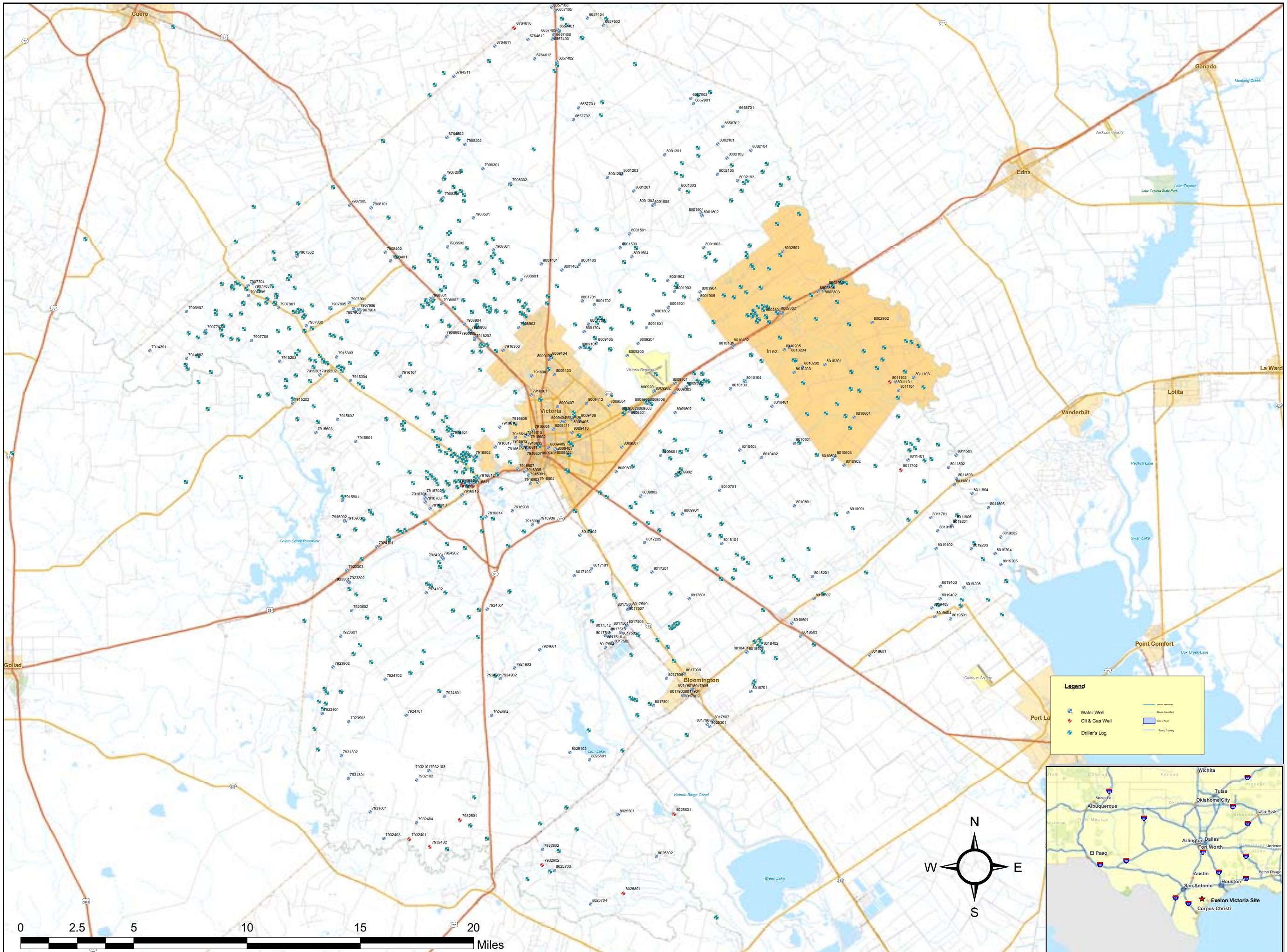
2.4.12 Groundwater Appendices

Appendix 2.4.12-A: Plate 1, Texas Water Development Board Wells

(1 page)

PLATE I



TEXAS WATER DEVELOPMENT BOARD WELLS

Appendix 2.4.12-B: Listing of Water Wells in Victoria County from Texas Water Development Board Well Database

(47 pages)

Record of Wells by County

County - Victoria

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
6657105	M.A. Finch Estate	290504	965908	/ /1958	190	C	3	0	170	121GOLD	171	1 measurement 1958 -120	P	W	S	Cased to bottom.
						S	3	170	190							
6657106	Church of Christ	290513	965918							112GLFC	172		S	E	D	
6657401	Welton Nickel	290420	965903	/ /	421					121GOLD	189	14 measurements 1958 to 1976 MIN -112.09 MAX -66.45	N		U	Flow estimated 1/2 gpm. Old well.
6657402	Mesario Rodriguez, Sr.	290306	965907	05/12/1980	160	C	4	0	120	121GOLD	157		J	E	H	
						S	4	120	160							
6657403	Jane Brown	290359	965918	/ /1985	87	C	4	0	87	112GOLD	182	2 measurements 1997 to 2001 MIN -49.06 MAX -48.7	S 0.50 hp	E	H	
6657404	William Brumond Well #1	290446	965745		80	C	4	0	80	121GOLD	173	1 measurement 1959 -65.3	P	W	H	
6657405	Welton Jetton	290410	965915	/ /1953	347	C	4	0	347	121GOLD	184		N		S	Flow estimated @ 0.5 gpm 11/10/58.
6657406	Fordtran Volunteer Fire Dept.	290401	965912	04/20/1999	270	C	5	0	230	121GOLD	185	5 measurements 1999 to 2007 MIN -104 MAX -83.54	S 7.50 hp	E	F	
						S	5	230	270							
6657502	T.W. Nickel	290429	965703	/ /	500					121GOLD	172	1 measurement 1974 1	N	S	S	Measured flow 0.25 gpm 3-14-74; produces some gas.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
6657701	Louis Kolle, Jr	290119	965812	/ /1940	400					121GOLD	130	2 measurements 1958 to 1964 MIN MAX	N		U	Reported flowed until 1957.
6657702	Louis Kolle, Jr.	290052	965826	/ /1948	60					112CHCT	154	1 measurement 1958 -26.8	T	E 0.5 hp	H	
6657901	Jarrell E. Brown	290124	965310	/ /	968					121GOLD	115	9 measurements 1964 to 1972 MIN -83.88 MAX -72.32			I	
6657902	Bill Daniels	290136	965317	/ /1956	137	C	4	0	137	121GOLD	110	1 measurement 1958 -56.8	T	E 2.0 hp	H	Drilled to 42 ft, then deepened to 137 ft in 1956. Cased to bottom.
6658701	Raymond Karnes	290104	965115	/ /	400					112LGLD	101	17 measurements 1956 to 1975 MIN -51.94 MAX -41.3			I	
6658702	Richard Burrough	290030	965154	/ /1950	600					112LISS	106	8 measurements 1955 to 1963 MIN -135.2 MAX -50.59	T	G	I	Cased to bottom. Slotted at sands from 140 to 600 ft. Discharge measured 1570 gpm. Temp. 75 degrees F. Aquifer test in TWDB R-98.
6764511	Joe E. Bialek	290237	970338	/ /1952	88	C S C S C	3 3 3 3 3	0 63 66 82 86	63 66 82 86 88	121GOLD	195	1 measurement 1958 -46.6	P	E 1.0 hp	H	Cased to bottom.
6764610		290426	970058	/ /						NOT-APPL						Oil test..
6764611	Shell Oil Corp.	290345	970149	/ /1952	270	C C	6 4			121GOLD	193	1 measurement 1958 -62	T	E 3.0 hp	P	Pump set @ 150 ft. Discharge reported @ 50 gpm 11/1958. Perforated @ bottom. Cased to bottom.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
6764612	Mrs. L.E. Batts	290359	970022	/ /1953	140	C	4	0	140	121GOLD	194	1 measurement 1958 -90.5	T	E 0.75 hp	H	
6764613	G.M. Booth	290314	970005		80	C	4	0	80	121GOLD	160	1 measurement 1958 -39.3	P	W	H	
6764801	O.D. Edwards	290025	970331	/ /1950	333					121GOLD	181	32 measurements 1959 to 1993 MIN -114.8 MAX -65.1	T	E 1.50 hp	H	
6764802	O.D. Edwards	290016	970359		72	C	2	0	72	121GOLD	185	2 measurements 1934 to 1959 MIN -39.9 MAX -38.3	P	W	H	
7906902	W.H. Ruschaupt	285343	971529	/ /1934	98	C	4	0	98	121GOLD	186	1 measurement 1958 -57.4	P	W	H	Cased to bottom.
7907305	Western Natural Gas	285743	970817	/ /1947	419					121GOLD	163	46 measurements 1947 to 2007 MIN -82.24 MAX -60	S	1.00 hp	U	Cased to bottom. Slotted from 380 to 400 ft.
7907502	A.J. Meisenhelder	285547	971037		94	C	4	0	94	121GOLD	160	2 measurements 1934 to 1958 MIN -88.7 MAX -78.9	P	E 0.5 hp	H	
7907702	Edgar Heinold	285259	971440	/ /1957	209					121GOLD	140	10 measurements 1958 to 1971 MIN -25.42 MAX -22.64	N		U	Cased to bottom. Perforated from 181 ft. to bottom. Drilled to supply water for oil well drilling-rig.
7907703	Freddie Heinold	285446	971234	11/23/1981	170	C	5	0		112GLFC	220	7 measurements 1983 to 2007 MIN -105.72 MAX -101	S 0.75	E hp	H	
7907704	Otto H. Albrecht	285441	971247	/ /1898	128	C	4	0	128	121GOLD	220	2 measurements 1934 to 1958 MIN -108 MAX -106	P	W	H	Temp. measured @ 73 deg F. 10/6/58.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7907705	E.W. Dentler	285418	971246	/ /1955	145	C	3	0	145	121GOLD	201	1 measurement 1958 -101.2	P	W	H	Deepened from 115 ft. to 145 ft. in 1955.
7907706	Marcellous Kolodzey	285234	971240		100	C	4	0	100	121GOLD	191	1 measurement 1958 -90.4	T 1.0 hp	E	H	Cased to bottom.
7907801	O.W. Schaefer	285349	971128	/ /1919	120	C	4	0	120	121GOLD	185	1 measurement 1958 -101.6	P	W	H	Drilled to 103 ft. and later deepened to 120 ft.
7907802	E.A. Jacob	285306	971016	/ /1903	85	C	5	0	85	121GOLD	155	2 measurements 1934 to 1958 MIN -73.8 MAX -69.7	P	E	H	Also powered by WIND. Temperature measured @ 72 deg F.
7907901	Joe M. Woodruff	285358	970822	/ /1911	81					112GLFC		2 measurements 1934 to 1958 MIN -65.1 MAX -64.2	P	W	H	
7907902	South Texas Electric Cooperative Well #3	285337	970807	05/17/1965	853	C C S S S S S S S S S S C	16 11 11 11 11 11 11 11 11 11 11 11 11	0 318 425 520 585 620 640 660 725 770 805 835 851	420 353 455 540 590 630 650 675 755 800 835 851 853	121EVGL	105	25 measurements 1965 to 2007 MIN -44.7 MAX 0	T 75.00 hp	E	N	Owner's well #3. Geophysical log Q-840. Observation well. Measured yield 752 GPM with 146 feet drawdown after pumping 24 hours in 1975. Specific capacity 5.1 GPM/ft. Cemented from 0 to 420 feet. Underreamed 30 inches from 420 to 853 feet. Gravel packed from 318 to 853 feet. 11 inch casing between screen intervals.
7907903	South Texas Electric Cooperative Well #1	285344	970811	/ /1962	905	C S C S C	11 4 4 4 4	0 406 446 620 660	406 446 620 660 905	121EVGL	105	1 measurement 1990 -24.52	T 20 hp	E	F	Owner's well #1. Standby well. Reported flowed 60 GPM in 1964. Average yield 437 GPM after pumping 9 hours in 1964. Cemented from 0 to 406 feet. Diameter of hole 15 inches. Gravel packed.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7907904	South Texas Electric Cooperative Well #2	285342	970757	08/06/1964	307	C	18	0	145	112CHCT	101	3 measurements 1964 to 2001 MIN -23.31 MAX -20	S	E	N	Owner's well #2. Geophysical log Q-839. Measured yield 350 GPM with 112 feet drawdown after pumping 43 hours in 1964. Specific capacity 3 GPM/ft. cemented from 0 to 145 feet. Underreamed 30 inches from 145 to 307 feet. Gravel packed.
						C	13	0	155							
						S	13	155	211							
						C	13	211	212							
						C	11	212	220							
						S	11	220	240							
						C	11	240	252							
						S	11	252	267							
						C	11	267	285							
						S	11	285	295							
						C	11	295	305							
						C	11	305	307							
7907905	John Schlein	285347	970914		67	C	6	0	67	112CHCT	170	2 measurements 1934 to 1958 MIN -58.2 MAX -57.2	P	W	S	
7907906	South Texas Electric Cooperative Well #4	285342	970758	01/01/2001	870	C	18	0	370	121EVGL	104	1 measurement 2001 -23.58	T	E	N	Reported yield 1250 GPM with 153 ft drawdown after pumping 24 hours in 2001. Cemented from 0 to 370 feet. Underreamed and gravel packed from 370 to 860 feet.
						C	12	292	372							
						S	12	372	388							
						C	12	388	420							
						S	12	420	452							
						C	12	452	460							
						S	12	460	472							
						S	12	520	550							
						S	12	584	598							
						S	12	628	680							
						S	12	720	750							
						S	12	770	800							
						S	12	804	810							
						S	12	826	850							
						C	12	850	870							
7908101	Edmund Nitschmann	285736	970721	/ /1886	101	C	36	0	70	121GOLD	154	2 measurements 1934 to 1958 MIN -71.9 MAX -58.2	P	W	H	Dug to 70 ft. & then bored from 70 ft. to 101 ft. Temp. measured @ 72 deg F.
						C	4	70	101							
7908201	Fernando DeLeon	285757	970412		350					121GOLD	185	5 measurements 2001 to 2007 MIN -79.85 MAX -70.68	S	E	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7908202	R.H. Welder Estate	285959	970312		50	C	4	0	50	121GOLD	147	1 measurement 1959 -18	P	W	S	
7908203	R.H. Welder Estate	285847	970407	/ /1924	78	C	4	0	78	121GOLD	187	1 measurement 1959 -66.6	P	W	S	
7908301	R.H. Welder Estate	285902	970226	/ /1957	100	C	2	0	100	121GOLD	141	1 measurement 1959 -28.5	P	W	S	
7908302	Welder Cattle Co.	285827	970114	/ /1958	103	C	4	0	103	121GOLD	157	1 measurement 1959 -58.8	P	W	S	
7908401	William A. Kyle, Jr.	285533	970632	/ /1957	80	C	4	0	80	121GOLD	145	1 measurement 1958 -54.7	T 0.75 hp	E	H	
7908402	Bill Kyle 14555 US Hwy 87	285553	970646		250					112GLFC	151	1 measurement 2005 -55.07	S	E	H	
7908501	Dr. macllum	285709	970253	/ /1957	340					121GOLD	172	28 measurements 1963 to 1989 MIN -127.5 MAX -97.27	T	E	U	Csaed to bottom. Slotted from 260 ft. to bottom. Pump set at 110 ft. Discharge reported 800 gpm with test pump in 1957.
7908502	Ben F. McCormick	285603	970402	/ /1952	500	C	4	0	500	112LISS	160		N		U	Flow reported @ 60 gpm on 11/11/58. Equipped with shut-off valve.
7908601	Mrs. E.D. Pittman	285554	970202	/ /1940	80					121GOLD	160	1 measurement 1958 -18.5	P	W	H	Depened from 37 ft to 80 ft in 1940
7908801	Johnny Crawford	285403	970450	/ /1953	287					121GOLD	122	29 measurements 1958 to 1989 MIN -81.7 MAX -45	T 7.50 hp	E	I	Cased to bottom. Drawdown reported 45 ft. after several hours pumping at 181 gpm.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7908802	J.L. Oliver	285352	970420	/ /1930	40	C	6	0	40	121GOLD	120	1 measurement 1934 -29.4	T	E	H	Temp. measured @ 71 deg F.
7908803	Mrs. M.H. Williams	285237	970408	/ /1955	90	C	4	0	90	121GOLD	98	1 measurement 1958 -30	P	W	S	
7908804	Mike and Gale Woods Woods Conoco	285304	970321	03/15/1992	220	C C S	5 3 3	0 170 190	190 190 220	121GOLD	117	2 measurements 1992 to 2003 MIN -78 MAX -78	S	E	C	
7908805	Memory Garden Cemetery	285233	970254	/ /1950	169	C	6	0	169	112CHCT	111	6 measurements 1958 to 2007 MIN -65.39 MAX -39.72	S	E	I	Well H-3 in TWBE Bulletin 6202. Discharge reported @ 100 GPM on 10/24/1958.
7908806	Flying J R. V. Park	285248	970307	01/25/2002	220					112CHCT	109	2 measurements 2006 to 2006 MIN -41.7 MAX -18	S	E	P	
7908901	Frank Boehm	285444	970049		65	C	4	0	65	121GOLD	131	1 measurement 1958 -35.9	P	W	U	Originally a dug well, then was cas ed and filled around casing.
7908902	G.N. West	285254	970059	/ /1956	54	C	4	0	54	121GOLD	120	1 measurement 1958 -44.3	P	W	H	Cased to bottom.
7914301	Alton Meritz	285214	971707		70	C	4	0	70	121GOLD	201	1 measurement 1958 -67.6	T 0.75 hp	E	H	Reported weak supply.
7914302	W.J. Thamm	285155	971531	/ /1919	106	C	4	0	106	121GOLD	159	1 measurement 1958 -59.6	P	W	H	
7915202	Armin Jaschke	285008	971055		90	C	36	0	90	121GOLD	170	1 measurement 1958 -77.8	P	W	H	Rock curb.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7915203	Mary Parkinson	285145	971127	/ /1874	125	C	4	0	125	121GOLD	190	2 measurements 1934 to 1958 MIN -65 MAX -62.1	T 0.75 hp	E	H	
7915301	Barry Rux	285112	970942	/ /1958	150	C	5	0	150	121GOLD	150	46 measurements 1958 to 2007 MIN -97.43 MAX -73.1	N		U	Drillers log. Formerly 7915201 then located correctly.
7915302	Barry Rux	285112	970942	/ /	157	C	5	0		121GOLD	188	1 measurement 2001 -94.04	S 1.0	E hp	H	
7915303	Miss Kate Davidson	285153	970858		101	C	4	0	101	121GOLD	189	2 measurements 1934 to 1958 MIN -99.9 MAX -94.5	P	W	H	Temp. measured @ 73 deg F.
7915304	Mrs. Emma D. Schmidt	285058	970822		65	C	10	0	65	121GOLD	187	1 measurement 1958 -34.5	P	W	H	10 inch concrete curb @ surface.
7915601	Warren Heinold	284837	970811		55	C	4	0	55	121GOLD	147	1 measurement 1958 -49.2	P	E	H	Reported weak supply.
7915602	Lester Albrecht	284929	970858	/ /1894	85	C	4	0	85	121GOLD	151	2 measurements 1934 to 1958 MIN -51.1 MAX -46.4	P	W	H	
7915603	Hahn Estate	284859	970955	/ /1958	213	C	6	0	213	112CHCT	142		N		U	Drillers log.
7915901	E.J. Pantel	284621	970848		70	C	4	0	70	121GOLD	126	1 measurement 1958 -53.7	T 0.5 hp	E	H	
7915902	Coletoville Lutheran Church	284535	970844	02/10/2000	298	C S	4 4	0 278	278 298	121GOLD	128	1 measurement 2000 -76	S	E	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.	Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7915903	Raisin Volunteer Fire Dept. Coletoville Sta.	284532	970842	03/27/2001	112	C 4 0 102 S 4 102 112	121GOLD	125	6 measurements 2001 to 2007 MIN -43.98 MAX -42.61	S	E	F	
7916101	Sil Schlein	285106	970612		84		121GOLD	131	2 measurements 1934 to 1958 MIN -46.9 MAX -43.5	N		U	Temp. measured @ 73 deg F.
7916202	Memory Garden Cemetery	285228	970255	09/27/2002	240	C 5 0 180 S 5 180 240	112CHCT	104	2 measurements 2002 to 2003 MIN -55 MAX -51.4	S	E	I	
7916301	Texas Concrete	285018	970030	06/02/1981	120		112CHCT	94	1 measurement 1991 -42.5	S	E 5 hp	N	
7916302	Victoria Country Club	285102	970027	04/30/1986	772	C 13 0 509 S 13 509 555 C 13 555 562 S 13 562 602 C 13 602 619 S 13 619 649 C 13 649 658 S 13 658 688 C 13 688 705 S 13 705 715 C 13 715 720	121EVGL	85	23 measurements 1986 to 2007 MIN -123 MAX -48.21	T 75.00	E hp	I	Observation well. Measured yield 1500 GPM with 211 feet drawdown after pumping 12 hours in 1986. Specific capacity 7.1 GPM/ft. Cemented from 0 to 65 feet. Gravel packed from 0 to745 feet.
7916303	G. Sala Estate	285202	970141	/ /1953	65	C 4 0 65	112CHCT	100	1 measurement 1958 -31.3	T 0.5 hp	E	H	
7916501	Emil Tibiletti	284846	970401	/ /1951	64	C 4 0 64	112CHCT	113	1 measurement 1958 -52.8	P	W	H	
7916502	A.L. Pozzi	284758	970302	/ /1931	410	C 10 C 4	121EVGL	56	1 measurement 1958 -9.2	N		U	Flow reported @ 150 gpm 3/1/34, but stopped in 1954. Temp. measured @ 75 deg F.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916601	Memorial Park Cemetery	284856	970026	/ /1956	550					112LISS	93	62 measurements 1959 to 1979 MIN -91.82 MAX -49.79	T	E 25.00 hp	U	Casing perforated from 480 ft to bottom. Supplies water for cemetery. Discharge reported 450 gpm.
7916602	City of Victoria	284846	970037	07/19/1974	1010	C	20	0	390	112GLFC	59	9 measurements 1974 to 1991 MIN -243 MAX -106.79	T	E 150 hp	P	City well #21. Geophysical log Q-100. Originally drilled to 1075 feet. Measured yield 2090 GPM with 104 feet drawdown after pumping 24 hours on 090574. Specific capacity 20.1 GPM/ft. Pumping level 243 feet. Cemented from 0 to 390 feet. Underreamed 36 inches and gravel packed from 390 to 1010 feet. 12.75 inch O.D. Set Nipple & B.P.V. from from 1008 to 1010 feet.
						C	14	320	400							
						S	14	400	430							
						C	14	430	440							
						S	14	440	460							
						C	14	460	485							
						S	14	485	550							
						C	14	550	575							
						S	14	575	620							
						C	14	620	680							
						S	14	680	715							
						C	14	715	785							
						S	14	785	840							
						C	14	840	930							
						S	14	930	990							
						C	14	990	1008							
7916603	City of Victoria	284821	970058	07/09/1934	612	C	12	0	509	112GLFC	53		N		U	Well H-9 in TBWE Bulletin 6202. City well #5. Abandoned and plugged Public Supply well. Reported yield 408 GPM in 1942.
						S	12	509	536							
						S	10	536	538							
						C	10	538	612							
7916604	City of Victoria	284822	970058	/ /1908	611	C	10			112GLFC	53		N		U	Well H-12 in TBWE Bulletin 6202. City well #1. Abandoned and plugged Public Supply well.
						C	7									
7916605	City of Victoria	284821	970059	/ /1941	604	C	13	0	470	112GLFC	53	1 measurement 1942 -0.5	N		U	Well H-13 in TBWE Bulletin 6202. City well #9. Abandoned and plugged Public Supply well. Measured yield 520 GPM in 1942. Cemented from 0 to 471 feet. Gravel packed from 471 to 604 feet.
						C	10	470	475							
						S	10	475	527							
						C	10	527	554							
						S	10	554	600							
						C	10	600	604							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916606	City of Victoria	284821	970058	/ /1941	414	C	10	0	374	112GLFC	53		N		U	Well H-11 in TBWE Bulletin 6202. City well #8. Abandoned and plugged Public Supply well. Reported yield 650 GPM in 1958. Cemented from 0 to 374 feet.
						S	8	374	414							
7916607	Torin Bales	284812	970043	06/27/1985	110	C	4	0	68	112CHCT	75	21 measurements 1985 to 2005 MIN -34.92 MAX -24.15	S	E	H	Observation well. Estimated yield 100+ GPM in 1985. Cemented from 0 to 10 feet. Historical observation well.
						S	4	68	73							
						C	4	73	90							
						S	4	90	110							
7916608	Riverside Golf Course Pres. Bill Shelton	284915	970125	06/14/1968	327	C	24	0	50	121EVGL	65	18 measurements 1968 to 2007 MIN -64.8 MAX -12.8	T 50.00	E hp	I	Owner's well #1. Observation well. Measured yield 1009 GPM with 192 feet drawdown after pumping 6 hours in 1968. Specific capacity 5.26. GPM/ft. Cemented from 0 to 50 feet. Gravel packed from 50 to 327 feet.
						C	14	0	119							
						S	14	119	140							
						C	14	140	149							
						S	14	149	184							
						C	14	184	194							
						S	14	194	233							
						C	14	233	242							
						S	14	242	267							
						C	14	267	282							
						S	14	282	325							
						C	14	325	327							
7916609	City of Victoria	284822	970058		414	C	12			121EVGL	53		N		U	Well #125 in TWDB Report M287. City well #2. Abandoned and plugged Public Supply well.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power Use	Remarks
7916610	City of Victoria	284823	970058	03/11/1938	356	C	16	0	160	121EVGL	53	1 measurement	N	U	City well #6. Abandoned and plugged
						C	9	117	158			1938			Public Supply well. Measured yield
						S	9	158	180			-1			500 GPM with 78 feet drawdown in
						C	9	180	204						1938. Underreamed and gravel packed
						S	9	204	222						
						C	9	222	258						
						S	9	258	314						
						C	9	314	326						
						S	9	326	347						
						C	9	347	354						
						S	9	354	356						
7916611	City of Victoria	284823	970058	/ /1940	412	C	16	0	369	121EVGL	53	1 measurement	N	U	Well H-14 in TBWE Bulletin 6202.
						S	10	364	410			1952			City well #7. Abandoned and Plugged
						C	10	410	412			-35			Public Supply well. Reported yield
															700 GPM in 1958. Drillers log. Temp
															erature @ 73 deg. F.
7916612	City of Victoria	284822	970058	/ /1946	754	C	18	0	400	121EVGL	53	1 measurement	N	U	Well H-10 in TBWE Bulletin 6202.
						C	10	400	754			1958			City well #11. Abandoned and plugg-
												-51			ed Public Supply well. Measured
															yield 1033 GPM with 70 feet draw-
															down after pumping 24 hours in
															1958. Specific capacity 14.8
															GPM/ft. Static level @ 51ft & pump-
															ing level @ 121 ft. Electric & rad-
															ioactivity logs. Temp. @ 75 deg. F.
7916613	City of Victoria	284818	970046	/ /1952	965	C	18	0	400	121EVGL	93	9 measurements	N	U	City well #13. Geophysical log.
						C	11	346	404			1952 to 1971			Abandoned and plugged Public Supply
						S	11	404	429			MIN -163 MAX -51			well. Measured yield 1033 GPM with
						S	11	434	459						79 feet drawdown after pumping 24
						S	11	489	540						hours in 1952. Specific capacity
						S	11	570	615						13.1 GPM/ft. Well reworked in 1967.
						S	11	665	700						Cemented from 0 to 400 feet. Under-
						S	11	785	835						reamed 36 inches from 400 to 965
						S	11	895	905						feet. Casing between screened
						S	11	925	950						intervals.
						C	11	950	965						

