

**APPENDIX C**

**BORING LOGS AND  
WELL CONSTRUCTION DIAGRAMS**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-1**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/18/02**

Location: **Northeast corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/18/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **M.McGlone**

Land Surf. Elev: **2378.4**

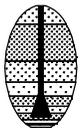
Meas. Pt. Elev: **2378.39**

Reviewed by: **C.Teague**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' x 2' x 2', Traffic-Rated Vault										GR	SA	FI	
0-5	9 1/4" Borehole (0-85' bls)								FILL MATERIAL.					
5-7	Type I, II portland cement w/ 5% bentonite (2-7' bls)		13	100	ND	X	5		SANDY SILT - Brown (7.5YR 5/4); minor gravel is fine to 1/4" max diameter; non-plastic, dry, reacts strongly with HCL. DYE TEST = 0	ML	10	30	60	D
7-11	1" SCH 40 blank PVC casing (1-14' bls)		14	11										
11-15	Hydrated bentonite pellets (7-12.5' bls)		50	100	ND	X	10		SILT WITH SAND - Pink (7.5YR 8/3); gravel in matrix of caliche, cemented; non-plastic, dry, reacts strongly with HCL. DYE TEST = 0	ML	5	20	75	D
15-17	10x20 sand (12.5-16' bls)		50											
17-20	1" SCH 40 PVC screen 0.020" slots with endcap (14-15' bls)		25	100	ND	X	15		SILTY SAND - Brown (7.5YR 5/4); fine gravel to 3/4" max diameter; dry, reacts strongly with HCL. NO DYE TEST PERFORMED	SM	5	65	30	D
20-25	Hydrated bentonite pellets (16-27' bls)		17	75	ND	X	20		WELL GRADED SAND - Brown (7.5YR 5/3); trace fine gravel, subangular to angular; dry, weak reaction with HCL. DYE TEST = 1	SW	10	85	5	D
25-30	1" SCH 40 blank PVC casing (1-29' bls)		30	50										
30-35	10x20 sand (27-31' bls)		15	100	ND	X	25		SILT WITH SAND - Brown (7.5YR 5/4); trace gravel; crumbly, will not mold; moist, no reaction with HCL. DYE TEST = 0	ML	0	20	80	M
35-39	1" SCH 40 blank PVC casing (1-29' bls)		22											
39-44	Hydrated bentonite pellets (31-43.5' bls)		23	100	ND	X	30		SIMILAR TO ABOVE. DYE TEST = 0	ML	0	20	80	M
44-45	1" SCH 40 blank PVC casing (1-44' bls)		50											
45-47	10x20 sand (27-31' bls)		22	91	ND	X	35		SANDY SILT - Brown (7.5YR 5/4); trace gravel; sand is crumbly; lean clay; moist, no reaction with HCL. DYE TEST = 0	ML	5	35	65	M
47-49	1" SCH 40 blank PVC casing (1-44' bls)		50											
49-55	Hydrated bentonite pellets (31-43.5' bls)		30	89	ND	X	40		WELL GRADED SAND - Brown (7.5YR 5/3); minor fine gravel; sand is poorly graded, medium to fine-grained, subangular to angular; moist, no reaction with HCL. DYE TEST = 0	SW	5	85	10	M
55-57	1" SCH 40 blank PVC casing (1-44' bls)		30											
57-60	1" SCH 40 PVC screen 0.020" slots with endcap (44-45' bls)		35											

**Lithologic Log and Well Construction Details of 7AZP-1**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**1a**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-1**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/18/02**

Location: **Northeast corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/18/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **M.McGlone**

Land Surf. Elev: **2378.4**

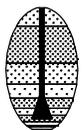
Meas. Pt. Elev: **2378.39**

Reviewed by: **C.Teague**

Depth - FT.	WELL COMPLETION 2' x 2' x 2', Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
48-50	10x20 sand (43.5-46' bls)	30 50/5 0	80	ND	X	48-50	[Pattern]	SIMILAR TO ABOVE - increased silt. DYE TEST = 0	SM	5	75	20	M
50-55	Hydrated bentonite pellets (46-57.5' bls)	20 50/5 0	60	ND	X	50-55	[Pattern]	SIMILAR TO ABOVE - increased silt; weak reaction with HCL. DYE TEST = 1	SM	5	65	30	M
55-60	4" SCH 40 blank PVC casing (1-60' bls)	50/5 0 0	100	ND	X	55-60	[Pattern]	SANDY SILT - Light brown (7.5YR 6/4); trace gravel; sand is medium to fine-grained, crumbly; moist, reacts strongly with HCL. DYE TEST = 0	ML	5	25	70	M
60-65		50/5 0 0	100	ND	X	60-65	[Pattern]	SIMILAR TO ABOVE - increased sand is fine-grained. DYE TEST = 0	ML	0	40	60	M
65-70	Depth to Water = 65.32 ft bls on 5/1/02	25 50 0	100	1.7	X	65-70	[Pattern]	SIMILAR TO ABOVE - Brown (7.5YR 5/3); increased gravel and fines. DYE TEST = 0	ML	5	25	70	M
70-75	4" SCH 40 PVC screen 0.020" slots with endcap (60-85' bls)	50/5 0 0	100	ND	X	70-75	[Pattern]	WELL GRADED SAND WITH GRAVEL - Brown (7.5YR 5/3); sand is well graded, coarse to fine-grained, very loose; wet, no reaction with HCL. DYE TEST = 0	SW	20	65	15	W
75-80	10x20 sand (57.5-84' bls)	30 50/5 0	100	ND	X	75-80	[Pattern]	SILTY SAND - Brown (7.5YR 5/3); trace gravel; sand is fine-grained; low plasticity, wet, weak reaction with HCL. DYE TEST = 0	SM	5	65	30	W
80-85		11 50 0	100	ND	X	80-85	[Pattern]	SIMILAR TO ABOVE - fines are silty/clayey, medium to fine-grained. DYE TEST = 0	SM	5	65	30	W
85-88	Perforated PVC Endcap	10 11 20	100	ND	X	85-88	[Pattern]	LEAN CLAY WITH SAND - Pink (7.5YR 7/3); minor gravels; low plasticity, wet, reacts strongly with HCL. DYE TEST = 0	CL	5	10	85	W

**Lithologic Log and Well Construction Details of 7AZP-1**

**7th St & Arizona Ave WQARF Site**



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Reference:  
**769000\GINTw**

FIG.

**1b**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-2**

Pg. 1 of 2

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/10/02**

Location: **Southeast corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/10/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2378.5**

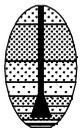
Meas. Pt. Elev: **2378.46**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' x 2' x 2', Traffic-Rated Vault										GR	SA	FI	
0-85'	9 1/4" Borehole (0-85' bls)								FILL MATERIAL.					
0-2.9'	Type I, II portland cement w/ 5% bentonite (2-9' bls)													
2.9-14'	1" SCH 40 PVC casing (1-14' bls)		11	60	ND	X	5		SILT - Brown (7YR 4/3); silt is highly plastic; trace coarse sand and fine gravel, angular to subangular; moist, reacts strongly with HCL. DYE TEST = 0	ML	0	<5	95	M
14-15'	Hydrated bentonite pellets (9-13.5' bls)		13											
15-16'	10x20 sand (13.5-16' bls)		28	100	ND	X	10		SILT WITH SAND - Brown (7.5YR 4/4); gravel is fine, angular to subangular; sand is well graded, fine to coarse-grained; high plasticity, dry, reacts strongly with HCL. DYE TEST = 0	ML	5	10	85	D
16-15'	1" SCH 40 PVC screen 0.020" slots with endcap (14-15' bls)		28											
15-20'	Hydrated bentonite pellets (16-27.5' bls)		30	30	200	X	15		SANDY SILT - Brown (7.5YR 4/2); trace gravel is fine, subrounded to subangular; sand is well graded, fine to coarse-grained; medium plasticity, dry, reacts strongly with HCL; first evidence of strong PCE odor. DYE TEST = 0	ML	5	30	65	D
20-27.5'	1" SCH 40 PVC casing (1-29' bls)		50	100	18.7	X	20		SILT SAND - Dark brown (7.5YR 3/3); gravels are fine, angular to subangular; sand is well graded, fine to coarse-grained; high plasticity, moist, reacts strongly to HCL. DYE TEST = 0	SM	10	50	40	M
27.5-30'	10x20 sand (27.5-30.5' bls)		50	1.5										
30-29'	1" SCH 40 PVC screen 0.020" slots with endcap (29-30' bls)		60	7	408	X	25		SANDY SILT - Brown (7.5YR 5/3); gravel is trace, fine to 3/8" max diameter, subrounded to subangular; sand is well graded, fine to coarse-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	ML	5	35	60	M
29-30'	Hydrated bentonite pellets (30.5-43' bls)		7											
30-35'	1" SCH 40 PVC casing (1-44.7' bls)		45	100	989	X	30		SILT SAND - Brown (7.5YR 5/4); trace gravel to 1/4" max diameter, angular to subangular; sand is well graded, coarse to fine-grained; non plastic, moist, no reaction with HCL. DYE TEST = 0	SM	0	70	30	M
35-43'	10x20 sand (44.7-45.7' bls)		50	3										
43-44.7'	1" SCH 40 PVC screen 0.020" slots with endcap (44.7-45.7' bls)		20	100	978	X	35		SANDY SILT - Brown (7.5YR 5/4); trace gravel to 1/4" max diameter, angular; sand is well graded, coarse to fine-grained; high plasticity, moist, weak reaction with HCL. DYE TEST = 0	ML	<5	30	70	M
44.7-45.7'			20											
45-45.7'			25											
45.7-45'			45	80	754	X	40		SILT SAND WITH GRAVEL - Brown (7.5YR 5/3); gravel is poorly graded, fine to 2" max diameter, angular to subangular; sand is well graded, coarse to fine-grained; low plasticity, moist, no reaction with HCL. DYE TEST = 0	SM	25	55	20	M
45'			50	3										

**Lithologic Log and Well Construction Details of 7AZP-2**

7th St & Arizona Ave WQARF Site



**HYDRO  
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CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**2a**

HGC-WELL2 832100.GPJ NEWPROJ.GDT 4/29/13

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-2**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/10/02**

Location: **Southeast corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/10/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2378.5**

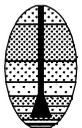
Meas. Pt. Elev: **2378.46**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION 2' x 2' x 2', Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
43	10x20 sand (43-46.2' bls)	43	80	997	X	43		WELL GRADED SAND WITH SILT - Brown (7.5YR 5/3); trace gravel to 1" max diameter, subrounded; non-plastic, moist, no reaction with HCL. DYE TEST = 0	SW-SM	<5	90	10	M
50	Hydrated bentonite pellets (46.2-54.5' bls)	50	80	918	X	50		SILTY SAND - Brown (7.5YR 4/4); trace gravel is fine to 3/8" max diameter, subrounded; sand is well graded, coarse to fine-grained; low plasticity, moist, no reaction with HCL. DYE TEST = 0	SM	<5	75	25	M
55	4" SCH 40 PVC casing (1-58.7' bls)	31	80	1018	X	55		WELL GRADED SAND WITH SILT - Brown (7.5YR 4/4); trace gravels, fine to 1/4" max diameter, angular; non-plastic, moist, no reaction with HCL. DYE TEST = 0	SW-SM	<5	90	10	M
60		45	80	1020	X	60		SILTY SAND WITH GRAVEL - Brown (7.5YR 4/4); gravel is poorly graded, fine to 3/4" max diameter, angular to subangular; sand is well graded, coarse to fine-grained; medium plasticity, moist, reacts strongly with HCL. DYE TEST = 0	SM	20	60	20	M
65	Depth to Water = 65.95' bls on 5/1/02	34	100	980	X	65		SILT - Dark brown (7.5YR 3/4); trace sand, poorly graded, coarse and fine-grained; high plasticity, moist, no reactions with HCL. DYE TEST = 0	ML	0	10	90	W
70	4" SCH 40 PVC screen 0.020" slots with perforated endcap (58.7-83.9' bls)	48	100	7.7	X	70		SILT - Brown (7.5YR 4/4); trace sand is poorly graded, coarse-grained; non-plastic, moist, reacts strongly with HCL. DYE TEST = 0	ML	0	<5	95	W
75	10x20 sand (54.5-86' bls)	10	100	2.8	X	75		SILTY GRAVEL WITH SAND - Brown (7.5YR 5/4); gravel is poorly graded, fine to 1" max diameter; sand is poorly graded, medium to coarse-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	GM	50	20	30	W
80		14	100	4.9	X	80		POORLY GRADED SAND WITH GRAVEL - Brown (7.5YR 5/4); gravel is poorly graded, fine to 3/16" max diameter, subrounded to subangular; sand is medium to coarse-grained; non-plastic, wet, reacts strongly with HCL. DYE TEST = 0	SP	10	90	<5	W
85	Perforated PVC Endcap	28	100	3.9	X	85		CLAY - Pink (7.5YR 7/3); trace sand is coarse-grained; high plasticity, wet, reacts strongly with HCL. DYE TEST = 0	CL	0	<5	95	W
		29											
		30											
		10											
		12											
		15											

