silt very competent calcite filled oblique fract @ 50.1-50.5
				BPF @ 51.6', 53.7', 53.9'
				VF from 53.6'-54.9'
	57-62'	43.5%	60"	
58.6'-62'				SANDSTONE: Fine grained, some medium grained sand, red-brown.
				BPF @ 60.3' and 62.3'
				VF @ 57.2-58', 58.[illegible]
62'-63.3'	62'-64.75'	75%	32"	SANDSTONE: Fine-medium gr[illegible] siltstone
				rip-up clasts <1/8". BP[illegible] fracture @ 623'
				VF [illegible]

AR302701

WELL NO. TB-1 SHEET 3 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
63.3'-63.8'	62-64.75' (CONTINUED)			SANDSTONE AND SILTSTONE: thinly to thickly laminated v. fine sandstone and siltstone with irregular, small calcite infillings and calcite infilled v. fractures bedding plane separations .1' apart in lower .4'.
63.8'-64.75'				SANDSTONE: Fining-up sequence with v. fine sandstone at 63.8 to medium grained sandstone at 64.75'. Minor irregular calcite infill and calcite filled VF @ 64.7'
64.75'-66.15'	64.75'-66.15	79.4%	47"	SANDSTONE: Fine grained sandstone with trace siltstone lenses, red to red-brown @ 66-66.15' Vertical oblique fracture with yellow mineral/stain along fracture surface
66.15'-66.40'	66.15-71.0'	55.9%	59"	SANDSTONE; Fine grained, red.
66.40'-67.3'				SILTSTONE: Thinly laminated, brown-red, broken along bedding plane separations (0.5 to 1")
67.3'-68.6'				SANDSTONE: Fining up sequence with fine grained micaceous brown sandstone coarsening down to fine-medium grained sandstone vertical fracture with styrene odor @ 68.6'
68.6'-69.55'				SANDSTONE: fine grained w/ some silt laminations, with trace irregular voids/weathered patches possibly from bioturbation, broken along bedding plane separations in 2 to 3" pieces
69.55'-71.0'				SANDSTONE: fining up sequence from fine grained to medium grained sandstone @ 69.7-70.' Vertical fracture with fracture surfaces coated with cream to yellow-brown, gummy, substance 1/16" thick with sweet aromatic odor (Styrene?)
71.0'-75.8'	71.0-75.8'	69.3%	57.75"	SANDSTONE, fine to medium grained, micaceous red-brown with weathered hematite cemented pits (bioturbation?) @ 71.6 and 73.5' @ 73-73.3' Vertical oblique fracture with strong sweet aromatic odor, (fracture is discontinuous) @ 73.3' fibrous gummy coating on VF surface

AR302702

WELL NO. TB-1 SHEET 4 OF

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY SPOON BLOWS DESIGNATION	RECOVERY (in)	CLASSIFICATION
75.8'-76'	75.8-80.2'	9.4%	53"	SANDSTONE: v. fine grained, red
76'-77.4'				SANDSTONE: Fining up sequence with very fine sand at top with fine-medium sandstone at bottom of interval, weathered hematite/ sand lenses create soft spots in core @ 77.1-77.4' @ 76-77.4' VF, irregular, open fracture w/ strong sweet aromatic odor (note fract does not continue through the underlying siltstone, V.F. sandstone
77.4'-77.65'				SILTSTONE: Red-brown
77.65'-77.75'				SANDSTONE: Very fine sandstone, brown
77.75'-80.2'				SANDSTONE: Fining-up sequence: brown tan crossbedded V.F. sandstone 77.75-78. white cool tan thickly laminate F. sandstone @ 78.15-80.0' @ 77.75-80.0' VF, irregular, open
80.2'-80.5'	80.2-84'	41.3%	46"	SILTSTONE AND SANDSTONE: very fine sand, silty VF @ 80.5'-82' slightly weathered with some mineralization on surface
80.5'-83.6'				SANDSTONE, medium-grained, massive, brown-medium brown with scattered siltstone rip-up clasts @ 83.6' undulatory contact (cut and fill?) with underlying siltstone @ 83.5' discontinuous open, vertical fracture
83.6'-84'				SILTSTONE: Red brown
84'-85.2'	84'-88.7'	73.2%	56"	SILTSTONE AND SANDSTONE: thinly laminated v. fine sandstone and siltstone with calcite veins along laminations
85.2'-86.4'				SANDSTONE: fine grained, thickly laminated (1/4-1/ tan-grey, bedding plane fractures (BPF) @ 85.8' and 86.2' with some mineralization uneven contact with underlying siltstone
86.4'-87.9'				SILTSTONE: rip-up clasts [illegible] 3in

WELL NO. TB-1 SHEET 4 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY SPOON BLOWS DESIGNATION	RECOVERY (in)	CLASSIFICATION
75.8'-76'	75.8-80.2'	9.4 %	53"	SANDSTONE: v. fine grained, red
76'-77.4'				SANDSTONE: Fining up sequence with very fine sand at top with fine-medium sandstone at bottom of interval, weathered hematite/ sand lenses create soft spots in core @ 77.1-77.4' @ 76-77.4' VF, irregular, open fracture w/ strong sweet aromatic odor (note fract does not continue through the underlying siltstone, VF. sandstone
77.4'-77.65'				SILTSTONE: Red-brown
77.65'-77.75'				SANDSTONE: Very fine sandstone, brown
77.75'-80.2'				SANDSTONE: Fining-up sequence: brown to tan crossbedded V.F. sandstone 77.75-78.15' white and tan thickly laminate F. sandstone @ 78.15-80.0' @ 77.75-80.0' VF, irregular, open
80.2'-80.5'	80.2-84'	41.3 %	46"	SILTSTONE AND SANDSTONE: very fine sand, silty VF @ 80.5'-82' slightly weathered with some mineralization on surface
80.5'-83.6'				SANDSTONE, medium-grained, massive, brown-medium brown with scattered siltstone rip-up clasts @ 83.6' undulatory contact (cut and fill?) with underlying siltstone @ 83.5' discontinuous open, vertical fracture
83.6'-84'				SILTSTONE: red brown
84'-85.2'	84'-88.7'	73.2 %	56"	SILTSTONE AND SANDSTONE: thinly laminated v. fine sandstone and siltstone with calcite veins along laminations
85.2'-86.4'				SANDSTONE: fine grained, thickly laminated (1/4-1/8") tan-grey, bedding plane fractures (BPF) @ 85.8' and 86.2' with some mineralization uneven contact with underlying siltstone
86.4'-87.9'				SILTSTONE: rip-up clasts of siltstone with v. fine sandstone matrix, red-brown