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916614	City of Victoria	284840	970112	11/15/1970	1068	C	18	0	450	121EVGL	63	6 measurements 1970 to 1989 MIN -165 MAX -94	T 200 hp	E	P	City well #19. Geophysical log. Originally drilled to 1082 feet. Measured yield 1520 GPM with 126.5 feet drawdown after pumping 24 hours in 1970. Specific capacity 12 GPM/ft. Cemented from 0 to 450 feet. Underreamed and gravel pack-ed.
						C	10	400	460							
						S	10	460	510							
						C	10	510	544							
						S	10	544	594							
						C	10	594	642							
						S	10	642	694							
						C	10	694	780							
						S	10	780	804							
						C	10	804	852							
						S	10	852	904							
						C	10	904	988							
						S	10	988	1088							
						C	10	1088	1026							
						S	10	1026	1048							
						C	10	1048	1068							
7916615	City of Victoria	284843	970046	12/09/1986	1060	C	24	0	398	121EVGL	98	3 measurements 1987 to 1991 MIN -170 MAX -137.6	T	E	P	City well #26. Measured yield 1750 GPM with 84 feet drawdown after pumping 24 hours in 1987. Specific capacity 20.9 GPM/ft. Cemented from 0 to 398 feet. Underreamed 30 inch-es from 398 to 1055 feet. Gravel packed from 0 to 1060 feet. Casing between screened intervals.
						C	18	0	400							
						S	18	400	434							
						S	18	444	484							
						S	18	500	520							
						S	18	545	580							
						S	18	584	612							
						C	18	612	620							
						C	14	620	628							
						S	14	628	686							
						S	14	735	808							
						S	14	850	892							
						S	14	896	912							
						S	14	984	1018							
						S	14	1022	1044							
						C	14	1044	1060							
7916616	Dudley Jones	284905	970153		28	C	4	0	28	112CHCT	63	1 measurement 1958 -8.3	P	W	H	
7916617	M.J. Tibiletti	284819	970206		38	C	4	0	38	112CHCT	61	1 measurement 1958 -14.3	T 0.5 hp	E	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916701	Quail Creek MUD	284624	970512	08/ /1942	578	C	13	0	412	112LGLD	103	35 measurements	T	E	P	Well H-30 in TBWE Bulletin 6202.
	Well #2					C	7	412	425			1958 to 2006	30.00 hp			Owner's well #2. Measured yield 269
						S	7	425	438			MIN -62.1 MAX -36				GPM with 20 feet drawdown after
						C	7	438	448							pumping 1 hour in 1990. Specific
						S	7	448	460							capacity 13 GPM/ft. Observation
						C	7	460	487							well.
						S	7	487	497							
						C	7	497	532							
						S	7	532	572							
						C	7	572	578							
7916702	Quail Creek MUD	284632	970512	/ /1942	588	C	12	0	396	112LGLD	103	18 measurements	T	E	P	Well H-29 in TBWE Bulletin 6202.
	Well #1					C	7	396	405			1942 to 2006	30.00 hp			Gravel packed. Measured yield 146
						S	7	405	429			MIN -65 MAX -21				GPM with 8 feet drawdown after
						C	7	429	449							pumping 1 hour in 1990.
						S	7	449	515							Specific capacity 18 GPM/ft.
						C	7	515	524							Owner's well #1 or Aloe well.
						S	7	524	542							Observation well.
						C	7	542	558							
						S	7	558	588							
7916703	Quail Creek MUD	284615	970512	01/30/1997	516	C	8	0	414	112LGLD	107	17 measurements	T	E	P	Quail Creek MUD Well No. 3. Yield
	Well #3					S	8	414	438			1997 to 2006	40.00 hp			1000 GPM with 155 feet drawdown
						C	8	438	446			MIN -80 MAX -38.35				after pumping 12 hours when drilled
						S	8	446	516							Specific capacity 6.4 GPM/ft.
																Water level observation well.
7916801	Victoria Packers	284659	970317	/ /	85					112CHCT	95				N	
7916802	Victor Heibel	284655	970334	/ /	81					112CHCT	89				H	
7916803	Wiedemayer	284653	970334	/ /	79					112LISS	89					
7916804	Zarbeck	284652	970334	/ /	96					112LISS	89					

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916805	Arthur Burks	284653	970313	/ /	65					112CHCT	95				H	
7916806	Ross Level	284653	970316	/ /	75					112CHCT	95				H	
7916807	J.L. Dohman	284652	970312	/ /	65					112CHCT	95				H	
7916808	Mrs. Edna Maurer	284659	970312	/ /	70					112CHCT	93				H	
7916809	A.R. Maurer	284659	970314	/ /	66					112CHCT	93				H	
7916810	Heldt Bros	284654	970307	/ /	126					112CHCT	92				N	
7916811	Heldt Bros.	284649	970308	/ /	126					112LISS	94					
7916812	W.F. Kennedy	284706	970252	/ /	65					112GLFC	87				H	
7916813	Gifford-Hill American	284559	970459	12/09/1969	588	C	7	0	443	121EVGL	111	1 measurement	S	E	N	Owner's well #1. Cemented from 0 to 470 feet.
						C	4	443	473			1970	15 hp			
						S	4	473	525			-37				
						C	4	525	533							
						S	4	533	586							
						C	4	586	588							
7916814	J.W. Calhoun	284538	970233	/ /1894	60	C	4	0	60	112CHCT	77	1 measurement	P	W	U	Temp. Measured @ 73 deg F.
												1958				
												-44.1				