**Lithologic Log and Well Construction Details of 7AZP-2**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**2b**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-3**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/15/02**

Location: **Southwest corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/15/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2377.4**

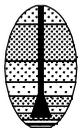
Meas. Pt. Elev: **2377.36**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' x 2' x 2', Traffic-Rated Vault										GR	SA	FI	
0-8.5'	9 1/4" Borehole (0-8.5' bls)								FILL MATERIAL.					
8.5-9.5'	Type I, II portland cement w/ 5% bentonite (2-9' bls)		8	100	4.9	X	5		SANDY SILT WITH GRAVEL - Dark brown (7.5YR 3/2); gravel is poorly graded, fine to 1/2" max diameter, subangular; sand is well graded, coarse to fine-grained; some fill material, clay brick pieces and asphalt chips; high plasticity, damp, reacts strongly with HCL.	ML	25	35	40	M
9.5-10.5'	1" SCH 40 PVC casing (1-14' bls)		8	10										
10.5-11.5'	Hydrated bentonite pellets (9-13.5' bls)		5	100	ND	X	10		DYE TEST = 0	ML	25	35	40	M
11.5-13.5'	10x20 sand (13.5-16' bls)		6						SANDY SILT WITH GRAVEL - Dark brown (7.5YR 3/3); gravel is poorly graded, fine to 3/4" max diameter, subrounded to subangular; sand is well graded, coarse to fine-grained; high plasticity, damp, reacts strongly with HCL.	ML	25	35	40	M
13.5-15.5'	1" SCH 40 PVC screen 0.020" slots with endcap (14-15' bls)		6						DYE TEST = 0					
15.5-16.5'	Hydrated bentonite pellets (16-28' bls)		15	80	1.5	X	15		SANDY SILT WITH GRAVEL - Brown (7.5YR 5/3); gravel is poorly graded, fine to 1/4" max diameter, subrounded to subangular; sand is well graded, coarse to fine-grained; high plasticity, damp, reacts strongly with HCL.	ML	25	25	50	M
16.5-18.5'	1" SCH 40 PVC casing (1-29' bls)		26						DYE TEST = 0					
18.5-20.5'	Hydrated bentonite pellets (16-28' bls)		15	60	1.3	X	20		SANDY SILT WITH GRAVEL - Brown (7.5YR 5/3); gravel is poorly graded, fine to 1/2" max diameter, angular; sand is well graded, coarse to fine-grained; high plasticity, damp, reacts strongly with HCL.	ML	30	30	40	M
20.5-22.5'	1" SCH 40 PVC casing (1-29' bls)		28						DYE TEST = 0					
22.5-25.5'	Hydrated bentonite pellets (16-28' bls)		25	80	ND	X	25		SILT WITH SAND - Brown (7.5YR 4/3); sand is poorly graded, fine-grained; high plasticity, damp, weak reaction with HCL.	ML	0	15	85	M
25.5-27.5'	1" SCH 40 PVC casing (1-29' bls)		50	50					DYE TEST = 0					
27.5-29.5'	Hydrated bentonite pellets (16-28' bls)		70	120	ND	X	30		WELL GRADED SAND WITH SILT - Brown (7.5YR 5/4); gravel is poorly graded, fine, subrounded to subangular; non-plastic, moist, no reaction with HCL.	SW-SM	10	80	10	M
29.5-31.5'	1" SCH 40 PVC screen 0.020" slots with endcap (29-30' bls)		0						DYE TEST = 0					
31.5-33.5'	Hydrated bentonite pellets (31-43.5' bls)		50	120	ND	X	35		SILT - Brown (7.5YR 4/2); sand is poorly graded, trace coarse to fine-grained, subrounded; low plasticity, moist, no reaction with HCL.	ML	0	10	90	M
33.5-35.5'	1" SCH 40 blank PVC casing (1-44' bls)		0						DYE TEST = 0					
35.5-37.5'	Hydrated bentonite pellets (31-43.5' bls)		50	100	1.2	X	40		SILT - Brown (7.5YR 4/3); trace gravel to 1/4" max diameter, angular; sand is poorly graded, trace medium to fine-grained; medium plasticity, moist, weak reaction with HCL.	ML	0	10	90	M
37.5-39.5'	1" SCH 40 blank PVC casing (1-44' bls)		0						DYE TEST = 0					
39.5-41.5'	Hydrated bentonite pellets (31-43.5' bls)		50	100										
41.5-43.5'	1" SCH 40 blank PVC casing (1-44' bls)		0											
43.5-45.5'	1" SCH 40 PVC screen 0.020" slots with endcap (44-45' bls)		0											

**Lithologic Log and Well Construction Details of 7AZP-3**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**3a**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-3**

Pg. **2** of **2**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/15/02**

Location: **Southwest corner of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/15/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2377.4**

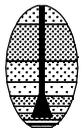
Meas. Pt. Elev: **2377.36**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION 2' x 2' x 2', Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
31-32	10x20 sand (43.5-46' bls)	31	100	ND	⊗	31	[Pattern]	WELL GRADED SAND WITH SILT - Brown (7.5YR 4/3); gravel is poorly graded, fine to 3/4" max diameter, subangular; non-plastic, moist, no reaction with HCL. DYE TEST = 0	SW-SM	5	85	10	M
32-42	Hydrated bentonite pellets (46-57' bls)	32	100	2.6	⊗	32	[Pattern]	WELL GRADED SAND - Brown (7.5YR 4/4); trace gravel is poorly graded, 1/2" to 2" max diameter, angular; non-plastic, moist, no reaction with HCL. DYE TEST = 0	SW	<5	95	5	M
42-60	4" SCH 40 blank PVC casing (1-60' bls)	42	100	3.2	⊗	42	[Pattern]	SILT WITH SAND - Brown (7.5YR 4/4); trace gravel is poorly graded to 1/4" max diameter; sand is well graded, coarse to fine-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	ML	0	25	75	M
60-64		60	100	2.5	⊗	60	[Pattern]	SANDY SILT - Brown (7.5YR 4/3); sand is well graded, coarse to fine-grained; high plasticity, moist, no reaction with HCL. DYE TEST = 0	ML	0	40	60	M
64-65	Depth to Water = 64.36' bls on 5/1/02	24	100	4.6	⊗	64	[Pattern]	SILT - Brown (7.5YR 4/3); sand is poorly graded, fine-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	ML	0	10	90	M
65-70	4" SCH 40 PVC screen 0.020" slots with perforated endcap (60-85' bls)	25	100	1.8	⊗	65	[Pattern]	WELL GRADED SAND WITH GRAVEL - Brown (7.5YR 5/3); gravel is poorly graded, fine to 1/4" max diameter, subrounded; non-plastic, wet, no reaction with HCL. DYE TEST = 0	SW	20	75	5	W
70-75	10x20 sand (57-85' bls)	60/7	100	2.3	⊗	70	[Pattern]	SILT - Brown (7.5YR 5/4); trace gravel, subangular; sand is poorly graded, fine-grained; high plasticity, moist, weak reaction with HCL. DYE TEST = 0	ML	0	10	90	W
75-80		40	100	ND	⊗	75	[Pattern]	WELL GRADED SAND WITH GRAVEL - Light brown (7.5YR 6/3); gravel is poorly graded, fine, subangular to angular; non-plastic, moist, reacts strongly with HCL. DYE TEST = 0	SW	15	85	<5	W
80-85	Perforated PVC Endcap	32	100	1.4	⊗	80	[Pattern]	SILTY CLAY - Pink (7.5YR 7/3); trace sand is coarse-grained; high plasticity, wet, reacts strongly with HCL. DYE TEST = 0	CL-ML	0	30	70	W
85-86		45	100		⊗	85	[Pattern]						
86-87		16	100		⊗	86	[Pattern]						
87-88		23	100		⊗	87	[Pattern]						

**Lithologic Log and Well Construction Details of 7AZP-3**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**3b**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-4**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/16/02**

Location: **Center of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/16/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2377.7**

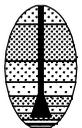
Meas. Pt. Elev: **2377.74**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' x 2' x 2', Traffic-Rated Vault										GR	SA	FI	
0-85'	9 1/4" Borehole (0-85' bls)								FILL MATERIAL.					
0-2.9'	Type I, II portland cement w/ 5% bentonite (2-9' bls)													
2.9-9.0'	1" SCH 40 blank PVC casing (1-14' bls)		1079	100	2.2	X	5		SANDY SILT WITH GRAVEL - Black (7.5YR 2.5/1); gravel is poorly graded, fine up to 1/4" max diameter, subrounded; sand is well graded; high plasticity, damp, reacts strongly with HCL. DYE TEST = 0	ML	25	25	50	M
9.0-13.5'	Hydrated bentonite pellets (9-13.5' bls)		5711	100	3.9	X	10		SILT WITH SAND - Dark brown (7.5YR 3/3); sand is poorly graded, trace fine and coarse, subrounded and subangular; high plasticity, damp, reacts strongly with HCL. DYE TEST = 0	ML	0	10	90	M
13.5-16.0'	10x20 sand (13.5-16' bls)													
16.0-14.15'	1" SCH 40 PVC screen 0.020" slots with endcap (14-15' bls)		5000	100	6.8	X	15		SANDY SILT WITH GRAVEL - Brown (7.5YR 4/4); gravel is poorly graded, fine to 1/2" max diameter, subangular to angular; sand is well graded, fine to coarse-grained; high plasticity, damp, reacts strongly with HCL. DYE TEST = 0	ML	20	30	50	M
14.15-28'	Hydrated bentonite pellets (16-28' bls)		50500	100	1.9	X	20		SILTY SAND WITH GRAVEL - Brown (7.5YR 4/3); gravel is poorly graded, up to 1/4" max diameter, rounded to subrounded; sand is well graded; high plasticity, damp, reacts strongly with HCL. DYE TEST = 0	SM	20	40	40	M
28-29'	1" SCH 40 blank PVC casing (1-29' bls)													
29-30'	10x20 sand (28-31' bls)		15300	100	2.5	X	25		SILT WITH SAND - Brown (7.5YR 4/3); gravel is fine up to 3/4" max diameter, poorly graded, angular and subangular; sand is poorly graded fine to medium-grained, trace coarse-grained; high plasticity, damp, no reaction with HCL. DYE TEST = 0	ML	10	20	70	M
30-29.30'	1" SCH 40 PVC screen 0.020" slots with endcap (29-30' bls)		205040	100	2.5	X	30		WELL GRADED SAND WITH SILT - Brown (7.5YR 4/3); trace fine gravels, poorly sorted to 1/4" max diameter, subrounded; non-plastic, damp, no reaction with HCL. DYE TEST = 0	SW-SM	0	90	10	M
29.30-31'	Hydrated bentonite pellets (31-43' bls)		26440	100	ND	X	35		SIMILAR TO ABOVE. DYE TEST = 0	SW-SM	0	90	10	M
31-44'	1" SCH 40 blank PVC casing (1-44' bls)													
44-45'	1" SCH 40 PVC screen 0.020" slots with endcap (44-45' bls)		395040	100	3.5	X	40		SILTY SAND WITH GRAVEL - Brown (7.5YR 4/2); gravel is poorly graded, fine up to 1/4" max diameter, angular to subangular; sand is well graded, fine to coarse-grained; low plasticity, moist, no reaction with HCL. DYE TEST = 0	SM	20	60	20	M

**Lithologic Log and Well Construction Details of 7AZP-4**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**4a**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZP-4**

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **4/16/02**

Location: **Center of parking lot**

Sampler: **2" Split Spoon**

Date Completed: **4/16/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **B.Anderson**