WELL NO. TB-1

SHEET 5 OF

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
87.9' - 88.7'	84' - 88.7' (CONTINUED)			SANDSTONE AND SILTSTONE: very fine sandstone laminated with siltstone, siltstone rip-up clasts in sandstone matrix, flame and boudinage structures
88.7' - 88.9'	88.7 - 93.2'	100 %	47"	SILTSTONE: Brown siltstone to v. fine sandstone BPF @ 88.9' with mineralized surfaces
88.9' - 89.1'				SILTSTONE: intraformational conglomerate of rounded to subrounded silstone rip-up clasts in v. fine to fine sandstone matrix.
89.1' - 89.8'				SANDSTONE: very fine to fine grained, grey-brown to brown, calcite filled v. fractures BPF @ 89.8' with mineralized surfaces
89.8' - 93.2'				SILTY SANDSTONE: very fine grained and silty sandstone grading to very fine grained grey-brown sandstone @ 89.8-91' tan, irregular, weathered fine sandstone lenses BPF @ 90.8', 91.2', 91.7' VF @ 90.8-91.1 w/ green mineralized surfaces. Calcite filled VF @ 92'
93.2 - 97'	93.2-97'	56.5 %	46"	SANDSTONE: massive, fine grained, red Two sets of VF @ 93.7-94.8' and @ 94.2-94.6'
				95-105' CORE
95.5-99.8'	95.5-105.5'	80 %	120"	SANDSTONE: fine grained, grey, thickly laminate to massive and bioturbated VF @ 97.4' open BPF @ 96.5' and 97.9'
99.8' - 102.8'				SILTSTONE AND SANDSTONE: interbedded siltstone and very fine sandstone, thinnly laminated to massive, bioturbated
102.8' - 105.5'				SANDSTONE: fine grained grey with 1-2 shale/siltstone interbeds, flame structure @ base VF @ 102.8 - 103.2' partially calcite cemented VF @ 105 - 105.5' open
105.5 - 105.7	105.5-115.5	76.7 %	120"	SAME; VF continues 105.5-105.7

AR302705

WELL NO. TB-1 SHEET 6 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
105.7'-107.6'	105.5'-115.5' (continued)			SANDSTONE: medium grained, dk grey-brown, mottled, porous appearance, bioturbated
107.6'-109.2'				SANDSTONE: fine grained, grey, HORIZONTAL WTHRD ZONE @ 108.4', BPF @ 108.9', 109.2'
109.2'-111.4'				SILTSTONE AND SANDSTONE: interlayered siltstone and very fine sandstone, with sandstone pull-aparts and bioturbated zone @ 111' red-brown to red
111.4'-115.6'				SANDSTONE: fine to very fine grey to red brown with few siltstone interlayers
115.6'-122.7'	115.5-125.5'	77.5%	120"	SAME AS ABOVE: 0.5-1.0' thick grey very fine sandstone interbedded with thinly laminated red siltstone
122.7'-123.65'				SANDSTONE: fine to medium grained, porous looking, grey-brown
123.65-123.8'				SILTSTONE: thinly laminated, red-brown
123.8-124'				SANDSTONE: fine to very fine, luminated grey to dk grey, fining downwards BPF @ 124'
124.0'-124.6'				SILTSTONE and SHALE: Grey-brown, malachite along BPF @ 124', 124.6' with dendritic black mineral in siltstone/claystone matrix above calcite filled BPF.
124.6-126.6	125.5-135.5	75%	120"	SANDSTONE: fine grained gray sandstone (0.1') underlain by 1.9' of very course grained sandstone - white quartz grains in yellow siltstone/clay matrix with occasional grey shale rip-up clasts at bottom.
126.6'-127'				SANDSTONE: very fine to fine grained, gray, thinnly laminated with grey siltstone at top and red-grey very fine grained sandstone at bottom.
127'-130'				SANDSTONE: very fine to fine grained with occasional silty sand, thinly laminated to bioturbated, medium red-brown BPF @ 128.75'

WELL NO. TB-1 SHE[illegible]