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916815	Linden Hill Motel	284630	970335	07/13/1977	100	C S	4 4	0 85	85 100	112CHCT	90	1 measurement 1977 -50			P	
7916901	Central Power & Light Co.	284713	970040	/ /1951	700	C C S C S C	10 5 5 5 5 5	0 540 550 620 660 690	540 550 620 660 690 700	121EVGL	59	1 measurement 1958 -13	T	E 25 hp	N	Well H-23 in TBWE Bulletin 6202. Owner's well #1.
7916902	Central Power & Light Co.	284518	970032	/ /1956	1019	C C S	18 10 10	0 38 388	380 388 	121EVGL	55	1 measurement 1958 -19.6	T	E 150 hp	N	Well H-22 in TBWE Bulletin 6202. Owner's well #2. Reported yield 1557 GPM. Driller'log. Pump set @ 250 ft.
7916903	Central Power & Light Co.	284654	970035	12/08/1965	770	C C S C S C S C S C S C	18 11 11 11 11 11 11 11 11 11 11 11	0 348 420 465 480 500 530 600 630 670 730 755	410 420 465 480 500 530 600 630 670 730 755 770	121EVGL	50	15 measurements 1965 to 2005 MIN -82.71 MAX -53	T	E 150 hp	N	Owner's well #3. Geophysical log. Observation well. Originally drill- ed to 1022 feet in 1966. Bottom plugged with cement from 795 to 770 feet. Measured yield 1511 GPM with 70.52 feet drawdown after pumping 24 hours in 1966. Specific capacity 21.4 GPM/ft. Cemented from 0 to 410 feet. Underreamed 30 inches from 420 to 770 feet. Graval packed from 348 to 770 feet. historical observation well
7916904	Central Power & Light Co.	284656	970016	01/10/1966	865	C C S S S S S S S S C	18 11 11 11 11 11 11 11 11 11 11	0 349 420 475 530 575 622 672 730 825 850	410 420 450 485 560 585 662 712 750 850 865	121EVGL	52	2 measurements 1966 to 1991 MIN -85.05 MAX -70	T	E 150 hp	N	Owner's well #4. Geophysical log. Originally drilled to 1042 feet in 1966. Measured yield 1515 GPM with 101.5 feet drawdown after pumping 24 hours in 1966. Specific capacity 15 GPM/ft. Cemented from 0 to 410 feet. Underreamed 30 inches from 450 to 865 feet. Gravel packed from 349 to 865 feet. Casing between screened intervals.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7916905	Central Power & Light Co.	284722	970050	02/11/1966	845	C	18	0	400	121EVGL	56	2 measurements 1966 to 1991 MIN -86.44 MAX -62	T	E 150 hp	N	Owner's well #5. Geophysical log Q-841. Originally drilled to 1058 feet in 1966. Measured yield 1512 GPM with 109.5 feet drawdown after pumping 24 hours in 1966. Specific capacity 13.8 GPM/ft. Cemented from 0 to 400 feet. Underreamed 30 inches from 410 to 845 feet. Gravel packed from 349 to 845 feet. Casing between screened intervals.
						C	11	349	410							
						S	11	410	430							
						S	11	440	460							
						S	11	480	490							
						S	11	520	530							
						S	11	570	615							
						S	11	625	645							
						S	11	680	710							
						S	11	785	830							
						C	11	843	845							
7916906	Victoria Regional Disposal Plant	284524	970016	07/28/1970	620	C	16	0	44	121EVGL	54	1 measurement 1970 -60	S	E 15 hp	N	Disposal Plant well #1. Geophysical log. Measured yield 257 GPM with 11 feet drawdown after pumping 13 hours in 1970. Cemented from 0 to 350 feet.
						C	9	0	350							
						C	7	330	360							
						S	7	360	370							
						C	7	370	430							
						S	7	430	475							
						C	7	475	545							
						S	7	545	610							
						C	7	610	620							
7916907	Victoria Bank & Trust Co.	284727	970108	/ /1958	84	C	6	0	84	112CHCT	58			E 0.5 hp	P	
7916908	Mrs. George Wilden	284551	970124		1517	C	8	0	1517	122BKVL	54		N		U	Flow estimated @ 100gpm on 11/19/58 Temp. measured @ 81 deg F.
7923301	Coleto Water Co. Shady Oaks Subdivision	284311	970833	10/09/1977	222	C	9	0	182	112CHCT	105	3 measurements 1977 to 2001 MIN -70.68 MAX -60	S	E 10 hp	P	Owner's well #1. Geophysical log. Measured yield 225 GPM with 50 feet drawdown after pumping 24 hours in 1977. Specific capacity 4.5 GPM/ft. Cemented from 0 to 50 feet.
						S	9	182	222							
7923302	Vernon Reaser	284314	970837	/ /1986	160					121EVGL	105		S	E	I	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7923303	Raisin Volunteer Fire Dept. Hwy 59 Station	284340	970840	12/22/1999	194	C S	4 4	0 174	174 194	121EVGL	100	6 measurements 1999 to 2007 MIN -51 MAX -31.64	S	E	F	
7923601	Ronnie Stock	284108	970859	09/24/1981	120					112CHCT	114	24 measurements 1983 to 2007 MIN -44.7 MAX -39.9	S	E	H	Observation Well
7923602	Durwood Wynn	284207	970829	/ /1931	64	C	4	0	64	112CHCT	109	2 measurements 1934 to 1959 MIN -56 MAX -54.6	P	W	H	
7923901	Baass Bros.	283810	970950	/ /1954	596					112LISS	115	24 measurements 1959 to 1985 MIN -59.99 MAX -51.22	T 150.00 hp	G	I	Casing slotted from 200 to 280, 300 to 330, 350 to 400, and 430 to 585 ft. Discharge reported 2000 gpm.
7923902	M.E. Williams Estate	283957	970920	/ /1911	58	C	4	0	58	112CHCT	115	2 measurements 1934 to 1958 MIN -81.7 MAX -51.3	P	W	H	Temp. measured @ 72 deg F.
7923903	F.L. Mathews	283750	970841	/ /1958	141	C S	4 4	0 103	103 141	112CHCT	108	1 measurement 1958 -47.7	P 0.75 hp	G	H	Also powered by WIND. Slotted from 103 ft. to bottom. Cased to bottom.
7924101	Raisin Windmill Store	284433	970720	08/29/1997	260	C S	5 3	0 220	220 260	112CHCT	102	1 measurement 1997 -62	S	E	C	Cemented from 0 to 220 feet.
7924102	Raisin Volunteer Fire Dept. Givens Station	284245	970513	07/29/2001	100	C S	4 4	0 90	90 100	112CHCT	98	6 measurements 2001 to 2007 MIN -62 MAX -47.65	S 0.50 hp	E	F	
7924201	Fred Maurer	284403	970427	/ /	195					112LISS	88	18 measurements 1963 to 1980 MIN -51.02 MAX -48.12			H	
7924202	Fred Maurer	284407	970430	/ /1895	83	C	4	0	83	112CHCT	88	1 measurement 1958 -46.7	P	W	H	Temp. measured @ 73 deg F.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7924501	Lowery Bros.	284205	970234	/ /1951	90	C	4	0	90	112CHCT	85	1 measurement 1958 -54.6	J 0.75 hp	E	H	Drilled to replace old well. Top of sand reported @ 83 ft.
7924601	Pat Witte Hunter's Camp Well	284029	970018	00/00/1968	40	C	5			112LISS	25	1 measurement 2001 -7.57	J 0.50 hp	E	S	Hunter's Camp well.
7924701	Rose Morris Estate	283803	970611	/ /1946	84	C	4	0	84	112CHCT	95	1 measurement 1958 -45.6	P	W	H	Cased to bottom.
7924702	Raisin Volunteer Fire Dept. Kemper City Road	283927	970704	05/19/1998	180	C S	4 4	0 160	160 180	112CHCT	107	6 measurements 1998 to 2007 MIN -48.87 MAX -45	S	E	F	
7924801	Elmo Heller	283845	970430	/ /1931	81	C	5	0	81	112CHCT	92	2 measurements 1934 to 1958 MIN -49.4 MAX -42.6	P	W	H	Temp. measured @ 72 deg F.
7924901	Pat Witte	283924	970202	/ /1954	90					112LISS	86	2 measurements 1958 to 1964 MIN -50.2 MAX -50.2	N		U	
7924902	Pat Witte	283924	970203	12/27/1995	125	C S C S	4 4 4 4	0 60 70 100	60 70 100 120	112LISS	86	2 measurements 1995 to 2001 MIN -28 MAX -28	S .50 hp	E	H	
7924903	Henry Witte	283948	970125		30	C	6	0	30	112LISS	29	1 measurement 1958 -20	P	W	S	
7924904	D.H. Braman	283759	970227	/ /1958	254	C C S C	16 4 4 4	0 219 220 253	219 220 253 254	112CHCT	83		T 7.5 hp	E	H	Drillers log. Discharge measured @ 100 gpm. Slotted from 220 ft to 253 ft. Gravel-walled. Test hole to 389 ft.
7931301	Armour Fagan	283539	970845	/ /1953	80	C	4	0	80	112CHCT	78	1 measurement 1958 -43	P	W	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7931302	Raisin Volunteer Fire Dept. S. A. River Sta.	283632	970902	12/19/1999	113	C S	4 4	0 103	103 113	112CHCT	107	1 measurement 1999 -54	S	E 00.50 hp	F	
7931601	O.C. Mathews	283421	970749	/ /1956	128	C S	4 4	0 110	110 128	112LISS	80	1 measurement 1958 -54.2	P	W	H	Cased to bottom. Slotted from 110ft to bottom.
7932101	J.J. Murphy Estate	283554	970514	/ /1957	250					112LISS	90	17 measurements 1958 to 1978 MIN -46.65 MAX -40.42	N		U	Cased to bottom. Slotted from 230 ft to bottom.
7932102	J. J. Murphy	283533	970546	/ /	1475					112LGLD	91	16 measurements 1963 to 1978 MIN -42.48 MAX -34.22			U	
7932103	Mary Murphy Greer	283554	970514	07/09/1997	142	C C S	10 4 4	0 0 120	15 120 140	112LISS	90	2 measurements 1991 to 2001 MIN -41.08 MAX -39	S	E .75 hp	H	
7932401	Lepold Morris well 1	283317	970608	/ /						NOT-APPL						Oil test.
7932402	Pedro Garza well 1	283258	970515	/ /						NOT-APPL						Oil test.
7932403	Louise O'Conner	283319	970714	/ /1968	150					112CHCT	87		S	E	H	
7932404	Gussie Smith	283354	970548	/ /1948	100	C	2	0	100	112CHCT	91	1 measurement 1958 -60	J	G 0.25 hp	H	
7932501	Mary Simmons well 9	283359	970355	/ /						NOT-APPL						Oil test.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
7932602	J.A. McFaddin Estate	283248	970020	/ /1951	595					112LISS	63	45 measurements 1959 to 2007 MIN -90.41 MAX -33.5	T 85.00 hp	G	I	Cased to bottom. Slotted from 185 ft to bottom. Discharge reported 1850 gpm. Temp. 82 degrees F.
7932902	--O'Connor well 1-F	283212	970022	/ /						NOT-APPL						Oil test.
8001201	Carter Bros.	285805	965551	/ /	737					112LGLD	123	11 measurements 1964 to 1975 MIN -107.42 MAX -84.22			I	
8001202	J.A. McFaddin Estate	285837	965659	/ /	70	C	8	0	70	121GOLD	141	1 measurement 1958 -30.8	P	W	S	
8001203	J.A. McFaddin Estate	285844	965622	/ /1952	203	C S	4 4	0 185	185 203	112CHCT	136	1 measurement 1958 -71.6	P	W	H	Casing slotted from 185ft to bottom
8001301	J.F. Terry	285927	965428	/ /1951	670					112LGLD	119	54 measurements 1956 to 2007 MIN -117.63 MAX -60	T	N	I	Cased to bottom. Slotted from 150 ft to bottom.
8001302	Carter Bros. Co. Maint. Bldg. Well	285733	965458	/ /	752					112LGLD	115	45 measurements 1964 to 2007 MIN -150.28 MAX -71.88	T	D	I	
8001303	J.A. McFaddin Estate	285807	965351	/ /1955	363	C S C S	4 4 4 4	0 192 200 350	192 200 350 363	121EVGL	117	1 measurement 1958 -89.7	P	W	S	Drilled to 200 ft, then deepened to 363 ft in 1955. Sand reported from 175-200 ft, and 330-363 ft.
8001401	Welder Cattle Co.	285520	965957		50	C	6	0	50	112CHCT	117	1 measurement 1959 -13.1	P	W	S	
8001402	J.A. McFaddin Estate	285505	965903	/ /1939	951	C	2	0	951	121EVGL	118	1 measurement 1958 -37.5	N		U	Drillers log. Reported flowed until summer of 1958.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8001403	J.A. McFaddin Estate	285518	965817	/ /1939	963	C	2	0	963	121EVGL	108	1 measurement 1958 -13	P	W	S	Reported formerly flowed.
8001501	J.A. McFaddin Estate	285626	965604	/ /1940	1211	C S	2 2	0 1191	1191 1211	121EVGL	96	1 measurement 1958 -1.5	N		U	Drillers log. Perforated from 1191 ft to bottom. Cased to bottom.
8001502	J.A. McFaddin Estate	285603	965620		60	C	4	0	60	112CHCT	98	1 measurement 1958 -22	P	W	H	
8001503	J.A. McFaddin Estate	285554	965629		1026	C	2	0	1026	121EVGL	93		N		S	Flow estimated @ 30 gpm on 12/18/58 Temp. measured @ 85 deg F.
8001504	J.A. McFaddin Estate	285533	965559		60	C	4	0	60	112CHCT	112	1 measurement 1958 -30.1	P	W	S	
8001505	J.A. McFaddin Estate	285731	965502	/ /1953	401	C S C	4 4 4	0 262 360	262 360 401	121GOLD	119	1 measurement 1958 -92.2	P	W	S	Drilled to 185ft, then deepened to 401ft in 1953. Sand reported from 155-260ft and 359ft to bottom.
8001601	Brown & Corey	285711	965255	/ /1947	595					112LISS	106	6 measurements 1955 to 1965 MIN -87 MAX -63	T 125.00 hp	G	I	Cased to bottom. Screen from 110 to 124, 155 to 165, 179 to 189, 245 to 256, and 330 to 343 ft. Pump set at 212 ft. Discharge reported about 1600 gpm.
8001602	J.A. McFaddin Estate	285705	965253	/ /1953	238	C	4	0	238	121GOLD	108	1 measurement 1958 -84.3	P	W	S	
8001603	Brown & Corey	285551	965250	/ /1954	408	C C	12 8			121EVGL	108	1 measurement 1959 -71.1	T 125.0 hp	G	I	Electric & Radioactivity logs. Discharge reported @ 1300gpm 1/20/1959 Gravel-walled. Cased to bottom.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8001701	J.A. McFaddin	285353	965811		70	C	4	0	70	112CHCT	125	1 measurement 1958 -37.1	P	W	S	
8001702	J.A. McFaddin Estate	285344	965740		70					112CHCT	121	1 measurement 1958 -39.4	P	W	S	
8001703	J.A. McFaddin Estate	285259	965756		70	C	4	0	70	112CHCT	117	1 measurement 1958 -44.8	P	W	S	
8001704	George Craigen	285242	965808	/ /1957	710	C C S	20 12 12	0 210 213	210 213 710	121EVGL	118	3 measurements 1958 to 1959 MIN -110.3 MAX -82	T	G 210.0 hp	I	Pump set @ 200 ft. Slotted from 213 ft to bottom. Cased to bottom.
8001801	Casa Blanca Ranch & Rice Co.	285249	965524	01/07/1982	1068	C S S S	20 20 16 12	0 309 409 900	309 409 900 1068	121EVGL	111		T	N	I	Owner's well #1. Geophsical log. Diameter of well 32 inches from 0 1068 feet. Gravel packed.
8001802	Casa Blanca Ranch & Rice Co.	285318	965506	03/22/1982	1125	C S S S	20 18 16 12	0 328 410 490	328 410 490 1125	121EVGL	111		T	N	I	Owner's well #2. Geophysical log. Diameter of well 32 inches from 0 to 1125 feet. Gravel packed.
8001901	Casa Blanca Ranch & Rice Co.	285335	965426	04/10/1982	960	C S S S	20 20 16 12	0 297 397 478	297 397 478 960	121EVGL	104		T	N	I	Owner's well #3. Geophysical log. Diameter of well 32 inches from 0 to 960 feet. Gravel packed from 0 to 960 feet.
8001902	C.V. Beck	285437	965426	/ /1936	42	C	4	0	42	112CHCT	100	1 measurement 1958 -30.4	P	E 0.5 hp	H	Also powered by WIND.
8001903	Edwin Finsbel	285411	965409		106	C	4	0	106	112CHCT	103	1 measurement 1958 -37.7	P	W	S	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8001904	Copano Cattle Co.	285409	965302	/ /1957	315	C	5	0	315	121EVGL	91	1 measurement 1959 -64.6	N		U	
8001905	Copano Cattle Co.	285352	965306		55	C	4	0	55	112CHCT	90	1 measurement 1958 -35.6	P	W	H	
8002101	Don Meek	285950	965208	/ /1948	600					112LGLD	104	6 measurements 1956 to 1960 MIN -72.1 MAX -52.84	T	G	I	Casing: 18-in to 294 ft., 12-in. from 294 to 599 ft. Slotted casing at sands below 121 ft.
8002102	Don Meek	285824	965118	/ /1954	366					112LISS	95	47 measurements 1958 to 2007 MIN -111.73 MAX -49.41			U	Cased to bottom. Slotted from 150 to 364 ft. Discharge estimated about 700 gpm.
8002103	George Musselman	285917	965145	/ /1969	783	C S S	20 16 12	0 302 340	302 340 783	121EVGL	101		T	D	I	Geophysical log. Diameter of well 30 inches from 0 to 783 feet. plugged back from 900 to 783 feet. Gravel packed.
8002104	George Musselman	285934	965042	/ /1951	600	C C	18 12			112LGLD	92	1 measurement 1958 -86.5	T	G	I	Discharge reported @ 2000 gpm on 9/18/1958. Cased to bottom.
8002105	C.D. Bracken	285840	965211	/ /1945	1345	C C	4 2			121EVGL	105		N		U	Flow estimated @ 4 gpm on 9/22/1958
8002501	Tom Eager	285539	964923	/ /1951	752					112LGLD	82	27 measurements 1958 to 1982 MIN -88.32 MAX -53.37	T	G	I	Cased to bottom. Slotted at sands from 138 ft. to bottom. Pump set at 160 ft. Discharge estimated 2000 gpm. Gravel-walled.
8002801	Texas Department of Transportation	285316	964927	10/16/1989	610	C C S C	9 6 6 6	0 527 577 602	575 577 602 610	112CHCT	65	2 measurements 1989 to 2004 MIN -98 MAX -29.35	S	E	P	Reported yield 40 gpm with 102 feet drawdown after pumping 24 hours in 1989. Well on east side of HWY 59.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8002802	TxDOT Rest Area US-59S Well ID# 2350046	285319	964935	11/01/1989	711	C	9	0	670	112CHCT	62	2 measurements 1989 to 2001 MIN -98 MAX -56.7	S	E	P	Reported yield 70 gpm with 4 feet drawdown after pumping 36 hours in 1989. Well on NW side of HWY 59. TxDOT Well ID# 2350046.
						C	6	620	670							
						S	6	670	700							
						C	6	700	711							
8002803	Inez Community Center	285408	964739	05/14/1991	92					112GLFC	64		S .50 hp	E	P	
8002804	Inez Ball Park Assoc.	285405	964752	11/15/1955	92	C	4	0	80	112GLFC	63	5 measurements 1995 to 2007 MIN -31.35 MAX -26.19	S	E	I	
						S	4	80	90							
8002902	T.J. Babb	285251	964532	/ /1951	595					112GLFC			T 170.00 hp	G	S	Cased to bottom. Casing slotted at sands from 150 ft.to bottom. Discharge reported 2500 gpm.
8002903	Ron Smith Texaco	285416	964728	05/30/1990	100	C	4	0	87	112CHCT	62	2 measurements 1990 to 2003 MIN -35 MAX -35	S	E	C	
						S	4	87	97							
8009101	Frank Peterson	285205	965819	/ /1957	851	C	18	0	200	112LGLD	115	52 measurements 1958 to 2007 MIN -148.78 MAX -69.2	T		U	Unused irrigation well. Reported yield 3000 GPM in 1963. Gravel packed. Historical observation well.
						S	18	200	300							
						S	12	300	851							
8009102	City of Victoria	285139	965940	03/03/1981	1090	C	20	0	380	121EVGL	106	5 measurements 1981 to 1991 MIN -152 MAX -117	T 250 hp	E	P	City well #24. Geophysical log. Measured yield 1752 GPM with 73 feet drawdown after pumping 12 hours in 1981. Specific capacity 24 GPM/ft. Cemented from 0 to 380 feet. Underreamed 36 inches and gravel packed from 380 to 1090 feet. casing between screened intervals.
						C	14	330	385							
						S	14	385	412							
						S	14	458	504							
						S	14	518	560							
						S	14	572	596							
						S	14	608	692							
						S	14	750	780							
						S	14	806	830							
						S	14	966	992							
						S	14	1004	1032							
						S	14	1054	1070							
						C	14	1070	1090							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009103	City of Victoria	285104	965928	11/11/1989	1140	C	20	0	545	121EVGL	107	2 measurements	T	E	P	City well #27. Geophysical log.
						C	14	465	556			1990 to 1991	250 hp			Measured yield 1760 GPM with 89
						S	14	556	621			MIN -143.02 MAX -130				feet drawdown after pumping 24
						S	14	640	724							hours in 1990. Specific capacity
						S	14	732	777							19.8 GPM/ft. Cemented from 0 to 545
						S	14	789	809							feet. Underreamed 36 inches and
						S	14	834	880							gravel packed from 545 to 1140
						S	14	909	935							feet. Casing between screened
						S	14	1000	1070							intervals.
						S	14	1088	1124							
						C	14	1124	1140							
8009104	Gressons Dairy	285144	965937	/ /1958	100	C	4	0	100	112CHCT	108	1 measurement	T	E	H	
												1958	0.5 hp			
												-44.1				
8009105	McGinnis & Skopal	285215	965736	/ /1957	881	C	18	0	198	112LGLD	116	1 measurement	T	G	I	Discharge reported @ 3000 gpm on 9/
						C	12	198	200			1958	216.0 hp			25/58. Slotted from 200ft to bottom
						S	12	200	881			-114.1				Gravel-walled. Cased to bottom.
																Aquifer test 5/6/59 in TWDB R-98.
																Specific capacity 54.6 GPM/ft.
8009201	Victoria County	285023	965507	/ /1941	523	C	13	0	440	112GLFC	98	1 measurement	T		U	Well J-15 in TBWE Bulletin 6202.
						C	7	440	443			1941				Owner's well #1. Unused Public
						S	7	443	453			-30				Supply well. Reported yield 510
						C	7	453	474							GPM. Gravel packed.
						S	7	474	517							
						C	7	517	523							
8009202	Victoria County	285020	965507	/ /1941	527	C	13	0	438	112GLFC	97	1 measurement	T		U	Well J-16 in TBWE Bulletin 6202.
	Airport Community					C	7	438	451			1941	50.00 hp			Owner's well #2. Unused Public
						S	7	451	461			-20				Supply well. Reported yield 510
						C	7	461	476							GPM. Gravel packed.
						S	7	476	517							
						C	7	517	527							
8009203	Duncan Bros.	285145	965616	/ /1950	810	C	20	0	222	121EVGL	112	2 measurements	T	G	I	Electric & Radioactivity logs. Dis-
						C	12	222	240			1951 to 1958				charge reported @ 2200gpm 11/12/58.
						S	12	240	808			MIN -93 MAX -56				Slotted form 240-808 ft.
						C	12	808	810							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009204	Duncan Bros.	285213	965547	/ /1956	885	C	20	0	303	121EVGL	114	1 measurement 1958 -94.8	T	G	I	Drillers log. Cased to bottom.
						C	12	303	885							
8009301	Cox Engineers	285039	965412	/ /1958	90					112GLFC			T 0.50 hp	E	H	Cased to bottom.
8009302	Hills Nursery	285030	965343	/ /1958	93	C	6	0	93	112CHCT	87	1 measurement 1958 -51.1	T	E	I	
8009303	Hills Nursery	285017	965413		60					112CHCT	95	1 measurement 1958 -46.5	J 0.25 hp	E	H	
8009401	City of Victoria	284812	965928	03/07/1946	752	C	16	0	432	112GLFC	99	11 measurements 1946 to 1990 MIN -165 MAX -31	T 100.00 hp	E	P	Well J-23 in TBWE Bulletin 6202. City well #12. Geophysical log. Originally drilled to 757 feet. Well was reworked with new casing and slotted pipe to 750 feet in 1966. Measured yield 880 GPM with 94 feet drawdown after pumping 19 hours in 1966. Specific capacity 9.4 GPM/ft. Cemented from 0 to 432 feet. Underreamed 36 inches from 432 to 752 feet. Gravel packed from 330 to 752 feet.
						C	11	330	439							
						S	11	439	492							
						C	11	492	538							
						S	11	538	663							
						C	11	663	719							
						S	11	719	749							
						C	11	749	755							
						C	11	755	757							
8009402	City of Victoria	284812	965929	/ /1942	1003	C	16	0	800	112GLFC	96	4 measurements 1942 to 1966 MIN -115 MAX -21	N		U	Well J-24 in TBWE Bulletin 6202. City well #10. Abandoned and plugg-ed Public Supply well. Originally drilled to 1504 feet. Plugged back to 1003 feet and underreamed in 1957.
						C	8	800	818							
						S	8	818	867							
						C	8	867	881							
						S	8	881	910							
						C	8	910	920							
						S	8	920	993							
						C	8	993	1003							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009403	City of Victoria	284810	965927	08/06/1975	1022	C	26	0	41	112GLFC	96	7 measurements	T	E	P	City well #22. Geophysical log.
						C	20	0	350			1975 to 1990	150 hp			Originally drilled to 1075 feet.
						C	14	250	360			MIN -241 MAX 144.55				Measured yield 1890 GPM with 96
						S	14	360	380							feet drawdown after pumping 24
						S	14	397	412							hours on 100175. Specific capacity
						S	14	440	470							19.68 GPM/ft. Cemented from 0 to
						S	14	485	500							350 feet. Undereamed 36 inches and
						S	14	535	585							gravel packed from 350 to 1022
						S	14	615	660							feet. 14 inch O.D. Set Nipple &
						S	14	715	745							B.P.V. Casing between Screened
						S	14	805	860							intervals.
						S	14	875	890							
						S	14	920	960							
						S	14	970	1000							
8009404	City of Victoria	284915	965912	10/23/1953	1034	C	18	0	420	112GLFC	99	17 measurements	T	E	P	Well J-22 in TBWE Bulletin 6202.
						C	11	350	425			1953 to 1991	200 .00 hp			City well #15. Geophysical log.
						S	11	425	460			MIN -205 MAX -91				Measured yield 2100 GPM with 105
						S	11	534	555							feet drawdown after pumping 1 hour
						S	11	615	645							in 1990. Specific capacity 20 GPM/
						S	11	695	715							ft. Cemented from 0 to 420 feet.
						S	11	730	756							Underreamed 30 inches and gravel
						S	11	780	810							packed from 420 to 1034 feet. 11
						S	11	930	1010							inch casing between screened inter-
						C	11	1010	1034							vals.
8009405	City of Victoria	284920	965844	/ /1958	1050	C	18	0	420	112GLFC	101	14 measurements	T	E	P	Well J-20 in TBWE Bulletin 6202.
						C	10	420	450			1958 to 1989	200 hp			City well #16. Geophysical log.
						S	10	450	510			MIN -185 MAX -50				Measured yield 1557 GPM in 1958.
						C	10	510	610							Cemented from 0 to 420 feet. Gravel
						S	10	610	670							packed from 420 to 1050 feet.
						C	10	670	690							
						S	10	690	740							
						C	10	740	775							
						S	10	775	810							
						C	10	810	925							
						S	10	925	1000							
						C	10	1000	1050							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009406	City of Victoria	284916	965903	09/18/1953	1017	C	18	0	435	112GLFC	101	18 measurements	T	E	P	Well J-21 in TBWE Bulletin 6202.
						C	11	368	442			1953 to 1991	150.00 hp			City well #14. Geophysical log.
						S	11	442	464			MIN -201 MAX -107				Measured yield 1560 GPM with 75
						S	11	484	510							feet drawdown after pumping 24
						S	11	579	590							hours in 1953. Cemented from 0 to
						S	11	614	630							435 feet. Underreamed 30 inches
						S	11	639	670							from 435 to 1017 feet. Gravel pack-
						S	11	687	710							ed from 368 to 1017 feet. Casing
						S	11	723	745							between screened intervals.
						S	11	779	810							Aquifer test 3/22/55 in TWDB R-98.
						S	11	875	885							Specific capacity 23.4 GPM/ft.
						S	11	934	956							
						S	11	975	1000							
						S	11	1000	1015							
						S	11	1015	1017							
8009407	City of Victoria	284950	965921	10/05/1977	1000	C	30	0	40	112GLFC	97	5 measurements	T	E	P	City well #23. Geophysical log.
						C	20	0	350			1977 to 1991	200 hp			Originally drilled to 1090 feet.
						C	14	300	362			MIN -152 MAX -139.12				Measured yield 1830 GPM with 117
						S	14	362	381							feet drawdown after pumping 24
						S	14	420	434							hours. Specific capacity 15.6 GPM/
						S	14	454	470							ft. Cemented from 0 to 350 feet.
						S	14	502	532							Underreamed 36 inches from 350 to
						S	14	580	630							1000 feet. Gravel packed from 300
						S	14	660	670							to 1000 feet. Casing between
						S	14	685	730							screened intervals.
						S	14	745	800							
						S	14	832	852							
						S	14	888	916							
						S	14	934	978							
						C	14	978	1000							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009408	City of Victoria	284920	965824	06/02/1964	828	C	18	0	420	121EVGL	828	15 measurements	T	E	P	City well #17. Geophysical log.
						C	11	357	433			1964 to 1991				Originally drilled to 1060 feet.
						S	11	433	453			MIN -178 MAX -100				Measured yield 1529 GPM with 126
						S	11	473	483							feet drawdown after pumping 26
						S	11	503	523							hours in 1964. Specific capacity 12
						S	11	543	553							GPM/ft. Cemented from 0 to 420
						S	11	563	583							feet. Underreamed 30 inches from
						S	11	612	637							420 to 828 feet. Gravel packed from
						S	11	701	737							357 to 828 feet. Casing between
						S	11	761	801							screened intervals.
						S	11	814	822							
						C	11	822	828							
8009409	City of Victoria	284815	965946	03/ /1968	1036	C	18	0	545	121EVGL	96	9 measurements	T	E	P	City well #18. Geophysical log.
						C	10	475	550			1968 to 1981	200 hp			Originally drilled to 1061 feet.
						S	10	550	588			MIN -171 MAX -118				Measured yield 1515 GPM with 139
						C	10	588	610							feet drawdown after pumping 24
						S	10	610	655							hours in 1968. Specific capacity
						C	10	655	718							10.9 GPM/ft. Cemented from 0 to 545
						S	10	718	758							feet. Gravel packed.
						C	10	758	828							
						S	10	828	892							
						C	10	892	922							
						S	10	922	946							
						C	10	946	964							
						S	10	964	1016							
						C	10	1016	1036							
8009410	City of Victoria	284850	965844	11/15/1970	1037	C	18	0	350	121EVGL	97	8 measurements	T	E	P	City well #20. Geophysical log.
						C	12	300	370			1970 to 1991	200 hp			Measured yield 1538 GPM with 133
						S	12	370	396			MIN -162 MAX -126.25				feet drawdown after pumping 14
						S	12	410	425							hours in 1970. Specific capacity
						C	10	425	445							11.56 GPM/ft. Cemented from 0 to
						C	10	445	448							350 feet. Underreamed from 350 to
						S	10	448	1017							1017 feet. Gravel packed from 300
						C	10	1017	1037							to 1037 feet.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009411	City of Victoria	284858	965933	07/30/1984	1040	C	20	0	395	121EVGL	101	3 measurements 1984 to 1991 MIN -181 MAX -151.92	T	E	P	City well #25. Geophysical log. Originally drilled to 1075 feet. Set with BPV,WWP,and STN at 1040 feet. Measured yield 1705 GPM with 117 feet drawdown after pumping 24 hours in 1984. Specific capacity 14.6 GPM/ft. Underreamed 36 inches 395 to 1040 feet. Gravel packed from 345 to 1040 feet. Casing be- tween screened intervals.
						C	14	345	406							
						S	14	406	422							
						S	14	440	484							
						S	14	496	508							
						S	14	542	576							
						S	14	618	658							
						S	14	726	768							
						S	14	780	862							
						S	14	932	1020							
						C	14	1020	1040							
8009412	J.J. Tagliabue	284956	965805	/ /1938	70	C	4	0	70	112CHCT	101	1 measurement 1958 -53.1	J 0.75 hp	E	H	
8009501	Dowell, Inc	284937	965613	/ /1957	250					112GLFC			T 5.00 hp	E	H	Cased to 237 ft. Screen from 237 to 247 ft. Pump set at 189 ft.
8009502	Enron Gas Processing	284934	965558	/ /1965	360	C	6			121EVGL	96		S 5 hp	E	N	Owner's well #1 Pumps Continously. Reported yield 35 GPM in 1991.
8009503	Enron Gas Processing	284934	965558	02/22/1988	360	C	4	0	320	121EVGL	96	1 measurement 1988 -150	S 5 hp	E	N	Owner's well #2. Stand by well. Reported yield 35 GPM in 1991. Cemented from 0 to15 feet.
						S	4	320	360							
8009504	Colony Creek Country Club	284951	965706	02/04/1985	850	C	13	0	452	121EVGL	95	1 measurement 1985 -190	T 75 hp	E	I	Owner's well #1. Geophysical log. Measured yield 2060 GPM with 67 feet drawdown after pumping 8 hours in 1985. Specific capacity 30.7 GPM/ft. Cemented from 0 to 15 feet. Gravel packed from 452 to 850 feet.
						S	13	452	508							
						C	13	508	650							
						S	13	650	725							
						C	13	725	760							
						S	13	760	796							
						C	13	796	800							
						O	26	800	850							
8009505	Aquasource Brentwood Manor #1	284954	965524	/ /1961	524	C	6	0	325	121EVGL	94		S 5 hp	E	P	Owner's well #1. Standby well. Cemented from 0 to 325 feet.
						S	6	325	253							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009506	Aquasource	284954	965523	01/20/1964	525	C	7	0	325	121EVGL	94	1 measurement	S	E	P	Owner's well #2. Cemented from 0 to
	Brentwood Manor #2					S	7	325				2001		15 hp		325 feet. Total depth unknown.
												-104.13				
8009507	Louis Pozzi	284814	965634	/ /1950	80	C	4	0	80	112CHCT	85	1 measurement	T	E	H	
												1958		0.5 hp		
												-47.4				
8009601	Mrs. Otto Joose	284753	965453	/ /1947	65	C	4	0	65	112CHCT	83	1 measurement	P	W	H	Drilled to replace old well 45 feet
												1958				deep.
												-46.9				
8009602	Owen Kolle	284931	965413	/ /1947	532	C	18	0	104	112LGLD	86	1 measurement	T	G	I	Drillers log. Discharge reported @
						C	12	104	532			1958				1750 gpm on 11/11/58. Gravel-walled
												-41.1				
8009801	N.E. Carsner	284717	965650	/ /1956	520					112LISS	87	12 measurements	T	G	I	Casing: 8-in to 150 ft, 7-in from
												1958 to 1973				150 ft to bottom. Screen at sands
												MIN -59.94 MAX -58.62				below 150 ft. Dishcarge reported
																750 gpm with test pump.
8009802	M.O. Schroeder	284620	965547		62	C	4	0	62	112CHCT	77	1 measurement	P	W	H	
												1958				
												-46.9				
8009901	George Smyjstrla	284537	965359	/ /1958	530	C	24	0	153	121EVGL	74	1 measurement	T	E	I	Drillers log. Drawdown measured @
						C	12	153	155			1958				167 ft after 10 hrs pumping @ 1290
						S	12	155	235			-47				gpm on 11/6/58. Static level @ 47ft
						C	12	235	280							Pumping level @ 214ft. SpecCapacity
						S	12	280	315							of 7.72 gpm/ft. Gravel-walled. Cas-
						C	12	315	340							ed to bottom.
						S	12	340	357							
						C	12	357	370							
						S	12	370	408							
						C	12	408	418							
						S	12	418	428							
						C	12	428	530							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8009902	A.P. Hagel	284705	965415	/ /1956	276	C	8	0	173	112LISS	79	1 measurement 1958 -83.6	T 15.0 hp	E	I	Discharge reported @ 350 gpm 9/3/58 Pump set @ 138ft. Slotted from 173-258 ft.
						S	8	173	258							
						C	8	258	276							
8010101	T.S. Clements	285200	965139	/ /1956	880					112LISS	78	81 measurements 1958 to 2007 MIN -99.18 MAX -44.53	S 30.00 hp	E	I	Casing: 20-in. to 303 ft, 12-in from 303 ft to bottom. 366 ft of screen at sands below 270 ft. Discharge reported 3200 gpm. Aquifer test in TWDB R-98.
8010102	Kolle Kutchka	285208	965140	/ /1922	68	C	4	0	68	112CHCT	78	2 measurements 1934 to 1958 MIN -45.3 MAX -30	P	W	H	Temp. @ 72 deg F.
8010103	G.M. Minatre	285024	965147	/ /1931	82	C	4	0	82	112CHCT	71	2 measurements 1934 to 1958 MIN -39.1 MAX -24.2	J 0.25 hp	E	H	temp. @ 70 deg F.
8010104	Michael Tater	285041	965109	05/19/2006	67					112CHCT	62	2 measurements 2006 to 2006 MIN -18 MAX -14.6	S	E	H	
8010201	Nat Maraggia	285116	964738		90	C	60	0	60	112CHCT	55	1 measurement 1958 -35.4	J 0.25 hp	E	H	Dug well w/ concrete curb to 60ft., drilled from 60-90 ft.
						C	4	60	90							
8010202	C.D. Schmidt	285111	964837		100	C	4	0	100	112CHCT	59	1 measurement 1958 -42.5	P	W	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8010203	N.E. Carsner	285059	964859	/ /1957	635	C	12	0	100	112LGLD	60	1 measurement 1958 -46	T 195.0 hp	G	I	Discharge reported @ 1250gpm on 12/11/58. Drawdown of 108ft after 6hrs pumping @ 1250 gpm on 12/11/58. Static level @ 46ft. Pumping level @ 154 ft, w/ SpecCap. of 11.57 gpm/ft Gravel-walled. Cased to bottom.
						S	12	100	228							
						C	12	228	250							
						S	12	250	282							
						C	12	282	310							
						S	12	310	344							
						C	12	344	352							
						S	12	352	370							
						C	12	370	406							
						S	12	406	420							
						C	12	420	422							
						S	12	422	438							
						C	12	438	506							
						S	12	506	550							
						C	12	550	566							
						S	12	566	630							
						C	12	630	635							
8010204	D.R. Blackburn	285157	964910	/ /1956	553	C	12	0	133	112LGLD	60	2 measurements 1958 to 1958 MIN -63.4 MAX -52.7	T	G	I	Drillers log. Discharge reported @ 1200 gpm on 11/22/58. Slotted from 133-358 ft. Gravel-walled. Cased to bottom.
						S	12	133	147							
						C	12	147	165							
						S	12	165	185							
						C	12	185	203							
						S	12	203	230							
						C	12	230	295							
						S	12	295	310							
						C	12	310	345							
						S	12	345	358							
						C	12	358	553							
8010205	Leo Kutchka	285152	964924	/ /1917	38	C	4	0	38	112CHCT	65	2 measurements 1934 to 1958 MIN -30.9 MAX -29.3	P	W	S	Temp. measured @ 72 deg F.
8010401	Allen Bros.	284942	965000	/ /1956	654					112LISS	66	44 measurements 1963 to 2007 MIN -57.13 MAX -32.55	N		U	Casing: 20-in to 205 ft, 14-in from 205 to 246 ft, 12-in from 246 ft to bottom. Discharge reported 2200 gpm.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8010402	A.P. Garrett	284744	965029	/ /1960	80	C	4	0	80	112GLFC	66	2 measurements 1997 to 2001 MIN -23.36 MAX -22.95	J 0.50 hp	E	I	Old Wood Hi Grocery Well.
8010403	B.H. Mutchler	284802	965125	/ /1948	112	C	4	0	112	112CHCT	70	1 measurement 1958 -35	P	W	H	
8010501	Wood Memorial School	284815	964902	/ /1951	170	C	4	0	170	112CHCT	61	1 measurement 1958 -37	T 1.5 hp	E	P	
8010601	Rovi Farms	284913	964624	02/23/1981	1080	C S S	20 16 12	0 399 479	399 479 1080	121EVGL	44		T	D	I	Owner's well #5. Geophysical log. Diameter of well 32 inches from 0 to 1080 feet. Gravel packed from 0 to 1080 feet.
8010602	Inez Farms	284736	964723	07/ /1978	1007	C S S	18 18 14	0 300 400	300 400 1007	121EVGL	55		T	N	I	
8010603	Catarina Briones	284743	964716		40	C	4	0	40	112CHCT	52	1 measurement 1958 -19.8	J 0.25 hp	E	H	
8010701	Edmond Kainer	284630	965220	/ /1958	450					112LISS	70	12 measurements 1958 to 1971 MIN -41.74 MAX -38.94	T 60.00 hp	E	I	Discharge measured 1013 gpm with test pump. Aquifer test in TWDB R-98.
8010801	L.H. Hanselka	284551	964905		38	C	3	0	38	112CHCT	57	1 measurement 1958 -22	P	W	H	
8010901	Mrs. Armel Baker	284533	964645	/ /1949	955					112LISS	48	25 measurements 1963 to 1986 MIN -24.12 MAX -15.18	J 0.50 hp	E	S	Cased to bottom. Screen from 923 ft to bottom.
8010902	Inez Farms	284723	964653	08/00/1978	1007					121EVGL	52		T	N	I	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8011101	Anton Otto	285033	964433	/ /1956	470					112LISS	49	47 measurements 1958 to 2007 MIN -70.58 MAX -27.06	T	G	U	Cased to bottom. Slotted from 162 to 215, 365 to 390 and 435 ft. to bottom. Discharge measured 1180 gpm with test pump. Pump set at 160 ft. Gravel-walled.
8011102		285033	964449	/ /						NOT-APPL						
8011103	A.H. Witte	285042	964346	/ /1958	138	C S	4 4	0 126	126 136	112CHCT	40	1 measurement 1958 -42.3	J 0.25 hp	E	H	
8011104	Anton Otto	285013	964426		60	C	4	0	60	112CHCT	42	1 measurement 1958 -43.1	N		U	
8011401	Henry Clay Koooatz	284732	964405	/ /						112LISS	41	34 measurements 1964 to 1997 MIN -47.87 MAX -10.82	J	E	S	
8011503	John Keeran	284741	964159	/ /1954	1020	C S	2 2	0 990	990 1020	121EVGL	4		N		S	Flow estimated @ 40-60 gpm 11/5/58. Cased to bottom.
8011701	John Keeran	284518	964308	/ /1950	1215	C S C S C	2 2 2 2 2	0 100 1030 1182 1202	1005 1030 1182 1202 1215	121EVGL	36		C 0.5 hp	E	H	
8011702	Fort Saint Louis Spg.	284709	964425													
8011801	John Keeran	284633	964205	/ /1954	1364					112GLFC		1 measurement 1958	N		S	Cased to bottom. Screen from 1295 to 1355 ft. Flow estimated 10 gpm.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8011802	John Keeran	284713	964219	/ /1956	1460	C	10	0	1460	121EVGL	36		N		U	Well is capped @ present. Cased to bottom.
8011803	John Keeran	284646	964159	/ /1954	865	C S	2 2	0 820	820 865	121EVGL	4		N		S	Flow estimated @ 30-40 gpm 11/5/58. Cased to bottom.
8011804	John Keeran	284612	964119	/ /1951	797	C S	2 2	0 766	766 797	121EVGL	4		N		S	Flow estimated @ 30-40 gpm 11/5/58. Cased to bottom.
8011805	John Keeran	284538	964037	/ /1954	1262	C S C	2 2 2	0 1200 1260	1200 1260 1262	121EVGL	32		N		S	Flow estimated @ 15-20 gpm 11/5/58. Cased to bottom.
8011806	John Keeran	284510	964205		1440	C S	10 10	0 1400	1400 1440	121EVGL	32		N		S	Flow estimated @ 20-30 gpm 12/4/58. Cased to bottom.
8017101	Lockwood, Andrews & Newman	284334	965759	/ /1956	703					112LISS	37	46 measurements 1958 to 2007 MIN -19.03 MAX -8.98	T	G	U	Casing: 16-in to 505 ft, 12-in from 505 ft. to bottom. Discharge reported 1500 gpm.
8017102	H.C. Robinson	284452	965828	/ /1958	147	C S	4 4	0 129	129 147	112LGLD	44	1 measurement 1958 -7.1	N		U	Discharge reported @ 300 gpm on 11/24/58. Sand & gravel reported from 135 ft. to bottom. Cased to bottom.
8017103	A.B. Weaver	284319	965845	/ /1952	22	C S	6 6	0 18	18 22	112CHCT	31	1 measurement 1958 -6.1	B	H	H	
8017201	A.V. Pargac	284324	965521		46					112CHCT	71	2 measurements 1934 to 1958 MIN -42.6 MAX -40.5	P	W	H	
8017202	Karl Haschke	284432	965539		60	C	4	0	60	112CHCT	77	1 measurement 1958 -45.8	P	W	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8017501	E.I. Dupont de Nemours & Co	284118	965633	/ /1956	1026					112LGLD	68	255 measurements 1952 to 2007 MIN -64.42 MAX -14.53	P	W	U	Observation well. Water level measured by owner.
8017502	E.I. Dupont de Nemours	284106	965646	/ /1956	1026					112LGLD	68	680 measurements 1958 to 2007 MIN -261.9 MAX -27.07	N		U	Observation well. Water level measured by owner. Radioactivity & Electric logs. Owner's Well #2.
8017503	E.I. Dupont De Nemours & Co.	284042	965709	/ /1949	1062	C	16	0	585	121EVGL	68	1 measurement 1958 -41.8	T	E 75 hp	P	Owner's well #1. Originally drilled to 1072 feet. Reported yield 1598 GPM with 75 feet drawdown after pumping 24 hours. Specific capacity 21.3 GPM/ft. Cemented from 0 to 585 feet. Static level @ 41.8 LSD. Pumping level @ 116.8 LSD. Aquifer test in TWDB R-98. Specific capacity 25 GPM/ft.
						C	10	433	587							
						S	10	587	622							
						C	10	622	688							
						S	10	688	718							
						C	10	718	736							
						S	10	736	819							
						C	10	819	863							
						S	10	863	929							
						C	10	929	954							
						S	10	954	1029							
						C	10	1029	1062							
8017504	E.I. Dupont De Nemours & Co.	284031	965726	/ /1949	1059	C	16	0	588	121EVGL	68	1 measurement 1958 -43.5	T	E 75 hp	P	Well N-10 in TBWE Bulletin 6202. Owner's well #2. Originally drilled to 1130 feet. Measured yield 1500 GPM with 96 feet drawdown. Cemente from 0 to 588 feet. Gravel packed from 588 to 1059 feet.
						C	10	423	595							
						S	10	595	607							
						C	10	607	625							
						S	10	625	646							
						C	10	646	696							
						S	10	696	776							
						C	10	776	797							
						S	10	797	826							
						C	10	826	875							
						S	10	875	917							
						C	10	917	995							
						S	10	995	1045							
						C	10	1045	1059							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8017505	E.I. Dupont De Nemours & Co.	284040	965707		447	C C S	16 9 9	0 212	255	121EVGL	68	1 measurement 1958 -45.7	T	E 75 hp	P	Well N-14 in TBWE Bulletin 6202. Owner's well #3. Cemented from 0 to 255 feet. Underreamed 30 inches from 255 to 447 feet. Gravel packed from 212 to 447 feet.
8017506	E.I. Dupont De Nemours & Co.	284122	965629	08/06/1965	420	C C S C S C S	11 7 7 7 7 7 7	0 250 329 360 375 405 418	318 329 360 374 405 418 420	121EVGL	69	2 measurements 1965 to 1991 MIN -63 MAX -47.16	S	E	H	Geophysical log Q-842. Originally drilled to 466 feet. Plugged back to 420 feet. Formerly used as a Industrial well. Measured yield 250 GPM with 34 feet drawdown after Pumping 8 hours in 1965. Specific capacity 7.4 GPM/ft. Cemented from 0 to 318 feet. Underreamed 26 inches. Gravel packed.
8017507	Tennessee Gas & Transmission Co.	284159	965627	/ /1947	815	C	6	0	815	121EVGL	71		T 10.0 hp	E	P	Discharge reported @ 141 gpm.
8017508	Tennessee Gas & Transmission Co.	284202	965624	/ /1949	1226					121EVGL	71	1 measurement 1958 -32.2	T	E	N	Electric & Radioactivity logs.
8017509	Tennessee Gas & Transmission Co.	284203	965618	/ /1948		C	6			112GLFC	71		T 10.0 hp	E	P	Discharge reported @ 100 gpm.
8017510	E.I. Dupont de Nemours & Co.	284059	965726		500					112LGLD	69	1 measurement 1958 -47	N		U	Observation well. Water level measured by owner.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.	Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8017511	E.I. Dupont de Nemours & Co.	284057	965714	/ /1949	1130	C 16 0 588 C 10 588 595 S 10 595 607 C 10 607 625 S 10 625 646 C 10 646 696 S 10 696 770 C 10 770 797 S 10 797 826 C 10 826 875 S 10 875 917 C 10 917 995 S 10 995 1045 C 10 1045 1130	121EVGL	67	1 measurement 1958 -43.5	T 75.0 hp	E	P	Drillers log. Discharge reported @ 1598 gpm on 10/19/58 @ test hole w/ test pump. Pump set @ 240 ft. Grav-el-walled & screened.
8017512	E.I. Dupont de Nemours & Co.	284114	965708		500		112LISS	69	1 measurement 1958 -44.9	N		U	Observation well. Water level meas-ured by owner.
8017513	E.I. Dupont de Nemours & Co.	284106	965716		500		112LISS	69	1 measurement 1958 -46.8	N		U	Observation well. Water level meas-ured by owner.
8017601	John Swoboda	284221	965345	/ /1957	305		112LISS	64	26 measurements 1958 to 1986 MIN -48.3 MAX -34.4	T 50.00 hp	G	I	Cased to bottom. Slotted from 181 ft to bottom. Pump set at 80 ft. Drawdown reported 38 ft. after 24 hours pumping at 1500 gpm.
8017801	United Gas Pipeline	283816	965524	/ /1955	305		112BMLS	60	3 measurements 1955 to 1964 MIN -55 MAX -55	T 3.00 hp	E	H	Casing: 6-in. to 100 ft, 4-in. from 100 ft. to bottom. Screen from 268 to 300 ft. Discharge reported 50 or 60 gpm.
8017901	Victoria WCID #1 City of Bloomington	283852	965341	/ /1947	845		112GLFC	55	1 measurement 1947 -6	N		U	Well N-31 in TBWE Bulletin 6202. Owner's well #1. Abandoned and plug ed Public Supply well. Taken out of service about 1954.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8017902	Victoria WCID #1 City of Bloomington	283838	965406	/ /1953	500	C S C		0 457 497	457 497 500	112GLFC	55	1 measurement 1957 -44	N		U	Well N-32 in TBWE Bulletin 6202. Owner's well #2. Abandoned and plug ed Public Supply well. Measured yield 110 GPM with 22 feet drawdown after pumping 2 hours in 1957. Specific capacity 5 GPM/ft. Taken out of service in 1969.
8017903	Victoria WCID #1 City of Bloomington	283838	965405	/ /1954	549	C C	6 4	0 408	408 549	112GLFC	61	1 measurement 1954 -49	N		U	Well N-30 in TBWE Bulletin 6202. Owner's well #3. Abandoned and Plug ed Public Supply well. Measured yield 100 GPM with 36 feet drawdown after pumping 24 hours in 1954. Specific capacity 2.8 GPM/ft. Taken out of service about 1988.
8017904	Victoria WCID #1 City of Bloomington	283838	965405	10/06/1969	1001	C C S C S C	9 7 7 7 7 7	0 731 770 814 928 970	773 770 814 928 970 1001	112GLFC	61	2 measurements 1969 to 1991 MIN -50.29 MAX -42	S	E 25 hp	P	Owner's well #4. Measured yield 508 GPM with 124 feet drawdown after pumping 24 hours in 1969. Specific capacity 4.1 GPM/ft. Cemented from 0 to 773 feet.
8017905	Victoria WCID #1 City of Bloomington	283851	965343	06/10/1981	1010	C C S C S C S C S C S C	11 8 8 8 8 8 8 8 8 8 8 8	0 770 784 824 872 890 942 947 955 960 974 996	780 784 824 872 890 942 947 955 960 974 996 1010	121EVGL	55	6 measurements 1981 to 2007 MIN -48 MAX -25.36	S	E 25 hp	P	Owner's well #5. Geophysical log. Measured yield 1000 GPM with 44 feet drawdown after pumping 4 hours in 1981. Specific capacity 23 GPM/ft. Cemented from 0 to 780 feet.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8017906	Big Three Industries	283918	965448	02/04/1982	820	C	9	0	414	121EVGL	61	2 measurements	S	E	N	Owner's well #1. Deepened from 654
						C	7	380	405			1982 to 1991	30 hp			to 820 feet 10/1982. Measured yield
						S	7	405	430			MIN -58.13 MAX -58				330 GPM with 65 feet drawdown after
						C	7	430	447							pumping 24 hours in 1982. Specific
						S	7	447	464							capacity 5 GPM/ft. Cemented from 0
						C	7	464	611							to 414 feet.
						S	7	611	648							
						C	7	648	653							
						C	4	630	679							
						S	4	679	699							
						C	4	699	721							
						S	4	721	748							
						C	4	748	799							
						S	4	799	820							
8017907	Gulf Oil Corp.	283738	965249	/ /1937	960	C	8	0	909	112LISS	56		T	E	P	
						S	8	909	960				5.0 hp			
8017908	T.P. Traylor	283731	965304	/ /1879	80	O	30	0	80	112CHCT	54	2 measurements	P	W	H	Dug & bored well.
												1934 to 1958				
												MIN -42.5 MAX -39.3				
8017909	Laurana Stubblefield	283928	965401	/ /1915	52					112CHCT	61	1 measurement	N		U	Abandoned well.
												1959				
												-45				
8018101	Frank Buhler	284427	965217		40	C	6	0	40	112CHCT	57	1 measurement	P	W	H	6 inch concrete @ surface.
												1958				
												-35.4				
8018201	Robert Herron	284307	964821	/ /1927	40	C	4	0	40	112CHCT	43	1 measurement	P	W	H	
												1958				
												-12.5				