Land Surf. Elev: **2377.7**

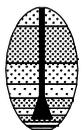
Meas. Pt. Elev: **2377.74**

Reviewed by: **M.McGlone**

Depth - FT.	WELL COMPLETION 2' x 2' x 2', Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
40	10x20 sand (43-46' bls)	50/40	80	ND	⊗	40		SILTY SAND WITH GRAVEL - Brown (7.5YR 4/3); gravel is poorly graded, fine to 1" max diameter, subrounded to subangular; sand is well graded, fine to coarse-grained, medium plasticity, moist, no reaction with HCL. DYE TEST = 0	SM	20	50	30	M
50	Hydrated bentonite pellets (46-58' bls)	28/33	100	1.9	⊗	50		POORLY GRADED GRAVEL WITH SAND - Brown (7.5YR 5/3); gravel is fine to 1.5" max diameter, subrounded to subangular; sand is well graded fine to coarse-grained; non-plastic, moist, no reaction with HCL. DYE TEST = 0	GP	70	25	5	M
55	4" SCH 40 blank PVC casing (1-60' bls)	55/0	50	ND	⊗	55		SILT - Brown (7.5YR 4/4); sand is poorly graded, fine-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	ML	0	10	90	M
60		18/23	100	2.4	⊗	60		SILT WITH SAND - Brown (7.5YR 4/4); sand is poorly graded, fine to medium-grained; high plasticity, moist, reacts strongly with HCL. DYE TEST = 0	ML	0	25	75	M
65	Depth to Water = 64.65' bls on 5/1/02	30/30	100	ND	⊗	65		SILT - Brown (7.5YR 5/3); gravel is poorly graded, trace up to 1/4" max diameter, angular; sand is poorly graded, trace coarse-grained; high plasticity, wet, reacts strongly with HCL. DYE TEST = 0	ML	<5	<5	95	W
70	4" SCH 40 PVC screen 0.020" slots with endcap (60-85' bls)	20/46	100	20	⊗	70		SILT WITH SAND - Brown (7.5YR 5/4); trace gravel to 1/4" max diameter, subrounded; sand is poorly graded, fine to medium-grained; medium plasticity, wet, reacts strongly with HCL. DYE TEST = 0	ML	0	15	85	W
75	10x20 sand (58-85' bls)	18/21	100	3.2	⊗	75		SANDY SILT - Brown (7.5YR 5/3); sand is well graded, fine to coarse-grained; high plasticity, wet, reacts strongly with HCL. DYE TEST = 0	ML	0	40	60	W
80		21/50	80	1.6	⊗	80		SANDY SILT - Brown (7.5YR 5/3); trace fine gravels to 1/4" max diameter, angular; sand is poorly graded, medium to coarse-grained; medium plasticity, wet, reacts strongly with HCL. DYE TEST = 0	ML	<5	50	50	W
85	Perforated PVC Endcap	32/38	100	ND	⊗	85		CLAY - Pink (7.5YR 7/3); trace sand is coarse-grained; high plasticity, wet, reacts strongly with HCL. DYE TEST = 0	CL-ML	0	<5	95	W

**Lithologic Log and Well Construction Details of 7AZP-4**

7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**4b**

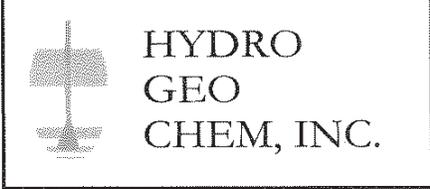
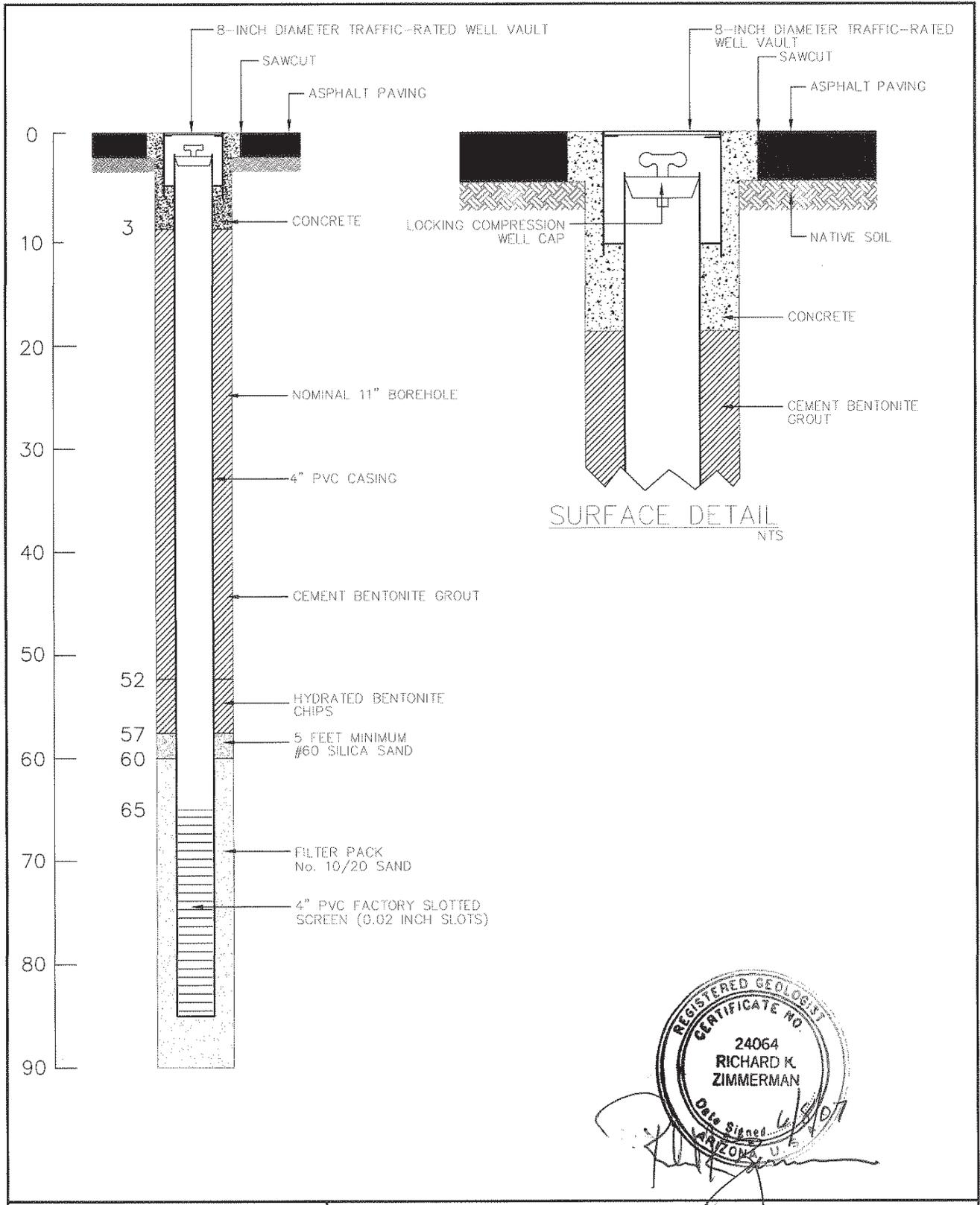
# HYDRO GEO CHEM, INC.

## Geologic Boring Log

Well ID: 7AZP-5

Project Name: 7th & Arizona		Drilling Company: WDC			Driller: Miguel Albavado			Project No:		
Site Plan at Boring Location: 50 West 5th Street					Well Registration No.: 55-214637					
SEE LOCATION MAP					Drilling Equipment: CME-85					
					Drilling Method: Rotary Auger					
					Bit Type/Size : Chisel Tooth/ 10"					
					Date/Time Started: 2/12/07 1059					
					Date/Time Completed: 2/12/07 1407					
					Boring Depth (ft): 90' bls					
					Casing Depth (ft): 85					
					Screened Interval (ft): 65-85					
					Depth to Water (ft): 63-15					
					City and State: Tucson, Arizona.					Logged By/Date: W. Thompson
Township, Range, Section: D(14-13) 12 BDC					Checked By/Date: Richard K. Zimmerman					
Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description	
		Gravel	Sand	Fines						
0								Asphalt		
0.3		0	10	90	ML	7.5YR7/3	S	SILT WITH SAND- Pink sand fraction is fine grained, silt is cemented as caliche, moderately hard, dry, very strong reaction to HCl.		
10		0	10	90	ML	7.5YR7/5	S	SILT WITH SAND- Pink sand fraction is fine grained, slightly cemented, damp, strong reaction to HCl.		
20		0	5	95	ML	7.5YR7/2 2.5Y7/2	S	SILT WITH TRACE CLAY- alternating layers of pink and pale yellow about 6" thick, moderately soft, slightly cohesive, slightly plastic; strong reaction to HCl.		
30		15	60	25	SM	7.5YR6/3	N	GRAVELLY SILTY SAND- light brown gravel to 2" max. dia, angular to rounded; sand fraction is through very fine grained, fairly well-graded throughout; silt fraction is damp; no reaction to HCl		





<b>AS-BUILT WELL CONSTRUCTION DIAGRAM FOR PERCHED AQUIFER WELL 7AZP-5</b>					
Approved <b>RKZ</b>	Date <b>06/06/07</b>	Author <b>RAM</b>	Date <b>06/06/07</b>	File No <b>8322704A</b>	Fig <b>E.1</b>



Hydro Geo Chem, Inc. Geologic Boring Log (continued)

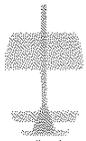
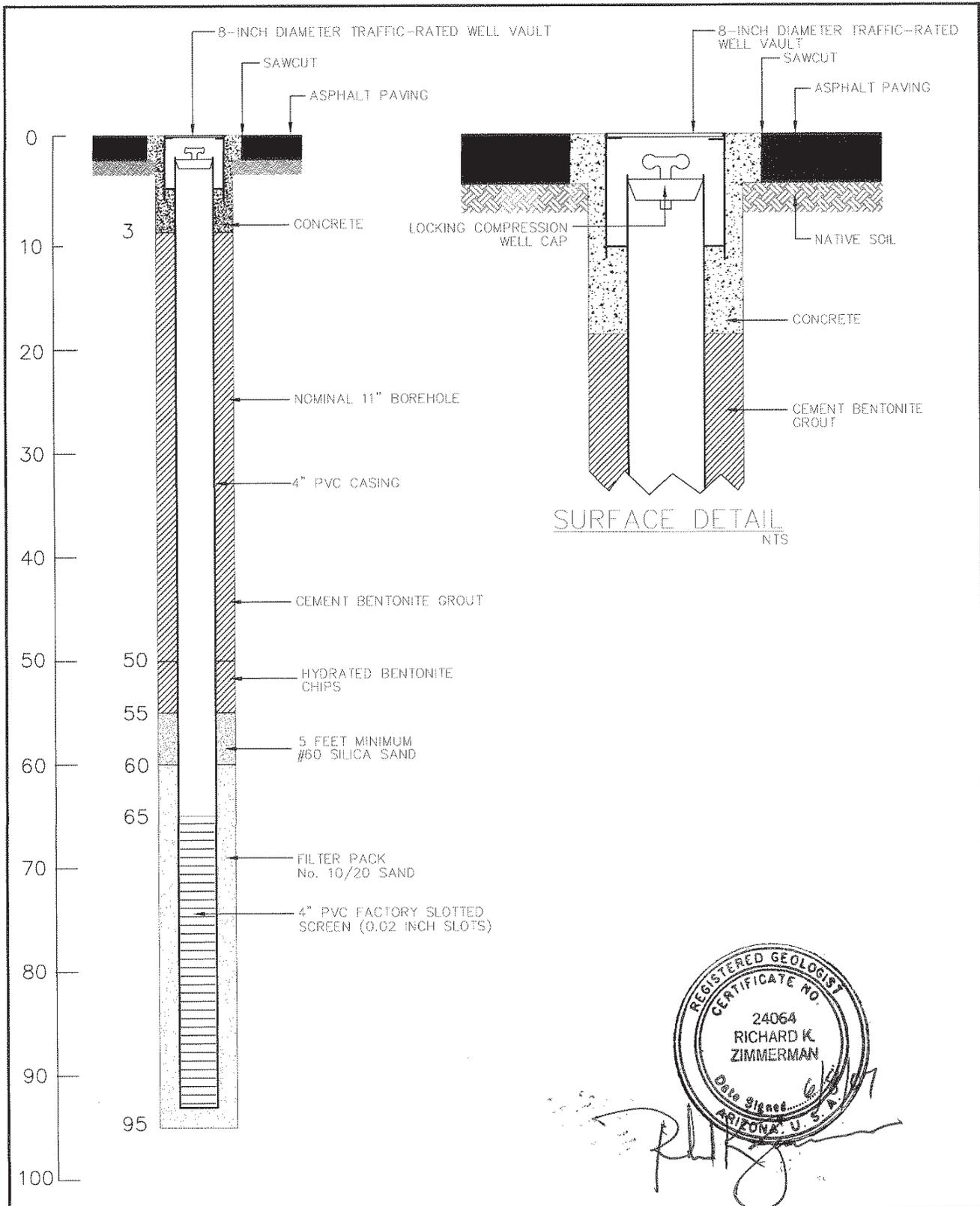
Well ID: 7AZP-6

Logged by: Warren Thompson

Checked by: Richard K. Zimmerman, R.G.

Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description
		Gravel	Sand	Fines					
40		0	30	70	ML	5YR6/4		W	SANDY SILT- light reddish brown; sand fraction is very fine-grained; medium hardness, dense, damp; very weak reaction to HCl.
50		0	25	75	ML	5YR6/4		N	SANDY SILT- light reddish brown as described above except no visible reaction to HCl.
60		10	50	40	SM	5YR5/4		N	SILTY SAND WITH GRAVEL- reddish brown; gravel fraction to 2" max. dia., angular to subrounded; sand fraction is coarse to very fine-grained, compact, moderately dense, moist; no reaction to HCl.
70		5	50	45	SM	5YR5/4		N	SILTY CLAY AND SAND WITH TRACE GRAVEL reddish brown; gravel fraction trace to 1" max. dia., angular to subrounded; sand fraction is coarse to very fine-grained; soft, cohesive, slightly sticky, very moist; no reaction to HCl.
80		0	70	30	SM	5YR6/4		N	SILTY SAND- light reddish brown; sand fraction is medium to very fine-grained, fairly well-graded through to silt fraction, fairly loose, very moist to wet; no reaction to HCl.





HYDRO  
GEO  
CHEM, INC.

AS-BUILT WELL CONSTRUCTION DIAGRAM  
FOR PERCHED AQUIFER WELL  
7AZP-6

Approved	Date	Author	Date	File No	Fig
RKZ	06/06/07	RAM	06/06/07	8322705A	E.2

# HYDRO GEO CHEM, INC.

## Geologic Boring Log

Well ID: 7AZP-7

Project Name: 7th & Arizona

Drilling Company: WDC

Driller: Miguel Albavado

Project No:

83229

Site Plan at Boring Location: E. side of 5th Ave. about 200' north of 6th Street

SEE LOCATION MAP

City and State: Tucson, Arizona

Township, Range, Section: D(14-13) 12 DBA

Well Registration No.: 55-214639

Drilling Equipment: CME-85

Drilling Method: Rotary Auger

Bit Type/Size : Chisel Tooth/ 10"

Date/Time Started: 2/16/2007 7:51

Date/Time Completed: 2/16/2007 11:45

Boring Depth (ft): 90' bls

Casing Depth (ft): 85

Screened Interval (ft): 65-85

Depth to Water (ft): NA

Logged By/Date: W. Thompson

Checked By/Date: Richard K. Zimmerman

Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description
		Gravel	Sand	Fines					
0								Asphalt	
0.5		10	15	75	ML	7.5YR7/2	S	SANDY SILT WITH GRAVEL- pinkish gray, gravel fraction to 2" max. dia., angular to subrounded; sand fraction tends to be fine to very fine-grained, loose, powdery, dry; strong reaction to HCl.	
10		10	15	75	ML	7.5YR 7/2	S	SANDY SILT WITH GRAVEL- as described above; caliche, moderately cemented, dry; strong reaction HCl.	
20		0	25	75	ML	7.5YR6/4	M	SANDY SILT- light brown; sand fraction is medium to very fine-grained, moderately hard, compact, dry; moderate reaction to HCl.	
30		0	25	75	ML	7.5YR6/4	M	SANDY SILT- as described above, moderately cemented; slightly greater reaction to HCl.	

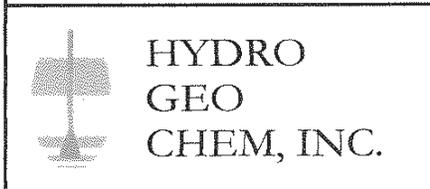
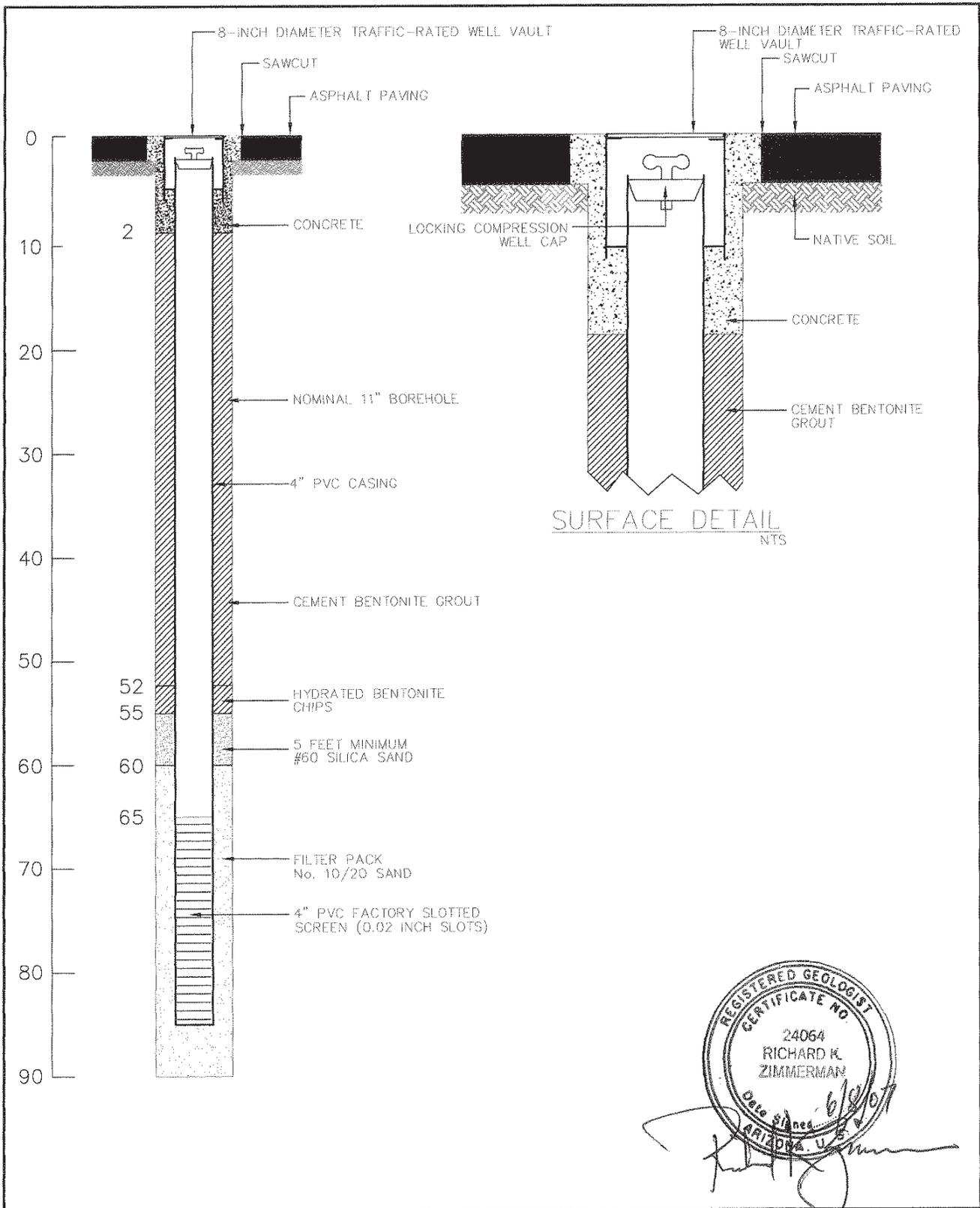
**Hydro Geo Chem, Inc. Geologic Boring Log (continued)**

**Well ID: 7AZP-7**

Logged by: Warren Thompson

Checked by: Richard K. Zimmerman, R.G.

Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description
		Gravel	Sand	Fines					
40								NO RECOVERY	
45		0	20	80	ML	7.5YR5/4	S	SANDY CLAYEY SILT- brown; sand fraction is medium to very fine-grained, soft, moderately plastic, cohesive, moist; strong reaction to HCl.	
50		0	20	80	ML	7.5YR5/4	S	SANDY CLAYEY SILT- brown; as described above.	
60		0	80	20	SM	5YR5/4	N	SILTY SAND- reddish brown; sand fraction is coarse through very fine-grained, fairly well graded through silt fraction, fairly compact, damp; no reaction to HCl.	
70		5	55	40	SM	5YR5/4	W	SILTY SAND TRACE GRAVEL- reddish brown; gravel fraction is fine-grained to 1/8" max. dia., angular to subrounded; sand fraction is coarse through very fine-grained, compact, medium hard, damp; weak reaction to HCl.	
80		0	55	45	SM	5YR5/4	S	CLAYEY SILTY SAND- reddish brown; sand fraction is coarse through very fine-grained, fairly well-graded through to silt/clay fraction, cohesive, sticky, slight to moderate plasticity, moist to wet; strong reaction to HCl.	
								CLAY TRACE SAND- very pale brown; trace fine grained sand, plastic, soft, cohesive, damp; strong reaction to HCl.	
90		0	5	95	CL	10YR8/2	S	TD = 90' bls @ 11:45	

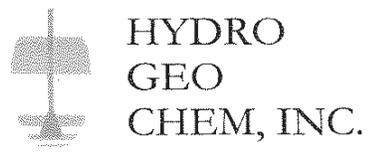
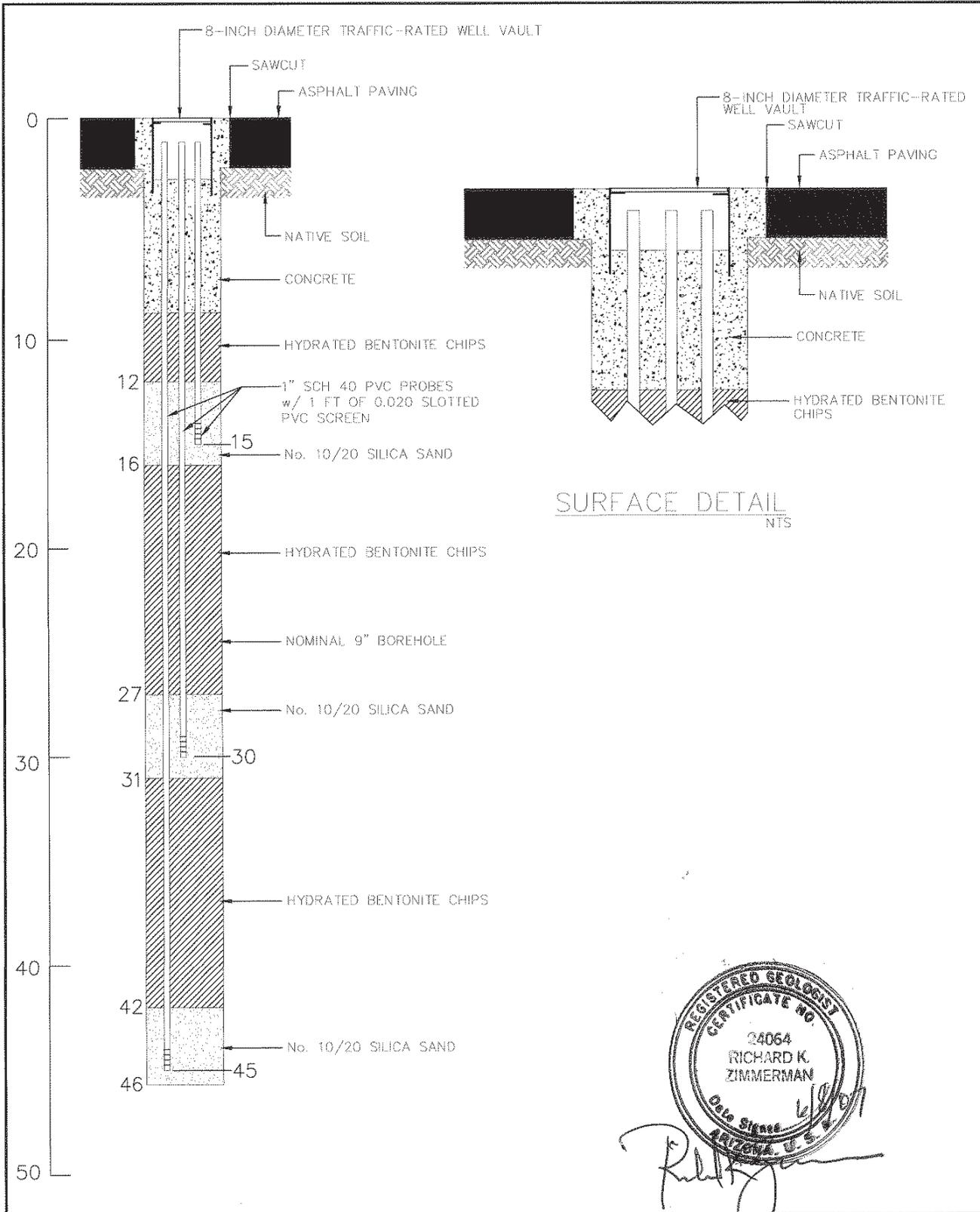