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (in)	CLASSIFICATION
130'-133.4'	125.5-135.5 (continued)			SILTSTONE AND SHALE: thinly laminai medium red-brown, bioturbated yellow brown mottles, calcite vein bedding planes @ 1/2-1" interva BPF @ 132.2, 132.65', 133.2' VF @ 130'
133.4'-135'				SANDSTONE: very fine, massive, biotur vertical calcite filled fracture, med re VF @ 133.4 and 135
135'-136.3'	135.5-145.5	82.1%	120"	SANDSTONE: fine grained, laminated to grey-red where silty.
136.3'-139'				SANDSTONE: fine grained, thinly to thickly grey to reddish-grey, with calcit VF @ 137' (tight) and 137.9' (open) BPF @ 136.8'
139'-141'				SANDSTONE: very fine grained, silty, re BPF @ 139.2', 140.3', 141'
141-145.5'	145.5'-154.8	95.5%	112	SANDSTONE: very fine to fine grained, silty than above S.S., red-brown VF calcite filled @ 143', 143.5'
145.5-149.2'				SANDSTONE: fine grained, porous appea grey-brown - red brown, thickly 0.1' of grey fine sandstone at BPF @ 146.4', 146.9', 147.6', and
149.2'-150.4'				SILTSTONE: with v fine sand, biotur medium red-brown. BPF 148.9' VF 150.2 - 150.9'
150.4'-153.5'				SANDSTONE: very fine grained, silty increasing silt towards bottom of inter BPF: 151.6-152.7', 153' VF: 151.4 - 151.6'
153.5-165.8	154.8-165.2	NA	125"	SANDSTONE: fine grained, red-brown [illegible] 155.6-155.8 bioturbated sandstone VF @ 153.6-154.1 (mineralized/weathere VF @ 155.6-155.8' 157.1-157.4, 163.1-163.4, 163.6-163.9' BPF @ 165.2; 163 [illegible]

WELL NO. TB-1

SHEET 8 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	~~SPOON BLOWS~~ ROCK QUALITY DESIGNATION	RECOVERY (in)	CLASSIFICATION
165.8 - 172.2	165.2'-175.2'	59.2%	120"	SANDSTONE: fine grained, porous appearance thickly laminated to massive, grey brown BPF: @ 165.9', 167.5, 169.5', 169.8', 170.8' VF: @ 166.3, 167, 166.8, 168.4, - 168.1, 170.3'
172.2' - 178'	175.2 - 185.1'	85.7%	119"	SANDSTONE: very fine grained, thinly laminated with bioturbated siltstone zones @ 172.3', 174', 175.2', 176.3', 177.5' grey to red-brown VF @ 173.6' (tight), 177.2' BPF @ 172.2 and 172.3' Clay filled BPF @ 174.5, 177.4, and 172.2'
178' - 180.75'				SANDSTONE: fine grained, slightly porous appearance, brown with occasional siltstone lense (rip-up clast?) VF: 178.2, 180.4 - 180.8' BPF: 178.9, 179, 179.3, 179.8
186.75 - 185.8	185.1 - 195	81.5%	119"	SANDSTONE: very fine, silty, bioturbated and thinly laminated, medium red-brown VF @ 181. - 182.3 calcite filled @ 185.8' vertical fract. stops at below silt
185.8 - 186'				SILTSTONE: red, thinly laminated thin calcite veins along bedding planes
186' - 187.7'				SANDSTONE: fine grained, micaceous, thin-bedded to massive, med. red-brown
187.7 - 196.8	195 - 205	89.2%	120"	SANDSTONE: fine grained, alternating layers (.4' - 1.2') of thinly laminated grey and red-brown sandstone. Numerous calcite filled vertical and bedding plane fractures, BPF @ 191.5, 192.3, 193.2, 194.6, 196.1, 194.9. VF @ 191.5 - 192.3' calcite filled
196.8 - 198.5'				SANDSTONE: very fine grained, silty, thinly laminated with siltstone/shale at the top of the interval, calcite filled fracture @
198.5 - 200'				SILTSTONE/SHALE: with little v. fine grained sand, red-brown, BPF @ 199' BPF: clay filled fractures @ 199.38

AR302738

WELL NO. TB-1 SHEET 9 OF [illegible]

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
200'-203.1'	195-205' (continued)			SANDSTONE: very fine grained, silty in lower 1/2 of interval, red-brown VF @ 200.4-200.7'
203.1-205'				SILTSTONE / SHALE: Thickly laminated, calcite filled bedding planes in lower 1.5', brown - dark red-brown BPF: @ 205' (clay filled?)
205'-207.5'	205-215'	81.7%	120"	SANDSTONE: very fine to fine, silty, red-brown bioturbated BPF @ 205.8' (mineralized)
207.5-214.5'				SANDSTONE: fine grained, thickly to thinly laminated some siltstone laminae/lenses bioturbated 210-211.2', grey to red-brown cross-bedded 211.5-214.5' BPF @ 210' VF @ 211.2 (partially cement.)
214.5-214.7'				SILTSTONE: laminated with fine sandstone red-brown
214.7'-216.6'	215-225'	55.8%	120"	SANDSTONE: fine grained, grey-brown, massive (bioturbated) to thinly laminated BPF @ 215.5' @ 216.8' small brown crystals on surface
216.6-217.6'				SILTSTONE: w/ little very fine sandstone red brown, Calcite filled BPF @ 216.8'
217.6-219.5'				SILTSTONE / SHALE: thinly laminated red brown
219.5-220.2'				SANDSTONE: fine grained, thinly laminated, grey
220.2'-222.2				SANDSTONE: fine grained, porous appearance brown, grey-brown, massive, micaceous VF 221.4-222.2 (mineralized surfaces) (highly fractured)
222.2-222.5'				SILTSTONE: intraformational breccia of angular to sub-rounded siltstone rip-up clasts in very-fine to fine grained sandstone matrix grey-brown-red-brown
222.5-222.8'				SANDSTONE: thinly laminated fine grained grey-brown, VF 224.5-224.8 (calcite)