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.	Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8018401	Bloomington ISD	284016	965118	/ /1956	450	C 18 0 150 C 8 0 202 S 8 202 222 C 8 222 302 S 8 302 322 C 8 322 426 S 8 426 444 C 8 444 450	112BMLS	57	46 measurements 1956 to 2007 MIN -41.63 MAX -33.04	N		U	Well P-15 in TBWE Bulletin 6202. Owner's well #1. Observation well. Abandoned Public Supply well. Gravel packed.
8018402	Jesse Estrada	284026	965037	08/02/1983	336		112CHCT	56	24 measurements 1983 to 2007 MIN -37.1 MAX -29.84	S	E	H	
8018403	Bloomington ISD	284015	965116	03/24/1990	229	C 6 0 200 S 6 200 220 C 6 220 225 O 18 225 229	112CHCT	57	2 measurements 1990 to 1991 MIN -60 MAX -38.05	S	E	P	Measured yield 300 GPM with 20 feet drawdown after pumping 8 hours in 1990. Specific capacity 15 GPM/ft. Cemented from 0 to 120 feet. Gravel packed from 170 to 229 feet.
8018501	City of Placedo Well # 1	284120	964917	07/01/1959	1100	C 12 0 960 C 9 0 960 S 4 960 1100	121EVGL	51	2 measurements 1991 to 2001 MIN -52.22 MAX -43.8	S	E 20 hp	P	Owner's well #1. Cemented from 0 to 960 feet. Underreamed 20 inches from 960 to 1100 feet. Gravel packed from 865 to 1100 feet.
8018502	Lad Marek	284216	964818	/ /1953	170	C 4 0 170	112CHCT	48	1 measurement 1958 -37.6	P	W	H	
8018503	Sunray Oil Corp.	284050	964855	/ /1955	1015	C 4 0 940 S 4 940 980 C 4 980 990 S 4 990 1015	112LGLD	51	1 measurement 1958 -34	J	G	N	Drillers log. Cased to bottom.
8018601	M.A. Ellis	284003	964555	02/00/1967	300		112BMNT	42	37 measurements 1970 to 2007 MIN -38.1 MAX -23.63	T	N	I	
8018701	Bryan White	283844	965108		112	C 4 0 112	112CHCT	56	1 measurement 1934 -41	T	E	H	

