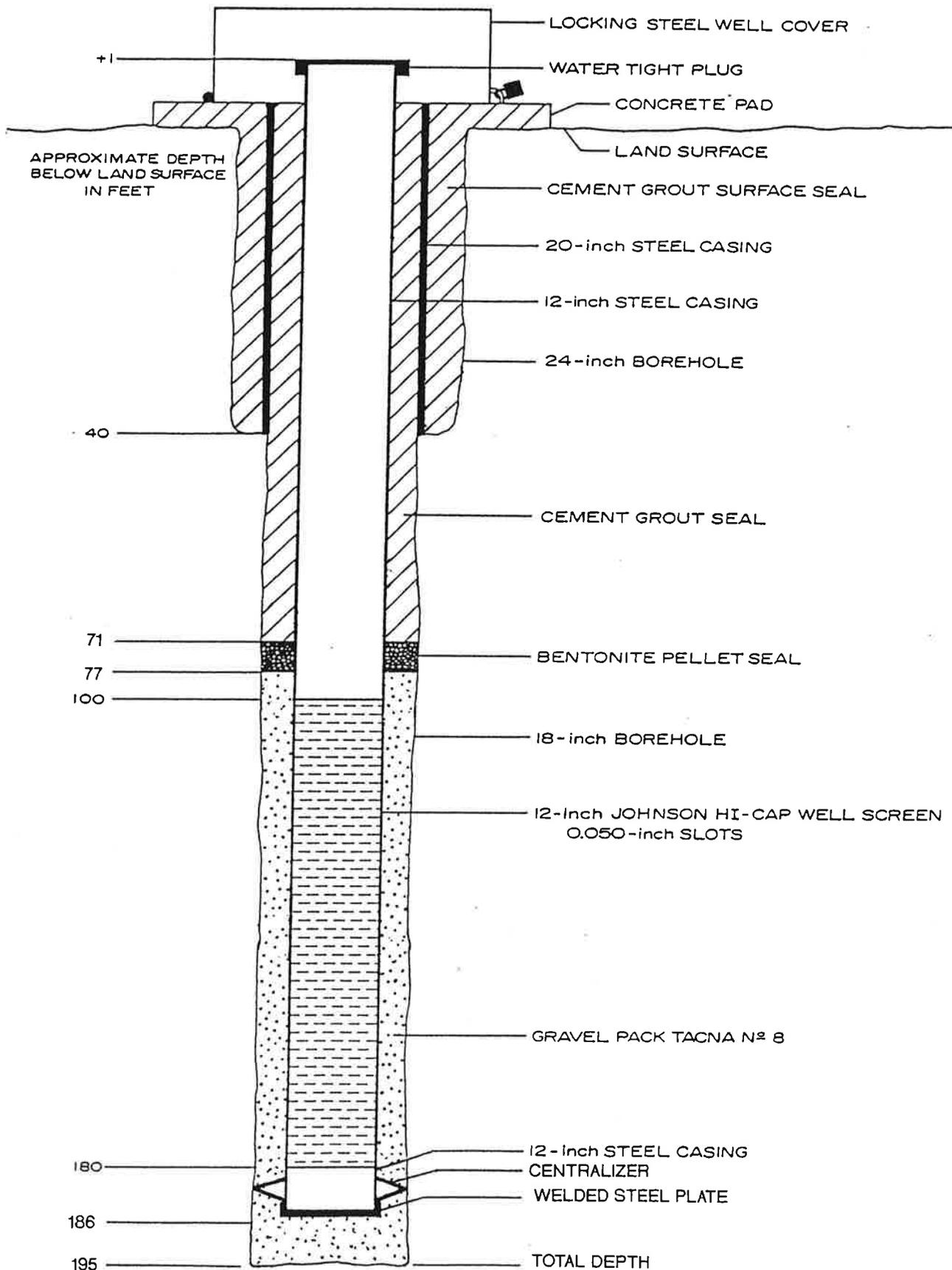


APPENDIX N
MONITOR WELL BORING LOGS

CW-1



**MALCOLM
PIRNIE**

LANDFILL ENVIRONMENTAL STUDIES PROGRAM - PHASE 3
EL CAMINO DEL CERRO STUDY AREA
REMEDIAL INVESTIGATION REPORT

MALCOLM PIRNIE, INC.

PILOT EXTRACTION WELL SCHEMATIC

FIGURE 3-2

GROUNDWATER RESOURCES CONSULTANTS, INC.

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 1.5	GRAVELLY SAND WITH COBBLES AND REFUSE	
1.5 - 19	GRAVELLY SAND WITH COBBLES	Medium brown to dark greyish brown, moist, very loose. At 11 feet: increased moisture. At 19 feet: clay layer, moist, soft, cohesive, less than one foot thick.
19 - 21	GRAVELLY SAND WITH COBBLES AND CLAY	Greyish brown, very moist.
21 - 30	GRAVELLY SAND WITH COBBLES	Medium brown, loose.
30 - 40	SANDY GRAVELLY CLAY	Yellowish brown, soft, slightly cohesive.
40 - 42	SANDY GRAVEL AND COBBLES	Light brown, sand is coarse to very coarse, graded gravel.
42 - 66	GRAVELLY SAND	Light brown, sand is predominately coarse to very coarse, contains fine sand and silt as matrix. At 48 feet: cobbly, contains small cobbles, increased gravel content.
66 - 100	SANDY GRAVEL	Brown, gravel is fine to medium size, sand is coarse to very coarse grained, contains fine sand and silt as matrix. At 70 feet: small cobbles. At 72 feet: small cobbles. At 86 feet: gravel coarsens, some small cobbles.

GROUNDWATER RESOURCES CONSULTANTS, INC.

TABLE A-1 (continued) LITHOLOGIC LOG OF PILOT EXTRACTION WELL CW-1		
DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
100 - 195	SANDY GRAVEL/ GRAVELLY SAND	<p>Light brown, graded mixture, variable fine sand and silt as matrix and interbeds, sand is predominately medium to very coarse grained, gravel is predominately fine to medium size.</p> <p>At 108 feet: small cobbles.</p> <p>At 120 feet: cobbles.</p> <p>At 131 feet: cobbles.</p> <p>At 138 feet: increased fines.</p> <p>At 139 feet: coarsens, cobbles.</p> <p>At 159 feet: cobbles.</p> <p>At 172 feet: cobbles.</p> <p>At 180 feet: cobbles.</p> <p>At 186 feet: cobbles.</p> <p>At 194 feet cobbles.</p>
<p>TOTAL DEPTH OF BOREHOLE: 195 FEET WELL COMPLETED: 09/30/94 STATIC WATER LEVEL: 100.5 FEET BELOW LAND SURFACE (10/03/94)</p>		

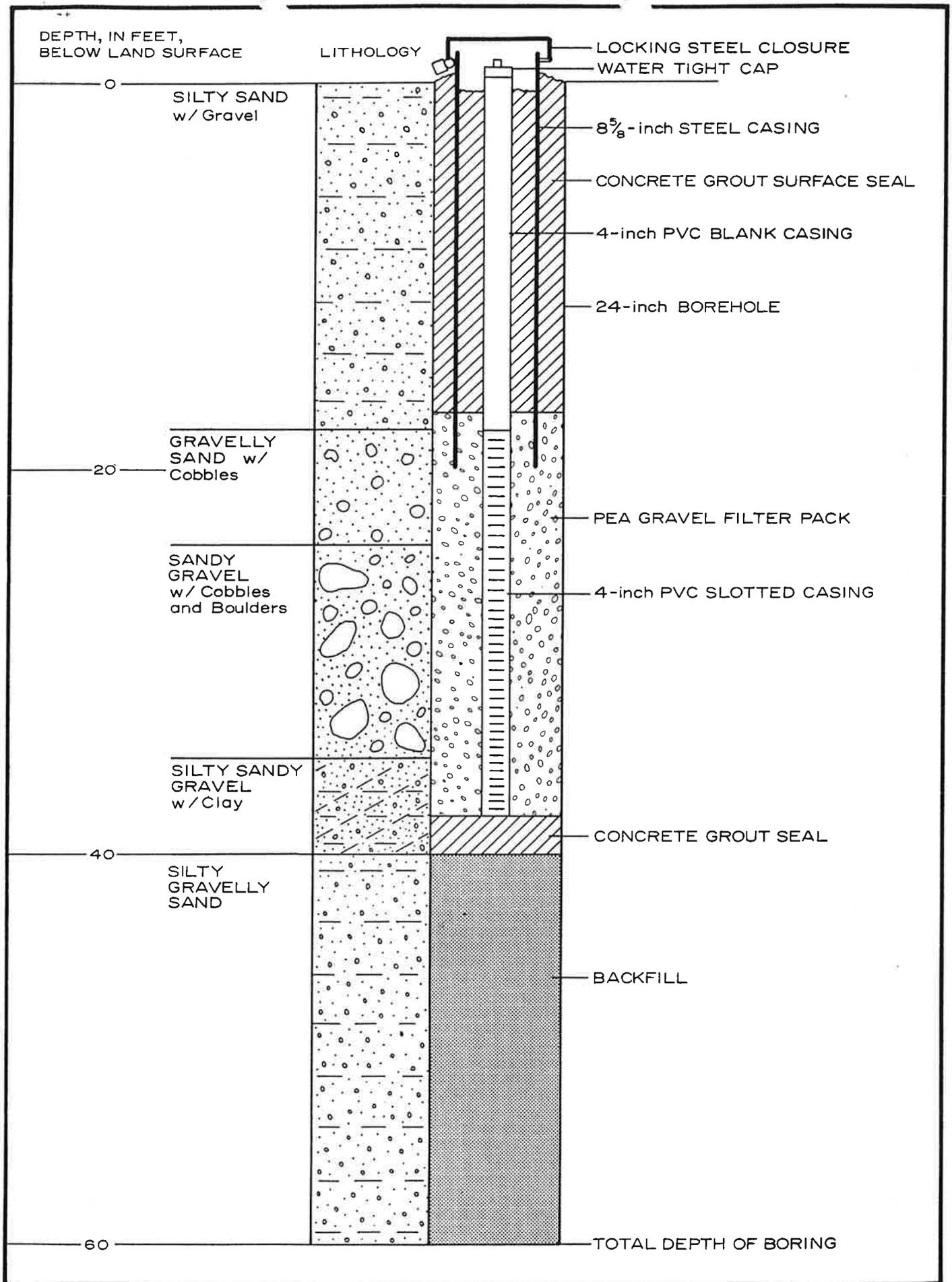


FIGURE 2
SCHEMATIC FOR PERCHED ZONE WELL P-1

FIGURE A-1

TABLE A-1

LITHOLOGIC LOG FOR PERCHED ZONE MONITOR WELL P-1

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 18	SILTY SAND	Brown-grey, with gravel and cobbles, sand is predominately fine to medium grained, non-cohesive slightly moist. At 5 feet, boulders.
18 - 24	GRAVELLY SAND	Light brown, sand is medium to very coarse grained, gravel is fine to coarse, some cobbles up to six-inches in diameter, coarsening downward, slightly moist, loose. At 23 feet, boulders.
24 - 35	SANDY GRAVEL	Light brown, with cobbles, moist, with moisture increasing with depth, loose. Below 27 feet, silty. At 29 feet, contains cobbles and boulders, moist. At 32 feet, very moist.
35 - 40	SILTY SANDY GRAVEL	Light brown, some clay, trace caliche in uppermost part, wet, moisture decreasing with depth.
40 - 60	SILTY GRAVELLY SAND	Light brown-tan, sand is very fine to very coarse grained, very poorly sorted, minor clay, moist, loose, strong organic odor from borehole.

TOTAL DEPTH OF BOREHOLE: 60 FEET

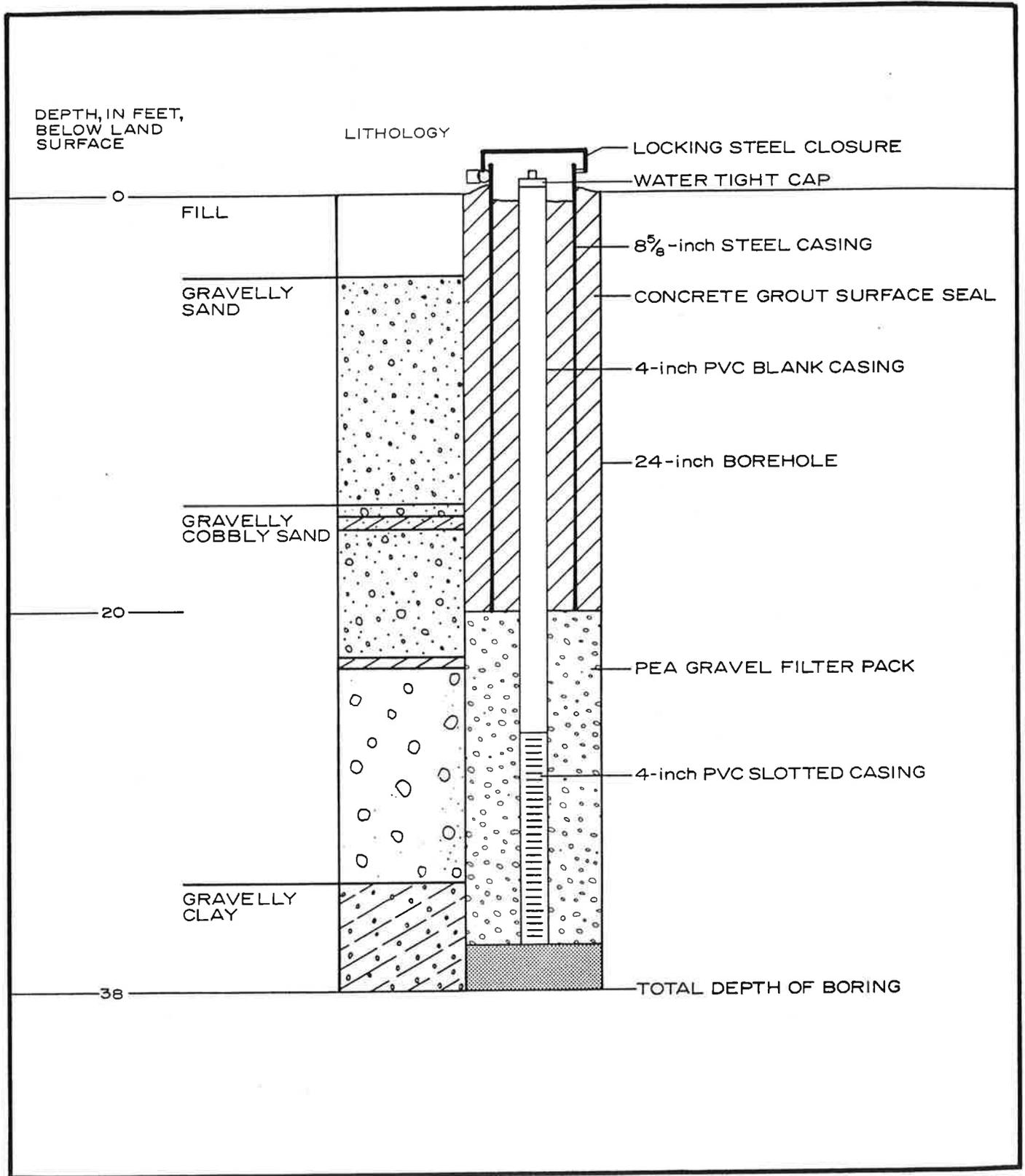


FIGURE 3
SCHEMATIC FOR PERCHED ZONE WELL P-2

TABLE A-2

LITHOLOGIC LOG FOR PERCHED ZONE MONITOR WELL P-2

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 4	FILL	
4 - 15	GRAVELLY SAND	<p>Light brown, very clean, moist, loose, some cobbles estimated up to six-inches in diameter, contains zones of fine-grained, well-sorted sand alternating with sandy gravel.</p> <p>At 7-8 feet, slight odor.</p> <p>At 13 feet, very moist gravelly sand, gravel and cobble content increasing.</p>
15 - 33	GRAVELLY COBBLY SAND	<p>Light brown, loose, moist, highest moisture content at gravelly clay contact, contains cobbles estimated up to one-foot in diameter.</p> <p>At 15.5 feet, sandy clay layer, saturated, soft, very cohesive.</p> <p>At 22 feet, sandy clay layer, saturated, soft, very cohesive.</p> <p>At 24 feet, sandy silt lens, saturated.</p> <p>At 30 feet, boulders estimated up to 18-inches in diameter.</p>
33 - 38	GRAVELLY CLAY	<p>Buff to orange brown, gravel to ½-inch diameter, very moist to saturated, firm, moisture decreasing with depth, no odor.</p>

TOTAL DEPTH OF BOREHOLE: 38 FEET

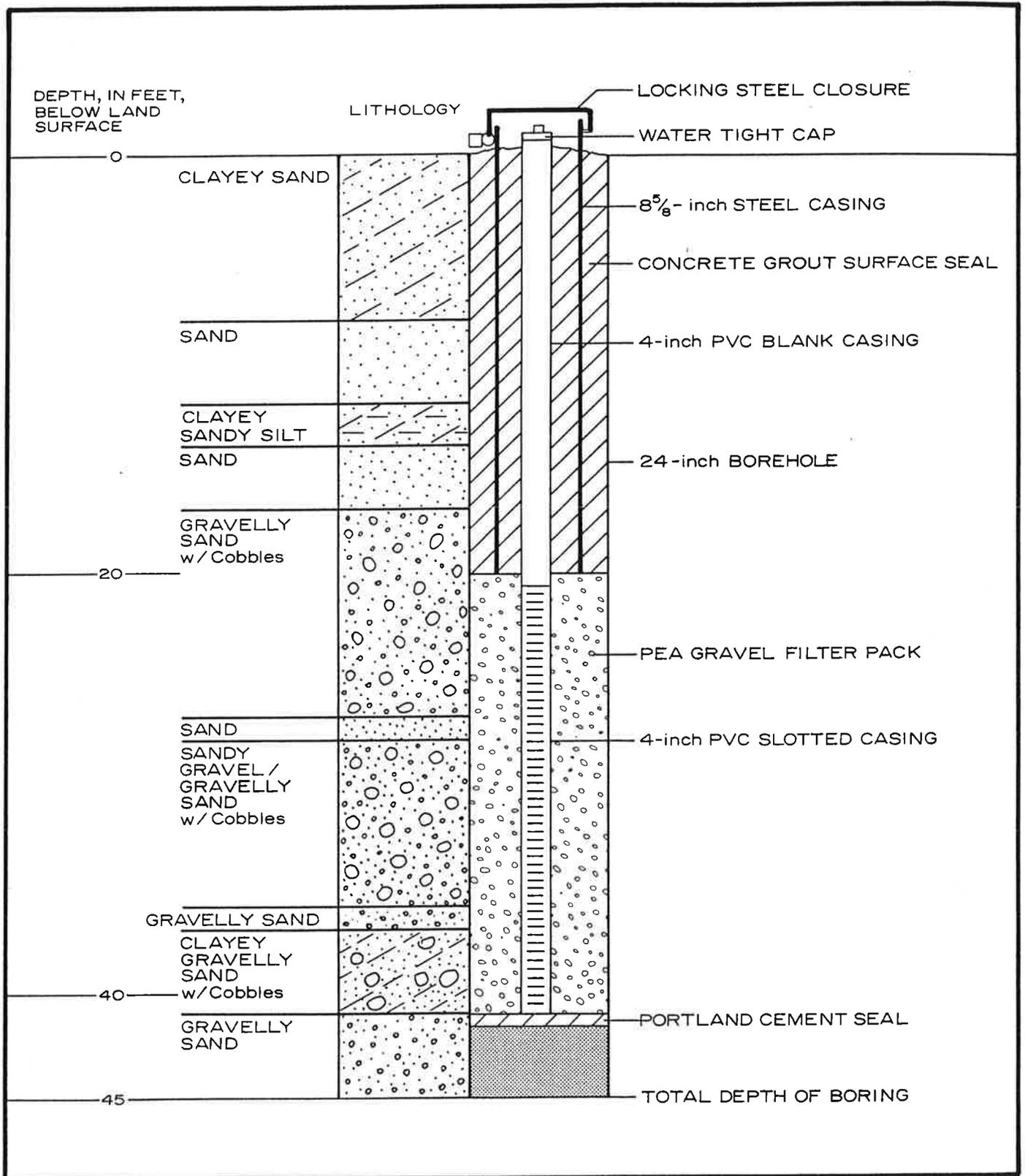


FIGURE 4
SCHEMATIC FOR PERCHED ZONE WELL P-3

TABLE A-3

LITHOLOGIC LOG FOR PERCHED ZONE MONITOR WELL P-3

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 8	CLAYEY SAND	Brown, contains silt, gravel, some cobbles, slightly cohesive, moist.
8 - 12	SAND	Brown, grey-brown, fine to medium grained, very slightly moist.
12 - 14	CLAYEY SANDY SILT	Brown, slightly cohesive, slightly moist, soft.
14 - 17	SAND	Light brown, medium to coarse grained, slightly moist, loose.
17 - 27	GRAVELLY SAND	<p>Brown, poorly sorted, sand is subrounded to subangular, some cobbles estimated up to six-inches in diameter, slightly moist, loose.</p> <p>At 19 feet, slightly cohesive, trace clay and silt.</p> <p>At 25 feet, clay and silt decreasing, cobbles estimated up to ten-inches in diameter, loose.</p>
27 - 28	SAND	Light brown, medium to very coarse grained, clean, some gravel and cobbles estimated up to five-inches in diameter, slightly moist, loose.
28 - 36	SANDY GRAVEL/GRAVELLY SAND	Brown, sand is very coarse grained, gravel is fine to very coarse, predominately fine gravel.
36 - 37	GRAVELLY SAND	Light tan, trace clay, wet, no odor, sand is medium to coarse grained, gravel is fine to medium size.
37 - 41	CLAYEY GRAVELLY SAND	<p>Light brown-tan-white, some cobbles, lightly cemented, calcareous, some thin hard caliche layers, wet at top, moisture decreasing with depth.</p> <p>At 40 feet, slight organic odor over borehole.</p>
41 - 45	GRAVELLY SAND	Light brown, calcareous cement and clay content decreasing, slightly moist.
<p>TOTAL DEPTH OF BOREHOLE: 45 FEET</p>		

EARL H. WILLIAMS WELL DRILLING

701 W. RIVER ROAD
TUCSON, ARIZONA 85704
888-3250

April 26, 1978

Metropolitan Water Company
3910 North Flowing Wells Road
Tucson, Arizona 85705

WILPWOOD

Well Log of New Well on North Shannon Road, south of
Orange Grove Road.

0- 50 ft.	Sand and clay
50-68	Boulders and coarse gravel
68-130	Sand and clay, water at 130 ft.
(130)-220	Sand and coarse gravel with some clay
220-273	Sand with some gravel
273-280	Sand and gravel with some clay
280-405	Sand and coarse gravel
405-410	Coarse gravel
410-415	Clay with some gravel
415-430	Coarse gravel
430-440	Sticky clay
440-455	Clay and gravel
455-470	Coarse sand and clay
470-475	Fine sand
475-480	Coarse gravel and clay
480-505	Cemented conglomerate
505-529	Sand and silt

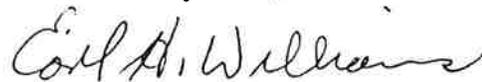
STATIC W' L
AT 125'
4-1A-82
INSTALL SUB
15HP PUMP AT
260'

The well is cased from the surface to 529 ft. with 16"x.281 wall well casing. The casing is mills knife perforated from 250 ft. to 465 ft. and from 480 ft. to 500 ft. The perforation pattern consists of 8 holes to the round and a round every 12 to 16 inches.

Static water level at the time of completion was 130 ft.

The well was developed for a period of 7 hrs 45 min. with a mud scow, pulling in about 2 ft. of fill.

Sincerely



Earl H. Williams



Interval	Color	Texture	Grain Size	Other	Notes
180-190	10. YR5/2	10. YR7/2	15	34	GRAVEL FRACTION HAS CHANGED TO ABOUT 45 PERCENT
190-200	10. YR5/2	10. YR7/2	25	39	APLISH GRAY, 40 PERCENT VOLCANIC ROCKS, WHICH INCL
200-240	10. YR5/2	10. YR7/2	17	44	GRAYISH GRANITE, HARD AND STONE AND DARK GRAY CHERT,
210-220	10. YR5/2	10. YR7/2	15	48	AND 15 PERCENT QUARTZITE. DOES NOT FIND ANY CATALINA
220-230	10. YR5/2	10. YR7/2	20	38	GLASS. FRAGMENT SURFACES ARE LIKE SUBANGULAR AND ANGULAR.
230-240	2.5Y 5/3	10. YR7/2	10	50	TO 470 FEET. THE SAND IS SAME COLOR AS ABOVE BUT IS
240-250	2.5Y 5/3	10. YR7/2	7	44	TO CEASELY FINE GRAINED (VERY FINE TO MEDIUM GRAINED) IN
250-260	2.5Y 5/3	10. YR7/2	12	41	TEXTURE. SLOUGH TO DRYER IN
260-270	2.5Y 5/3	10. YR7/2	9	45	TO DRYER. SLOUGH TO DRYER IN
270-280	2.5Y 5/3	10. YR7/2	17	40	SMALLER GRAVEL. PERCENT IS NOW
280-290	2.5Y 5/3	10. YR7/2	8	46	GRANITIC ROCKS AND 50 PERCENT VOLCANIC ROCKS. ANY VOLCANIC ROCKS
290-300	2.5Y 5/3	10. YR7/2	12	44	ARE GRAYISH OR BROWNISH GRAY
300-310	2.5Y 5/3	10. YR7/2	20	48	QUARTZITE AND GRANITIC ROCKS ARE
310-320	2.5Y 5/3	10. YR7/2	7	42	STILL PURPLISH AND PINKISH
320-330	2.5Y 5/3	10. YR7/2	7	48	STILL PURPLISH AND PINKISH. SAMPLES HAVE A DULL GREENISH GRAY CAST
330-340	2.5Y 5/3	10. YR7/2	15	45	THROUGHOUT THE INTERVAL. THE FRAGMENTS HAVE SMALL SANDY
340-350	2.5Y 5/3	10. YR7/2	9	44	CALCAREOUS PATCHES ON THE IR SURFACES. THERE ARE SOME FRESH
350-360	2.5Y 5/3	10. YR7/2	11	46	ROUST STAINED PARTICLES IN THE 300-310 FOOT SAMPLE PROBABLY
360-370	2.5Y 5/3	10. YR7/2	10	42	DUPLICATE TO METAL CHIPS FROM THE SOIL. THE GRAVEL FRAGMENT
370-380	2.5Y 5/3	10. YR7/2	8	50	SURFACES ARE MOSTLY SUBANGULAR WITH ABOUT 20 PERCENT BEING
380-390	2.5Y 5/3	10. YR7/2	0	50	ANGULAR (SHARPI). THE SAMPLES SUGGEST THAT FORMATION IS AN
390-400	2.5Y 5/3	10. YR7/2	12	43	INDURATED GRAVEL AND SAND.
400-410	2.5Y 5/3	2.5Y 7/2	9	42	
410-420	2.5Y 5/3	2.5Y 7/2	9	42	
420-430	2.5Y 5/3	2.5Y 7/2	2	43	
430-440	2.5Y 5/3	2.5Y 7/2	5	43	
440-450	2.5Y 5/3	2.5Y 7/2	5	48	
450-460	2.5Y 5/3	2.5Y 7/2	4	49	
460-470	2.5Y 5/3	2.5Y 7/2	1	47	

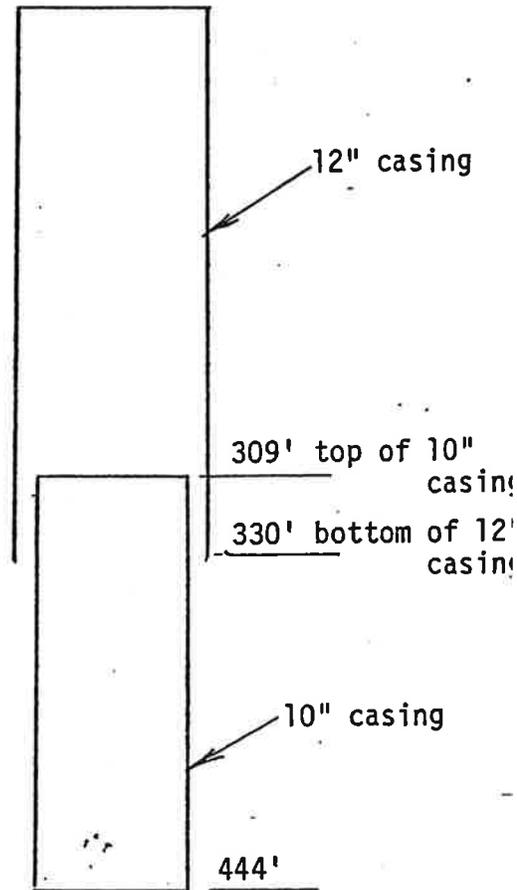
GRAVEL FRACTION HAS CHANGED TO ABOUT 45 PERCENT APLISH GRAY, 40 PERCENT VOLCANIC ROCKS, WHICH INCL GRAYISH GRANITE, HARD AND STONE AND DARK GRAY CHERT, AND 15 PERCENT QUARTZITE. DOES NOT FIND ANY CATALINA GLASS. FRAGMENT SURFACES ARE LIKE SUBANGULAR AND ANGULAR. TO 470 FEET. THE SAND IS SAME COLOR AS ABOVE BUT IS TO CEASELY FINE GRAINED (VERY FINE TO MEDIUM GRAINED) IN TEXTURE. SLOUGH TO DRYER IN TO DRYER. SLOUGH TO DRYER IN SMALLER GRAVEL. PERCENT IS NOW GRANITIC ROCKS AND 50 PERCENT VOLCANIC ROCKS. ANY VOLCANIC ROCKS ARE GRAYISH OR BROWNISH GRAY QUARTZITE AND GRANITIC ROCKS ARE STILL PURPLISH AND PINKISH STILL PURPLISH AND PINKISH. SAMPLES HAVE A DULL GREENISH GRAY CAST THROUGHOUT THE INTERVAL. THE FRAGMENTS HAVE SMALL SANDY CALCAREOUS PATCHES ON THE IR SURFACES. THERE ARE SOME FRESH ROUST STAINED PARTICLES IN THE 300-310 FOOT SAMPLE PROBABLY DUPLICATE TO METAL CHIPS FROM THE SOIL. THE GRAVEL FRAGMENT SURFACES ARE MOSTLY SUBANGULAR WITH ABOUT 20 PERCENT BEING ANGULAR (SHARPI). THE SAMPLES SUGGEST THAT FORMATION IS AN INDURATED GRAVEL AND SAND.

WELL Z-2

formation log

0 - 50'	Dirt & river sand
50 - 100	Clay & little sand
100 - 150	Heavy clay & very little sand
150 - 315	Hard mountain rock
315 - 375	Coarse sand & gravel
375 - 390	Sand, gravel & clay streaks
390 - 420	Coarse gravel
420 - 428	Clay & gravel
428 - 444	Coarse gravel & sand

construction of well



History of Well:

This well originally drilled to 330' in 1952 by McCray.
It was deepened to 444' in 1975 by M & A Drilling Co.

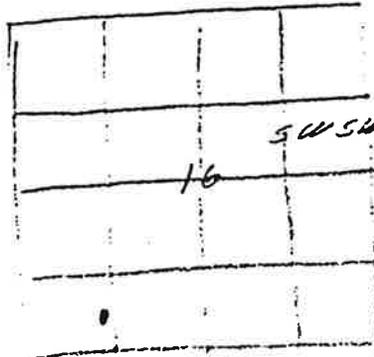
A. A. McDANIEL MACHINE SHOP
 2940 Railroad Rd.
 Mail Address 1203 E. Roger Rd.
 Tucson, Arizona

23

define

ccd.

LOG OF WELL drilled for
 Tucsonita Water Co. #2
 Russell Pagol
 3256 E. Lee Street
 Tucson, Arizona



24 September 1959

T 13 S R 13 E

D-(13-13)16 ccd

FROM		to	
0'		26'	Soil
26'	"	55'	Gravel
53'	"	125'	Sandy clay, water @ 100'
125'	"	135'	Clay
135'	"	200'	Muddy gravel & water
200'	"	235'	Clean gravel & water
235'	"	265'	Gravel - clay
265'	"	275'	Clean gravel & water
275'	"	301'	gravel - clay

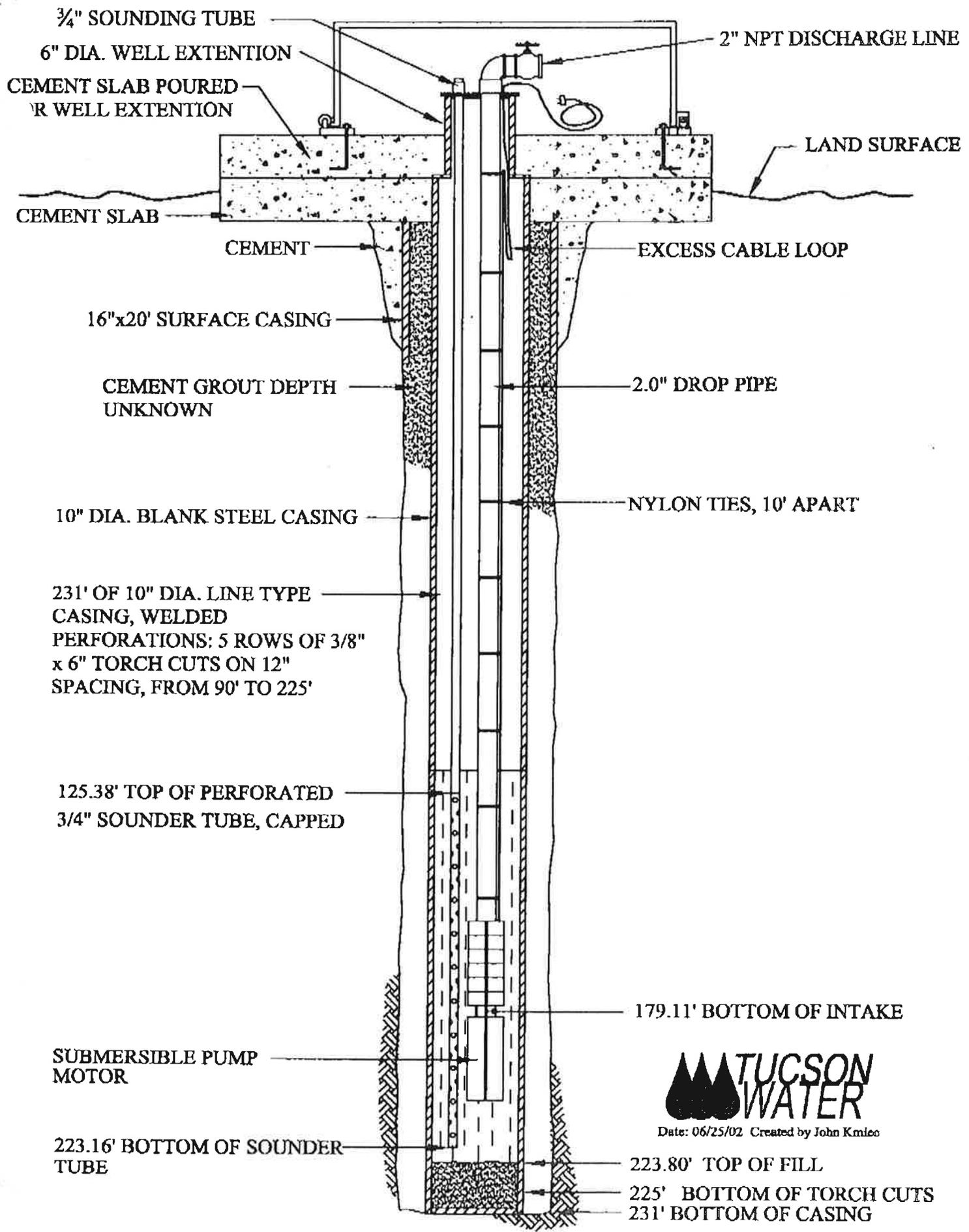
Casing: 302' of 12" ID linepipe. Welded

Perforations : Mills knife, $\frac{1}{8}$ " x $\frac{1}{4}$ " cuts, 5 cuts per circle, circles 12" apart from 95' to 298'

Static Water level : 90'

(Signature)

A. A. McDaniel



Date: 06/25/02 Created by John Kmiec

Z-004A MONITOR WELL CONSTRUCTION

DATA ON WELLS AND PUMP IRRIGATION

with 2-5 well!
 ~~2-5~~
 ~~15~~
 ~~Dim~~

AGRICULTURAL ENGINEERING DEPARTMENT

UNIVERSITY OF ARIZONA

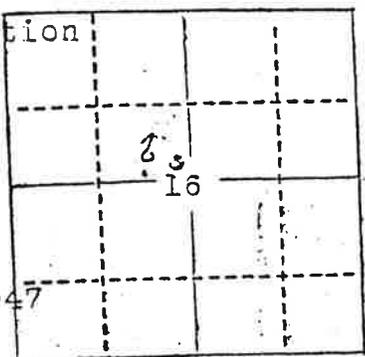
AGRICULTURAL EXPERIMENT STATION
TUCSON, ARIZONA

primary wells #2

Sec 16 bdd

NAME: A. Ralph Curtis ADDRESS: Near Jaynes Station

WELL: Location ^{SEC 16} NW 1/4 Sec. 16., Twp. 13S., R. 13E



Use, domestic, stock, or irrigation.....acres

Type..... Casing 10" 170'

Perforations ALL perforated

Drilled by L.G. McCray Date: March 20, 1947

LOG

FROM Feet	TO Feet	MATERIAL	FROM Feet	TO Feet	MATERIAL
0		Old hole 18" 135'			
		Starting 10" hole at 135'			
135	180	Hard conglomerate			2-5 measured 16" dia. casing 340' deep
180	185	Soft spot			
185	225	Hard conglomerate			
225	230	Soft conglomerate			
230	267	Hard conglomerate			
267	270	Soft conglomerate			
270	300	Hard conglomerate			
416	428	Gravel, sd. & clay (not cemented)			
428	429	hard cemented gravel			
429	567	Gr., sd. & clay (not cemented)			
567	572	Gr. sd. cl. w/ hot water str. (Temp 110°)			water level (118') Temp. 74°
572	607	" " "			
607	612	" " " (w/ hot water 116°)			

entire
1947

612 - 620 " " " (not cemented) feet. Date: March 20, 1947

WATER LEVEL: Depth from surface when drilled..... feet. Date.....

Present depth to water..... feet. Date.....

Notes on fluctuation of water level.....

PUMP: Make..... Type..... Size.....

Diam. of bowls..... Number of stages.....

Diam. of column..... Diam. discharge..... Diam. suction.....

Rated capacity in G. P. M..... at..... feet head, at..... R. P. M.

Amount of discharge..... G. P. M. measured by means of.....

Drawdown..... feet when pumping..... G. P. M. Total lift..... feet

ENGINE OR MOTOR: Make..... Type..... Size..... H. P.

Drive: direct-connected..... belted....., or geared.....

Fuel consumption or power input.....

Description of installation.....

Page 1 of 2
 Pan set Black Nos.
 Date 4/20/79

Well Cutting Analysis Form

Well Number Z-5 (Deepened)
 Driller City of Tucson
 Method Cable Tool

Depth to in Feet	Sample Size	Munsell Color		Gravel > 4.0 mm		Gravel > 2.0 mm		Sand > .0625mm		Fines < .0625 mm		Mudstone		Acid *	Max. Size	Remarks
		Dry	Wet	Wt.	%	Wt.	%	Wt.	%	Wt.	%	Wt.	%			
340	249	7.5YR	6/4	7.5YR	5/2	103	53	68					W 30			
350	250		6/4		5/4	17	41	111					W 11			Samples in 10' intervals except 355'
355	232		6/4		5/4	28	40	106					W 17			
360	252		6/4		5/4	104	39	67					W 26			
370	221		6/4		5/4	36	31	105					W 15			
380	270		6/2		5/2	42	77	138					W 15			
390	260		7/2		5/2	56	73	111					W 20			
400	277		7/2		5/2	63	70	122					W 17			
410	231		6/2		5/2	85	61	71					W 32			
420	260		7/2		5/2	90	64	67					W 20			
430	268		6/2		5/2	56	78	119					W 21			
440	284		7/2		5/2	123	70	79					W 21			
450	254		7/2		5/4	59	55	99					W 23			
460	239		7/2		5/4	51	57	88					W 15			
470	245		7/2		5/2	83	71	67					W 34			
480	265		7/2		5/2	150	59	39					W 27			
490	241		7/2		5/4	73	58	66					W 15			
500	237		7/2		5/2	153	33	29					M 22			
510	249		7/2		5/2	132	51	38					M 37			
520	256		7/2		5/2	177	27	48					M 56			
530	283		7/2		5/2	152	48	50					M 26			
540	253		7/2		5/2	75	67	90					M 21			
550	242		7/2		5/4	57	49	74					M 14			
560	255		7/2		5/4	81	40	73					W 24			
570	264		7/2		5/4	68	42	85					W 40			

* Reaction to HCL M-Moderate O-None

By _____

LITHOLOGIC DESCRIPTION

HOLE No. Z-5 deepened

DATE 5-2-79 GA

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u>340</u> <u>610</u> <u>T.D.</u>	<u>2</u> % Gneiss, quartz and feldspar	<u> </u> Rounded	<u> </u> Well sorted
Gravel	<u> </u> % Quartzite	<u> </u> Subrounded	<u> </u> Moderately sorted
	<u>95</u> % Volcanics	<input checked="" type="checkbox"/> Subangular	<input checked="" type="checkbox"/> Poorly sorted
	<u>3</u> % fine gr. Sed.	<u> </u> Angular	
	<u> </u> %		
	<u> </u> %		
	Comments: <u>Trachytes, Dacites & Dacite sargpays</u>		
	<u>Tuffs & tuffs</u>		
	<u>probably require to thinen beds</u>		

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u> </u> <u> </u>	<u> </u> % Gneiss, quartz and feldspar	<u> </u> Rounded	<u> </u> Well sorted
Sand	<u> </u> % Quartzite	<u> </u> Subrounded	<u> </u> Moderately sorted
	<u> </u> % Volcanics	<u> </u> Subangular	<u> </u> Poorly sorted
	<u> </u> %	<u> </u> Angular	<u> </u> sorted
	<u> </u> %		
	<u> </u> %		
	Comments: <u> </u>		
	<u> </u>		
	<u> </u>		

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u> </u> <u> </u>	<u> </u> % Gneiss, quartz and feldspar	<u> </u> Rounded	<u> </u> Well sorted
Gravel	<u> </u> % Quartzite	<u> </u> Subrounded	<u> </u> Moderately sorted
	<u> </u> % Volcanics	<u> </u> Subangular	<u> </u> Poorly sorted
	<u> </u> %	<u> </u> Angular	<u> </u> sorted
	<u> </u> %		
	<u> </u> %		
	Comments: <u> </u>		
	<u> </u>		
	<u> </u>		

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u> </u> <u> </u>	<u> </u> % Gneiss, quartz and feldspar	<u> </u> Rounded	<u> </u> Well sorted
Sand	<u> </u> % Quartzite	<u> </u> Subrounded	<u> </u> Moderately sorted
	<u> </u> % Volcanics	<u> </u> Subangular	<u> </u> Poorly sorted
	<u> </u> %	<u> </u> Angular	<u> </u> sorted
	<u> </u> %		
	<u> </u> %		
	Comments: <u> </u>		
	<u> </u>		
	<u> </u>		

2-6

26

February 28, 1963

D(13-13) 17 2 29

Log of Well Drilled for

L. Shannon

Jaynes Station

From	0'	to	23'	Soil
	23'	to	38'	Clay
	38'	to	45'	Gravelly Clay
	45'	to	60'	Boulders
	60'	to	102'	Gravelly Clay, seep at 93'
	102'	to	105'	Clay
	105'	to	114'	Boulders in Clay
	114'	to	126'	Gravel & Water
	126'	to	167'	Muddy Gravel & Water
	167'	to	183'	Gravel & Water
	183'	to	192'	Muddy Gravel & Water
	192'	to	217'	Gravel & Water
	217'	to	219'	Gravelly Clay

Possible Bt

Total Depth--219'

Casing: 220' of 1 1/2" OD linepipe w/welded joints.
 Perforations: Mills Knife 1/2" x 4" cuts, 7 cuts per circle,
 circles 10" apart from 108' to 215'
 Stable water level: 83'

A. A. Mc Daniel

LITHOLOGIC DESCRIPTION

HOLE No. Z-6 deepened

DATE _____

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u>220 490</u>	<u>4</u> % Gneiss, quartz and feldspar	<input type="checkbox"/> Rounded	<input type="checkbox"/> Well sorted
Gravel	<u>41</u> % Quartzite	<input type="checkbox"/> Subrounded	<input type="checkbox"/> Moderately sorted
	<u>95</u> % Volcanics	<input checked="" type="checkbox"/> Subangular	<input checked="" type="checkbox"/> Poorly sorted
	_____ % _____	<input type="checkbox"/> Angular	
	_____ % _____		
	_____ % _____		

Comments: Poorly sorted, sub angular volcanic sandy gravels, Rhyolites & fine gr. volcanics, little or no calcareous material. Larger frags, partially coated w/ calc. carbonate.

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
<u>220 490</u>	<u>4</u> % Gneiss, quartz and feldspar	<input type="checkbox"/> Rounded	<input type="checkbox"/> Well sorted
<u>8-1</u>	<u>41</u> % Quartzite	<input type="checkbox"/> Subrounded	<input type="checkbox"/> Moderately sorted
	<u>95</u> % Volcanics	<input checked="" type="checkbox"/> Subangular	<input checked="" type="checkbox"/> Poorly sorted
	_____ % _____	<input type="checkbox"/> Angular	
	_____ % _____		
	_____ % _____		

Comments: _____

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
Gravel	_____ % Gneiss, quartz and feldspar	<input type="checkbox"/> Rounded	<input type="checkbox"/> Well sorted
	_____ % Quartzite	<input type="checkbox"/> Subrounded	<input type="checkbox"/> Moderately sorted
	_____ % Volcanics	<input type="checkbox"/> Subangular	<input type="checkbox"/> Poorly sorted
	_____ % _____	<input type="checkbox"/> Angular	
	_____ % _____		
	_____ % _____		

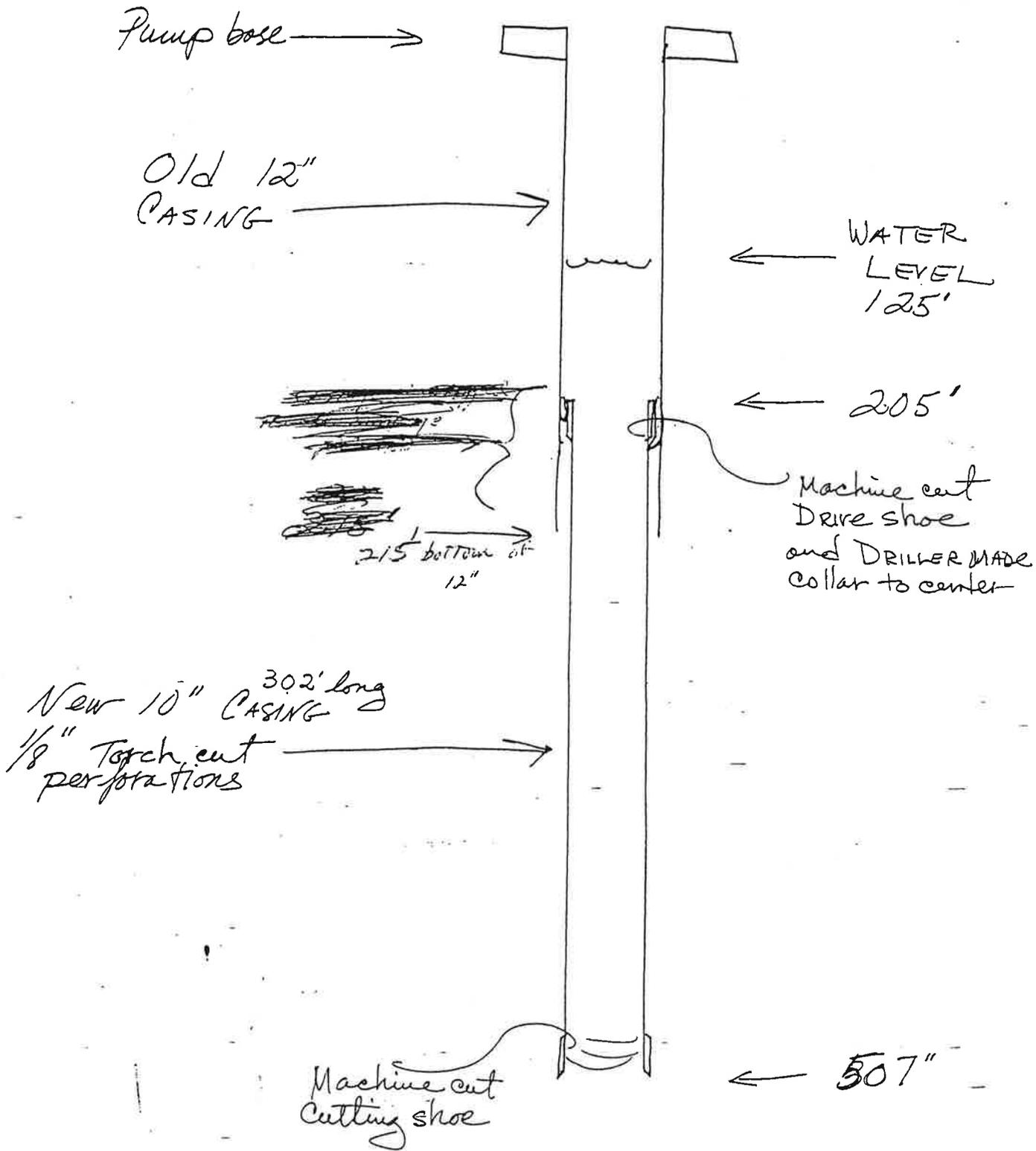
Comments: _____

Depth From To	Rock and Mineral types present	Degree of Roundness	Sorting
Sand	_____ % Gneiss, quartz and feldspar	<input type="checkbox"/> Rounded	<input type="checkbox"/> Well sorted
	_____ % Quartzite	<input type="checkbox"/> Subrounded	<input type="checkbox"/> Moderately sorted
	_____ % Volcanics	<input type="checkbox"/> Subangular	<input type="checkbox"/> Poorly sorted
	_____ % _____	<input type="checkbox"/> Angular	
	_____ % _____		
	_____ % _____		

Comments: _____

WE - Z-7
NOT-TO-SCALE

12-2-76



WELL Z-7
Cable Tool Deepened, 215 to 500'

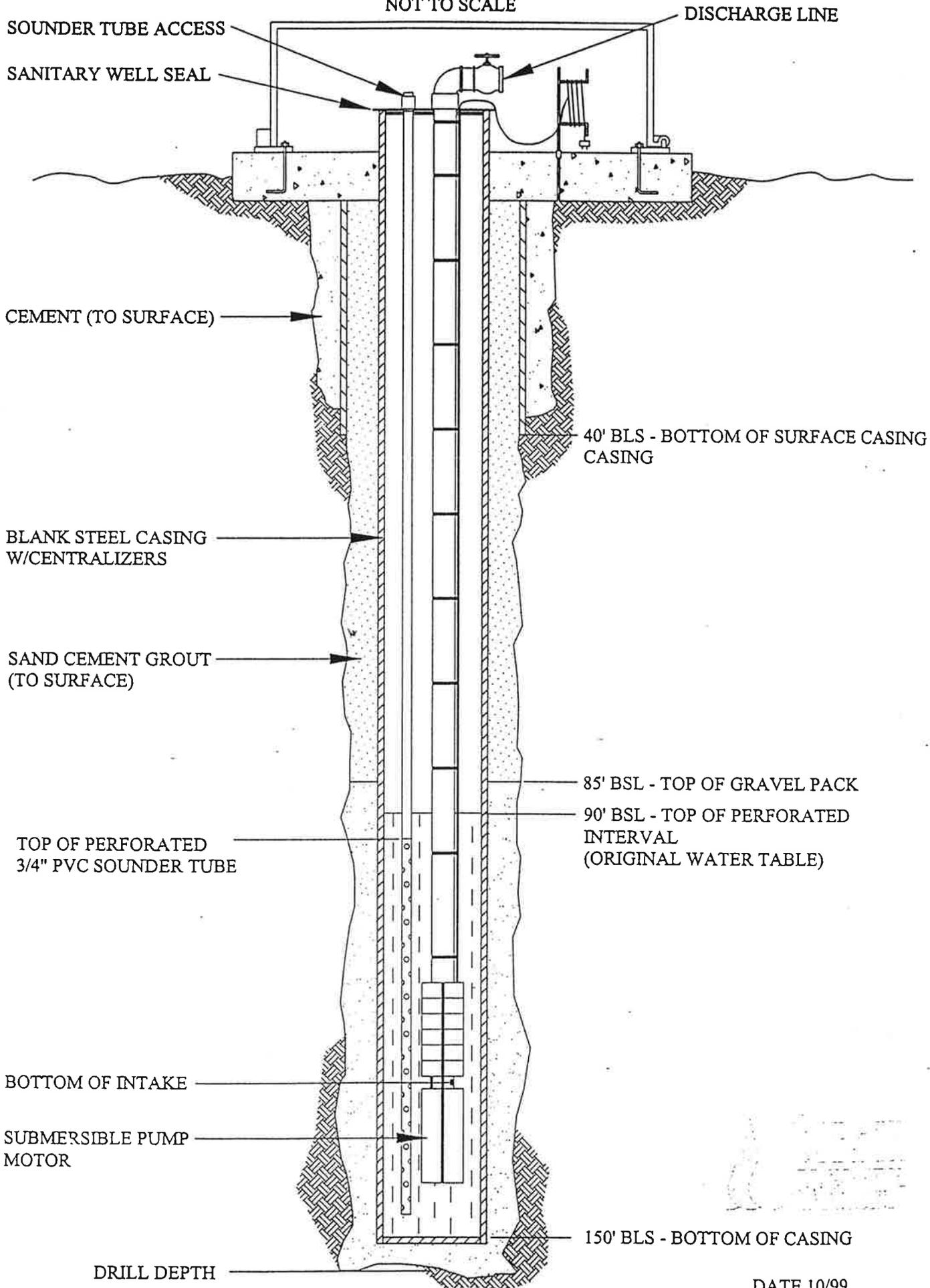
215 - 500 Coarse sandy gravels to gravelly sand with minimal clay
Size distribution 8-27% clay, 12-47% sand, 28-68% gravel.
Acid reaction: none to weak.

Gravel: 80-95% Gneiss, most of which is an almost pure
silica; 5-20% dark quartzite. D.R. 50% sub-
angular, 50% subrounded.

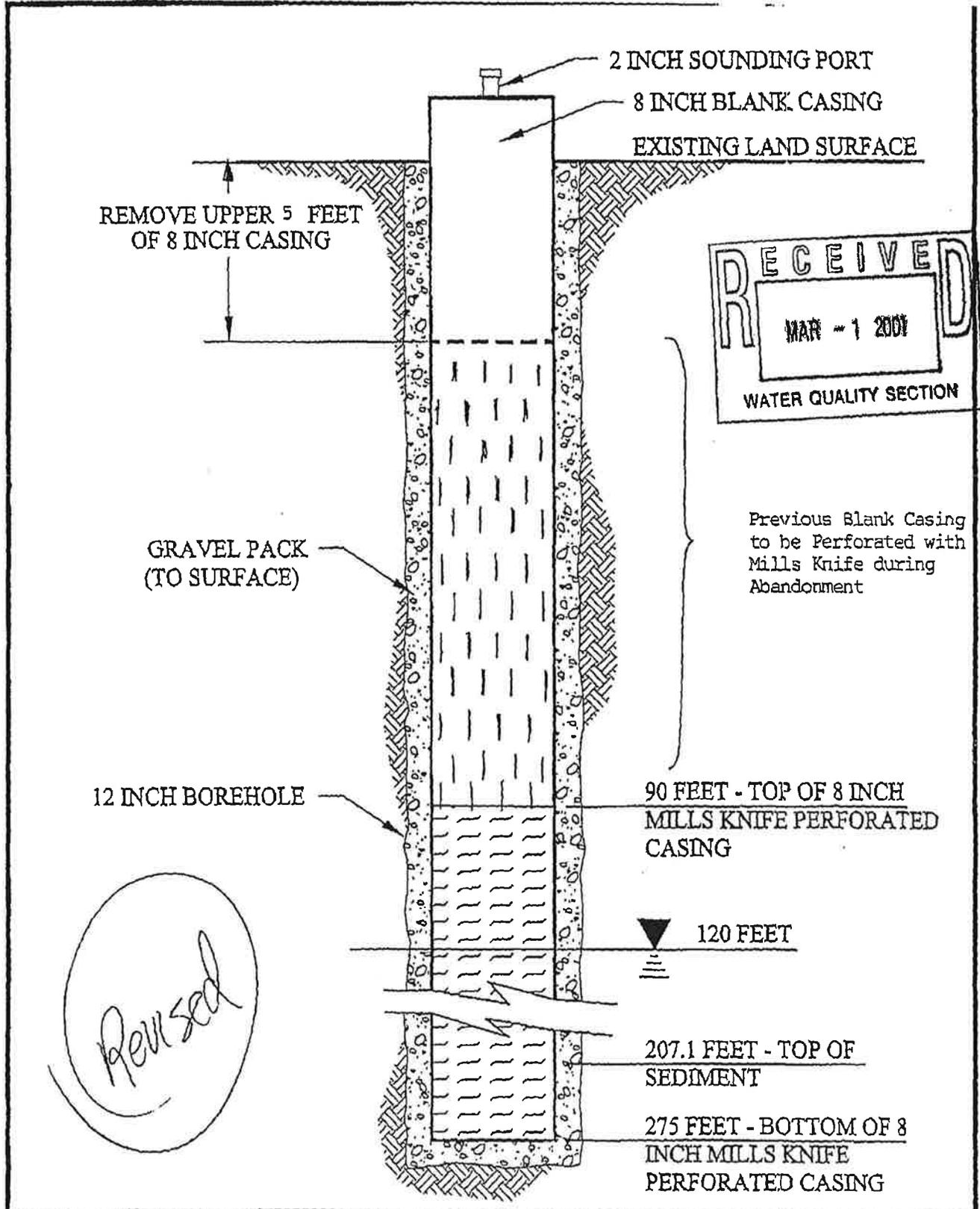
Sand: 70% multicolored gneiss grains, almost no pure
quartz, 30% quartzite. D.R. 50% subangular,
50% subrounded.

Construction Diagram - Replacement of Well Z-016A

NOT TO SCALE



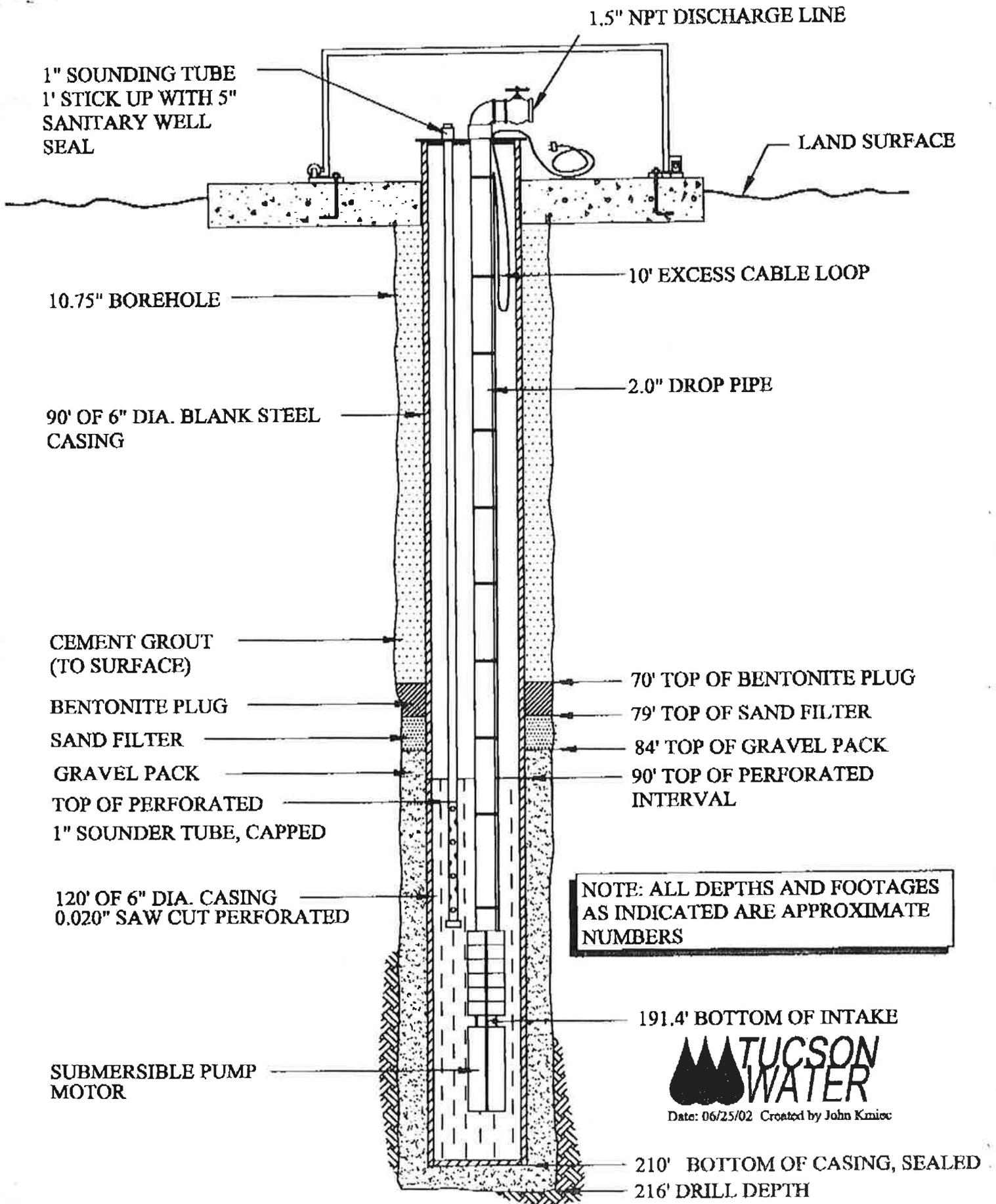
DATE 10/99



WELL ABANDONMENT DETAIL WELL Z-016A

DATE: 2-01

SCALE: NOT TO SCALE



Date: 06/25/02 Created by John Kmiec

WR-369A MONITOR WELL CONSTRUCTION

WR-369A

LOG OF WELL

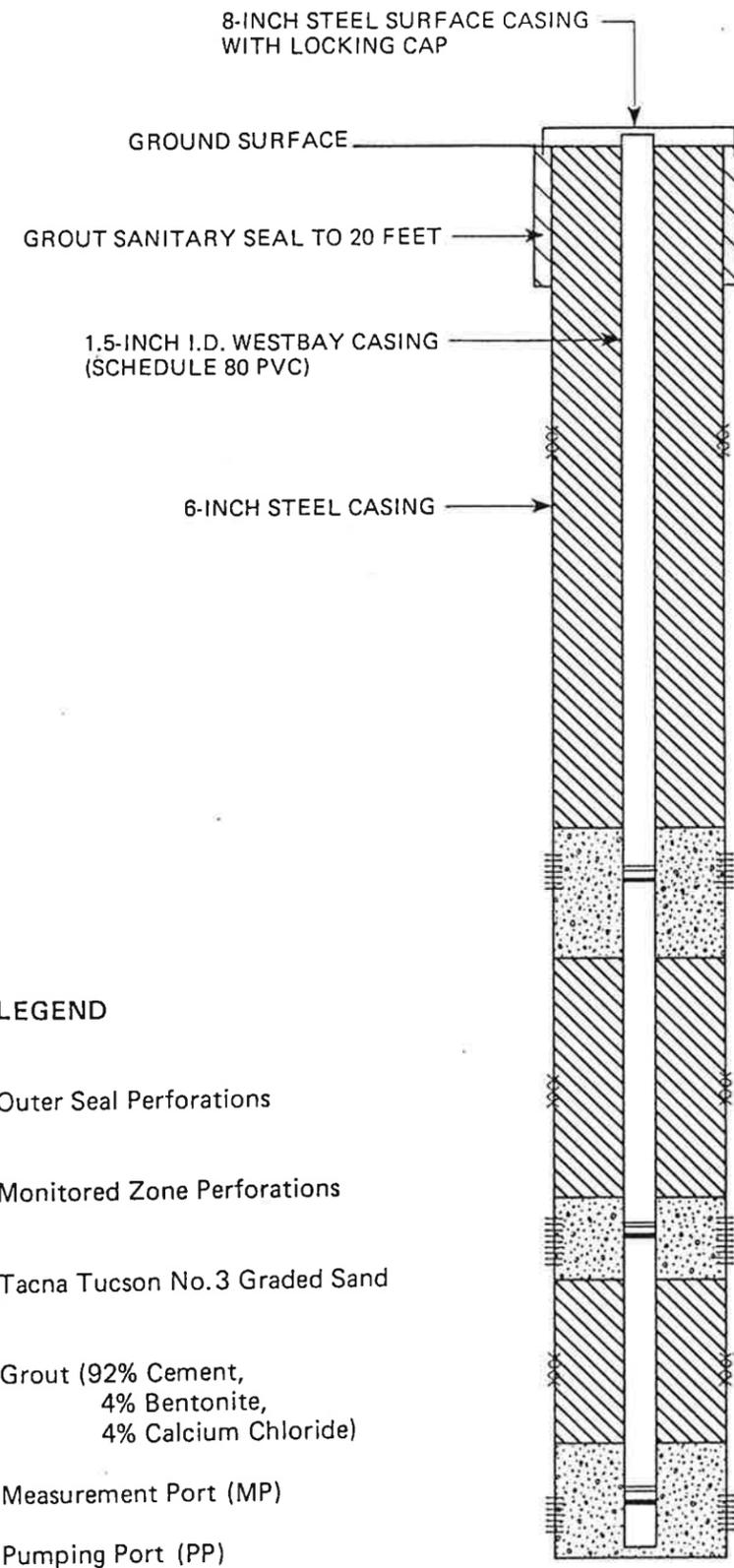
Indicate depth at which water was first encountered, and the depth and thickness of water bearing beds. If water is artesian, indicate depth at which encountered, and depth to which it rose in well.