**AS-BUILT WELL CONSTRUCTION DIAGRAM  
FOR PERCHED AQUIFER WELL  
7AZP-7**

Approved	Date	Author	Date	File No	Fig
RKZ	06/06/07	RAM	06/06/07	8322706A	E.3





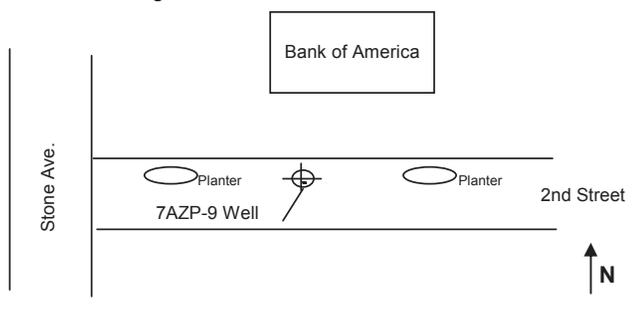


**AS-BUILT WELL CONSTRUCTION DIAGRAM  
FOR VAPOR PROBE NEST  
7AZP-8**

Approved	Date	Author	Date	File No	Fig
RKZ	12/11/06			8322708A	E.5

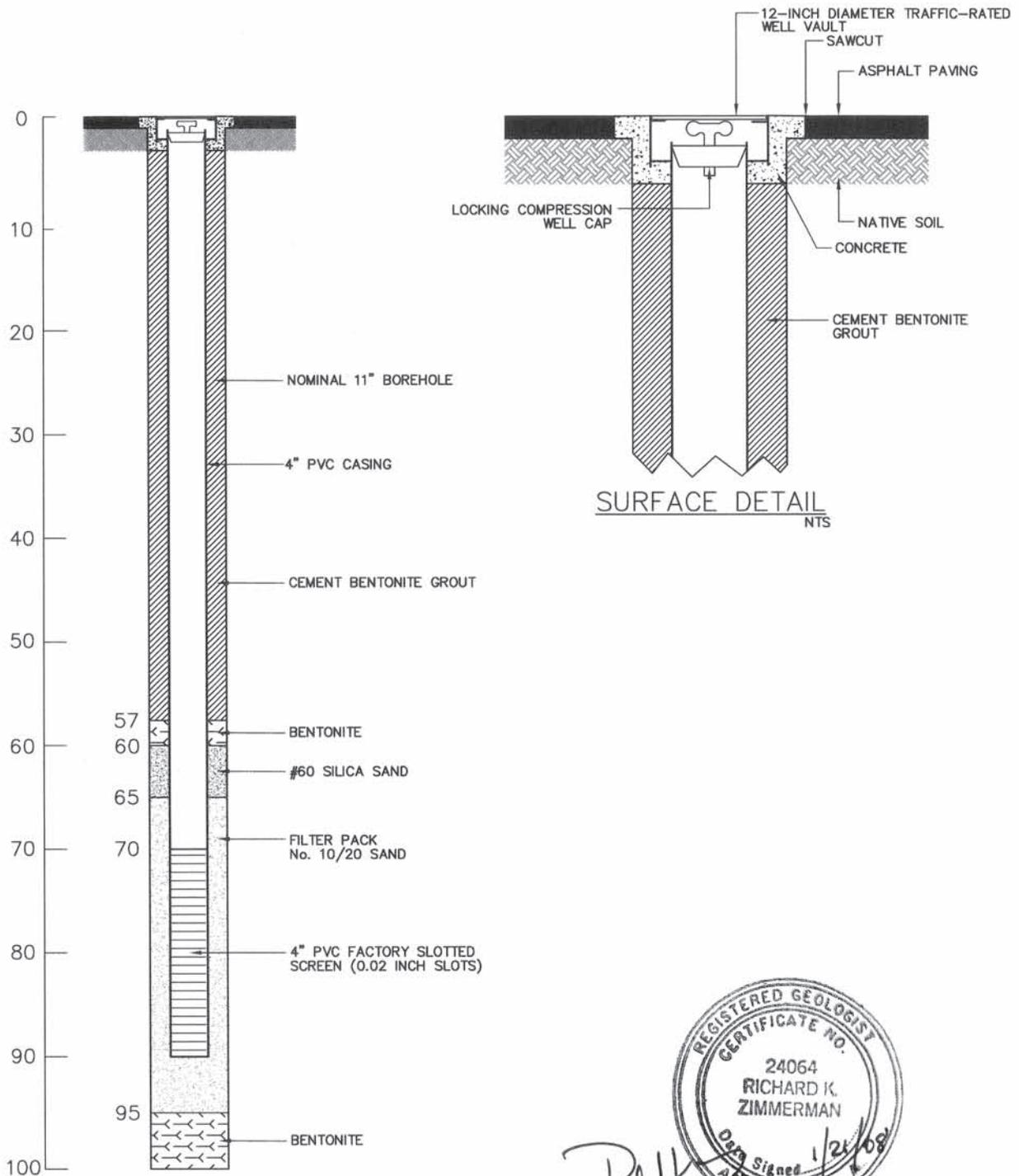
# HYDRO GEO CHEM, INC.

## Geologic Boring Log

Boring No.: <b>7AZP-9</b>									
Project Name: <b>7th Street and Arizona Avenue WQARF Site</b>				Project No.: 832200					
Drilling Company: Geomechanics Southwest				Driller: Steve Bradshaw					
Site Plan at Boring Location: 				ADWR Registration No.: <b>55-908158</b>					
				Drilling Equipment: CME-75					
				Drilling Method: Rotary Auger					
				Bit Type/Size: 10 inch OD HSA					
				Total Borehole Depth: 100 feet bls					
				Casing Depth: 90 feet					
				Screened Interval: 70-90 feet					
				Screen slot size: 0.02 inch					
				Filter pack type: 10-20 silica sand					
				Top of Casing Elevation: 2,378.58 feet amsl					
				Land surface Elevation: 2,378.96 feet amsl					
				Township, Range, Section:				Date/Time Started: 11/15/07 10:03	
Latitude:                      Longitude:				Date/Time Completed: 11/15/07 16:00					
				Logged by: Warren Thompson					
				Checked by: Rick Zimmerman					
Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	PID Reading	HCI Rxn	Sample Description
		GR	SA	FI					
0-6"									Asphalt
6"		5	25	70	ML	7.5YR7/3		S	Silt with sand (caliche); pink silty fines, hard, sand is coarse to fine grained; few gravel clasts; strong cementation; very strong reaction to HCl.
5							0		As above.
10							0		As above.
15		10	30	60	ML	7.5YR7/3	0	S	Sandy silt with gravel and caliche; pink; gravel clasts angular to sub rounded up to 2 inches; sand is coarse to fine grained; hard, consolidated; carbonate cemented; dry; very strong reaction to HCl.
20		10	30	60	ML	7.5YR7/3	0	S	As above, very consistent.
25			30	70	ML	7.5YR6/3	0	S	Sandy clayey silt; light brown, sand is medium to fine grained; clay occurs as soft, moderately plastic balls; moist; very strong reaction to HCl.
30			15	85	ML	7.5YR6/4	2.5	S	As above, except that clay balls are much larger indicating greater cohesiveness with increasing clay content; moderately plastic; less, primarily fine sand; damp, strong reaction to HCl.
35			15	85	CL-ML	7.5YR4/4	2.5	S	Silty clay with sand; brown, sand medium to very fine; soft, cohesive, moderate plasticity; moist; strong reaction to HCl.

Project Name: 7th Street and Arizona Avenue WQARF Site								Boring No.: 7AZP-9	
Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCI Rxn	Sample Description
		GR	SA	FI					
40			15	85	CL-ML	7.5YR4/4	6.1	S	Silty clay with sand; brown; sand medium to very fine grained; soft, cohesive, moderate plasticity, moist; strong reaction to HCl.
45			15	85	CL-ML	7.5YR4/4	12	S	As above - slightly stiffer not quite as soft, slight decrease in clay fraction, not quite as plastic.
50		5	35	60	ML	7.5YR4/4	63	S	Sandy silt with trace gravel; brown; gravel is fine to 1/2 inch, subrounded to rounded; sand coarse to predominantly fine grained; trace clay; damp, very strong reaction to HCl.
55									No return of cuttings from 50-55' bls
60		70	15	15	GM	7.5YR5/3	4.5	S	Sandy silty gravel; brown; gravel angular to subrounded up to 2 inches, light-colored crystalline granitoids and light to dark gray aphanitic clasts; sand coarse to fine grained; moist, strong reaction to HCl.
65		50	25	25	GM	7.5YR5/3	5.6	S	As above; decreasing gravel fraction
70		50	30	20	GM	7.5YR5/3	3.2	S	Sandy silty gravel; brown; gravel fraction to 2 inches, angular to subrounded, primarily light-colored crystalline clasts with very dark through light gray aphanites; sand is coarse to fine grained; moist, strong reaction to HCl.
75		50	30	20	GM	7.5YR5/3	5.7	S	As above except that gravel clasts are finer grained overall, to about 1" maximum diameter. Most of this fraction is 1/2" or less in diameter.
80		10	15	75	CL	7.5YR5/3	14	S	Sandy silt, clay with gravel; brown, gravel to 1/2" maximum diameter, sand fraction is medium to fine grained, clay silt fraction is cohesive, sticky, plastic, strong reaction to HCl.
85							2.1		As above.
90							2.1		Very consistently a sandy clay with small amount of gravel, very soft; plastic, cohesive. Reacts strongly to HCl.
95							2		As above.
100							1.7		Total depth at 100 feet bls in sandy clay, as above.





REGISTERED GEOLOGIST  
CERTIFICATE NO.  
24064  
RICHARD K.  
ZIMMERMAN  
Data Signed 1/21/08  
ARIZONA, U.S.

*RKZ*



HYDRO  
GEO  
CHEM, INC.

WELL CONSTRUCTION DIAGRAM FOR  
PERCHED AQUIFER WELLS  
7AZP-9

Approved	Date	Author	Date	File Name	Figure
RKZ	12/11/07			8322712A	1

# HYDRO GEO CHEM, INC.

## Geologic Boring Log

Project Name: <b>7th Street and Arizona Avenue WQARF Site</b>						Boring No.: <b>7AZP-10</b>			
Drilling Company: <b>Geomechanics Southwest</b>						Project No.: <b>832200-5</b>			
Site Plan at Boring Location:						Driller: <b>Steve Bradshaw</b>			
						ADWR Registration No.: <b>55-908157</b>			
						Drilling Equipment: <b>CME-75</b>			
						Drilling Method: <b>Rotary Auger</b>			
						Bit Type/Size: <b>10 inch OD HSA</b>			
						Total Borehole Depth: <b>95 feet bls</b>			
						Casing Depth: <b>94 feet bls</b>			
						Screened Interval: <b>74 to 94 feet bls</b>			
						Screen slot size: <b>0.02 inch</b>			
						Filter pack type: <b>10-12 silica sand</b>			
						Top of Casing Elevation: <b>2,383.43 feet amsl</b>			
Township, Range, Section:						Logged by: <b>Warren Thompson</b>			
Latitude:						Checked by: <b>Rick Zimmerman</b>			
Longitude:									
Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	PID Reading	HCI Rxn	Sample Description
		GR	SA	FI					
0-6"									Asphalt
10		20	80		ML	7.5 yr 4/3	0.3	S	Sandy silt with small amounts of clay; brown, sand fracture medium to very fine grained, but is primarily fine grained, soft, dry, very strong reaction to HCL.
15		20	80		ML	7.5 yr 4/3	0.0	S	As described above.
20		2	20	78	ML	7.5 yr 4/3	0.6	S	Sandy silt with clay; brown, as above except for few gravels up to 1/2 in., subangular to rounded, light colored volcanics; soft, slightly moist, very strong reaction to HCL.
25		10	90		ML	7.5 yr 5/4	0.9	S	Clayey silt with same sand; brown, soft, cohesive, slightly plastic, damp, strong reaction to HCL.
30		5	10	85	ML	7.5 yr 5/4	20.3	S	Clayey silt with sand and trace gravel; brown, gravel fraction subangular to rounded granitoid volcanics, light colored; sand medium to very fine grained; soft cohesive, slightly plastic, damp, strong reaction to HCL.
35		10	20	70	ML	7.5 yr 5/4	7.1	S	As above except for increase in gravel and sand fractions.