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.				Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8019101	John Keeran	284447	964251	/ /1957	1495	C	2	0	1369	121EVGL	33		N		S	Drillers log. Reported flowing asof 11/5/1958.
						S	2	1369	1390							
						C	2	1390	1495							
8019102	Mrs. Emily Campbell	284406	964256	/ /1954	1378	C	2	0	1335	121EVGL	30		N		S	Flow estimated @ 10-15 gpm 11/5/58.
						S	2	1335	1378							
8019103	Mrs. Emily Campbell	284239	964247	/ /1954	1054	C	2	0	1000	121EVGL	26		N		S	Flow estimated @ 5-10 gpm 11/5/58. Cased to 1014 ft.
						S	2	1000	1046							
						O	2	1046	1054							
8019201	John Keeran	284459	964215	/ /1951	1367	C	2	0	1314	121EVGL	33		N		S	Flow estimated @ 20-30 gpm 11/5/58. Cased to bottom.
						S	2	1314	1359							
						C	2	1359	1367							
8019202	John Keeran	284430	964006	/ /1954	1415	C	2	0	1300	121EVGL	2		N	d hp	S	Drillers log. Flow estimated @ 20 - 30 gpm on 11/5/58. Cased to bottom.
						S	2	1300	1345							
						C	2	1345	1385							
						S	2	1385	1406							
						C	2	1406	1415							
8019203	John Keeran	284404	964124	/ /1950	1015	C	2	0	840	121EVGL	26		N		S	Reported flowing 11/5/58. Cased to bottom.
						S	2	840	857							
						C	2	857	898							
						S	2	898	929							
						C	2	929	1015							
8019204	John Keeran	284352	964022	/ /1956	1300	C	9	0	1270	121EVGL	3		N		S	Flow estimated @ 10-15 gpm 12/4/58. Cased to bottom.
						S	9	1270	1300							
8019205	John Keeran	284326	964007		1400	C	2	0	1400	121EVGL	3		N		S	Flow estimated @ 10-15 gpm 12/4/58. Perforated. Cased to bottom.
8019206	Mrs. Emily Campbell	284235	964145	/ /1954	1170	C	2	0	1100	121EVGL	15		N		S	Flow estimated @ 5-10 gpm 11/5/1958 Cased to 1130 ft.
						S	2	11001	1160							
						O	2	1160	1170							
8019402	Mrs. Emily Campbell	284210	964248	/ /1954	1450	C	9	0	1410	121EVGL	30	1 measurement 1958 0	N		U	
						S	9	1410	1450							