From (feet)	To (feet)	Description of formation material
0	7	Fine To med sand
7	17	Clayey Fine sand
	32.5	med. Bun. Sandy Gneissic Gravel
32.5	34	yellowish coarse sand.
34	44	coarse sandy gravel
44	215	Basin Fill Bun To Reddish Bun.
		Clayey. Coarse sandy Volcanic
		Gravel occ. COBBLE.

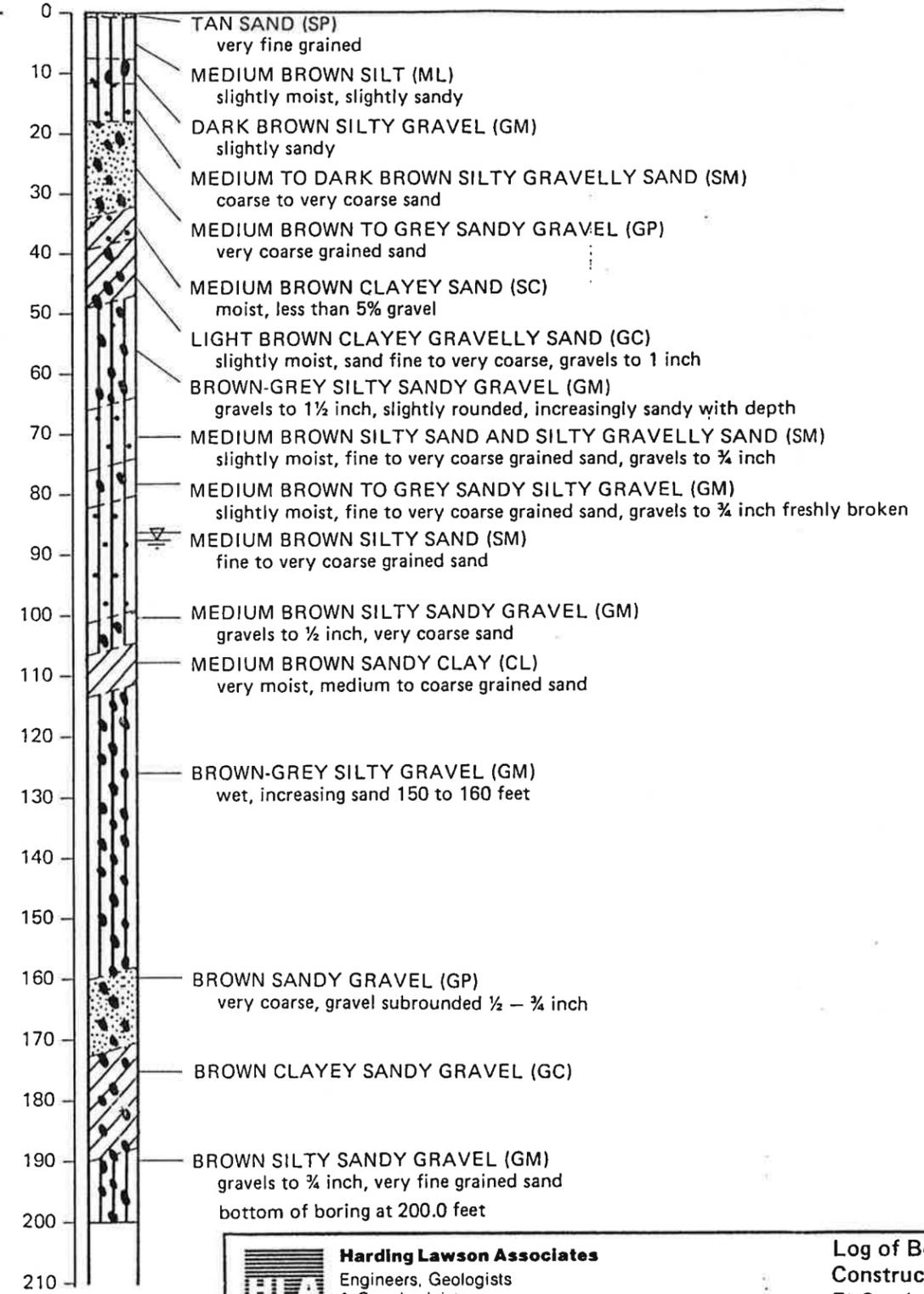
I hereby certify that this well was drilled by me (or under by supervision), and that each and all statements herein contained are true to the best of my knowledge and belief.

Driller Name: THF DRILLING, INC.
 2420 SOUTH 16TH AVENUE
 Street
 PHOENIX, AZ 85007-4403
 City State Zip Phone No.
 Signature of Driller  Date 5-1-01

Equipment SCHRAMM ROTADRILL
 Elevation 2230.11 feet Date 9/4/84



DEPTH BELOW
GROUND
SURFACE (feet)
SAMPLE



LEGEND

- xxx Outer Seal Perforations
- ||||| Monitored Zone Perforations
- Tacna Tucson No. 3 Graded Sand
- ▨ Grout (92% Cement, 4% Bentonite, 4% Calcium Chloride)
- Measurement Port (MP)
- Pumping Port (PP)
- ▽ Average Water Level, July 1985 to January 1986

MP AT 103 FEET
PP AT 105 FEET

MP AT 155 FEET
PP AT 157 FEET

MP AT 192 FEET
PP AT 194 FEET

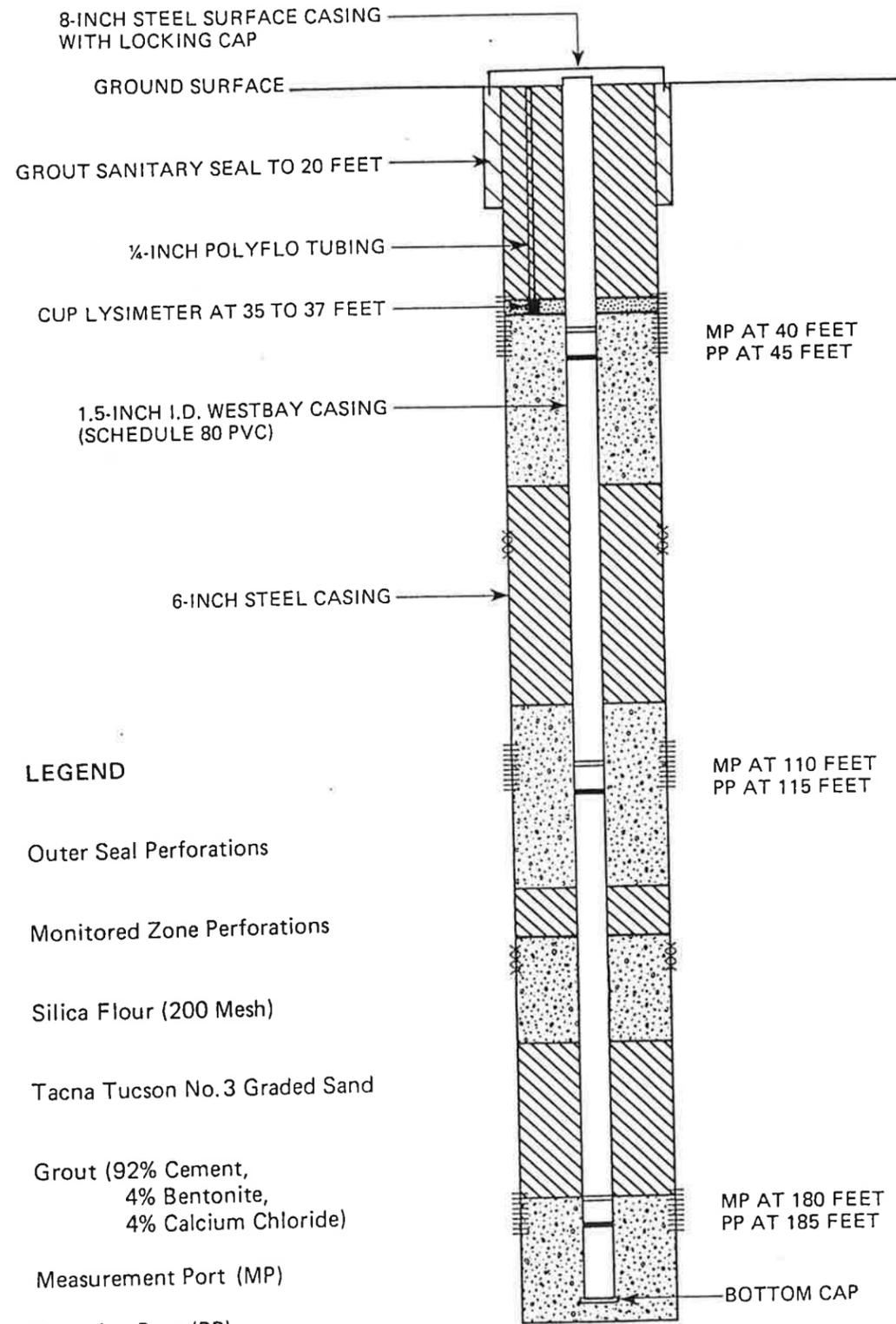
Harding Lawson Associates
 Engineers, Geologists & Geophysicists

Log of Boring CDC W1 with Construction Diagram of Well
 El Camino del Cerro Landfill
 Pima County, Arizona

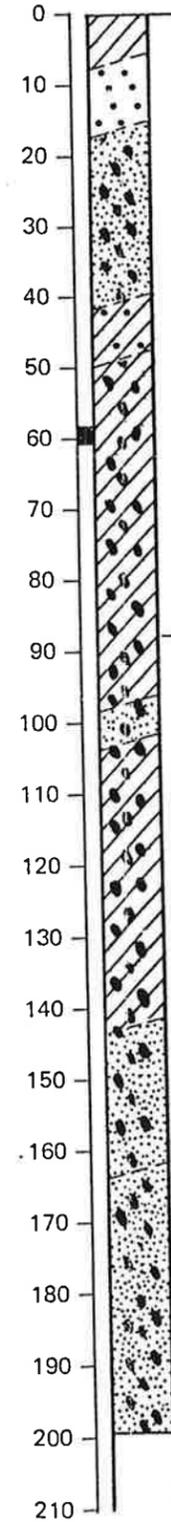
PLATE **II-12**

DRAWN ML	JOB NUMBER 17,144,008.02	APPROVED MLR	DATE 2/86	REVISED	DATE
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Equipment SCHRAMM RÖTADRILL
 Elevation 2232.61 feet Date 10/3/84



DEPTH BELOW GROUND SURFACE (feet)
 SAMPLE



DARK BROWN SANDY SILTY CLAY (CL)
 slightly moist, some gravel

BROWN GRAVELLY SAND (SW)
 slightly moist, fine to coarse

GREY SANDY GRAVEL (GP)
 dry, gravel subangular to 3/4 inch, some fine to coarse sand

BROWN CLAYEY GRAVELLY SAND (SC)
 moist, gravel to 2 inch

BROWN SANDY CLAYEY GRAVEL (GC)
 slightly moist

GREY GRAVEL (GP)
 wet, clean, broken to 3/4 inch, coarse sand or broken to 1/8 inch

BROWN CLAYEY SANDY GRAVEL (GC)
 moist, gravel to 1/2 inch, broken, decreasing sand with depth

GREY-GREEN SANDY GRAVEL (GP)
 clean

GREY SANDY GRAVEL (GW)
 wet, gravel to 2 inch

bottom of boring at 199.0 feet

LEGEND

- xxx Outer Seal Perforations
- ||||| Monitored Zone Perforations
- [Stippled Box] Silica Flour (200 Mesh)
- [Dotted Box] Tacna Tucson No. 3 Graded Sand
- [Hatched Box] Grout (92% Cement, 4% Bentonite, 4% Calcium Chloride)
- [Horizontal Line] Measurement Port (MP)
- [Vertical Line] Pumping Port (PP)
- [Water Level Symbol] Average Water Level, July 1985 to January 1986

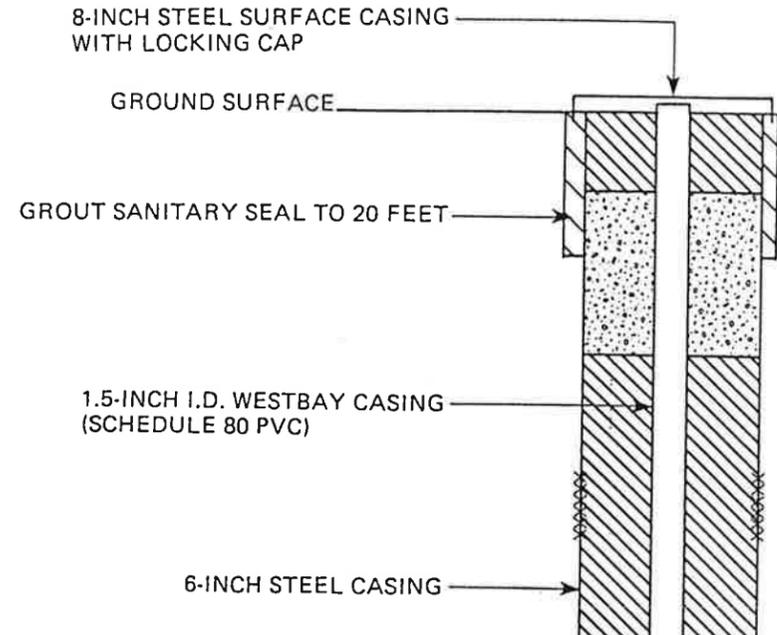
Harding Lawson Associates
 Engineers, Geologists
 & Geophysicists

Log of Boring CDC W2 with
 Construction Diagram of Well
 El Camino del Cerro Landfill
 Pima County, Arizona

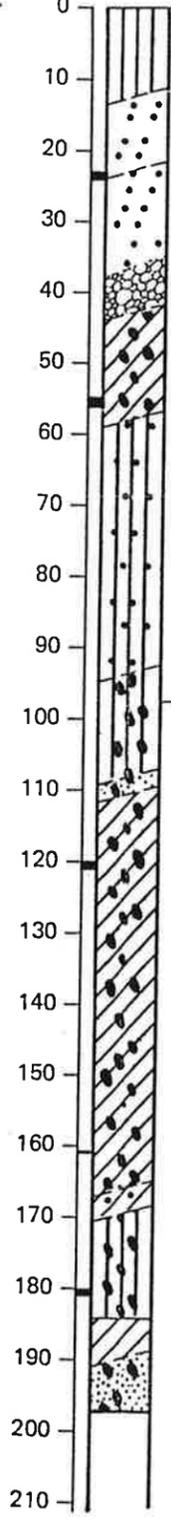
DRAWN ML:	JOB NUMBER 17,144,008.02	APPROVED ADR	DATE 2/86	REVISED	DATE
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Equipment SCHRAMM ROTADRILL
 Elevation 2242.46 feet Date 7/17/84



DEPTH BELOW
GROUND
SURFACE (feet)
SAMPLE



0 DARK BROWN SANDY CLAYEY SILT (ML)
soft, moist, with trace small gravel

10 GREY-BROWN COARSE SAND (SW)
medium to coarse grained, trace silt

20 GREY-BROWN GRAVELLY SAND (SW)
very dry, some cobbles

30 cobbles and boulders at 37.0 feet
water encountered in cobbles and boulders at 39.0 feet

40 BROWN CLAYEY GRAVEL (GC)
moist, some silt and coarse sand

50 BROWN SILTY SAND (SM)
slightly moist, coarse, gravel layer 73 feet to 74 feet

60

70

80

90

100 BROWN SILTY GRAVEL (GM)
moist

110 BROWN-GREY GRAVEL (GW)
wet

120 BROWN-GREY CLAYEY GRAVEL AND CLAYEY SANDY GRAVEL (GC)
wet

130

140

150

160 CLAYEY SAND (SC)
coarse sand

170 BROWN SILTY GRAVEL (GM)

180 BROWN SANDY CLAY (CL)
some coarse sand and gravel

190 BROWN SANDY GRAVEL (GW)
very wet
bottom of boring at 197 feet

200

210

MP AT 115.5 FEET
PP AT 120.5 FEET

MP AT 165.5 FEET
PP AT 170.5 FEET

MP AT 190.5 FEET
PP AT 192.5 FEET

LEGEND

- xxx Outer Seal Perforations
- ||||| Monitored Zone Perforations
- ▒ Tacna Tucson No. 3 Graded Sand
- ▨ Grout (92% Cement, 4% Bentonite, 4% Calcium Chloride)
- ▭ Measurement Port (MP)
- ▬ Pumping Port (PP)
- ▽ Average Water Level, July 1985 to January 1986

Harding Lawson Associates
 Engineers, Geologists
 & Geophysicists

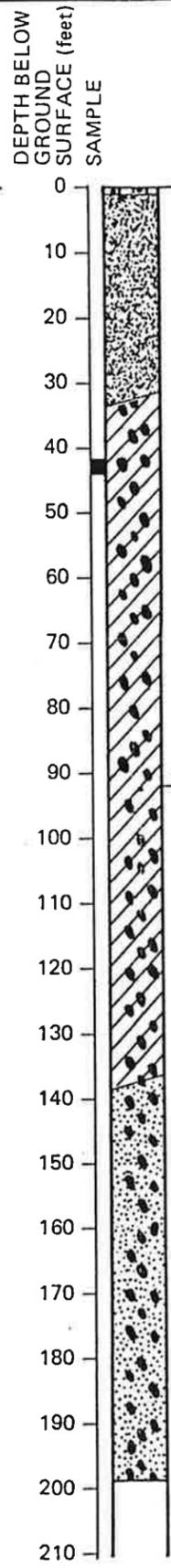
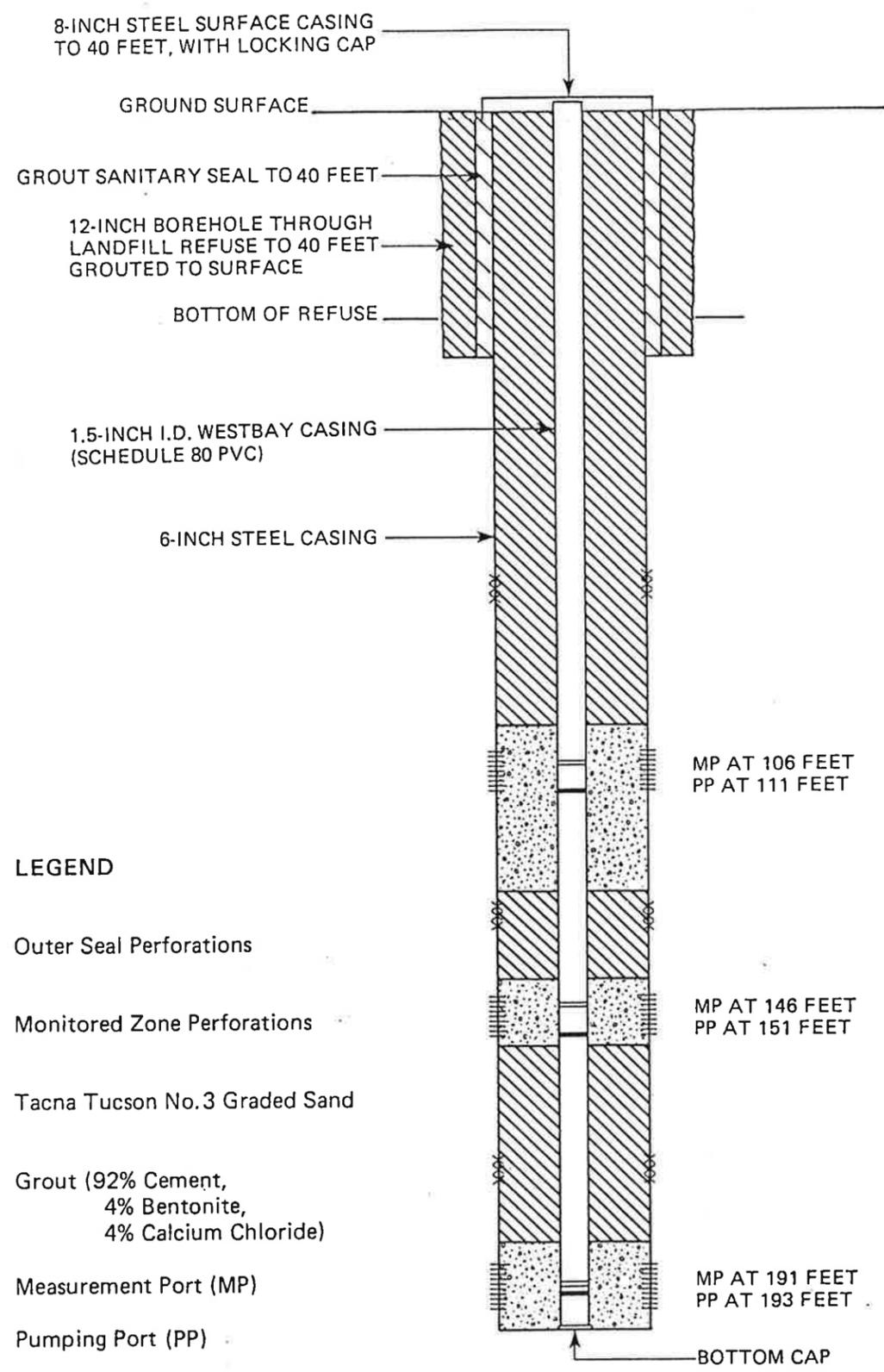
**Log of Boring CDC W3 with
 Construction Diagram of Well**
 El Camino del Cerro Landfill
 Pima County, Arizona

PLATE

11-13

DRAWN ML	JOB NUMBER 17,144,008.02	APPROVED ADR	DATE 2/86	REVISED	DATE
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Equipment SCHRAMM ROTADRILL
 Elevation 2237.26 feet Date 10/17/84



0 BROWN SILTY SAND (SM) slightly moist

10 REFUSE (paper products, plastic)

20

30

40 BROWN CLAYEY GRAVEL (GC) slightly moist

50

60

70

80

90

100

110

120

130

140 BROWN TO GREY-BROWN GRAVEL (GW) wet, some sand and clay, gravel angular to 1/4-inch diameter

150

160

170

180

190

200 bottom of boring at 198 feet

210

LEGEND

- xxx Outer Seal Perforations
- ||||| Monitored Zone Perforations
- Tacna Tucson No. 3 Graded Sand
- Grout (92% Cement, 4% Bentonite, 4% Calcium Chloride)
- Measurement Port (MP)
- Pumping Port (PP)
- Average Water Level, July 1985 to January 1986

Harding Lawson Associates
 Engineers, Geologists
 & Geophysicists

Log of Boring CDC W4 with
 Construction Diagram of Well
 El Camino del Cerro Landfill
 Pima County, Arizona

PLATE

11-14

DRAWN ML	JOB NUMBER 17,144,008.02	APPROVED ADR	DATE 2/86	REVISED	DATE
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Equipment Drill Systems Reverse Air
 Elevation Not Surveyed Date 4/14/86

BROWN SILTY GRAVELLY SAND (SP)
 fine to medium sand, gravel 1/2 in. to 3/4 in.

DARK BROWN SAND (SW) – slightly moist, medium- to coarse-grained

DARK BROWN GRAVELLY SAND (SP)
 slightly moist, medium to coarse sand, gravel from 1/2 in. to 2 in., rounded

at 34 ft. color change to brown, cobbles to 5 in. diameter

at 38 ft. becomes finer grained

BROWN CLAYEY GRAVEL (GC) – slightly moist

GRAY-BROWN SILTY GRAVELLY SAND (SP) – slightly moist, fine to coarse sand, gravel to 1/2 in.

BROWN SILTY SANDY GRAVEL (GP)
 slightly moist, less sand than above, gravel 1/2 in. to 2 in.

water level, April 1986

BROWN SILTY GRAVELLY SAND (SP)
 wet, fine to coarse sand, gravel to 1 in.

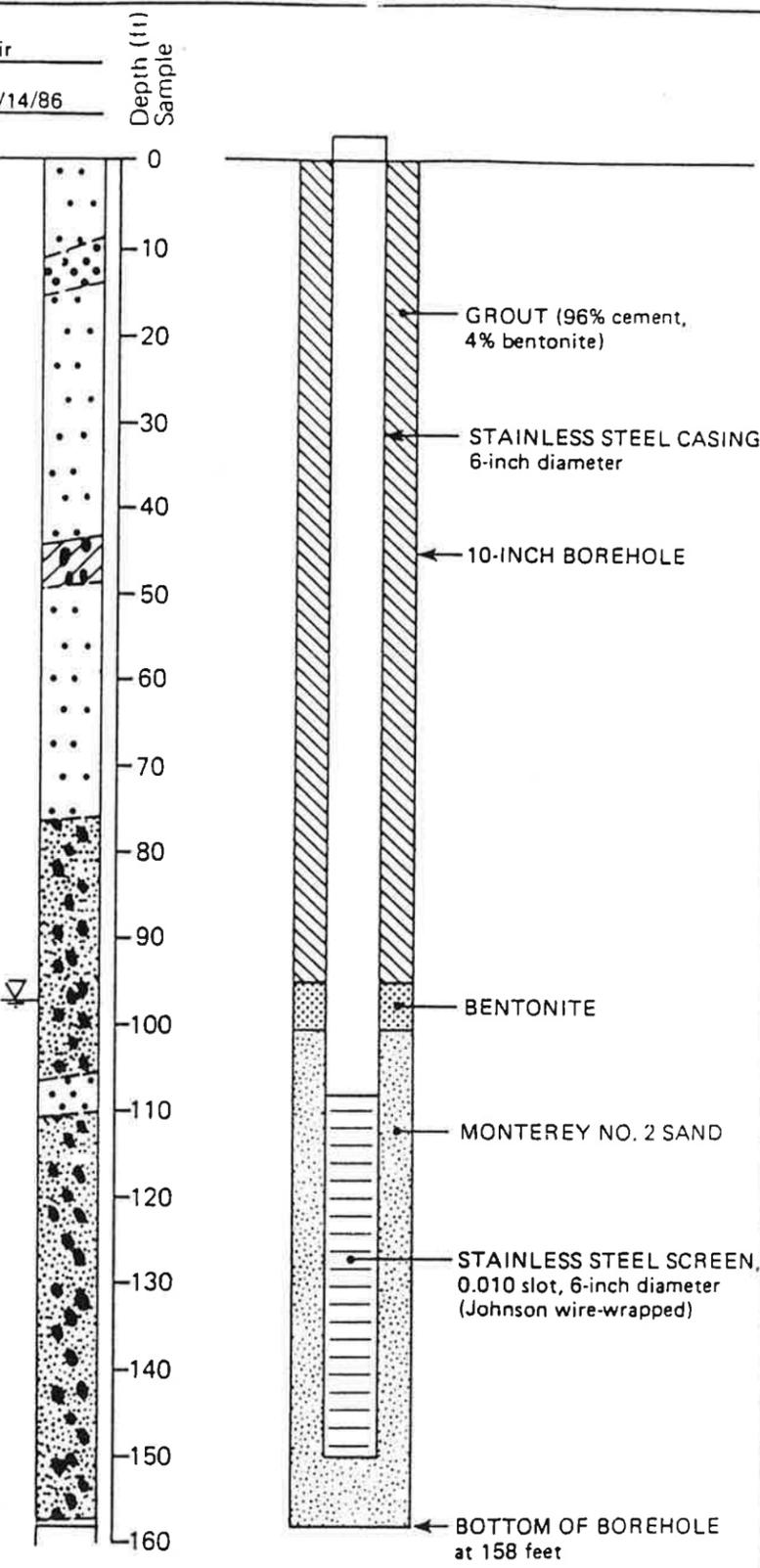
BROWN GRAVEL (GP) – subangular to 1 in., some cobbles, some silt

at 130 ft., color change to gray-green, increased sand

at 146 ft., color change to gray, increased gravel and silt

at 158 ft., color change to brown, increased silt content

bottom of borehole at 158 ft.



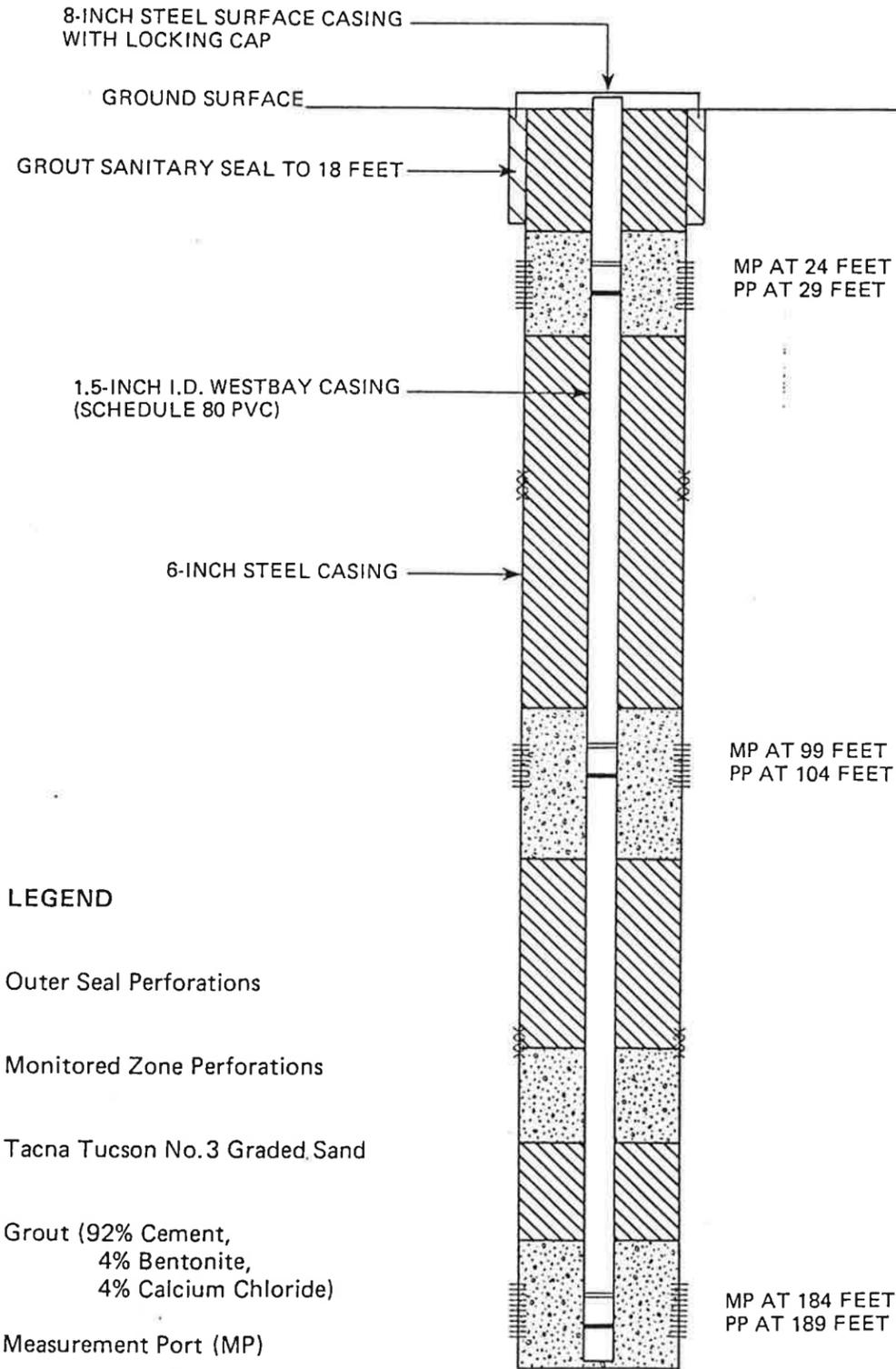
HLA Harding Lawson Associates
 Engineers, Geologists
 & Geophysicists

Log of Boring CDCW5 with Construction
 Diagram of Well
 El Camino del Cerro Landfill
 Pima County, Arizona

II-17

JOB NUMBER 17,144,008.02 APPROVED *AMR* DATE 6/86 REVISED DATE

Equipment SCHRAMM ROTADRILL
 Elevation 2228.13 feet Date 9/12/84



DEPTH BELOW GROUND SURFACE (feet)
 SAMPLE

0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210

BROWN SAND (SP)
dry, very fine, some gravel, some silt from 10 to 20 feet

GREY SANDY GRAVEL (GW)
slightly moist
wet cuttings

BROWN SANDY CLAYEY GRAVEL (GC)
very moist, gravel to 1/2-inch diameter

wet cuttings

GREY SANDY GRAVEL (GW)
wet, medium to coarse sand, angular to 2-inch diameter

bottom of boring at 200 feet

LEGEND

- ⊗ Outer Seal Perforations
- ||||| Monitored Zone Perforations
- ▒ Tacna Tucson No. 3 Graded Sand
- ▨ Grout (92% Cement, 4% Bentonite, 4% Calcium Chloride)
- Measurement Port (MP)
- Pumping Port (PP)
- ▽ Average Water Level, July 1985 to January 1986

Harding Lawson Associates
 Engineers, Geologists
 & Geophysicists

Log of Boring CDC W9 with
 Construction Diagram of Well
 El Camino del Cerro Landfill
 Pima County, Arizona

PLATE

11-15

DRAWN ML	JOB NUMBER 17,144,008.02	APPROVED ADR	DATE 2/86	REVISED	DATE
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TABLE 6D-4

LITHOLOGIC LOG FOR MONITOR WELL CDC-W10

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 6	FILL	Dark brown, gravelly sand and cobbles, some silt and clay dry.
6 - 18	FILL	Dark brown, silty coarse sand, some gravel, poorly sorted, dry, organic odor.
18 - 26	SAND	Light brown, fine to coarse sand, some silt, well sorted.
26 - 39	GRAVELLY SAND	Light brown, gravelly sand, some cobbles and boulders, poorly sorted.
39 - 41	SANDY CLAY	Light brown to white, silty clay, fine to very fine sand, low plasticity.
41 - 52	CLAYEY SILTY SAND	Light brown, fine to coarse sand, poorly sorted, with silty matrix, trace clay, trace cobbles.
52 - 65	GRAVELLY SAND/SANDY GRAVEL	Light grey, fine to coarse sand, gravel to 1-inch, trace cobbles, poorly sorted, trace clay.
65 - 84	SILTY GRAVELLY SAND	Light brown to grey, fine to coarse sand, poorly sorted, trace clay.
84 - 135	SILTY GRAVELLY SAND	Light brown, fine to coarse sand, gravel to ½-inch, poorly sorted, trace sandy clay. At 121-123 feet, cobbles.
135 - 165	SILTY SAND	Light brown to light grey, fine to medium sand, some gravel, in loose silty matrix, poorly sorted.
TOTAL DEPTH OF BOREHOLE: 165 FEET		

TABLE 6D-5

LITHOLOGIC LOG FOR MONITOR WELL CDC-W11

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 8	SANDY GRAVEL	Dark brown, poorly sorted sand, some clay and silt, some cobbles.
8 - 10	CLAYEY SAND	Dark brown, some gravel, cohesive.
10 - 15	CLAYEY SILTY SAND	Dark brown, some gravel.
15 - 20	SILTY SAND	Dark brown, some gravel, cobbles. At 17 feet.
20 - 31	GRAVELLY SAND AND COBBLES	Light brown, medium to very coarse sand, cobbles, some boulders, trace silt and sand, saturated at 27 feet, organic odor.
31 - 37	SANDY GRAVEL AND COBBLES	Brown, fine to coarse gravel, fine to very coarse sand, cobbles to 10-inches, some silt and clay, cobbles decreasing with depth.
37 - 42	CLAYEY SILTY SAND SAND AND GRAVEL	Light brown, sand, gravel to ½-inch.
42 - 80	GRAVELLY SILTY SAND	Light brown, fine to very coarse sand, gravel to ½-inch, clayey silt matrix, trace cobbles.
80 - 103	GRAVELLY SILTY SAND	Dark brown, fine to very coarse sand, some clay; clayey silt matrix, trace cobbles at 89 feet, 93 feet, increasing gravel and cobbles 97-100 feet.
103 - 124	SILTY GRAVELLY SAND	Light brown, fine to coarse sand, gravel to ½-inch trace cobbles, clayey silt matrix. At 116 feet, cobbles.
124 - 130	SILTY SAND AND GRAVEL	Light brown, fine to very coarse sand, gravel to ½-inch, increasing silt in matrix.
130 - 179	SILTY SAND	Light brown, fine to very coarse sand, some fine to medium gravel in silty matrix, some clay. At 140 feet, increasing clayey silt. At 157 and 164 feet, cobbles
TOTAL DEPTH OF BOREHOLE: 179 FEET		

TABLE 6D-6

LITHOLOGIC LOG FOR MONITOR WELL CDC-W12

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 5	SANDY SILT	Light brown, poorly sorted, some gravel.
5 - 15	CLAYEY SILT	Dark brown, trace of sand.
15 - 20	CLAYEY SANDY GRAVEL	Dark brown, coarse, poorly sorted sand with very cohesive clumps of brown clay.
20 - 35	SILTY SANDY GRAVEL	Dark brown, fine to coarse sand, trace of cobbles at 27 feet below land surface.
35 - 44	BOULDERS/COBBLES	
44 - 95	SANDY SILTY GRAVEL	Dark brown, poorly sorted. At 67 feet, gravel then increasing silt and fine sand.
95 - 100	SILTY CLAYEY SAND	Dark brown, very fine to coarse sand, trace of gravel.
100 - 122	SAND	Dark brown, very fine to coarse sand, trace of silty clay. At 114 feet, cobbles/gravel. At 118 feet, increasing gravel.
122 - 128	GRAVELLY SAND	Dark brown, very fine to coarse sand, fine gravels.
128 - 167	SILTY GRAVELLY SAND	Dark brown, very fine to coarse sand, predominately coarse, some fine gravels and trace of clay, cobbles at 167 feet.

TOTAL DEPTH OF BOREHOLE: 167 FEET

TABLE 6D-7
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W13

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 5	FILL	Dark brown, gravelly sand, some silt and clay.
5 - 10	SANDY SILTY CLAY	Dark brown, fine to very fine sands, slight clay content.
10 - 15	SANDY SILTY GRAVEL	Dark brown, very fine to coarse sand, trace of clay.
15 - 18	SILTY CLAY	Light brown, very fine to fine, silty matrix, slightly cohesive clay.
18 - 20	CLAY	Brown, dense, cohesive clay, soft.
20 - 27	GRAVELLY CLAYEY SAND	Brown, fine to coarse sand, gravels to 1-inch, clay is soft and cohesive, some silt.
27 - 47	GRAVELLY SAND WITH COBBLES	Brown, predominately coarse sand, gravel to 1-inch rounded trace cobbles. At: 36 feet, cobbles.
47 - 70	GRAVELLY SILTY SAND	Dark brown, very fine to coarse sand, gravels to 1/2-inch, predominately coarse sand, trace silty clay.
70 - 90	SAND/SILTY SAND	Dark brown, predominately coarse sand, some very fine to fine sand, trace gravel in silty matrix, trace clay.
90 - 125	CLAYEY SILTY SAND	Light brown, predominately coarse sand, fine gravel in silty clay matrix, trace coarse gravel/cobbles. From: 98-100 feet, cobbles. At: 102 feet, cobbles. At: 105 feet, cobbles. At: 112 feet, cobbles.

**TABLE 6D-7
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W13**

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
125 - 185	SILTY SAND WITH GRAVEL	Dark brown, predominately coarse sand. At 130 feet, cobbles/gravel decreasing fines. At 131 feet, silty matrix. At 137 feet, cobbles. At 153 feet, cobbles. At 173 feet, gravel lens.
TOTAL DEPTH OF BOREHOLE: 185 FEET		

TABLE 6D-8

LITHOLOGIC LOG FOR MONITOR WELL CDC-W14

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 22	SILT	Light brown, fine sand, trace clay. At 9 feet, gravel.
22 - 33	SILT SAND	Light brown, fine to very fine sand.
33 - 60	SANDY GRAVEL AND COBBLES	Light brown, fine to very fine sand.
60 - 110	GRAVELLY SAND	Brown, fine to medium sands.
110 - 169	SILT SANDY GRAVEL	Brown to red brown, fine to medium sand, gravel to 1/2-inch, trace clay and silt. At 119 feet, cobbles. At 139 feet, large cobbles. At 145 feet, minor sandy clay streaks. At 146 feet, increasing clay streaks, no distinctive bed or lens.
169 - 192	SANDY GRAVEL	Light brown, decrease in clayey sand streaks, some cobbles.
192 - 195	GRAVELLY CLAYEY SAND	Light brown, coarse sand, gravel to 1/2-inch, loose matrix, trace cobbles.
TOTAL DEPTH OF BOREHOLE: 195 FEET		

TABLE 6D-9

LITHOLOGIC LOG FOR MONITOR WELL CDC-W15D

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 4	SANDY CLAY/CLAYEY SAND	Dark brown, fine to medium sand, firm, slightly cohesive clay, odor present.
4 - 6	SAND	Dark brown, fine to medium, trace of clay, odor present.
6 - 20	SILTY GRAVELLY SAND	Dark brown, very fine to coarse sand, predominately coarse, trace clay (sandy). At 11 feet, boulders. At 16 feet, boulders.
20 - 38	SANDY GRAVEL WITH COBBLES	Dark brown, coarse sand, gravel to 1-inch angular grain shape. At 24 to 38 feet, boulders in matrix.
38 - 65	SILTY GRAVELLY SAND	Fine to coarse sand, predominately coarse, gravel to ½-inch, trace cobbles, silty matrix.
65 - 92	SILTY SANDY GRAVEL	Light brown, sand medium to coarse, gravel fine to coarse clayey silty matrix.
92 - 180	SILTY GRAVELLY SAND	Light brown, sand medium to very coarse gravel, fine to medium. At 114 feet, cobbly. At 128 feet, cobbly. At 130 feet, cobbly. At 132 feet, cobbly. At 147-148 feet, cobbly. At 161 feet, cobbly. At 167 feet, cobbly.
180 - 210	GRAVELLY SAND/SANDY GRAVEL	Some cobbles, minor silty to clayey fines in matrix sand medium to coarse gravels, fine to medium, increasing white volcanic clasts.

TABLE 6D-9

LITHOLOGIC LOG FOR MONITOR WELL CDC-W15D

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
210 - 275	SANDY GRAVEL	Gravel: fine to medium. Sand: coarse to very coarse, some cobbles. At 225 feet, cobbles (large). At 234 feet, cobbles (large). At 252 feet, cobbles. At 259 feet, cobbles (large). At 266 feet, cobbles.
275 - 280	N/A	Grout from pressure grouting conductor casing.
280 - 338	SILTY SANDY GRAVEL	Very fine to coarse sand, average gravel ½-inch, silty clay matrix, soft clay. At 280 feet, cobbles. At 308 feet, increase in percentage sandy clay interbeds. At 325 feet, cobbles (?). At 330 feet, cobbles. At 335 feet, cobbles.
TOTAL DEPTH OF BOREHOLE: 338 FEET		

**TABLE 6D-10
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W16**

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 23	SILT	Light brown, trace fine sand and clay. At 7 feet, gravel lens.
23 - 27	SILTY SAND WITH GRAVEL	Light brown, sand is medium to coarse, gravel fine to coarse.
27 - 51	SANDY GRAVEL AND COBBLES	Light brown, coarse sand, medium to coarse gravel, cobbles to 6-inches. At 35 feet, cobbles increasing in size and amount.
51 - 63	SANDY CLAY/CLAYEY SAND	Red brown, soft, cohesive, fine to coarse sand, some gravel.
63 - 70	SAND	Light brown, fine to coarse sand, light brown silty clay interbeds.
70 - 87	CLAYEY SAND/SILTY SAND	Dark brown to light brown, medium to coarse sand, poorly sorted, some gravel and silt, loose silty matrix, trace fine sand. At 83 feet, increasing clay. At 87 feet, cobble zone.
87 - 93	CLAYEY SAND	Light brown, fine to medium sand. At 92 feet, cobbles and gravel.
93 - 113	SILTY GRAVELLY SAND	Dark brown to grey, fine to coarse sand, poorly sorted, subangular, gravel to ½-inch, silty matrix, trace of clay in thin lens. At 113 feet, decrease in gravel.
113 - 124	SILTY SAND	Brown, predominately coarse sand, trace of clay.

**TABLE 6D-10
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W16**

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
124 - 194	SILTY GRAVELLY SAND	Brown, fine to coarse sand, gravel to ½-inch, silty clay matrix. At 157 feet, increasing clay. At 161 feet, decreasing clay. At 166 feet, gravel 3-6 inches. From 172-174 feet, cobbles.
TOTAL DEPTH OF BOREHOLE: 194 FEET		

CDC-W17

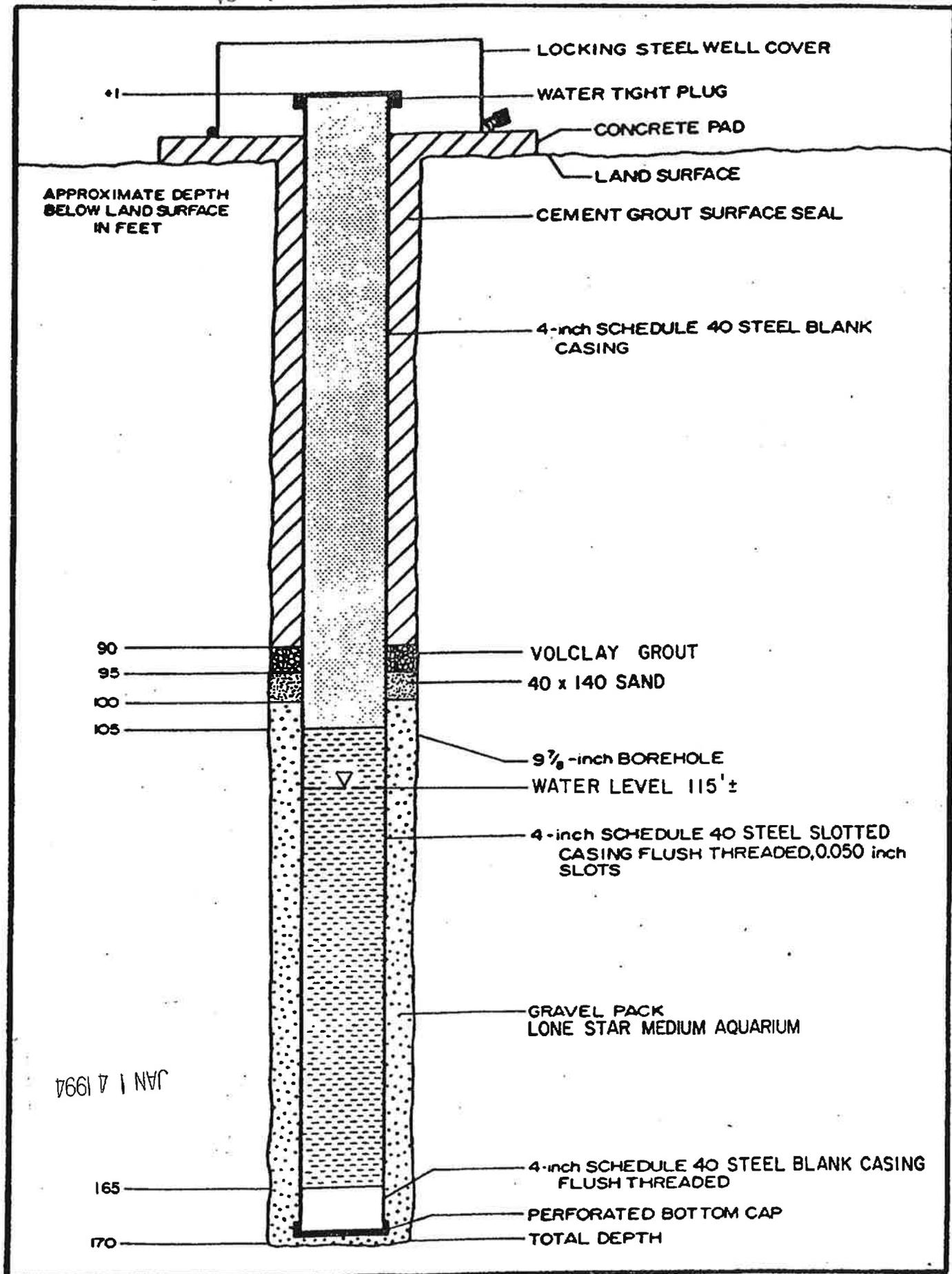


FIGURE 2
SCHEMATIC CONSTRUCTION DIAGRAM
FOR SHALLOW MONITOR WELLS

TABLE 6D-11
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W17

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 9	SILTY SAND/SANDY SILT	Dark brown, moist, sand is predominantly very fine to fine grained, contains some weak caliche cementation as veinlets.
9 - 11	SILTY SAND	Brown, very slightly moist, sand is medium to coarse grained, contains some gravel and small cobbles.
11 - 25	SANDY SILT/SAND	Light brown, very slightly moist, compact, sand is very fine to fine grained.
25 - 34	SAND	Light brown, dry, loose, sand is fine to very coarse grained, contains minor fine and medium size gravel. Below 31 feet: contains some clasts up to 3-inches in size.
34 - 38	GRAVELLY SAND	Greyish brown, dry, sand is fine to very coarse grained, gravel is predominately fine, some coarse gravel and cobbles to 6-inches in size.
38 - 43	GRAVEL AND COBBLES	Greyish brown, dry, fine to coarse gravel and cobbles up to about 8-inches in size, contains some sand and silt in matrix. At 40 feet: boulder.
43 - 53	GRAVELLY SAND w/SILT	Light greyish brown, dry to slightly moist, compact, interbedded/graded mixture, sand is fine to very coarse grained, gravel is fine to coarse size. At 44 feet: some weak caliche cementation. At 48 feet: some caliche cementation.
53 - 61	SILTY GRAVELLY SAND w/COBBLES	Light greyish brown, dry to slightly moist, compact, graded mixture, sand is fine to very coarse grained, gravel is fine to coarse sized, contains variable cobbles estimated up to 8-inches in size, grades to sandy gravel in part.
61 - 68	SILTY GRAVELLY SAND	Light brown, slightly moist, sand is fine to very coarse, gravel is fine to medium size.
68 - 69.5	SILTY SAND	Light brown, slightly moist, compact, sand is very fine to medium grained.
69.5 - 71	SILTY GRAVELLY SAND	Light brown, slightly moist, sand is fine to coarse grained, gravel is fine, silt is in matrix or as thin interbeds.
71 - 73	SILTY SAND	Light brown, slightly moist, dense, sand is very fine to medium grained.

**TABLE 6D-11
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W17**

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
73 - 81	SILTY SAND w/GRAVEL	Light greyish brown, slightly moist, sand is very fine to medium grained, gravel is fine overall, contains some coarse gravel and trace small cobbles to about 5-inches in size.
81 - 85	SILTY SAND	Light brown, slightly moist, sand is very fine to medium grained, minor fine gravel.
85 - 89	SILTY GRAVELLY SAND	Light brown, slightly moist, sand is fine to coarse grained, some very coarse sand, gravel is fine.
89 - 91	SANDY GRAVEL	Light greyish brown, slightly moist, gravel is fine to coarse, sand is coarse, contains some fine sand and silt in matrix.
91 - 102	SILTY GRAVELLY SAND	<p>Light brown, slightly moist, sand is very fine to coarse grained, gravel is fine to coarse size, graded/interbedded mixture.</p> <p>At 93 feet: boulder, some caliche cementation.</p> <p>Below 96 feet: moist.</p> <p>Below 97 feet: decreased fines, moist to very moist, some cobbles to 6-inches in size.</p>
102 - 172	SANDY GRAVEL w/ COBBLES	<p>Light brown, very moist to wet, gravel is fine to coarse, sand is medium to very coarse, grades to gravelly sand in part, contains variable cobbles and some boulder size clasts.</p> <p>At 112 feet: silty sand interbed.</p> <p>At 113 feet: slight solvent-like odor.</p>
<p align="center">TOTAL DEPTH OF BOREHOLE: 172 FEET WELL COMPLETED: 02/11/94 STATIC WATER LEVEL: 104 FEET BELOW TOP OF WELL CASING (02/17/94)</p>		

JAN 14 1994

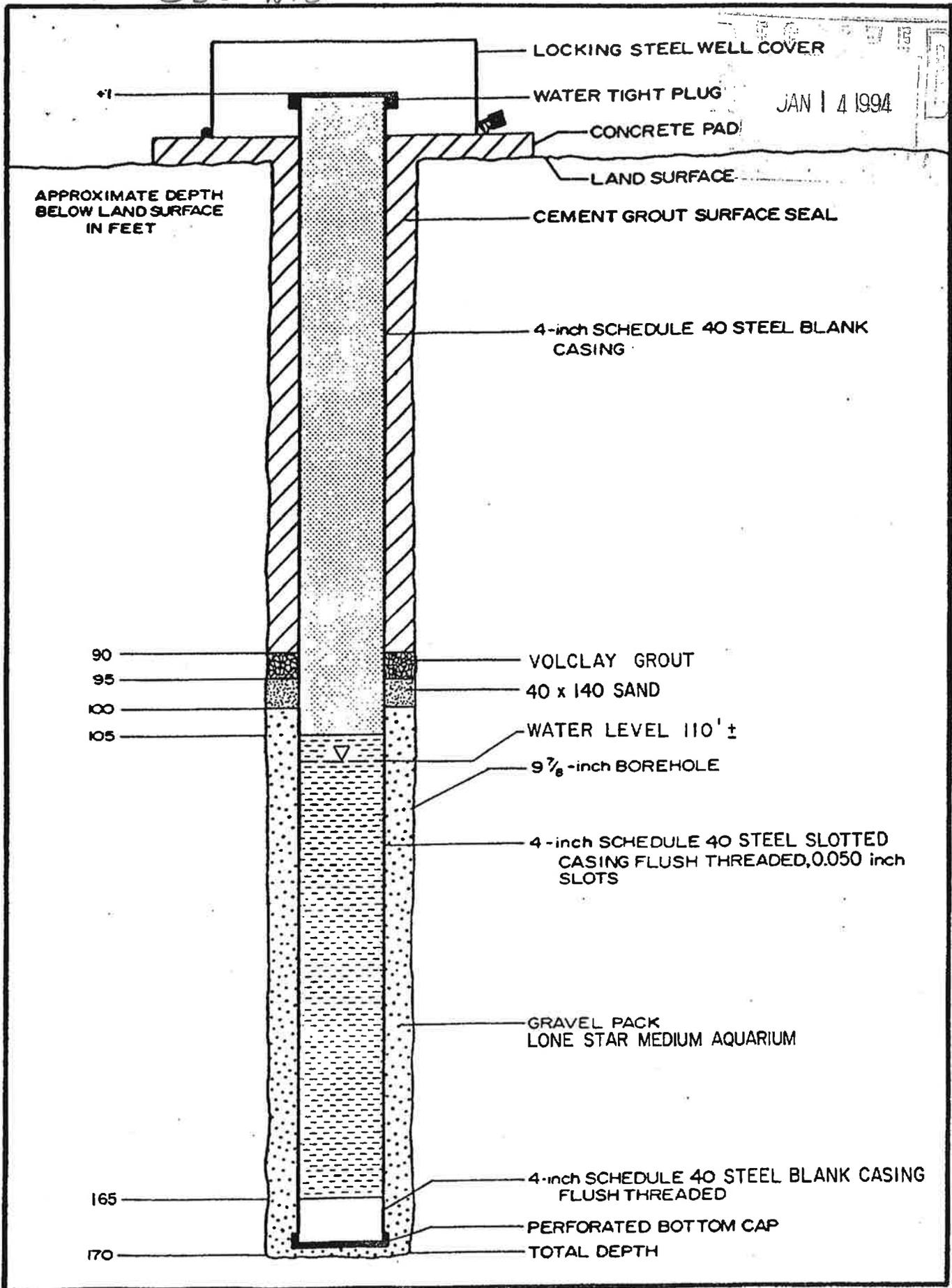


FIGURE 2
SCHEMATIC CONSTRUCTION DIAGRAM
FOR SHALLOW MONITOR WELLS

TABLE 6D-12
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W18

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 10	FILL	Concrete, bricks and construction debris with silty sand, gravel, and cobbles to depth of approximately 8-12 feet.
10 - 18	SANDY GRAVEL/ GRAVELLY SAND AND COBBLES	Light brown, slightly moist, sand is fine to very coarse, gravel is fine to coarse.
18 - 23	SAND	Light brown, moist, compact to loose, sand is medium to very coarse grained.
23 - 35	GRAVELLY SAND W/COBBLES AND BOULDERS	Light greyish brown, slightly moist, sand is fine to very coarse grained, gravel is fine to coarse size, graded mixture, variable content of cobbles, trace boulder size clasts, contains some silt.
35 - 54	SANDY GRAVEL w/COBBLES	Light brown, moist to very moist, gravel is predominately fine to medium size, sand is fine to very coarse, contains some silt as matrix or interbeds.
54 - 56	SILTY SAND	Light brown, slightly moist to moist, sand is fine to coarse grained, contains minor gravel.
56 - 80	SILTY GRAVELLY SAND	Light brown, slightly moist to dry, sand is fine to coarse grained, gravel is predominately fine, contains some coarse gravel and cobble size clasts. From 67 to 72 feet: contains some light brown to yellow brown silt and clayey silt interbeds.
80 - 100	GRAVELLY SILTY SAND	Light brown, slightly moist to moist, sand is fine to coarse grained, gravel is predominately fine.
100 - 126	GRAVELLY SAND/ SANDY GRAVEL	Light brown, very moist to wet, sand is fine to very coarse, gravel is fine to coarse, contains minor small cobbles, variable graded mixture.
126 - 151	SILTY SANDY GRAVEL	Light brown, wet, gravel is fine to coarse, sand is predominately medium to very coarse, some fine to very fine sand and silt, minor cobble size clasts. At 144 feet: increased fines as matrix or interbeds.
151 - 169	SANDY GRAVEL	Light brown, wet, gravel is fine to coarse, sand is predominately coarse to very coarse grained, contains some cobbles and trace boulder size clasts.

**TABLE 6D-12
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W18**

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
169 - 172	GRAVEL AND COBBLES	Light brown, wet, gravel is fine to coarse, contains minor sand.