Project Name: 7th Street and Arizona Avenue WQARF Site					Boring No.: 7AZP-10				
Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCI Rxn	Sample Description
		GR	SA	FI					
40		10	60	30	SM	7.5 yr 6/4	4.0	M	Silty sand with gravel; light brown, sand medium to very fine grained, well graded to silt fraction; gravel as above; soft, damp, moderate reaction to HCL.
45		20	60	20	SM	7.5 yr 6/4	3.6	M	Gravelly silty sand; light brown, as above except increasing gravel and decreasing silt; light-colored granitoid gravels subangular to rounded to 2 inches.
50		20	40	20	SM	7.5 yr 6/4	12	M	As described above.
55		50	35	15	SM	7.5 yr 6/7	7.9	S	Silty sandy gravel; light brown, light gray granitoid gravels are subangular to rounded to 2 inches; sand fraction is coarse through very fine grained, damp, moderate reaction to HCL.
60		20	30	50	CL-ML	7.5 yr 6/7	23	S	Gravelly sandy clayey silt; light brown, gravel is subangular to rounded up to 1 inch; sand fraction is coarse through medium grained; slight to moderate plasticity, soft, cohesive, moist, strong reaction to HCL.
65			25	75	CL	7.5 yr 5/3	28	M	Sandy silty clay; brown, sand fraction is fine to very fine grained; soft, cohesive, moderately plastic, moist, moderate reaction to HCL.
70		3	27	70	CL	7.5 yr 5/3		M	As above except for slight amount of gravel up to 1/2 inch, subangular to rounded; sand fraction is coarse through fine grained; soft, plastic, cohesive, moist, moderate reaction to HCL.
75		3	27	70	CL	7.5 yr 5/3	7.4	M	As above.
80		10	30	60	CL	7.5 yr 5/3	7.3	S	Sandy clay with little gravel; brown; gravel fraction fine to 1/2 inch, subangular to rounded light-colored volcanics; sand is coarse to very fine; soft, plastic, moist; strong reaction to HCL.
85			15	85	CL	7.5 yr 5/3	5.0	S	Clay with sand; brown; sand is fine grained; soft, plastic, moist, strong reaction to HCL.
90									No sample return from 90 to 95 feet bls
95									Total depth 95 feet bls at 11/20/07 13:03

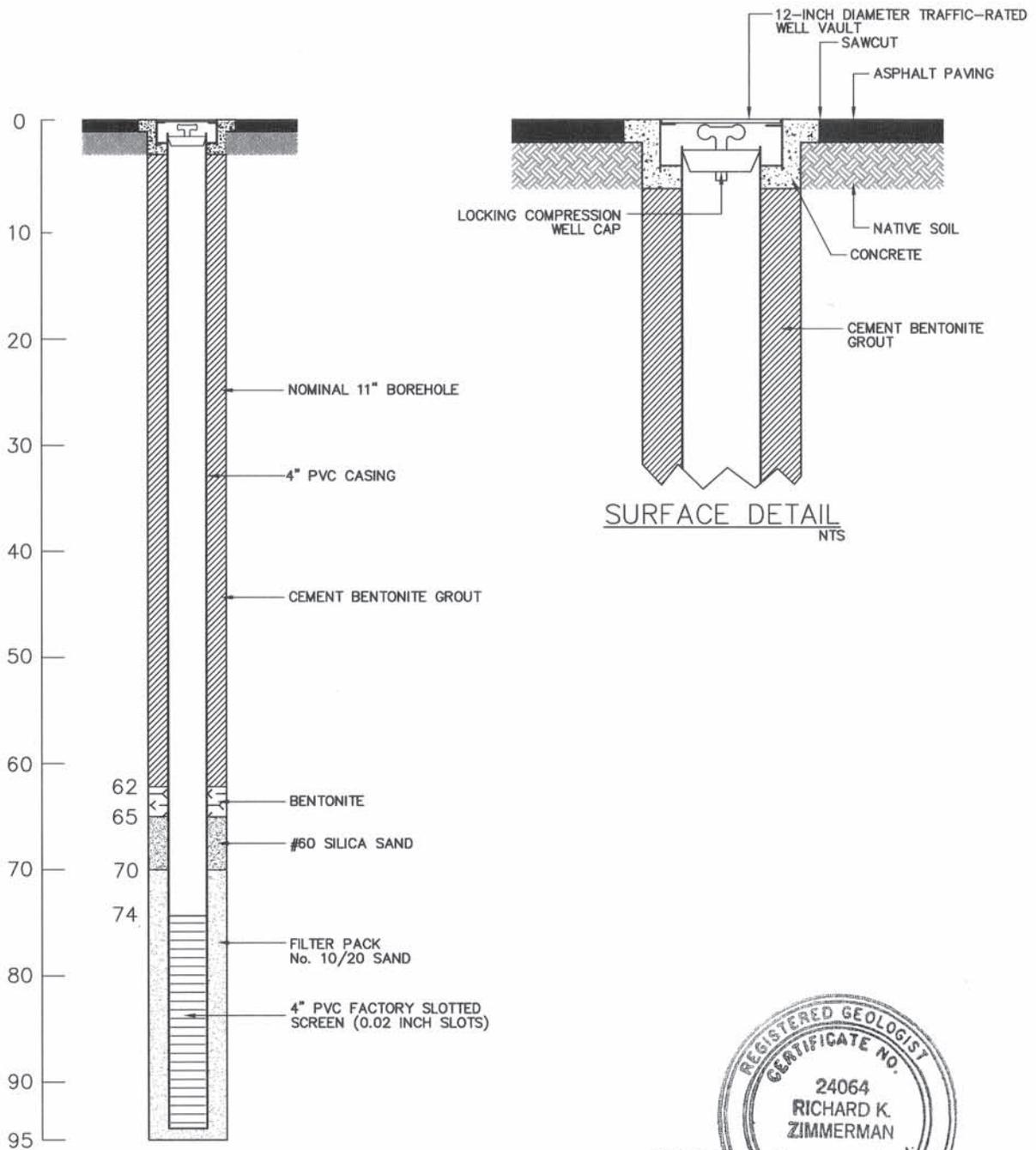
# HYDRO GEO CHEM, INC.

## Well Construction Summary

Project Name	7th Street and Arizona Avenue WQARF Site	Boring No.	<b>7AZP-10</b>
Drilling Company	Geomechanics Southwest	Project No.	832200
ADWR Well No.	55-908157	Driller	Steve Bradshaw
		Geologist	Warren Thompson
Location North Side of 4th street about 60 feet East of 6th Avenue			

AS-BUILT DIAGRAM		DRILLING SUMMARY					
Depth (Ft)	Lithology	Total Depth	95 feet	Hole Diameter	10 inch- Auger		
		Drill Rig	CME-75	Bit Type	S-Series Rock Bit		
<b>WELL CONSTRUCTION DATA</b>							
<b>Depth Interval (Ft)</b>							
		<b>Type of Material</b>	<b>From</b>	<b>To</b>	<b>Description</b>		
10	ML	Casing	0	74	4", SCH 40 PVC		
		Screen	74	94	4", SCH 40 PVC, .02 slot		
20		Filter Pack	70	95	10-20 silica sand		
		Transition Sand	65	70	#60 silica		
		Bentonite Chips	62	65	3/8" Hydrated		
		Bentonite Grout	3	62	Cement-Bentonite mix		
30		Cement	0	3	Concrete		
		Centralizer Locations			none used		
		Surface Completion	12" round, steel, flush-mounted, traffic-rated vault set in concrete				
		Measuring Point	Ground surface				
40	SM						
50							
<b>CONSTRUCTION TIME LOG</b>							
		<b>Start</b>		<b>Finish</b>			
		<b>Date</b>	<b>Time</b>	<b>Date</b>	<b>Time</b>		
60	CL-ML	Drilling	19-Nov-07	8:30 AM	20-Nov-07	1:03 PM	
		Casing	20-Nov-07	1:35 PM	20-Nov-07	2:46 PM	
	CL	Filter Pack	20-Nov-07	2:50 PM	20-Nov-07	4:28 PM	
		Bentonite Chips	20-Nov-07	4:28 PM	20-Nov-07	4:38 PM	
70		Bentonite Grout	21-Nov-07	9:15 AM	21-Nov-07	10:30 AM	
		Cement	21-Nov-07	10:30 AM	21-Nov-07	10:45 AM	
		Surface Completion	21-Nov-07	10:55 AM	21-Nov-07	11:32 AM	
80	CL						
<b>WELL DEVELOPMENT</b>							
		Date & Time Started	11/27/2007 8:45	Date & Time Completed	11/27/2007 14:21		
		a = Cased Depth (ft)	94	d = Casing Diameter (in.)	4		
90		b = Water Depth (ft)	80.79	Date & Time Measured	11/26/2007 13:30		
		Well Volume = (a - b) * d <sup>2</sup> * 0.0408 =	8.6				
		Method of Development	Bailer				
		Swabbed and Bailed for	333 minutes				
		Pumped at	NA	gpm for	minutes		
100		Gallons Purged	110				

Remarks:



REGISTERED GEOLOGIST  
 CERTIFICATE NO.  
 24064  
 RICHARD K.  
 ZIMMERMAN  
 Date Signed... 1/24/08  
*Richard K. Zimmerman*



HYDRO  
 GEO  
 CHEM, INC.

WELL CONSTRUCTION DIAGRAM FOR  
 PERCHED AQUIFER WELLS  
 7AZP-10

Approved	Date	Author	Date	File Name	Figure
RKZ	12/11/07			8322713A	1

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZ-R**

Pg. **1** of **4**

Drilling Co: **Water Development Corp.**

Drilling Method: **Air Rotary Casing Hammer**

Date Started: **4/19/02**

Location: **Northeast corner of parking lot,  
near 7AZP-2**

Sampler: **2.5" Split Spoon**

Date Completed: **4/20/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **M.McGlone**

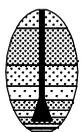
Land Surf. Elev: **2378.5**

Meas. Pt. Elev: **2378.54**

Reviewed by: **C.Teague**

Depth - FT.	WELL COMPLETION	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
0	2' diameter, Traffic-Rated Vault					0		REFER TO LITHOLOGIC LOG FOR 7AZP-2 FOR DESCRIPTION OF LITHOLOGY FROM 0 TO 85' BLS.					
0-92'	16" Borehole (0-92' bls)					5							
10-92'	10" Low Carbon Steel Conductor (1-92 ft bls)					10							
3-92'	Type I, II portland cement w/ 5% bentonite (3-92' bls)					15							
3-125.2'	Type I, II portland cement w/ 5% bentonite (3-125.2' bls)					20							
						25							
						30							
						35							
						40							
						45							
						50							
						55							
						60							

HGC-WELL2 832100.GPJ NEWPROJ.GDT 4/29/13



**HYDRO  
GEO  
CHEM, INC.**

**Lithologic Log and Well Construction Details of 7AZ-R**  
7th St & Arizona Ave WQARF Site

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**5a**

**Drilling Co:** Water Development Corp.      **Drilling Method:** Air Rotary Casing Hammer      **Date Started:** 4/19/02

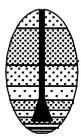
**Location:** Northeast corner of parking lot, near 7AZP-2      **Sampler:** 2.5" Split Spoon      **Date Completed:** 4/20/02

**Desc. of Meas Pt:** Land Surface Elevation      **Logged by:** M.McGlone

**Land Surf. Elev:** 2378.5      **Meas. Pt. Elev:** 2378.54      **Reviewed by:** C.Teague

Depth - FT.	WELL COMPLETION 2' diameter, Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
65						65		REFER TO LITHOLOGIC LOG FOR 7AZP-2 FOR DESCRIPTION OF LITHOLOGY FROM 0 TO 85' BLS. (continued)					
70						70							
75						75							
80						80							
85						85							
90						90		LEAN CLAY (from cyclone) - Brown (7.5YR 5/4); Fines - clay with 20% silt; very sticky, low plasticity, moist, reacts strongly with HCL.					
95	4" SCH 40 PVC casing (0-135' bls)	6	100	ND	X	95		LEAN CLAY - Brown (7.5YR 5/4); Fines - clay with 20% silt; very sticky, low plasticity, moist, reacts strongly with HCL. DYE TEST = 0	CL	0	0	100	M
100	10" Borehole (92-200' bls)	8	100	ND	X	100		WELL GRADED SAND - Brown (7.5YR 5/3); sand is well graded, medium to fine-grained; moist, weak reaction with HCL. DYE TEST = 0	SW	0	95	5	M
105		12	100	ND	X	105		SILTY SAND - Light brown (7.5YR 6/3); sand is fine-grained; Fines - 60% silt with 40% clay, non-plastic; moist, reacts strongly with HCL. DYE TEST = 0	SM	0	60	40	M
110		15	100	ND	X	110		WELL GRADED SAND WITH SILT - Light brown (7.5YR 6/3); gravel is fine to 1/2" max diameter, subangular; sand is coarse to fine-grained; moist, weak reaction with HCL. DYE TEST = 0	SW	10	80	10	M
115		21	100	ND	X	115		SIMILAR TO ABOVE - Brown (7.5YR 5/3); sand is coarse to medium-grained. DYE TEST = 0	SW	10	80	10	M
120		40	100	ND	X	120							