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.	Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8019403	Mrs. Emily Campbell	284149	964310	/ /1949	960	C 2 0 893 S 2 893 940 C 2 940 960	121EVGL	43		N		S	Flow estimated @ 5-10 gpm 11/5/1958 Cased to bottom.
8019404	Lena Rendon 4517 Lake Placedo Rd.	284129	964303				112GLFC	27	1 measurement 2005 -39.65	J	E	H	
8019501	G.E. McKamey	284123	964222	/ /1955	324		112BMNT	30	15 measurements 1958 to 1975 MIN -29.35 MAX -23.7	T	G	I	Cased to bottom. Slotted from 158 to 190, 235 to 260 and 290 ft to bottom. Discharge reported 500 gpm . Aquifer test in TWDB R-98.
8025101	J.A. McFaddin Estate	283613	965813	/ /	888		112LISS	57	2 measurements 1963 to 1964 MIN MAX	P	W	S	Oil test. Cased to bottom. Perforate from 808 ft to bottom.
8025102	J.A. McFaddin Estate	283631	965904	/ /1957	131		112CHCT	60	1 measurement 1958 -54.9	P	W	S	Drillers log.
8025301	T.P. Traylor	283725	965257	/ /1956	945	C 8 0 905 S 8 905 945	121EVGL	56		T 5.0 hp	E	H	Originally drilled as oil test well to 5492 ft. Reported shot from 905 to 945 ft. and completed as a water well.
8025501	J.A. McFaddin Estate	283405	965701		700	C 4 0 700	121EVGL	59	1 measurement 1958 -24.3	P	W	S	Reported formerly flowed.
8025601	--McCan well 2	283404	965435	/ /			NOT-APPL						Oil test.
8025703	Mark Dearlum	283159	965950		780		112CHCT	22	2 measurements 1992 to 2001 MIN 0 MAX 0	S	E	H	Flowing well submersible assisted.
8025704	J.A.McFaddin Estate	283040	965817		680	C 4 0 680	121EVGL	15	1 measurement 2001	N		S	Flow estimated @ 20-30 gpm 12/16/58 & 4/2001 Temp.@ 81 F in 1958.

Well	Owner	Latitude	Longitude	Date Drilled	Well Depth	Casing Info.	Aquifer	Elevation	Water Levels	Lift	Power	Use	Remarks
8025801	C.K. McCan	283103	965651	/ /			NOT-APPL						Oil test.
8025802	J.A. McFadden Estate	283227	965523		930	C 4 0 930	121EVGL	28		T	E 1.0 hp	H	Reported formerly flowed @ 20gpm in 1934. Flow has since diminished to an estimated 0.25 gpm, and pump was installed.

Aquifers:

112BMLS	BEAUMONT CLAY AND LISSIE FORMATION
112BMNT	BEAUMONT CLAY
112CHCT	CHICOT AQUIFER
112GLFC	GULF COAST AQUIFER
112GOLD	GOLIAD AND YOUNGER ROCKS,UNDIFFERENTIATED
112LGLD	LISSIE FORMATION AND GOLIAD SAND
112LISS	LISSIE FORMATION
121EVGL	EVANGELINE AQUIFER
121GOLD	GOLIAD SAND
122BKVL	BURKEVILLE AQUICLUDE
NOT-APPL	AQUIFER CODE IS NOT APPLICABLE TO THIS WELL

Appendix 2.4.12-C: Groundwater Flow Model of Cooling Basin Seepage

(71 pages)

Table of Contents

List of Tables

List of Figures

List of Attachments

1.0 Purpose

The Victoria County Station (VCS) Cooling Basin Groundwater Flow Model is being prepared to evaluate potential impacts on the groundwater flow system from the construction and operation of the cooling basin. Three specific areas of impact were assessed:

- seepage rate from the cooling basin into the site groundwater system
- impacts on plant construction dewatering from cooling basin seepage
- impacts on the accidental release pathway resulting from cooling basin seepage

The groundwater flow model is executed under the Groundwater Modeling System (GMS) version 6.5 environment developed by Aquaveo, LLC (Reference 1). The program consists of a series of pre- and post-processors that feed information to various numerical groundwater flow models developed by others. The groundwater flow model selected for the VCS utilizes a three-dimensional finite-difference groundwater flow model known as MODFLOW-2000 (Reference 2). This model consists of a main program that directs the execution of the simulation and a series of user selectable packages or modules that (1) simulate groundwater flow using block-centered (BCF), hydrogeologic unit (HUF), or layer property (LPF) finite-difference approaches, (2) control the solution of the finite-difference equations to represent the system (GMG, LMG, PCG2, SIP1, or SOR1), and (3) simulate boundary conditions, including drains (DRN1), evapotranspiration (EVT1), general head boundaries (GHB1), horizontal flow barriers (HFB1), lakes (LAK3), recharge (RCH1), rivers (RIV1), specified head boundaries (CHD1), streams (STR1), and wells (WEL1). Additionally, a subsidiary program known as MODPATH (Reference 3) is used to perform particle tracking to estimate travel time from the Radwaste Building to the nearest receptor for simulation of the accidental release pathway for radionuclides.

This work was accomplished by the following processes (Reference 4):

- Develop a conceptual hydrogeologic model.
- Develop groundwater flow model design.
- Calibrate numerical model using existing data.
- Perform a sensitivity analysis to document the effects of parameter uncertainty.
- Perform predictive simulations.
- Perform a sensitivity analysis to document the effects of uncertainty in predictive simulations.
- Document modeling results.

2.0 Assumptions

The following assumptions are used in this calculation:

1. The hydraulic conductivity of the fill material used in plant construction is assumed to be the equivalent of a typical clean sand and gravel at about 1,000 ft/d (Reference 4, Table 3.3).
2. The subsurface materials beneath the site are subdivided into four groundwater flow zones, designated “Sand 1” (unsaturated under pre-construction site conditions), the “Upper Shallow” aquifer, the “Lower Shallow” aquifer, and the “Deep” aquifer. The “Sand 1” aquifer is assumed to become saturated once the Exelon Victoria County Station cooling

basin (VCS CB) and Guadalupe-Blanco River Authority storage water reservoir (GSWR) are filled.

3. A single value of hydraulic conductivity (the mean of the aquifer pumping tests for each flow zone) is representative of the properties of each sand layer over the entire model domain. The "Sand 1" aquifer is assumed to be the same as the "Upper Shallow" and "Lower Shallow" aquifers, based on visual similarity and laboratory index property testing.
4. The native materials within each groundwater flow zone or model layer are assumed to be homogeneous and horizontally isotropic.
5. Interior and exterior cooling basin dikes are not considered in the cooling basin seepage analysis due to their small size in relation to the overall cooling basin area.
6. The cut-off wall is assumed to have a hydraulic conductivity of 1 x 10^{-6} ft/d and a thickness of 3 ft. The clay liner is assumed to have the same hydraulic conductivity as the cut-off wall and has a thickness of 3 ft.
7. Scenarios are assumed to represent steady-state conditions. There is little evidence to suggest that a time-dependent analysis (transient simulation) is necessary, nor is there sufficient onsite historical groundwater level data available to support transient modeling.

3.0 References

1. Aquaveo (2008) *Groundwater Modeling System Tutorials, GMS version 6.5*, Provo, Utah.
2. Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G. (2000) *MODFLOW-2000 The U.S. Geological Survey Modular Ground-Water Model – User Guide to Modularization Concepts and the Ground-Water Flow Process*, U.S. Geological Survey Open-File Report 00-92, Reston, Virginia.
3. Pollock, D.W. (1994) *User's Guide for MODPATH/MODPATH-PLOT, version 3: A Particle Tracking Post-Processing Package for MODFLOW, the U.S. Geological Survey Finite-Difference Ground-Water Flow Model*, U.S. Geological Survey Open-File Report 94-464, Reston Virginia.
4. Anderson, M.P., Woessner, W.W. (1992) *Applied Groundwater Modeling Simulation of Flow and Advective Transport*, Academic Press, Inc., San Diego, CA.
5. Chowdhury, A.H. and Turco, M.J. (2006) "Geology of the Gulf Coast Aquifer, Texas." in *Aquifers of the Gulf Coast of Texas*, R.E. Mace, S.C. Davidson, E.S. Angle, and W.F. Mullican III eds., Texas Water Development Board Report 365, Austin, TX.
6. National Geodetic Survey (2008) VERTCON North American Vertical Datum Conversion Utility available on line at http://www.ngs.noaa.gov/TOOLS/Vertcon/vertcon.html accessed June 21, 2008.
7. Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C. (2004) *Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999*, Groundwater Availability Modeling Section, Texas Water Development Board, Austin, TX.
8. Walton, W.C. (1984) *Practical Aspects of Groundwater Modeling*, National Water Well Association, Dublin, Ohio.
9. Texas Water Development Board [TWDB] (2008) *Water Information Integration & Dissemination (WIID) Groundwater Database*, on-line database at http://wiid.twdb.state.tx.us/
10. de Marsily, G. (1986). *Quantitative Hydrogeology – Groundwater Hydrology for Engineers*, Academic Press.
11. United States Geological Survey, *USGS Water Data for the Nation*, available at http://waterdata.usgs.gov/nwis, accessed July 28, 2008.
12. GE-Hitachi Nuclear Energy (2007) *ESBWR Design Control Document, Tier 2*, 26A6642AH, Revision 4, September.

4.0 Summary of Available Data

4.1 Regional Overview

The VCS site is located in southern Victoria County, and is approximately 13 mi south of the City of Victoria and about 140 mi southwest of Houston (Figure 1). The VCS site lies within the Coastal Prairies subprovince of the Gulf Coastal Plains physiographic province, which extends as a broad band along the coast of the Gulf of Mexico. The depositional environment for the geologic materials underlying the Coastal Prairies subprovince is that of a delta. This deltaic environment consists of a complex overlapping series of braided stream, levee, lagoon, and overbank flood sediments deposited in the Gulf of Mexico Basin during the Pleistocene. The Gulf of Mexico Basin was formed during the breakup of the megacontinent Pangaea in the Late Triassic. The deltaic depositional environment was influenced by a series of transgressive and regressive sea levels in the Gulf (Reference 5). The deltaic depositional environment would be similar to that seen on the present-day Mississippi delta. In the subsurface, deltaic deposits appear as alternating and interfingering layers of clay, sand, gravel, and silt. Continental uplift and subsidence of underlying sediments within the Gulf of Mexico Basin have produced units that dip toward the Gulf of Mexico.

The primary aquifers in the site area are the Chicot and Evangeline aquifers. The Chicot Aquifer is comprised of the Pleistocene-aged Beaumont Clay and the Lisse Formation. Defining a stratigraphic contact between these formations is difficult due to the considerable heterogeneity of the sediments, a general absence of index fossils and marker beds, and an absence of diagnostic electric log signatures. The Evangeline Aquifer is comprised primarily of the Pliocene-aged Goliad Sand, which consists of coarse-grained sediments. The Chicot and Evangeline aquifers are components of the encompassing Gulf Coast aquifer system, which is the primary aquifer system along the Gulf Coast of Texas (Reference 5).

4.2 Site-Specific Information

The VCS site is a greenfield site and little historical hydrogeologic data are available. The site consists of approximately 11,500 acres of land presently used for cattle ranching, oil and gas production, and recreational uses. The proposed site land utilization includes areas for the power block, the VCS CB and GBRA water reservoir, and support facilities. Figure 2 presents a plan view of the proposed VCS layout.

Plant-specific information for the VCS site was obtained primarily from the site subsurface investigation program conducted between October 2007 and February 2008 and is documented in Appendices 2.5.4-A and 2.5.4-B. The subsurface investigation reports are divided into two multi-volume reports, the first report documents boring logs, borehole geophysics, field and laboratory testing and results, cone penetrometer data, observation well installations, and other data collection activities in the power block area and the second report documents the same information within the cooling basin and other areas outside the power block.

The power block area of the site is presently at an approximate elevation of 80 feet North American Vertical Datum of 1988 (NAVD 88) and the ground surface is generally flat within the power block area. Plant-specific boring information (Appendix 2.5.4-A) suggests that the bottom of the Chicot Aquifer is approximately 500 ft below current ground surface in the power block area. To the east of the power block, a steep decrease in surface elevation marks the edge of the Guadalupe River Valley. The surface elevation on the Guadalupe River floodplain is approximately 15 ft NAVD 88. It should be noted that site elevations are reported referencing the NAVD 88 elevation datum, while the elevations on the USGS topographic maps used as background on some of the figures are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). The datum shift between NAVD 88 and NGVD 29 is approximately 0.44 ft in the VCS area (Reference 6).

The Chicot aquifer is subdivided into three saturated sandy zones at the VCS site: the “Upper Shallow” aquifer, the “Lower Shallow” aquifer, and the “Deep” aquifer. Additionally, a sand layer designated the “Sand 1” aquifer exists above the saturated zone beneath the cooling basin. These sand units are separated by less permeable layers of clayey materials. The primary zones of concern for VCS CB and GBRA reservoir (GSWR) seepage and excavation dewatering are the “Sand 1” aquifer and the “Upper Shallow” aquifer.