**TOTAL DEPTH OF BOREHOLE: 172 FEET
WELL COMPLETED: 02/15/94
STATIC WATER LEVEL: 100 FEET BELOW TOP OF WELL CASING (02/17/94)**

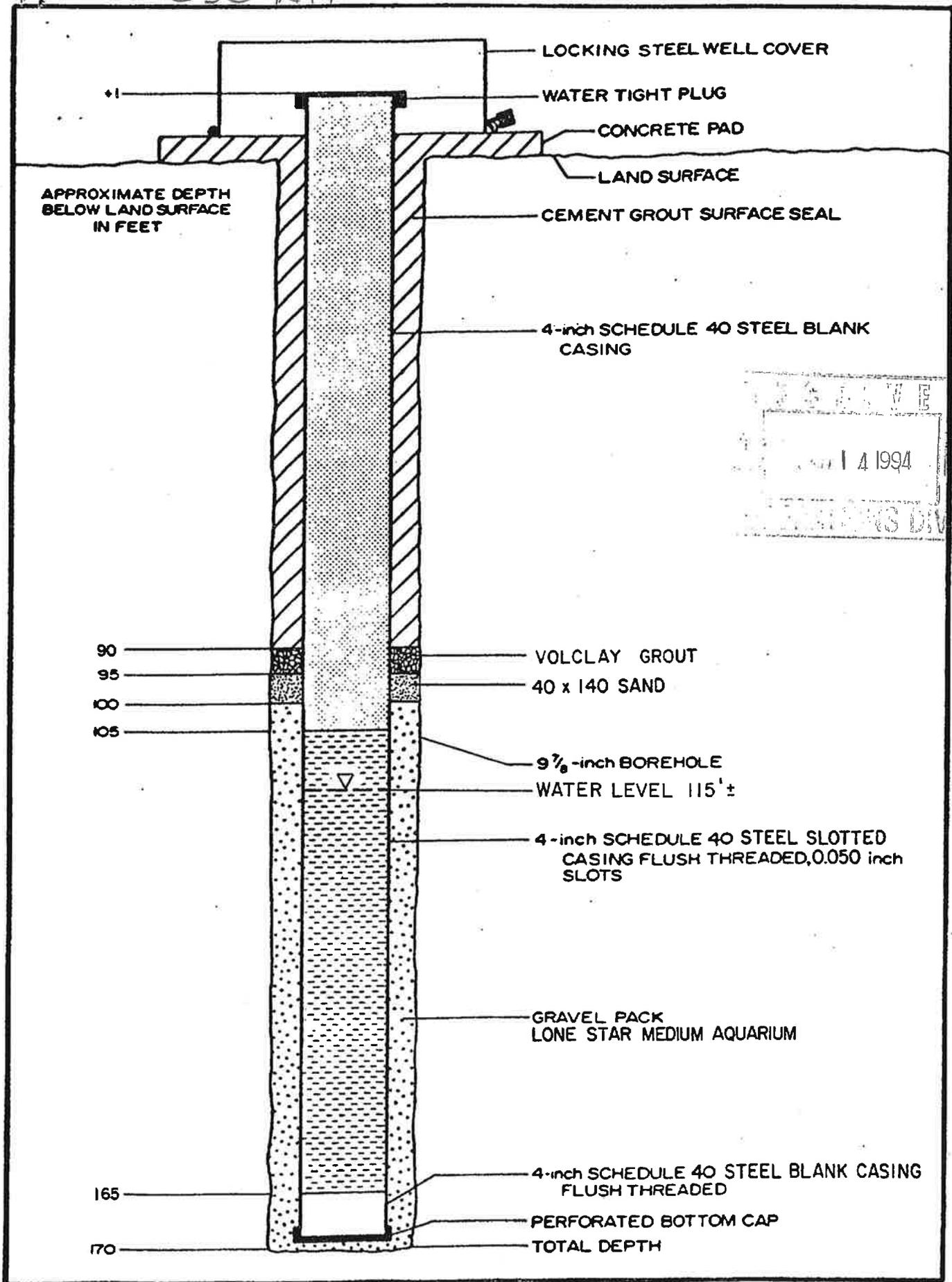


FIGURE 2
SCHEMATIC CONSTRUCTION DIAGRAM
FOR SHALLOW MONITOR WELLS

TABLE 6D-13
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W19

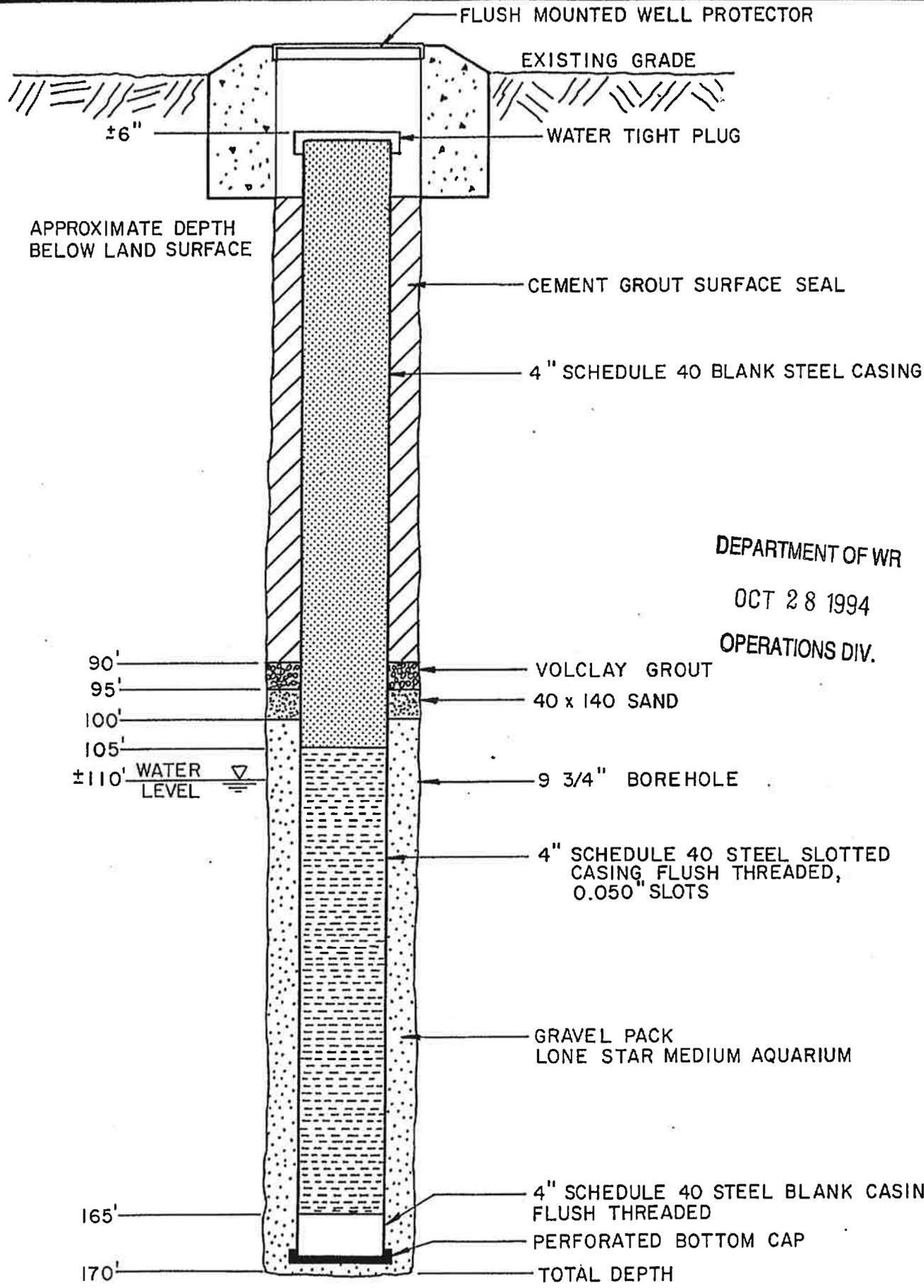
DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 1	CLAYEY SANDY SILT	Light brown, dry, sand is very fine to fine grained.
1 - 33	SANDY GRAVEL w/COBBLES	Greyish brown, moist, gravel is medium to coarse grained, gravel is fine to coarse sized, cobbles are up to 6-inches or more in size. At 22 feet: boulder.
33 - 61	GRAVELLY SAND	Light brown, sand is medium to very coarse grained, gravel is fine to medium size, contains some gravel and trace boulders. At 50 feet: cobble zone. At 57 feet: cobble zone, boulder.
61 - 98	SANDY GRAVEL	Light brown, gravel is predominately fine size, sand is predominately very coarse grained, contains fine to medium sand and silt as matrix. At 62 feet: coarse gravel and cobbles. At 68 feet: small cobbles. At 73 feet: cobbles At 86 feet: cobbles At 88 feet: cobbles Below 91 feet: increased medium to coarse size gravel
98 - 103	SAND	Light brown, sand is fine to very coarse grained, contains some fine to medium gravel and contains some silt as matrix.
103 - 126	GRAVELLY SAND	Light brown, sand is fine to very coarse grained, gravel predominately fine. At 113 feet: cobbles
126 - 157	SANDY GRAVEL	Light brown, gravel is fine to coarse size, predominately fine gravel overall, sand is predominately coarse.
157 - 175	GRAVELLY SAND	Light brown, sand is medium to very coarse, gravel is predominately fine.

TABLE 6D-13
(continued)
LITHOLOGIC LOG FOR MONITOR WELL CDC-W19

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
175 - 178	SANDY GRAVEL	Light brown, gravel is predominately fine, sand is coarse.

TOTAL DEPTH OF BOREHOLE: 178 FEET
WELL COMPLETED: 02/25/94
STATIC WATER LEVEL: 93 FEET BELOW TOP OF WELL CASING (03/11/94)

CDC-W20



159381

**MALCOLM
PIRNIE**

LESP 3
EL CAMINO DEL CERRO LANDFILL
SCHEMATIC CONSTRUCTION DIAGRAM
FOR SHALLOW MONITOR WELLS

MALCOLM PIRNIE, INC.

FIGURE 2

CDC - W20

CONCRETE COLLAR

STAINLESS STEEL FLUSH MOUNTED BOLT (TYP.)

TOP VIEW

FLUSH MOUNTED WELL PROTECTOR

FINISHED GRADE

18° TYP.

45°

EXISTING GRADE

CAST IRON COVER DEPARTMENT OF WR

OCT 28 1994

3" TYPICAL OPERATIONS DIV.

8.38"

9.53"

BUNA-N GASKET

GALVANIZED STEEL SKIRT

SIDE VIEW

NOT TO SCALE

MALCOLM PIRNIE

LESP 3

EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

159381

TABLE A-14

LITHOLOGIC LOG OF MONITOR WELL CDC-W20

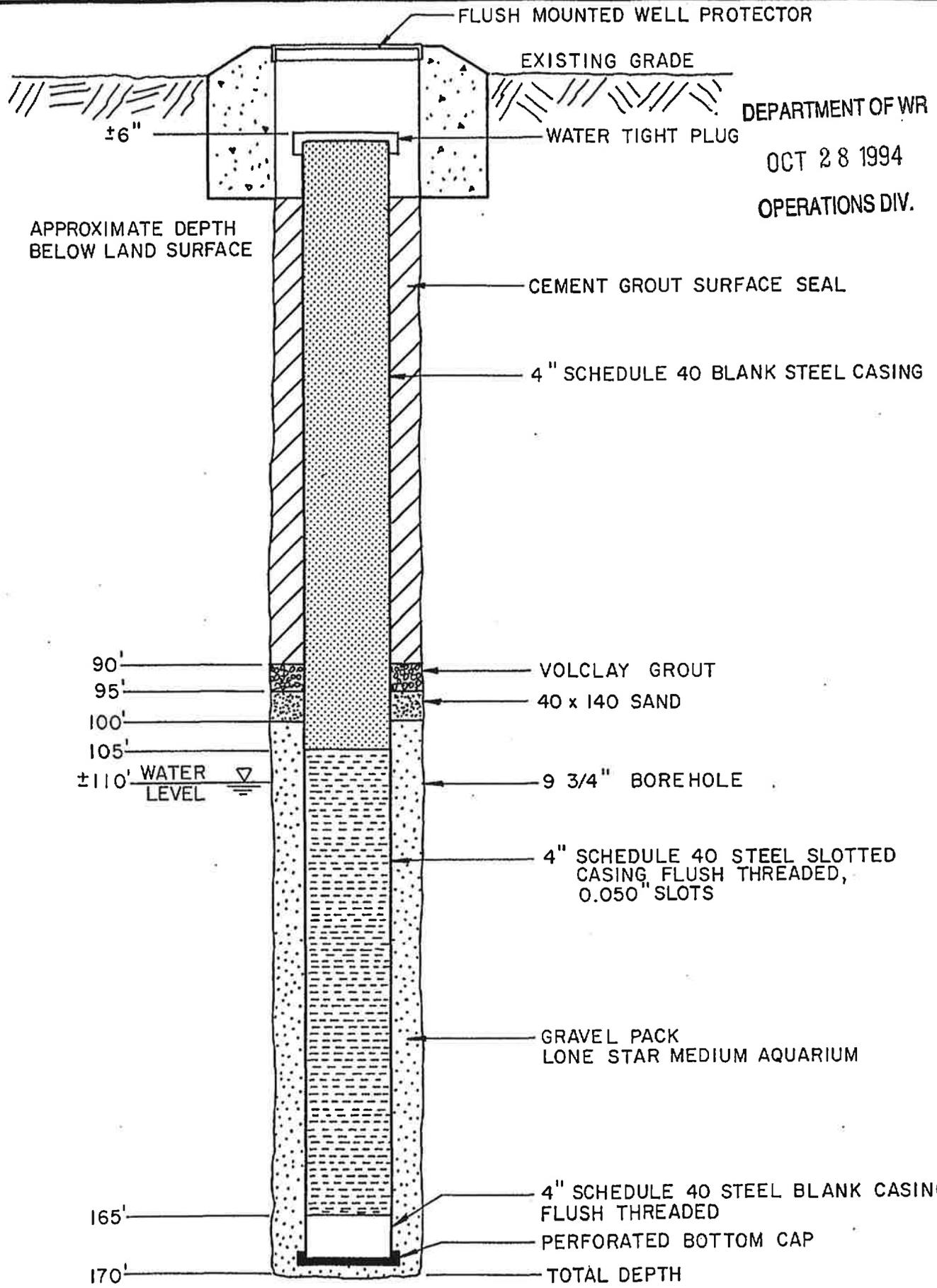
DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 12	SANDY SILT	Light brown, slightly moist, sand is very fine to medium grained, calcareous, some weak caliche cementation.
12 - 14	SAND	Light brown, dry, sand is medium to very coarse grained, contains some silt.
14 - 25	SILTY SANDY CLAY	Brown, dry, hard, sand is fine to medium grained, contains some weak caliche cementation and veinlets, sand content increases with depth, grades to clayey sand at 18 feet, contains some gravel size clasts.
25 - 27	SAND	Light brown, dry, loose, non-calcareous, sand is medium to very coarse grained.
27 - 38	GRAVELLY SAND	Light brown, sand is medium to very coarse grained, gravel is up to 1-inch in size, contains some coarse gravel and cobbles. At 35 feet: coarsens, contains large cobbles and boulders.
38 - 40	SILTY SAND	Brown, moist, sand is fine to very coarse grained, contains some fine gravel.
40 - 78	SAND/GRAVELLY SAND WITH SILT AND CLAY	Brown, moist, sand is very fine to very coarse, gravel is fine overall, contains variable silt and clay as matrix fill, contains some cobbles and boulders, interbedded and graded mixture. At 45 feet: cobbles. At 47 feet: very moist silty clay as matrix or thin interlayers. At 51 feet: cobble and boulders. Below 56 feet: moist to very moist clay and silt as matrix. At 70 feet: cobbles and boulders.
78 - 83	SILTY SAND	Light brown, moist, sand is fine to very coarse grained, contains some fine gravel.

Continued on back

TABLE A-14
(continued)
LITHOLOGIC LOG OF MONITOR WELL CDC-W20

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
83 - 128	GRAVELLY SILTY SAND WITH COBBLES	Brown to light brown, moist, graded mixture, sand is very fine to very coarse, gravel is predominately fine to medium size. Below about 113 feet: very moist to wet.
128 - 167	SANDY GRAVEL/ GRAVELLY SAND	Brown, wet, sand is medium to very coarse, gravel is predominately fine to medium, contains some coarse gravel and cobbles, contains some silt and clay. Below 152 feet: contains increased fines as matrix.
<p>TOTAL DEPTH OF BOREHOLE: 167 FEET WELL COMPLETED: 11/15/94 STATIC WATER LEVEL: 109.2 FEET BELOW LAND SURFACE (11/15/94)</p>		

CDC-W21



MALCOLM PIRNIE

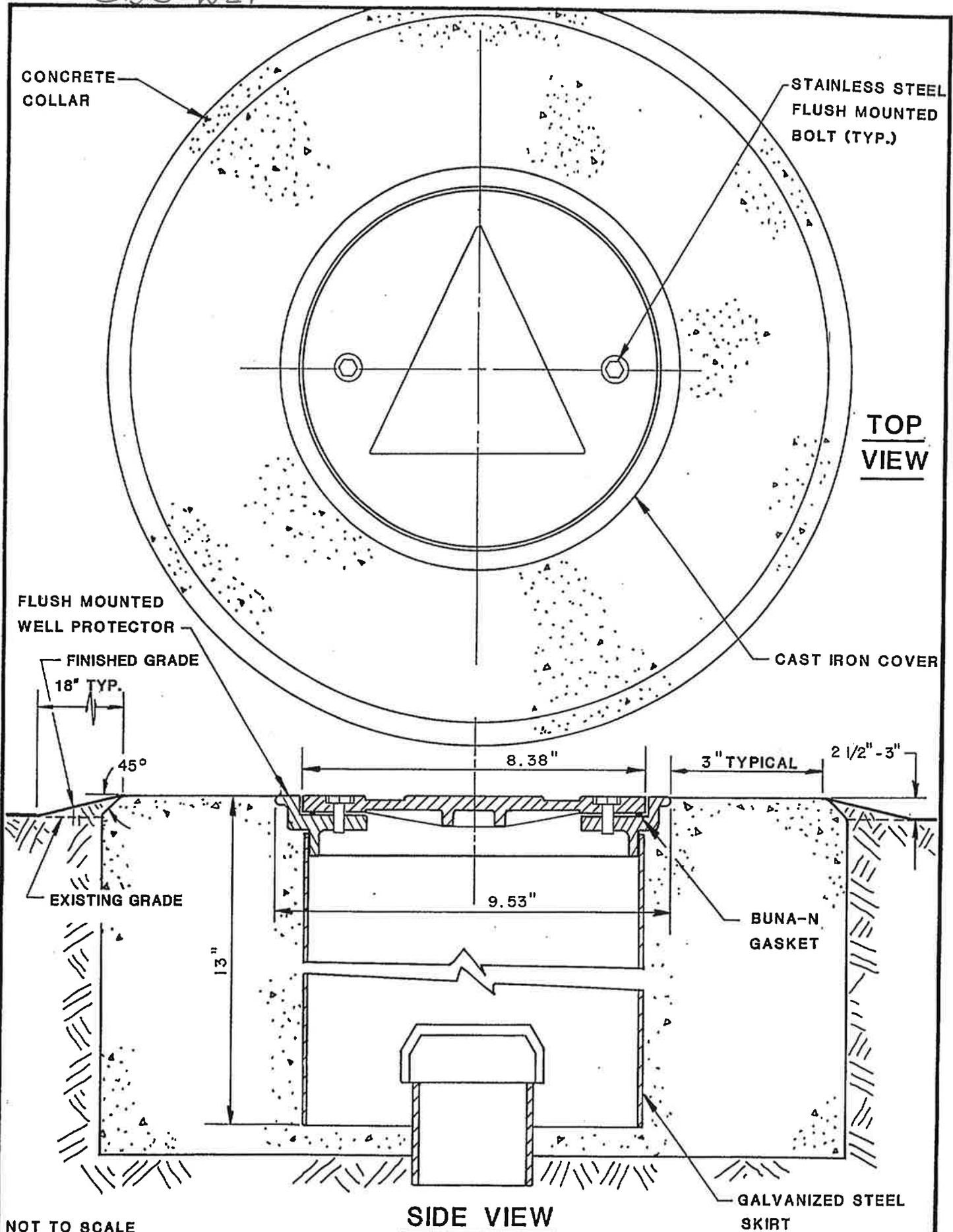
LESP 3
EL CAMINO DEL CERRO LANDFILL
SCHEMATIC CONSTRUCTION DIAGRAM
FOR SHALLOW MONITOR WELLS

MALCOLM PIRNIE, INC.

FIGURE 2

159381

CDC-W21



159381

MALCOLM PIRNIE

LESP 3
EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

TABLE A-15

LITHOLOGIC LOG OF MONITOR WELL CDC-W21

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 12	SILTY SAND	<p>Dark brown, sand is fine to very coarse grained, calcareous.</p> <p>From 0 to 5 feet: very moist.</p> <p>Below 5 feet: light brown, dry.</p>
12 - 17	CLAYEY SILT	Dark brown, moist, soft, low plasticity.
17 - 23	SILTY SAND	Brown, moist, sand is very fined to fine grained.
23 - 44	SAND/GRAVELLY SAND	<p>Light brown, moist, sand is medium to very coarse grained, gravel is fine to coarse, contains some cobbles, interbedded/graded mixture.</p> <p>At 33 feet: increased gravel content, cobbles.</p> <p>At 41 feet: cobbles and boulders.</p>
44 - 50	SILTY GRAVELLY SAND	Brown, moist, sand is medium to very coarse grained, variable silt, clay and fine sand content as matrix.
50 - 137	SILTY GRAVELLY SAND TO SANDY GRAVEL AND COBBLES	<p>Brown, moist, variable interbedded/graded mixture, sand is fine to very coarse grained, gravel is fine to coarse, variable matrix fines.</p> <p>From 55 feet to 70 feet: very moist.</p> <p>At 70 feet: moist to slightly moist.</p> <p>At 75 feet: increased gravel and cobbles.</p> <p>At 96 feet: cobbles.</p> <p>At about 110 feet: very moist.</p> <p>Below about 115 feet: wet.</p>
137 - 143	GRAVEL	Light brown, fine to medium size overall, contains some cobbles, sand and matrix fines.

TABLE A-15
 (continued)
LITHOLOGIC LOG OF MONITOR WELL CDC-W21

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
143 - 167	GRAVELLY SAND/ SANDY GRAVEL	<p>Brown, sand is medium to very coarse grained, gravel is fine to medium size, contains some cobbles and fines.</p> <p>From 150 to 154 feet: finer grained, contains increased fines as matrix.</p> <p>Below 165 feet: graded coarse sand to cobbles.</p>
<p align="center">TOTAL DEPTH OF BOREHOLE: 167 FEET WELL COMPLETED: 11/17/94 STATIC WATER LEVEL: 106.5 FEET BELOW LAND SURFACE (11/17/94)</p>		

TABLE A-16

LITHOLOGIC LOG OF MONITOR WELL CDC-W22

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 11	SILTY SAND	Light brown, slightly moist, sand is very fine to fine grained, some medium and coarse grained sand, calcareous.
11 - 15	SAND	Light brown, very slightly moist, sand is very fine to medium grained, calcareous.
15 - 16	CLAYEY SILT	Brown, moist, compact, calcareous.
16 - 20	SILT	Light brown, dry, contains some very fine to fine grained sand, contains some brown clayey silt, calcareous. At 18 feet: some weak caliche cementation.
20 - 24	SILTY SAND	Light brown, slightly moist, sand is very fine to fine grained, calcareous.
24 - 36	SILTY SAND	Light brown, slightly moist, sand is fine to medium grained contains some coarse to very coarse grained sand and fine gravel. At 32 feet: increased silt and decrease in sand grain size to very fine and fine.
36 - 37	GRAVELLY SILTY SAND	Light brown, slightly moist, gravel is fine, sand is fine to coarse grained.
37 - 43	SANDY GRAVEL WITH COBBLES	Light brown, dry, sand is medium to very coarse grained, gravel is fine to very coarse, loose. At 40 feet: Boulder.
43 - 70	GRAVELLY SAND/SANDY GRAVEL AND COBBLES	Light brown, moist, sand is medium to very coarse, gravel is fine to coarse, contains some silt. Below 58 feet: some moist to very moist clayey silt as matrix fill or interbeds.

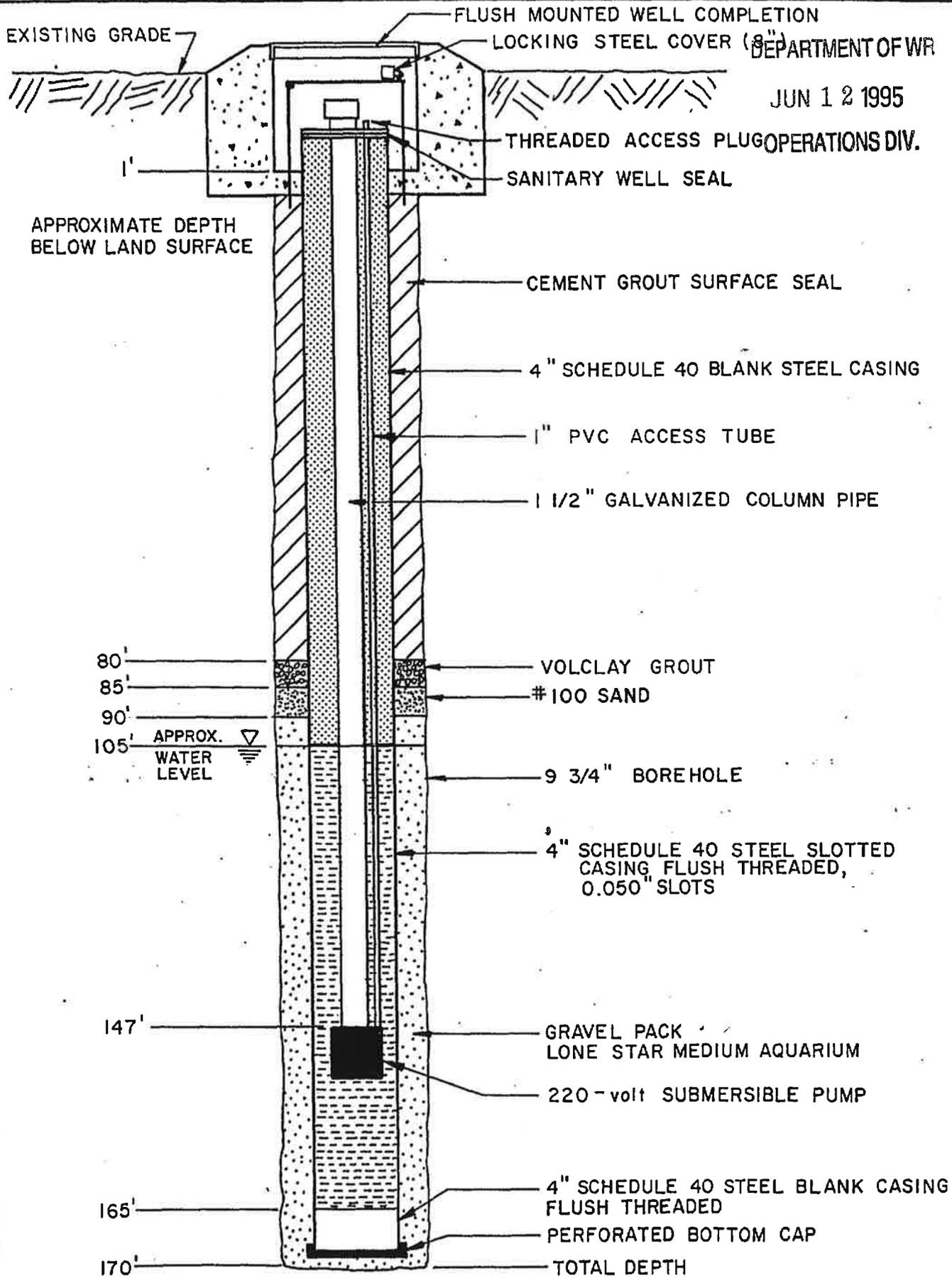
Continued on back

TABLE A-16
 (continued)
LITHOLOGIC LOG OF MONITOR WELL CDC-W22

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
70 - 138	SILTY SANDY GRAVEL TO GRAVELLY SANDY SILT	<p>Brown, moist, variable graded and interbedded mixture, medium to very coarse sand and fine to medium gravel overall, with silt and clayey silt as matrix fill, contains some cobbles and boulders.</p> <p>At 83 feet: cobbles and boulders.</p> <p>At 106 feet: cobbles.</p> <p>Below about 115 feet: very moist to wet.</p> <p>At 125 feet: cobbles.</p> <p>At 134 feet: cobbles.</p>
138 - 167	SILTY GRAVELLY SAND TO SANDY CLAYEY SILT	<p>Brown, wet, sand is fine to very coarse grained, gravel is fine overall, contains silt and clayey silt as matrix, graded and interbedded mixture, contains some small cobbles.</p> <p>From 161 to 165 feet: decreased matrix fines, predominately coarse to very coarse sand and fine gravel, contains some coarse gravel and cobbles.</p>

TOTAL DEPTH OF BOREHOLE: 167 FEET
 WELL COMPLETED: 11/16/94
 STATIC WATER LEVEL: 111.4 FEET BELOW LAND SURFACE (11/16/94)

CDC-W23



MALCOLM PIRNIE

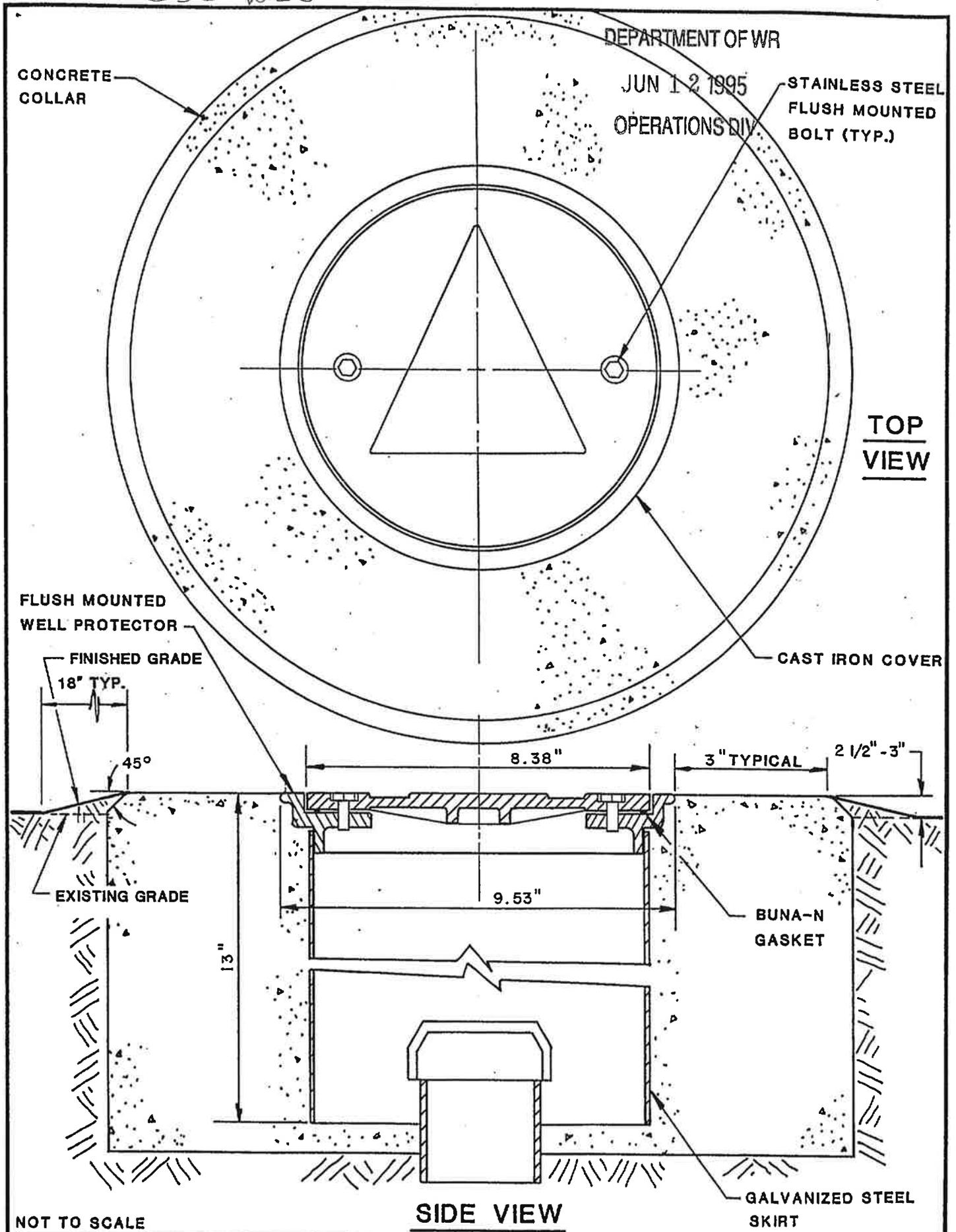
LESP 3
EL CAMINO DEL CERRO LANDFILL:
SCHEMATIC CONSTRUCTION DIAGRAM FOR
SHALLOW MONITOR WELL

MALCOLM PIRNIE, INC.

FIGURE 2

159381

CDC-W23



NOT TO SCALE

SIDE VIEW

GALVANIZED STEEL SKIRT

**MALCOLM
PIRNIE**

LESP 3

MALCOLM PIRNIE, INC.

**EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION**

FIGURE 3

59381

TABLE A-17

Landfill Environmental Studies Program - Phase 3
 El Camino del Cerro Study Area
 Remedial Investigation Report

Lithologic Log of Monitor Well CDC-W23

Depth Interval (feet)	Description of Material	
0-19	Silty Sand	Light brown, dry , compact to loose, sand is very fine to fine grained. Below 11 feet: slightly moist, sand is coarser, very fine to medium grained, contains some clayey silt.
19-23	Clayey Silt	Medium brown, slightly moist, compact to dense.
23-27	Sand	Light brown, slightly moist, loose, sand is fine to very coarse grained.
27-39	Gravelly Sand	Light brown, slightly moist, sand is fine to very coarse grained, contains some cobbles up to 4-inches in size, contains some silt, graded mixture.
39-50	Gravelly Sand to Sandy Gravel with Cobbles	Light brown, dry to slightly moist, sand is medium to very coarse grained, gravel is graded, cobbles are up to 6-inches or more in size. At about 45 feet: contains some clay and silt as matrix, moist, sand is coarse grained and gravel is fine
50-60	Gravelly Sand to Sand	Light brown, moist, sand is fine to coarse grained, gravel is fine to medium, contains some cobbles to 6-inches or more in size. At 60 feet: increase in matrix fines, moist to very moist.
60-80	Silty Gravelly Sand and Cobbles	Light brown, moist, sand is predominantly coarse to very coarse grained, gravel is fine to medium size, cobbles to more than 5-inches, contains variable sand, silt and clay as matrix. At 69 feet: boulder At 76 feet: boulder At 79 feet: increase in matrix fines.
80-93	Gravelly Sand	Light brown, moist, sand is medium to very coarse grained, gravel is fine overall, contains some very fine to fine sand, silt and trace clay as matrix.

TABLE A-17 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W23

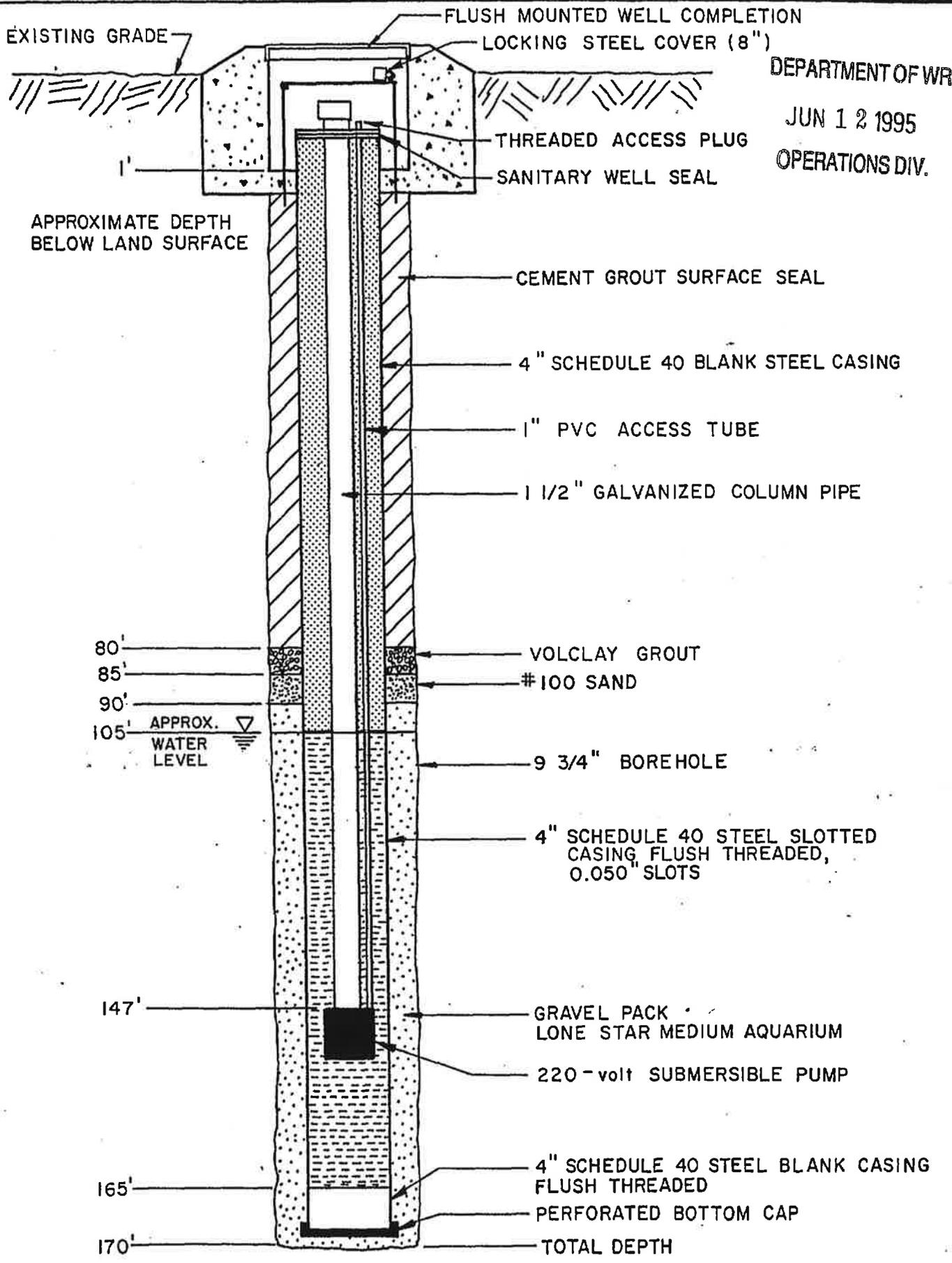
Depth Interval (feet)	Description of Material	
93-120	Silty Gravelly Sand	Light brown, moist, interbedded and graded mixture, sand is fine to very coarse grained, gravel is predominantly fine, contains silt and trace clay in At 105 feet: contains increased light brown sandy silt as matrix or interbeds. Below about 110 feet: wet.
120-125	Gravelly Sand	Light brown, sand is medium to very coarse grained, gravel is fine, contains some very fine to fine grained
125-130	Silty Sand with Gravelly Sand	Light brown to grey, compact, sand is very fine to fine grained, interbedded or grading to medium to very coarse sand and fine gravel with minor cobble size
130-139	Gravelly Sand to Sand	Light brown to grey, sand is coarse to very coarse grained, gravel is fine to medium size, contains some gravel size clasts up to 2-inches, contains some silt and very fine sand as matrix.
139-140	Gravel	Light brown, fine to medium size overall, contains some cobbles up to 5-inches in size.
140-172	Gravel to Silty Gravelly Sand	Light brown, compact to dense, gravel is predominantly fine, sand is fine to coarse grained, interbedded/graded mixture.

Total Depth of Borehole: 172 feet

Well Completed: 07/18/95

Static Water Level: 109.7 Feet Below Top of Casing (07/20/95)

CDC-W24



**MALCOLM
PIRNIE**

LESP 3
EL CAMINO DEL CERRO LANDFILL
SCHEMATIC CONSTRUCTION DIAGRAM FOR
SHALLOW MONITOR WELL

MALCOLM PIRNIE, INC.

FIGURE 2

159381

CDC-W24

DEPARTMENT OF WR

JUN 12 1995

OPERATIONS DIV

STAINLESS STEEL
FLUSH MOUNTED
BOLT (TYP.)

CONCRETE
COLLAR

TOP
VIEW

FLUSH MOUNTED
WELL PROTECTOR

FINISHED GRADE

18° TYP.

45°

EXISTING GRADE

CAST IRON COVER

8.38"

3" TYPICAL

2 1/2" - 3"

9.53"

BUNA-N
GASKET

13"

GALVANIZED STEEL
SKIRT

SIDE VIEW

NOT TO SCALE

LESP 3

EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

**MALCOLM
PIRNIE**

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TABLE A-18

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W24

Depth Interval (feet)	Description of Material	
0-20	Silty Sand/Sandy Silt	<p>Light brown to grayish brown, dry sand is very fine to fine grained, loose to compact.</p> <p>At 12 feet: very compact to dense.</p> <p>At 15 feet: contains thin clayey silt interbeds, medium brown, dense, moist</p>
20-29	Silty Sand	<p>Light brown, moist, sand is predominately fine to medium grained, contains minor clay.</p> <p>From 23 to 25 feet: coarsens, contains coarse and fine gravel.</p>
29-32	Silt	Medium brown, moist, soft, contains some clay.
32-34	Clayey Silt	Brown, moist, soft, medium plasticity.
34-38	Sand	Light brown to orangeish brown, medium to very coarse grained, contains some gravel and cobbles.
38-45	Gravel and Cobbles	Light brown to light grayish brown, dry clasts range up to greater than 6-inches in size, contains some probable boulder size clasts.
45-50	Sandy Gravel	Light brown, moist to very moist, gravel is fine, sand is very coarse, contains some cobbles up to 4-inches in
50-63	Gravelly Sand to Sandy Gravel	<p>Light brown, dry to slightly moist, sand is medium to very coarse grained, gravel is graded, cobbles are up to 6-inches or more in size.</p> <p>At 55 feet: increased silt and very fine to fine sand as matrix or thin interbeds.</p> <p>At 56 feet: increased cobbles.</p> <p>At 58 feet: some clayey silt, medium brown, moist to very moist.</p>

TABLE A-18 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W24

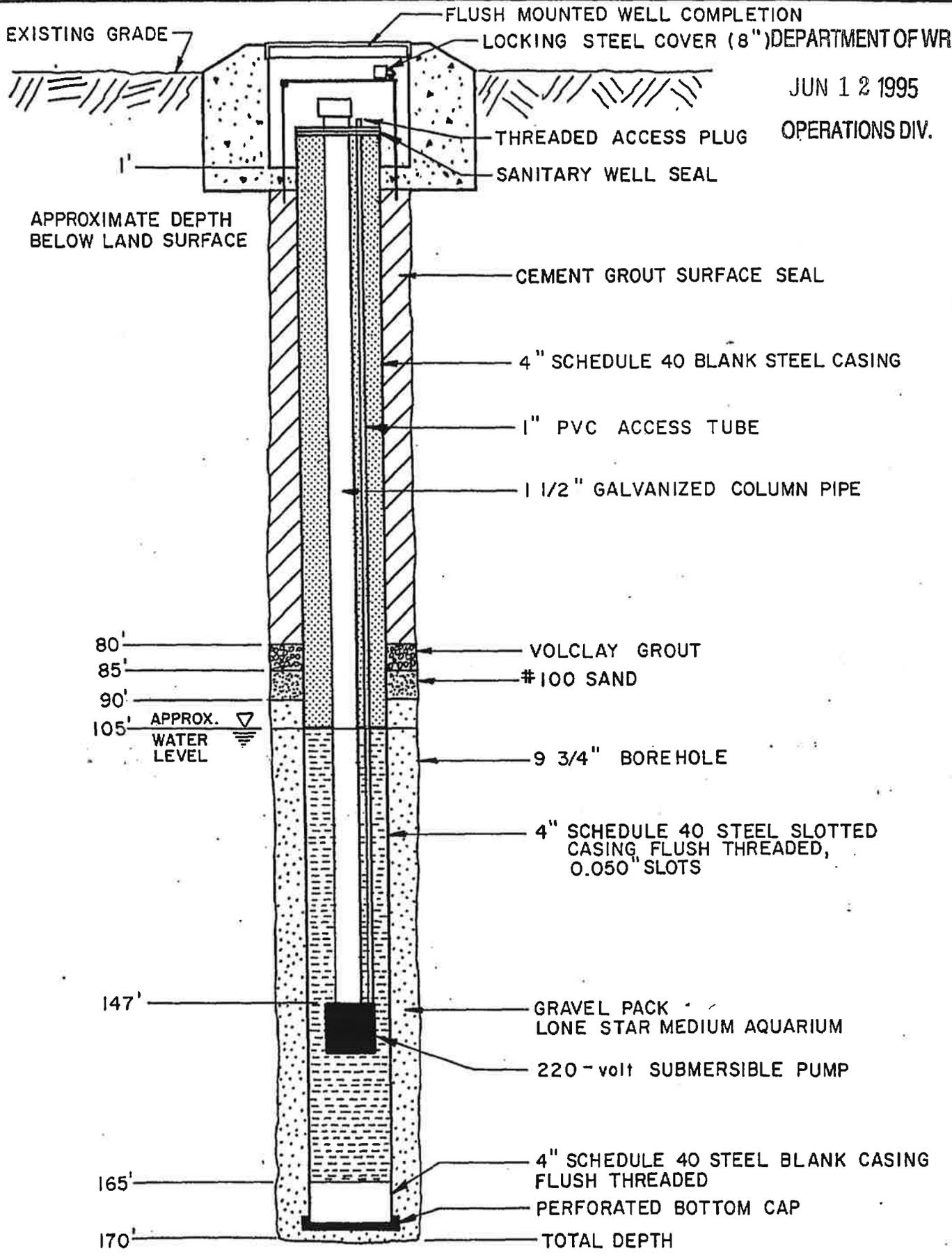
Depth Interval (feet)	Description of Material	
63-67	Silty Gravelly Sand with Cobbles	Brown, moist, sand is medium to coarse grained, gravel is fine to medium, contains some very fine to fine sand and coarse gravel, cobbles are up to 6-inches in size or
67-103	Gravelly Sand	Brown, moist, sand is predominantly very coarse, gravel is fine overall, contains some cobbles estimated up to 8-inches in size, contains variable very fine sand and silt as matrix.
103-110	Silty Sandy Gravel to Silty Gravelly Sand	Brown, moist, sand is medium to coarse grained, some cobbles up to 4-inches in size, fine to very fine sand, silt and clay as matrix or interbeds, variable and graded mixture.
110-129	Sandy Gravel/Gravelly Sand	Light brown, sand is very coarse, gravel is fine, some fines as matrix, some cobbles up to 4-inches in size. From 118 to 120 feet: increased fine sands and silt as matrix or interbeds.
129-172	Sandy Gravel to Silty Sand	Brown, wet, sand is very fine to very coarse, gravel is coarse, variable interbedded and graded mixture. At 136 feet: predominately very coarse sand and fine gravel. At 165 feet: cobbles, hard. At 169 feet: fine to coarse gravel.

Total Depth of Borehole: 172 feet

Well Completed: 07/17/95

Static Water Level: 104.6 Feet Below Top of Casing (07/19/95)

CDC-W25



MALCOLM PIRNIE

LESP 3
EL CAMINO DEL CERRO LANDFILL
SCHEMATIC CONSTRUCTION DIAGRAM FOR
SHALLOW MONITOR WELL

MALCOLM PIRNIE, INC.

FIGURE 2

159361

CDC-W25

DEPARTMENT OF WR

JUN 12 1995

OPERATIONS DIV.

STAINLESS STEEL
FLUSH MOUNTED
BOLT (TYP.)

CONCRETE
COLLAR

TOP
VIEW

FLUSH MOUNTED
WELL PROTECTOR

FINISHED GRADE

18" TYP.

45°

EXISTING GRADE

13"

8.38"

3" TYPICAL

2 1/2" - 3"

9.53"

BUNA-N
GASKET

GALVANIZED STEEL
SKIRT

SIDE VIEW

NOT TO SCALE

LESP 3

MALCOLM PIRNIE, INC.

**MALCOLM
PIRNIE**

**EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION**

FIGURE 3

59381

TABLE A-19

Landfill Environmental Studies Program - Phase 3
 El Camino del Cerro Study Area
 Remedial Investigation Report

Lithologic Log of Monitor Well CDC-W25

Depth Interval (feet)	Description of Material	
0-0.25	Asphalt	
0.25-17	Sandy Silt	Brown, moist, compact to loose, sand is very fine to fine grained, contains some weak cementation, contains some clay. At 7 feet: color change to light brown, dry.
17-29	Silty Sand	Light brown, dry to slightly moist, loose, sand is very fine to fine grained, some weak cement as small nodules and veinlets, grades to sandy silt in part.
29-40	Sand to Gravelly Sand	Light brown, dry to slightly moist, sand is medium to very coarse grained, gravel is medium to coarse, contains some cobbles. Below 38 feet: contains some fines as matrix.
40-55	Sandy Gravel with Cobbles	Brown, slightly moist, gravel is coarse, contains cobbles estimated to 8-inches or more in size.
55-60	Gravelly Sand with Cobbles	Light brown, moist to slightly moist, sand is coarse to very coarse grained, gravel is fine.
60-70	Silty Gravelly Sand	Light brown, moist, sand is coarse grained, gravel is fine, very fine sand and silt as matrix, variable-graded
70-76	Gravelly Sand	Light brown, moist, sand is coarse grained, gravel is fine, contains some cobbles and matrix fines.
76-80	Silty Gravelly	Light brown, moist, graded-interbedded mixture.
80-87	Sandy Gravel	Light brown, moist, sand is very coarse, gravel is fine, some matrix fines and clasts up to cobble size. At 85 feet: very moist to wet.
87-91	Silty Sand to Sandy Silt	Brown, moist to very moist, sand is very fine to coarse grained, contains some gravel and some clay, graded to thinly interbedded.
91-98	Sand	Light brown, moist, loose, sand is fine to medium grained overall, contains some silt and very fine and coarse grained sand.

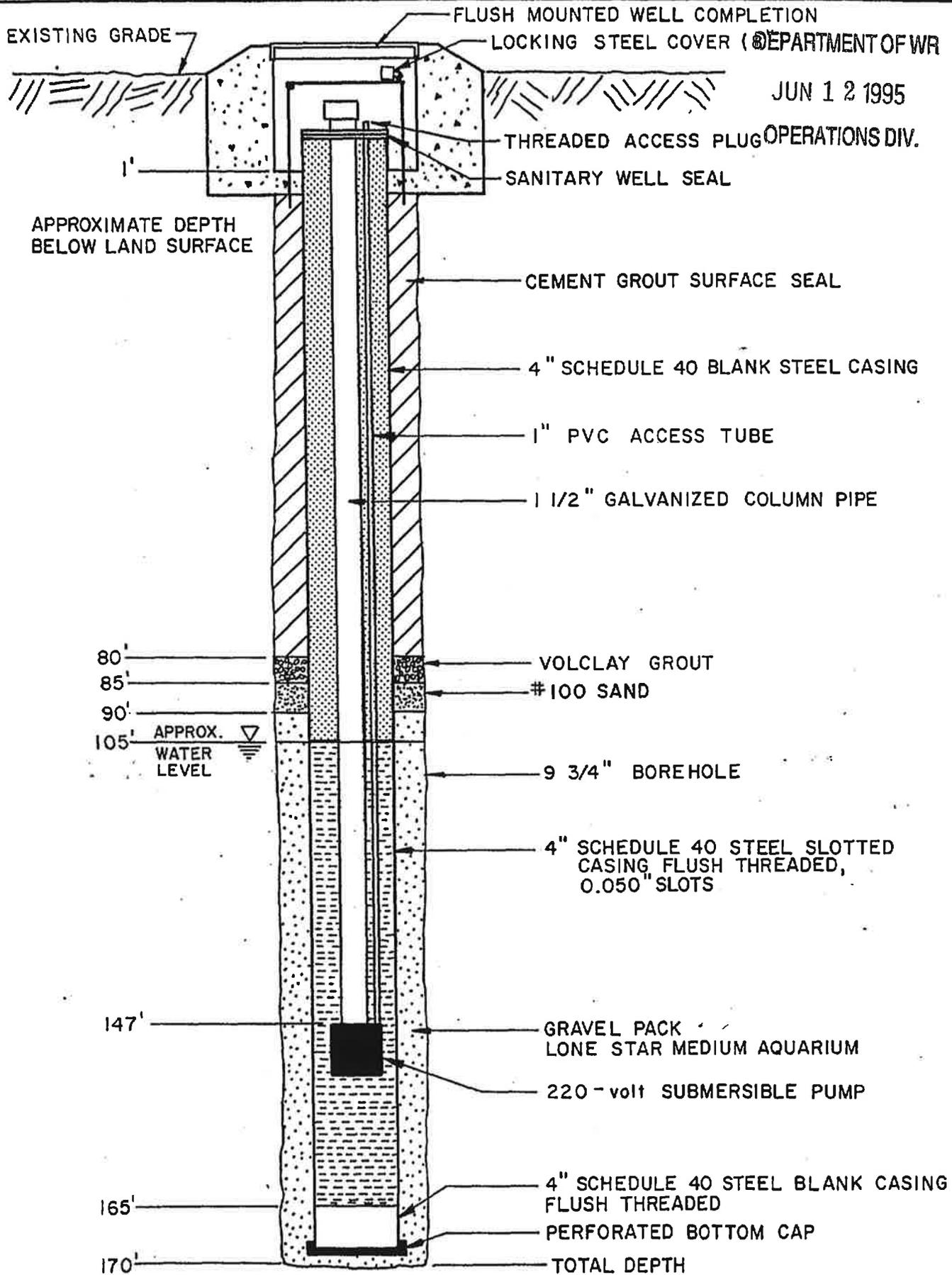
TABLE A-19 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W25

Depth Interval (feet)	Description of Material	
98-102	Gravelly Sand	Brown, moist to very moist, gravel is up to 2-inches in size, sand is coarse to very coarse grained.
102-110	Silty Gravelly Sand	Brown, moist, sand is very fine to very coarse grained, gravel is graded, contains silt and fine sands as matrix or interbeds, contains some cobbles.
110-115	Gravelly Sand	Brown, very moist to moist, sand is medium to very coarse grained, gravel is fine, contains some coarse gravel, small cobbles and silt.
115-130	Silty Gravelly Sand	Brown, very moist to moist, sand is very fine to very coarse, gravel is fine to medium, variable silt content as matrix or thin interbeds, variable mixture.
130-135	Sandy Gravel with Silt	Brown, wet, sand is very coarse grained, gravel is fine, silt as variable content in matrix or interbeds.
135-140	Silty Sand	Brown, sand is fine to coarse, contains some gravel and cobbles.
140-145	Silty Sandy	Brown, gravel is graded.
145-160	Silty Gravelly Sand to Gravelly Sandy Silt	Brown, variable graded or interbedded mixture, sand is very fine to very coarse, gravel is fine to coarse.
160-170	Silty Sand to Sandy Silt	Brown, compact to dense, sand is very fine to very coarse grained, contains some gravel to 1/2-inch is size.
Total Depth of Borehole: 170 feet		
Well Completed: 07/20/95		
Static Water Level: 111.6 Feet Below Top of Casing (07/21/95)		

CDC-W26



**MALCOLM
PIRNIE**

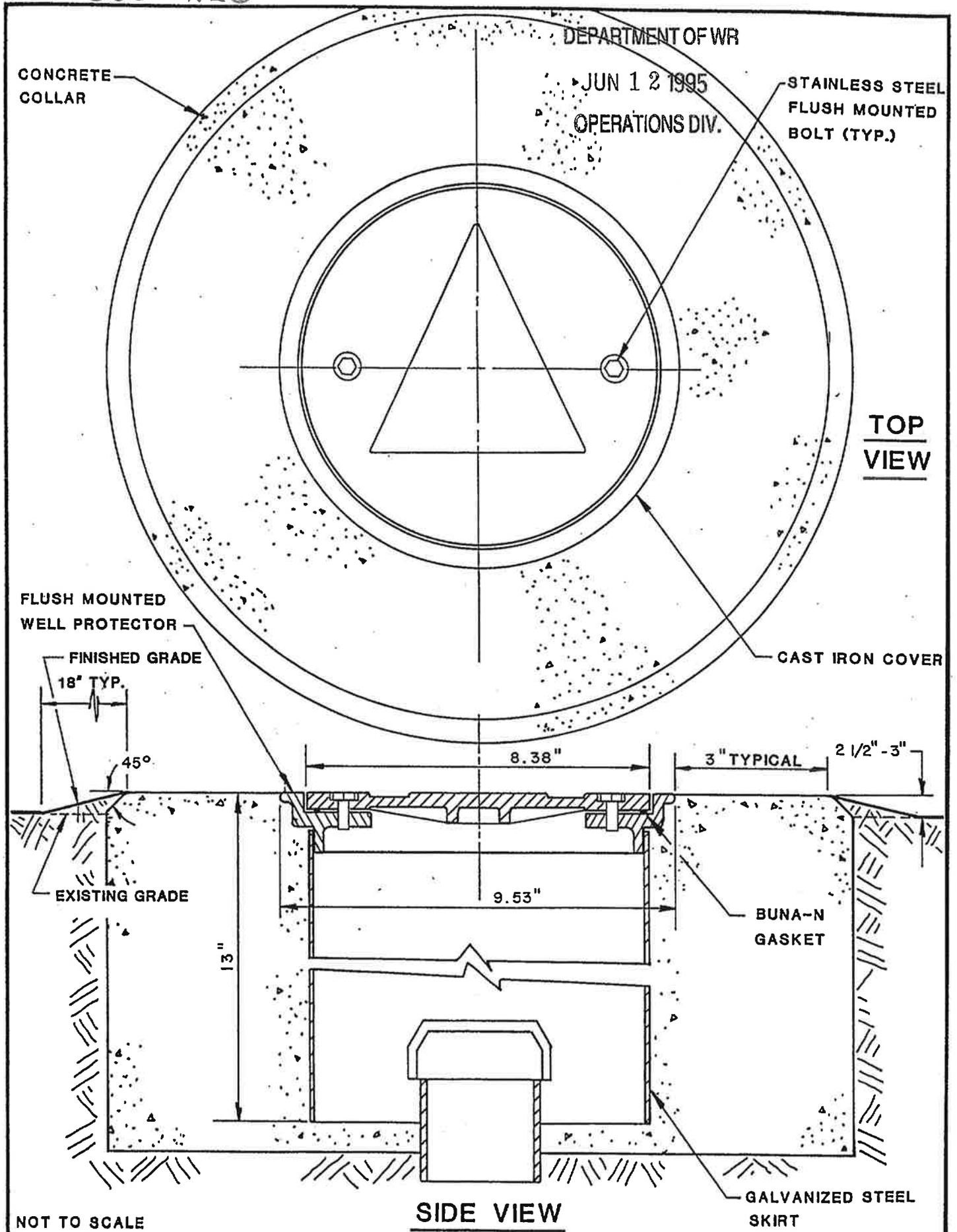
LESP 3
EL CAMINO DEL CERRO LANDFILL
SCHEMATIC CONSTRUCTION DIAGRAM FOR
SHALLOW MONITOR WELL

MALCOLM PIRNIE, INC.

FIGURE 2

159381

CDC - W26



LESP 3

EL CAMINO DEL CERRO LANDFILL
 FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

59381

MALCOLM PIRNIE

TABLE A-20

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W26

Depth Interval (feet)	Description of Material	
1-8	Sandy Silt	Brown to light brown, dry, compact, sand is very fine to very coarse grained, contains some gravel.
8-19	Silt	Brown, dry to moist, compact to dense, clayey in part, contains some very fine to fine sand. At 15 feet: some weak cementation.
19-37	Sand	Light brown, very slightly moist, sand is very fine grained, grades to sandy silt in part. At 30 feet: thin clayey silt interbed, moist. At 32 feet: some weak cementation.
37-43	Gravelly Sand	Light brown, slightly moist, sand is medium to very coarse grained, gravel is fine overall, contains some cobbles to 4-inches in size.
43-53	Sandy Gravel and Cobbles	Brown, slightly moist, gravel is graded, sand is coarse to very coarse grained, cobbles are up to 8-inches or more in size.
53-55	Sand	Light brown, very moist, very coarse grained.
55-57	Silty Sand to Clayey Silt	Light brown, moist to very moist, interbedded or graded.
57-69	Sandy Gravel with Cobbles	Light brown, moist, sand is medium to very coarse grained, graded.
69-71	Gravelly Sand with Cobbles	Light brown, dry to slightly moist, sand is medium to very coarse grained, gravel is graded.
71-81	Silty Gravelly Sand	Brown to reddish brown, moist, sand is fine to very coarse grained, contains very fine sand, silt and some clay as matrix or interbeds.
81-85	Silty Sandy	Light brown, very moist, gravel is fine, sand is very
85-90	Silt to Clayey Silt	Light brown to light reddish brown, very moist, contains very coarse sand and fine gravel.
90-99	Sandy Gravel with Cobbles to Silty Gravelly Sand	Light brown, moist, predominantly very coarse grained sand and fine gravel, interbedded and graded mixture with variable fines.