WELL NO. TB-1 SHEET 10 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
222.8-223.4	215-225' (continued)			SANDSTONE: fine to very fine, grey.
223.4-229.4	225-235'	73.3%	120"	SANDSTONE: very fine, silty, horizontal BPF filled w/ calcite in upper 0.5', bioturbated to thinly laminated, micaceous, red-brown BPF @ 224.2', 229.1' (calcite filled)
229.4'-231.8'				SANDSTONE: fine grained, thinly laminated BPF @231.8' w/ calcite crystals on surface VF calcite filled 229.4-231.8'
231.8-232.6'				SANDSTONE: v. fine grained, silty, red-brown bioturbated, calcite filled BPF
232.6'-236.3'	235'-245	64.2%	120"	SANDSTONE: fine grained, thinly laminated to thin bedded, calcite filled v. fracture @ 234.8' partly open, grey-brown VF @ 235.5-236.3' (open)
236.3-238.3'				SANDSTONE: fine grained, porous appearance, massive to thickly laminated, med. red-brown BPF: throughout interval on 1-3"
238.3'-238.7'				SILTSTONE: intraformational breccia of red-brown siltstone rip-up clasts in a fine, grey sand matrix.
238.7'-240.3'				SANDSTONE: silty, very fine grained red, brown. calcite filled VF @239.5'
240.3-243.7'				SILTSTONE: thinly laminated, some bioturbation red-brown, calcite filled BPF in lower 2/3 of interval, BPF @ 243.7' clay-filled?
243.7-248.3'	245-255	75.0%	120"	SANDSTONE: very fine-fine grained, silty, bioturbated, red-brown. BPF @ 244', 244.2', and 245.5'
248.3'-256.8'	255-265	80.8%	120	SANDSTONE: fine grained, grey, interbeds of very fine, red-brown sandstone. porous appearance 251.5-255' Numerous calcite cemented bedding planes some partially dissolved/calcite crystals BPF @ 250, 250.3', 25[illegible] + calcite xtal 254.6-254.7, 255.5 VF @ 252.1, 254

WELL NO. TB-1 SHEET 11 O[redacted]

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
256.8'-267.5'	255-265			SANDSTONE: very fine grained, silty,
	(Continued)			thinly laminated to bioturbated
	265-275'	68.35%	120"	VF calcite filled @ 261.4', 261.8', 266', 267.[illegible]
				BPF calcite filled @ 262.9'
267.5-271.6'				SILTSTONE/SANDSTONE: very fine sandstone,
				thinly laminated occasional fine
				sandstone lenses, red brown
				BPF calcite filled
				VF @ 272' (yellow mineral), 271.2' (calcite)
271.6-272.3'				SANDSTONE: very-fine, red brown
272.3-277.3	275-285	92.6%	120"	SANDSTONE: fine grained, grey to red-brown
		(4.3' continuous carbonate		porous appearance and red-brown 273.7-276.1'
		core 278.4-282.7")		VF @ 272.4, 275.0, 275.8' (calcite fill[redacted]
277.3-278.6'				SILTSTONE: thinly laminated, calcite veining
				along BPF., red-brown BPF @ 278.6'
278.6'-290.8	285-295'	92.6%	120"	SANDSTONE: very fine grained, silty,
				bioturbated to massive, micaceous
				red-brown. VF calcite filled @ 283.7-285'
				BPF @ 284.2' calcite filled
290.8-307.5'	295-305'	72.5%	120"	SANDSTONE: fine grained, thin-bedded to
				massive, grey with interbeds of
				medium grained sandstone with
	305-315'	92.6%	120"	porous appearance @ 295.8, 299.2-301'
				302.6-303.6', rip-up clasts and
				siltstone lense at bottom
307.5-308'				SANDSTONE: fine-very fine, silty,
				thinly laminated, red-brown
308-308.7'				SANDSTONE: fine grained, grey, thinly
				laminated, siltstone rip up clasts at base
308.7-309'				SANDSTONE: very fine-fine, silty, red-b[redacted]
309-315.4'				SANDSTONE: fine grained, massive, grey
				porous appearance 310.6-312', 314.2-314.5' and
				315.2-315.5'
				VF @ 311.2' (light). 313.1' [illegible]

AR302711

WELL NO. TB-1 SHEET 12 OF: 13

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	ROCK QUALITY ~~SPOON BLOWS~~ DESIGNATION	RECOVERY (in)	CLASSIFICATION
315.4-318.3'	315-325	78.3%	120"	SANDSTONE: medium grained, porous appearance, grey, grey-brown BPF @ 317.3', 318.1'
318.3-318.9'				SANDSTONE: fine grained coarsening down to medium grained at bottom of interval, grey.
318.9-319.4'				SILTSTONE: with very fine sandstone, thinly laminated, red-brown
319.4-320.3'				SANDSTONE: fine grained, thinly laminated slight porous appearance, grey.
320.3-324.1'				SANDSTONE: fine to medium grained, porous appearance (320.3-321.3') and (322.5-323.5') massive, grey. VF two sets @ 320.3-321.4'
324.1-328.1				SANDSTONE: fine to medium sandstone, within fining-up sequences w/ rip-up siltstone clasts
	325-335'	40.8%	61"	at base thinly laminated to massive, grey.
	NOTE: RECOVERY	CORE BLOCK YIELDED POOR AND REDUCED	RDQ.	VF @ 326-326.4 and 327.9 both partially cemented
328.1-342.3				SILTSTONE: thinly laminated to massive (bioturbated?)
	335-340.3'	81.6%	60"	w/ white blebs of ? calcite? - rooted zone?
	NOTE:	5' CORE RUN		especially from 339.4-340.3', red-brown
342.3-353.8'	340.3-345.5'	100%	62"	SANDSTONE: very fine, silty, thinly laminated, - wavy laminations, dewatering structures
	345.5-355.7'	79.5%	122"	bioturbated, red-brown
				VF: 350.5 (light) 348.6-356.7 (calcite filled)
353.8'-360.5				SANDSTONE: fine to very fine, grey to red-brown,
	355.7-365.5	66.9%	118"	thinly laminated to cross-bedded, porous appearance @ 356.7-357.2 and 360-360.5'
				VF: 358.2-358.8 (partially cemented), 360-360.5'
				VF: 353-356.7 (calcite filled)
360.5-362.9'				SANDSTONE: fine to medium, slight porous appearance with siltstone interbed / lense @ 361-361.5', generally massive, brown-red brown
				BPF: 360.5 (yellow mineral), 360.9, 362-362.5
362.9-363.5'				SANDSTONE: fine grained, thinly laminated, grey w/ intraformational breccia of siltstone clasts in fine sandstone matrix grading to very fine sandstone - red to red-brown