Upon plant completion, the following operating parameters will be used:

- A VCS CB consisting of a 4,818 acre main cooling basin and a 1,295 acre GBRA water reservoir. The VCS CB and GBRA reservoir outline, as determined by the exterior dikes, was digitized from a site plan.
- The VCS CB and GBRA reservoir bottom will be at an approximate elevation of 69 ft NAVD 88 in the main cooling basin. The top of cooling basin exterior dikes will be elevation 102 ft NAVD 88.
- The normal maximum operating water level for the VCS CB and GBRA reservoir will be elevation 90.5 ft NAVD 88 ± 1 ft.
- The finished plant grade in the power block area will be elevation 95 ft NAVD 88.

4.3 Groundwater Level Measurements

Because the site is a greenfield site, little historical groundwater level data exist for the site proper; however the Texas Water Development Board (TWDB) does maintain several observation wells close to the site to measure water levels in the Chicot and Evangeline aquifers. Regionally, groundwater flow is generally toward the southeast, or toward the Gulf of Mexico, as shown on Figure 3, which is a regional potentiometric surface map for the Chicot Aquifer for 1999. The limited number of data points in the site area would obscure any localized impacts from rivers in the site area. Figure 4 presents the steady-state simulated groundwater level elevations in the Chicot aquifer using the calibrated Central Gulf Coast Groundwater Availability Model (GAM) (Reference 7). This map shows the influence of the Guadalupe and San Antonio Rivers on localized flow conditions adjacent to the site, where an east-west component of flow is overlain on the regional flow pattern.

Monthly groundwater level measurements commenced at the site in October of 2007. For the first three months, only the OW-01U/L through OW-10U/L wells were installed, which included a total of 20 observation wells. By February of 2008, an additional 42 observation wells were installed, bringing the total number of observation wells to 62. Table 1 presents the monthly groundwater levels recorded through April 2008. The magnitude of groundwater level fluctuation was assessed using the OW-01U/L through OW-10U/L wells, which have the longest period of record. The greatest fluctuation was observed at OW-09U, with a fluctuation of 5.45 ft over the period of record (includes suspect water level measurement). The February 2008 groundwater level elevation data were used in the model to provide starting heads and as calibration targets for model calibration. The maximum fluctuation value was used with the calibration data to provide a realistic range of fluctuation within the groundwater system. Figures 5, 6, and 7 present the potentiometric surface maps for the “Upper Shallow”, “Lower Shallow”, and “Deep” aquifers for February 2008 measurements. These maps show groundwater flow generally west to east, across the VCS site, reflecting the influence of the Guadalupe River. The February 2008 data were selected for model calibration because the groundwater level measurements are generally representative of the period of record, and because the number of observations is higher than in prior months.

4.4 Hydraulic Conductivity

A variety of hydraulic conductivity values were needed to support defining the groundwater flow system. The following list summarizes the data needs and methodology for determining the values:

- Horizontal hydraulic conductivity of the sand layers – "Sand 1", "Upper Shallow" aquifer, "Lower Shallow" aquifer, and "Deep" aquifer – values derived from aquifer pumping tests;
- Vertical hydraulic conductivity of the sand layers – used typical ratio of K_h/K_v = 3 (Reference 8, page 23);
- Vertical hydraulic conductivity of clayey layers – laboratory permeability testing of undisturbed soil samples;
- Horizontal hydraulic conductivity of clayey layers – used the relationship K_h/K_v = 10 (Reference 8, page 23), a higher anisotropy ratio was used for the clays due to the presence of sand layers interbedded with the clay; and
- Vertical hydraulic conductivity of cooling basin bottom material – estimated from tests measuring saturated hydraulic conductivity.

The horizontal hydraulic conductivity values for sand layers were determined from the results of the aquifer pumping tests performed at the site. The aquifer pumping tests provided hydraulic conductivity values higher that those from the geometric mean of slug tests. Hydraulic conductivity values derived from pumping tests, as opposed to slug tests, were adopted because pumping tests result in a more representative hydraulic conductivity value at the larger scale of interest. The results of the aquifer pumping tests are presented on Table 2. The TW-2320U aquifer pumping test was performed in the "Upper Shallow" aquifer. The hydraulic conductivity for the "Upper Shallow" aquifer was determined by averaging the results from the Theis and Cooper-Jacob methods, yielding a value of 60 ft/d. The "Sand 1" and "Lower Shallow" aquifers are similar in grain size distribution to the "Upper Shallow" aquifer and were, therefore, also assigned a horizontal hydraulic conductivity of 60 ft/d. The "Deep" aquifer test at TW-2359L resulted in a horizontal hydraulic conductivity of approximately 103 ft/d, which represents the average of the values obtained by the Theis and Cooper-Jacob methods.

The vertical hydraulic conductivity of the sand layers was based on the ratio of K_h/K_v = 3. Therefore, the vertical hydraulic conductivity of "Sand 1", "Upper Shallow", and "Lower Shallow" aquifers used in the model is 20 ft/d. The vertical hydraulic conductivity of the "Deep" aquifer used in the model was 34 ft/d.

The vertical hydraulic conductivity of the silt or clay layers between the sand layers was determined as the geometric mean of the laboratory measurements of undisturbed soil samples, which were obtained using a triaxial cell permeameter. The results of these tests are shown on Table 3.

The cooling basin bottom materials were evaluated using stratigraphic information (sand versus clay) to subdivide the cooling basin into two zones of hydraulic conductivity for simulation of basin seepage. Zone 1 represents the sandy and silty portion of the basin and was assigned a vertical hydraulic conductivity of 20 ft/d, as with the "Sand 1", "Upper Shallow", and "Lower Shallow" aquifers described above. Zone 2 represents the clayey portion of the basin and was assigned a vertical hydraulic conductivity of 0.182 ft/d based on the 95% upper confidence limit (UCL) of the arithmetic mean of the Guelph permeameter tests summarized in Table 4. The 95% UCL was used in lieu of the geometric mean of the permeameter test results to provide a conservative estimate of basin seepage. The sand (zone 1) and clay (zone 2) zones are depicted on Figure 8.

4.5 Stratigraphic Data

Site investigation borehole log data and borehole geophysical logs were combined with off-site TWDB driller's logs (Reference 9) to develop a stratigraphic model of the area. The observed layer information (Table 5) was initially imported directly into GMS and interpolated into the model grid to create a complex layering scheme. However, automatic interpolation and adjustment of the layer elevations to correct layer errors in MODFLOW-2000 resulted in the inactivation of many of the cells in the model domain due to the interfingering nature of the stratigraphic units at the site. Therefore, an alternative simplified "layer-cake" stratigraphic model approach based on the average thickness of each layer in the boreholes was evaluated.

Seven layers were chosen to represent the "Sand 1," "Upper Shallow," "Lower Shallow," and "Deep" aquifers (model layers 1, 3, 5, and 7) and the interfingering clay layers (model layers 2, 4, and 6) based on the borehole data. The explicit method of representing a confining layer in MODFLOW-2000 using a model layer was selected to represent the confining layers at the VCS site, resulting in the following seven model layers:

- Layer 1 is the presently unsaturated "Sand 1" aquifer and is represented as a convertible layer type (The convertible layer type in MODFLOW-2000 allows the model to change from unconfined to confined conditions or vice versa depending upon the computed head and layer elevation information). Layer 1 extends from elevation 100 ft NAVD 88 to 50 ft NAVD 88;
- Layer 2 represents clayey materials separating the "Sand 1" aquifer from the "Upper Shallow" aquifer, this layer is also represented as a convertible layer type. Layer 2 extends from elevation 50 ft NAVD 88 to 30 ft NAVD 88;
- Layer 3 represents "Upper Shallow" aquifer and is defined as a convertible layer type. Layer 3 extends from elevation 30 ft NAVD 88 to 10 ft NAVD 88;
- Layer 4 represents clayey materials separating the "Upper Shallow" and "Lower Shallow" aquifers and is defined as a convertible layer type. Layer 4 extends from elevation 10 ft NAVD 88 to -10 ft NAVD 88;
- Layer 5 represents the "Lower Shallow" aquifer and is defined as a convertible layer type. Layer 5 extends from elevation -10 ft NAVD 88 to -30 ft NAVD 88;
- Layer 6 represents clayey materials separating the "Lower Shallow" aquifer and the "Deep" aquifer and is defined as a convertible layer type. Layer 6 extends from elevation -30 ft NAVD 88 to -50 ft NAVD 88; and
- Layer 7 represents the "Deep" aquifer and is defined as a convertible layer type. Layer 7 extends from elevation -50 ft NAVD 88 to -140 ft NAVD 88

The model layer thicknesses were determined from the average observed thickness of each stratigraphic layer based on the borehole logs. Figure 8 presents the location of data points used in the stratigraphic model and Table 5 presents the observed field data used to determine the average thickness of each layer and the corresponding model layer thickness. Layers 1 and 7 were expanded to include the upper and lower bounds of the model domain, elevation 100 and -140 ft NAVD 88, respectively. Model layer 1 was expanded to elevation 100 ft NAVD 88, for a thickness of 50 feet across the model domain, because the finished plant grade will be elevation 95 ft NAVD 88, as discussed in Section 4.2. This thickened layer conservatively overestimates the transmissivity of the aquifer.

4.6 Other Properties

Other properties used to support model development include recharge rate and effective porosity. Values for these properties were established as described below.

The recharge rate was treated as a calibration parameter. The GAM (Reference 7 [Section 1.3 Table 1]) indicates a recharge rate range from 0.09 to 0.43 in/yr [2 x 10^{-5} to 9.8 x 10^{-5} ft/d] for the northern and southern Gulf Coast GAMs. The recharge rate was varied within this range during calibration to obtain the best match to observed groundwater levels at the site. Model calibration using recharge is discussed in more detail in Section 6.0.

Total porosities for each of the model layers were calculated as a function of void ratio for individual soil samples using the relationship:

$$n = \frac{e}{1+e}$$

Table 6 summarizes the soil classification, void ratio, specific gravity, and total porosity for each soil sample. The effective porosity for a given model layer was then determined as a function of the total porosity (geometric mean) and grain size using Figure 2.17 of Reference 10. For the silty sand that comprises the aquifers (d_{50} equal about 0.1 mm), the ratio of effective porosity to total porosity is 0.8. For the clay comprising the intervening aquitards (d_{50} equal about 0.001 mm), the ratio is 0.65. Table 7 summarizes the specific gravity, total porosity, and effective porosity for each model layer.

5.0 Numerical Model

Figure 8 also presents a plan view of the model area showing the boundary conditions for the model. The model area was established to take advantage of natural boundary conditions in the site area. The Guadalupe and San Antonio Rivers form physical boundaries along the northeast and southwest perimeters of the model domain. The features were treated as specified head boundaries. Groundwater flow directions are interpreted as southwest to northeast across the VCS site, based on the potentiometric surfaces plotted in Figures 5, 6 and 7. Groundwater discharge is interpreted to occur on the west side of valley into Linn Lake and a series of sloughs that run along the west side of the valley. The northwest and southeast boundaries of the model were treated as no flow hydraulic boundaries representing groundwater streamlines because these boundaries are oriented perpendicular to the observed groundwater flow direction. The northern boundary is situated more than one cooling basin length away from the VCS site boundary to minimize boundary effects associated with the no-flow boundary condition.

It should be noted that the San Antonio River is separated from the VCS site by a groundwater divide. However, the exact nature and location of the groundwater divide are not known because observation wells were not installed in this area. As discussed in Section 6.0, the San Antonio River was chosen as the model boundary, rather than the groundwater divide, to minimize boundary effects to the west of the site and to provide a better match to observed groundwater elevation data.

Figure 9 is a generalized cross-section running from southwest to northeast across the model area. The section shows the influence of the San Antonio and Guadalupe Rivers and Kuy Creek on the local groundwater flow system. The section also shows the distribution of the seven stratigraphic layers beneath the site and their relationship to the geotechnical units and hydrogeologic units. Comparison with site groundwater level measurements plotted on the section shows that layer 1 (“Sand 1” aquifer) is unsaturated in the preconstruction groundwater flow system.

5.1 Model Grid

The modeled area has been selected to encompass the boundary conditions interpreted to be present near the VCS site. After initial simulations, it was decided to expand the modeled area to minimize the edge effects of inactive cells (no flow boundaries) on groundwater flow in the northwest and southeast extremities of the modeled area under pre- and post-construction conditions. The model grid was also expanded to the north of the VCS site to minimize boundary effects after the VCS CB and GBRA reservoir are filled.

The model grid is rotated 44° counterclockwise to match up with plant north. This allows a more precise representation of the cooling basin footprint, since the pond dikes are oriented approximately parallel to the rows and columns of the grid. This orientation also is approximately parallel to the interpreted regional groundwater flow direction in the site area (from the southwest to northeast across the VCS site).

The horizontal grid spacing should be fine enough to accurately represent features in the model, while at the same time not be too fine to unnecessarily slow down the model execution. The data density (typical borehole spacing is between 1,500 and 3,000 ft) within the cooling basin footprint suggests that a 500 ft grid spacing would be adequate to represent the subsurface features. The horizontal model grid consists of a total of 122 rows and 122 columns, although a portion of these cells are inactive due to irregularities in boundary locations along the San Antonio and Guadalupe Rivers.

5.2 Boundary Conditions

Five surface features in the modeled area (Figure 9) are interpreted to represent boundary conditions in the model:

- Guadalupe River Valley – Includes the Guadalupe River, Linn Lake, Cypress Lake, and Linn and Black Bayous. Surface elevations in the valley suggest that Layers 1 and 2 are daylighted in the valley wall and that Layer 3 is penetrated by the valley. Water well logs drilled in the valley indicate that the extensive alluvial fill present in the valley creates a hydraulic connection between the five lower model layers.
- San Antonio River Valley – Includes the main channel of the San Antonio River and the relict Old San Antonio River near McFaddin. Surface elevations suggest that Layers 1 and 2 are daylighted in the valley wall and layer 3 is penetrated by this feature. The limited extent of the San Antonio Valley, as compared to the Guadalupe River Valley, suggests a thinner sequence of valley fill and thus less influence would be exerted on Layers 4 through 7 by this feature.
- “Sand 1” aquifer seeps or springs – as mentioned above, the “Sand 1” aquifer is daylighted in the wall of the Guadalupe River Valley. In the preconstruction conditions, this layer is interpreted to be unsaturated; however, after the cooling basin is filled, a series of springs or seeps are predicted to form on the valley wall.

- Kuy Creek – Located on the west/southwest side of the proposed cooling water basin. Elevations in the creek channel indicate that the bottom of the channel is near the top of Layer 3. Visual observations of flow in the creek indicate limited contribution by groundwater to the base flow of the creek. The primary influence of this feature is interpreted to be on the post-basin-filling groundwater flow pattern.
- Dry Kuy Creek – Located southeast of the proposed cooling water basin. The conditions in Dry Kuy Creek are similar to those described for Kuy Creek, except that a more limited area of influence is predicted due to a less incised channel.

In addition to the natural features, the cooling basin is also interpreted to represent a river boundary condition in the model. The water level in the cooling basin is to be maintained at elevation 90.5 ft NAVD88. A layer of resistance was applied between the bottom of the basin and model layer 1 to represent the field saturated hydraulic conductivity of the geologic materials underlying the basin. A summary of the boundary conditions is presented on Table 8.

A recharge boundary condition was imposed on model layer 1. For the preconstruction model, a recharge rate of 0.000055 ft/d was used based on model calibration. This rate is within the range of rates given for the GAM model. A higher recharge rate of 0.0004 ft/d was used in areas where surficial soils are interpreted as former stream channels. These areas correspond to Beaumont Formation meander belts and stream channels (Qbs and Qbs-sc) depicted on Attachment 1 from the VCS Site FSAR Figure 2.5.1-204. For the post-construction model, a recharge rate of 0 ft/d was imposed over areas covered by buildings in the power block. For the remainder of the power block area a recharge rate of 0.0004 ft/d was imposed to represent the permeable backfill material around the structures.

In addition to the major boundary conditions, scenario specific boundary conditions were also used. These include:

- Construction dewatering – specified heads equal to the desired dewatering elevation were applied to the appropriate sand layer within the finite-difference cells representing the foundation excavation. With the head specified, the modeled flow from this constant head boundary represents the dewatering pumping rate.
- Cut-off wall – the horizontal flow barrier (HFB6) package was used to simulate an impervious cut-off wall without having to assign a low permeability value to an entire model cell. HFB package assigns a hydraulic conductance value to one face of the grid cell. The hydraulic conductance factor is the hydraulic conductivity of the wall (assumed to be 1.0×10^{-6} ft/d for a relatively impermeable clay, which is within the range of clay values reported in Reference 4) divided by the wall thickness (assumed to be 3 ft) for a hydraulic conductance per unit area of 3.33×10^{-7} day^{-1}.

6.0 Model Calibration

Model calibration involved adjustment of uncertain input parameters to obtain the best match between observed and simulated groundwater levels and the lowest water balance error. The input parameter with the most uncertainty is the recharge rate, because this value is based on regional observations rather than site-specific measurements. The model was calibrated by systematically varying the recharge over a plausible range to determine the recharge rate that yielded the best model fit to the observed piezometric head data. The model was considered calibrated when the following criteria were met:

- Magnitude of the mean error < 2 ft
- Root mean squared residual *RMS* < 5 ft
- Normalized root mean squared residual *NRMS* < 10 percent
- Mass balance discrepancy M_d < 1 percent
- Residual errors randomly distributed in space
- A simpler model that meets these criteria is preferable over a more complex model that also meets the same criteria.

Four scenarios were evaluated to determine the final calibrated model for the VCS site. These include:

1) Western model boundary at San Antonio River with regional recharge rate applied across the entire model domain;
2) Western model boundary at San Antonio River with a regional recharge rate applied across the model domain plus localized higher recharge area in the vicinity of OW-2301U/L;
3) Western model boundary at San Antonio River with a regional recharge rate applied across the model domain plus localized higher recharge areas in the vicinity of former stream meanders and channels; and
4) Western model boundary at groundwater divide with a regional recharge rate applied across the model domain plus localized higher recharge areas in the vicinity of former stream meanders and channels.