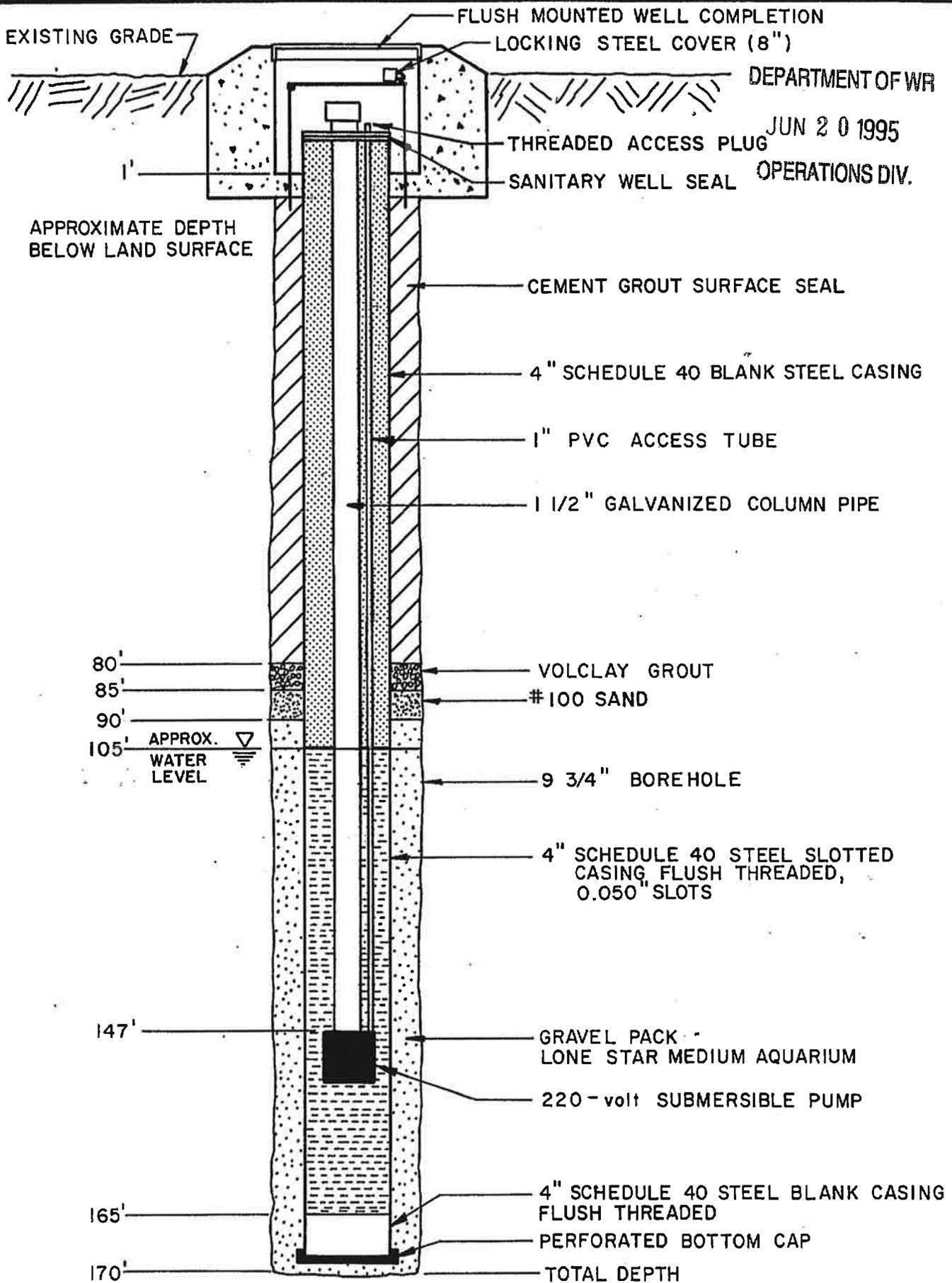
TABLE A-20 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W26

Depth Interval (feet)	Description of Material	
99-130	Silty Gravelly Sand to Gravelly Silty Sand	Brown, moist, compact, sand is medium to coarse grained, gravel is predominantly fine, some coarse gravel and cobbles. Below about 115 feet: wet.
130-150	Gravel to Sandy Silty Gravel	Brown, compact to dense, gravel is predominately fine, contains variable content of silt and very fine sand as matrix, interbedded mixture.
150-170	Sandy Silty Gravel and Silt	Brown, compact to dense, graded and interbedded mixture, contains minor cobbles, matrix of silt and very fine to fine grained sand.
<p>Total Depth of Borehole: 170 feet Well Completed: 07/21/95 Static Water Level: 112.8 Feet Below Top of Casing (07/22/95)</p>		

CDC-W27



LESP 3

EL CAMINO DEL CERRO LANDFILL

SCHEMATIC CONSTRUCTION DIAGRAM FOR SHALLOW MONITOR WELL

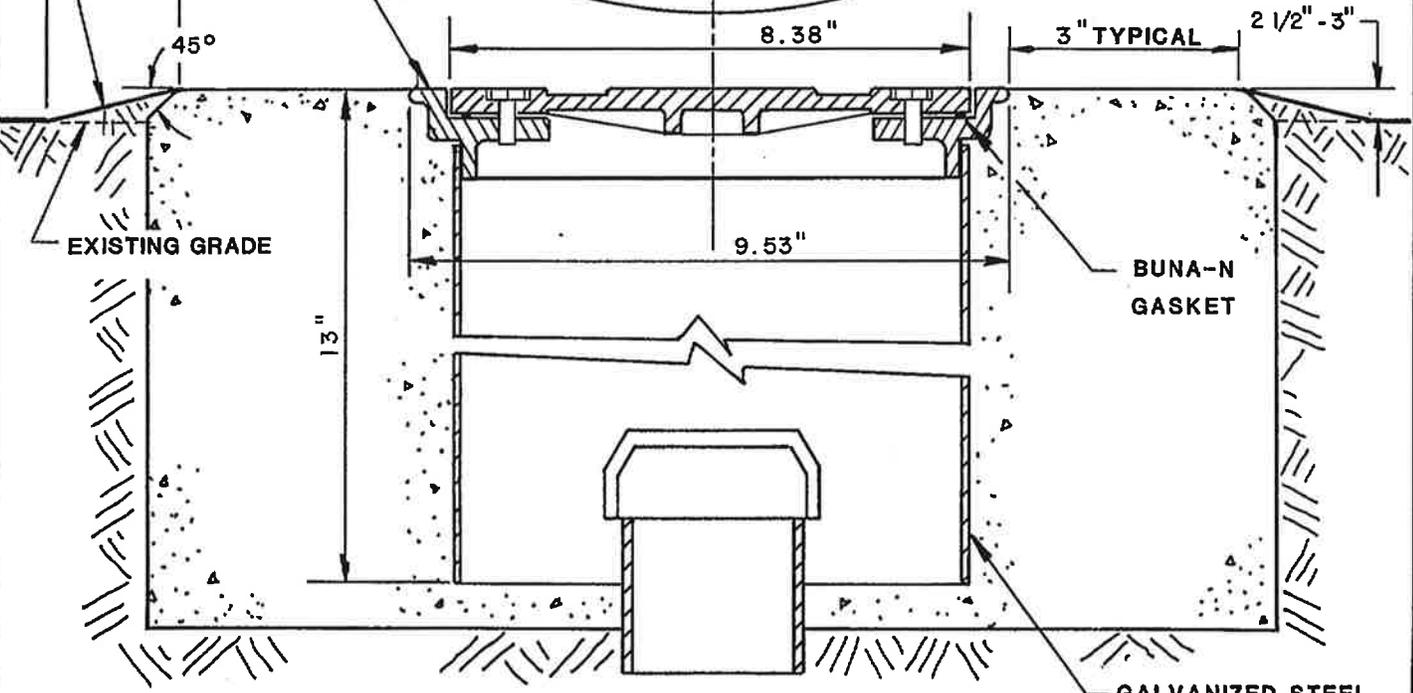
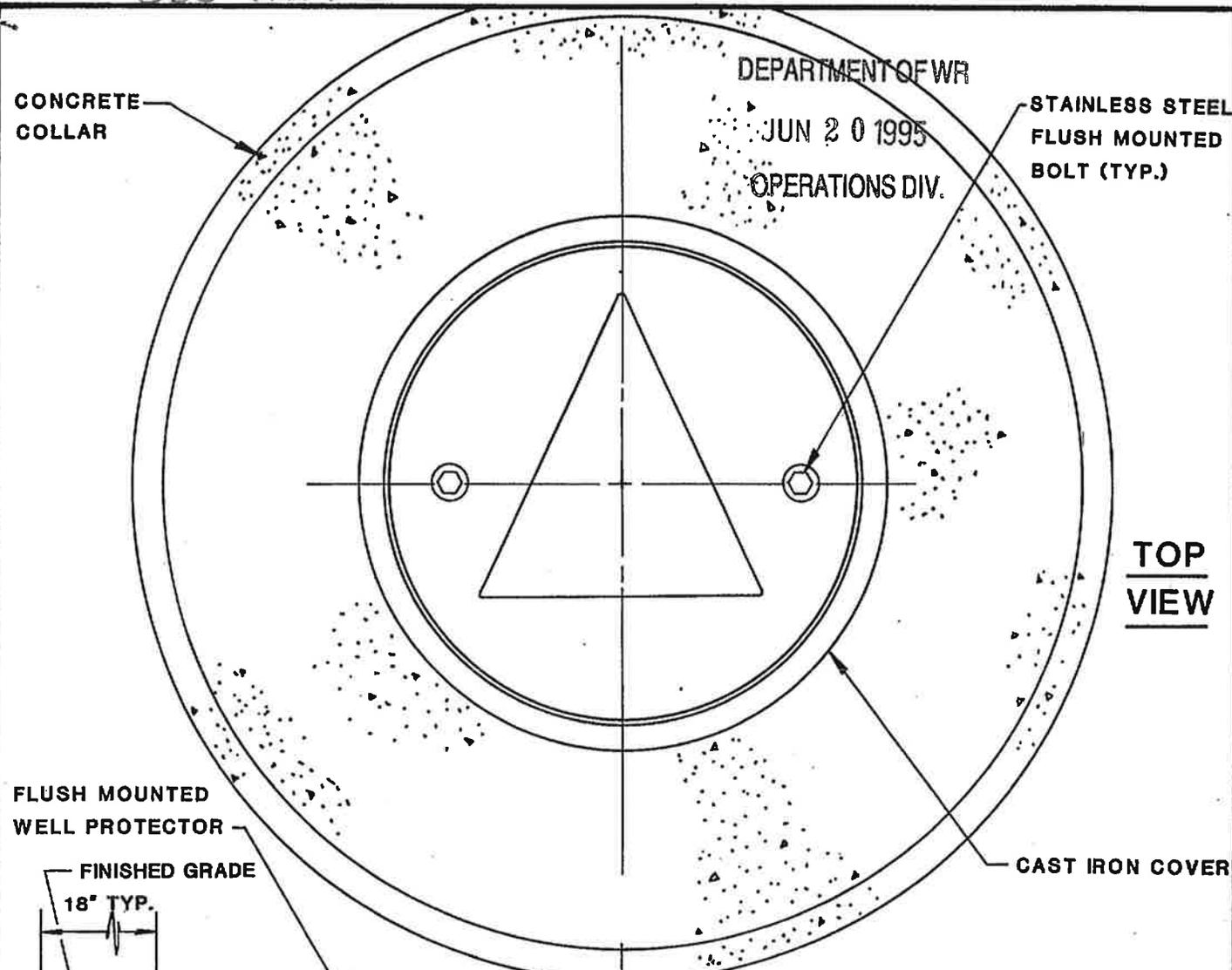
MALCOLM PIRNIE, INC.

FIGURE 2

159381

MALCOLM PIRNIE

CDC-W27



NOT TO SCALE

MALCOLM PIRNIE

LESP 3
EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

159381

TABLE A-21

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W27

Depth Interval (feet)	Description of Material	
0-10	Sandy Silt	Light brown, dry, compact, sand is very fine to fine
10-28	Silty Sand to Sandy Silt	Light brown, dry to slightly moist, compact, sand is very fine to medium grained. Below 20 feet: contains some sandy silty clay, brown, slightly moist, firm.
28-31	Sand	Light brown, dry, loose, sand is medium to very coarse grained, contains some fine gravel.
31-55	Gravelly Sand to Sandy Gravel and Cobbles	Light brown, slightly moist to moist, sand is medium to very coarse grained, gravel is fine overall. Below 35 feet: contains coarse gravel clasts and cobbles up to 6-inches or more in size. Below 50 feet: very moist.
55-60	Sand	Light brown, moist to slightly moist, compact, sand is predominantly very coarse grained, contains some gravel to cobble size clasts and fine grained sand.
60-67	Sand to Gravelly Sand	Lightly brown, slightly moist, graded from medium grained sand to fine gravel overall, matrix of very fine to fine grained sand and silt in part, some cobble to
67-83	Gravelly Sand with Cobbles to Gravelly Silty Sand	Brown, moist to very moist, variable-graded and interbedded mixture.
83-85	Gravelly Sand to Gravelly Sandy Silt	Brown, moist, very graded or interbedded mixture.
85-130	Silty Gravelly Sand to Sandy Gravel	Brown, moist, compact to dense, sand is medium to very coarse grained, gravel is predominantly fine, graded or interbedded mixture. Below about 110 feet: wet. Below 125 feet: increased fines content, contains some clay. At 129 feet: coarse gravel bed.

TABLE A-21 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W27

130-160	Sandy Gravel to Gravelly Sandy Silt	Brown, compact, sand is very fine to very coarse grained, gravel is fine to coarse, graded and At 148 feet: coarse gravel bed.
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Total Depth of Borehole: 170 feet

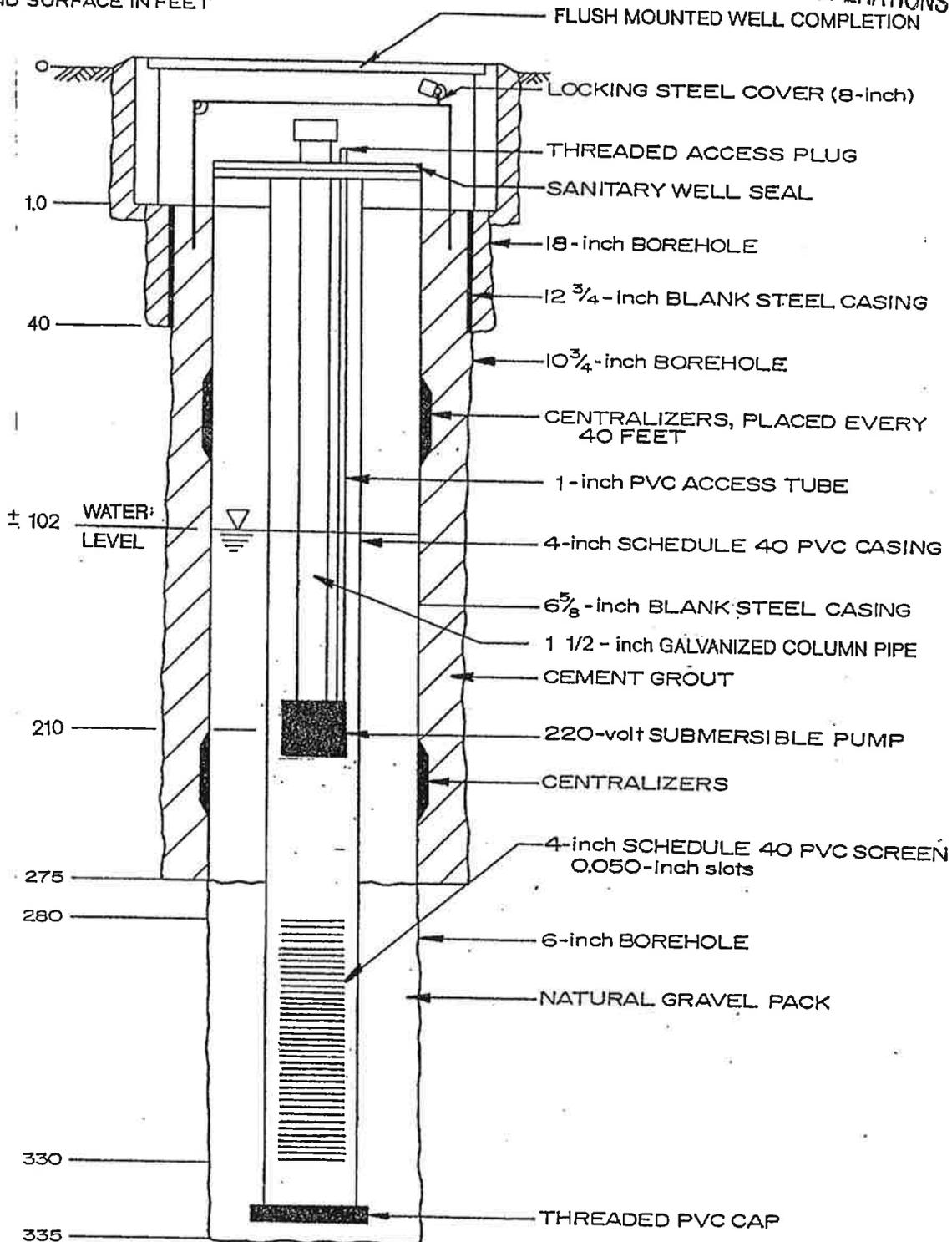
Well Completed: 07/29/95

Static Water Level: 109.7 Feet Below Top of Casing (07/31/95)

JUN 12 1995

OPERATIONS DIV.

DEPTH BELOW
LAND SURFACE IN FEET



CDC-W28D

DEPARTMENT OF WR

JUN 1 & 1995

OPERATIONS DIV

STAINLESS STEEL
FLUSH MOUNTED
BOLT (TYP.)

CONCRETE
COLLAR

TOP
VIEW

FLUSH MOUNTED
WELL PROTECTOR

FINISHED GRADE

18° TYP.

45°

EXISTING GRADE

8.38"

3" TYPICAL

2 1/2" - 3"

9.53"

BUNA-N
GASKET

GALVANIZED STEEL
SKIRT

SIDE VIEW

NOT TO SCALE

**MALCOLM
PIRNIE**

LESP 3

EL CAMINO DEL CERRO LANDFILL
FLUSH MOUNTED WELL COMPLETION

MALCOLM PIRNIE, INC.

FIGURE 3

159381

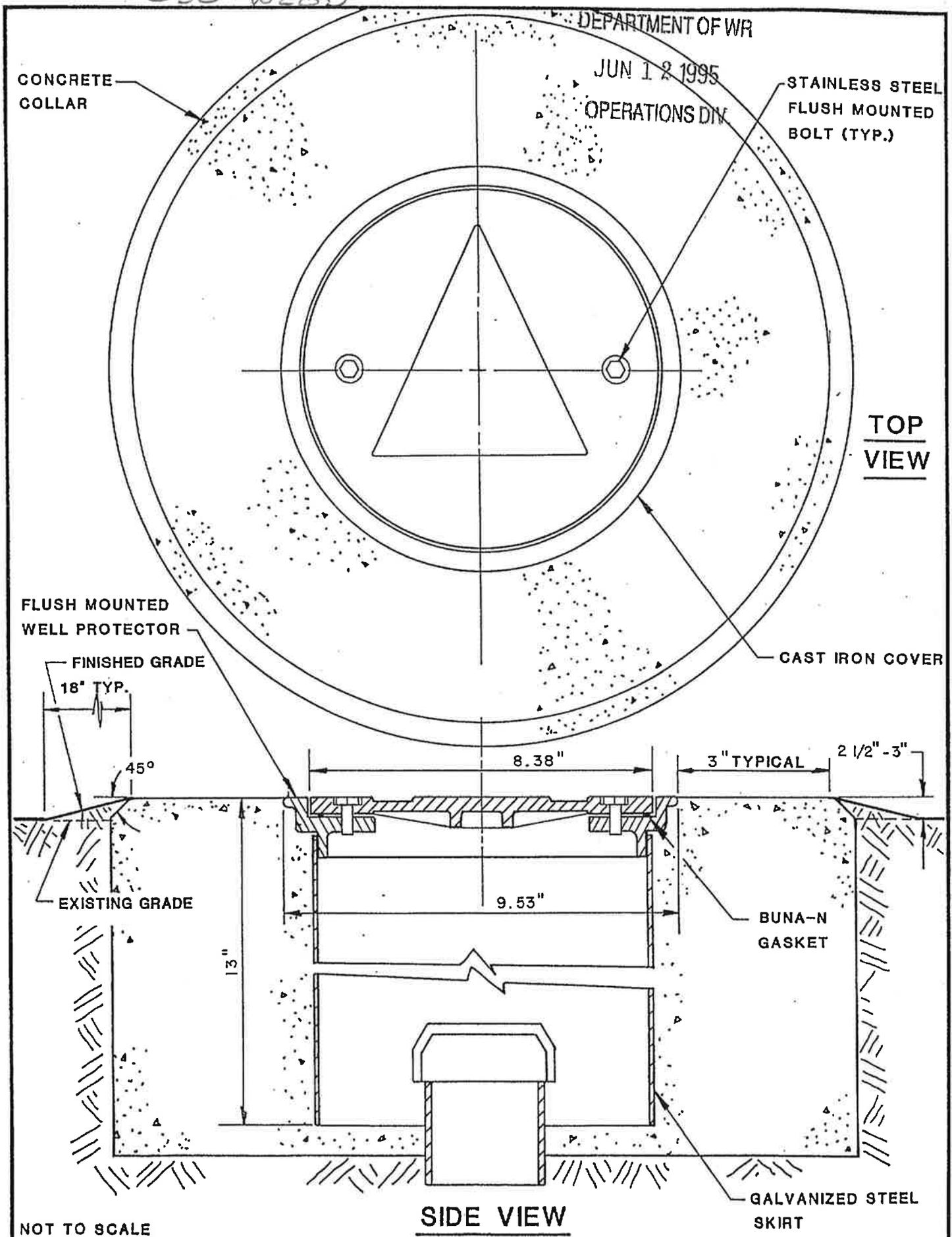


TABLE A-22

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W28D

Depth Interval (feet)	Description of Material	
0-5	Gravelly Silty Sandy Clay	Dark brown, fine to medium sand, angular and poorly sorted, approximate composition; 45% clay, 25% gravel, and 25% gravel with cobbles and rock
5-10	Gravelly Sandy Silty Clay	Dark brown, slightly moist, fine to medium sand, angular and poorly sorted, approximate composition; 55% clay, 20% sand, and 20% gravel with cobbles and rock fragments.
10-15	Gravelly Silty Sandy Clay	Medium brown, fine to medium sand, angular and poorly sorted, approximate composition; 45% clay, 35% sand, 20% gravel with cobbles and rock fragments.
15-25	Sandy Silty Clay	Dark brown, fine to medium sand, angular and poorly sorted, approximate composition; 70% clay, 20% sand, and 10% silt.
25-30	Gravelly Sandy Clay	Dark brown, fine to medium sand, sub-angular and poorly sorted, approximate composition; 60% clay, 30% sand, and 10% gravel with cobbles.
30-40	Clayey Sandy Gravel	Brownish gray, fine to very coarse sand, sub-angular and poorly sorted, approximate composition; 60% gravel with cobbles and rock fragments, 20% sand, and
40-70	Silty Sandy Gravel	Brownish gray, fine to very coarse sand, sub-angular and poorly sorted, approximate composition; 70% gravel with cobbles and large rock fragments, 30% sand, some silt. Rock fragments consisted of dolomite, pink granite, rhyolite, gneiss, and quartzite.
70-85	Silty Sandy Gravel with Cobbles and Rock Fragments	Brownish gray, fine to very coarse sand, sub-angular and poorly sorted, approximate composition; 60% gravel with cobbles and rock fragments, 30% sand, 10% silt and a little clay.
85-100	Silty Clayey Sandy Gravel	Brownish gray, fine to very coarse sand, sub-angular to rounded and poorly sorted, approximate composition; 45% gravel with cobbles and rock fragments, 30% sand, and 15% clay.

TABLE A-22 (Continued)

**Landfill Environmental Studies Program - Phase 3
El Camino del Cerro Study Area
Remedial Investigation Report**

Lithologic Log of Monitor Well CDC-W28D

Depth Interval (feet)	Description of Material	
100-150	Silty Clayey Sandy gravel	Brownish gray, fine to very coarse sand, angular to rounded and poorly sorted, approximate composition; 50% gravel with cobbles and rock fragments, 35% sand, 15% silt and clay. At 105 feet: water table was encountered.
150-205	Silty Clayey Sandy Gravel	Dark gray, fine to very coarse sand, angular to rounded and poorly sorted, clay balls, approximate composition; 60% gravel with cobbles and rock fragments, 30% sand, and 10% silt and clay.
205-220	Silty Clayey Sand and Gravel	Brownish gray, fine to very coarse sand, angular to rounded and poorly sorted, some clay balls, approximate composition; 40% sand, 40% gravel with cobbles and rock fragments, 20% silt and clay.
220-300	Silty Clayey Sandy Gravel	Brownish gray, fine to very coarse sand, angular to rounded and poorly sorted, approximate composition; 45% gravel with cobbles and rock fragments, 35% sand, and 20% silt and clay.
300-310	Silty Clayey Gravelly Sand	Brownish gray, fine to very coarse sand, angular to rounded and poorly sorted, approximate composition; 40% sand, 35% gravel with cobbles, and 25% clay.
310-315	Silty Clayey Sandy Gravel	Brownish gray, fine to very coarse sand, angular to rounded and poorly sorted, approximate composition; 40% gravel with cobbles and rock fragments, 40% sand, and 20% silt and clay.
315-340	Silty Clayey Gravelly Sand	Brown, medium to very coarse sand, angular to rounded and poorly sorted, approximate composition; 50% sand, 30% gravel with cobbles and rock fragments, and 20% silt and clay.
Total Depth of Borehole: 340 feet Well Completed: 10/06/95 Static Water Level: 111.6 Feet Below Top of Casing (10/09/95/95)		

Flush-mount Well Protection (16")

Ground Surface

Quick crete

Neat Cement

12" Steel Surface Casing

1" PVC Casings

3" PVC Ring

Zip-Tie

Casing Detail
PVC Rings Spaced at
~50-foot intervals

High Solids Bentonite Grout
(or Neat Cement if Free Product)

▼ Static Groundwater Table
(~128' bgs)

CDC-W29S

Barcad Porous Membrane
(1 1/2" x 36" ...Typical)

1" Schedule 80 PVC
(Typical)

Bentonite Seal
(Typical)

#60 Silica Sand
(Typical)

CDC-W29M

Bottom Seal

NOT TO SCALE

CDC-W29D

WELL BORING DETAILS:

Total Depth 391'
Nominal Borehole Diameter 12"
Drilling Method Air Rotary Casing Hammer

WELL CONSTRUCTION DETAILS:

Conductor Casing Surface' to 20' bgs
Material Low Carbon Steel
Diameter 12"

Surface Seal 0 to 5'
Seal Material Concrete

Surface Seal 5' to 20'
Seal Material Neat Cement

Well Casing lengths 150', 348', 384'
Material Schedule 80 PVC
Diameter 1"

Backfill 20' to 120'
Backfill Material High Solids Bentonite Grout

Seal Intervals 151' - 330'
..... 351' - 368'
Seal Material Granulated Bentonite w/10-20 Sand

Bottom Seal 386' - 391'
Seal Material 3/8-inch Bentonite Pellets

Filter Pack Intervals 120' - 151'
..... 330' - 351'
..... 368' - 386'
Gravel Pack Material #60 Silica Sand

Barcad Porous Membranes 147' - 150'
..... 345' - 348'
..... 381' - 384'

Surface Completion Flush Mount

CDC-W29D MONITOR WELL SCHEMATIC

Remedial Investigation/Feasibility Study

El Camino del Cerro WQARF Site

Tucson, Arizona

Figure 3



DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time
1	SC			Fill - CLAYEY SAND little gravel, angular to subangular sand and gravel, light brown, Nil HCl, low to med PI, slightly moist	1.5	
2					2.3	
3					4.6	
4					0.2	
5					0.1	
6					0.1	
7					0.1	
8					0.3	
9					0.2	
10					1.5	
11					10.6	
12					10.5	
13					19.4	
14					10.9	
15					14.9	
16					10.3	
17					12.7	
18					6.4	
19						
20						

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 1 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotasonic

Drilling Contractor: Prosonic

Drilling Method: Rotasonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
21	SC			Fill - CLAYEY SAND little gravel, angular to subangular sand and gravel. light brown, Nil HCl, low to med PI, moist	13.0		
22	CL			CLAY little sand, brown mottled tan, weak HCL, med PI, slightly moist	2.7		
23	SP			SAND little gravel, subangular to subrounded sand and gravel, brown, Nil HCl, Nil PI, slightly moist	20.7		
24						3.4	
25						3.5	
26						19.6	
27						10.3	
28						8.4	
29						7.3	
30						6.9	
31						4.2	
32						2.6	
33				6.4			
34				2.4			
35				3" thick CLAY layer, brown, moist	6.9		
36				3" thick GRAVELY CLAY layer, brown, med PI, moist	4.2		
37					4.6		
38	GP			GRAVEL few cobbles, few sand, subangular to subrounded sand and gravel, Nil HCl, Nil PI, dry	too hot		
39							
40							

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 2 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time
41	GP			GRAVEL few cobbles, few sand, subangular to subrounded sand and gravel, Nil HCl, Nil PI, dry	too hot	
42	GC			CLAYEY GRAVEL some sand, subrounded sand and gravel, brown, Nil HCl, med PI, moist	8.7	
43					9.4	
44			6.7			
45			20.6			
46	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	14.3	
47					6.5	
48					8.9	
49					9.9	
50					9.3	
51					9.6	
52				8.6		
53				9.5		
54				9.4		
55				7.5		
56				cobble layer		
57						
58						
59						
60						

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 3 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
61	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	6.2		
62				cobble layer	9.1		
63						3.9	
64						4.0	
65						3.6	
66						2.9	
67						6.2	
68						8.5	
69						4.2	
70						6.3	
71						5.7	
72						4.5	
73						2.4	
74						8.0	
75					gravel layer	6.8	
76						6.3	
77						3.6	
78						2.7	
79						3.5	
80						7.2	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 4 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
81	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	9.1		
82					2.4		
83					interbedded low to med PI clays	4.8	
84						4.5	
85						4.7	
86						5.3	
87						4.5	
88						4.8	
89					SILTY SAND layer	5.5	
90						5.3	
91						6.8	
92						2.3	
93						4.3	
94						5.6	
95						5.5	
96						6.2	
97						3.4	
98						1.2	
99						6.2	
100						2.2	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 5 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
101	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	1.4		
102						1.3	
103						2.0	
104						1.7	
105						4.3	
106						4.3	
107						7.2	
108						2.2	
109						4.2	
110						1.2	
111						2.5	
112						4.4	
113						2.8	
114						1.4	
115						2.3	
116						6.1	
117						2.6	
118						2.5	
119						2.4	
120				1.6			

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 6 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
121	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	6.2		
122					3.6		
123					4.8		
124					7.1		
125					1.4		
126					4.1	IV	
127					1.6	IV	
128					2" gravel layer	5.9	
129						5.2	IV
130						4.1	B
131						3.6	
132						3.5	
133						2.7	
134					larger gravels are subrounded	5.3	
135						3.5	
136						1.6	
137						2.8	
138						1.5	
139						3.8	
140						3.8	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 7 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time
141	SC			CLAYEY SAND few gravel, brown, Nil HCl, med PI, slightly moist	3.5	
142	SP			GRAVELY SAND few silt, angular to subrounded sand and gravel, brown, Nil HCl, Nil PI, wet	2.1	
143					0.3	
144	SC			CLAYEY SAND few gravel, brown, Nil HCl, low PI, wet	0.3	
145	GP			SANDY GRAVEL some clay, angular to subangular sand and gravel, brown, Nil HCl, low PI, wet	0.2	
146	SC			CLAYEY SAND few gravel, brown, Nil HCl, low PI, very moist	3.6	
147	SP			SAND some gravel few clay, angular to subrounded sand and gravel, brown, Nil HCl, low PI, wet	1.3	
148					1.2	
149					3.2	
150					3.6	
151					2.9	
152					0.3	
153					2.0	
154				2-3" med to coarse SAND layer	2.0	
155					2.6	
156				2-3" med to coarse SAND layer	0.5	
157					0.5	
158					0.4	
159					3.8	
160					5.2	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 8 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time
161	SP			SAND some gravel few clay, angular to subrounded sand and gravel, brown, Nil HCl, low PI, wet	3.4	
162	GC			CLAYEY GRAVEL little sand, subrounded sand and gravel, brown, Nil HCl, med PI, very moist	3.4	
163					3.1	
164				6" GRAVELY SAND layer	3.0	
165					4.5	
166					4.3	
167					4.8	
168				8" CLAYEY SAND layer	4.3	
169				6" GRAVELY SAND layer	1.2	
170					1.3	
171					5.6	
172					1.0	
173					3.0	
174					1.3	
175					5.2	
176					4.2	
177					1.3	
178					0.2	
179					0.3	
180					1.2	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 9 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
181	GC			CLAYEY GRAVEL little sand, subrounded sand and gravel, brown, Nil HCl, med PI, very moist	1.2		
182					3.6		
183					5.0		
184					0.2		
185					0.3		
186					6" SILTY SAND layer		0.1
187							0.1
188					2" coarse grain SAND layer		0.4
189							1.3
190							5.9
191							2.4
192							5.3
193					14" SP-SM layer		2.2
194							7.6
195					4" SILTY SAND layer		1.4
196					4" SANDY CLAY layer		4.0
197							3.6
198	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, Nil HCl, low PI, very moist	4.3		
199					3.3		
200					3.1		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 10 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
201	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, Nil HCl, low PI, very moist	6.3		
202					3.0		
203					1.2		
204					3.4		
205					1.2		
206					6.3		
207	SM-GM			Interbedded - SILTY GRAVEL and SILTY SAND, brown, weak HCl, low PI, slightly moist	5.7		
208					0.3		
209					4" SAND few gravel layer	3.1	
210						2.6	
211						2.8	
212						0.0	
213						1.1	
214						0.9	
215					10" SAND trace gravel layer	3.7	
216						1.7	
217				1.6			
218				0.5			
219	SC			CLAYEY SAND some gravel, subrounded sand and gravel, brown, Nil HCl, low PI, very moist	1.4		
220					2.2		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 11 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
221	SC			CLAYEY SAND some gravel, subrounded sand and gravel, brown, Nil HCl, low PI, very moist	11.0		
222					12.4		
223					1.4		
224					4.3		
225					9.8		
226					9.6		
227					18.6		
228					1.0		
229					7.5		
230					0.3		
231					7.0		
232					19.5		
233					45.8		
234					4" SAND trace gravel and silt layer	7.6	
235					2" SAND trace gravel and silt layer	5.7	
236					4" SAND trace gravel and silt layer	4.1	
237						7.8	
238						1.4	
239						2.1	
240						20.8	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 12 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
241	SC			CLAYEY SAND some gravel, subrounded sand and gravel, brown, Nil HCl, low PI, very moist	0.3		
242				3" SANDY CLAY layer	5.2		
243				4" SANDY GRAVELY CLAY layer	5.2		
244				2" SANDY CLAY layer	3.8		
245	SM			SILTY SAND little gravel, angular to subangular sand and gravel, Nil HCl, moist	10.7		
246					2.1		
247					1.6		
248					19.0		
249	GC			CLAYEY GRAVEL some sand, angular sand and subangular to subrounded gravel, brown, Nil HCl, med PI, very moist	5.4		
250					1.2		
251					10.3		
252					2" CLAYEY SAND layer	5.7	
253						7.0	
254						7.5	
255						2.7	
256					6.3		
257					1.6		
258					1.7		
259					1.6		
260				2" SANDY CLAY layer	3.7		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 13 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
261	GC			CLAYEY SAND few gravel, angular to subrounded sand and gravel, brown, Nil HCl, med PI, slightly moist	3.2		
262	SC				14.7		
263					5.3		
264					5" SP few gravel layer	3.4	
265						8.4	
266					4" SAND few silt and gravel layer	10.1	
267						14.1	
268						3.7	
269						6.1	
270						1.2	
271						1.7	
272						13.4	
273						21.7	
274					3" SAND layer	9.3	
275						12.3	
276						1.9	
277						12.8	
278						53.0	
279						31.6	
280						11.8	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 14 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
281	SC			CLAYEY SAND few gravel, angular to subrounded sand and gravel, brown, Nil HCl, med PI, slightly moist	3.6		
282				6" SANDY CLAY layer	6.7		
283						12.2	
284						6.9	
285					6" SILTY SAND layer	4.8	
286						6.0	
287	SM			SILTY SAND few gravel, angular to subangular sand and gravel, brown, Nil HCl, Nil PI, slightly moist	6.4		
288						3.4	
289						1.7	
290						6.2	
291						19.4	
292						7.8	
293	SC			CLAYEY SAND few gravel, angular to subangular sand and gravel, weak HCl, med PI, very moist	6.3		
294				4" SILTY SAND some gravel layer	0.5		
295				2" SILTY SAND little gravel layer	0.6		
296						21.7	
297				3" SILTY SAND layer	24.1		
298						0.7	
299					10.6		
300					17.9		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 15 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
301	SC			CLAYEY SAND few gravel, angular to subangular sand and gravel, weak HCl, med PI, very moist	2.4		
302					5.8		
303					6.5		
304					9.6		
305					9" SILTY SAND few gravel layer	9.8	
306						12.3	
307						16.7	
308						43.2	
309						33.9	
310	CL				SANDY CLAY few gravel, brown, weak HCl, med PI, dry	28.3	
311					96.5		
312	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, weak HCl, low to med PI, slightly moist	39.0		
313					278.6		
314					13.7		
315					9.9		
316					1" SILTY SAND layer	25.4	
317						15.6	
318					3" SANDY CLAY layer	15.2	
319						32.3	
320					32.0		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 16 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
321	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, weak HCl, low to med PI, slightly moist	35.1		
322					63.2		
323					57.1		
324					237		
325					204		
326					251		
327					8" CLAYEY SAND little gravel layer	235	
328						6.0	
329						44	
330						1.2	
331						2.3	
332						4.5	
333						3.9	
334						18.1	
335					3" SILTY SAND layer	2.8	
336						6.1	
337						5.2	
338						29.2	
339						43.3	
340						17.3	

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 17 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C.Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
341	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, weak HCl, low to med PI, slightly moist	1.5		
342					25.8		
343					2" SANDY CLAY few gravel layer	91.5	
344						42.3	
345						210	
346					5" SANDY CLAY few gravel layer	51.6	
347						4.5	
348						3.2	
349						3.5	
350						12.8	
351						15.9	
352						2.5	
353						3.7	
354						13.6	
355						10.5	
356						56.2	
357						75.2	
358					75.2		
359					403.2		
360					17.4		

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 18 of 19

DRILLING LOG FOR: Soil Boring #1

Date Hole Started: 4/01/02

ADWR No:

Date Hole Completed: 4/10/02

Site Location: E.C. Winter

Rig Type: Rotosonic

Drilling Contractor: Prosonic

Drilling Method: Rotosonic

Depth of Borehole: 375'



Depth	Soil Class	USCS Symbol	Blows/6"	Narrative Lithologic Description	VOC Conc. (ppm)	Sample ID/Time	
361	SC			CLAYEY SAND little gravel, angular to subangular sand and gravel, brown, weak HCl, low to med PI, slightly moist	18.6		
362					27.8		
363					41.1		
364					14.1		
365					13.1		
366					4" SILTY SAND layer	2.8	
367						4.3	
368						6.1	
369						8.9	
370						4.3	
371	GC			CLAYEY GRAVEL some sand, angular to subangular sand and gravel, brown, weak HCl, med PI, slightly moist	2.9		
372						4.5	
373						4.2	
374						12.4	
375						END OF BORING	16.1
376							
377							
378							
379							
380							

Geologist's Name: D. Carlson

Client: ADEQ

Volatile Organic Compounds (VOCs) concentration determined by photoionization detector (PID) calibrated each morning with 100 parts per million (ppm) isobutylene

Project: E.C. Winter

Sheet: 19 of 19

W30S

SRC-W30S

SRC-W30D

SRC-W30M

WELL BORING DETAILS:

Total Depth	40-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 176'
Nominal Borehole Diameter	8"
Depth Interval	176' - 404'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Shallow Well Casing Length	120'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	120' - 170'
Perforations	0.040", Slotted
Deep Regional Well Casing Length	370'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	370' - 400'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	3' - 20'
Seal Material	Cement Grout
2nd Upper Seal Interval	20' - 108'
Seal Material	Bentonite Grout
3rd Upper Seal Interval	108' - 112'
Seal Material	Bentonite Chips
Upper Transition Interval	112' - 115'
Transition Material	#30 Sand
Upper Gravel Pack Interval	115' - 170'
Gravel Pack Material	#8-12 Sand
Middle Transition Interval	170' - 172'
Transition Material	#30 Sand
1st Lower Seal Interval	172' - 198'
Seal Material	Bentonite Chips
2nd Lower Seal Interval	198' - 340'
Seal Material	Bentonite Pellets
3rd Lower Seal Interval	340' - 361'
Seal Material	Bentonite Grout
Lower Transition Interval	361' - 364'
Transition Material	#30 Sand
Lower Gravel Pack Interval	364' - 400'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	400' - 402'
Transition Material	#30 Sand
Bottom Seal Interval	402' - 404'
Seal Material	Bentonite Chips
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Both Wells	
Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	15SQ-10C-250
Pump capacity	30 gpm
Deep Regional Well	
Pump Intake	362' bgs
Water Table Well	
Pump Intake	165' bgs

WELL BORING DETAILS:

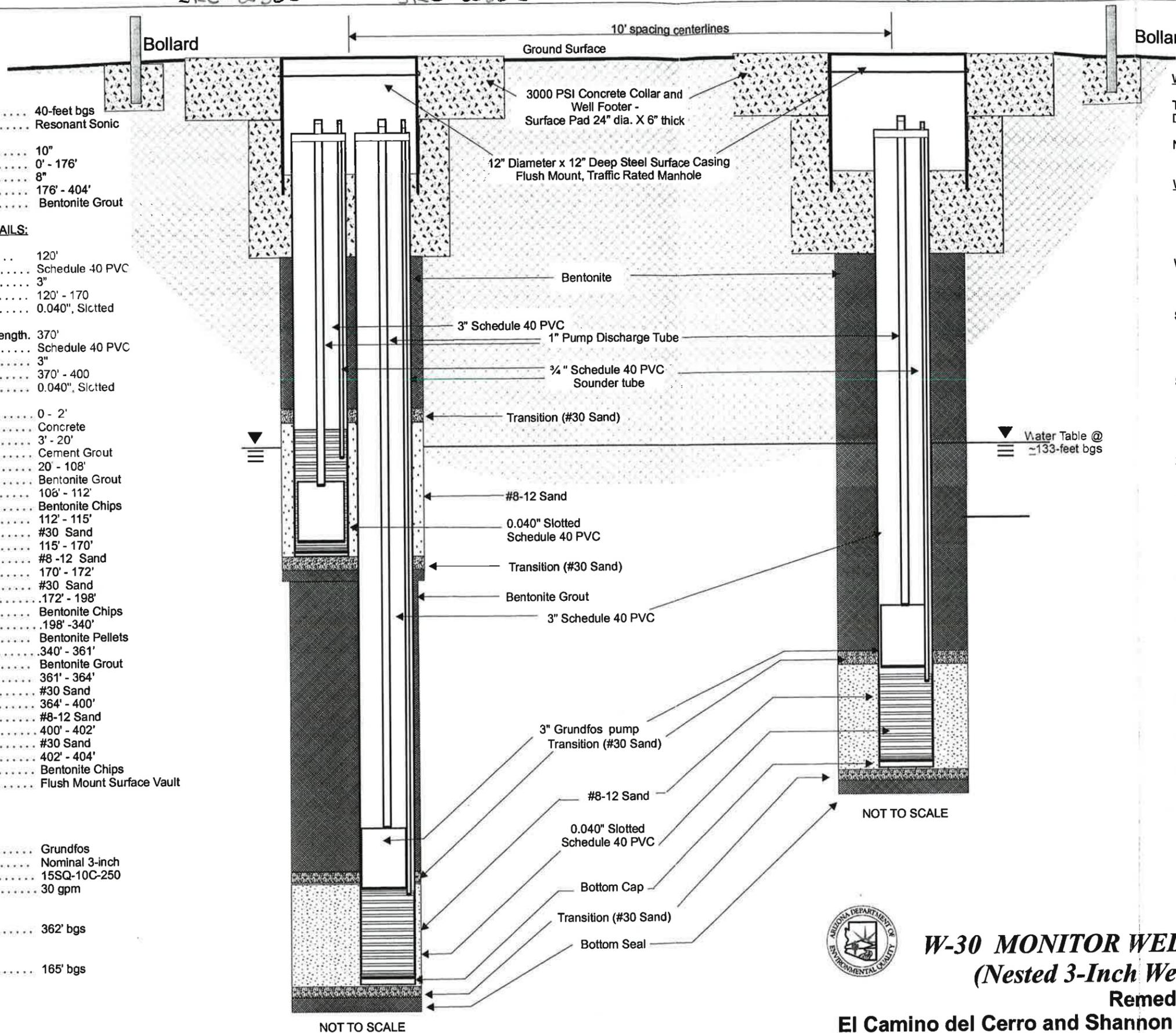
Total Depth	260-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	8"
Depth Interval	0' - 260'

WELL CONSTRUCTION DETAILS:

Well Casing Length	0 - 20'
Material	Steel
Diameter	3"
Well Casing Length	20 - 205'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	205' - 235'
Material	Schedule 40 PVC
Diameter	3"
Perforations	0.040", Slotted
Surface Seal Interval	0 - 5'
Seal Material	Concrete
1st Upper Seal Interval	5' - 20'
Seal Material	Cement Grout
2nd Upper Seal Interval	20' - 196'
Seal Material	Bentonite Grout
3rd Upper Seal Interval	196' - 198'
Seal Material	Bentonite Chips
Transition Interval	198' - 200'
Transition Material	#30 Sand
Gravel Pack Interval	200' - 235'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	235' - 237'
Transition Material	#30 Sand
1st Bottom Seal Interval	237' - 248'
Seal Material	Bentonite Chips
2nd Bottom Seal Interval	248' - 260'
Seal Material	Bentonite Pellets
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Medium Regional Well	
Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	15SQ-10C-250
Pump capacity	30 gpm
Pump Intake	200' bgs



W-30 MONITOR WELLS AS-BUILT SCHEMATIC
(Nested 3-Inch Wells + 3-Inch Companion Well)
 Remedial Investigation/Feasibility Study
 El Camino del Cerro and Shannon Road- Rillito Creek WQARF Sites

Project: ECDC-1-SF/monitor_wells/drilling/2003_Wells/Installation_Report/Figures/W-30 As Built Nested Well Schematic.cdr





333 E Wetmore, Suite 611
Tucson, AZ 85705
520-887-1800
520-887-8438 (Fax)

BORING LOG: W-30 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRG WQARF Areas
URS PROJECT #: 23442974 and 23442975

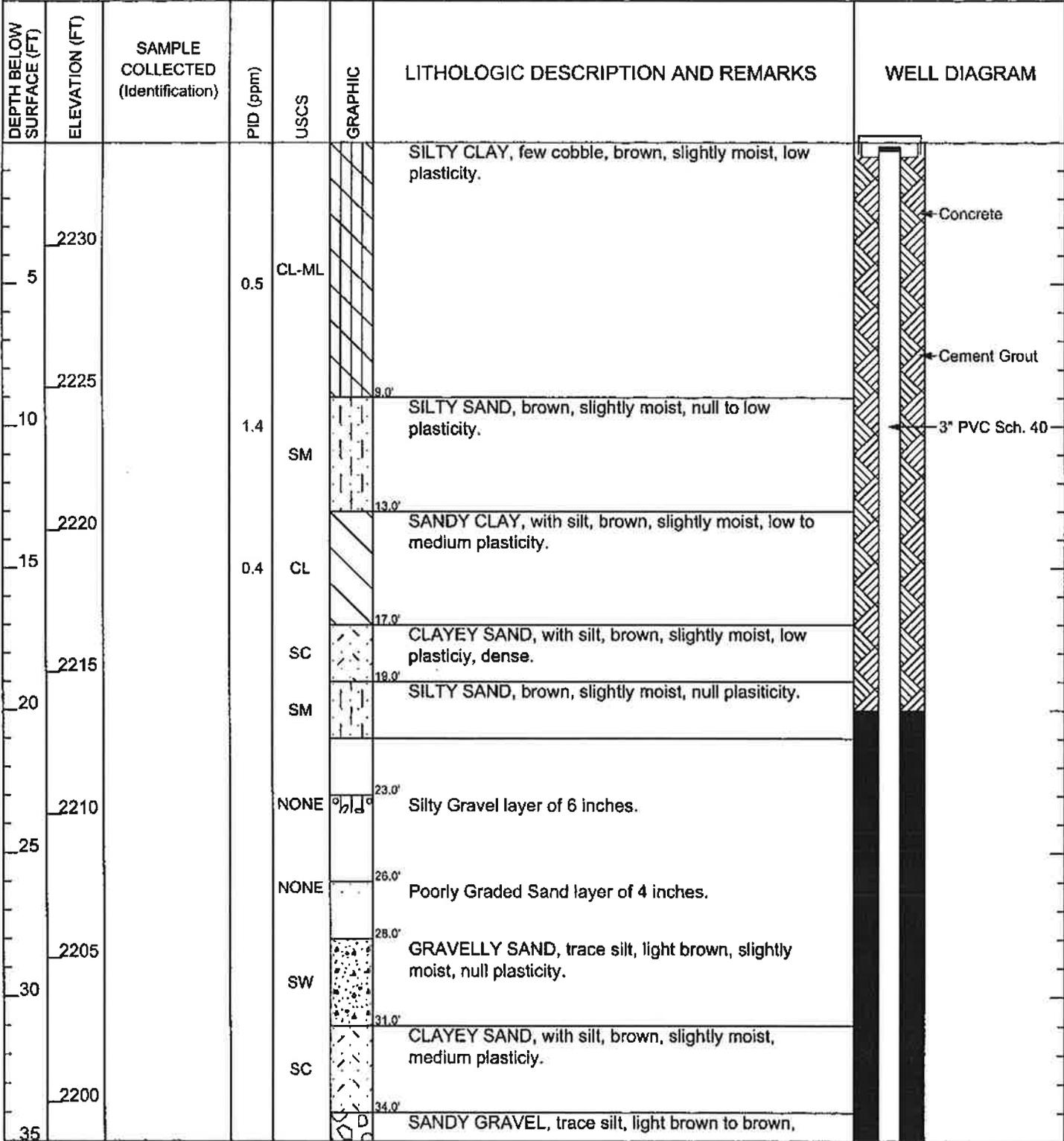
DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 03/14/2003 02:30 PM
FINISH DATE/TIME: 03/20/2003 12:05 PM

LATITUDE (NAVD27): 32.183
LONGITUDE (NAVD 27): 111.015

TOP OF GROUND ELEVATION: 2233.66 A.S.L.
TOP OF CASING ELEVATION: 2233.66 A.S.L.
SCREENED INTERVAL: 2028.66' - 1998.66'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring





333 E Wetmore, Suite 611
Tucson, AZ 85705
520-887-1800
520-887-8438 (Fax)

BORING LOG: W-30 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 03/14/2003 02:30 PM
FINISH DATE/TIME: 03/20/2003 12:05 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2195		8.1	NONE GP		slightly moist, null plasticity. Gravel layer	
45	2190					CLAYEY SAND, with gravel, dark brown, very moist to wet, low plasticity. Cobbel layer at 50' and 55'.	
50	2185		17.1			Cobble layer	
55	2180					3 inch layer of CL with fine sand, gravel and cobble. SILTY SAND, brown, slightly moist.	
60	2175			SC		Trace of cobble	
65	2170						
70	2165		10.1 13.4	SM			
75	2160					6 inch layer of clayey sand layer.	



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80	2155		3.1			8 inch layer of silty sand.	
85	2150			SC		81.0' CLAYEY SAND, brown, moist. 4 inch layer of clay. 8 inch of sandy clay layer Interbedded clayey gravel and clayey sand.	
90	2145					88.0' Blackish-greenish color. CLAYEY GRAVEL, brown, moist.	
95	2140			GC			
100	2135		17.1			98.0' Interbedded silty gravel. CLAYEY SAND, brown, moist, low to medium plasticity.	
105	2130		18.6			Interbedded clayey gravel.	
110	2125					Interbedded silty gravel.	
115	2120			SC		Interbedded silty sand.	Bentonite Grout



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120	2115		7.8			Interbedded silty sand.	
125	2110		7.9				
130	2105		4.1				
131.0				GC		CLAYEY GRAVEL, brown, slightly moist, low plasticity.	
134.0				SC		CLAYEY SAND, brown, moist, low to medium plasticity.	
140.0				SM		Interbedded silty gravel. Interbedded clayey gravel. SILTY SAND with gravel, brown, moist.	
143.0						CLAYEY GRAVEL, brown, moist.	
150	2085		5.0			Interbedded silty gravel.	
155	2080		2.0				
			10.0	GC			



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075		5.5			Thin clayey sand.	
						Interbedded silty sand.	
						Interbedded silty sand and clayey gravel.	
165	2070		4.8	GP		162.0' SILTY GRAVEL, brown, moist.	
170	2065		16.0			167.0' CLAYEY GRAVEL, brown, very moist.	
175	2060		13.0			Very dense.	
180	2055		13.9			Interbedded silty sand.	
185	2050		8.1				
			7.9				
190	2045						
195	2040		2.1				



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200	2035		7.7	GC		3 inch layer of silty gravel.	
205	2030		4.4			2 inch layer of gravel and sand.	
210	2025		18.0			2 inch layer of silty gravel. Trace of cobble ~ 3" to 4". 4 inch layer of silty sand.	
215	2020					Interbedded silty gravel.	
220	2015		15.1			Interbedded silty sand.	
225	2010		9.8			Interbedded silty sand.	
230	2005			GC		228.0' CLAYEY GRAVEL, brown, moist.	
230	2005					230.0' SILTY GRAVEL, brown, moist.	
230	2005					Interbedded silty sand.	
230	2005					Interbedded silty gravel and few clay.	



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240	1995		8.1				
245	1990		13.6	GM		Interbedded silty gravel and few clayey sand.	
250	1985						
255	1980		6.7				
260	1975						
265	1970						
270	1965						
275	1960						



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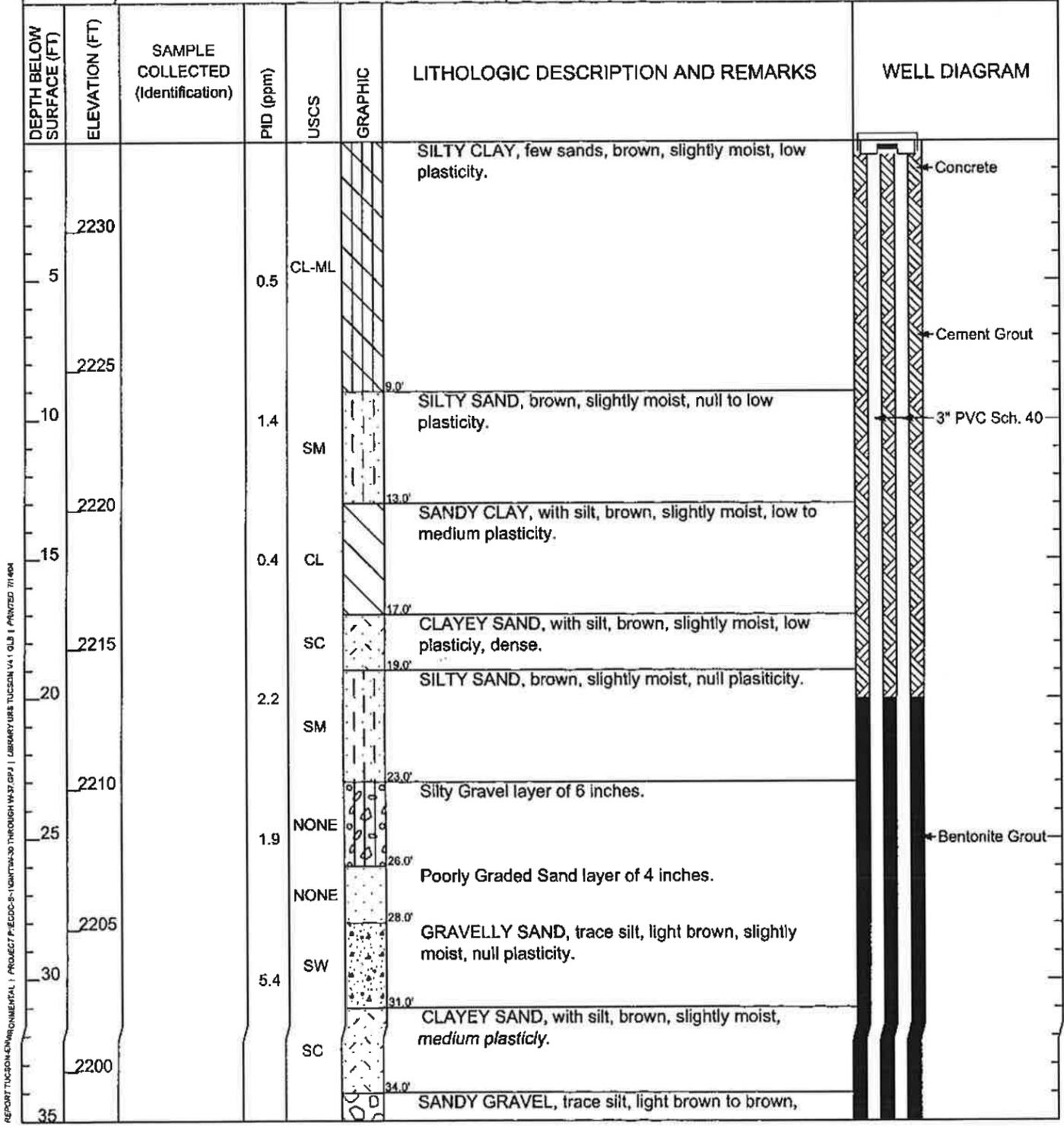
DRILLING CONTRACTOR: Boart Longyear
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LOGGED BY: Dennis Carlson
START DATE/TIME: 02/24/2003 02:45 PM
FINISH DATE/TIME: 03/14/2003 09:30 AM

LATITUDE (NAVD27): 32.183
LONGITUDE (NAVD 27): 111.015

TOP OF GROUND ELEVATION: 2233.24 A.S.L.
TOP OF CASING ELEVATION: 2233.24 A.S.L.
SCREENED INTERVAL: 2113.46' -2063.46' and 1863.24' - 1833.24'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring



REPORT TUCSON-ENVIRONMENTAL / PROJECT F-ECDC-SRRC/WQARF THROUGH W-30 / LIBRARY URS TUCSON V41 013 / PRINTED 7/1/04



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			5.1			slightly moist, null plasticity.	
	2195			NONE GP		37.5' Gravel layer	
40			8.1				
	2190						
45			13.5			44.0' CLAYEY SAND, with gravel, dark brown, very moist to wet, low plasticity. Cobble layer at 50' and 55'.	
	2185						
50			17.1			Cobble layer	Bentonite Grout
	2180					3 inch layer of CL with fine sand, gravel and cobble.	
55			9.9			Cobble layer.	3" PVC Sch. 40
	2175			SC			
60			4.9			Decrease in gravel, increase in clay, slightly moist to moist.	
	2170						
65			1.6			64.0' Interbedded cobble. 3 inch layer of sandy silty clay.	
	2165						
70			17.6			6 inch layer of silty sand. Interbedded with increase in silt.	
	2160						
75						73.0' CLAYEY GRAVEL, with sand and cobble, brown, moist, medium plasticity.	



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2155				GC		Gravel layer.	
80			0.8	CL		SILTY CLAY, greenish grey, very moist, low to medium plasticity. Weathered surface w/ root structured oxidation.	
2150				SP-SM		CLAYEY SAND, brown, moist, null to low plasticity.	
85						8 inch layer of slightly moist to moist.	
2145						CLAYEY GRAVEL with sand, brown, wet, low to medium plasticity.	Bentonite Grout
90			3.8	GC			3" PVC Sch. 40
2140						CLAYEY SAND with gravel, brown, moist, low to medium plasticity, very dense.	
95			10.1			Plasticity decreases and slightly moist.	
2135						Interbedded silt and clay.	
100			8.0			Decrease in clays and plasticity	
2130							
105			10.2				
2125							
110							
2120							
115				SC			#30 Trans. Sand



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	% PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2115		5.1			Increase in clay.	
125	2110						
130	2105						
135	2100						
136.0				GM		Water Table Decrease in clay.	
137.0						SILTY GRAVEL with sand, brown, moist, null plasticity.	
140.0	2095			GC		CLAYEY GRAVEL with sand and few silt, brown, slightly moist to moist, low plasticity. Thin Interbedded poorly-graded Sand with Clay.	
143.0	2090	W-30-143.5'		SM		SILTY SAND with gravel, brown, moist.	
145	2085					8 inch layer of silty gravel with sand. Thin gravel layer.	
150	2080		10.1			Interbedded silty sand, clayey sand, clayey gravels, low to medium plasticity.	
155			10.5	GC			



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2075			3.1				
160			9.2				
2070				GM		162.0' SILTY GRAVEL with sand, brown, moist, null plasticity.	
165						165.0' CLAYEY GRAVEL with trace of silt, brown, very moist, low plasticity.	
2065							
170		W30-171	9.9				
2060				GC			
175							
2055			3.9				
180				SC		181.0' CLAYEY SAND with trace gravel, brown, slight moist.	
2050						183.0' SILTY SAND with gravel, brown, moist.	
185						Interbedded gravel.	
2045				SM			
190			2.7			Interbedded poorly graded sand. Interbedded clayey sand.	
2040						193.0' CLAYEY GRAVEL, brown, moist.	
195							

← #30 Trans. Sand



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2035				GC		2 inch layer of poorly graded sand	
200			1.2			199.0' SILTY SAND with gravel, brown, moist.	
2030						4 inch layer of clayey gravel.	
205				SP			
2025			8.1				
210						211.0' SILTY GRAVEL with sand, trace clay, brown, moist, null plasticity. Sample I.D. W-30-211.5'	
2020		W30-211.5	12.1	GM			
215						Poorly graded sand with silt.	
2015							
220							
225						224.0' Poorly graded sand with silt.	
2010							
230						Increase in silt and clay, low plasticity Decrease in fines, null plasticity.	
2005							
235						231.0' POORLY GRADED GRAVEL, brown, moist, null plasticity. Sample I.D. W-30-231.5'	
2000			11.8	GP			
235						234.0' CLAYEY GRAVEL, brown, moist.	



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240	1995		6.5	GC		6 inch layer of poorly graded gravel. Decrease in fines, increase in sand. Increase in clay.	
245	1990					6 inch layer of silty gravel.	
250	1985		6.9			248.0' SILTY SAND with fine gravels, brown, moist, medium plasticity.	
255	1980	W-30-251.5'	7.6			Gravel layer.	
260	1975			SP-SM		Clayey sand and silt layer.	
265	1970		7.3			265.0' A soil trap was used, disturbed core.	
270	1965		12.8			271.0' CLAYEY SAND, light brown, dry, medium plasticity, strong cementation. Sample I.D. W-30-271.5'	
275	1960		7.9	SC		274.0' CLAYEY GRAVEL, some sand, brown, moist.	



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280	1955		10.0			Increase in gravel. Decrease in clay. Some interbedded clay, decrease in gravel.	
285	1950		10.7	GC		2 inch layer of interbedded silty gravel and silty sand. Nodules of weak cementation, 1/4" to 1/2". 2 inch layer of gravel.	
290	1945		11.6			Increase in cobble.	
295	1940					Slightly moist and very dense. 294.0' SANDY GRAVEL, trace silt, brown, wet. Interbedded silty sand, silty gravel and clayey sand.	
300	1935	W-30-301'		SP		299.0' CLAYEY GRAVEL, brown, slight moist.	
305	1930		7.3	GC		305.0' Very dense. SILTY GRAVEL with sand, trace clay, brown, moist to wet.	
310	1925			GM		Cobble layer. Interbedded clean sand, 3 to 8 inches thick. Interbedded clayey gravel. Interbedded clean sand, 3 to 8 inches thick.	
314	1920			SC		310.0' CLAYEY SAND, brown, moist to wet, low plasticity.	
315						314.0' CLAYEY GRAVEL with sand, brown, moist,	



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			11.5			medium plasticity, very dense.	
320	1915		13.0	GC			
325	1910			GM		325.0' SILTY GRAVEL with sand, brown, wet.	
				GM		4 inch layer of interbedded clayey gravel with sand.	
330	1905			GC		328.0' CLAYEY GRAVEL, brown, moist.	
				GC		2 inch layer of sand and fine to coarse mostly medium. 1/2 inch cementation.	
				GM		331.0' SILTY GRAVEL with sand, brown, moist.	
335	1900			GM		2 inch layer of gravel with clay.	
			6.8	GC		334.0' CLAYEY GRAVEL with sand, brown, moist, medium plasticity.	
340	1895			GM		339.0' 3 inch layer of silty sand.	
				GM		SILTY GRAVEL, brown, moist, medium plasticity.	
345	1890			GC		340.5' CLAYEY GRAVEL with sand, brown, moist, medium plasticity and very dense. Increase in clay.	
350	1885	W-30-351'		GM		347.0' SILTY GRAVEL, brown, moist, medium plasticity.	
				GM		2 inch layer of interbedded clay.	
				GM		2 inch layer of poorly-graded sand.	
355	1880			GC		352.0' CLAYEY GRAVEL with sand, brown, moist.	
				GC		3 inch cobble.	