WELL NO. TB-1 SHEET 13 OF:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	~~SPOON BLOWS~~ ROCK QUALITY DESIGNATION	RECOVERY (in)	CLASSIFICATION
363.5'-369.3'	355.7'-365.5			SANDSTONE: very fine grained, bioturbated,
	(continued)			red-brown, thinly laminated to massive
				VF calcite filled @ 365.3, 365.8, 366.8
369.3-377'	365.5-375.5	61.7%	120"	SANDSTONE: fine grained with interbeds of
				fine-medium grained w/ porous appearance
				@ 371.4, 371.9, 373.2-373.5, 374.1-375
				and siltstone interbeds @ 371, 372.1, 372.5
				373', 373.7 that are approximated 0.2' thick
				sandstone is grey-brown to grey.
	375.5-385.5	67.5%	120"	VF (open) 370.6-370.8, 371.2-372.2,
				373.7-374.4' (terminate mostly @ siltst.)
377-378.2'				SILTSTONE/SANDSTONE INTRAFORMATIONAL BRECCIA:
				yellow-brown siltstone clasts, sub-rounded
				in red-brown siltstone and v. fine sandstone
				matrix separated by thinly laminated
				siltstone layers 0.4-0.1' thick.
				VF @ 377.5 calcite filled
378.2-382.4				SANDSTONE: very fine grained, silty, red-brown
				bioturbated, w/ siltstone lense @ 380.3-380.5'
382.4-385.4	385.5-395.5	84.2%	120"	SANDSTONE: very fine to fine grained, grey to grey-brown
				VF: 384.5 (partially open), 385.2 (open), 385.5 (tight)
				BFF: 385' w/ yellow mineralized fractures
385.4-386.1				SANDSTONE: fine grained, porous appearance,
				red-brown, VF: 385.5-385.7 (tight)
386.1-403.8	395.5-400.5	80%	60"	SANDSTONE: fine to very-fine grained, silty
NOTE:	5 foot core run			thinly laminated, red brown with
				alternating thin beds of siltstone and
				very fine silty sandstone.
	400.5-405	83.3	90"	
				Calcite filled VF: 387.7-388.2 (opposing sets)
				395.-395.7, 396.2-396.4, 398.8-400'
				Partially open VF: 396.3, 397, 399'
403.8				END OF CORE

BCM

DOWNHOLE CAMERA LOGS

Name of Client: OCCIDENTAL CHEMICAL CO-4064-13 Sheet Number 1 of 7

Project: POTTSTOWN FACILITY TB-1 Logged By: DMW/EBS

DEPTH	CASING/ WATER LEV.	FRACTURES: VERT.	FRACTURES: HOR.	FRACTURES: CLOSED	FRACTURES: TIGHT	FRACTURES: OPEN 1/4"	FRACTURES: OPEN 1/2"	FRACTURES: OVER 1/2"	BOREHOLE SURFACE: LG. IRR. CREV.	BOREHOLE SURFACE: SM. IRR. CREV.	BOREHOLE SURFACE: CREV-2 SIDE	BOREHOLE SURFACE: CREV-1 SIDE	BOREHOLE SURFACE: BLOCKY SIDES	BOREHOLE SURFACE: JT. PLANE	BOREHOLE SURFACE: UNDULAT.	BOREHOLE SURFACE: ROUGH	BOREHOLE SURFACE: SMOOTH	BOREHOLE SURFACE: V. SMOOTH	BOREHOLE SURFACE: V. ROUND	SHAPE: OBLONG	SHAPE: SEMICIRC.	SHAPE: RECT.	SHAPE: SQUARE	ROCK TYPE: CONGLOMERATE	ROCK TYPE: SANDSTONE	ROCK TYPE: SILTSTONE	ROCK TYPE: SHALE	NOTES
																												8" steel casin
																												0-22' tem
																												0-100' perman
10																												
20																												
															X				X									
															X				X									
			X		X										X				X									@28' some cascadi
30		X	X		X	X									X				X									water, wets side
			X		X	X						X			X				X									of bore hol
			X										X		X				X									
		X	X		X	X							X		X				X									
		X	X		X	X							X		X				X									
			X										X		X				X									
40		X	X												X	X			X									@39-41 V fract
		X									X								X									@42-43 v. fract
			X		X						X								X									
			X		X						X								X									
															X	X			X									@45' walls left rough
															X	X			X									and less fractured
															X	X			X									@47' core hole. visibe
50			X		X										X				X									
			X		X										X				X									@50' calcite
		X				X					X								X									@52-54 vertical
		X	X			X				X	X								X									@55' open vertical
	▼	X									X								X									@58' water level with
																												possibly floating pack
60															X				X									
		X			X										X				X									@61-66 vertical fract
		X			X	X				X		X						X										@68' rock color change
		X			X	X				X		X			X													white subst. fills fractur
															X				X									
															X				X									
70													X															
		X			X	X																						@72-76 open dark ppt.
		X			X	X					X				X				X									growth assoc. w/ fracture
		X				X					X								X									@75-77
																			X									AR302711
															X				X									
80		X			X										X				X									@80' V. open fract.