**Lithologic Log and Well Construction Details of 7AZ-R**  
7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved <b>MG</b>	Date <b>6/27/02</b>	Revised <b>CT</b>	Date <b>4/26/02</b>	Reference: <b>769000\GINTw</b>	FIG. <b>5b</b>
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HGC-WELL2 832100.GPJ NEWPROJ.GDT 4/29/13

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZ-R**

Drilling Co: **Water Development Corp.**

Drilling Method: **Air Rotary Casing Hammer**

Date Started: **4/19/02**

Location: **Northeast corner of parking lot,  
near 7AZP-2**

Sampler: **2.5" Split Spoon**

Date Completed: **4/20/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **M.McGloine**

Land Surf. Elev: **2378.5**

Meas. Pt. Elev: **2378.54**

Reviewed by: **C.Teague**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' diameter, Traffic-Rated Vault										GR	SA	FI	
125			15 32 24/1	100	ND	X	125		WELL GRADED SAND WITH GRAVEL - Light brown (7.5YR 6/3); gravel is fine up to 3/4" max diameter, subangular; sand is well graded, coarse to medium-grained, loose; moist, no reaction with HCL. DYE TEST = 0	SW	15	80	5	M
130		Hydrated bentonite pellets (125.2-129.7' bls)	50 0 0	100	ND	X	130		SIMILAR TO ABOVE - increased gravel. DYE TEST = 0	SW	20	75	5	M
135		10x20 sand (129.7-196' bls)	50 0 0	100	ND	X	135		POORLY GRADED SAND - Light brown (7.5YR 6/3); sand is fine-grained; moist. DYE TEST = 0	SP	0	95	5	M
140			15 48/8 0	100	ND	X	140		SILTY SAND - Brown (7.5YR 5/3); sand is fine-grained; no plasticity, moist, reacts strongly with HCL. DYE TEST = 0	SM	5	65	30	M
145			50 4 0	80	1	X	145		SIMILAR TO ABOVE - increased gravel is fine; sand is medium to fine-grained. DYE TEST = 0	SM	10	70	20	M
150			16 40 50/4	100	ND	X	150		SILTY SAND WITH GRAVEL - Reddish brown (2.5YR 5/4); gravel is fine up to 1" max diameter; sand is medium to fine-grained; no cementation, moist, moderate reaction with HCL; FeOX staining on sand. DYE TEST = 0	SM	15	70	15	M
155			15 27 30	90	ND	X	155		SILTY SAND - Reddish brown (2.5YR 5/3); sand is medium to fine-grained; moist, reacts strongly with HCL. DYE TEST = 0	SM	10	65	25	M
160		4" SCH 40 PVC screen 0.020" slot (135-195' bls)	21 33 30	100	ND	X	160		SIMILAR TO ABOVE - Light brown (7.5YR 6/3). DYE TEST = 0	SM	10	70	20	M
165			15 21 31	95	ND	X	165		SIMILAR TO ABOVE - fines are 70% silt and 30% clay; moderate reaction with HCL. DYE TEST = 0	SM-SC	0	60	40	M
170			8 17 21	100	ND	X	170		SANDY SILT - Brown (7.5YR 5/3); sand is fine-grained; fines are 60% silt and 40% clay; low plasticity, moist, weak reaction with HCL. DYE TEST = 0	ML-CL	0	30	70	M
175		Depth to Water = 171 ft bls on 4/21/02	50 0 0	100	ND	X	175		POORLY GRADED SAND - Pinkish gray (7.5YR 7/2); sand is fine-grained; trace silt; weak cementation, moist, reacts strongly with HCL. NO DYE TEST	SP	0	95	5	W
180			8 17 22	90	ND	X	180		SILTY SAND - Pinkish gray (7.5YR 7/2); sand is fine-grained, loose; moist, no reaction with HCL. DYE TEST = 0	SM	0	80	20	W

HGC-WELL2 832100.GPJ NEWPROJ.GDT 4/29/13



**HYDRO  
GEO  
CHEM, INC.**

**Lithologic Log and Well Construction Details of 7AZ-R**

**7th St & Arizona Ave WQARF Site**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**5c**

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **7AZ-R**

Drilling Co: **Water Development Corp.**

Drilling Method: **Air Rotary Casing Hammer**

Date Started: **4/19/02**

Location: **Northeast corner of parking lot,  
near 7AZP-2**

Sampler: **2.5" Split Spoon**

Date Completed: **4/20/02**

Desc. of Meas Pt: **Land Surface Elevation**

Logged by: **M.McGlone**

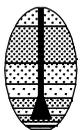
Land Surf. Elev: **2378.5**

Meas. Pt. Elev: **2378.54**

Reviewed by: **C.Teague**

Depth - FT.	WELL COMPLETION 2' diameter, Traffic-Rated Vault	Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
										GR	SA	FI	
12		12	100	ND	X	12		SIMILAR TO ABOVE - Light brown (7.5YR 6/4); sand is medium to fine-grained; increased silts are 30% clay; moist, reacts strongly with HCL. DYE TEST = 0	SM-SC	0	60	40	W
185		14	100	ND	X	185		SILTY SAND - Light brown (7.5YR 6/4); gravel is fine; sand is well graded, coarse to fine-grained; wet, weak reaction with HCL. DYE TEST = 0	SM	10	70	20	W
190		12	100	ND	X	190		SILT WITH SAND - Light brown (7.5YR 6/4); sand is fine-grained; low plasticity, wet, no reaction with HCL. DYE TEST = 0	ML	0	20	80	W
195	Endcap	50	100	ND	X	195		SIMILAR TO ABOVE - weak reaction with HCL. NO DYE TEST	ML	0	20	80	W
200		30	100	ND	X	200		LEAN CLAY - Brown (7.5YR 5/4); calcite filled voids; low plasticity, moist, reacts strongly with HCL. DYE TEST = 0	CL-ML	0	10	90	W

**Lithologic Log and Well Construction Details of 7AZ-R**  
7th St & Arizona Ave WQARF Site



**HYDRO  
GEO  
CHEM, INC.**

Approved  
**MG**

Date  
**6/27/02**

Revised  
**CT**

Date  
**4/26/02**

Reference:  
**769000\GINTw**

FIG.

**5d**



Hydro Geo Chem, Inc. Geologic Boring Log (continued)

Well ID: 7AZR-2

Logged by: Warren Thompson

Checked by: Richard K. Zimmerman, R.G.

Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description
		Gravel	Sand	Fines					
40		20	70	10	SM	7.5YR6/3	N	As described above except that gravel fraction has increased slightly and clast size is larger to 2.5" dia.; slight decrease in silt fraction; no reaction to HCl.	
50		40	50	10	SM	7.5YR6/3	N	GRAVELLY SAND WITH SILT - brown; gravel to 3" max. dia., may be few cobbles, angular to subrounded, hard, crystalline, fairly clean; sand fraction is coarse through fine-grained, fairly well graded, dry; no reaction to HCl.	
60		25	50	10	SM	7.5YR7/2	N	GRAVELLY SAND WITH SILT - pink; gravel fraction to 3" max. dia., angular to subrounded, cobbles may be present; sand fraction is coarse through very fine-grained, well graded through to silt fraction, compact, hard, damp; no reaction to HCl.	
65		10	75	15	SM	5YR6/4	N	SILTY SAND WITH GRAVEL - light reddish brown; gravel fraction to 1" max. dia., angular to subrounded; sand fraction is coarse through fine-grained, well graded to silt fraction, loose, damp; no reaction to HCl.	
70		10	85	5	SW	5YR6/3	N	SAND WITH GRAVEL - light reddish brown; gravel fraction to 1" max. dia., angular to subrounded; sand fraction is coarse through fine-grained, well graded, clean, loose, wet; no reaction to HCl.	
80		0	60	40	SM	5YR6/3	N	SILTY CLAYEY SAND - light reddish brown; sand fraction is coarse through fine-grained, fairly soft, cohesive, slightly plastic, very moist to wet; no reaction to HCl.	



Hydro Geo Chem, Inc. Geologic Boring Log (continued)

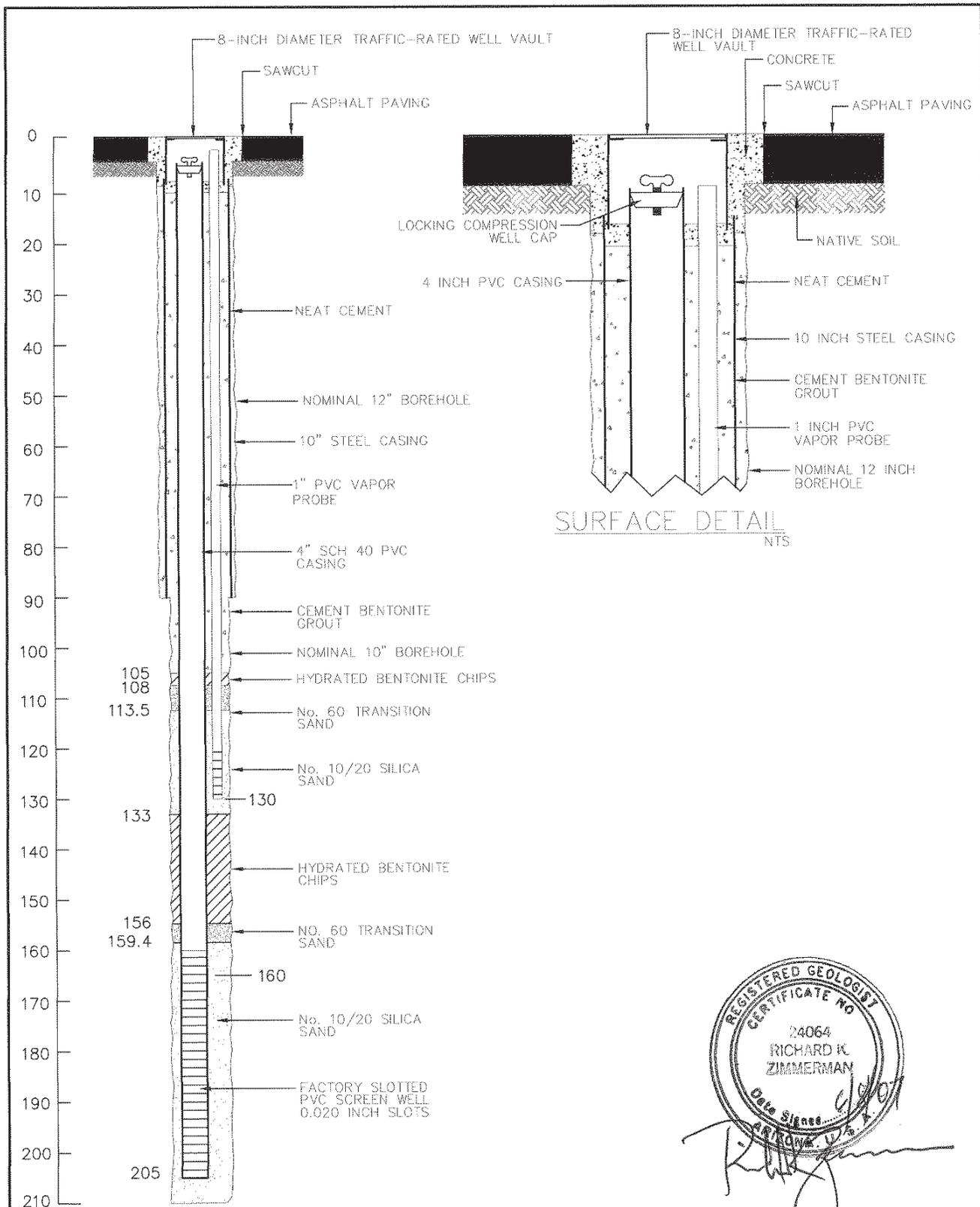
Well ID: 7AZR-2

Logged by: Warren Thompson

Checked by: Richard K. Zimmerman, R.G.

Depth (ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	FID Reading	HCl Rxn	Sample Description
		Gravel	Sand	Fines					
140		40	55	5	SW	10YR7/2		N	GRAVELLY SAND - light gray; gravel is fine-grained to 3/4" max. dia., angular to subrounded, hard; sand fraction is very coarse-grained to fine-grained, well graded; no reaction to HCl.
145		10	75	15	SW-SM	10YR7/3		M	SILTY SAND WITH GRAVEL - very pale brown; gravel fraction to 1" max. dia., angular to subrounded; sand fraction is coarse through fine-grained, well graded to silt fraction; moderate reaction to HCl; driller is injecting water.
150									
160		20	55	25	SM	10YR7/3		M	GRAVELLY SILTY SAND - as described above, except for increase in gravel/silt fractions and decrease in sand fraction.
170		55	30	15	GM	10YR6/4		M	SANDY GRAVEL WITH SILT - light yellowish brown; gravel fraction to 2" max. dia., angular to subrounded; sand fraction is very coarse through fine grained but is primarily very coarse; moderate reaction to HCl.
180		20	60	20	SM	10YR6/4		M	GRAVELLY SILTY CLAYEY SAND - light yellowish brown; gravel fraction to 1" max. dia., angular to subrounded; sand fraction is coarse through fine-grained, fairly well-graded through silt fraction; moderate reaction to HCl; driller is injecting water.