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1875	360		11.8	GC		3 inch cobble. 8 inch layer of gravelly sand.	
1870	365			GC		8 inch cobble. 2 inch layer of poorly graded sand with silt	#30 Trans. Sand
1865	370			GC		Coarse gravel.	#8-12 Sand
1860	375			GM		SILTY GRAVEL, brown, moist.	
1855	380		4.4	GM		8 inch layer of interbedded clayey gravel. 6 inch layer of few interbedded clay. 18 inch layer of interbedded silty gravel and poorly graded gravel.	
1850	385		10.6	GC		4 inch layer of interbedded silty and clayey gravel layer.	3" PVC Sch. 40 (0.040" slot)
1845	390			GC		CLAYEY GRAVEL with sand, brown, moist, very dense.	
1840	395			GC			



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400	1835	401*	5.1	SP		POORLY GRADED SAND, brown, moist, medium plasticity.	
			398.0			Layer of cobble.	
						6 inch layer of interbedded clayey sand. 8 inch layer of interbedded clayey sand.	
405	1830		0.3	SC		CLAYEY SAND with gravel, brown, moist, low to medium plasticity.	← #30 Trans. Sand ← Bentonite Chips
410	1825						
415	1820						
420	1815						
425	1810						
430	1805						
435	1800						

SRC-W31D

SRC-W31S

SRC-W31M

404-FOOT WELL BORING DETAILS:

Total Depth	404-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 200'
Nominal Borehole Diameter	8"
Depth Interval	200' - 404'
Seal at Reduction	Bentonite Grout

400-FOOT ("DEEP") WELL CONSTRUCTION DETAILS:

Steel Protective Casing	0-20'
Well Casing Length	20'-370'
Material	Schedule 80 PVC
Diameter	4"
Screened Interval	370' - 400'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	2' - 358'
Seal Material	Bentonite Grout
2nd Upper Seal Interval	358' - 363'
Seal Material	Bentonite Chips
Transition Interval	363' - 365'
Transition Material	#30 Sand
Gravel Pack Interval	365' - 400'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	400' - 402'
Transition Material	#30 Sand
Bottom Seal Interval	402' - 404'
Seal Material	Bentonite Chips
Surface Completion	Flush Mount

184-FOOT WELL BORING DETAILS:

Total Depth	184-feet bgs
Drilling Method	ARCH
Nominal Borehole Diameter	10"
Depth Interval	0' - 184'

180 FOOT ("SHALLOW") WELL CONSTRUCTION

DETAILS:

Well Casing Length	120'
Material	Schedule 80 PVC
Diameter	4"
Screened Interval	130' - 180'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	2' - 30'
Seal Material	Cement Grout
2nd Upper Seal Interval	30' - 115'
Seal Material	Bentonite Grout
3rd Upper Seal Interval	115' - 123'
Seal Material	Bentonite Chips
Transition Interval	123' - 125'
Transition Material	#30 Sand
Gravel Pack Interval	125' - 180'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	181' - 182'
Transition Material	#30 Sand
Bottom Seal Interval	182' - 184'
Seal Material	Bentonite Chips
Surface Completion	Flush Mount

239-FOOT WELL BORING DETAILS:

Total Depth	239 feet bgs
Drilling Method	ARCH
Nominal Borehole Diameter	10"
Depth Interval	0' - 239'

235 FOOT ("MIDDLE") WELL CONSTRUCTION

DETAILS:

Well Casing Length	205'
Material	Schedule 80 PVC
Diameter	4"
Screened Interval	205' - 235'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	2' - 20'
Seal Material	Cement Grout
2nd Upper Seal Interval	20' - 189'
Seal Material	Bentonite Grout
3rd Upper Seal Interval	189' - 195'
Seal Material	Bentonite Chips
Transition Interval	195' - 199'
Transition Material	#30 Sand
Gravel Pack Interval	199' - 235'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	235' - 237'
Transition Material	#30 Sand
Bottom Seal Interval	237' - 239'
Seal Material	Bentonite Chips

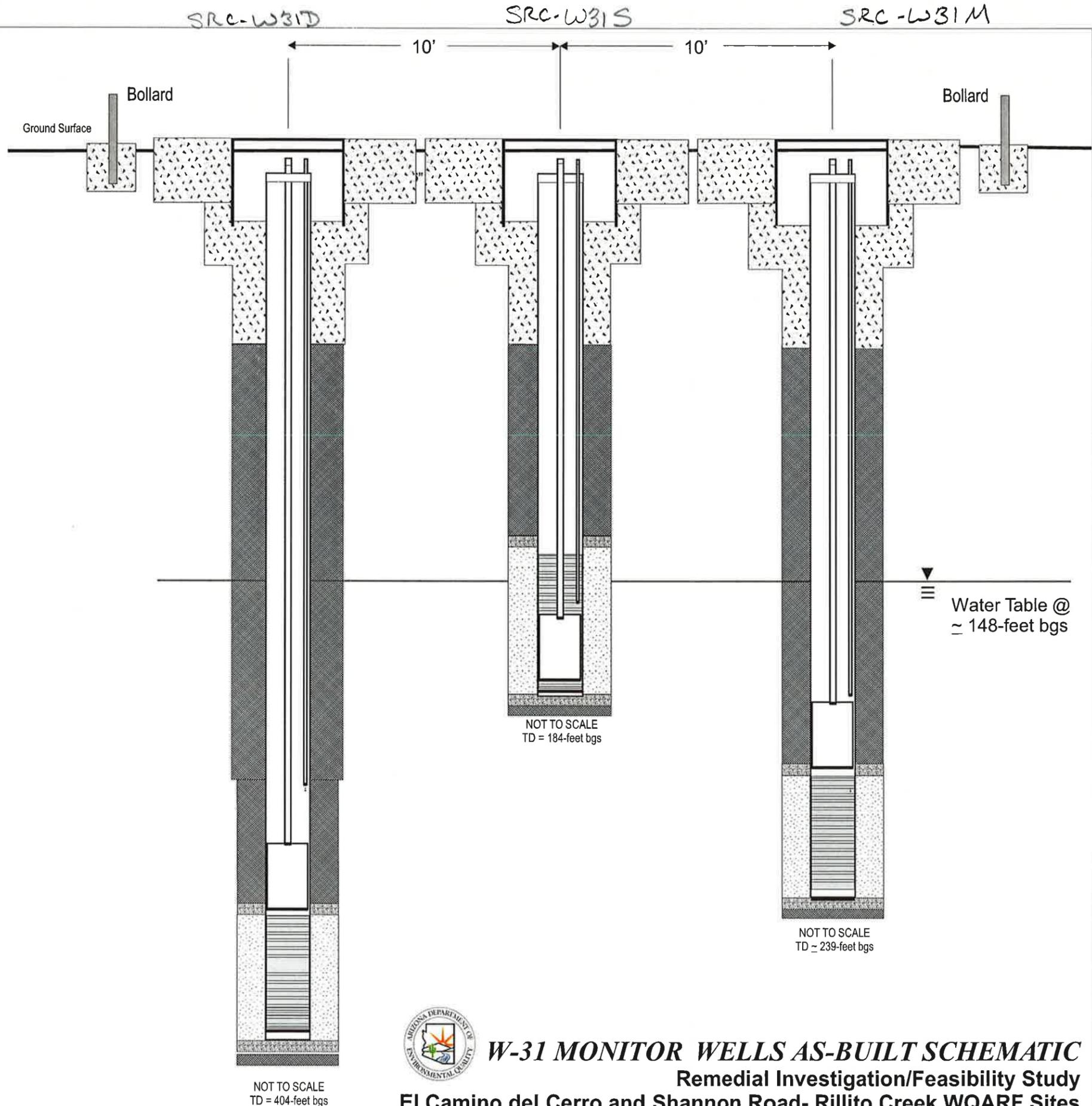
WELL EQUIPPING

"DEEP and MIDDLE" Wells

Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	15SQ10C-250
Pump capacity	30 gpm
Pump Intake - "DEEP"	360'bgs
Sounding Tube - "DEEP"	250'bgs
Pump Intake - "MIDDLE"	200'bgs
Sounding Tube - "MIDDLE"	190'bgs

"SHALLOW" Well

Water Table Well	
Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	30SQ10C-130
Pump capacity	30 gpm
Pump Intake - "SHALLOW"	175'bgs
Sounding Tube - "SHALLOW"	170'bgs



NOT TO SCALE
TD = 404-feet bgs

NOT TO SCALE
TD = 184-feet bgs

NOT TO SCALE
TD ~ 239-feet bgs

Water Table @
~ 148-feet bgs



W-31 MONITOR WELLS AS-BUILT SCHEMATIC
Remedial Investigation/Feasibility Study
El Camino del Cerro and Shannon Road- Rillito Creek WQARF Sites



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520-887-8438 (Fax)

BORING LOG: W-31 (shallow)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/03/2003 07:00 AM
FINISH DATE/TIME: 06/03/2003 02:00 PM

LATITUDE (NAVD27): 32.1853
LONGITUDE (NAVD 27): 111.0142

TOP OF GROUND ELEVATION: 2235.47 A.S.L.
TOP OF CASING ELEVATION: 2235.47 A.S.L.
SCREENED INTERVAL: 2105.47' - 2055.47'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Tresser 70W
DRILLING METHOD: Arch Method
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2235					SANDY CLAY with silt, brown, dry, medium PI, soft density, weak cementation.	Concrete
5	2230			CL			
11.0	2225			SM		SILTY SAND, brown, dry, null PI.	
13.8				CL		SANDY CLAY, light brown, dry, medium PI.	3" PVC Sch. 40
16.5	2220			SM		SILTY SAND with few gravel, tan, null cementation.	Cement Grout
21.5	2215			SC		CLAYEY SAND with trace of gravel and silt, brown, slightly moist, low PI.	
25.0	2210			SM		SILTY SAND with trace gravel, light brown, slightly moist.	
30	2205			SM			
35							



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BORING LOG: W-31 (shallow)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/03/2003 07:00 AM
FINISH DATE/TIME: 06/03/2003 02:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2200							
40	2195			GM		36.0' SILTY GRAVEL with sand and few cobble, brown, slightly moist.	
45	2190						
50	2185			GC		51.0' CLAYEY GRAVEL with some sand, reddish orange to tan, moist, low cementation, medium PI. Gravel and sand are decomposed granite, weathered clay.	
55	2180			GM		55.0' SANDY GRAVEL with little silt, few clay, orange to gray, moist, low PI.	
60	2175			CL		60.0' SANDY CLAY with few gravel, dark brown, moist, strong cementation, medium to high PI.	
				SW		61.0' Well-graded SAND, tan, slightly moist, null PI.	
						62.0' Poorly-graded SANDY GRAVEL with few silt, tan, slightly moist.	
65	2170			GP			
70	2165						
75						72.0' SANDY GRAVEL with little silt few clay, brown, slightly moist.	← Bentonite Grout



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BORING LOG: W-31 (shallow)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/03/2003 07:00 AM
FINISH DATE/TIME: 06/03/2003 02:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2160			GM			
						78.0'	
				SM		SILTY SAND with gravel, poorly graded, tan to light brown, moist.	
	2155					81.0'	
				SC		CLAYEY SAND with little gravel, few silt, dark brown, moist.	
	2150					87.0'	
				CL		SANDY CLAY with little gravel, few silt, dark brown, moist.	
	2145					90.0'	
				SP		GRAVELLY SAND with few silt, few clay, tan, moist, low PI, weak cementation.	
	2140					93.0'	
				SC		CLAYEY SAND with little gravel, brown, moist, weak cementation.	
	2135					97.0'	
				CH		CLAY with few silt and sand, dark brown, moist, medium to high PI, strong cementation.	
	2130					100.5'	
				SP		GRAVELLY SAND with few silt and clay, tan to light brown, slightly moist.	
	2125					108.0'	
				SC		CLAYEY SAND with few gravel and little silt, brown, slightly moist, medium PI.	
115						115.0'	



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BORING LOG: W-31 (shallow)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/03/2003 07:00 AM
FINISH DATE/TIME: 06/03/2003 02:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2115			CL		SANDY CLAY with few gravel and silt, brown, moist, medium PI.	
122	2113			GM		SANDY GRAVEL with few clay and silt, poorly graded, tan to light brown, slightly moist.	Bentonite Chips
123	2112			SC		CLAYEY SAND with gravel, dark brown, moist.	#30 Trans. Sand
133	2103			GP		SANDY GRAVEL with few cobble, white to gray, moist.	#8-12 Sand
135	2101			SC		CLAYEY SAND with gravel and fine cobble, dark brown, slightly moist.	
150	2085			SC		SAMPLE ID: W-31-147'	



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BORING LOG: W-31 (shallow)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/03/2003 07:00 AM
FINISH DATE/TIME: 06/03/2003 02:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2080							3" PVC Sch. 40, Slotted 0.040"
160	2075						
165	2070					CLAYEY GRAVEL with little sand, dark brown, moist, low to medium Pl.	
170	2065						
175	2060			GC			
180	2055						#30 Trans. Sand
185	2050						Bentonite Seal
190	2045						
195							



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

LATITUDE (NAVD27): 32.1853
LONGITUDE (NAVD 27): 111.0142

TOP OF GROUND ELEVATION: 2235.57 A.S.L.
TOP OF CASING ELEVATION: 2235.57 A.S.L.
SCREENED INTERVAL: 2030.57' - 2000.57'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Tresser 70W
DRILLING METHOD: Arch Method
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2235					SANDY CLAY with silt, brown, dry, medium PI, soft density, weak cementation.	Concrete
5	2230			CL			Cement Grout
10	2225			SM		11.0' SILTY SAND, brown, dry, null PI.	3" PVC Sch. 40
15	2220			CL		13.5' SANDY CLAY, light brown, dry, medium PI.	
20	2215			SM		16.5' SILTY SAND with few gravel, tan, null cementation.	
25	2210			SC		21.5' CLAYEY SAND with trace of gravel and silt, brown, slightly moist, low PI.	
30	2205			SM		25.0' SILTY SAND with trace gravel, light brown, slightly moist.	
35							



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2200						
40	2195			GM		38.0' SILTY GRAVEL with sand and few cobble, brown, slightly moist.	
45	2190						
50	2185			GC		51.0' CLAYEY GRAVEL with some sand, reddish orange to tan, moist, low cementation, medium PI. Gravel and sand are decomposed granite, weathered clays.	
55	2180			GM		56.0' SANDY GRAVEL with little silt, few clays, orange to gray, moist, low PI.	
60	2175			CL		60.0' SANDY CLAY with few gravel, dark brown, moist, strong cementation, medium to high PI.	
				SW		61.0' Well-graded SAND, tan, slightly moist, null PI.	
						62.0' Poorly-graded SANDY GRAVEL with few silt, tan, slightly moist.	
65	2170			GP			
70	2165						
75						72.0' SANDY GRAVEL with little silt few clays, brown, slightly moist.	



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDG/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2160				GM			
80	2155			SM		78.0' SILTY SAND with gravel, poorly graded, tan to light brown, moist.	
85	2150			SC		81.0' CLAYEY SAND with little gravel, few silt, dark brown, moist.	
90	2145			CL		87.0' SANDY CLAY with little gravel, few silt, dark brown, moist.	
95	2140			SP		90.0' GRAVELLY SAND with few silt, few clay, tan, moist, low PI, weak cementation.	
100	2135			SC		93.0' CLAYEY SAND with little gravel, brown, moist, weak cementation.	
105	2130			CH		97.0' CLAY with few silt and sand, dark brown, moist, medium to high PI, strong cementation.	
110	2125			SP		100.5' GRAVELLY SAND with few silt and clay, tan to light brown, slightly moist.	
115				SC		108.0' CLAYEY SAND with few gravel and little silt, brown, slightly moist, medium PI.	← Bentonite Grout



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2120				CL		SANDY CLAY with few gravel and silt, brown, moist, medium Pl.	
120	2115			GM		118.0' SANDY GRAVEL with few clay and silt, poorly graded, tan to light brown, slightly moist.	
125	2110			SC		123.0' CLAYEY SAND with gravel, dark brown, moist.	
130	2105						
135	2100			GP		133.0' SANDY GRAVEL with few cobble, white to gray, moist.	
140	2095					135.0' CLAYEY SAND with gravel and fine cobble, dark brown, slightly moist.	
145	2090						
150	2085			SC			
155							



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2080							
160	2075						
165	2070					CLAYEY GRAVEL with little sand, dark brown, moist, low to medium PI.	
170	2065						
175	2060			GC			
180	2055						
185	2050					CLAYEY SAND with little gravel, dark brown, moist, weak cementation.	
190	2045						
195							



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2040				SC			#30 Trans. Sand
200	2035			SC			#8-12 Sand
205	2030			SC			#8-12 Sand
210	2025			GC		CLAYEY GRAVEL with little sand, brown, slightly moist, strong cementation.	#8-12 Sand
215	2020			GC			
220	2015			GC			3" PVC, Slotted .040"
225	2010			GC			
230	2005			SC		CLAYEY SAND with little gravel, brown, slightly moist, weak cementation.	
235				SC			



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BORING LOG: W-31 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Loren Rudolph
LOGGED BY: Armando Jimenez
START DATE/TIME: 06/04/2003 12:30 PM
FINISH DATE/TIME: 06/04/2003 05:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2000							<p>#30 Trans. Sand Bentonite Seal</p>
240	1995						
245	1990						
250	1985						
255	1980						
260	1975						
265	1970						
270	1965						
275							



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BORING LOG: W-31 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 04/17/2003 12:30 PM
FINISH DATE/TIME: 05/31/2003 01:05 PM

LATITUDE (NAVD27): 32.1853
LONGITUDE (NAVD 27): 111.0142

TOP OF GROUND ELEVATION: 2235.45 A.S.L.
TOP OF CASING ELEVATION: 2235.45 A.S.L.
SCREENED INTERVAL: 1865.45' - 1835.45'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2235		0.9			SANDY CLAY with silt, brown, dry, medium PI, soft density, weak cementation.	Concrete
5	2230			CL		Thin veins of medium cementation, medium stiffness.	Cement Grout
10	2225			SM		11.0' SILTY SAND, brown, dry, null PI.	3" PVC Sch. 40
13.5				CL		SANDY CLAY, light brown, dry, medium PI.	
16.5	2220			SM		16.5' SILTY SAND with few gravel, tan, null cementation. 3-inch layer of gravel, interbedded with very coarse sand. Fine cobble.	
21.5	2215			SC		21.5' CLAYEY SAND with trace of gravel and silt, brown, slightly moist, low PI.	
25	2210		3.4	SM		25.0' SILTY SAND with trace gravel, light brown, slightly moist. 3-inch layer of interbedded cobble and gravel.	Bentonite Grout
30	2205			SM		18-inch layer of sandy clay, dark gray color. Increase in gravel. 3-inch layer of clay with few sand, medium PI.	
35							

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BORING LOG: W-31 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 04/17/2003 12:30 PM
FINISH DATE/TIME: 05/31/2003 01:05 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2200			4.0			12-inch layer of interbedded sandy clay.	
40	2195			GM		SILTY GRAVEL with sand and few cobble, brown, slightly moist. Decrease in silt, gravels and increase in sand.	
45	2190			GM		8-inch layer of poorly graded sand, moist.	
50	2185			GM		6 to 10-inch layer of interbedded clayey gravel, silty gravel, sandy clay and clayey sand. Low to medium PI. Decrease in gravel and cobble.	
55	2180		8.5	GC		CLAYEY GRAVEL with some sand, reddish orange to tan, moist, low cementation, medium PI. Gravel and sand are decomposed granite, weathered clays.	
60	2175			GM		SANDY GRAVEL with little silt, few clays, orange to gray, moist, low PI.	
65	2170			CL		SANDY CLAY with few gravel, dark brown, moist, strong cementation, medium to high PI.	
70	2165			SW		Well-graded SAND, tan, slightly moist, null PI.	
						Poorly-graded SANDY GRAVEL with few silt, tan, slightly moist.	
				GP		6 to 9-inch layer of interbedded sandy gravel and gravelly sand, few silt, poorly sorted.	
						Few cobble, dry to slightly moist.	
75						SANDY GRAVEL with little silt few clays, brown, slightly moist.	



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BORING LOG: W-31 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 04/17/2003 12:30 PM
FINISH DATE/TIME: 05/31/2003 01:05 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2160			GM			
80	2155			SM		78.0' SILTY SAND with gravel, poorly graded, tan to light brown, moist.	
85	2150			SC		81.0' CLAYEY SAND with little gravel, few silt, dark brown, moist.	
85	2150			SC		87.0'	
90	2145		11.6	CL		87.0' SANDY CLAY with little gravel, few silt, dark brown, moist. Increase in gravel size, 2-inches.	
90	2145			SP		90.0' Some cobble. GRAVELLY SAND with few silt, few clay, tan, moist, low PI, weak cementation.	
95	2140			SC		93.0' CLAYEY SAND with little gravel, brown, moist, weak cementation.	
100	2135			CH		97.0' CLAY with few silt and sand, dark brown, moist, medium to high PI, strong cementation.	
105	2130			SP		100.5' GRAVELLY SAND with few silt and clay, tan to light brown, slightly moist. 8 to 10-inch layer of interbedded gravelly sand and sandy gravel.	
110	2125			SC		108.0' CLAYEY SAND with few gravel and little silt, brown, slightly moist, medium PI. 6-inch layer of coarser gravel.	
115						115.0'	



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BORING LOG: W-31 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2120				CL		SANDY CLAY with few gravel and silt, brown, moist, medium PI.	
120	2115		4.2	GM		118.0' SANDY GRAVEL with few clay and silt, poorly graded, tan to light brown, slightly moist. 4-inch layer of clay, black. Decrease in gravel size.	
125	2110			SC		123.0' CLAYEY SAND with gravel, dark brown, moist.	
130	2105						
135	2100		5.5	GP		133.0' SANDY GRAVEL with few cobble, white to gray, moist.	
140	2095					135.0' CLAYEY SAND with gravel and fine cobble, dark brown, slightly moist. Material becomes dry. 8 to 12-inch layer of interbedded clayey sand and sandy clay.	
145	2090						
150	2085		4.4	SC		Moist and low PI.	
155							



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2080							
160	2075						
165	2070						
170	2065		17.1			CLAYEY GRAVEL with little sand, dark brown, moist, low to medium PI.	
175	2060			GC		SAMPLE ID: W-31-171.5 Reddish iron staining.	
180	2055					6 to 12-inch layer of increasing sand and increasing clay.	
185	2050						
190	2045					CLAYEY SAND with little gravel, dark brown, moist, weak cementation.	
195							



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2040			3.9				
200	2035			SC		Increase in gravel size.	
205	2030					Increase in gravel proportion and a decrease in sand proportion.	
210	2025		4.6			CLAYEY GRAVEL with little sand, brown, slightly moist, strong cementation. SAMPLE ID: W-31-211.5	
215	2020					2 to 6-inch layer of interbedded clayey gravel and clayey sand.	
220	2015			GC			
225	2010					Increase in in gravel size.	
230	2005					CLAYEY SAND with little gravel, brown, slightly moist, weak cementation. SAMPLE ID: W-31-232'	
235			4.3	SC			



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2000							
240	1995					239.0' SILTY GRAVEL, brown, slightly moist. 1 to 2-inch layer of poorly graded sand.	
245	1990			GM		4-inch layer of clayey sand, wet. 9-inch layer of clayey gravel, moist. 8-inch layer of clayey gravel, wet.	
250	1985		11.3			250.0' 6-inch layer of poorly graded gravel. CLAYEY GRAVEL with sand, brown, moist, medium PI. SAMPLE ID: W-31-251	
255	1980						
260	1975			GC		6-inch layer of clayey sand with little gravel, moist, medium to high.	
265	1970						
270	1965		0.5			8-inch layer of coarser gravels. Increase in silt clay. SAMPLE ID: W-31-271.5	
275						274.0' 8-inch layer sandy gravel with little clay. GRAVELLY SAND with little clay and poorly sand,	



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1960				SP		brown, moist, low PI, low cementation.	
280	1955			GP		278.0' SANDY GRAVEL with little clays, brown, moist, low to medium PI. 6 to 12-inch layer of interbedded gravelly sand and sandy gravel.	
285	1950			SC		287.0' CLAYEY SAND with little gravel, brown to dark gray, moist, medium plasticity.	
290	1945			GM		291.0' Cobble of 3.5-inches in diameter are present. GRAVELLY SAND with little clay, brown, moist, weak cementation, low PI.	
295	1940			GM		292.0' CLAYEY GRAVEL with little sand, some cobble, brown, moist, moderate cementation.	
300	1935		0.2	GC		18-inch layer of clayey sand with little gravel. 4-inch layer of poorly sorted. 16-inch layer of poorly graded gravel, dark brown, moist, low PI, weak cementation. SAMPLE ID: W-31-301.5	
305	1930			GC		18-inch layer of poorly graded gravel.	
310	1925		2.2	GM		310.0' SANDY GRAVEL with little clays, dark brown, moist. 6 to 12-inch layer few cobble, 4-inch in diameter.	
315							



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PI D (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1920							
320	1915					CLAYEY GRAVEL with little sand, dark brown, moist, weak to medium cementation.	
						Iron staining.	
						Decrease in gravel content.	
						Increase in gravel content.	
325	1910					12-inch layer of sandy gravel with clay.	
330	1905					18-inch layer of clayey gravel.	
335	1900			GC			
340	1895		2.0			18-inch layer of sandy gravel with little clay.	
						Decrease in gravel size.	
345	1890					12-inch layer of clayey sand with few gravel, medium PI.	
350	1885		2.8				
						352.0' SAMPLE ID: W-31-351.5	
						SANDY GRAVEL with little clay, dark brown, moist, weak cementation, low PI.	
355							



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	1880					Increase in fines.	
360	1875			GM		12-inch layer of sandy clay with silt, low to medium PI.	
365	1870			GM		6 to 8-inch layer of clayey sand with little gravel.	#30 Trans. Sand
370	1865					Increase in gravel size to 1.5 inches.	
375	1860			SC		CLAYEY SAND with little gravel, brown, moist, moderate cementation, medium PI.	
380	1855					6-inch layer of iron staining.	
						Decrease in gravel size to half-inch.	#8-12 Sand
385	1850			GC		18-inch layer of clayey sand with little gravel.	3" PVC, 0.040" Slot
						Red and green weathered staining.	
390	1845					12-inch layer of clayey sand with little gravel.	
395							

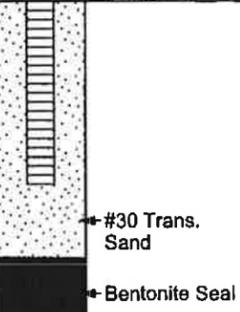


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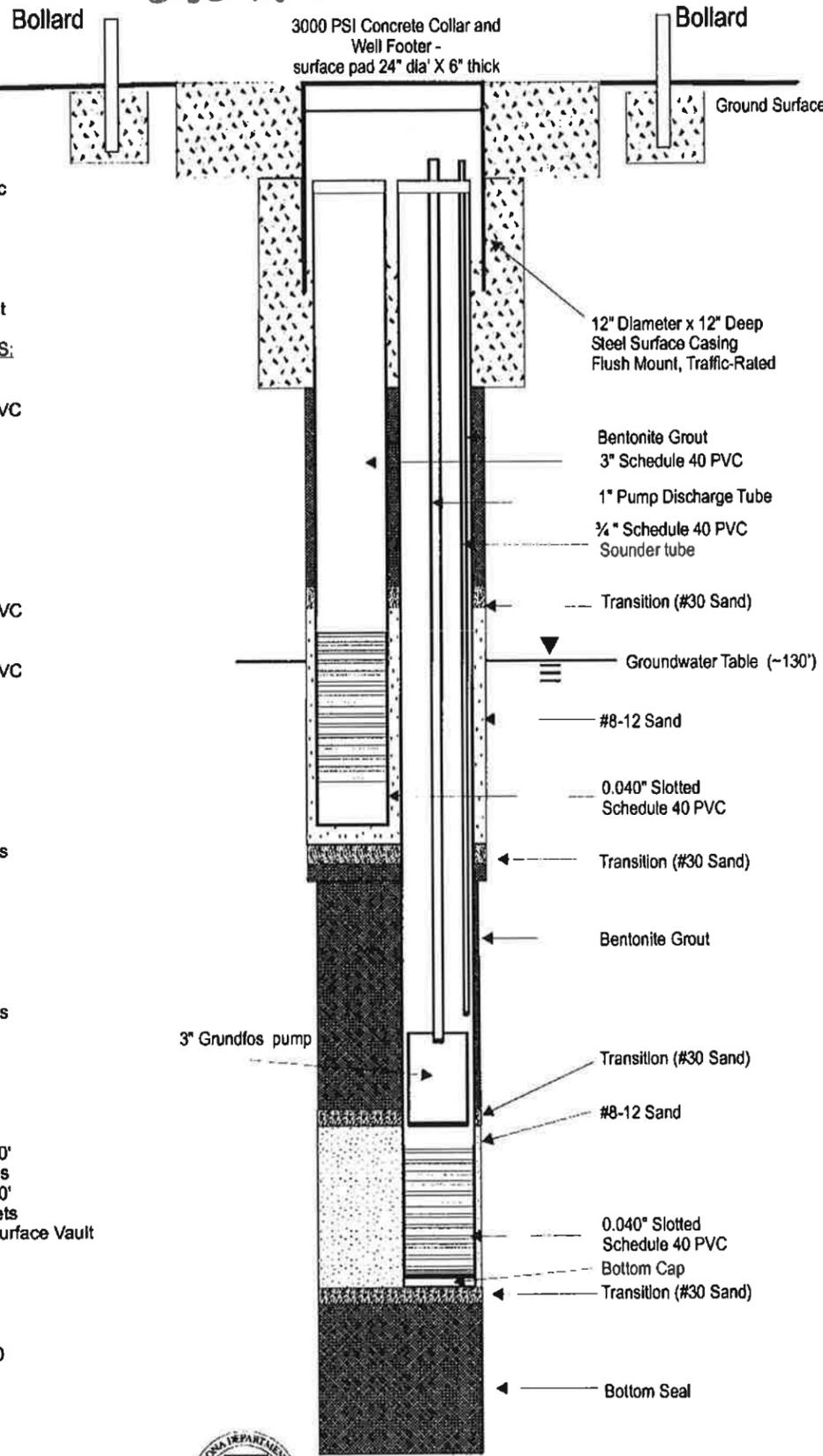
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1840						CLAYEY SAND with few gravel, brown, moist, weak cementation, low PI.	 <p>#30 Trans. Sand Bentonite Seal</p>
400	1835		1.2	SC	Increase in gravel percentage and in size. A 4 to 5-inch cobble found. SAMPLE ID: W-31-401.5		
405	1830						
410	1825						
415	1820						
420	1815						
425	1810						
430	1805						
435							

CDC-W32S CDC-W32M



P:\CDC-SRR\CIR-FS\Monitor Wells\Drawings\2003\Boat\Figure 4.cdr 5-02

WELL BORING DETAILS:

Total Depth	301-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 17'
Nominal Borehole Diameter	8"
Depth Interval	17' - 301'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Water Table Well Casing Length	120'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	120' - 170'
Perforations	0.040", Slotted
Regional Well Casing Length	205'
Well Casing Interval	0 - 20'
Material	Steel
Diameter	3"
Well Casing Interval	20 - 205'
Material	Schedule 40 PVC
Diameter	3"
Well Screened Interval	205' - 235'
Material	Schedule 40 PVC
Diameter	3"
Perforations	0.040", Slotted
Surface Seal Interval	0 - 5'
Seal Material	Concrete
1st Upper Seal Interval	5' - 20'
Seal Material	Cement Grout
2nd Upper Seal Interval	20' - 113'
Seal Material	Bentonite Chips
Upper Transition Interval	113' - 115'
Transition Material	#30 Sand
Upper Gravel Pack Interval	115' - 170'
Gravel Pack Material	#8 -12 Sand
Middle Transition Interval	170' - 172'
Transition Material	#30 Sand
Lower Seal Interval	172' - 198'
Seal Material	Bentonite Chips
Lower Transition Interval	198' - 200'
Transition Material	#30 Sand
Lower Gravel Pack Interval	200' - 235'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	235' - 237'
Transition Material	#30 Sand
1st Bottom Seal Interval	237' - 260'
Seal Material	Bentonite Chips
2nd Bottom Seal Interval	260' - 300'
Seal Material	Bentonite Pellets
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Regional Well	
Pump Make	Grundfos
Pump Size	Nominal 3"
Model	15SQ-10C-250
Pump Capacity	20-30 gpm
Regional Well	
Pump Intake	200' bgs



**W-32 MONITOR WELLS
AS-BUILT SCHEMATIC**

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites





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URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 03/21/2003 01:00 PM
FINISH DATE/TIME:

LATITUDE (NAVD27): 32.1815
LONGITUDE (NAVD 27): 111.0204

TOP OF GROUND ELEVATION: 2234 A.S.L.
TOP OF CASING ELEVATION: 2234 A.S.L.
SCREENED INTERVAL: 2114.84' - 2064.84' ; 2029.82' - 1,999.82'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5	2230		0.8	CL	[Symbol]	SILTY CLAY with sand, brown, dry to slightly moist, low plasticity.	
10	2225		1.5	SC-SM	[Symbol]	SANDY CLAY, brown, dry to slightly moist, medium plasticity, 15% fine sand. Decrease in sand, medium stiff to stiff. 35% fine sand and 20% silt. Transition to clayey sand.	
15	2220		2.9	SP	[Symbol]	POORLY-GRADED SAND, trace to few silt, brown, slightly moist, 30% fine sand and 5% to 10% silt. 3 inch layer of interbedded clayey sand. Fine grain sand transitions to silt.	
20	2215		14.1	SC	[Symbol]	CLAYEY SAND with silt, brown to dark brown, slightly moist. Interbedded poorly graded sand, silty sand, clayey sand and silt from 15' to 20'.	
25	2210		5.4		[Symbol]	POORLY-GRADED SAND with silt, brown, slightly moist. Interbedded clean sand, silty sand, and clayey sand from 23' to 28'.	
30	2205	30'	2.0	SP-SM	[Symbol]	Gravel layer Interbedded poorly graded sand and silty sand, 20% silt, 15% gravel and 15% fine to coarse sand. Interbedded large gravel. Gravel and cobble layer.	
35	2200				[Symbol]		

REPORT TUCSON-ENVIRONMENTAL / PROJECT ECDC-SRRC WQARF THROUGH W-32 / LIBRARY URS TUCSON W-1 GLE / PRINTED 7/14/04



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			1.3	SM		5 inch size cobble noted. SILTY SAND with gravel, brown, slightly moist, 25% silt, 15% gravel and fine to coarse but mostly medium sand.	
40	2195			GM		SILTY GRAVEL with sand, trace of cobble, brown, slightly moist, 15% sand and gravel, 10% silt and clay.	
			18.6	SP		8 inch layer clayey sand gravel. SAND with gravel, trace cobble, light brown, slightly moist, 30% gravel, 5% silt and medium to coarse but mostly medium sand.	
45	2190			GC		CLAYEY GRAVEL with cobble and few sand, brown to dark brown, slightly moist, low plasticity, 40% gravel, 35% cobble, 15% sand, and 10% clay.	
50	2185		3.3	CL		SANDY CLAY with silt, trace gravel, greenish, yellowish, gray, brown, moist, low to medium plasticity, 20% sand 15% silt, 5% gravel.	
55	2180			SC		CLAYEY SAND, few gravel, brown, slightly moist, low plasticity and dense.	
			8.1	GC		CLAYEY GRAVEL, light brown, slightly moist.	
60	2175	60'	10.1	SP		SAND, few silt, light brown, slightly moist to moist.	
65	2170					CLAYEY SAND with gravel, trace cobble, brown, moist, low plasticity, dense to very dense, 25% gravel, 20% clay, fine to coarse mostly coarse sand.	
70	2165		9.5			Thin interbedded clayey gravel layer Trace of cobble.	
			8.4			Trace of cobble.	
75	2160					Interbedded 10 inch layer of silty sand with gravel.	

← Bentonite Chips



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80	2155		4.3	SC		6 inch layer of silty sand. Interbedded clayey gravel with sand layer. Interbedded silty sand with gravel.	
85	2150		5.7			Interbedded 8 inch layer of silty sand with gravel. Interbedded silty sand with a trace of gravel (2"). 8 inch layer of silty sand. 3 inch layer of silty sand.	
90	2145	90'	11.7				
95	2140		23.5				
95	2140		6.4	GM		83.0' SILTY GRAVEL with sand, brown, slightly moist, 35% fine to coarse sand, 20% silt and clay.	
100	2135		24.0			97.0' CLAYEY SAND with gravel, brown, slightly moist. Interbedded clayey gravel.	
105	2130		22.3	SC		Interbedded 8 inch layer of silty gravel.	
110	2125		12.2				
110	2125		23.3			105.0' SILTY GRAVEL with sand, brown, slightly moist, null plasticity. Interbedded clayey gravel.	
115	2120		35.1			Interbedded clayey gravel.	
115	2120			GM		Increase in gravel size. Interbedded 2 inch layer between clayey gravel and	#30 Trans. Sand



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120	2115	120'	6.1			silty gravel.	
125	2110		12.3			CLAYEY GRAVEL with sand, brown, slightly moist, low plasticity, 25% clay.	
130	2105		10.4			Interbedded silty gravel. Interbedded clayey sand with gravel.	
135	2100			GC		4 inch layer of silty sand.	
140	2095	W-32-139'	7.4			6 inch layer of silty gravel layer. 4 inch layer silty gravel layer, 35% sand and 20% silt.	
145	2090		3.1			10 inch layer silty sand layer. Silty sand layer. 7 inch layer of silty sand and clean sand with few gravel. Increase in plasticity. Silty gravel and clean sand with few gravel.	
150	2085					8 inch layer of silty sand with coarse gravel layer.	
155	2080					SILTY GRAVEL with sand, dark brown, wet, 30% to 40% fine to coarse sand, 10% to 20% silt and fine gravel. Few interbedded silty sand and poorly-graded sand.	



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160	2075		5.7			6 inch layer of interbedded silty sand with gravel.	
			8.1			4 inch layer of clayey gravel.	
						Trace of coarse gravel and cobble.	
165	2070					2 inch layer of gravel layer.	
						8 inch layer silty sand layer with trace gravel.	
170	2065					8 inch layer of interbedded clay layer.	
			2.8			4 inch layer of interbedded sand, and silty sand.	
175	2060					10 inch layer of interbedded silty sand.	
			5.4			6 inch layer of clayey gravel with sand, low plasticity, trace to 15% silt, trace gravel, fine to coarse mostly coarse sand.	
180	2055		12.2			3 inch layer of clayey gravel with sand.	
						5 inch layer of clean sand, trace of gravel and silt.	
185	2050					Coarse gravel.	
						Silty gravelly sand.	
190	2045		4.8	GM			
195	2040						

← #30 Trans. Sand

← Bentonite Chips



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PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Armando Jimenez
START DATE/TIME: 03/21/2003 01:00 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2035		7.5			6 inch layer of silty sand and trace gravel.	
						4 inch layer of clayey gravel with sand.	
205	2030					10 inch layer of silty sand with few gravel.	
						Coarse gravel.	
						6 inch layer of clayey gravel.	
210	2025		9.0			6 inch layer of clayey gravel.	
						4 inch layer of silty sand with gravel.	
						2 to 3 inch layer of silty, clean sand with few gravel.	
215	2020	W-32-211.5'				2 to 3 inch layer of silty, clean sand with few gravel.	
						Interbedded clayey gravel.	
			6.2			2 to 3 inch layer of silty, clean sand with few gravel.	
						Interbedded clayey gravel.	
220	2015					2 to 3 inch layer of silty, clean sand with few gravel.	
						Interbedded clayey gravel.	
			1.8			Trace cobble.	
						2 to 3 inch layer of silty, clean sand with few gravel.	
225	2010					2 to 3 inch layer of silty, clean sand with few gravel.	
						CLAYEY GRAVEL with sand, brown, moist, low plasticity, dense.	
				GC			
230	2005		2.1			SILTY GRAVEL, wet, brown.	
						Cobble noted.	
		W-32-231.5'				4 inch layer of clayey gravel.	
						6 inch layer of silty sand.	
235	2000					3 inch layer of clayey gravel.	



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BORING LOG: W-32

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Armando Jimenez
START DATE/TIME: 03/21/2003 01:00 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240	1995		5.3	GM		Interbedded with clayey gravel and silty gravel.	
245	1990		5.3	GM		SILTY GRAVEL with sand, brown, wet. 2 to 3 inch layer of silty sand with gravel.	
250	1985			GM		2 to 3 inch layer of silty sand with gravel.	
255	1980	W-32-251.5'	5.3	GM		Interbedded silty sand with gravel.	
260	1975			GM		Clayey gravel layer.	
265	1970		27.6	GC		CLAYEY GRAVEL, brown, moist to wet, low plasticity, dense. 4 inch layer poorly-graded sand and silty sand.	
270	1965		27.0	GC		2 to 6 inch layers of clayey gravel, silty gravel and silty sand.	
275	1960		10.8 10.2 96.8 25.2	GC		SILTY GRAVEL with sand, brown, wet, 30% gravel and clay, fine to coarse mostly coarse sand.	



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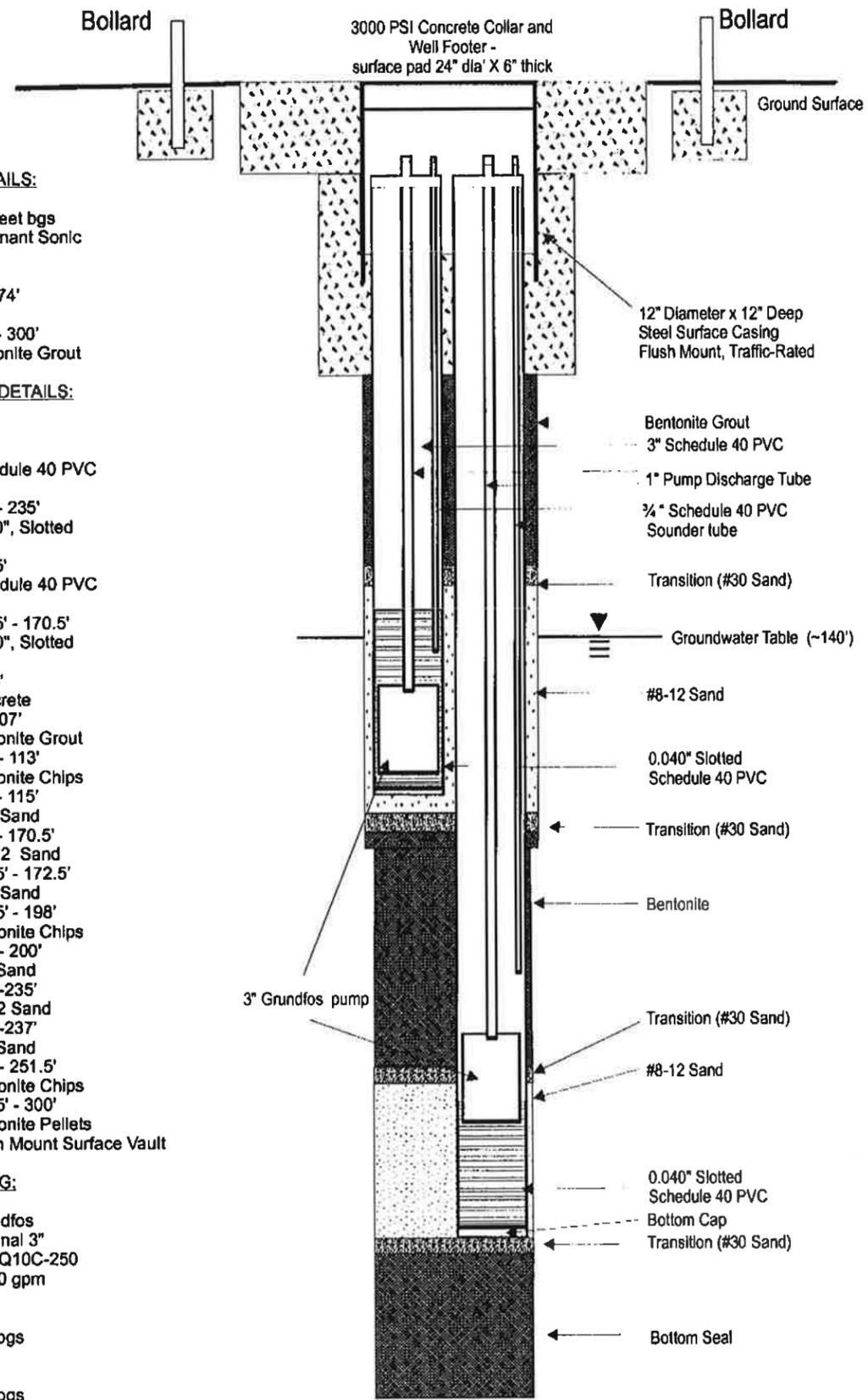
BORING LOG: W-32

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Armando Jimenez
START DATE/TIME: 03/21/2003 01:00 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
280	1955		5.5	GM		7 inch layer of fine to coarse sand. 2 inch layer of clayey sand. 3 inch layer of clayey coarse gravel.	<p>Bentonite Pellet Pellets</p>
285	1950					2 inch medium grain size. 8 inch layer of sand.	
290	1945		8.1			CLAYEY GRAVEL, brown, moist, low plasticity, 25% to 30% clay, fine to coarse sand and fine to coarse mostly fine gravel. 4 inch layer of silty gravel, wet.	
295	1940			GC		Interbedded clayey gravel and silty gravel.	
300	1935	W-32-301'				Interbedded clayey gravel and silty gravel. 2 inch layer of silty sand.	
305	1930						
310	1925						
315	1920						

CDC-W33 S CDC-W33 M



WELL BORING DETAILS:

Total Depth	300-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 174'
Nominal Borehole Diameter	8"
Depth Interval	174' - 300'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Regional Well Casing Length	205'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	205' - 235'
Perforations	0.040", Slotted
Water Table Well Casing Length	120.5'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	120.5' - 170.5'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 5'
Seal Material	Concrete
1st Upper Seal Interval	5' - 107'
Seal Material	Bentonite Grout
2nd Upper Seal Interval	107' - 113'
Seal Material	Bentonite Chips
Upper Transition Interval	113' - 115'
Transition Material	#30 Sand
Upper Gravel Pack Interval	115' - 170.5'
Gravel Pack Material	#8 -12 Sand
Middle Transition Interval	170.5' - 172.5'
Transition Material	#30 Sand
Lower Seal Interval	172.5' - 198'
Seal Material	Bentonite Chips
Lower Transition Interval	198' - 200'
Transition Material	#30 Sand
Lower Gravel Pack Interval	200' -235'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	235' -237'
Transition Material	#30 Sand
Bottom Seal Interval	237' - 251.5'
Seal Material	Bentonite Chips
Backfill Interval	251.5' - 300'
Seal Material	Bentonite Pellets
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Both Wells	
Pump Make	Grundfos
Pump Size	Nominal 3"
Model	15 SQ10C-250
Pump Capacity	20-30 gpm
Regional Well	
Pump Intake	203' bgs
Water Table Well	
Pump Intake	163' bgs



W-33 MONITOR WELLS AS-BUILT SCHEMATIC

Remedial Investigation/Feasibility Study
Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites



P:\E\CD\SRRC\RI-FS-Monitor Wells\Drilling\2003\Installation Report\Figures\W-33 AS-Built.cdr 10-03



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

LATITUDE (NAVD27): 32.1822
LONGITUDE (NAVD 27): 111.0158

TOP OF GROUND ELEVATION: 2238 A.S.L.
TOP OF CASING ELEVATION: 2238 A.S.L.
SCREENED INTERVAL: 2117.82' - 2067.82' ; 2033.34' - 2003.34'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5	2235		1.9	SW		SAND with few gravels and fines, tan to light brown, dry, weak cementation.	<p>3" PVC Sch. 40 Concrete</p>
10	2230			CL		SILTY CLAY with few sand, light brown, dry, weak to medium cementation, high plasticity. Increase in fine sand, dark brown.	
15	2225			SC		CLAYEY SAND with few gravel, light brown, dry, weak to medium cementation, medium plasticity.	
20	2220		3.4	CL		SILTY CLAY with little sand, light brown, dry, weak to medium cementation, high PI, soft.	
25	2215			SC		CLAYEY SAND, light brown, dry, weak to medium cementation, medium plasticity, dense.	
30	2210			SM		SILTY SAND with few clay, tan, dry, weak cementation, low PI, dense.	
35	2205			SW		SAND with little clay, tan, dry. Coarse sand.	



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2200			GM		36.0' SANDY GRAVEL with little clay, tan to light gray. 6-inch layer of coarse gravel.	
40						6-inch layer of coarse gravel.	
	2195			SP		41.0' GRAVELLY SAND with few clay, tan, dry, null PI. 6-inch layer of cobble upto 4 inches in diameter.	
45						46.0' SANDY GRAVEL with little cobble and clay, light brown, dry to slightly moist. 6 to 12-inch layer of cobble found, upto 4-inch in diameter.	
	2190		7.2			Molted clayey sand with gravel. 9-inch layer of silty sand with clay.	
50						Increase in gravel, decomposed granite.	
	2185					9-inch layer of interbedded clay. 6-inch layer of gravelly sandy clay, decomposed granite.	
55						3-inch layer of gravelly clay sand.	
	2180					6-inch layer of gravelly sand with silt and clay.	
60						Interbedded clay and gravel.	
	2175						
65							
	2170						
70							
	2165						
75							

← Bentonite Grout



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM	
80	2160					12-inch layer of sandy gravel, cobble with silt and clay.		
85	2155					9-inch layer of gravelly sand with silt and clay.		
90	2150		12.4			9-inch layer of clayey sand with gravel and silt.		
95	2145			GM		6-inch layer of silt to clayey sand with gravel.		
100	2140					8-inch layer of clayey sand with silt and gravel, slightly moist to dry.		
105	2135					6-inch layer of silty sand with clay and gravel.		
110	2130					Becomes silty sand with clay and gravel.		
115	2125					3-inch layer of clayey sand with silt and gravel.		
								← Bentonite Chips
								← #30 Trans. Sand



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2120		11.9			Becomes silty sand with gravel, clay and trace of cobble.	← #8-12 Sand
	2115					6-inch layer of sandy gravel with silt and trace of clay and cobble.	
125						Interbedded clayey sand and gravel.	
130	2110		3.3			8-inch layer of silty sand with gravel and clay.	
135	2105					Decrease in gravel size.	
140	2100		4.3			6-inch layer of interbedded clayey sand and gravel. SAMPLE ID: W33-139	
140				GC		GRAVELLY SAND with little clay, brown, moist, moderate cementation, medium PI.	
145	2095						← 3" PVC Sch. 40 Slotted 0.040"
145						SILTY GRAVEL with little clay and silt, brown, moist, moderate cementation, medium PI.	
150	2090		6.8			Red and yellow sedimentary clasts.	
155	2085			GM		6-inch layer of sandy gravel with few clay and silt.	



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2080						18-inch layer of increase gravel size.	
2075							
2070				GC		CLAYEY GRAVEL with few sand, light brown, moist, medium PI.	
2065			11.3			SAMPLE ID: W33-170	
2060				SP		GRAVELLY SAND with little clay, light brown, moist, poorly sorted.	
2055						Interbedded with sandy gravel, little clay.	
2050				GC		SANDY GRAVEL with little clay, brown, moist.	
2045			8.3			3-inch layer of interbedded gravelly sand with little clay.	
2040							
2035							
2030							
2025							
2020							
2015							
2010							
2005							
2000							
1995						SANDY GRAVEL with little silt, few clay, light	

← #30 Trans. Sand

← Bentonite Chips



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2040						brown, moist, weak cementation, low PI. 3 to 6-inch layer of gravelly sand with little silt and few clay.	
200							#30 Trans. Sand
2035						Large cobble, 3-inch diameter.	#8-12 Sand
205						Increase of clay.	
2030							
210			7.8			6-inch layer of silty sand with little gravel, poorly sorted and graded. SAMPLE ID: W33-211.5 6 to 12-inch layer of interbedded clayey sand with little gravel.	
2025							
215				GM			
2020							
220							3" PVC Sch. 40 Slotted 0.040"
2015						6 to 12-inch layer of silty sand with few gravel.	
225						Increase in gravel, silty sand with little gravel.	
2010							
230							
2005			1.3			SAMPLE ID: W33-231.5	
235							



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
							#30 Trans. Sand
240	2000					SANDY GRAVEL with little silt, few clay, gray to dark brown, moist, weak cementation, low PI.	
245	1995			GM		18-inch layer of gravelly sand with little silt and clay.	Bentonite Chips
250	1990		2.7			6 to 16-inch layer of sandy gravel with little silt and clay.	
255	1985			GC		CLAYEY GRAVEL with little sand and few silt, dark brown to gray, moist, medium PI. SAMPLE ID: W33-251.5	
255						12-inch layer of gravelly sand with little sand and clay.	
255				GC		CLAYEY GRAVEL with little sand and few silt, dark brown to gray, moist, medium PI.	
260	1980					SANDY GRAVEL with few silt and few clay, dark brown, moist, null PI.	
265	1975					18-inch layer of interbedded clayey gravel with little sand.	
270	1970			GM		18-inch layer of sandy gravel with few silt and few clay.	
275	1965		1.4			9-inch layer of sandy gravel with some clay and silt, brown, moist, moderate cementation, medium PI. SAMPLE ID: W33-271.5	



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BORING LOG: W-33

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dana Strength
START DATE/TIME: 06/02/2003 11:30 AM
FINISH DATE/TIME: 06/10/2003 04:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1960						18-inch layer of interbedded sandy gravel with few silt and few clay, low PI.	<p>Bentonite Pellets</p>
280				GC		CLAYEY GRAVEL with some silt and clay, brown, moist, weak cementation, medium PI.	
1955						SANDY GRAVEL with few silt and clay, brown, moist, low PI.	
285				GM			
1950						CLAYEY GRAVEL with little sand, brown, moist, moderate cementation, medium PI.	
290			14.0	GC			
1945						GRAVELLY SAND with silt and clay, gray to light brown, slightly moist, weak cementation, low PI.	
295				SP			
1940							
300			5.4				
1935						W33-301.5	
305							
1930							
310							
1925							
315							

W34 S

WELL BORING DETAILS:

Total Depth	404-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 200'
Nominal Borehole Diameter	8"
Depth Interval	200' - 404'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Deep Regional Well Casing Length	370'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	370' - 400'
Perforations	0.040", Slotted
Water Table Well Casing Length	125'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	125' - 175'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	2' - 25'
Seal Material	Cement Grout
2nd Upper Seal Interval	25' - 118'
Seal Material	Bentonite Grout
Upper Transition Interval	118' - 123'
Transition Material	#30 Sand
Upper Gravel Pack Interval	123' - 175'
Gravel Pack Material	#8-12 Sand
Middle Transition Interval	175' - 177'
Transition Material	#30 Sand
Lower Seal Interval	177' - 363'
Seal Material	Bentonite Grout
Lower Transition Interval	363' - 365'
Transition Material	#30 Sand
Lower Gravel Pack Interval	365' - 400'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	400' - 402'
Transition Material	#30 Sand
Bottom Seal Interval	402' - 404'
Seal Material	Bentonite Chips
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Both Shallow and Deep Wells	
Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	15SQ10C-250
Pump capacity	30 gpm
Deep Regional Well	
Pump Intake	366' bgs
Water Table Well	
Pump Intake	171' bgs

WELL BORING DETAILS:

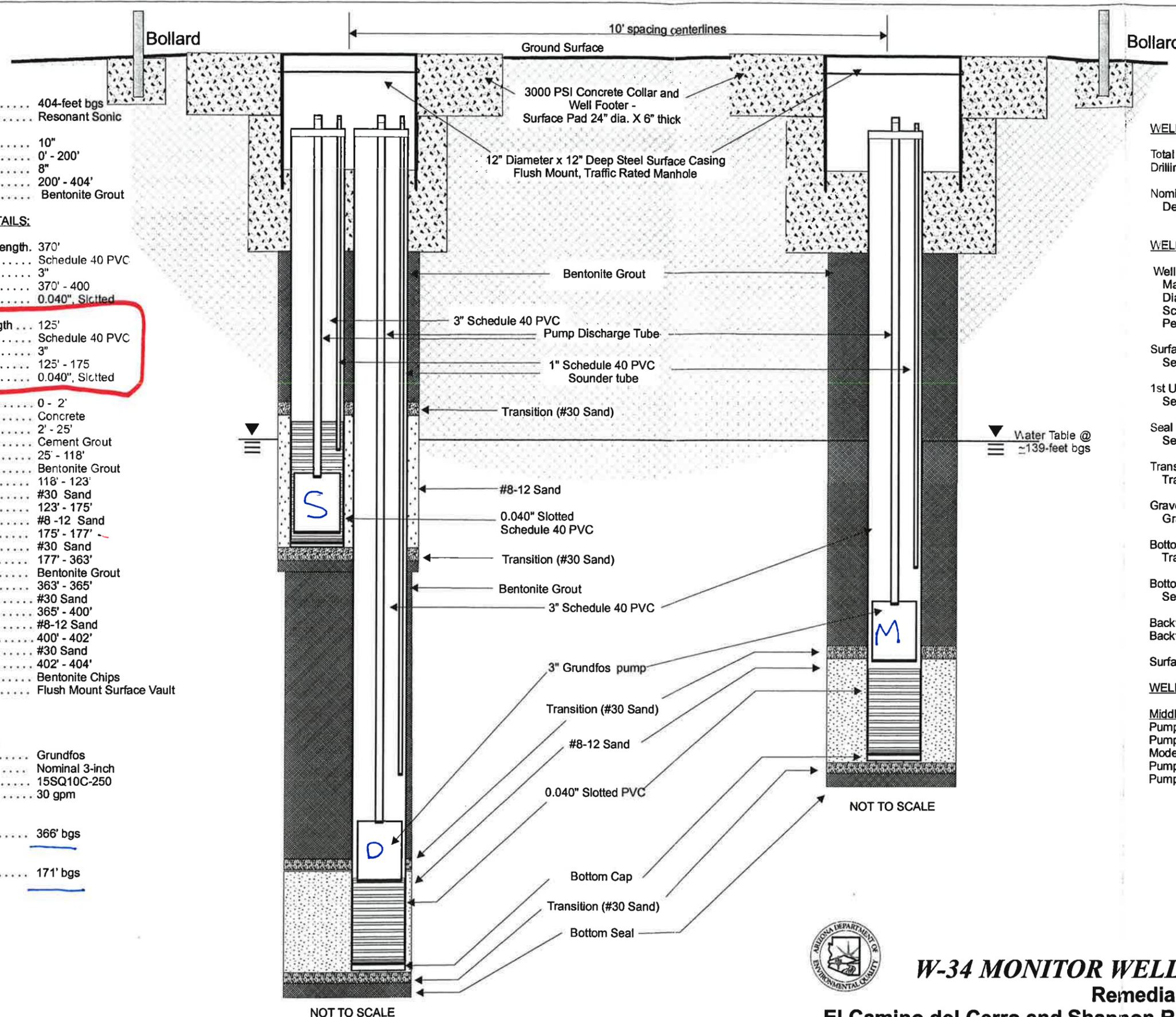
Total Depth	246-feet bgs
Drilling Method	ARCH
Nominal Borehole Diameter	10"
Depth Interval	0' - 246'

WELL CONSTRUCTION DETAILS:

Well Casing Length	200'
Material	Schedule 80 PVC
Diameter	3"
Screened Interval	205' - 235'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 2'
Seal Material	Concrete
1st Upper Seal Interval	2' - 20'
Seal Material	Cement Grout
Seal Interval	2' - 198'
Seal Material	Bentonite Grout
Transition Interval	198' - 200'
Transition Material	#30 Sand
Gravel Pack Interval	200' - 235'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	235' - 237'
Transition Material	#30 Sand
Bottom Seal Interval	237' - 239'
Seal Material	Bentonite Chips
Backfill	239' - 246'
Backfill Material	Soil Cuttings
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Middle Regional Well	
Pump Make	Grundfos
Pump Size	Nominal 3-inch
Model	15SQ10C-250
Pump capacity	20 gpm
Pump Intake	191' bgs



W-34 MONITOR WELLS AS-BUILT SCHEMATIC
 Remedial Investigation/Feasibility Study
 El Camino del Cerro and Shannon Road- Rillito Creek WQARF Sites

Project/EC: RL-FS/monitor_wells/drilling/2003/installation Report/W-34 As Built.cdr 10-03





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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

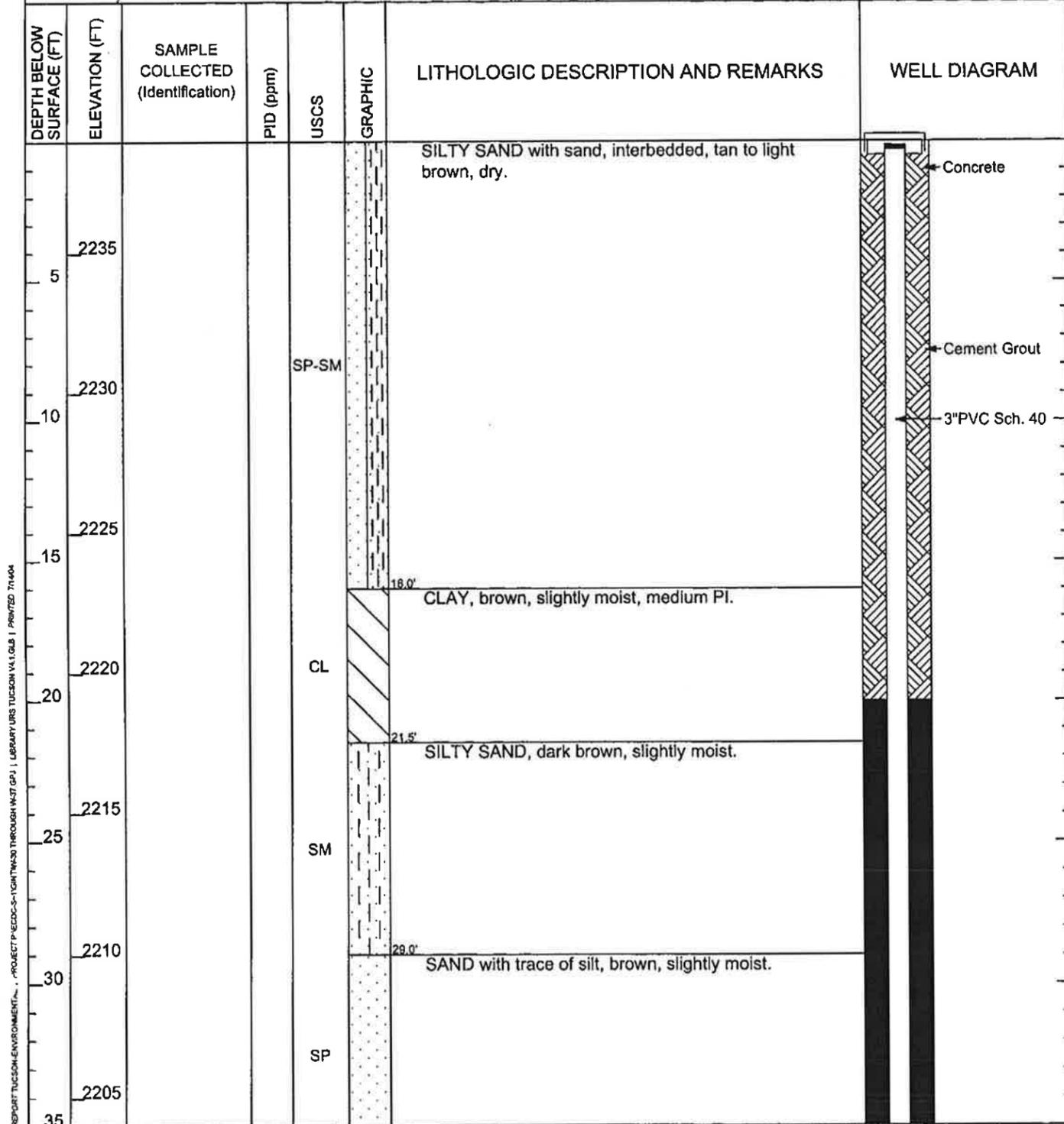
DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

LATITUDE (NAVD27): 32.1805
LONGITUDE (NAVD 27): 111.0203

TOP OF GROUND ELEVATION: 2239.02 A.S.L.
TOP OF CASING ELEVATION: 2239.02 A.S.L.
SCREENED INTERVAL: 2039.02' - 2009.02'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Speedstar 50K
DRILLING METHOD:
SAMPLING METHOD:





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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
						36.0'	
40	2200					SANDY GRAVEL with sand, light brown, moist, null PI.	
45	2195			GP-GM			
50	2190					46.0'	
55	2185					CLAYEY GRAVEL with sand, light brown, slightly moist, low PI.	
60	2180						
65	2175						
70	2170						
75	2165						



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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2160						
85	2155			GC			
90	2150						
95	2145						
100	2140						
105	2135						
110	2130						Bentonite Grout
115	2125						



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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2120						
125	2115					SILTY GRAVEL with sand, brown, slightly moist, dense.	
130	2110						
135	2105						
140	2100			GM			
145	2095						
150	2090						
155	2085						



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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2080						
						159.0'	
	2075			SM		SILTY SAND, brown, wet, null PI.	
170	2070						
						172.0'	
	2065			GC		CLAYEY GRAVEL with sand, brown, wet, low to medium PI, dense.	
175							
						178.0'	
	2060					SILTY GRAVEL with sand, dark brown, wet, null PI.	
180							
	2055						
185							
	2050						
190							
				GP-GM			
	2045						
195							



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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
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URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
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LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2040						#30 Trans. Sand
205	2035						#8-12 Sand
210	2030			GC		CLAYEY GRAVEL with sand, brown, moist, medium PI. 206.0'	
215	2025						
220	2020			GM		SILTY GRAVEL with sand, dark brown, wet. 211.0'	3" PVC Sch. 40 Slotted 0.040"
225	2015						
230	2010						
235	2005			GC		CLAYEY GRAVEL with sand, brown, moist, very dense, medium PI. 230.0'	



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BORING LOG: W-34 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: WDC
DRILLER: Vern Christensen
LOGGED BY: Mike Greene
START DATE/TIME: 06/20/2003 10:00 AM
FINISH DATE/TIME: 06/21/2003 05:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240	2000						<ul style="list-style-type: none"> → #30 Trans. Sand → Bentonite Chips → Soil Cuttings
245	1995						
250	1990						
255	1985						
260	1980						
265	1975						
270	1970						
275	1965						



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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

LATITUDE (NAVD27): 32.1805
LONGITUDE (NAVD 27): 111.0203

TOP OF GROUND ELEVATION: 2239 A.S.L.
TOP OF CASING ELEVATION: 2239 A.S.L.
SCREENED INTERVAL: 2113.79' - 2063.79' ; 1868.73' - 1838.73'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5	2235		0.4	SP-SM		SILTY SAND with sand, interbedded, tan to light brown, dry.	
10	2230					Becomes coarse sand.	
15	2225		2.6				
20	2220		5.5	CL		CLAY, brown, slightly moist, medium PI. 2-inch layer of interbedded clayey sand.	
25	2215			SM		SILTY SAND, dark brown, slightly moist.	
30	2210					6-inch layer of clayey sand. SAND with trace of silt, brown, slightly moist.	
35	2205			SP		5-inch cobble, increase in gravel. 6-inch layer of gravel layer. 4-inch layer of silty sand with gravel.	