BCM

DOWNHOLE CAMERA LOGS

Name of Client: OCCIDENTAL CHEMICAL 00-4064-13 Sheet Number 2 of 7

Project: POTTSTOWN FACILITY TB-1 Logged By: DMW / EBS

DEPTH	CASING/ WATER LEV.	FRACTURES: VERT.	FRACTURES: HOR.	FRACTURES: CLOSED	FRACTURES: TIGHT	FRACTURES: OPEN 1/4"	FRACTURES: OPEN 1/2"	FRACTURES: OVER 1/2"	BOREHOLE SURFACE: LG. IRR. CREV.	BOREHOLE SURFACE: SM. IRR. CREV.	BOREHOLE SURFACE: CREV. 2 SIDE	BOREHOLE SURFACE: CREV. 1 SIDE	BOREHOLE SURFACE: BLOCKY SIDES	BOREHOLE SURFACE: JT. PLANE	BOREHOLE SURFACE: UNDULAT.	BOREHOLE SURFACE: ROUGH	BOREHOLE SURFACE: SMOOTH	BOREHOLE SURFACE: V. SMOOTH	SHAPE: V. ROUND	SHAPE: OBLONG	SHAPE: SEMICIRC.	SHAPE: RECT.	SHAPE: SQUARE	ROCK TYPE: CONGLOMERATE	ROCK TYPE: SANDSTONE	ROCK TYPE: SILTSTONE	ROCK TYPE: SHALE	NOTES
		X	X		X	X									X	X			X									@80-83 H. fract open
			X												X	X			X									@84 V. fracture
		X			X											X			X									
																				X								
		X										X	X		X				X									@87' natural.
																X			X									
90																												
																X			X									@91 calcite veins
																X			X									
																X			X									@95 calcite veins
																X			X									
															X				X									
100																												
		X			X	X						X				X			X									@101' V. fracture
			X		X																							@103' Bottom of Hole
		X	X		X										X													@106' observed flowing
			X									X																water
		X													X													
110																												
			X													X												
			X												X	X												
			X			X									X	X												
			X													X												
																X												
120																X												
																X												
			X												X	X												
			X												X	X												
			X													X												
															X													
			X												X	X												
130																												
		X	X									X			X	X												
															X													
																X												
																X												
140		X		X												X												
			X									X			X	X												
		X													X													
		X													X													
		X													X													
150															X													
			X									X			X													
			X									X			X													
																X												
																X												
																X												
160			X		X											X												