REGISTERED GEOLOGIST  
 CERTIFICATE NO  
 24064  
 RICHARD K.  
 ZIMMERMAN  
 Date Signed... 6/6/07  
 APPROVE, U.S.A.



**HYDRO  
 GEO  
 CHEM, INC.**

**AS-BUILT WELL CONSTRUCTION DIAGRAM  
 FOR REGIONAL AQUIFER WELL  
 7AZR-2**

Approved	Date	Author	Date	File No	Fig
RKZ	06/06/07	RAM	06/06/07	8322707A	E.4

# HYDRO GEO CHEM, INC.

## Geologic Boring Log

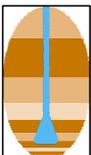
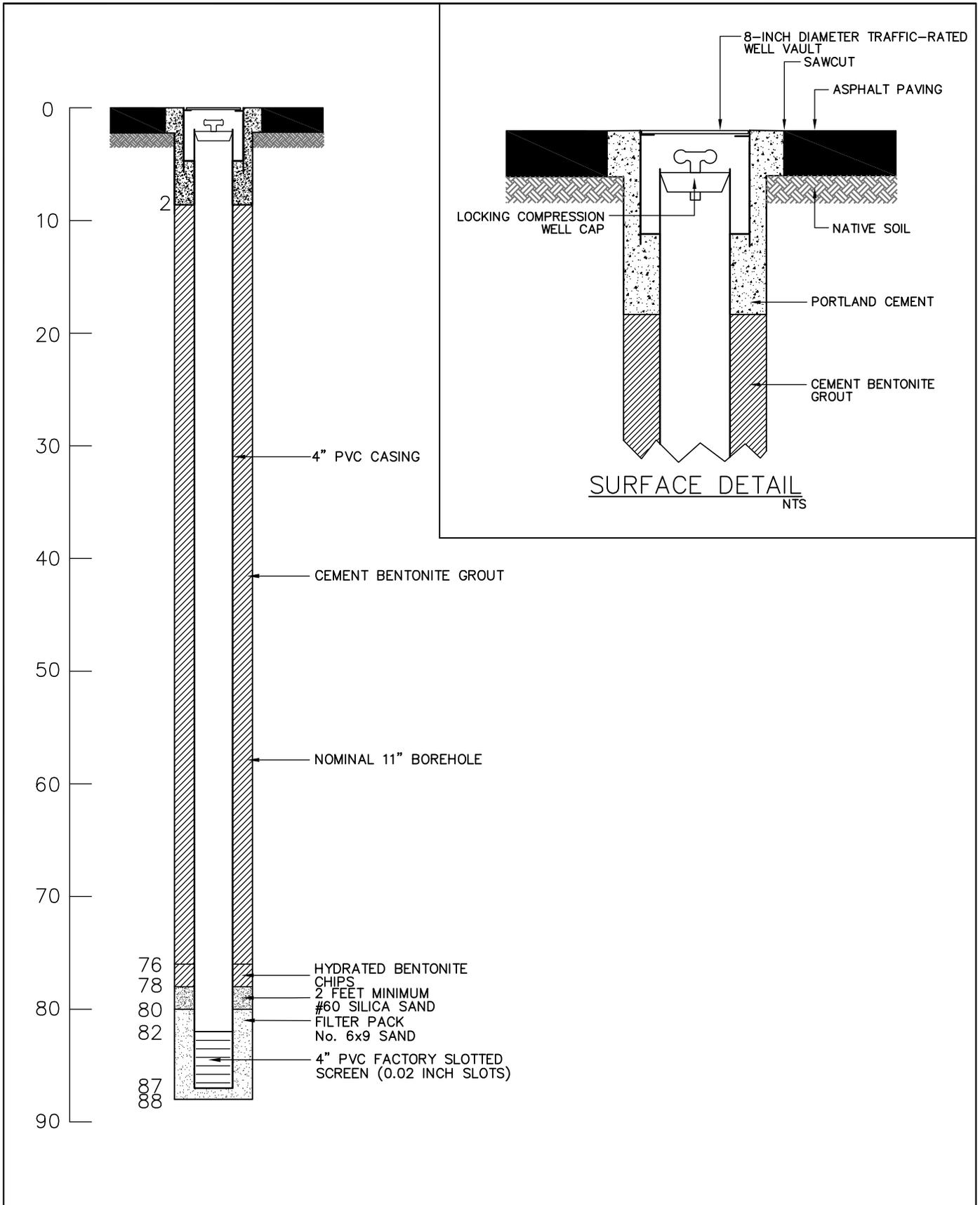
Project Name: <b>Seventh &amp; Arizona</b>		Boring No.: <b>AS-1</b>
Drilling Company: <b>Geo Mechanics SW</b>		Project No.: <b>832200</b>
Site Plan at Boring Location:		Driller: <b>Chuck Fiesler</b>
		ADWR Registration No.:
		Drilling Equipment: <b>CME-75HD</b>
		Drilling Method: <b>Rotary Auger</b>
		Bit Type/Size: <b>Auger/8" OD</b>
		Total Borehole Depth: <b>88 feet bls</b>
		Casing Depth:
		Screened Interval:
		Screen slot size:
		Filter pack type:
		Top of Casing Elevation:
Land surface Elevation:		
Date/Time Started: <b>10/15/07 9:44</b>	Logged by: <b>W. Thompson 10/15/07</b>	
Date/Time Completed: <b>10/15/07 13:30</b>	Checked by:	

Township, Range, Section:	Latitude:	Longitude:
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Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	HCI Rxn	Sample Description
		GR	SA	FI				
0-3"							Asphalt	
3"			10	90	ML	7.5 yr 4/4	S Silt, with 10% sand-brown, sand fraction is fine to very fine-grained, very soft, damp; strong reaction to HCL	
10			5	10	85	ML	7.5 yr 4/4 S Silt, with 10% sand trace gravel-brown, as above except for trace gravel to 3" max diam, sub angular to well rounded. Very soft, moist, slightly cohesive; strong reaction to HCL	
15			10	20	65	ML	7.5 yr 5/4 S Sandy silt with gravel-brown, sand fraction is coarse through fine grained, gravel is subangular to rounded, max diam 3", loose, damp, strong reaction to HCL	
20			40	30	30	GM	7.5 yr 5/4 S Silty gravel with sand-brown, gravel fraction is subangular to rounded, primarily a granitoid, clasts average to 2" max diam; sand fraction is coarse through very fine gravel, fairly well-graded through to silt fraction, loose mix, damp, strong reaction to HCL.	
25			5	15	80	ML	7.5 yr 5/4 S Silt with sand trace gravel; gravel fraction as above; sand fraction is mostly fine grained, little coarse material: loose, soft, moist; strong reaction to HCL	

Project Name: <b>Seventh &amp; Arizona</b>					Boring No.: <b>AS-1</b>			
Depth (Ft)	Graphic Log	Estimated %			USCS Symbol	Munsell Color	HCI Rxn	Sample Description
		GR	SA	FI				
30		10	20	70	ML	7.5 yr 5/4	S	Sandy silt with gravel-brown; gravel fraction is as above, clasts to 2" in diam; sand coarse through fine. Grained, soft, loose, moist; strong reaction to HCL
35		10	20	70	ML	7.5 yr 5/3	M	As above, except that fines contain some clay; slightly cohesive, small balls of slightly plastic material, very soft, moist; moderate reaction to HCL
40		10	20	70	ML	7.5 yr 5/3	M	As above
45		10	40	50	ML	7.5 yr 5/3	W	Sandy silt with gravel-brown; gravel clasts up to 2" max diam, subangular to rounded; sand fraction is coarse through fine. Grained; loose, soft, slightly cohesive, moist; Weak reaction to HCL
48		80	10	10	GW-GM	7.5 yr 5/3	N	Gravel-gravel clasts are a light gray crystalline grainitoid, subangular to well rounded, to 3" max diam; small amount of sand and silt, loose, damp; no reaction to HCL
50		10	40	50	ML	7.5 yr 5/3	M	Sandy silt-brown, gravel to 2" max diam as described above; sand fraction is coarse-through fine-grained, fairly well graded through to silt fraction, loose, damp; moderate reaction to HCL
55		60	30	10	GM	7.5 yr 5/3	N	Gravel with silt and sand-brown; gravel composed of light colored grainitoid clasts, subangular to rounded, 2" max diam; sand fraction is coarse-through fine-grained, loose mix, damp; no reaction to HCL
60		40	40	20	GM	7.5 yr 5/3	M	Silty gravel with sand-brown as above except that constituent percentages have changed as noted and silts react moderately to HCL
65		20	30	50	ML	7.5 yr 5/3	S	Sandy silt with gravel-brown; gravel to 1.5" max diam, light colored granitoids; sand is coarse-through very fine-grained, soft loose mix; diesel odor; moist; strong reaction to HCL
70		20	30	50	ML	7.5 yr 5/3	S	As described above
75								No return from auger
80			15	85	ML	7.5 yr 5/3	S	Clayey silt with sand-brown, sand fraction is medium to very fine grained; soft, cohesive, slightly plastic, moist; strong reaction to HCL





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**AS-BUILT WELL CONSTRUCTION DIAGRAM  
FOR AIR SPARGE WELL  
7AZAS-1**

Approved	Date	Author	Date	File Name	Figure
<b>RKZ</b>	<b>11/14/07</b>			<b>8322711A</b>	<b>2</b>

**Project: 7th St & Arizona Ave WQARF Site Investigation**

Boring: **SVE-1**

Pg. 1 of 1

Drilling Co: **Geomechanics Southwest Inc.**

Drilling Method: **Hollow Stem Auger**

Date Started: **12/20/05**

Location: **300 E. 7th Street**

Sampler: **Grab**

Date Completed: **12/20/05**

**Tucson, AZ**

Desc. of Meas Pt: **Land Surface Elev.**

Logged by: **W.Thompson**

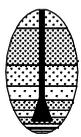
Land Surf. Elev: **NS**

Meas. Pt. Elev: **NS**

Reviewed by: **R. Zimmerman**

Depth - FT.	WELL COMPLETION		Blow Count	% Recovery	PID (ppm)	Samples	Depth - FT.	Graphic Log	DESCRIPTION	USCS Symbol	ESTIMATED % OF			Moisture
	2' diameter, Traffic-Rated Vault										GR	SA	FI	
5	12" Borehole (0-55' bls)					G	5		SILTY SAND - Strong brown (7.5YR 4/6); sand is fine to very fine-grained, soft, loose, damp.	SM		80	20	M
10	Bentonite/cement grout (0-21.5' bls)			0.7			10		SILTY SAND - Strong brown (7.5YR 4/6); gravel up to 1/2" max diameter, subangular to well rounded; sand as above; loose, damp.	SM	10	75	15	M
15	4" SCH 40 PVC casing (0-30' bls)			0.9		G	15							
20				1.6			20							
25	Bentonite seal (21.5-22' bls)			1.6		G	25		WELL GRADED SAND WITH GRAVEL - Brown (7.5YR 5/4); gravel up to 1" max diameter, angular to subrounded; sand is coarse to fine-grained, well graded; damp.	SW	15	80	5	M
30	#60 Sand (22-25' bls)			4.5		G	30		Similar to above; small amount of clay, probably thin interbeds.	SW	15	80	5	M
35	3/8" Gravel (30-55' bls)			0.3		G	35		SILTY SAND - Brown (7.5YR 5/4); sand is mostly fine-grained, few coarse-grained; soft, slightly sticky, damp.	SM		80	20	M
40				11.0		G	40		Similar to above.	SM		80	20	M
45	4" SCH 40 PVC 0.060" slot (30-50' bls)			5.1		G	45		WELL GRADED SAND WITH GRAVEL - Brown (7.5YR 5/4); Gravel up to 1/2" max diameter, subangular to subrounded; sand is coarse to very fine-grained, well graded; damp.	SW	15	80	5	M
50				1.8		G	50		Similar to above; gravel up to 1" max diameter.	SW	15	80	5	M
55	4" SCH 40 PVC sump (50-55' bls)			33.7		G	55		Similar to above.	SW	15	80	5	M
									T.D. = 55' bls.					

HGC-WELL2 832100.GPJ NEWPROJ.GDT 4/29/13



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**Lithologic Log and Well Construction Details of SVE-1**  
7th St & Arizona Ave WQARF Site

Approved <b>RZ</b>	Date <b>2/3/06</b>	Revised <b>BE</b>	Date <b>2/20/06</b>	Reference: <b>832100lgINT</b>	FIG. <b>2</b>
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