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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2200					38.0' 2-inch layer of clayey sand, moist, medium PI. SANDY GRAVEL with sand, light brown, moist, null PI.	
45	2195		14.5	GP-GM		Increase in cobble. 8-inch cobble. 6-inch cobble.	
50	2190		9.4			48.0' CLAYEY GRAVEL with sand, light brown, slightly moist, low PI. Interbedded clayey gravel and silty gravel.	
55	2185		22.4			Increase in gravel with few sand.	
60	2180					Multi-color gravel. 1 to 2-inch layer of cobble, moist.	
65	2175					Interbedded clayey sand and clayey gravel. Becomes slightly moist.	
70	2170		4.9				
75	2165						



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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2160					10-inch layer of silty gravel.	
85	2155			GC	82.0' 48-inches of interbedded clayey sand, silty sand, silty gravel, clayey gravel. 5-inch cobble.		
90	2150				92.0' Becomes moist. Becomes slightly moist. 24-inches of silty gravel and clayey gravel.		
95	2145						
100	2140		10.1				
105	2135				104.0'	24-inches of interbedded silty sand and silty gravel.	
110	2130		40.8			9-inch layer of clayey sand with few gravel. 4-8-inch layer of clayey gravel, sand, poorly graded gravel.	
115	2125						



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BORING LOG: W-34 (deep)

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CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 05/02/2003 02:15 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
			48.8				
120	2120						
125	2115					<p>123.0'</p> <p>SILTY GRAVEL with sand, brown, slightly moist, dense.</p> <p>4-inch layer of silty sand with trace gravel.</p> <p>6-inch layer of clayey gravel.</p>	<p>#30 Trans. Sand</p> <p>#8-12 Sand</p>
130	2110					<p>6-inch layer of clayey gravel.</p>	
135	2105					<p>6-inch layer of clayey gravel.</p>	
140	2100		5.1	GM		<p>2 to 6-inch layer of sand, clayey gravel, silty sand.</p> <p>SAMPLE ID: W-34-142-060403</p>	
145	2095		0.3				
150	2090						
155	2085					<p>10-inch layer of silty sand and silty gravel.</p>	<p>3" PVC Sch. 40 Slotted 0.040"</p>



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BORING LOG: W-34 (deep)

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CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2080					8-inch layer of silty sand and silty gravel.	
165	2075			SM		SILTY SAND, brown, wet, null PI. Interbedded with silty gravel with sand.	
170	2070		3.4			10-inch layer of clayey gravel, moist, very dense. 4-inch layer of silty sand.	
175	2065			GC		8-inch layer of silty gravel, loose. SAMPLE ID: W-34-171.5-060503 CLAYEY GRAVEL with sand, brown, wet, low to medium PI, dense.	
180	2060					SILTY GRAVEL with sand, dark brown, wet, null PI.	
185	2055					4-inch layer of clayey gravel.	
190	2050					10-inch layer of clayey gravel.	
195	2045			GP-GM		6-inch layer of clayey gravel.	
						6-inch layer of clayey gravel.	

← #30 Trans. Sand



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CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 05/02/2003 02:15 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2040		4.9			10-inch layer of clayey gravel.	
						8-inch layer of clayey gravel.	
						3-inch layer of silty sand.	
205	2035					12-inch layer of clayey gravel.	
						206.0'	
				GC		CLAYEY GRAVEL with sand, brown, moist, medium PI.	
210	2030		3.8			211.0'	
						SITLY GRAVEL with sand, dark brown, wet. SAMPLE ID: W-34-211.5-060503	
215	2025					3-inch layer of silty sand.	
220	2020			GM			
						224.0'	
225	2015					2 to 6 inch layer of interbedded clayey gravel, silty sand, silty gravel.	
						230.0'	
230	2010					CLAYEY GRAVEL with sand, brown, moist, very dense, medium PI. SAMPLE ID: W-34-231.5-060603	
235	2005		6.7	GC			



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BORING LOG: W-34 (deep)

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CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240	2000						
				GM		239.0' SILTY GRAVEL with sand, brown, moist.	
245	1995					Becomes blackish brown.	
						248.0'	
250	1990		1.7			CLAYEY GRAVEL with sand, brown, moist to wet, very dense, medium PI.	
255	1985					2 to 4-inch layer of silty sand.	
						2 to 4-inch layer of silty sand.	
260	1980			GC		6-inch layer of clayey gravel.	
265	1975					4 to 10-inch layer of interbedded clayey gravel and silty gravel.	
270	1970						← Bentonite Grout
275	1965					275.0'	



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CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
			29.1	GM		SILTY GRAVEL with sand, brown, wet, null PI.	
						CLAYEY GRAVEL with sand, brown, moist, dense, low to medium PI.	
280	1960					8-inch layer of silty sand.	
285	1955						
290	1950						
295	1945						
300	1940		4.0				
305	1935					2-inch layer of interbedded sand, moist.	
310	1930					Wide range of particle sizes.	
315	1925						



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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
320	1920					2-inch layer of sand.	
325	1915					2-inch layer of sand. 2-inch layer of sand.	
330	1910		1.9				
335	1905						
340	1900			GC		3-inch layer of sand, dry.	
345	1895						
350	1890						
355	1885					2-inch layer of increasing gravel.	



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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
360	1880		1.6			Decrease in clay.	
365	1875					Increase in sand, poorly sorted gravel.	 ← #30 Trans. Sand ← #8-12 Sand
370	1870					Increase in clay.	
375	1865		4.7			Increase in gravel and decrease in clay.	
380	1860						
385	1855						← 3" PVC Sch. 40 Slotted 0.040"
390	1850		0.0			6-inch layer of interbedded fine.	
395	1845					Increase in cobble present.	



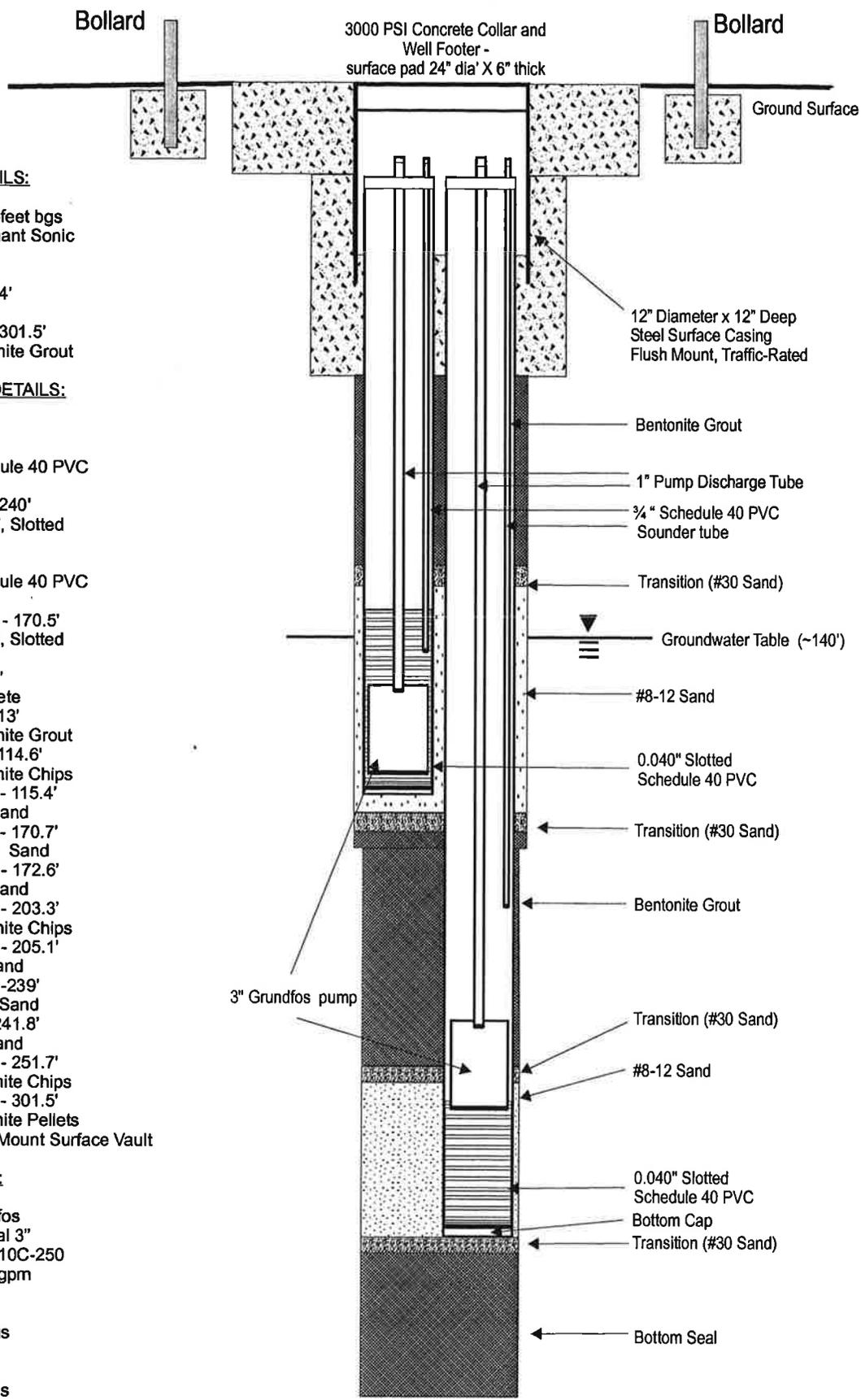
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BORING LOG: W-34 (deep)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/02/2003 02:15 PM
FINISH DATE/TIME: 06/09/2003 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
400	1840		0.0				
405	1835					SAMPLE ID: W-34-401.5-060903	
410	1830						
415	1825						
420	1820						
425	1815						
430	1810						
435	1805						



WELL BORING DETAILS:

Total Depth	301.5-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 174'
Nominal Borehole Diameter	8"
Depth Interval	174' - 301.5'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Regional Well Casing Length	205'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	210' - 240'
Perforations	0.040", Slotted
Water Table Well Casing Length	120.5'
Material	Schedule 40 PVC
Diameter	3"
Screened Interval	120.5' - 170.5'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 20'
Seal Material	Concrete
1st Upper Seal Interval	20' - 113'
Seal Material	Bentonite Grout
2nd Upper Seal Interval	113' - 114.6'
Seal Material	Bentonite Chips
Upper Transition Interval	114.6' - 115.4'
Transition Material	#30 Sand
Upper Gravel Pack Interval	115.4' - 170.7'
Gravel Pack Material	#8-12 Sand
Middle Transition Interval	170.7' - 172.6'
Transition Material	#30 Sand
Lower Seal Interval	172.6' - 203.3'
Seal Material	Bentonite Chips
Lower Transition Interval	203.3' - 205.1'
Transition Material	#30 Sand
Lower Gravel Pack Interval	205.1' - 239'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	239' - 241.8'
Transition Material	#30 Sand
Bottom Seal Interval	241.8' - 251.7'
Seal Material	Bentonite Chips
Backfill Interval	251.7' - 301.5'
Seal Material	Bentonite Pellets
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Both Wells	
Pump Make	Grundfos
Pump Size	Nominal 3"
Model	15 SQ10C-250
Pump Capacity	20-30 gpm

Regional Well	
Pump Intake	203' bgs

Water Table Well	
Pump Intake	163' bgs

W-35 MONITOR WELLS AS-BUILT SCHEMATIC

Remedial Investigation Feasibility Study

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites





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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

LATITUDE (NAVD27): 32.1845
LONGITUDE (NAVD 27): 111.0152

TOP OF GROUND ELEVATION: 2227.7 A.S.L.
TOP OF CASING ELEVATION: 2227.7 A.S.L.
SCREENED INTERVAL: 2022.70' - 1992.70'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PI/D (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2225		1.1		Fill	Fill	
5				SP	3.0' 4.0'	SAND with trace of silt and gravel, tan, dry. SILTY SAND with trace of gravel, brown, slightly moist.	
10	2220			SM		Trace of clay.	Concrete
15	2215			CL	10.5'	CLAY with few sand and silt, brown slightly moist, medium PI, weak cementation. Increase in silt.	3" PVC Sch. 40
20	2210				20.0'	Decrease in silt and sand, medium to high PI.	
25	2205		0.2	SM		SILTY SAND with trace of gravel, brown, slightly moist, dense.	
30	2200				27.0'	6-inch layer of clayey sand, medium PI. SANDY GRAVEL with trace silt, brown, moist. 5-inch in diameter cobble.	
35	2195			GP-GM		8-inch layer of clayey sand, slightly moist, medium PI. Increase in cobble.	

REPORT TUCSON-ENVIRONMENTAL - PROJECT P/ECDC-S-1/CANTINA-30 THROUGH W-37 GP-1 / LIBRARY URS TUCSON V4.1 GLB / PRINTED 7/4/04



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2190		0.8			18-inch layer of interbedded sand and sandy gravel.	<p>← Bentonite Grout</p>
						Trace of clay.	
45	2185					CLAYEY GRAVEL with sand, brown, slightly moist, low PI, dense.	
50	2180					Interbedded layer of clayey gravel and silty gravel.	
55	2175		1.6			6-inch layer of clay with silt, wet.	
60	2170			GC		2-inch layer of sand.	
65	2165					2 to 6-inch layer of interbedded clay, silty sand.	
						2-inch layer of gravel.	
70	2160		2.4			Increase in gravel.	
75	2155						



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 Tucson, AZ 85705
 520-887-1800
 520-887-8438 (Fax)

BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2150			GC		CLAYEY GRAVEL with sand, trace of cobble, light brown, moist to wet, medium PI.	
85	2145					3-inch layer of clay with sand, wet.	
87.5	2140			CL		SANDY CLAY, brown, moist, stiff.	
90	2135		1.0			CLAYEY GRAVEL with sand, trace of cobble, light brown, moist to wet, medium PI. Interbedded clayey sand and clayey gravel.	
95	2130					Interbedded clayey sand and clayey gravel.	
100	2125		2.1			Interbedded clayey sand and clayey gravel.	
105	2120					Interbedded clayey sand and clayey gravel.	
110	2115					Decrease in PI and fines.	
115						Bentonite Chips	



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2110		6.3				
125	2105			GC		6-inch layer of clayey sand, no gravel. 6-inch layer of clayey sand, no gravel.	#30 Trans. Sand #8-12 Sand
135	2095		4.6			4-inch layer of silty gravel. 2-inch layer of silty gravel.	
145	2085					6-inch layer of clayey sand with gravel. 3-inch layer of silty gravel.	3" PVC Sch. 40 Slotted 0.040"
150	2080		1.1			18-inch layer of interbedded silty gravel and silty sand. 3-inch layer of cobble. 4-inch layer of silty sand.	
155	2075						



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2070		4.9			8-inch layer of silty gravel.	<p>#30 Trans. Sand</p> <p>Bentonite Chips</p>
165	2065					7-inch layer of silty sand, wet.	
165	2065					165.0' SILTY GRAVEL with sand, brown, wet to moist, null PI.	
170	2060			GM		4-inch layer of clayey gravel.	
175	2055		1.6			172.0' SAMPLE ID: W-35-171.5-052703 CLAYEY GRAVEL with sand, brown, moist, medium PI, dense to very dense. Interbedded silty gravel.	
180	2050					Interbedded silty gravel.	
185	2045					8-inch layer of clayey gravel.	
190	2040			GC		3-inch layer of silty gravel with sand.	
195	2035						



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2030		2.7			Intebbeded silty gravel.	
205	2025					Intebbeded silty gravel.	
210	2020		0.6			SILTY SAND with gravel, brown, wet.	
215	2015					Interbedded silty gravel and sand.	
220	2010					Interbedded clayey gravel with sand.	
225	2005					Interbedded clayey gravel with sand.	
230	2000			SM		4 to 6-inch layer of clayey gravel. SAMPLE ID: W-35-213.5-02803	
235	1995		4.2			4 to 6-inch layer of silty gravel.	
						4-inch cobble.	
						4 to 6-inch layer of silty gravel.	
						4 to 6-inch layer of clayey gravel.	
						Interbedded clayey gravel, silty gravel and silty sand.	
						8-inch layer of sand.	
						11-inch layer of clayey gravel. SAMPLE ID: W-35-231.5-02903	
						Interbedded clayey gravel and silty gravel.	



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1990						Interbedded clayey gravel and silty gravel.	
240						Interbedded sand.	#30 Trans. Sand
1985							
245							
1980						CLAYEY SAND with gravel, brown, moist, medium PI.	Bentonite Chips
250						Trace of cobble.	
1975				SC			
255						Thin cementation layer, dry.	
1970							
260						SILTY SAND with gravel, brown, wet.	
1965							
265							
1960							
270							
1955			2.1			SAMPLE ID: W-35-271.5-053003	
275							



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BORING LOG: W-35

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 05/20/2003 05:05 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1950							
280				SM			
1945						1 to 2-inch layer of hard cementation.	
285						4 to 6-inch layer of silty gravel.	
1940						10-inch layer of clayey gravel.	
290						6-inch layer of clayey sand, slightly moist to moist.	
1935			5.6			SAMPLE ID: W-35-301.5-053103	
295							
1930							
300							
1925							
305							
1920							
310							
1915							
315							

Bollard 3000 PSI Concrete Collar and Well Footer - surface pad 24" dia' X 6" thick Bollard

WELL BORING DETAILS:

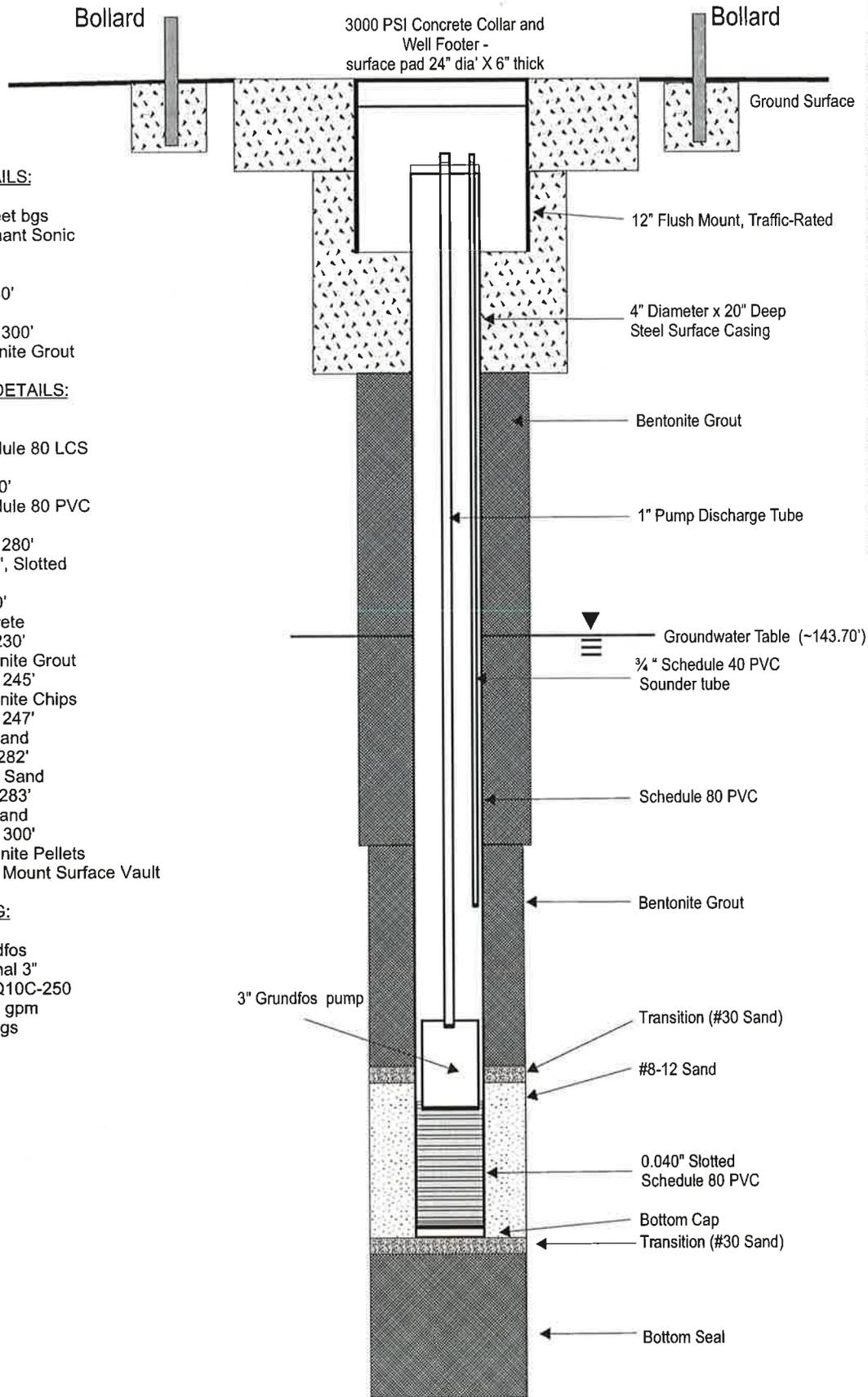
Total Depth	300-feet bgs
Drilling Method	Resonant Sonic
Nominal Borehole Diameter	10"
Depth Interval	0' - 140'
Nominal Borehole Diameter	8"
Depth Interval	140' - 300'
Seal at Reduction	Bentonite Grout

WELL CONSTRUCTION DETAILS:

Surface Casing Length	17'
Material	Schedule 80 LCS
Diameter	4"
Well Blank Casing Interval	17-250'
Material	Schedule 80 PVC
Diameter	4"
Screened Interval	250' - 280'
Perforations	0.040", Slotted
Surface Seal Interval	0 - 20'
Seal Material	Concrete
Upper Seal Interval	20' - 230'
Seal Material	Bentonite Grout
Middle Seal Interval	230' - 245'
Seal Material	Bentonite Chips
Transition Interval	245' - 247'
Transition Material	#30 Sand
Gravel Pack Interval	247' - 282'
Gravel Pack Material	#8-12 Sand
Bottom Transition Interval	282' - 283'
Transition Material	#30 Sand
Bottom Seal Interval	283' - 300'
Seal Material	Bentonite Pellets
Surface Completion	Flush Mount Surface Vault

WELL EQUIPPING:

Pump Make	Grundfos
Pump Size	Nominal 3"
Model	15 SQ10C-250
Pump Capacity	20-30 gpm
Pump Intake	250' bgs



W-37 MONITOR WELL AS-BUILT SCHEMATIC
 Remedial Investigation Feasibility Study
 Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites



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BORING LOG: W-37 (middle)

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 06/05/2004 03:04 PM
FINISH DATE/TIME: 06/11/2004 02:15 PM

LATITUDE (NAVD27): 32.1838
LONGITUDE (NAVD 27): -111.0148

TOP OF GROUND ELEVATION: 2236.06 A.S.L.
TOP OF CASING ELEVATION: 2236.06 A.S.L.
SCREENED INTERVAL: 1984.06' - 1954.06'

COMMENTS: Lithology elevations calculated from top of casing (ground surface elevations not available)

RIG TYPE: Sonic
DRILLING METHOD: RotoSonic
SAMPLING METHOD: Continuous Coring

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2235					Potholed to 5 feet.	Concrete
5	2230			SP	7.0'	POORLY GRADED SAND. light brown. few gravel and trace silt.	4" PVC Schedule 80 Cement
				SM	8.5'	SILTY SAND. light brown, little silt and trace gravel.	
10	2225				12.0'	CLAY. Stiff some silt and little sand. Low to moderate plasticity.	
15	2220			CL			
20	2215			ML	20.0'	SANDY SILT. Some fine sand, brown, no plasticity.	
					22.0'	SILTY SAND. black and tan.	
25	2210			SM		Interbedded from 24-25' with GRAVELLY SANDS and SANDY GRAVELS. 7" CLAYEY SAND stringer at 25', moderate plasticity, weak reaction with HCL. 4-inch COBBLE layer.	
30	2205				31.0'	POORLY GRADED GRAVEL, brown, some sand, trace silt and trace cobbles. Maximum particle size 2.0".	
35				GP			



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BORING LOG: W-37

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
DRILLER: Shawn Cain
LOGGED BY: Dennis Carlson
START DATE/TIME: 06/05/2004 03:04 PM
FINISH DATE/TIME: 06/11/2004 02:15 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2200						
40	2195			GM		36.0' SILTY GRAVEL, some sand, dry, weak reaction with HCL. 8-inch CLAYEY SAND/CLAYEY GRAVEL unit, moderate plasticity.	
45	2190					42.0' CLAYEY GRAVEL WITH SAND, brown, some sand, little silt. Wet and moist interbedded. Decomposed granite material in matrix.	
50	2185					COBBLE layer at 48 feet.	
55	2180			GC			
60	2175					Increase in gravels and sand. Weak to moderate plasticity.	
65	2170						
70	2165					71.0' CLAYEY SAND WITH GRAVEL, brown, moist to wet. Interbedded with CLAYEY GRAVEL WITH SAND, moderate plasticity. Rock cobble wedges in shoe bit.	
75							



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BORING LOG: W-37

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CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 06/05/2004 03:04 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2160						
85	2155			SC/GC		6-inch SILTY CLAY lenses, trace fine sand.	
90	2150						
95	2145					GRAVELLY CLAY.	
95	2140					8-inch POORLY SORTED SAND/SILTY SAND.	
100	2135					1-inch SANDY CLAY.	
100						COBBLES at 99'.	
105	2130			GM		2-inch CLAY layer. 104.0' SILTY GRAVEL WITH SAND.	
110						105.0' CLAYEY GRAVEL interbedded with SILTY GRAVEL, light brown and beige.	
110	2125			GC		COBBLE layer at 110'.	
115						INTERBEDDED SILTY SANDS WITH TRACE CLAY, moderate plasticity.	
						114.0' POORLY GRADED SAND INTERBEDDED WITH	



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BORING LOG: W-37

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2120			SP		POORLY SORTED GRAVEL, brown and tan.	
120	2115					118.0' COBBLES present. CLAYEY GRAVEL, brown and black with some white, low to moderate plasticity. 8-inch POORLY GRADED SAND/SILTY SAND, brown and beige. 6-inch SILTY SAND/CLAYEY GRAVEL.	
125	2110			GC		Becomes brown, increase in clay, increase in plasticity.	
130	2105						
135	2100						
140	2095			GP-GM		139.0' GRAVEL WITH SILT AND SAND, brown.	
145	2090					142.0' CLAYEY GRAVEL interbedded with SILTY GRAVEL, brown, low plasticity.	
150	2085			GC		Interbedded CLAYEY GRAVEL AND SILTY GRAVEL layers.	
155							



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BORING LOG: W-37

PROJECT: Well Installation W-30 through W-35
CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 06/05/2004 03:04 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075			GP		160.0' POORLY GRADED GRAVEL WITH SAND, trace silt, brown, wet. 5-inch CLAYEY GRAVEL. 4-inch CLAYEY GRAVEL. 8-inch CLAYEY GRAVEL.	
175	2060		GC		172.5' CLAYEY GRAVEL, brown, low plasticity. Maximum particle size 2.5 inches.		
180	2055		GP		178.0' POORLY GRADED SAND, trace silt, brown and black, wet. POORLY GRADED SAND.		
185	2050		GC		182.0' CLAYEY GRAVEL interbedded with SILTY GRAVEL, brown, low plasticity.		
190	2045		GP-GC		184.0' Interbedded CLAYEY GRAVEL and SILTY GRAVEL, approximately 3 to 8-inches thick.		
195	2045				190.0' POORLY GRADED GRAVEL WITH SAND, trace to little silts, brown, wet. Interbedded with CLAYEY GRAVELS.		



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2040						
205	2035			GC		6-inch POORLY GRADED SAND. CLAYEY GRAVEL.	
210	2030			GC		CLAYEY GRAVEL.	
215	2025			GC		CLAYEY GRAVEL.	
220	2020			GC		CLAYEY GRAVEL.	
225	2015			GC		6-inch CLAYEY GRAVEL, low plasticity.	
230	2010			GP			
235	2005			GC		6-inch CLAYEY GRAVEL, low plasticity.	
				GM		Interbedded SILTY GRAVELS with some CLAYEY GRAVELS.	
				GC		6-inch CLAYEY GRAVEL.	



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BORING LOG: W-37

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LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2000							
240	1995						
245	1990					242.0' CLAYEY GRAVEL WITH SAND, brown, low plasticity, moist to wet, noticeable increase in fines. Possible formation contact?	
250	1985			GC		8-inch POORLY GRADED SAND. Interbedded SILTY GRAVELS and CLAYEY GRAVELS from 251 to 260 feet bgs.	#30 Trans. Sand #8-12 Sand
255	1980					4-inch COBBLES. 4-inch POORLY GRADED SAND.	
260	1975					260.0' POORLY GRADED SAND WITH SILT, brown.	
265	1970					10-inch POORLY GRADED SAND. 4-inch POORLY GRADED SAND.	4" PVC, Slotted 0.040"
270	1965			GP-GM		2 to 4-inch Interbedded SILTY SAND AND CLAYEY GRAVEL.	
275							



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CLIENT: ADEQ
LOCATION: ECDC/SRRC WQARF Areas
URS PROJECT #: 23442974 and 23442975

DRILLING CONTRACTOR: Boart Longyear
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START DATE/TIME: 06/05/2004 03:04 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
1960							
280	1955					CLAYEY GRAVEL WITH SAND, brown, slightly moist.	#8-12 Sand #30 Trans. Sand
285	1950			GC		Becomes interbedded with 1-inch layers of SILTY GRAVEL AND CLAYEY GRAVEL.	
290	1945					Cobbles at 295'. Increase in clays, moderate plasticity, strong HCL reaction.	Bentonite Chips
295	1940						
300	1935					End of Boring.	
305	1930						
310	1925						
315							

Bollard

3000 PSI Concrete Collar and Well Footer - surface pad 24" dia' X 6" thick

Bollard

Ground Surface

WELL BORING DETAILS:

Total Depth 300-feet bgs
 Drilling Method Casing Hammer
 Nominal Borehole Diameter 10 1/2"

WELL CONSTRUCTION DETAILS:

Middle Well Casing Length ~205'
 Material Schedule 40 PVC
 Diameter 3"
 Screened Interval ~205' - 235'
 Perforations 0.040", Slotted

Water Table Well Casing Length ~130'
 Material Schedule 40 PVC
 Diameter 3"
 Screened Interval 130' - 180'
 Perforations 0.040", Slotted

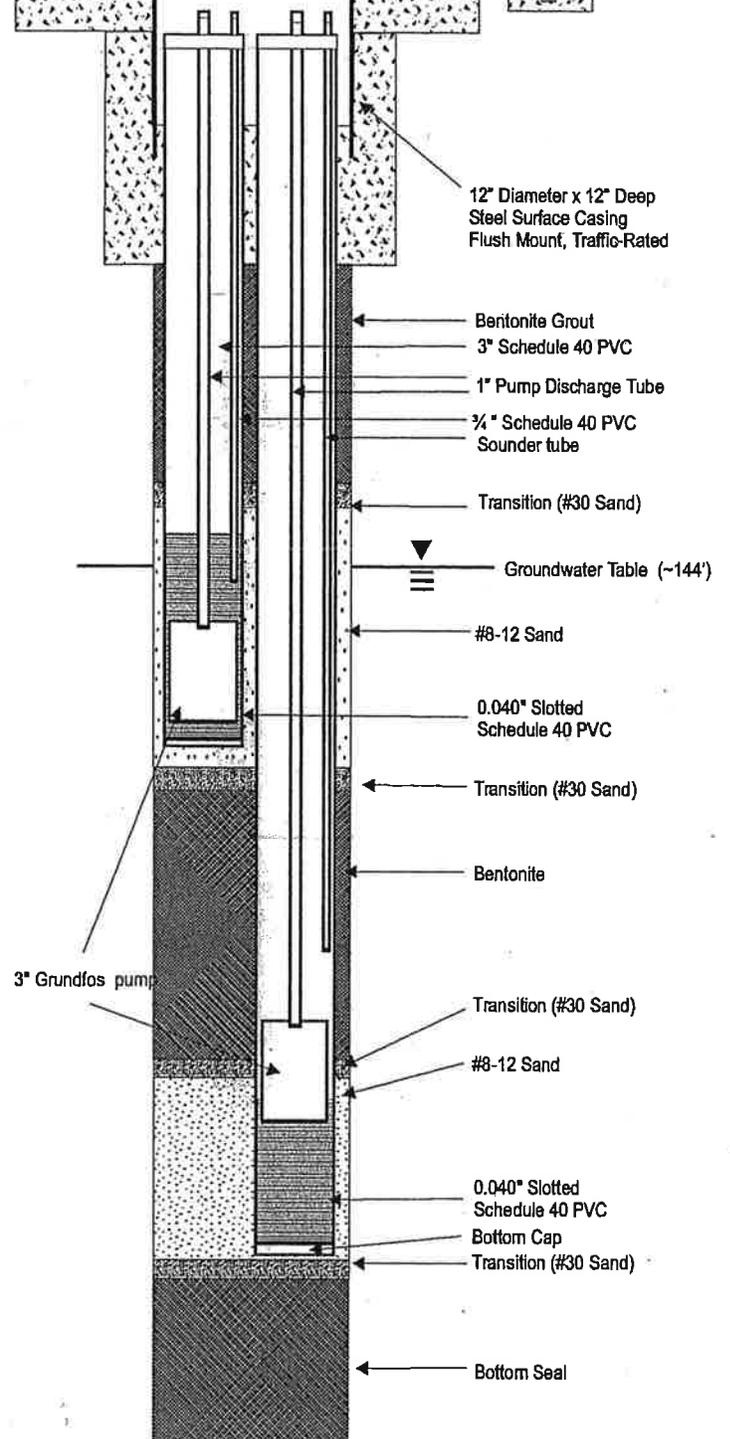
Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout
 1st Upper Seal Interval 20' - 117'
 Seal Material Bentonite Grout
 2nd Upper Seal Interval 117' - 123'
 Seal Material Bentonite Chips
 Upper Transition Interval 123' - 125'
 Transition Material #30 Sand
 Upper Gravel Pack Interval 125' - 180'
 Gravel Pack Material #8-12 Sand
 Middle Transition Interval 180' - 182'
 Transition Material #30 Sand
 Lower Seal Interval 182' - 198'
 Seal Material Bentonite Pellets
 Lower Transition Interval 198' - 200'
 Transition Material #30 Sand
 Lower Gravel Pack Interval 200' - 235'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 235' - 240'
 Transition Material #30 Sand
 Bottom Seal Interval 240' - 245'
 Seal Material Bentonite Chips
 Backfill Interval 245' - 300'
 Seal Material Bentonite Pellets
 Surface Completion Flush Mount Surface Vault

WELL EQUIPPING:

Both Wells
 Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 20-30 gpm

Middle Interval Well
 Pump Intake203' bgs

Shallow Interval Well
 Pump Intake173' bgs



W-38 MONITOR WELLS
As-Built Schematic

Remedial Investigation/Feasibility Study
 Shannon Road / El Camino Del Cerro WQARF Site





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BORING LOG: MW-38

PROJECT: MW-38
CLIENT: ADEQ
LOCATION: Parcel 101-17-0320
URS PROJECT #: 23444228.4000

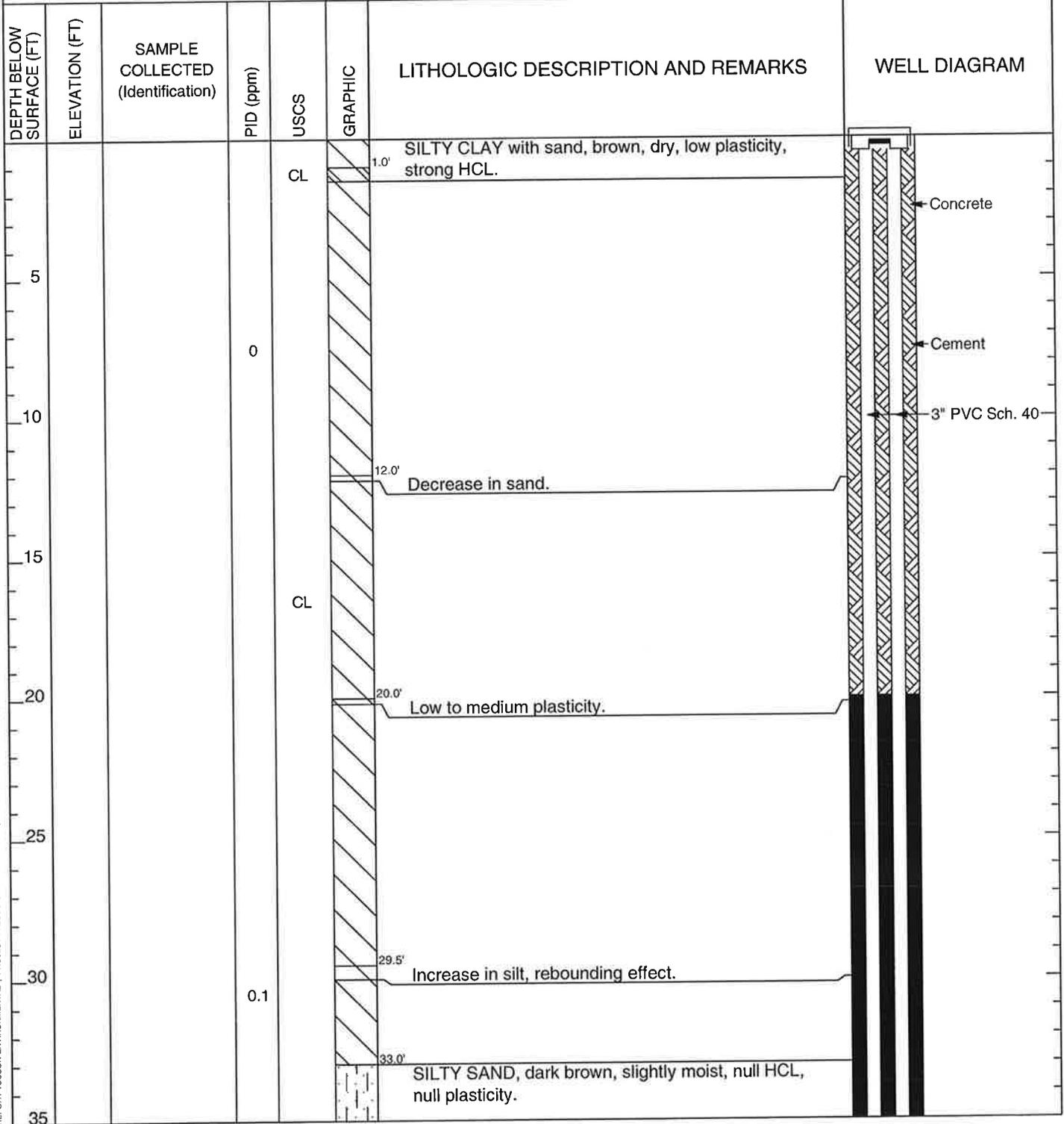
DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL:

COMMENTS:

RIG TYPE: Becker AP-1000
DRILLING METHOD: Casing Hammer
SAMPLING METHOD: Auto Hammer





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 Tucson, AZ 85705
 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-38

PROJECT: MW-38
CLIENT: ADEQ
LOCATION: Parcel 101-17-0320
URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM	
37.0'				SM		Gravels (sub angular to sub rounded) encountered, <2".		
40.0'						WELL GRADED SANDS with little gravels, brown, dry, null HCL, null plasticity.		
43.0'						4" sub rounded cobble encountered.		
44.0'						Increase in gravelsm medium to fine sand.		
54.0'			0.8	SP		Coarse sand encountered.		
60.0'						Increase in coarse sand, slightly moist.		
67.0'						CLAYEY SAND with few gravels, dark brown to brown, slightly moist, null HCL, null plasticity.		
75.0'				SC				
								← Bentonite Grout



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BORING LOG: MW-38

PROJECT: MW-38
CLIENT: ADEQ
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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80				GC		CLAYEY GRAVEL with little sand, dark brown to brown, slightly moist, null HCl, null plasticity.	
82.0'				SC		CLAYEY SAND, dark brown, dry, null HCL, null plasticity.	
85				SC			
88.0'				GC		CLAYEY GRAVEL with little sand, dark brown to brown, slightly moist, null HCl, null plasticity.	
90			0	GC			
93.0'				SC		CLAYEY SAND with trace gravels, light brown, dry, null HCL, null plasticity.	
95				SC			
99.0'				SC		Increase in silt.	
100				SC			
105				SC			
110				SC			
115				SC			



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PROJECT: MW-38
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LOCATION: Parcel 101-17-0320
URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
				SC		116.0' Increase in coarse sand.	
			0			117.0' SILTY SAND, light brown, dry, null HCL, null plasticity.	
120							← Bentonite Pellets
				SM		126.0' Trace of gravels, 1" to 2" sub angular.	← #30 Sand
125							
						129.0' Increase in silt and decrease in clay.	
130							
						134.0' Increase in gravel.	
						135.0' SILTY GRAVEL with little sand, light brown, dry, null HCL, null plasticity.	
135							
				GM			
140							
145							
						151.0' Soil is moist to wet.	← #8-12 Sand
150							
155							



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160				GC		CLAYEY GRAVEL with little sand, dark brown to brown, moist, null HCL, null plasticity.	 3" PVC Sch. 40 Slotted 0.040 #30 Sand Bentonite Pellets
165		MW-38-165	0			Interbedded silts and clays. Sand and gravels being dominant.	
170						SILTY GRAVEL with little sand, brown, wet, null HCL, null plasticity.	
175						Increase in sand, fine to medium grain size.	
180				GM		Decrease in silt and increase in clay. Soil not as moist.	
185						Increase in gravel size, 2" to 3".	
190		MW-38-190	0	SM		SILTY SAND with little gravel, brown, wet, null HCL, null plasticity.	
195							



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
195.5'				SM		195.5' 196.0' 197.0' SILTY GRAVEL with little sand, brown, wet, null HCL, null plasticity. Soil is being washed out of cyclone, too much water in contact to properly classify.	
200							
205				GM		206.0' Increase in angular size (1" to 2").	
210		MW-38-210	0			211.0' An increase of water production.	
215						214.0' Cobbles encountered, angular to sub angular, 3" to 5" in size.	
220							
225							
230		MW-38-230	0			230.0' 2" to 3" gravels encountered.	
235							



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
FINISH DATE/TIME:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
				GM		236.0'	
240							
245							
250		MW-38-250	0	GM			
255							
260							
265							
270		MW-38-270	0				
275							

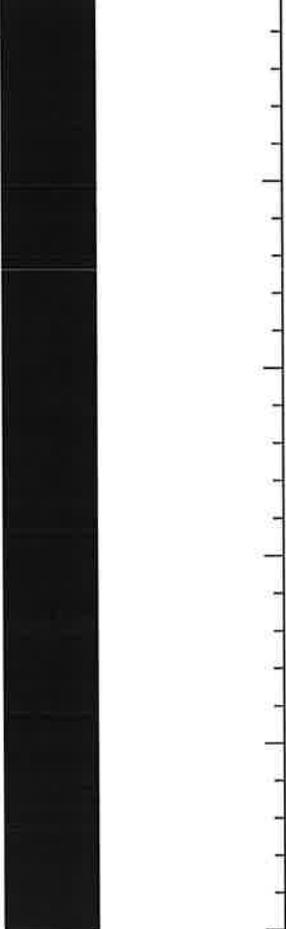


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PROJECT: MW-38
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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Layne Christensen
DRILLER: Perry Hormann
LOGGED BY: AAJ
START DATE/TIME: 03/15/2005 02:45 PM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
				GM		276.0'	
280							
285							
290							
295							
300		MW-38-300	0				
305							
310							
315							

WELL BORING DETAILS:

Total Depth 409-feet bgs
 Drilling Method Air Rotary Casing Hammer
 Nominal Borehole Diameter 12"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Casing

Material Schedule 40 Blank PVC
 Diameter 3"
 Well Casing Length
 Shallow Well ~130'
 Middle Well ~254'
 Deep Well ~370'

Material 0.040", Slotted Schedule 40 PVC
 Diameter 3"
 Screen Length
 Shallow Well 50'
 Middle Well 30'
 Deep Well 30'
 Screened Interval
 Shallow Well 129.5-179.5'
 Middle Well 253.5-283.5'
 Deep Well 369.5- 399.5'
 Threaded End Cap Length 6"

Shallow Well

1st Upper Seal Interval 20' - 117.5'
 Seal Material Bentonite Grout
 2nd Seal Interval 117.5' - 122'
 Seal Material Bentonite Chips
 Upper Transition Interval 122' - 124'
 Transition Material #30 Sand
 Gravel Pack Interval 124' - 181.5'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 181.5' - 183'
 Transition Material #30 Sand
 Bottom Seal Interval 183' - 245'
 Seal Material Bentonite Pellets

Middle Well

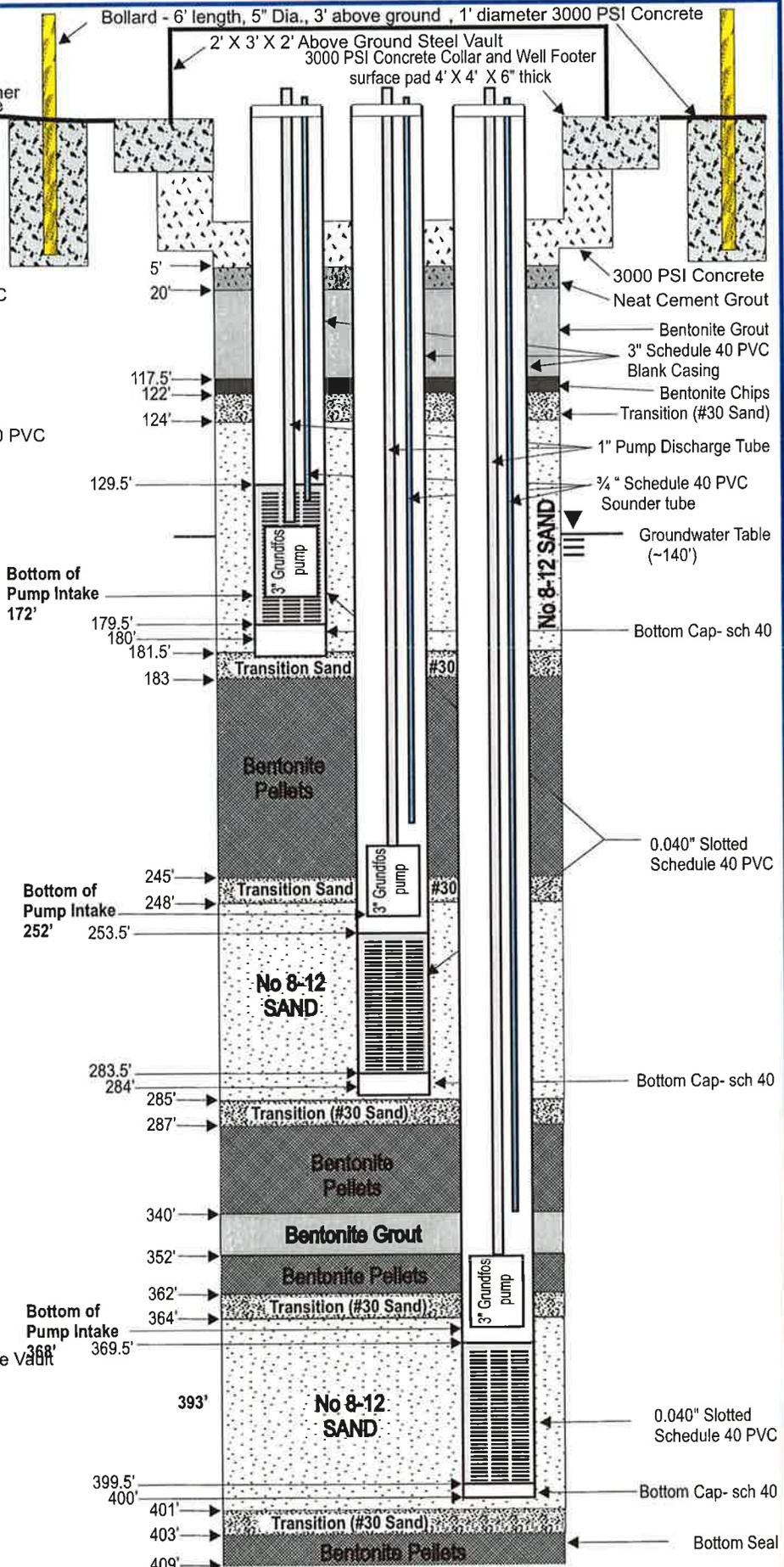
Upper Transition Interval 245' - 248'
 Transition Material #30 Sand
 Gravel Pack Interval 248' - 285'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 285' - 287'
 Transition Material #30 Sand
 Bottom Seal Interval 287' - 362'
 Seal Material Bentonite Pellets & Bentonite Grout

Deep Well

Upper Transition Interval 362' - 364'
 Transition Material #30 Sand
 Gravel Pack Interval 364' - 401'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 401' - 403'
 Transition Material #30 Sand
 Bottom Seal Interval 403' - 409'
 Seal Material Bentonite Pellets
 Surface Completion Flush Mount Surface Vault
 In a 3'X3'X6" 3000 psi concrete pad

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake
 Shallow Well 172' bgs
 Middle Well 252' bgs
 Deep Well 368' bgs



W-39 As-Built SCHEMATIC

Remedial Investigation/Feasibility Study

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites



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BORING LOG: MW-39

PROJECT: MW-39
CLIENT: ADEQ
LOCATION: Parcel 999-99-9993
URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 04/18/2005 10:21 AM
FINISH DATE/TIME: 04/26/2005 06:50 PM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 130-180, 254-284, 370-400

COMMENTS:

RIG TYPE:
DRILLING METHOD: Air Rotary Casing Hammer
SAMPLING METHOD: Auto Hammer

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5				SM		SANDY SILT, light brown, low- <i>n</i> ull plasticity, moderate HCl, Dry, <i>n</i> ull Cementation.	
8.0'				GW		GRAVELLY SAND, with few fines, brown, <i>n</i> ull plasticity, moderate HCl, dry, <i>n</i> ull cementation.	
15.0'				SP-SM		SILTY SAND with trace gravel, light brown, <i>n</i> ull plasticity, <i>n</i> ull HCl, dry, <i>n</i> ull cementation.	
25.0'				SP-SC		POORLY GRADED SAND with few gravel and silt, brown, <i>n</i> ull plasticity, <i>n</i> ull HCl, <i>n</i> ull cementation. (moisture unknown-driller adding water)	
31.0'						SANDY GRAVEL with trace fines, angular - subround, brown, <i>n</i> ull plasticity, <i>n</i> ull HCl, <i>n</i> ull cementation. (moisture unknown-driller adding water)	
35							



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 04/18/2005 10:21 AM
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40				GP			<p>3" PVC Sch. 40 ← Bentonite Grout</p>
45						45.0' CLAYEY SAND, with gravel, angular, brown, low-moderate plasticity, null HCL, null cementation. (moisture unknown-driller adding water)	
55				SC			
60							
65						65.0' GRAVELLY SAND with clay, angular - subround, brown, low plasticity, null HCL, null cementation. (moisture unknown-driller adding water)	
70				SP			
75						75.0'	



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DRILLING CONTRACTOR: Yellow Jacket Drilling
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80			0.0	GC		CLAYEY GRAVEL, with sand, subangular - subround, brown, moderate plasticity, null HCl, null cementation. (moisture unknown-driller adding water)	
85				GC			
90				GC			
93.0'				GC		CLAYEY GRAVEL, with sand and trace silts, subangular - subround, brown, low - moderate plasticity, null HCl, moist, null cementation.	
95				GC			
100			1.2	GC			
105				GC			
106.0'				GP		SANDY GRAVEL, with clay, angular, brown, low plasticity, null HCl, moist, null cementation.	
110				GP			
115				GP			



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120			0.0	SP		GRAVELLY SAND, with clay, subangular - subround, brown, null - low plasticity, null HCl, moist, null cementation.	
125						125.0' SANDY GRAVEL with few clay, subangular - subround, brown, null -low plasticity, null HCl, moist, null cementation.	
130				GP			
135						136.0' SANDY GRAVEL with clay, subangular - subround, brown, low plasticity, null HCl, null cementation.(moisture unknown-driller adding water)	
140			0.2	GP			
145						146.0' POORLY GRADED GRAVEL, with little sand and trace fines, angular - subround, brown, null plasticity, null HCl, null cementation. (moisture unknown-driller adding water)	
150				GP			
155							



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160		SREDCD-MW39-160	0 0.1	GC		157.0' CLAYEY GRAVEL, with trace sand and silt, angular - subround, brown, low plasticity, null HCl, wet, null cementation.	 3" PVC Sch. 40 Slotted 0.040 #30 Sand 3" PVC Sch. 40
165				GC		165.0' CLAYEY GRAVEL, with few clay and sand, angular - subround, brown, null plasticity, null HCl, wet, null cementation.	
170		SREDCD-MW39-170		GC		176.0' WELL GRADED SAND with gravel and few fines, angular - subround, brown, null plasticity, null HCl, wet, null cementation.	
175				SW		185.0' POORLY GRADED SAND with gravel and few fines, angular - subround, brown, null plasticity, null HCl, wet, null cementation.	
180				SW			
185				SP			
190		SREDCD-MW39-190	0.1	SP			
195						195.0'	



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DRILLER: Jacob Lagana
LOGGED BY: PAP
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200				SW		WELL GRADED SAND with gravel and few fines, angular - subround, brown, null plasticity, null HCl, wet, null cementation.	
205						205.0' SANDY GRAVEL with few fines, subangular - subround, brown, null plasticity, null HCl, wet, null cementation.	
210		SREDCD-MW39-210 0.1		GP		215.0' POORLY GRADED SAND with gravels and little fines, subangular - subround, brown, null plasticity, null HCl, wet, null cementation.	
215							← Bentonite Pellets
220							
225							
230		SREDCD-MW39-230 0.1		SP			
235							



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 04/18/2005 10:21 AM
FINISH DATE/TIME: 04/26/2005 06:50 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240							
245						245.0'	
						POORLY GRADED SAND, with gravel, angular - subround, brown - gray brown, null plasticity, strong HCl, wet, null Cementation.	← #30 Sand
250		SREDCD-MW39-250		SP			
255						255.0'	
						POORLY GRADED SAND, with gravel, angular - subround, brown - gray brown, null plasticity, weak HCl, wet, null Cementation.	
260			0.3	SP			
265						265.0'	
						POORLY GRADED GRAVEL with sand, angular - subround, brown, null plasticity, strong HCl, wet, null cementation.	← #8-12 Sand
270		SREDCD-MW39-270		GP			← 3" PVC Sch. 40 Slotted 0.040
275						275.0'	



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
280				SP		POORLY GRADED SAND with gravel and little silt, fine - coarse sand and coarse gravel, angular - subround, brown, null plasticity, moderate HCl, wet, null cementation.	
285						285.0' SANDY GRAVEL with clay, fine sand and fine - predominantly coarse gravel, angular - subround, brown, null plasticity, strong HCl, wet, null - weak cementation.	
290			0.2	GP		295.0' POORLY GRADED GRAVEL with few clay and little sand, angular - subround, brown with colorful gravel, null plasticity, strong HCl, wet, null - weak cementation.	
295				GP		305.0' POORLY GRADED GRAVEL with sand and few clay/silt, angular - subround, brown with colorful gravel, null plasticity, moderate HCl, wet, null - weak cementation.	
300				GP			
305				GP			
310		SREDCD-MW39-310		GP			
315						315.0'	



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URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
320						POORLY GRADED SAND with gravel and few fines, angular - subround, brown, null plasticity, moderate HCl, wet, null - weak cementation.	
325				SP			
330		SREDCD-MW39-330					
335						POORLY GRADED GRAVEL with sand and few fines, angular - subround, brown with colorful gravel, null plasticity, strong HCl, wet, null - weak cementation.	
340			0.2				
345				GP			
350							
355							



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DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
360		SREDCD-MW39-360		SP		POORLY GRADED SAND with gravel, angular - subround, brown, null plasticity, strong HCl, wet, null - weak cementation.	
365					365.0' POORLY GRADED GRAVEL with sand and few fines, angular - subround, brown, null plasticity, strong HCl, wet, null - weak cementation.		
370				GP			
375							
380							
385						385.0' POORLY GRADED SAND with gravel and little silt, angular - subround, brown, null plasticity, strong HCl, wet, null - weak cementation.	#8-12 Sand
390				SP			3" PVC Sch. 40 Slotted 0.040
395						395.0'	