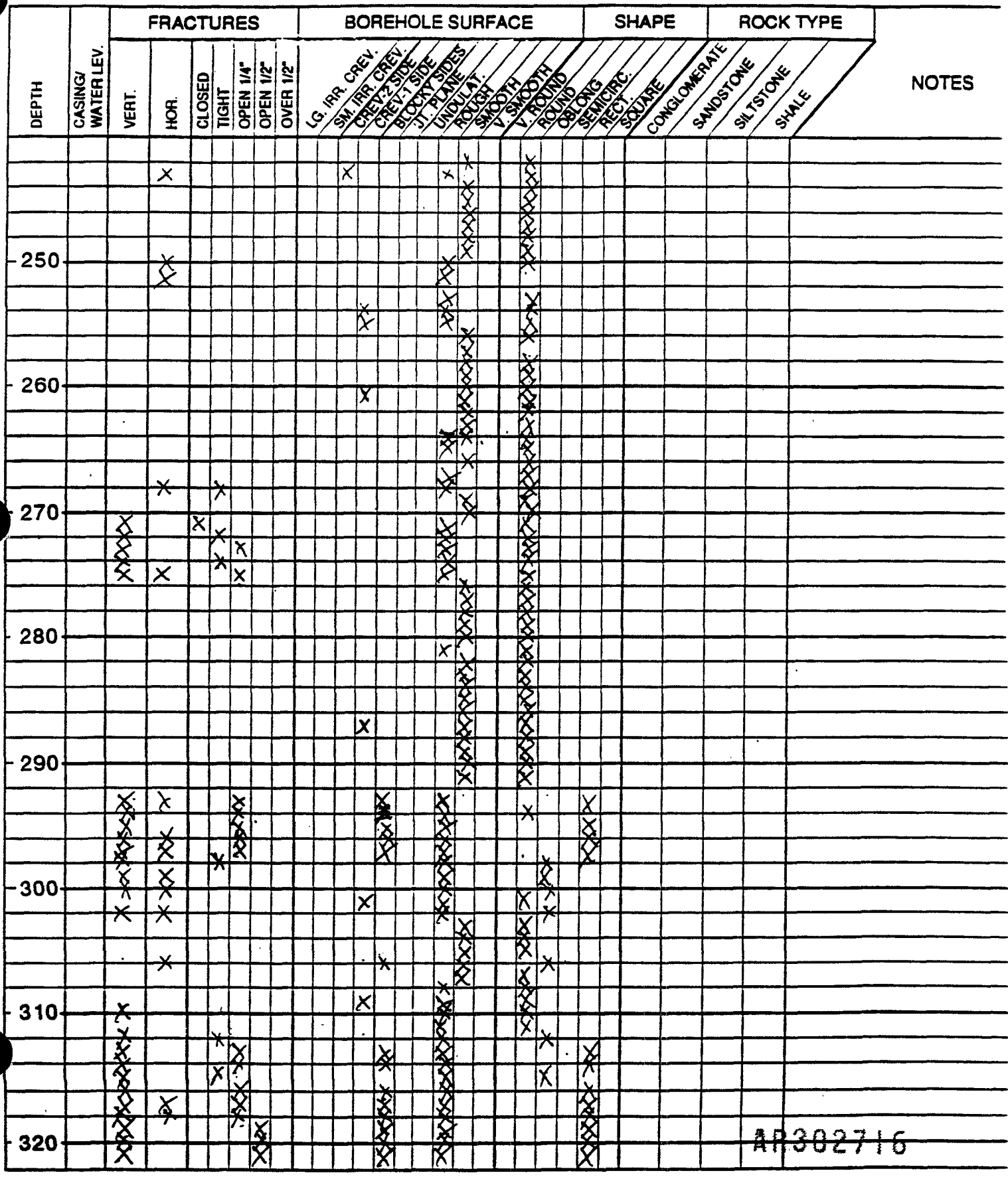
AR302715

BCM

DOWNHOLE CAMERA LOGS

Name of Client: OCCIDENTAL CHEMICAL 00-4064-13 Sheet Number 4 Of 7

Project: POTTSTOWN FACILITY TB-1 Logged By: DMW/ERS



AR302716

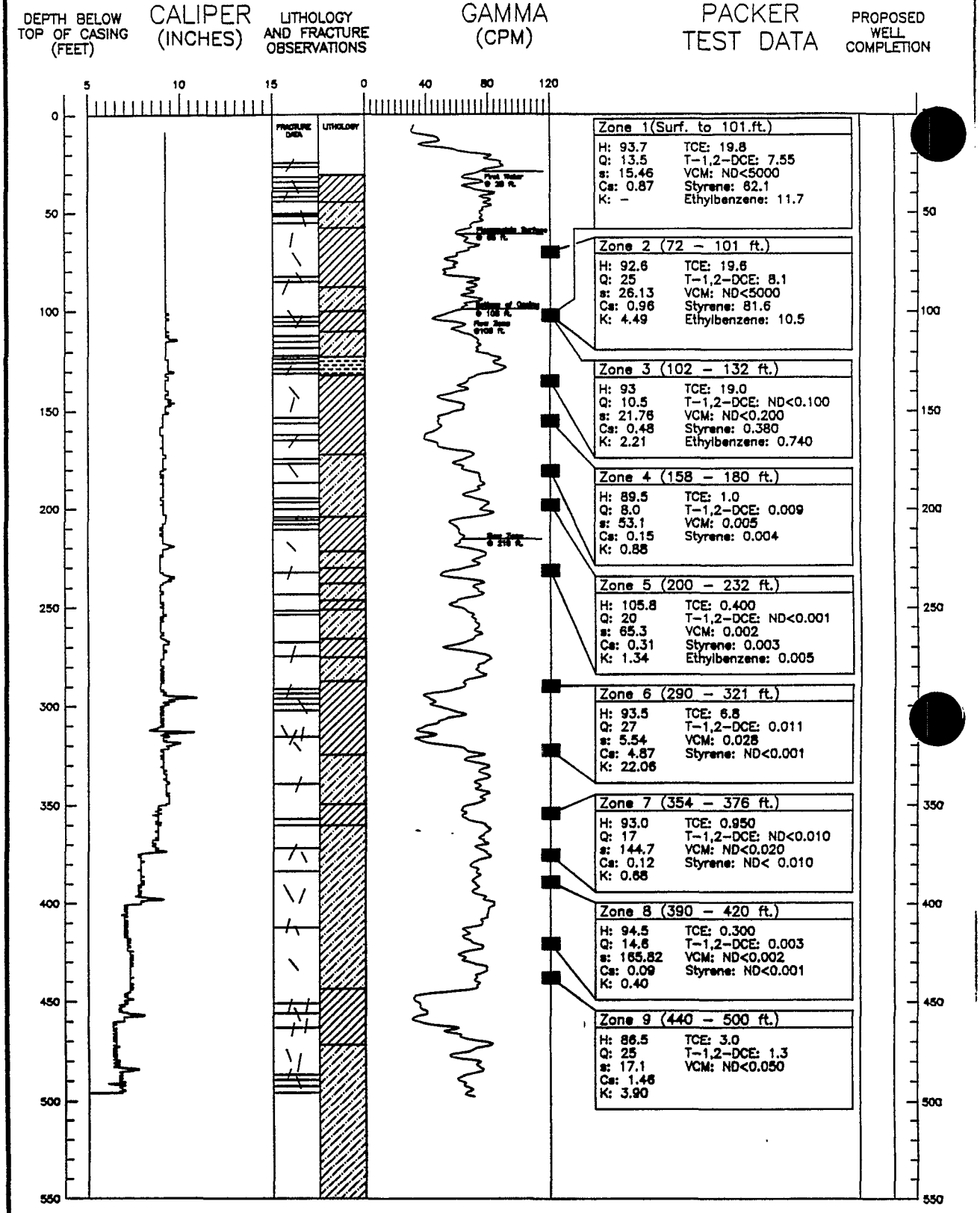


Figure 3.1

Occidental Chemical Corporation

TB-1 Borehole Data Graphic

Interim Report

AR302717

BCM WELL DRILLING LOG

WELL NO:	PW-1R
SHEET 1 OF: 3	
PROJECT: OXY CHEM - POTTSTOWN	PROJECT NO.: 00-4064-13
WELL LOCATION:	DATE(S) DRILLED: 1/17/91 -
DRILLING CONTRACTOR: Empire Soil Investigation	DRILLING METHOD: Air Rotary
BORING DIAMETER: / SAMPLING METHOD: CUTTINGS	SAMPLE INTERVAL: 10'
LOGGED BY:	TOTAL DEPTH: 550'
SCREEN SIZE AND MATERIAL:	SCREENED INTERVAL:
CASING SIZE AND MATERIAL: 8" STEEL	CASED INTERVAL: +2 - 37
GRAVEL PACK SIZE:	PACKED INTERVAL:
GROUT TYPE:	GROUTED INTERVAL: 0-37'
GROUTING METHOD: TREMIE	BENTONITE SEAL:
DEVELOPMENT METHOD: COMPRESSED AIR / TIME:	ESTIMATED YIELD:
STATIC WATER DEPTH: / DATE:	REFERENCE:

REMARKS: WEATHERED BEDROCK ENCOUNTERED AT 27' B.G. Competant BEDROCK at 32'. DRILLED 5' INTO COMPETANT BEDROCK TO 37'.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION OF MATERIALS
0				Silty Clay, orange brown, some organic material
5				SAME
10	10			SAME
15				Silty Clay, med. red brown
20	20			SAME
25				SAME WEATHERED ROCK at 27'
30	30			Shale, med red brown, competent rock @ 32'
35				SAME
40	40			Shale, med. red brown
45				SAME
50	50			
55				
60	60			
65				
70	70			
75				
80	80			SAME / MOIST CUTTINGS @ 78' WATER

AR302718

BCM

WELL DRILLING LOG

WELL NO: PW-1

SHEET OF:

PROJECT: OXY CHEM, POTTSTOWN PA	PROJECT NO.:
WELL LOCATION: PARKING AREA	DATE(S) DRILLED: 1/15/91
DRILLING CONTRACTOR: EMPIRE SOILS INVESTIGATION	DRILLING METHOD: AIR ROTARY
BORING DIAMETER: 7 7/8" / SAMPLING METHOD: CUTTINGS	SAMPLE INTERVAL: 10'
LOGGED BY: DAVE FUNK	TOTAL DEPTH: 550'
SCREEN SIZE AND MATERIAL:	SCREENED INTERVAL:
CASING SIZE AND MATERIAL: 8" & 10" ? 0 - 42'	CASED INTERVAL:
GRAVEL PACK SIZE:	PACKED INTERVAL:
GROUT TYPE:	GROUTED INTERVAL:
GROUTING METHOD:	BENTONITE SEAL:
DEVELOPMENT METHOD: TIME:	ESTIMATED YIELD:
STATIC WATER DEPTH: / DATE:	REFERENCE:

REMARKS: Depth 387' go to 550'

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION OF MATERIALS
0-400'				OPEN BORE
405				Sandstone, med red brown, v.fine sand,
410				SAME
415				SAME
420				SAME
425				SAME HARDER
430				Sandstone, med red brown, v.fine sand, micaceous
	BOTTOM OF HOLE			
				TOO close to property line

AR302719

WELL NO. PW-1R

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (in)	CLASSIFICATION
85				
90	90			Shale, med red brown
95				SAME
100	100			SAME
110				Shale, grey brown, moist / ~ ½ gpm @ 102'
115	110			Shale, med. red brown
120	120			SAME
125				SAME
130	130			SAME
135				
140	140			SAME
145				Shale, med red brown, some grey brown
150	150			Shale, med. red brown
155				SAME 1-2 gpm
160	160			SAME
165				Sandstone, med red brown, f. sand, micaceous
170	170			SAME
175				SAME
180	180			Sandstone, med red brown, f-med sand ~ 5 gpm, micaceous
185				SAME
190	190			SAME
195				Sandstone, med red brown, f. sand
200	200			SAME
205				SAME, micaceous, calcite
210	210			Sandstone, med red brown, f. sand
215				Same
220	220			Same
225				SAME
230	230			SAME
235				Sandstone, med red brown, med sand
240	240			SAME
245				Sandstone, med. red brown, fine sand
250	250			SAME
255				Sandstone, med red brown, v. f sand, some weather grey-brown sandst
260	260			SAME
265				Sandstone, grey brown ~10 gpm, med sand
270	270			SAME
275				Sandstone, med red brown, weather med
280	280			SAME
285				Sandstone, med red brown, f. sand
290	290			SAME, w some grey brown sandstone
295				SAME
300	300			SAME
305				Sandstone, med red brown, f. sand
310	310			SAME
315				SAME
320	320			Sandstone, medium red brown, med sand, calcite weathered
				SAME

WELL NO. PW-1R

SHEET 3 OF 3

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (in)	CLASSIFICATION
325				Sandstone, med red brown, fine sand, micaceous
330	330			SAME
335				
340	340			
345				SAME
350	350			Sandstone, med gray, med sand
355				Sandstone, med red brown, med sand, some light gray med sand
360	360			SAME
365				SAME
370	370			Sandstone, med red brown, fine sand
375				SAME
380	380			Sandstone, med red brown, med. ~~brown~~ sand
385				Sandstone, med red brown, f. sand, micaceous
390	390			SAME
395				SAME
400	400			Sandstone, med red brown, f-med sand
405				SAME
410	410			Sandstone, med red brown, fine sand
415				SAME
420	420			SAME
425				SAME
430	430			Sandstone, med red brown, ~~Med sand~~ / Pick up more WATER, ~ 20 gp TOTAL 430'
435				SAME
440	440			SAME
445				SAME
450	450			SAME
455				SAME MORE WATER @ 455
460	460			Sandstone, med red brown, f. sand / ~ 30 gpm TOTAL
465				SAME
470	470			"
475				"
480	480			Sandstone, med red brown, med sand, micaceous
485				SAME
490	490			Sandstone, med red brown, f sand, micaceous
495				"
500	500			"
505				SAME
510	510			Sandstone, light gray to dark gray, f. sand
515				SAME
520	520			SAME
525				SAME
530	530			Sandstone, black, vf. sand
535				SAME
540	540			Sandstone, black w/ light gray, f. sand
545				SAME
550	550			SAME - Bottom of hole

AR302721