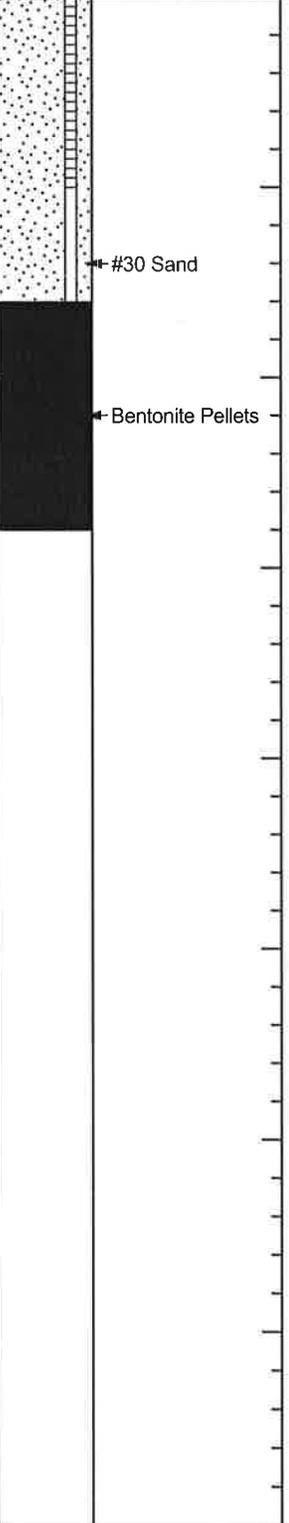


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 520-887-1800
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BORING LOG: MW-39

PROJECT: MW-39
CLIENT: ADEQ
LOCATION: Parcel 999-99-9993
URS PROJECT #: 23444228.4000

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 04/18/2005 10:21 AM
FINISH DATE/TIME: 04/26/2005 06:50 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
400 405 410 415 420 425 430 435		SREDCD-MW39-400 0.1		GP		POORLY GRADED GRAVEL with some sand and little fines, angular - subround, brown with colorful gravel, null plasticity, strong HCl, wet, null cementation.	 <p>#30 Sand</p> <p>Bentonite Pellets</p>

WELL BORING DETAILS:

Total Depth 405-feet bgs
 Drilling Method Air Rotary Casing Hammer
 Nominal Borehole Diameter 12"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Casing

Material Schedule 40 Blank PVC
 Diameter 3"
 Well Casing Length
 Shallow Well ~130'
 Middle Well ~205'
 Deep Well ~370'

Material 0.040", Slotted Schedule 40 PVC
 Diameter 3"
 Screen Length
 Shallow Well 50'
 Middle Well 30'
 Deep Well 30'
 Screened Interval
 Shallow Well 129.5-179.5'
 Middle Well 204.5-234.5'
 Deep Well 369.5- 399.5'
 Threaded End Cap Length 6"

Shallow Well

1st Upper Seal Interval 20' - 116'
 Seal Material Bentonite Grout
 2nd Seal Interval 116' - 122'
 Seal Material Bentonite Chips
 Upper Transition Interval 122' - 124'
 Transition Material #30 Sand
 Gravel Pack Interval 124' - 181'
 Gravel Pack Material #8 -12 Sand
 Jttom Transition Interval 181' - 183'
 Transition Material #30 Sand
 Bottom Seal Interval 183' -197'
 Seal Material Bentonite Pellets

Middle Well

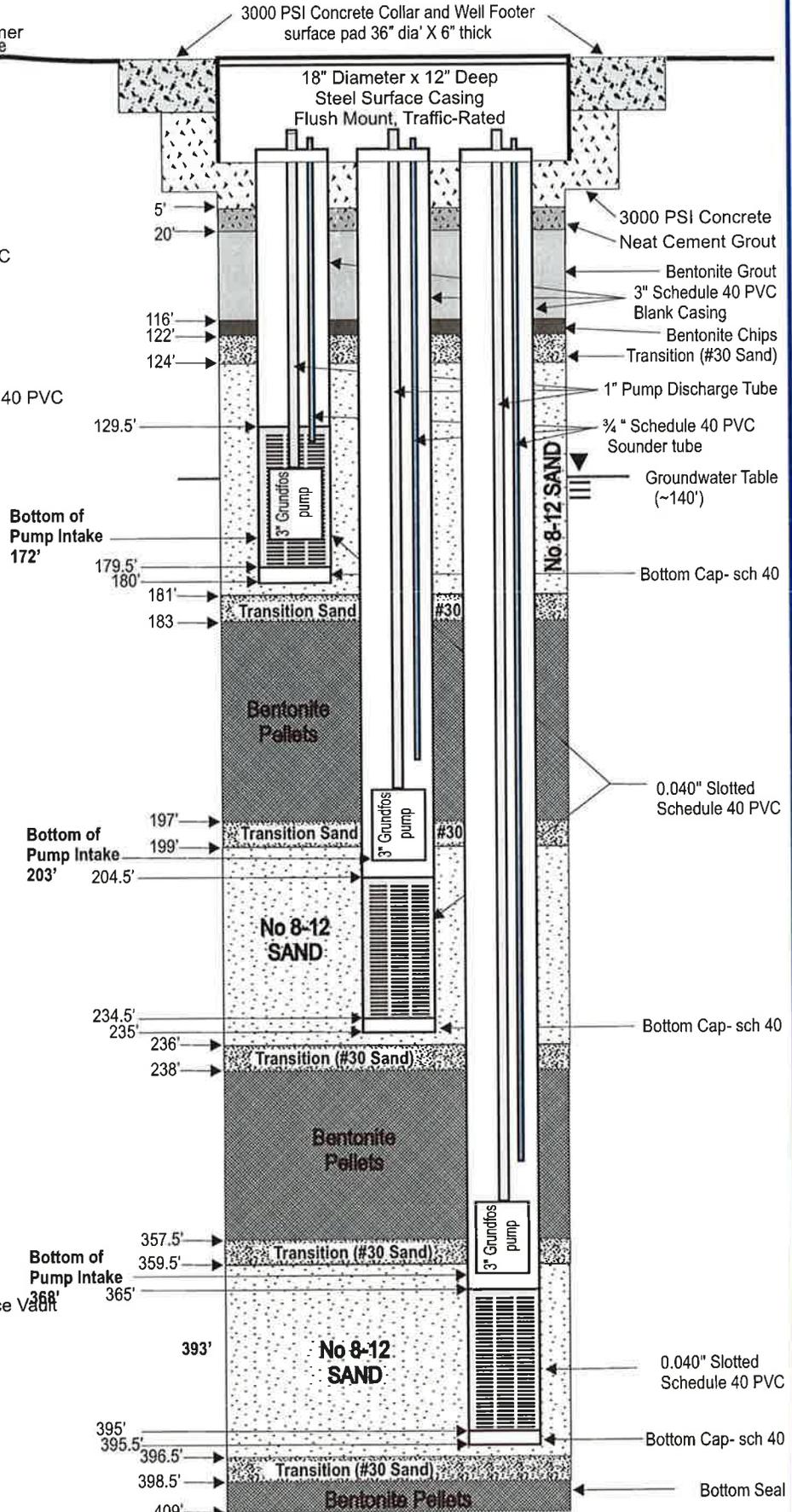
Upper Transition Interval 197' -199'
 Transition Material #30 Sand
 Gravel Pack Interval 199' -236'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 236' -238'
 Transition Material #30 Sand
 Bottom Seal Interval 238' - 357.5'
 Seal Material Bentonite Pellets

Deep Well

Upper Transition Interval 357.5' - 359.5'
 Transition Material #30 Sand
 Gravel Pack Interval 359.5' - 396.5'
 Gravel Pack Material #8-12 Sand
 Bottom Transition Interval 396.5' - 398.5'
 Transition Material #30 Sand
 Bottom Seal Interval 398.5' - 409'
 Seal Material Bentonite Pellets
 Surface Completion Flush Mount Surface Valve
 In a 3'X3'X6" 3000 psi/ concrete pad

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake
 Shallow Well ... 172' bgs
 Middle Well ... 203' bgs
 Deep Well 363.5' bgs



P:\E\CD\SRRC\RI\F\ator Wells\Drilling\W-40\Well Schematic 40.cdr 12-05

W-40 AsBuilt SCHEMATIC

Remedial Investigation/Feasibility Study

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 129.5-179.5, 204.5-234.5, 365-395

COMMENTS:

RIG TYPE:
DRILLING METHOD: Air Rotary Casing Hammer
SAMPLING METHOD: Auto Hammer

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0						CLAYEY SILT, light brown, strong HCl, med plasticity, null cementation, dry.	
5				ML			
10							
15							
20			0.2				
25						CLAYEY SILT, light brown, strong HCl, med-low plasticity, null Cementation, Moisture unknown (driller adding water).	
30				ML			
35							



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40			0.0	GP		SANDY SILTY GRAVEL, with few clay, light brown, sub-angular to round, strong HCl, low-med plasticity, null cementation, Moisture unknown (driller adding water).	<p>3" PVC Sch. 40 ← Bentonite Grout</p>
45				GP		SANDY SILTY GRAVEL, with few clay, light brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, Moisture unknown (driller adding water).	
50				GP			
55				SP		POORLY GRADED SAND with gravel and clay, light brown, angular to sub-round, null HCl, low plasticity, null cementation, Moisture unknown (driller adding water).	
60				GP		SANDY GRAVEL, with clay, brown, angular to sub-round, no HCl, null plasticity, null cementation, Moisture unknown (driller adding water).	
65							
70				GP			
75							



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80						GRAVELLY SAND with clay, brown, sub-angular to sub-round, null HCl, moderate plasticity, null cementation, Moisture unknown (driller adding water).	
85				SP			
90							
95						95.0' SILTY SAND with gravel and trace clays, brown, sub-angular to sub-round, null HCl, low plasticity, null cementation, Moisture unknown (driller adding water).	
100					SP		
105						105.0' CLAYEY SAND with gravel, brown, sub-angular to sub-round, null HCl, low-mod plasticity, null cementation, Moisture unknown (driller adding water).	
110			0.1	SC			
115						115.0'	



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120				SC		CLAYEY SAND with gravel, brown, sub-angular to round, null HCl, null plasticity, null cementation, Moisture unknown (driller adding water).	
125						125.0' CLAYEY GRAVEL, with sand and trace silt, brown, sub-angular to round, no HCl, low plasticity, null cementation, moist.	
130				GP			
135						135.0' WELL GRADED SAND with gravel, brown, angular to sub-round, null HCl, null plasticity, null cementation, moist.	
140				SW			
145						145.0' SANDY GRAVEL, with few clay, brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, moist.	
150			0.0	GP			
155						155.0'	



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160		SREDCD-MW40-160		SP		GRAVELLY SAND with clay, brown, sub-angular to round, null HCl, null plasticity, null cementation, wet.	<p>3" PVC Sch. 40 Slotted 0.040</p> <p>#30 Sand</p> <p>3" PVC Sch. 40</p> <p>Bentonite Pellets</p>
165						165.0' SANDY GRAVEL, with clay, brown, angular to sub-round, no HCl, null plasticity, null cementation, wet.	
170		SREDCD-MW40-170 0.0	0.0	GP			
175						175.0' CLAYEY SAND with gravel, brown, angular to sub-angular, null HCl, null plasticity, low cementation, wet.	
180				SC			
185						185.0' GRAVELLY SAND with few fines, brown, angular to sub-round, null HCl, null plasticity, low cementation, wet.	
190		SREDCD-MW40-190 0.0	0.0	SP			
195						195.0'	



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200				GP		SANDY GRAVEL, with trace fines, brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, wet.	
205						205.0' GRAVELLY SAND with few fines, brown, angular to sub-round, null HCl, null plasticity, null cementation, wet.	
210		SRECDC-MW40-210 0.0		SP			
215						215.0' SANDY GRAVEL, with trace fines, brown, angular to sub-round, no HCl, null plasticity, null cementation, wet.	
220							
225							
230		SRECDC-MW40-230		GP			
235							

#30 Sand

#8-12 Sand

3" PVC Sch. 40 Slotted 0.040



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
240			0.0				
245						245.0' WELL GRADED SAND with gravel, brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, wet.	
250		SREDCD-MW40-250	0.0	SW		250.0'	
255						255.0' SANDY GRAVEL, with silt, brown, angular to sub-round, no HCl, null plasticity, null cementation, wet.	
260							
265						265.0' WELL GRADED SAND with gravel, brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, wet.	
270		SREDCD-MW40-270		SW			
275						275.0'	



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
280				GP		Poorly Graded Gravel, with silt, clay and little sand, brown, sub-angular to sub-round, no HCl, null plasticity, null cementation, wet.	
285				GP		285.0' SANDY GRAVEL, with little silt, brown, sub-angular to sub-round, strong HCl, null plasticity, null cementation, wet.	
290				GP			
295				SW		295.0' WELL GRADED SAND with few fines, brown, sub-angular to sub-round, strong HCl, null plasticity, null cementation, wet.	
300		SREDCD-MW40-310 0.0		SW			← Bentonite Pellets
305						305.0' WELL GRADED SAND with gravel, brown, sub-angular to round, moderate HCl, null plasticity, null cementation, wet.	
310							
315							



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
320				SW			
325							
330		SREDCD-MW40-330 0.0					
335				SP		335.0' GRAVELLY SAND with few fines, brown with colorful clasts, sub-angular to sub-round, null HCl, null plasticity, null cementation, wet.	
340							
345						345.0' SANDY GRAVEL, with few fines, brown with colorful clasts, angular to sub-round, weak HCl, null plasticity, null cementation, wet.	
350				GP			
355						355.0'	



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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
360		SREDCD-MW40-360 0.0				GRAVELLY SAND with few fines, brown with colorful clasts, sub-angular to sub-round, moderate to strong HCl, null plasticity, null cementation, wet.	
365				SP			
370							
375						375.0' WELL GRADED SAND with little gravel and few fines, brown, sub-angular to round, weak HCl, null plasticity, null cementation, wet.	
380				SW			
385						385.0' GRAVELLY SAND with few fines, brown, angular to sub-round, weak HCl, null plasticity, null cementation, wet.	
390							
395							

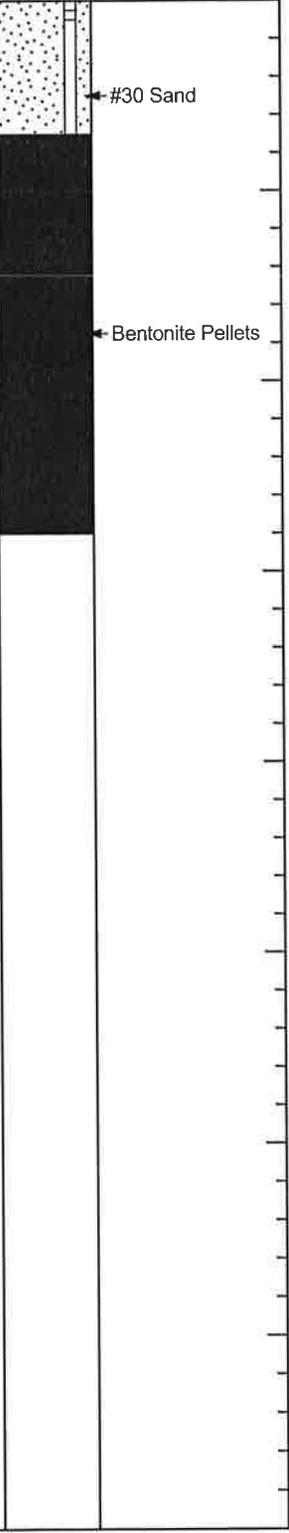


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BORING LOG: MW-40

PROJECT: MW-40
CLIENT: ADEQ
LOCATION:
URS PROJECT #: 23444555

DRILLING CONTRACTOR: Yellow Jacket Drilling
DRILLER: Jacob Lagana
LOGGED BY: PAP
START DATE/TIME: 05/12/2006 01:17 PM
FINISH DATE/TIME: 05/23/2006 12:00 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
400 405 410 415 420 425 430 435		SREDCD-MW40-400 0.0		SP			 <p>#30 Sand</p> <p>Bentonite Pellets</p>

WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 200-feet bgs
 Nominal Borehole Diameter . . 9"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Blank Casing

Material Blank Schedule 40 PVC
 Diameter 4"
 Well Casing Length . . . ~121.5'
 Blank Interval 0'-121.5'

Screened Interval

Material . . . 0.040" Slotted Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval . . . 121.5'-196.5'
 Threaded End Cap Length 6"

Well Backfill

Top Seal Interval 20' - 108'
 Seal Material Bentonite Grout
 2nd Seal Interval 108' - 114.5'
 Seal Material Bentonite Chips
 Top Transition Interval . . . 114.5'-116'
 Transition Material #30 Sand
 Gravel Pack Interval 116' - 197'
 Gravel Pack Material . . #8 -12 Sand
 Bottom Transition Interval . 197' - 199'
 Transition Material . . . #30 Sand
 Bottom Seal Interval . . . 199' - 201'
 Seal Material Bentonite Chips

Sounding Tube

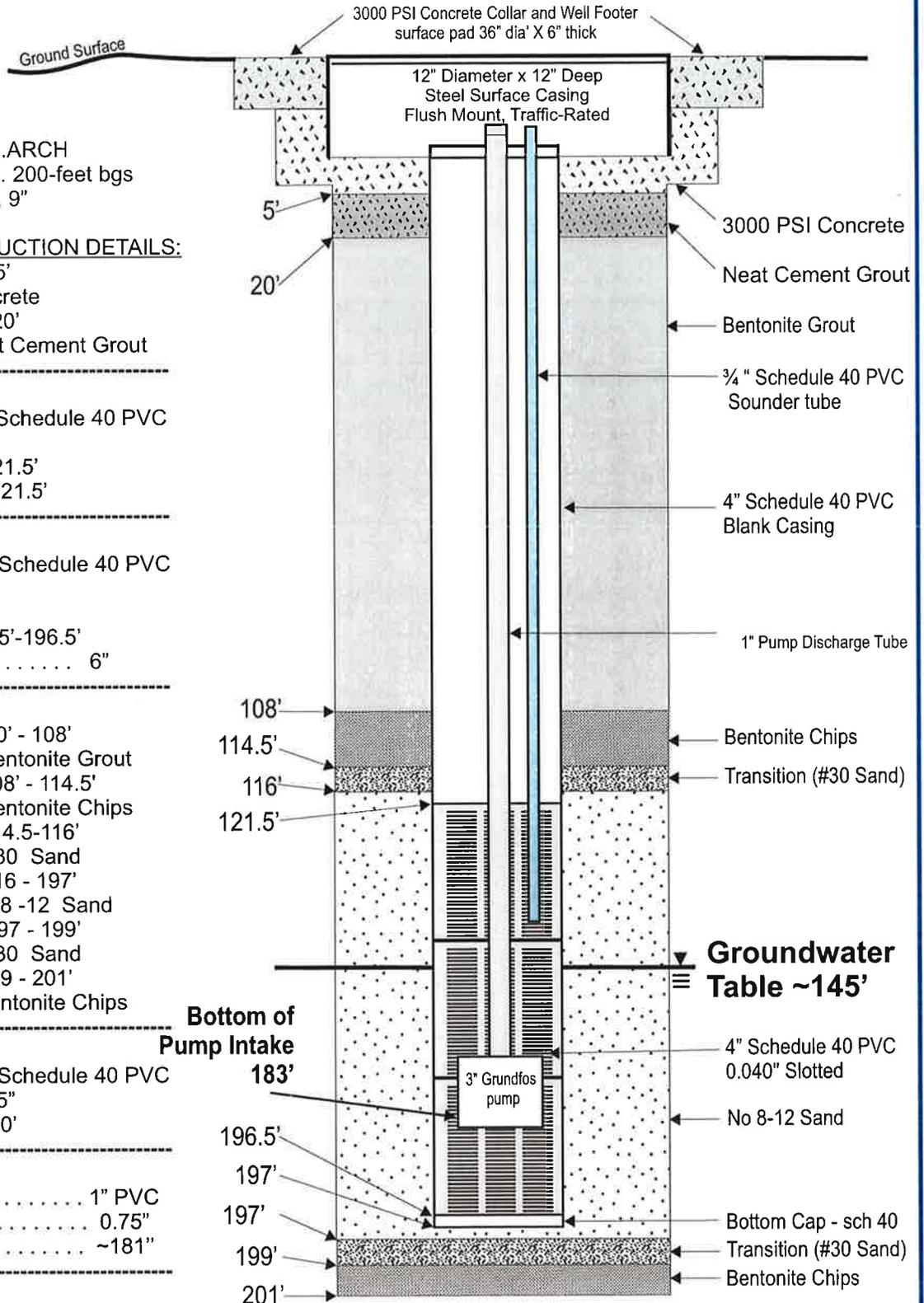
Material Blank Schedule 40 PVC
 Diameter 0.75"
 Tube Casing Length . . ~180'

Riser Tube

Material 1" PVC
 Diameter 0.75"
 Length ~181"

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake 183' bgs



P:\E\DC 2007\...-Aspers\Wreckspers\Sampling and Analysis Plan\Appendix and Figures\Proposed Well Schematic.cdr

MW-41

MONITOR WELL AS-BUILT SCHEMATIC

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites





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BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

LATITUDE (NAVD27): 32.180882998
LONGITUDE (NAVD 27): -111.015850979

TOP OF GROUND ELEVATION: 2238.415 A.S.L.
TOP OF CASING ELEVATION: 2238.135 A.S.L.
SCREENED INTERVAL: 121.5 - 197

COMMENTS: Approximate WL: 146.3 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 7.5" tricone bit
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5	2235					SANDY SILT, trace clay, brown, fine sand, medium HCl reaction, nil plasticity index, dry	<p>3000 PSI Concrete</p> <p>Neat Cement Grout</p>
10	2230			ML			
15	2225					SILTY SAND, brown, predominantly fine to coarse sand, nil HCl reaction, nil plasticity index, dry becomes predominantly coarse sand, trace fine angular gravel	
20	2220				20.0'		
25	2215			SM			
30	2210					POORLY GRADED GRAVEL, trace sands, angular	
35	2205				34.0'		

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BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2195			GP		to subrounded, dry	<p>4" Schd 40 PVC Blank Casing</p> <p>Bentonite Grout</p>
45	2190					44.0' POORLY GRADED SAND, few silts, brown, fine to predominantly coarse sand, nil plasticity index, nil HCl reaction, dry-slightly moist	
50	2185			SP-SM			
55	2180					58.0' CLAYEY GRAVEL, with sand, brown, low plasticity index, fine to predominantly coarse gravel	
60	2175						
65	2170			GC			
70	2165						
75	2160						



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BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2155					SILTY SAND/POORLY GRADED SAND, with gravel, brown, fine to coarse sand and fine gravel, nil plasticity index, nil HCl reaction, angular to subangular	
85	2150			SP-SM		Water added to drill stem, for dust suppression, masks in-situ water content	
90	2145						
95	2140						
100	2135						
105	2130						
110	2125			SC		CLAYEY SAND, with few gravel, brown, fine to coarse sand and gravel, low to medium plasticity index, nil HCL reaction, angular to subrounded	
115	2120						

← Bentonite Chips



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BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2115						
125	2110					<p>124.0'</p> <p>CLAYEY SAND/CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand and gravel, low plasticity index, angular to subrounded</p>	
130	2105			SC-GC			
135	2100					<p>135.0'</p> <p>CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand and fine to coarse gravel, low to nil plasticity index, angular to subrounded</p>	
140	2095						
145	2090			GP-GC			
150	2085						
155	2080						



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BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
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LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
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START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075					CLAYEY SAND/CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand and gravel, low plasticity index, angular to subrounded	
165	2070					Clay and in-situ water binds in drill casing forcing drillers to add water to free cuttings. This process washes fines out of the cuttings limiting the accuracy of the lithological classification. See area boring logs for soils classification.	
170	2065						
175	2060						
180	2055			GC		drill cuttings below watertable are washed gravels with fine to predominantly coarse sand	
185	2050						
190	2045						
195	2040						

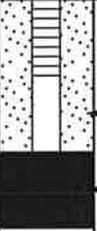


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 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-41

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/09/2006 10:00 AM
FINISH DATE/TIME: 11/09/2006 01:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200	2035						
						Total depth at 201'	
205	2030						
210	2025						
215	2020						
220	2015						
225	2010						
230	2005						
235	2000						

WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 200-feet bgs
 Nominal Borehole Diameter 9"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 4.5'
 Material Concrete
 Casing Protection 4.5' - 106'
 Material Neat Cement Grout

Blank Casing

Material Blank Schedule 40 PVC
 Diameter 4"
 Well Casing Length ~119'
 Blank Interval 0'-119'

Screened Interval

Material 0.040" Slotted Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval 119'-195'
 Threaded End Cap Length 6"

Well Backfill

and Seal Interval 106' - 111'
 Seal Material Bentonite Chips
 Top Transition Interval 111-113'
 Transition Material #30 Sand
 Gravel Pack Interval 113 - 195.5'
 Gravel Pack Material #8 -12 Sand
 Bottom Transition Interval 195.5'-197.5'
 Transition Material #30 Sand
 Bottom Seal Interval 197.5'-200'
 Seal Material Bentonite Chips

Sounding Tube

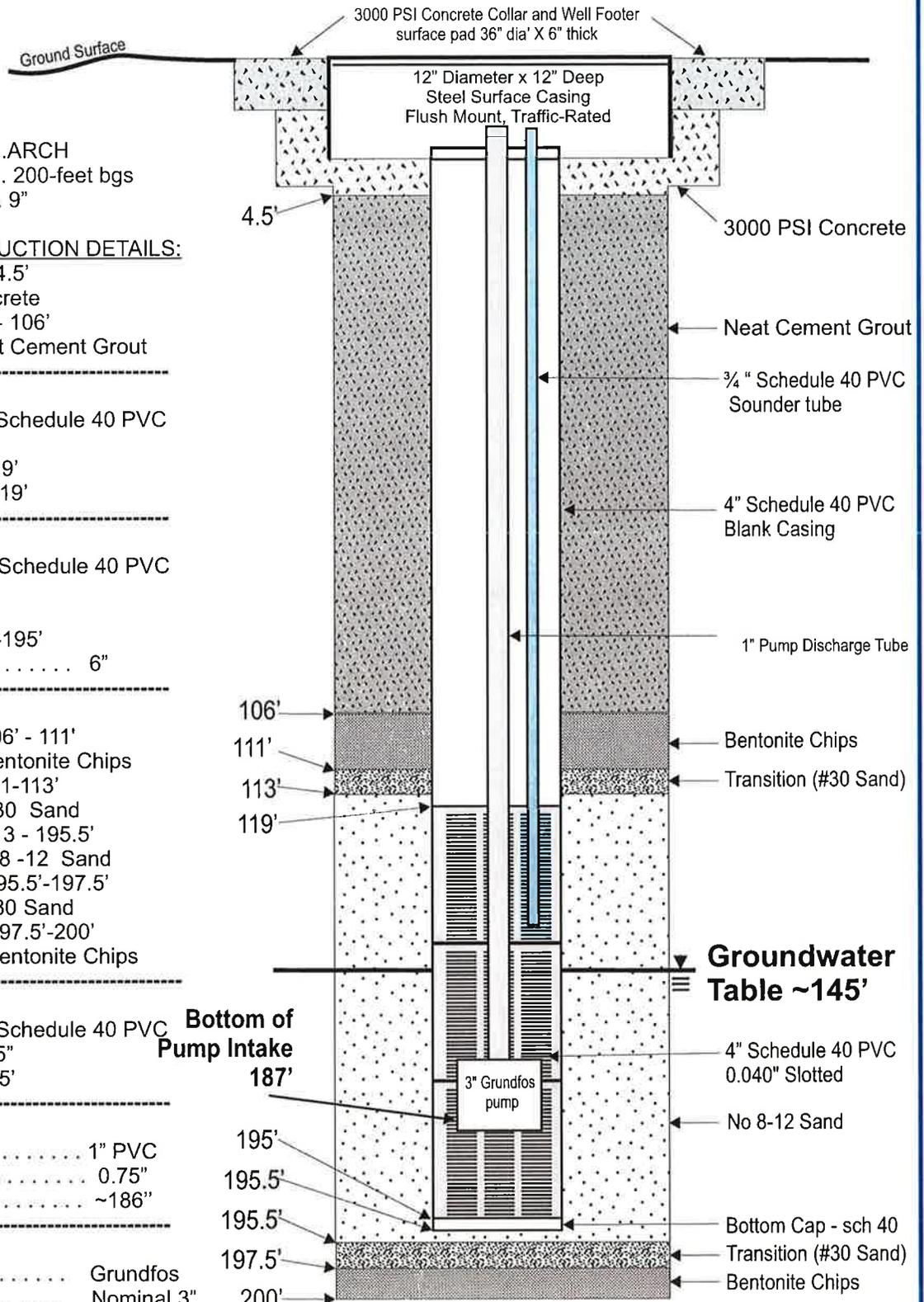
Material Blank Schedule 40 PVC
 Diameter 0.75"
 Tube Casing Length ~185'

Riser Tube

Material 1" PVC
 Diameter 0.75"
 Length ~186"

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake 187' bgs



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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

LATITUDE (NAVD27): 32.18983378
LONGITUDE (NAVD 27): -111.02047668

TOP OF GROUND ELEVATION: 2236.772 A.S.L.
TOP OF CASING ELEVATION: 2236.657 A.S.L.
SCREENED INTERVAL: 119 - 195.5

COMMENTS: Approximate WL: 150 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 7.5" tricone bit
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2235			NONE		FILL: 1.5" minus AGGREGATE BASE COARSE material	
5	2230			CL		SANDY CLAY, with silt, dark brown, fine sand, moist, strong HCl reaction, low to medium plasticity	
10	2225						
15	2220			ML		CLAYEY SILT, with sand brown slightly moist to dry, low plasticity index, fine to medium sand, weak HCl reaction	
20	2215						
25	2210					SILTY GRAVEL, with sand, brown, dry, nil HCl reaction	
30	2205			GM			
35							

REPORT TUCSON-ENVIRONMENTAL | PROJECT: ECDC20-1 | GROUND-1 | WELL 41-45 | 4-11 | FIGURE ECDC WELLS 41-45.GPJ | LIBRARY: URS TUCSON | V.1 | G.I.B. | PRINTED: 04/07



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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2195			SC-SM		SILTY SAND, brown, fine to coarse sand, nil to low plasticity, nil HCl reaction	<p>Neat Cement Grout</p> <p>4" Schd 40 PVC Blank Casing</p>
45	2190					45.0' SILTY GRAVEL, with sand, brown, nil plasticity index, dry, nil HCl reaction	
55	2185			GP-GM		65.0' CLAYEY SAND/CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand and gravel, low plasticity index, nil HCL reaction, slightly moist to moist	
60	2180						
65	2175						
70	2170						
75	2165						
	2160						
	2155						



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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2155			SC-GC			
85	2150					CLAYEY GRAVEL, with sand, brown, low plasticity index, moist, nil HCl reaction	
90	2145						
95	2140						
100	2135						
105	2130						
110	2125						
115	2120						



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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2110						
125	2105						
130	2100						
135	2095					decrease in clay, mostly coarse gravel, becomes borderline GC/GM	
140	2090			GC			
145	2085						
150	2080						
155						Clay and in-situ water binds in drill casing forcing	← #8-12 Filter



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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075					drillers to add water to free cuttings. This process washes fines out of the cuttings limiting the accuracy of the lithological classification. See area boring logs for soils classification.	<p>Pack Sand 4" Schd 40 PVC 0.040" Slotted</p>
165	2070					drill cuttings below watertable are washed gravels with fine to predominantly coarse sand	
170	2065						
175	2060						
180	2055						
185	2050						
190	2045						
195	2040						

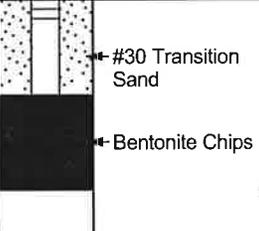


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BORING LOG: MW-42

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Ryan Reynolds
LOGGED BY: DMC
START DATE/TIME: 04/10/2006 10:42 AM
FINISH DATE/TIME: 04/10/2006 02:24 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2035							
200						Total depth at 200'	 <p>#30 Transition Sand Bentonite Chips</p>
2030							
205							
2025							
210							
2020							
215							
2015							
220							
2010							
225							
2005							
230							
2000							
235							

WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 200-feet bgs
 Nominal Borehole Diameter 9"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Blank Casing

Material Blank Schedule 40 PVC
 Diameter 4"
 Well Casing Length ~ 127'
 Blank Interval 0' - 127'

Screened Interval

Material 0.040" Slotted Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval 127'-201.5'
 Threaded End Cap Length 6"

Well Backfill

Top Seal Interval 25' - 107'
 Seal Material Bentonite Grout
 2nd Seal Interval 107' - 111.5'
 Seal Material Bentonite Chips
 Top Transition Interval 111.5'-114'
 Transition Material #30 Sand
 Gravel Pack Interval 114 - 202'
 Gravel Pack Material #8 -12 Sand
 Bottom Transition Interval 202'-203'
 Transition Material #30 Sand
 Bottom Seal Interval 203'-205'
 Seal Material Bentonite Chips

Sounding Tube

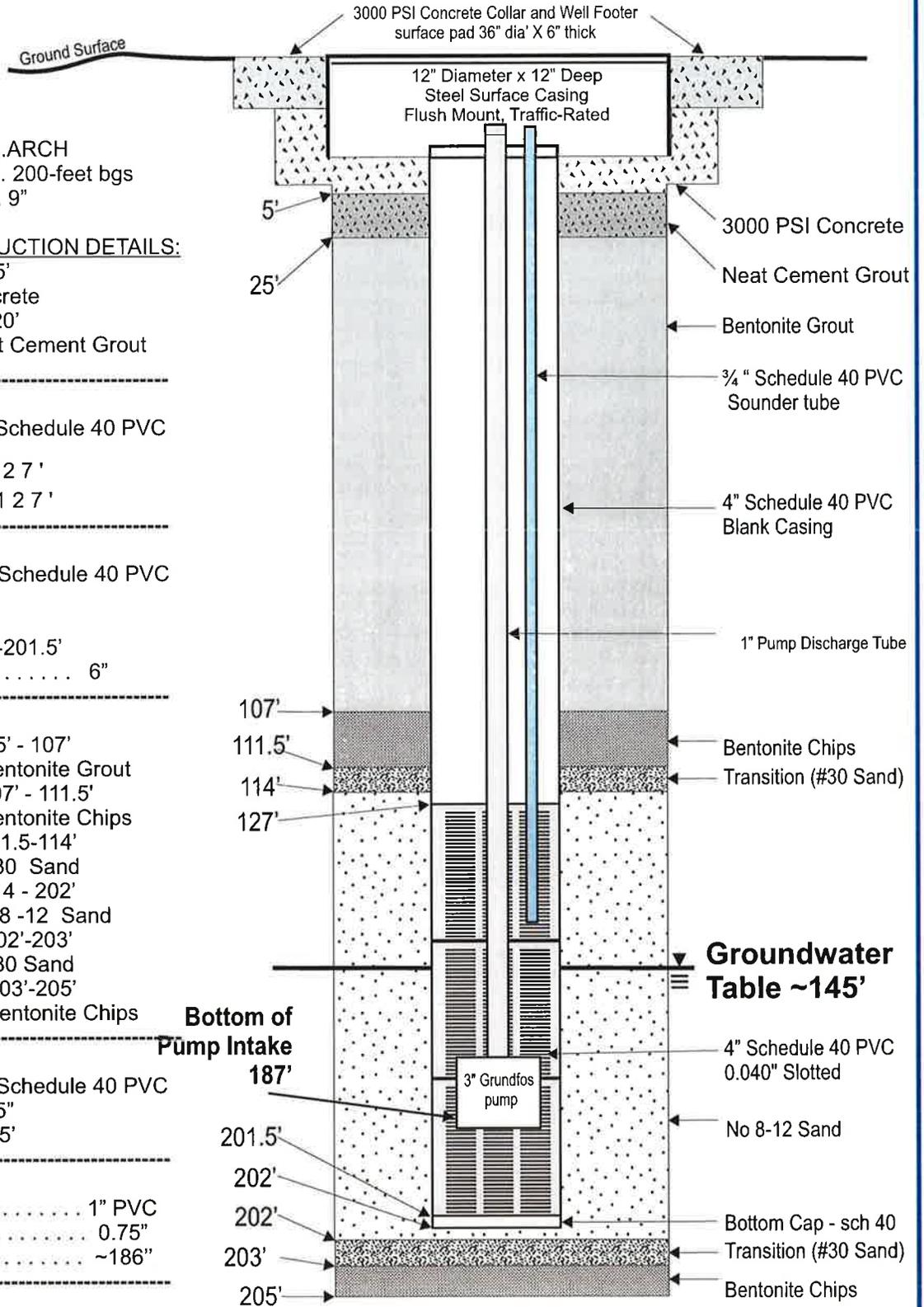
Material Blank Schedule 40 PVC
 Diameter 0.75"
 Tube Casing Length ~185'

Riser Tube

Material 1" PVC
 Diameter 0.75"
 Length ~186"

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake 187' bgs



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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

LATITUDE (NAVD27): 32.181191761
LONGITUDE (NAVD 27): -111.020649102

TOP OF GROUND ELEVATION: 2236.187 A.S.L.
TOP OF CASING ELEVATION: 2235.852 A.S.L.
SCREENED INTERVAL: 127 - 202

COMMENTS: Approximate WL: 147.8 feet bgs

RIG TYPE: Rotasonic
DRILLING METHOD: Rotasonic
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2235		0	SC		SANDY CLAY, with gravel and silt, brown, subrounded to subangular, strong HCl reaction, nil cementation, medium to strong plasticity index, dry	<p>3000 PSI Concrete</p> <p>Neat Cement Grout</p>
5	2230		5.9	ML		CLAYEY SILT, brown, strong HCl reaction, nil cementation, low plasticity Water added to drill stem to 90' below ground surface, for dust suppression, masks in-situ water content	
7			12	SM		SILTY SAND, light brown, nil HCl reaction, nil plasticity	
9				CL		SILTY CLAY, brown, strong HCl reaction, nil cementation, low to medium plasticity	
13			25			CLAY, with silt, brown, strong HCl reaction, nil cementation, medium plasticity becomes black with white spots, moderate HCl reaction, weak cementation, medium plasticity	
14	2225		4	CL			
20	2220		14				
22	2215		136.6	GC		CLAYEY GRAVEL, with sand, few silt, brown, medium HCl reaction, moderate cementation, low plasticity	
25	2210		51.2	GP		SANDY GRAVEL, with silt, brown, subangular to subrounded sand, subrounded gravel, nil HCl reaction, low-nil cementation, nil plasticity	
28			7.8	SP		GRAVELLY SANDY, trace silt, brown, subangular to subrounded, nil HCl reaction, nil cementation, nil plasticity	
30	2205		7.8	SM		SILTY SAND, with gravel, light brown, nil HCl reaction, nil plasticity, angular to subangular sand, subrounded to rounded gravel	
35			7.8				

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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2195		15.5			SILTY - SANDY GRAVEL, light brown, angular to subrounded gravel, nil HCl reaction, nil cementation, nil plasticity	<p>4" Schd 40 PVC Blank Casing</p> <p>Bentonite Grout</p>
40	2190		17	GM		Black CLAY layer @ 40'	
45	2185		4.6			increase in sand	
50	2180		16.3	GP		SANDY GRAVEL, with silt and clay, light brown, angular to subrounded sand, subrounded gravel, nil HCl reaction, nil cementation, nil to low plasticity	
55	2175		19			CLAYEY GRAVEL, brown to dark brown, subangular to subrounded sand, subrounded gravel, nil HCl reaction, nil cementation, low to medium plasticity	
60	2170		45	GC			
65	2165		36			cobble layer @ 57'	
70	2160		75	GP		SANDY GRAVEL, with silt, brown, angular to subrounded sand and gravel, nil HCl reaction, nil cementation, nil plasticity, decomposed gravel	
75			53	GC		CLAYEY GRAVEL, with sand and silt, brown, subangular to subrounded sand, subrounded gravel, nil HCl reaction, nil cementation, low-nil plasticity	
			27			CLAYEY-SANDY GRAVEL, brown, subangular to subrounded, nil HCl reaction, low - nil cementation, low to medium plasticity	
			22.7			cobble layer @ 70'	
			70.2	GC		interbedded CLAYEY SAND with gravel, low plasticity	
			27				
			51.8				



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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PI D (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2155		59.7			CLAYEY-SANDY GRAVEL, brown, subangular to subrounded sand and gravel, nil HCl reaction, nil cementation, low plasticity	
			23				
			17.3				
	2150		42.6				
			69.7				
	2145		49.2				
			49.7				
	2140		19.9			moist	
	2135		32.1				
	2130		18.6				
			75.5				
	2125		19.6			interbedded CLAYEY SAND with fine gravel @ 105'	
			37.4				
	2120		16.6				
115			40				



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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2115		26.3			interbedded SILTY GRAVEL with sand @ 118'	
125	2110		9.3			interbedded SILTY SAND with gravel	
			28.9				
			28.1				
130	2105		6.9				
			4.3				
135	2100		1.2				
			10.9				
140	2095		52.6				
			20.2			137.0' SILTY GRAVEL with interbedded CLAYEY GRAVEL, brown, angular to subangular sand gravel, nil HCl reaction, nil cementation, nil plasticity	
145	2090		22.7	GM			
			17.5				
150	2085		2.1			144.0' SANDY GRAVEL, brown, angular to subangular sand gravel, nil HCl reaction, nil cementation, nil plasticity	
			12.2				
155	2080		7.1			interbedded CLAYEY GRAVEL @ 150'	
			22.5				



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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075		1			wet	
165	2070		0.3	GP			
170	2065		13.4			becomes dark brown and black	
175	2060		50.9				
180	2055		6.7			becomes brown	
185	2050		4.6				
190	2045		9.4			interbedded GRAVELLY SAND @ 178', few to trace silt, wet	
195	2040		0.7				
			4.7			182.0' CLAYEY GRAVEL, with sand, brown, coarse sand, fine to coarse gravel, angular to subangular sand and gravel, nil HCl reaction, low plasticity, moist	
			16.9			sample is disturbed- washed at 185 to 188'	
			9.1				
			14.2	GC			
			25.7				



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BORING LOG: MW-43

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: A. Chavez, J. Check
LOGGED BY: DMC/PP
START DATE/TIME: 03/13/2006 01:50 AM
FINISH DATE/TIME: 03/24/2006 09:40 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
2035			6.7			interbedded CLAYEY SAND @ 196', low plasticity, angular	
			10.6			becomes medium plasticity @ 197'	
200						becomes brown/black	
2030							
205							#30 Transition Sand
2025							Bentonite Chips
210							
2020							
215							
2015							
220							
2010							
225							
2005							
230							
2000							
235							

WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 200-feet bgs
 Nominal Borehole Diameter 9"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Blank Casing

Material Blank Schedule 40 PVC
 Diameter 4"
 Well Casing Length ~121.5'
 Blank Interval 0'-121.5'

Screened Interval

Material 0.040" Slotted Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval 121.5'-196.5'
 Threaded End Cap Length 6"

Well Backfill

Top Seal Interval 20' - 106'
 Seal Material Bentonite Grout
 2nd Seal Interval 106' - 113'
 Seal Material Bentonite Chips
 Top Transition Interval 113-116'
 Transition Material #30 Sand
 Gravel Pack Interval 116 - 202'
 Gravel Pack Material #8 -12 Sand

Sounding Tube

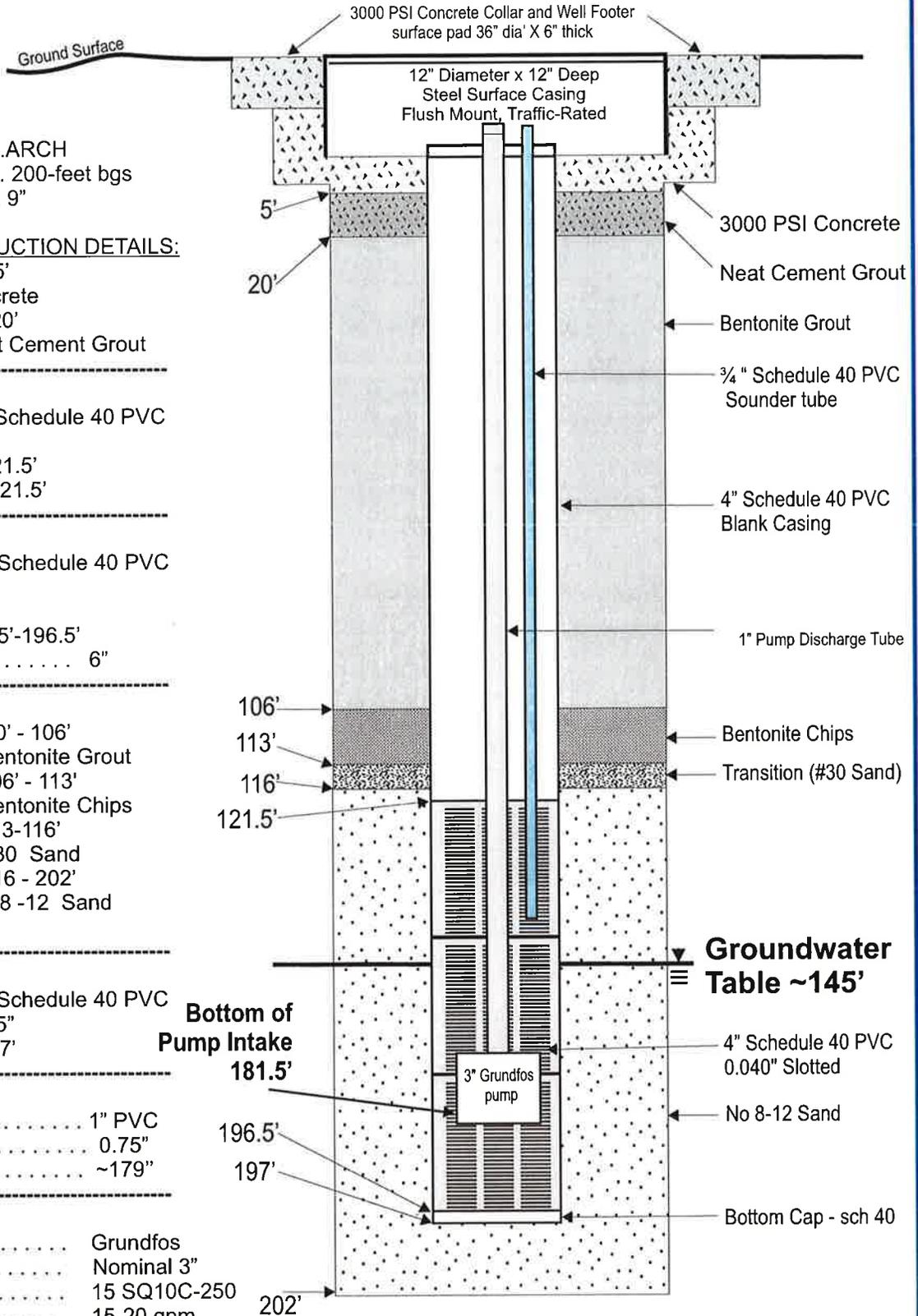
Material Blank Schedule 40 PVC
 Diameter 0.75"
 Tube Casing Length ~177'

Riser Tube

Material 1" PVC
 Diameter 0.75"
 Length ~179'

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake 181.5' bgs



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MW-44

MONITOR WELL AS-BUILT SCHEMATIC

Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites



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BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

LATITUDE (NAVD27): 32.181480771
LONGITUDE (NAVD 27): -111.020748391

TOP OF GROUND ELEVATION: 2235.977 A.S.L.
TOP OF CASING ELEVATION: 2235.712 A.S.L.
SCREENED INTERVAL: 121.5 - 197

COMMENTS: Approximate WL: 145.6 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 7.5" tricone bit
SAMPLING METHOD:

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5	2235			SC		CLAYEY SAND, with silt, brown, dry, low plasticity index, predominantly fine to coarse sand, strong HCl reaction	
10	2230			SC			
15	2225			CL		14.0' SANDY CLAY, trace silt, brown/dark brown, moist, medium plasticity index, fine sand, hard, weak HCl reaction	
20	2220			CL			
25	2215			CL			
30	2210			SP-SM		30.0' SILTY SAND, trace gravel, brown/light brown, fine to predominantly coarse sand, predominantly fine to coarse gravel, angular, nil HCl reaction, slightly moist	
35	2205			SP-SM			

REPORT TUCSON-ENVIRONMENTAL | PROJECT: ECDC20-1GROUND-1WELLS4-1MW41-4-TIFIGURESECD WELLS 41-45.GPJ | LIBRARY: URS TUCSON V4.1.GLB | PRINTED: 5/14/07



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 520-887-8438 (Fax)

BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0	2195						
40	2190					40.0'	
45	2185					Water added to drill stem, for dust suppression, masks in-situ water content	
50	2180			SP-GP		becomes tan/light brown	
55	2175						
60	2170					60.0'	4" Schd 40 PVC Blank Casing
65	2165					CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand, fine to coarse gravel, low plasticity index, angular, slightly moist	Bentonite Grout
70	2160						
75							



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BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2155			GC			
85	2150						
90	2145						
90.0'	2140			SC		CLAYEY SAND, with gravel, brown, fine to predominantly coarse sand, fine gravel, low to medium plasticity index, angular, nil HCl reaction, slightly moist	
96.0'	2135						
100	2130			SM		SILTY SAND, with gravel, trace clay, brown, fine to coarse sand, fine gravel, nil plasticity index, angular to subrounded, nil HCl reaction, slightly moist	
106.0'	2125						
110	2120			GC		CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand, fine to coarse gravel, low plasticity index, angular, slightly moist	
114.0'							
115						CLAYEY SAND, with gravel, brown, fine to	← Bentonite Chips ← #30 Transition



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BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2115					predominantly coarse sand, fine gravel, low plasticity index, angular, nil HCl reaction, slightly moist	<p>Sand</p>
120	2110				increasing silt with depth		
125	2105						
130	2100						
135	2095			SC			
140	2090						
145	2085						
150	2080					decrease in silt, increase in clay, low to medium plasticity, wet/moist	
155							



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BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2070					CLAYEY GRAVEL, with sand, brown, fine to predominantly coarse sand, fine to coarse gravel, low plasticity index, angular, slightly moist drill cuttings are washed gravels with fine to predominantly coarse sand	
165	2065						
170	2060						
175	2055						
180	2050			GC			
185	2045						
190	2040						
195							

159.0'

#8-12 Filter Pack Sand
 4" Schd 40 PVC
 0.040" Slotted



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BORING LOG: MW-44

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/16/2006 08:45 AM
FINISH DATE/TIME: 11/16/2006 11:45 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
	2035					drill cuttings are mostly washed coarse gravel,	
200	2030					Total depth at 202'	
205	2025						
210	2020						
215	2015						
220	2010						
225	2005						
230	2000						
235							

WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 200-feet bgs
 Nominal Borehole Diameter 9"

WELL CONSTRUCTION DETAILS:

Surface Completion 0 - 5'
 Material Concrete
 Casing Protection 5' - 20'
 Material Neat Cement Grout

Blank Casing

Material Blank Schedule 40 PVC
 Diameter 4"
 Well Casing Length ~120'
 Blank Interval 0'-120'

Screened Interval

Material 0.040" Slotted Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval 120'-195'
 Threaded End Cap Length 6"

Well Backfill

Top Seal Interval 20' - 106'
 Seal Material Bentonite Grout
 2nd Seal Interval 106' - 113'
 Seal Material Bentonite Chips
 Top Transition Interval 113'-116'
 Transition Material #30 Sand
 Gravel Pack Interval 116 - 195.5'
 Gravel Pack Material #8 -12 Sand
 Bottom Transition Interval 195.5'-197.5'
 Transition Material #30 Sand
 Bottom Seal Interval 197.5'-200'
 Seal Material Bentonite Chips

Sounding Tube

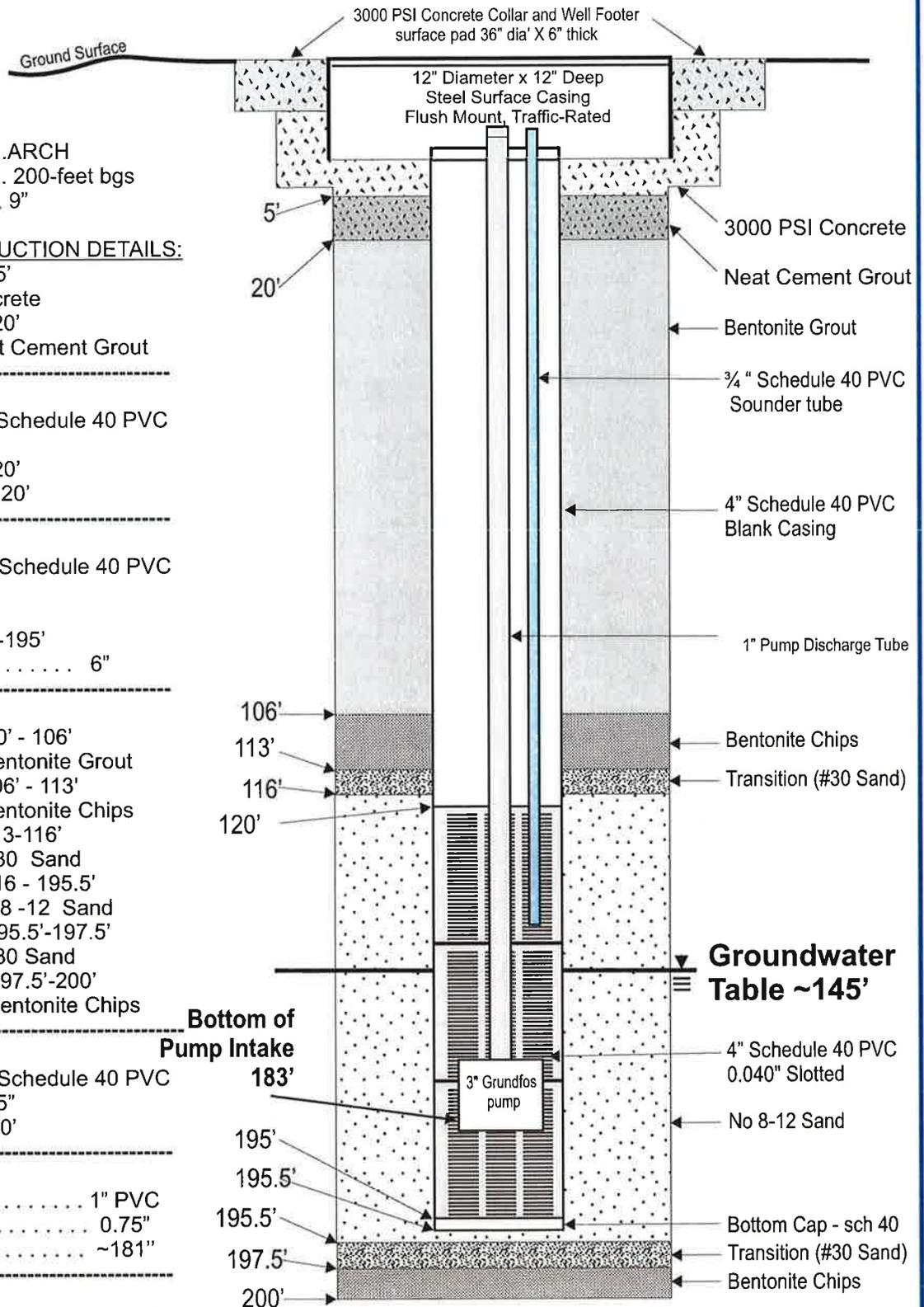
Material Blank Schedule 40 PVC
 Diameter 0.75"
 Tube Casing Length ~180'

Riser Tube

Material 1" PVC
 Diameter 0.75"
 Length ~181"

WELL EQUIPPING:

Pump Make Grundfos
 Pump Size Nominal 3"
 Model 15 SQ10C-250
 Pump Capacity 15-20 gpm
 Pump Intake 183' bgs



P:\E\DC\2007\... \Aspers\Woodspears\Sampling and Analysis Plan\Appendix and Figures\Proposed Well Schematic.cdr

Bottom of Pump Intake 183'

Groundwater Table ~145'

MW-45

MONITOR WELL AS-BUILT SCHEMATIC
 Shannon Road - Rillito Creek & El Camino Del Cerro WQARF Sites





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BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

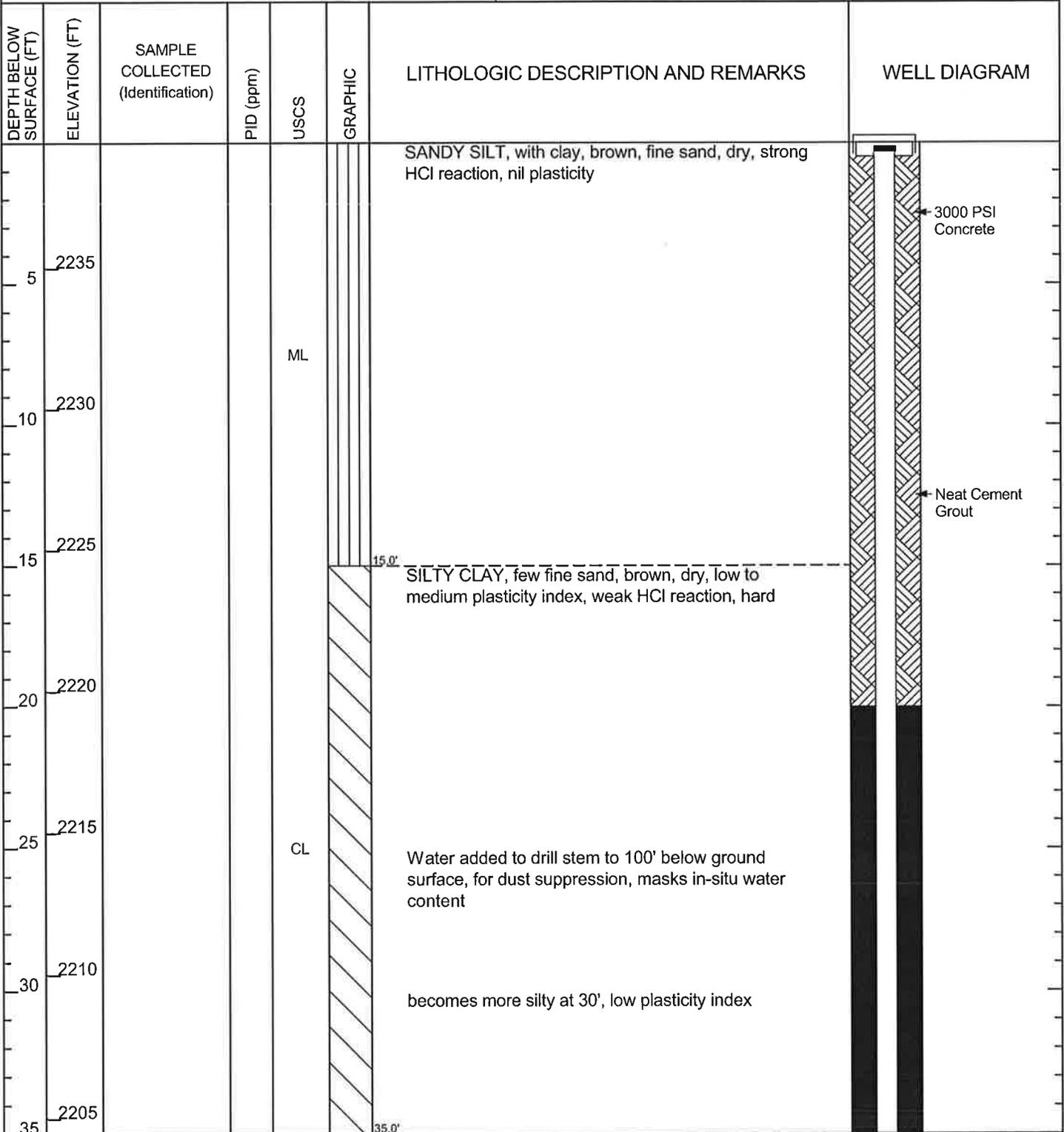
DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

LATITUDE (NAVD27): 32.181485017
LONGITUDE (NAVD 27): -111.020150394

TOP OF GROUND ELEVATION: 2239.45 A.S.L.
TOP OF CASING ELEVATION: 2236.091 A.S.L.
SCREENED INTERVAL: 120 - 195.5

COMMENTS: Approximate WL: 145.8 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 7.5" tricone bit
SAMPLING METHOD:



REPORT TUCSON-ENVIRONMENTAL | PROJECT ECDC20-1GROUND-1WELLS4-1MW41-4-1FIGURES ECDC WELLS 41-45 GP | JBRARY URS TUCSON VA 1.GLB | PRINTED 5/14/07



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BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40	2195			GC		CLAYEY GRAVEL, with sand, brown, fine to coarse sand gravel, medium plasticity index, angular	<p>4" Schd 40 PVC Blank Casing</p> <p>Bentonite Grout</p>
45	2190					POORLY GRADED GRAVEL, few sand, trace silt, brown, dry, angular to subangular, nil HCl reaction	
50	2185			GP		increase in sand	
55	2180					CLAYEY GRAVEL, with sand, brown, fine to coarse sand gravel, medium plasticity index, angular	
60	2175						
65	2170					CLAYEY GRAVEL, with sand, brown, fine to coarse sand gravel, medium plasticity index, angular	
70	2165			GC			
75	2160						



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BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80	2155			SP		POORLY GRADED SAND, trace gravel and silt, brown, fine to predominantly coarse sand and fine gravel, nil plasticity index, nil HCl reaction	
85	2150					85.0' SILTY GRAVEL, few sand, brown, fine to coarse sand and gravel, angular to subrounded, nil HCl reaction	
90	2145			GP-GM			
95	2140					95.0' CLAYEY SAND, with silt and few fine gravel, brown, dry, low plasticity index, fine to coarse sand, angular to subrounded	
100	2135						
105	2130						
110	2125						← Bentonite Chips
115	2120						← #30 Transition

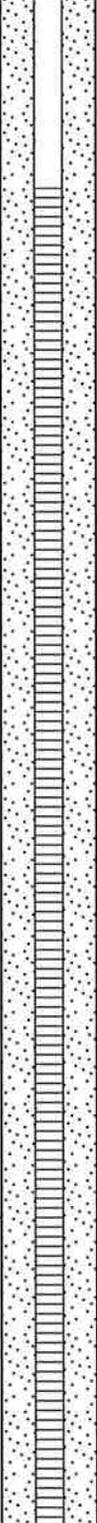


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BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120	2115			SC		decrease in clay and gravel, increase in silt	
125	2110						
130	2105						
135	2100						
140	2095						
145	2090						
150	2085					drill cuttings below water table are washed gravels with fine to predominantly coarse sand	
155	2080						

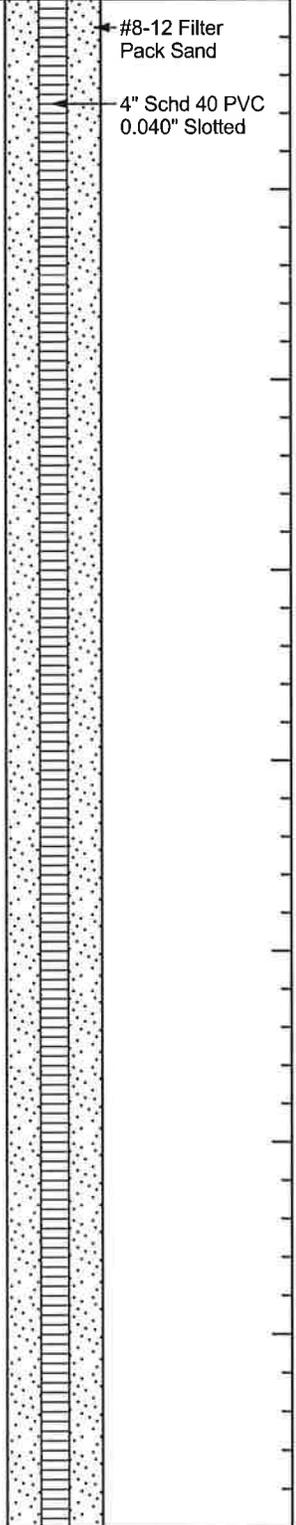


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BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160	2075						 <p>#8-12 Filter Pack Sand 4" Schd 40 PVC 0.040" Slotted</p>
165	2070						
170	2065						
175	2060						
180	2055						
185	2050						
190	2045						
195	2040						



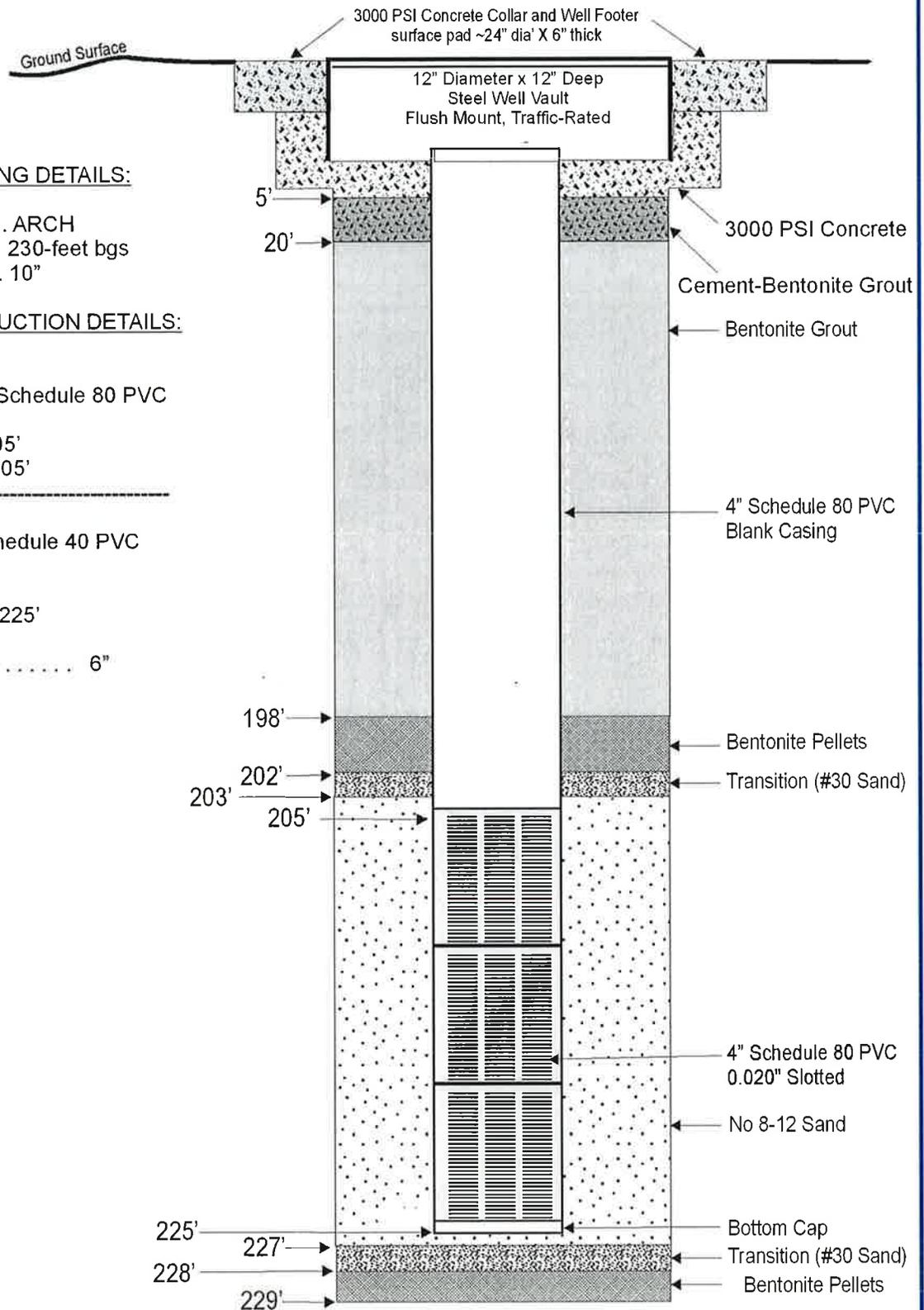
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 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-45

PROJECT: ECDC Wells 41-45
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23444819

DRILLING CONTRACTOR: WDC Exploration
DRILLER: Arnold Lamon
LOGGED BY: DMC
START DATE/TIME: 11/14/2006 01:05 PM
FINISH DATE/TIME: 11/14/2006 04:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200 205 210 215 220 225 230 235	2035 2030 2025 2020 2015 2010 2005 2000					Total depth at 201'	<p>#30 Transition Sand Bentonite Chips</p>



WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 230-feet bgs
 Nominal Borehole Diameter . . . 10"

WELL CONSTRUCTION DETAILS:

Blank Casing

Material Blank Schedule 80 PVC
 Diameter 4"
 Well Casing Length . . . ~205'
 Blank Interval 0'-205'

Screened Interval

Material . . . 0.020" Slot Schedule 40 PVC
 Diameter 4"
 Screen Length 20'
 Screened Interval 205-225'

Threaded End Cap Length 6"

P:\A\DEQ_SREDC\ECDC 2006\Task 2 - Monitor Well Installation\Drawings-Maps-Figures

SRC-W46M Monitor Well Construction



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BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 205-225

COMMENTS: Approximate WL: 142.90 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 8.5" tricone bit
SAMPLING METHOD:

REPORT TUCSON-ENVIRONMENTAL | PROJECT PIA DEQ_SRECDC ECDC 2008 TASK 2 - MONITOR WELL INSTALLATION GROUNDWATER WELL INSTALLATION REPORT WELLS MW-46 THROUGH MW-50 KWV1.GRIB#547PURS TUCSON VA.1 GLB | PRINTED 01/2008

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5				ML		SILT with sand.	
10							
15						Poorly graded SAND with gravel.	
20							
25							
30							
35							

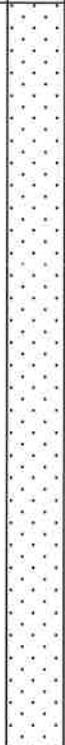


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 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40				SP			
45							
50							
55						55.0'	
						Poorly graded GRAVEL with sand.	
60				GP			
65						65.0'	
						Poorly graded GRAVEL with clay and sand.	
70				GP-GC			
75						75.0'	



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BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80				SW-SM		Well graded SAND with silt and gravel.	<p>4" Schd 40 PVC Blank Casing</p> <p>Bentonite Grout</p>
85						Silty SAND with gravel. Wet at 90 ft bgs.	
95				SM			
105						Poorly graded GRAVEL with silt and sand.	
110				GP-GM			
115							



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BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120				GM		Well graded GRAVEL with silt and sand.	
125						Silty SAND.	
130				SM			
135						Poorly graded SAND with silt.	
140				SP-SM			
145						Well graded GRAVEL with silt and sand.	
150				GW-GM			
155							



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BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160				ML		Sandy SILT.	
165						165.0' Poorly graded GRAVEL with silt and sand.	
170				GP-GM			
175						175.0' Silty GRAVEL with sand.	
180				GM			
185						185.0' Silty SAND with gravel.	
190				SM			
195						195.0'	



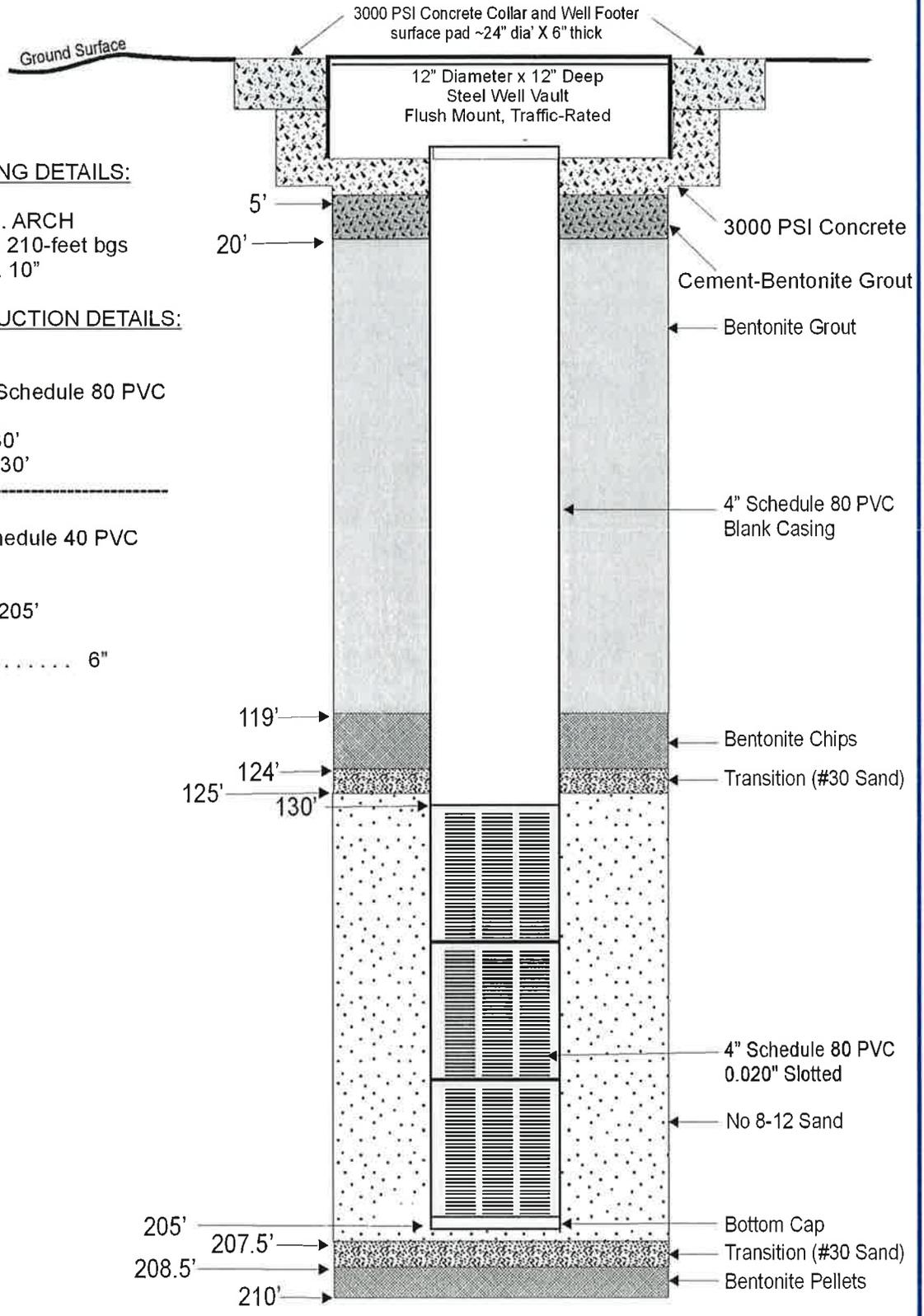
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 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-46

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/18/2008 01:15 PM
FINISH DATE/TIME: 02/20/2008 05:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200				GM		Silty GRAVEL with sand.	
205						Well graded GRAVEL.	
210							
215				GW			
220							
225						Well graded SAND with gravel.	
230				SW			
235							



WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 210-feet bgs
 Nominal Borehole Diameter . . . 10"

WELL CONSTRUCTION DETAILS:

Blank Casing

Material Blank Schedule 80 PVC
 Diameter 4"
 Well Casing Length . . . ~130'
 Blank Interval 0'-130'

Screened Interval

Material . . . 0.020" Slot Schedule 40 PVC
 Diameter 4"
 Screen Length 75'
 Screened Interval . . . 130-205'
 Threaded End Cap Length 6"

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SRC-W47S Monitor Well Construction



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 520-887-1800
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BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 130-205

COMMENTS: Approximate WL: 143.27 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 8.5" tricone bit
SAMPLING METHOD:

REPORT TUCSON-ENVIRONMENTAL | PROJECT: ADEQ_SRECDC ECDC 2008 TASK 2 - MONITOR WELL INSTALLATION GROUNDWATER WELL INSTALLATION REPORT WELLS MW-46 THROUGH MW-50 KWV1.GPJ@URS TUCSON VA 1 G5B | PRINTED 01/2008

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0						CLAY: sandy gravelly.	
5							
10							
15				ML			
20							
25							
30						30.0'	
35						Sandy GRAVEL: light brown with multi-colored gravels.	



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520-887-1800
520-887-8438 (Fax)

BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40							
45				GP			
50							
55							
60						60.0' Silty SAND: light brown, dry.	4" Schd 40 PVC Blank Casing
65				SM			
70						70.0' Silty GRAVEL: light brown with colored gravels.	Bentonite
75							



333 East Wetmore, Suite 611
 Tucson, AZ 85705
 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80							
85				GM			
90							
95							
100						100.0' Sandy SILT, light brown.	
105				CL			
110						110.0' Sandy SILT, light brown.	
115							



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BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120				GP		120.0' GRAVEL: poorly sorted, multi-colored gravels.	
125				GP			
130				CL		130.0' Gravelly SILT: light brown, very angular.	
135				CL			
140				GW		140.0' GRAVEL: light brown, well sorted.	
145				GW			
150						150.0' Driller not using water, water table encountered. SAND: light brown.	
155							

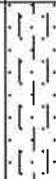
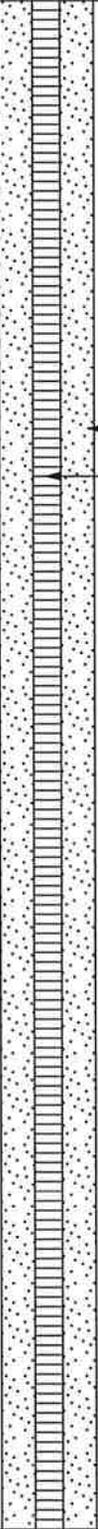


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BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160				SM		160.0' Sandy SILT: light brown, very fine sand.	 ← #8-12 Filter Pack Sand 4" Schd 40 PVC 0.040" Slotted
165			ML				
170				GP		170.0' Poorly sorted GRAVEL: multi colored, angular gravels.	
175							
180							
185							
190							
195							

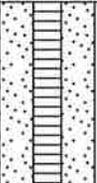
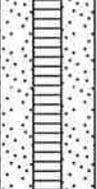
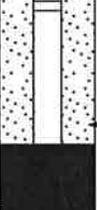


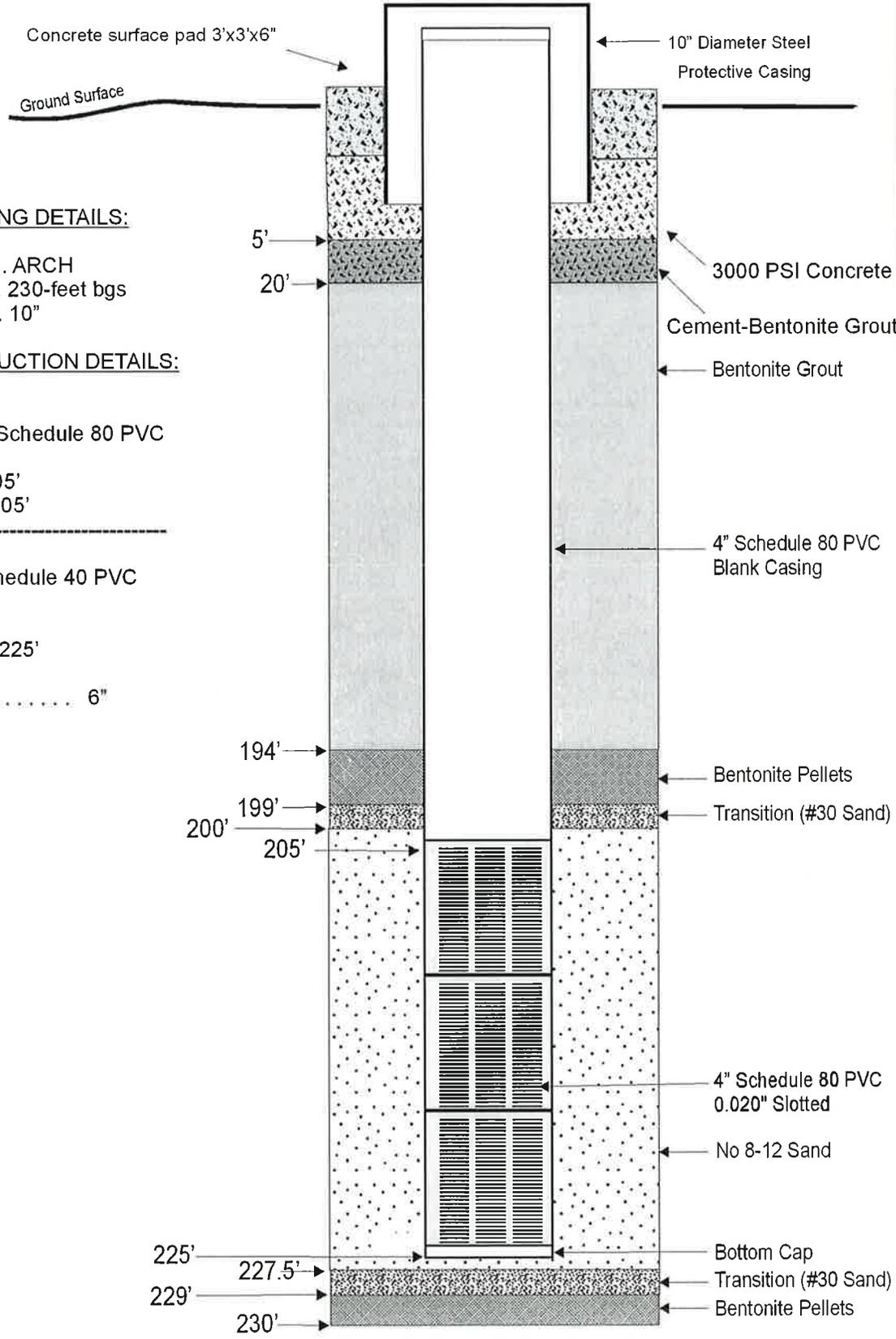
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BORING LOG: MW-47

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/11/2008 08:00 AM
FINISH DATE/TIME: 02/15/2008 02:30 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200						Gravelly SAND. Angular.	
205				SW			
210							
215							
220							
225							
230							
235							



WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 230-feet bgs
 Nominal Borehole Diameter . . . 10"

WELL CONSTRUCTION DETAILS:

Blank Casing
 Material Blank Schedule 80 PVC
 Diameter 4"
 Well Casing Length . . . ~205'
 Blank Interval. 0'-205'

Screened Interval
 Material . . . 0.020" Slot Schedule 40 PVC
 Diameter 4"
 Screen Length. 20'
 Screened Interval. . . . 205-225'

Threaded End Cap Length. 6"

P:\A\DEQ_SRECDC\ECDC 2006\Task 2 - Monitor Well Installation\Drawings-Maps-Figures

SRC-W48M Monitor Well Construction



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BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 205-225

COMMENTS: Approximate WL: 151.31 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 8.5" tricone bit
SAMPLING METHOD:

REPORT TUCSON-ENVIRONMENTAL | PROJECT P: ADEQ_SREGDC ECDC 2008 TASK 2 - MONITOR WELL INSTALLATION GROUNDWATER WELL INSTALLATION REPORT WELLS MW-46 THROUGH MW-50 KWV1 GRI0804RURS TUCSON V4.1.GLB | PRINTED 01/20/08

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
0			0			Clayey SILT: brown.	
5			5.9				
10			12				
15			25	ML			
20			4				
25			14				
30			136.6				
			51.2				
			7.8				
35			7.8			Sandy GRAVEL with silt: light brown, angular.	



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BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40			15.5	GM			
			17			40.0' GRAVEL: poorly sorted, angular/sub-angular, light brown with multi-colored gravels.	
45			4.6	GP			
			16.3			50.0' Silty GRAVEL with sand.	
50			19				
			72				
55			45	GC			
			36			60.0' Sandy GRAVEL.	
60			75				
			53				
65			27	GP			
			22.7				
70			70.2			70.0' Silty GRAVEL: brown with pink gravels, wet.	
			27				
75			51.8				



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BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
59.7				GM			<p>4" Schd 40 PVC Blank Casing</p> <p>Bentonite Grout</p>
23							
17.3						Clayey GRAVEL: light brown, subangular.	
42.6							
69.7							
49.2				GC			
49.7							
19.9							
32.1						Silty GRAVEL: light brown with multi-colored gravels, very wet. Water table encountered at 150 feet bgs.	
18.6							
75.5							
19.6							
37.4							
16.6							
40							



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BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120			26.3				
			9.3				
			28.9				
125			28.1				
			6.9				
			4.3				
130			1.2				
			10.9				
135			52.6				
			20.2				
140			22.7	GM			
			17.5				
145			2.1				
			12.2				
150			7.1				
			22.5				
155							



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BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160			1				
			3.8				
165			0.3				
			13.4				
170			50.9				
			6.7				
175			4.6				
			9.4				
180			0.7				
			4.7				
185			16.9				
			9.1				
190			14.2				
			25.7				
195							

180.0' Poorly sorted GRAVEL: multi-colored, very coarse.



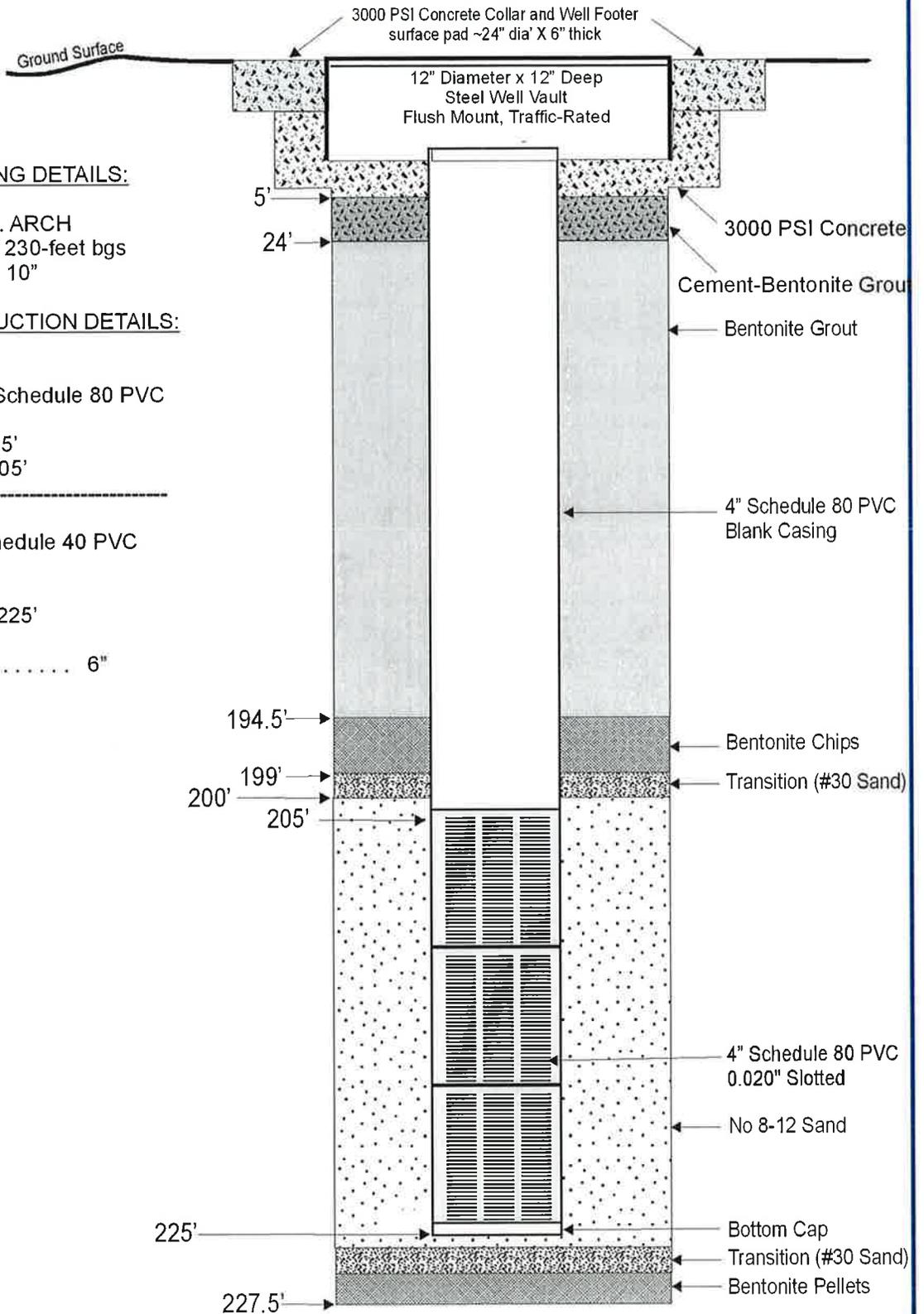
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 520-887-8438 (Fax)

BORING LOG: MW-48

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/17/2008 11:00 AM
FINISH DATE/TIME: 01/24/2008 05:20 PM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	GUSCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
200			6.7	GP			
205			10.6				
210						210.0' Poorly sorted SAND with gravels. Angular/Subangular, multi-colored gravels. Coarse sand.	
215							
220							
225							
230							
235							



WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 230-feet bgs
 Nominal Borehole Diameter . . . 10"

WELL CONSTRUCTION DETAILS:

Blank Casing

Material Blank Schedule 80 PVC
 Diameter 4"
 Well Casing Length . . . ~205'
 Blank Interval 0'-205'

Screened Interval

Material . . . 0.020" Slot Schedule 40 PVC
 Diameter 4"
 Screen Length 20'
 Screened Interval 205-225'

Threaded End Cap Length 6"

SRC-W49M Monitor Well Construction



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 520-887-8438 (Fax)

BORING LOG: MW-49

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/25/2008 01:00 PM
FINISH DATE/TIME: 02/04/2008 09:00 AM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 205-225

COMMENTS: Approximate WL: 144.46 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 8.5" tricone bit
SAMPLING METHOD:

REPORT TUCSON-ENVIRONMENTAL | PROJECT: ADEQ_SRECC/ECDC 2008/TASK 2 - MONITOR WELL INSTALLATION/GROUNDWATER WELL INSTALLATION/REPORT WELLS MW-46 THROUGH MW-50 KWV1.CP#R#P#R#Y#R#S TUCSON.V4.1.GLB | PRINTED 01/2008

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5				SP		Poorly sorted SAND with gravel.	
10				SM		10.0' Silty SAND: light brown, dry.	
20				SM		20.0' Silty SAND with gravel: light brown, coarse sand, medium gravel, sub-angular.	
30				SP			
35							



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BORING LOG: MW-49

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/25/2008 01:00 PM
FINISH DATE/TIME: 02/04/2008 09:00 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40						40.0'	
						Silty SAND: light brown, medium grained sand.	
45				SM			
50						50.0'	
						Sandy SILT	
55				ML			
60						60.0'	
						CLAY: light brown, very fine, high plasticity.	
65				CH			
70						70.0'	
						Gravelly SILT: light brown, some plasticity, sub-angular.	
75							



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BORING LOG: MW-49

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/25/2008 01:00 PM
FINISH DATE/TIME: 02/04/2008 09:00 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80				GM			
85							
90						Sandy SILT: light brown, fine to very fine grained.	
95				CL			
100						SILT: light brown, very fine grained, some sands.	
105				CH			4" Schd 40 PVC Blank Casing
110						Sandy CLAY with gravel.	Bentonite Grout
115							

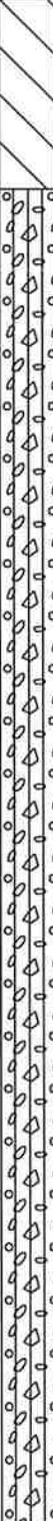
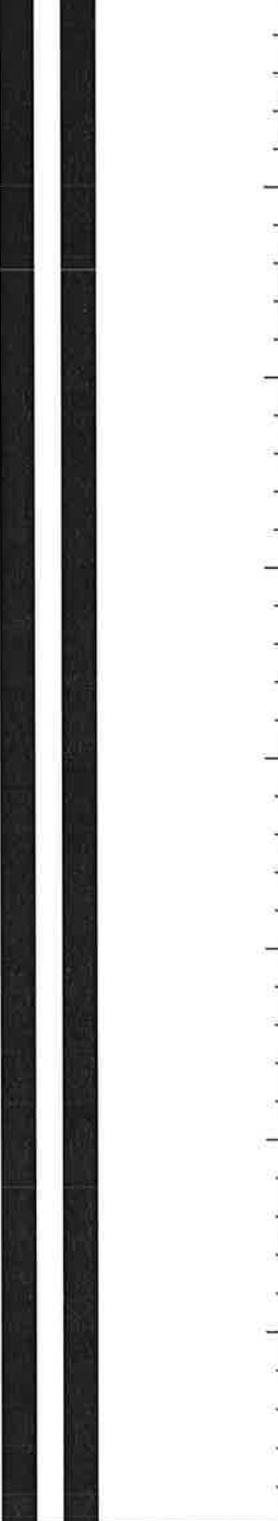


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 520-887-8438 (Fax)

BORING LOG: MW-49

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/25/2008 01:00 PM
FINISH DATE/TIME: 02/04/2008 09:00 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120 125 130 135 140 145 150 155				GM		<p>120.0'</p> <p>Silty GRAVEL with sand: light brown with multi-colored gravels, very fine sand to very coarse gravels. Very wet. Water table encountered at around 150 feet bgs.</p>	



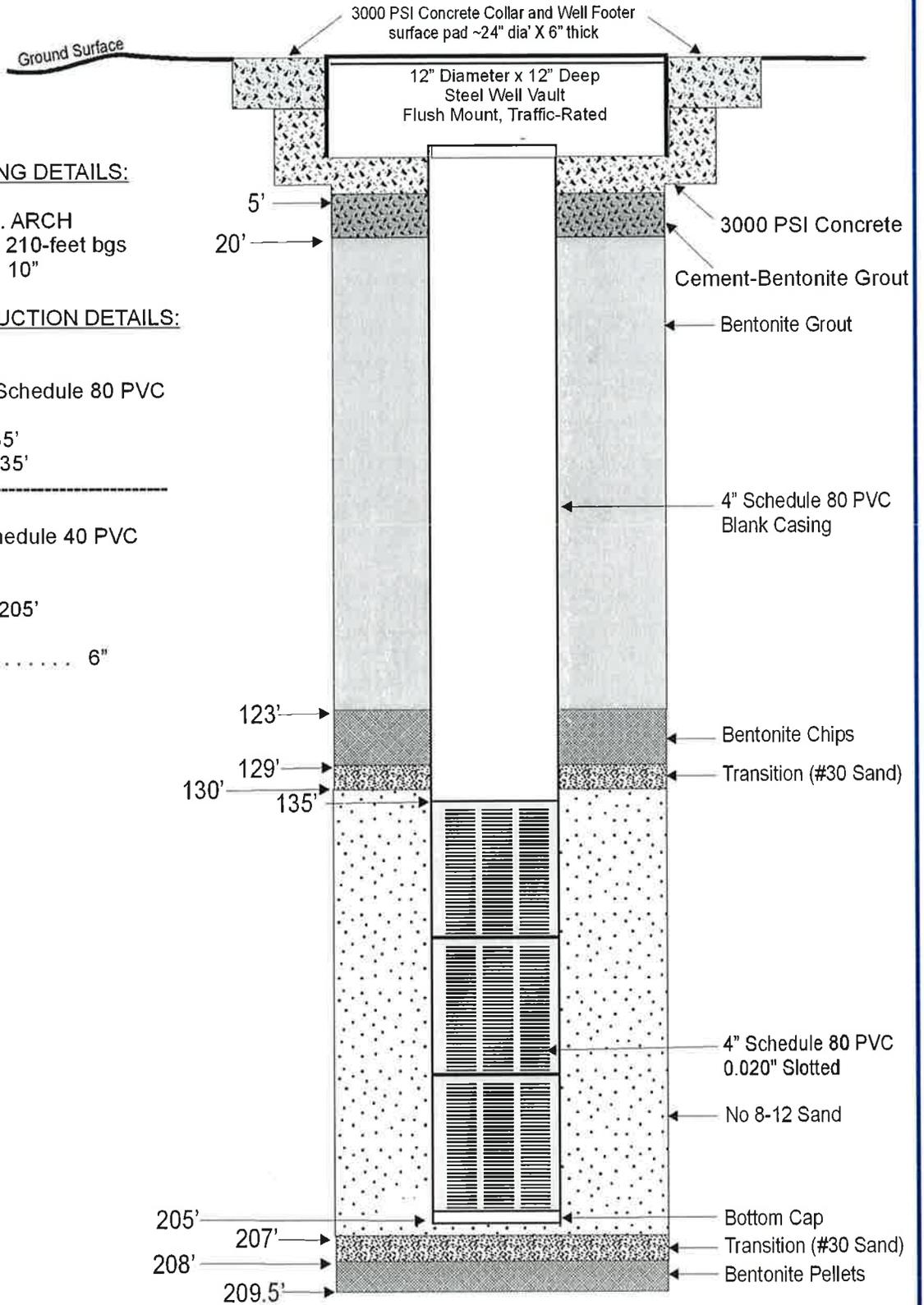
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 520-887-1800
 520-887-8438 (Fax)

BORING LOG: MW-49

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 01/25/2008 01:00 PM
FINISH DATE/TIME: 02/04/2008 09:00 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
160							
165							
170						170.0'	
175				CL			
180						180.0'	
185							
190							
195							



WELL BORING DETAILS:

Drilling Method ARCH
 Hammer Total Depth 210-foot bgs
 Nominal Borehole Diameter . . . 10"

WELL CONSTRUCTION DETAILS:

Blank Casing

Material Blank Schedule 80 PVC
 Diameter 4"
 Well Casing Length . . . ~135'
 Blank Interval 0'-135'

Screened Interval

Material . . . 0.020" Slot Schedule 40 PVC
 Diameter 4"
 Screen Length 70'
 Screened Interval 135-205'

Threaded End Cap Length 6"

P:\ADEC_SRECDC\ECDC 2005\Task 2 - Monitor Well Installation\Drawings-Maps-Figures

SRC-W50S Monitor Well Construction



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BORING LOG: MW-50

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/05/2008 11:00 AM
FINISH DATE/TIME: 02/07/2008 08:45 AM

LATITUDE (NAVD27):
LONGITUDE (NAVD 27):

TOP OF GROUND ELEVATION: A.S.L.
TOP OF CASING ELEVATION: A.S.L.
SCREENED INTERVAL: 135-205

COMMENTS: Approximate WL: 144.00 feet bgs

RIG TYPE: ARCH
DRILLING METHOD: 8.5" tricone bit
SAMPLING METHOD:

REPORT TUCSON-ENVIRONMENTAL | PROJECT P-ADEQ_SRECDC ECDC 2008 TASK 2 - MONITOR WELL INSTALLATION GROUNDWATER WELL INSTALLATION REPORT WELLS MW-46 THROUGH MW-50 KWV1 GRINDING PULVERS TUCSON V4.1.GLB | PRINTED 01/2008

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
5				CL		Silty CLAY.	
10				SP		10.0' Poorly sorted SAND: very fine grained, multi-colored.	
20				CL		20.0' Sandy SILT: light brown, very fine grained.	
30						30.0' SAND: multi-colored, medium to coarse grained, well graded.	
35							



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BORING LOG: MW-50

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/05/2008 11:00 AM
FINISH DATE/TIME: 02/07/2008 08:45 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
40				SW		GRAVEL with sand and silt: light brown, medium gravels.	
45				GM		Gravelly SILT with clay: light brown with multi-colored gravels. Very fine silt to medium grained gravels, angular. Water encountered at 160 feet bgs.	
50							
55							
60							
65							
70							← 4" Schd 40 PVC Blank Casing
							← Bentonite Grout
75							



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BORING LOG: MW-50

PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/05/2008 11:00 AM
FINISH DATE/TIME: 02/07/2008 08:45 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
80							
85							
90							
95							
100							
105							
110				CL			
115							



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BORING LOG: MW-50

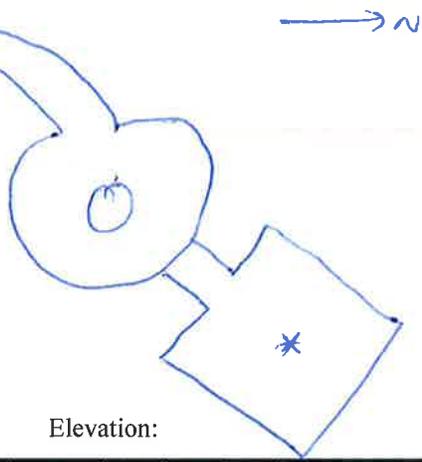
PROJECT: ECDC Wells 46-50
CLIENT: ADEQ
LOCATION: ECDC
URS PROJECT #: 23445137

DRILLING CONTRACTOR: Yellow Jacket
DRILLER: M. Stockton
LOGGED BY: KAW
START DATE/TIME: 02/05/2008 11:00 AM
FINISH DATE/TIME: 02/07/2008 08:45 AM

DEPTH BELOW SURFACE (FT)	ELEVATION (FT)	SAMPLE COLLECTED (Identification)	PID (ppm)	USCS	GRAPHIC	LITHOLOGIC DESCRIPTION AND REMARKS	WELL DIAGRAM
120							
125							
130							Bentonite Chips #30 Transition Sand
135							
140							
145							
150							
155							

Location of Boring

El Camino de la Tierra



Datum:

Elevation:

LOG OF WELL NO. SRC-W51

Job No. 24097087	Client URS	Sheet 1 of 10
Drilling Contractor Boart Longyear	Drilling Method Roto Sonic	Date/Time Start 1031 4-18-13
Drilling Equipment	Sampling Method	Date/Time Stop 1435 4-19-13
Depth to Water		Logged By BL
FIRST:	SECOND:	

Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION	COMMENTS
						Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	Penetration rate, water, etc.
0							
2.5							
5		SP/sw	0	95	5	sand; brown, fine-coarse sand, predominantly fine-med, moist	
6							
7.5		SP	0	100	0	sand, brown, fine-med sand, some coarse, moist	
8.5							
10		Sw	0	90	10	Sand w/ some gravel, fine-coarse sand, predominantly med, brown, moist, sub-angular - sub rounded gravel	
11						Same as above	
12.5						↓ description on next page	

Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
13.5		ML	60	30	10	Sandy silt w/ some gravel, brown, moist, non elastic, sub angular - sub rounded gravel,	
15		SW	>35 or	60	25	Silty sand	
16		ML	60	35	25	Sandy silt, tan, fine-med grained sand (predom fine),	
17.5		ML	60	35	25	Sandy silt, tan, fine-med grained sand (predom fine),	
18.5		CL	90	10	0	Clay, dry, weak-med cementation brown (dark), non elastic, clay "chunks" med-toughness (stiff) high	
20		CL	90	10	0	Same as above	
21		SP	15	80	5	(Silty) sand, grayish brown, fine-med sand, moist	
22.5	≈ 4"					gray dust brown clay, same as 10-18.5 interval	
23.5		ML	>95	25	0	silt, light brown, slight elastic breaks + forms easily, slightly moist	
25		SW	40	60	30	sand, reddish brown, fine-course sand gravelly	
26						subangular - sub rounded fine + coarse gravel. moist	
27.5		SW	0	65	35	gravelly sand, brown, moist, some cobbles (small), fine-course sand, subangular - sub rounded, fine-course gravel	
28.5		SP				well graded sand, fine-med grade sand (predominantly fine), brown/tan moist	
30							

Job No.		Client		Sheet 3 of 10		LOG OF WELL NO.	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
31						Same as a	
32.5		SP	15	45	40	gravelly sand, brown, fine-course sand, fine-course gravel, cobbles (2-3" dia, 6" long) subangular-sub rounded, moist	
33.5		GW	0	30-40	70-60	sandy gravel, fine-course sand (predom med-course), fine-course gravel, subangular-subrounded, some cobbles, brown, moist (more than previous)	
35							
36		SP	0	65	35	sandy gravelly sand, brown, fine-med sand, fine-course gravel, subangular-subrounded, moist (some rounded)	
37.5							
38.5		SP	0	65	35	Same as above, some cobbles, more fine gravel	
40							
41		SW-SM	10	60	30	Same as above, cobbles (5-6" dia), slightly wet, some fines	
42.5							
43.5		SW-SM	20	50	30	gravelly, clayey (silty), sand, brown, slightly wet, subangular-sub rounded soft, fine-course sand, fine-course gravel	
45							
46		SPSC	30	55-45	15-25	gravelly, clayey, sand, brown/tan/peachy, med to coarse sand, fine-course gravel, subangular-sub rounded, soft, elastic, moist	
47.5							

Job No.		Client		Sheet 4 of 10		LOG OF WELL NO.	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
50		SC	20-25 25	70-65 65	10	Clayey sand w/ some gravel brown, moist, fine-med sand, soft, elastic, breaks & firms easily fine gravel	
52.5		SC	25	65	10	clayey sand w/ gravel, brown/peachy moist, med-course sand, fine gravel, soft, elastic, firms & breaks easily,	
55		SC	25	50	25	Same as above	
57.5		SC	20-25	55-50	25	Same as above	
60		SW	10	55	35	gravelly sand, white/grayish, fine-course gravel, subangular-subrounded (some rounded), some cobbles (small), fine-course sand (mainly fine-med), moist	} 1 bag
60		SC	25	50	25	Same as 50-52.5 interval	
62.5			20	60	20	clayey sand w/ gravel, brown, some pale white/grayish, fine-course sand, fine to coarse gravel, angular-subrounded, moist	
63.5						Black clay (fat) like substance in sand and gravel (see pic), no odor very moist	PID = 0.3
64.75							
65							

→ on back

Job No.		Client		Sheet 5 of 10		LOG OF WELL NO.	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
66		SC	25	70	5	light brown/peachy ^{clayey} silty sand, mainly med grained sand, clumps & breaks easily, moist, some fine gravel	
67.5		SC	35	50	15	Same as above, more fines, more gravel/cobbles	
68							
68		CL	50	35	15	sandy clay w/ gravel, one large cobble (dia = 6"), some smaller cobbles, soft, elastic, med-fine sand, brown/tan, moist	
70		CI	50	35	15	same as above, coarse sand to fine sand	
72.5		SC	30	40	30	gravelly clayey sand, pale white/brown fine-med sand, fine gravel, subangular, subrounded, clumps & breaks easily	
73.5		SC	15	55	30	gravelly sand, pale white/light brown, fine-med sand, fine gravel, moist	
75		MH	60-65	30-25	10	sandy silty with some gravel fine-course sand, elastic, soft, moist, some cobbles, brown	
76		SC	20	60	20	gravelly sand, brown, very moist, ^{clayey} fine-course sand, mostly fine-med, fine gravel	
78.5							
80		SC	20	65-60	15-20	Same as above, finer gravel, finer sands	
81		SC	35	45	20	clayey gravelly sand, med-course sand, fine-course gravel (mainly fine) brown, very moist, soft, elastic	
82.5							

→ on back

Job No.		Client		Sheet <u>6</u> of <u>10</u>		LOG OF WELL NO.	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
83.5		SC	35	45	20	Same as above	
85							
86		SC	30	45	25	Same as above, more coarse gravel, weak cementation pale brown	
87.5							
88.5		SC	25	50-45	25-30	Pale brown silty gravelly sand, moist, fine-med sand, fine-coarse gravel, sub angular - sub rounded	
90							
91		SC	25	50-40	25-30	Same as above	
92.5		SC	35	50	15	clayey sand w/ gravel, pale brown, soft, elastic, moist, fine-coarse sand, fine gravel (mainly fine-med)	
94		CL	50	35	15	Sandy clay w/ gravel pale brown/grayish moist, med-fine sand, some cobbles,	
95							
96.5		SC	35	50	15	clayey sand with gravel pale brown/grayish, moist, fine-coarse sand, fine gravels, some cobbles	
97.5						Same as above	
99			30-25	50-55	20		
100							

Sheet 7 of 10

99-101.S	41S	750	35	gravelly sand w/ silt, fine-coarse sand, fine gravel (all mainly about thumb size) moist, brown	SC
101.S-104	1S	60	25	gravelly sand w/ silt, fine-med sand, fine-coarse gravel, slightly moist-moist brown, angular-subrounded	SC
104-106	1S- 20	60 6	25- 20	same as above	SC
106-108	2S	50	25	same as above	SC
108-110	1S 10	65 70	20	same as above	SC
110-112.S	10 5	65	25 30	gravelly sand, fine-med sand, coarse, slightly moist, fine-coarse gravel, subangular-sub rounded	SC
112.S-115	2S 3	60 5	15	Silty sand w/ gravel, fine-med sand some coarse sand, fine gravel, weak cementation, brown, slightly moist,	SW-SM
7 115-115.S	30 35	40 40	30 25	Silty sand w/ gravel silty sand w/ gravel, no cementation, no coarse sand, fine-coarse gravel, fine-med sand, angular-sub rounded, brown, slightly moist	SW-SM
115.S-118	20	60	20	silty sand w/ gravel, brown, slightly moist fine gravel, sub angular-sub rounded, fine-med sand	SC
118-120.S	3S	40	25	silty sand w/ gravel, weak cementation, slightly moist, fine-med sand, fine gravel angular-sub rounded	SW-SM
120.S-123	30 25	60	10 15	silty sand w/ gravel, weak cementation, slightly moist, fine-med sand (mostly fine) fine gravel	SP-SM

123-125.5	30	45	25	silty sand w/ gravel, brown, slightly moist, fine-course sand, fine-course gravel, subangular - subrounded	SW-SM	
125.5-128	30 35	55 50	15	silty sand w/ gravel, brown, moist - v moist, fine-med sand, fine gravel, angular - sub rounded, weak cementation	SP-SM	sample too hot to get a good feel
128-129	35 40	40 35	25 25	gravelly sandy silt or gravelly silty sand fine med sand, fine-course gravel, cubicle or twos, soft, elastic, brown, slightly moist	SP-SM ML	
129-131	20	65	15	silty sand with gravel, fine-course sand, fine-course gravel, brown, slightly moist, some weak cementation	SM	
131-133.5	25	65	10	silty sand, fine-med sand (mostly fine), brown, moist, some weak cementation	SM	
133.5-136	25	70	5	silty sand, fine sand (some med-course), brown, moist, to weak cementation	SM	
136-138.5	20	60	20	silty sand w/ gravel, brown, moist, fine-med sand, fine-course gravel, subangular - subrounded	SM	
138.5-141	20	60	20	same as above, more coarse sand, more coarse gravel	SM	
141-143.5	10	70 65	20 25	same as above gravelly sand, brown, moist, fine-course sand, fine gravel, subangular - subrounded (some coarse gravel)	SW-SM	
143.5-146.0	10	70	20	gravelly sand, brown, moist, fine-med sand (mostly fine), fine gravel, subangular - subrounded	SW-SM	
146-148				clayey silty sand w/ gravel, brown, moist, fine med sand, soft, elastic		
146-148.5	30	60 55	10 15	clayey sand w/ some gravel, fine-course grade sand (mostly fine-med), fine gravel, soft, elastic, brown, wet	SC	

148.5 - 151	30	65	5	Same as above, less gravel	SC
151 - 153.5	50	35	15	Sandy clay/silt w/ gravel brown, moist-wet, elastic soft, med cementation, med-coarse sand, fine gravel, angular - subrounded	CL
153.5 - 156	20 15	60 65	20	Silty gravelly sand, med-coarse sand, fine gravel, subangular-subrounded, brown, wet	SPSm
156 - 158.5	20	75	5	Silty sand, med-fine sand (mostly med) wet, brown, occasional fine gravel	SM
158.5 - 161	20	60	20	Silty sand w/ gravel, med-coarse sand, wet-saturated, brown/tanish, fine-coarse gravel, subangular - rounded	SPSm
161 - 161.5	70	30	0	sandy silt, elastic, soft, brown, wet, fine sand	MH
161.5 - 162	20	60	20	Same as, some cobbles	
162 - 163.5	0	95	5	Sand, coarse sand, mostly homogeneous (1/8" dia) (⊙) saturated/wet	SP
163.5 - 164.5	25	25	50	Sandy silty sandy gravel, fine gravel some coarse, fine-med sand, soft, elastic (clayey sand in chunks large)	GM
164.5 - 166	30	55	15	Silty sand with gravel, med-coarse sand, fine gravel, brown, wet, slightly elastic	SPSm
166 - 168.5	20	65	15	same as above	SPSm
168.5 - 171	35	40	25	Clayey sand w/ gravel, brown (dark) moist-wet, fine-coarse gravel, angular, sub rounded, fine - some coarse sand, soft elastic	SPSc
171 - 173.5	35	50	15	Clayey sand w/ gravel, med-coarse sand brown (dark), wet, fine gravel, soft, elastic	SPSc

172.5 - 176	35	55 60	10 15	clayey sand w/ gravel, fine-med sand, fine gravel, soft, elastic, brown (dark), wet	SC
176 - 178	55	60 30	10 15	gravelly sandy clay, med-coarse sand (some fine), fine to coarse gravel, sub- angular - sub rounded, soft, elastic, brown (dark), moist-wet	CL
178 - 180	25	50	25	gravelly clayey sand, fine-med sand w/ some coarse, fine-coarse gravel (mainly fine) subangular - subrounded, brown (dark), moist	SC
180 - 182.5	25	60	15	silty sand w/ gravel, fine-med sand, fine gravel, brown, moist, (dark)	SM
182.5 - 185	20	55 60	25 20	gravelly silty sand, fine-med sand, fine-coarse gravel, subangular-sub- rounded, brown (dark), moist-wet,	SM
185 - 187.5	25	70 30	5	silty sand, brown (dark), moist, some weak cementation, fine-coarse sand,	SM
187.5 - 190	20 25	75 70	5	silty sand, brown (dark), moist-wet, fine-med sand,	SM

SRC - W51

Well Materials Tally

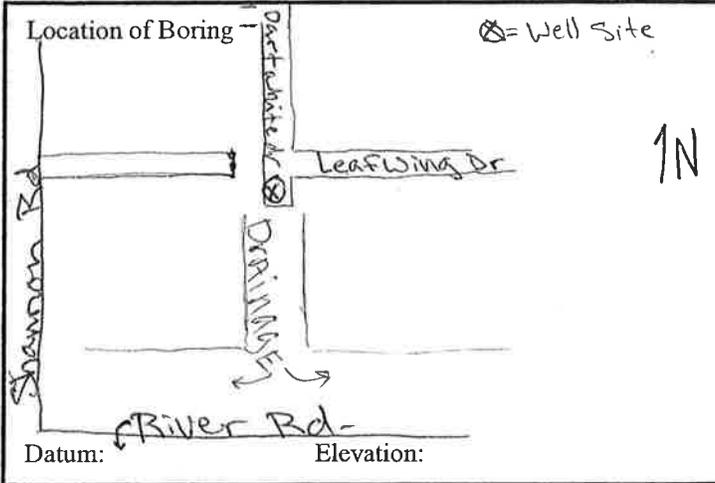
BLANK CASING						WELL NO.: SRC-W51	
Type:		Diameters		Total Length Required:	Delivery		Job No.:
Manufacturer:		I.D.: 4 3/16"		140'	Date:		Client:
Vendor:		O.D.: 4 1/2"			Time:		Project:
		Thickness: 5/16"					Driller:
Actual Length	Diameter OK 4	Installed Date/Time	Connection OK 4	Comments		AS-BUILT DIAGRAM	
60" (5')	✓			not used			
120" (10')	✓	7-19-13 1505	✓				
SCREENED CASING							
Type: Sch 80 0.020 mesh		Diameters		Total Length Required:	Delivery		
Manufacturer:		I.D.: 4 3/16"		50'	Date:		
Vendor:		O.D.: 4 1/2"			Time:		
		Thickness: 5/16"					
Actual Length	Diameter OK 4	Installed Date/Time	Connection OK 4	Comments			
60" (5')	✓			not used			
120" (10')	✓	4-19-13 1505	✓				
ANNULAR MATERIALS							
Borehole Diameter (D):		Casing O.D. (d):		Annular volume per foot; ft³ = 0.005454 x (D² - d²):			
Material Description	Estimated Volume Required	Volume per Container	Quantity Required	Quantity Delivered	Quantity Installed	Installed Date/Time	Comments
8x12 Silica Sand				Bin 35	34 1/2	4-19-13 1815	
bentonite seal				2		4-19-13 1830	
bentonite grout				33 1/2		4-20-13 0925	
Portland				12		4-20-13 1130	
concrete				5		4-20-13 1350	surface complete from

(14)

(5)

(hole plug)





LOG OF WELL NO. SRC-W52

Job No. 24097087	Client ADEQ	Sheet 1 of 4
Drilling Contractor Boost Longyear	Drilling Method Rotasonic	Date/Time Start 3/14/13/1340
Drilling Equipment GP24-300RS	Sampling Method Cont. Core	Date/Time Stop 3/16/13/1500
Depth to Water		Logged By
FIRST: 163.1	COMPLETED:	Miles Hearn

Depth (feet)	Graphic Log	Lithology (USCS)	Lithology (USCS)			DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
			% fines	% sand	% gravel		
0	GP	GP	5	10	85	Sandy Gravel, Brown, Moist, 0.5" - 1" Clasts, Sub Angular clasts	Surface: Asphalt ~ 3", Hand Auger to 4 ft logs
	Cl		85	15		Sandy Clay, Low plasticity	Some water from Residual in Rig lines in first 5 feet
	Sm		85	15		Sandy Silt	
10	SP		15	85		Silty Sand, Brown, Moist, No odor	
	SW	SW	5	95		Well Graded Sand, Brown, Some Moisture, Mostly Dry, Fine to Coarse grained, No odor/staining, Sub Round	
20	GP		5	80	15	Same as Above, More Gravel - 1 Collicle ~ 8"	
	SP			70	30	Gravelly Sand, Fine to Coarse grained Sand, Gravel Sized 1" to 6", Sub Angular Sand	
30				60	40	same	
				60	40	same	
40			5	80	15		
				60	40		
				60	40	Same, Some Moist Areas	
				75	25	same, Some Caliche	
50							

Job No.		Client		Sheet		LOG OF WELL NO.	
24097087		ADEQ		2 of 4		SRC-452	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	COMMENTS Penetration rate, water, etc.
50		GW-cl	40	30	30	Clayey Sandy Gravel, Brown. Moist No Odor, No staining, 0.5"-1" clasts	
55		SM-GM	20	60	20	Silty Sand ^{vs} Gravel, Brown, Moist, Fine to Coarse sand, 1" to 4" Gravel, Sub Angular to Sub Round Sand	
60		SM	20	75	5	Same, less gravel	
70		SW	10	75	15	Same, More Gravel, Fewer Fines Gravel Clasts 0.5" to 2" Layer of Clay, Some Cementation same as above, Low plasticity	Cementation is weak
80		SM	50	45	5	Silty Sand, Brown, Moist, Fine to Coarse sand, Sub Round Grains	
90		SC	40	55	5	Clayey Sand, Brown, Very Moist but Not Saturated. No Odor, Fine to Med. Grain, Sub Round Sand	
						Same, less Moist, Not Dry	
		ML	60	40		Silt w/ sand, Brown, Moist	
100						Same	
						Same	
110		SM	15	80	5	Silty Sand, Brown, Moist	
		SW	5	90	5	Well graded Sand, Brown, Moist, Some Gravel Clasts 0.5"-2", Fine to Med. Grained Sand, Sub Round	
		SW	5	75	20	Same, More Gravel	
120						Same	

Job No.		Client		Sheet		DESCRIPTION	COMMENTS
24097087		ADEC		3 of 4			
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	Penetration rate, water, etc.
125	SW		5	70	25	Well Graded Sand, Brown, Moist, Gravel Clasts 0.5" - 3" Fine to medium Grain, Sub Round Grains	
130	SC		30	60	10	Clayey Well Graded Sand w/ Gravel, fine to coarse grained sand, Gravel Clasts up to 2", Brown, Moist, No odor, fine to coarse , Sub-Round to Sub-Angular	Mostly Coarse sand
140						Same	
150	SC		15	60	15	Gravelly Sand, Moist Brown, Moist, No odor, Coarse sand, Sub Angular	
160			30	60	10	Clayey Gravelly Sand, Fine to Coarse grained sand, 0.5" - 1" Gravel, Angular to Sub Angular sand	
165						Same, Saturated Wet	Ground Water at ~165 Ft bgs
170							
180			35	60	5	Same, Wet	
190			30	55	15	Same, Wet,	

Job No.		Client		Sheet		LOG OF WELL NO.	
Z4097087		ADEQ		4 of 4		SRC W52S	
Depth (feet)	Graphic Log	Lithology (USCS)	% fines	% sand	% gravel	DESCRIPTION	COMMENTS
						Formation name, color, roundness, grain size distribution, plasticity, cementation, etc.	Penetration rate, water, etc.
200	SC		30	50	20	Clayey Sand with Gravel, Brown, Wet, No odor, Fine to Coarse sand, 0.5" - 1" Gravel, Sub Angular Sand	
						Same	
210			35	50	15	Same	
220						Same	
230						Same	TD @ 230 Ft logs DTW:

MONITORING WELL COMPLETION RECORD

W52M

DRILLING INFORMATION

DRILLING BEGAN:
 DATE 3/14/13 TIME 1340
 WELL INSTALLATION BEGAN:
 DATE 3/17/13 TIME 0950
 WELL COMPLETION FINISHED:
 DATE 3/18/13 TIME 0930
 DRILLING CO. Beart Longyear
 DRILLER Justin Maples
 LICENSE _____
 DRILL RIG GP24-300BS

DRILLING METHOD:
 HOLLOW STEM AUGER
 AIR ROTARY
 Rotasonic
 DIAMETER OF AUGERS:
 ID _____ OD 10 1/8"

BENTONITE SEAL

AMOUNT CALCULATED 1.3 ft³
 AMOUNT USED ~0.7
 PELLETS, SIZE _____
 CHIPS, SIZE _____

 PRODUCT _____
 MFG. BY _____
 METHOD INSTALLED:
 POURED TREMIE
 AMOUNT OF WATER USED _____

FILTER PACK

AMOUNT CALCULATED 15.19 / 14.82 ft³
 AMOUNT USED 11.9
 SAND, SIZE 8-12
 FORMATION COLLAPSE:
 FROM _____ TO _____
 PRODUCT Colorado Silica Sand
 MFG. BY Premier Silica
 METHOD INSTALLED:
 POURED TREMIE

SURVEY INFORMATION

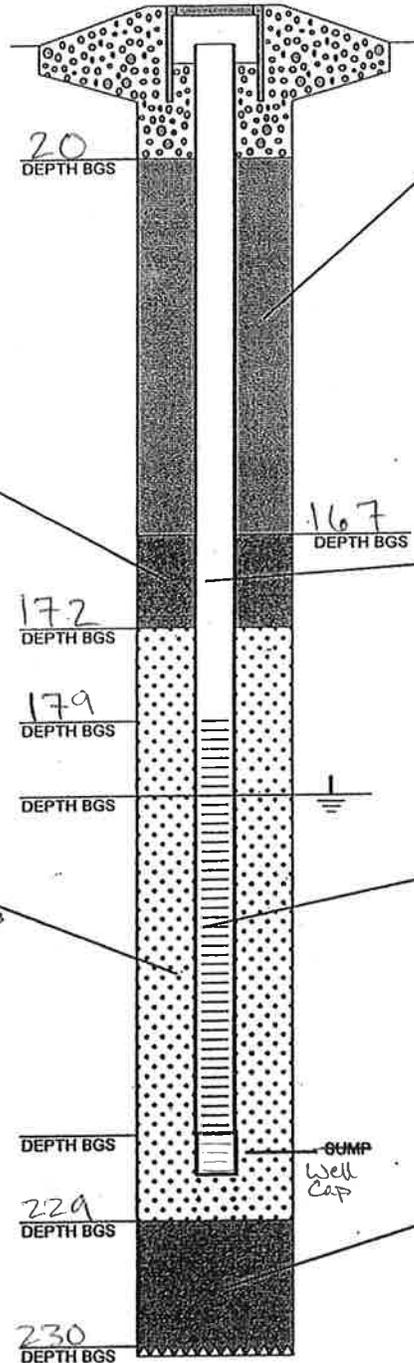
TOC ELEVATION _____
 GROUND ELEVATION _____
 NORTHING CORD. _____
 EASTING CORD. _____
 DATE SURVEYED _____
 SURVEY CO. _____

CENTRALIZERS USED?

YES NO;
 CENTRALIZER DEPTHS: _____

SURFACE COMPLETION

FLUSH MOUNT
 ABOVE GROUND W/BUMPER POST
 CONCRETE ASPHALT



MONITORING WELL

MONITORING WELL NO. 52M
 PROJECT 24097087 ABED H4 EDC
 SITE Dartmouth Dr / Leafwing Dr
 BOREHOLE NO. SCC-52M
 WELL PERMIT NO. 5.5-915342
 TOC TO BOTTOM OF WELL 229'

ANNULAR SEAL

AMOUNT CALCULATED 49.28 ft³
 AMOUNT USED 61.6 ft³
 GROUT FORMULA
 PORTLAND CEMENT _____
 BENTONITE _____
 WATER _____
 PREPARED MIX
 PRODUCT Aqua Guard
 MFG. BY Baroid

METHOD INSTALLED:

POURED TREMIE

CASING

SCHEDULE 40 PVC
 Sch 80 PVC
 PRODUCT _____
 MFG. BY Empire Container Corp
 CASING DIAMETER:
 ID 4" OD 4.5"
 LENGTH OF CASING 179'

WELL SCREEN

SCHEDULE 40 PVC
 Sch 80 PVC
 PRODUCT _____
 MFG. BY Empire Container Corp
 CASING DIAMETER:
 ID 4" OD 4.5"
 SLOT SIZE 0.020
 LENGTH OF SCREEN 50'

BOREHOLE BACKFILL

AMOUNT CALCULATED 0.37
 AMOUNT USED _____
 BENTONITE CHIPS, SIZE _____
 BENTONITE PELLETS, SIZE _____
 SLURRY _____
 FORMATION COLLAPSE
 PRODUCT 8-12 Silica
 MFG. BY Premier Silica
 METHOD INSTALLED:
 POURED TREMIE