Calibration scenario 1 began with a recharge rate of 0.000199 ft/d and proceeded as shown on Table 9 and Figure 10. The best fit to the observed data (February 18, 2008 water level measurements) occurred using a recharge rate of 0.000150, which is above the regional recharge rates reported in the GAM (Reference 7). Calibration simulation 4 provided a good match to the majority of the observed heads, but did not accurately predict the elevated hydraulic heads in the vicinity of OW-2301-U/L.

Calibration scenario 2 was performed to determine the effects of a higher recharge rate in the vicinity of OW-2301U/L. Calibration began with a regional recharge rate of 0.000055 ft/d combined with a localized recharge rate of 0.0005 ft/d around OW-2301U/L. The localized recharge rate was increased to maximum of 0.007 ft/d, which produced systematic calibration errors for wells outside the power block area.

Calibration scenario 3 was performed to reduce the systematic errors across the model domain and to predict the hydraulic heads in the power block area more accurately. Calibration scenario 3 used a regional recharge rate of 0.000055 ft/d combined with localized recharge rates around former stream channels and meanders between 0.000055 and 0.0009 ft/d based on Attachment 1. The best fit to the observed data (February 18, 2008 water level measurements) occurred using a stream channel recharge rate of 0.000055 ft/d, combined with a localized recharge rate of 0.0004 ft/d for the areas interpreted as former stream channels.

Calibration scenario 4 was performed to compare the results of using the San Antonio River and the groundwater divide between the site and the San Antonio River as the western boundary of the site. The best fit to the observed data (February 18, 2008 water level measurements) occurred using a stream channel recharge rate of 0.000055 ft/d, combined with a localized recharge rate of 0.001 ft/d for the areas interpreted as former stream channels. Calibration of scenario 4 required higher recharge rates than scenario 3 because of the close proximity of the groundwater divide to the western boundary of the site. In addition, the boundary effects of the proximity of the groundwater divide would artificially constrict flow from the VCS CB and GRBA reservoir after the basin is filled. Therefore, simulation 12 (scenario 3) was chosen as the final calibrated preconstruction model for the VCS site.

Table 10 presents the comparison of simulated and observed heads from the observation wells selected for the final calibrated preconstruction model. There are two types of error measures, the first is the residual heads at each calibration well, and the second is the statistical error methods (mean error, mean absolute error, and root mean square error). The statistical error methods address the overall error in the model domain. If the overall error is much less than the total head difference across the model domain, the calibration error is considered to be negligible. The total head difference across the model domain is approximately 50 ft, and the statistical error measures are less than 5 ft, therefore the overall model head error is less than the 10 percent target value for head error. The water balance error for the calibrated model is 0%, which is less than the target water balance error of 1 percent.

Figures 11a/b, 12 and 13 show the simulated potentiometric surface in Layers 3, 5 and 7 of the final calibrated model. Figure 11b also includes calibration markers for the observation wells used in the calibration. This figure shows the spatial distribution of residual heads. As depicted on the figure, the residual errors are evenly distributed across the model domain, indicating there is not a spatial relationship between head error and location. Because the observation well pairs are closely spaced, some of the calibration markers overlap and are obscured.

Figure 14 shows a graph of simulated versus observed groundwater levels. The 45° line on the plot represents an ideal agreement between simulated and observed groundwater levels. The plot shows some variability around the ideal agreement, but this appears to be random rather than systematic error.

6.1 Calibration Sensitivity Analysis

A sensitivity analysis was performed on the calibrated model to assess the impact of various input parameters on the model calibration and stability. The following scenarios were considered:

- Increase the horizontal hydraulic conductivity by an order of magnitude.
- Increase the recharge rate by an order of magnitude.
- Increase the vertical hydraulic conductivity by an order of magnitude.

The following table presents the error statistics for these three scenarios and the calibrated model.

Simulation	Mean Error (ft)	Mean absolute Error (ft)	Root Mean Squared Error (ft)
Calibrated Model	0.10	3.88	4.59
10 times Recharge	27.09	27.09	33.10
10 times vertical conductivity	0.01	3.88	4.59
10 times horizontal conductivity	-2.80	4.36	5.98

The error statistics indicate that the most sensitive parameter is the recharge rate. The head errors for the remaining scenarios were similar to those of the calibrated model.

6.2 Summary of Calibrated Model Results

The following results of the calibrated model were used as a baseline to evaluate post-construction groundwater flow conditions:

1. Flow from drains in Kuy and Dry Kuy Creeks = 80 gpm
2. Constant head cell outflow into the Guadalupe River Valley = 2,870 gpm
3. Constant head cell inflow from the San Antonio River Valley = 1,720 gpm
4. Flow from “Sand 1” aquifer drains simulating valley wall seeps = 0 gpm
5. Seepage from Cooling basin through River boundary = 0 gpm

Flows were obtained from GMS by selecting each individual boundary condition while in the appropriate GMS model module. Outflows in GMS are displayed beneath the module selection area on the lower left portion of the screen and are reported in cubic feet per day. It should be noted that the constant head cell outflows from the model indicate that the San Antonio River may act as a losing river. Stream flow data collected in 2007 from USGS stations (Reference 19) in Elmendorf (08181800), Floresville (08183200), Falls City (08183500), Goliad (08188500), and McFaddin (08188570) indicate that the San Antonio varies between a gaining and losing river.

7.0 Predictive Simulations

The predictive simulations were performed to analyze the following conditions:

1. General cooling basin seepage – impacts on flows to various surface water features, heads within the power block, interaction with backfill materials around the power block structures, and as a basis for evaluating the accidental release pathway.
2. Simulation of construction dewatering impacts in the power block with the preconstruction conditions, with cooling basin full, with a cut-off wall between the full basin and power block.
3. Simulation of a cut-off wall surrounding the cooling basin and simulation of a liner within the cooling basin.
4. Simulation of accident release pathway – use various seepage scenarios and MODPATH particle tracking program to evaluate advective transport of an accidental release from the plant radwaste buildings.

7.1 Simulation of Cooling Basin Seepage

The calibrated preconstruction model was revised by adding in the river boundary condition within the cooling basin and the higher recharge and hydraulic conductivity zones around Units 1 and 2 representing the backfill material in the power block. The results of the seepage simulation are summarized on Table 11 along with the preconstruction results for comparison. Figures 15 and 16 present the simulated heads in layer 1 (“Sand 1” aquifer) and layer 3 (“Upper Shallow” aquifer). The model results suggest that groundwater flow to the rivers and creeks in the site area increases as much as 17 times the preconstruction rate as a result of basin seepage.

A series of sensitivity runs were performed to evaluate uncertainties in key model parameters. The following sensitivity cases or alternate conceptual models were considered:

- VCS CB and GSWR bottoms are assumed to be clean sand with a vertical hydraulic conductivity of 20 ft/d. This case assumes that there is no clay present in the basin bottom.
- Construction of the VCS CB without the GSWR.
- VCS CB has a bottom elevation of 75 ft NAVD 88.
- VCS CB and GSWR water level held at maximum normal operating level of 91.5 ft NAVD88.
- Power block backfill has a recharge rate ten times the rate assumed in the base case.
- River cells have a conductance value ten times the value used in the base case.
- Layers 2, 4, and 6 (clay) have horizontal and vertical conductivities ten times the rate assumed in the base case.
- Drain cells have a conductance value ten times the value used in the base case.

Table 11 presents a summary of the results of the sensitivity runs or alternate conceptual models. The basin bottom elevation, river and drain cell conductance, and the basin operating level have negligible impacts on the VCS CB and GSWR seepage rates. The most sensitive parameters appear to be the absence of GSWR and the horizontal and vertical hydraulic conductivity of the clay layers of model layers 2, 4 and 6. Calibration sensitivity simulations indicate an increase in the horizontal and vertical hydraulic conductivity of the clay layers at the VCS site by an order of magnitude could produce a total basin seepage rate of approximately 16,110 gpm for the VCS CB and GSWR, which is more than twice the rate simulated for the base case seepage scenario (7,040 gpm).

However, the geometric mean vertical conductivity (0.00007 ft/day) and horizontal hydraulic conductivity (0.0007 ft/day) values used in the base case seepage simulations are thought to be more representative of site conditions than the values used in the increased clay layer conductivity sensitivity run because the vertical hydraulic conductivity value used in the base case seepage simulations is greater than 80% of the laboratory hydraulic conductivity values included on Table 3. The geometric mean value reported on Table 3 (used for the base case seepage simulations) is thought to be conservative because it is influenced by the potentially anomalous value from boring B-2321UD, which is approximately three orders of magnitude higher than the remaining values on the table. Note, however, that these results are based on only five laboratory measurements of hydraulic conductivity. If the overall hydraulic conductivity of the layer 2 aquitard is greater than the geometric mean of the five observed values (0.00007 ft/day), then the leakage rates from the cooling basin will be more than those reported in the Table 13.

7.2 Simulation of Power Block Dewatering Effects (Cooling Basin Empty or Full)

Construction dewatering will be performed during construction of the reactor building and fuel building in the power block. Figure 17 presents the excavation plan for the power block area. Figure 18 presents a geologic cross-section through the Unit 1 power block area showing the various depths of excavation and the preconstruction groundwater levels. The deepest excavation, which is beneath the Reactor Building/Fuel Building, is planned to elevation 8 ft NAVD 88, with a corresponding dewatering elevation of 3 ft NAVD 88. Dewatering to elevation 3 ft NAVD 88 would result in dewatering to model Layer 4, a confining layer. It is unlikely that the dewatering system used during construction will extract from the confining layer. Dewatering will most likely occur in the aquifer below the confining layer, the “Lower Shallow” aquifer (model layer 5), to lower its potentiometric head. Shallower excavations are also planned for the remaining buildings in the power block area. Therefore, dewatering elevations in model Layers 3 and 5 were evaluated to obtain a conservative estimate of construction dewatering pumping rates. Dewatering was represented in the model as specified constant heads at the target dewatering levels of 19 (“Upper Shallow” aquifer) and -20 ft NAVD 88 (“Lower Shallow” aquifer).

Because the scheduling of the construction activities is still in the planning stage, two dewatering conditions were evaluated. The first condition assumes dewatering occurs under the preconstruction groundwater conditions (current conditions Figures 19 and 20) and the second condition assumes the cooling basin is full (Figures 21 and 22). These two conditions would represent the lower and upper bounds of dewatering pumping rates. Backfill material with a hydraulic conductivity of 1,000 ft/d was simulated in the power block area during dewatering to create a hydraulic connection between the model layers and provide more conservative upper and lower bounds of pumping rates.

Sensitivity scenarios or alternate conceptual models were also formulated to address uncertainties:

- The dimensions of the excavations have not been finalized, therefore three scenarios were prepared to examine the effects of the excavation dimensions: (1) dewater half of Unit 1 or Unit 2, (2) dewater Unit 1 or Unit 2, and (3) dewater both Unit 1 and Unit 2. These sensitivity cases were analyzed only for the empty cooling basin condition.
- An alternate scenario was prepared using an excavation depth of 19 feet NAVD 88 to compare the basin full and basin empty numerical model results to the analytical solutions in Reference 22.
- The impact of installing a cut-off wall around the power block area was evaluated for two scenarios: 1) wall penetrates through model layer 3, and 2) wall penetrates through model layer 5. These sensitivity cases were analyzed only for the full cooling basin condition.

Table 12 presents a summary of the results of these simulations. The simulated pumping rates ranged from 310 to 870 gpm for the different dewatering scenarios. The two base conditions representing preconstruction and full cooling basin simulations were compared to calculated estimates, which are based on analytical flow solutions. The analytical flow solution for the full cooling basin condition assumed a radial head distribution around the excavation, thus the predicted flow from the excavation is considered to be more conservative (higher) than actual flow conditions. In general, the numerical model flows and analytical flows are similar.

The sensitivity or alternate conceptual model case for a cut-off wall (the simulated heads for the layer 3 cut off wall are shown on Figure 23) suggest there is a 150 gpm flow reduction with a cut off wall penetrating layer 3 for dewatering at the elevation 19 NAVD 88 level. Extending the cut off wall to layer 5 (“Lower Shallow” aquifer) will decrease the pumping rate at the excavation by an additional 180 gpm.

The sensitivity cases for dewatering elevation suggest variations in depth can affect the pumping rates and local drawdown effects. The finalization of a dewatering or foundation level is considered an important precursor to finishing the dewatering system design.

7.3 Simulation of Cut-Off Walls at the Cooling Basin

The influence of a cut-off wall was considered in the previous section for reducing dewatering pumping rates. A second possible use of a cut-off wall is to reduce the seepage from the VCS CB and GSWR.

The cut-off wall would need to completely surround the VCS CB and GSWR to be effective. Three scenarios were investigated: 1) cut off only “Sand 1” aquifer, 2) cut off “Sand 1” and “Upper Shallow” aquifers (layer 3), and 3) “Sand 1”, “Upper Shallow”, and “Lower Shallow” (layer 5) aquifers. The results of the cut-off wall simulations are summarized in Table 13 and the head distributions in Layer 3 are depicted in Figure 24. The layer 3 cut off wall appears to represent the optimum design for the cut off walls evaluated.

An alternative to using a cut-off wall would be to line a portion of the basin to control groundwater flow. The liner would consist of a 3 ft thick layer of clay. The hydraulic conductivity of the clay liner would control how fast the basin water seeps out, regardless of how much sand is present between the bottom of the liner and the water table. The section of the basin to be lined is the Zone 1 area discussed previously. This area represents approximately 2,300 acres of the cooling basin. As a result of using the liner, a predicted total basin (VCS CB and GSWR) seepage rate of 6,080 gpm is estimated, which is 960 gpm less than the base case seepage rate. The results of the clay liner simulations for layers 1 and 3 are shown on Figures 25 and 26.

7.4 Simulation of Accident Release Pathway

The groundwater flow system downgradient of the power block was evaluated to identify potential exposure points from an accidental release at the Radwaste Buildings. The release is postulated to occur from the basement of the buildings and enter into Layer 2 of the model through the permeable backfill material. Based on this evaluation, particle tracking in Layer 2 was used to determine travel times for the following scenarios:

1. Hypothetical domestic water-supply well at northern property boundary under base case seepage, cut-off wall through layer 3, and clay liner simulations.
2. Discharge to Guadalupe River Valley into the Black Bayou/Linn Lake drainage system under base case seepage, cut-off wall through layer 3, and clay liner simulations.

A brief description of each scenario follows: 1) the hypothetical domestic water supply well at the northern property boundary was assumed to fully penetrate the “Lower Shallow” aquifer (Layer 5) and pump at a rate of 10 gpm (1,925 ft^3/d) based on field observations of stock watering wells existing on the site, and 2) discharge to the Guadalupe Valley was through the constant head cells forming the boundary conditions on the eastern side of the model.

The results of these simulations are summarized on Table 14. The particles released from Units 1 and 2 in the base case seepage scenario travel vertically downward through the backfill beneath the power block and pass through model layers 3 and 4 and intercept layer 5. Upon intercepting layer 5, the particles follow the groundwater flow direction to the north, away from the cooling basin, and pass beneath the site boundary. Once offsite, the particles intercept Layer 6 and travel vertically through the confining layer until they intercept layer 7, at which point advective flow carries them downgradient to the east toward Linn Lake. The particle tracks overlaid on the groundwater contour map for Layer 3 for base case seepage are shown on Figures 27 and 28. As shown on these figures, the most conservative particle track pathway is from Unit 2 to the northern site boundary under the base case seepage scenario. The particle from Unit 1 has a longer travel time through layer 4 than the particle from Unit 2, and hence a longer overall travel time to the site boundary. The tracks for both the Unit 1 and 2 Radwaste Buildings are shown on the figures for comparison. The figure does not depict the vertical travel through the different layers. The markers (i.e., arrowheads) shown on the flow lines represent 5 year increments of travel.

The particles in the cut-off wall scenario travel vertically downward through the backfill beneath the power block and pass through model layers 3 through 6. Upon intercepting layer 7, the particles follow the groundwater flow direction to the east toward Linn Lake. The results of the particle tracking under the cut-off wall scenario indicate that the particles will not intercept the northern property boundary, but will both remain onsite before they discharge to Linn Lake on the eastern property boundary (Figure 29).

The particle tracks overlaid on the groundwater contour map for Layer 3 for the clay liner scenario are shown on Figures 30 and 31. The tracks for both the Unit 1 & 2 radwaste buildings are shown on the figures for comparison. The tracks are similar to those of the base case seepage scenario, but the most conservative pathway is from Unit 1 to the northern site boundary because the particle from Unit 2 remains onsite before discharging to Linn Lake. The particles released from Units 1 and 2 in the clay liner scenario travel vertically through the backfill beneath the power block and pass through model layers 3 and 4 and intercept layer 5. Upon intercepting layer 5, the particles follow the groundwater flow direction to the north, away from the cooling basin. The particle from Unit 1 passes beneath the site boundary while the particle from Unit 2 remains onsite and discharges to Linn Lake. Once offsite, the particle from Unit 1 intercepts Layer 6 and travels vertically through the confining layer until it intercepts layer 7, at which point advective flow carries it downgradient to the east toward Linn Lake.

The results of these simulations are summarized on Table 14. The particles released from Units 1 and 2 in the base case seepage scenario travel vertically through the backfill beneath the power block and pass through model layers 3 and 4 and intercept layer 5. Upon intercepting layer 5, the particles follow the groundwater flow direction to the north, away from the cooling basin, and pass beneath the property boundary. Once offsite, the particles intercept Layer 6 and travel vertically through the confining layer until they intercept layer 7, at which point advective flow carries them downgradient to the east toward Linn Lake. The particle tracks overlaid on the groundwater contour map for Layer 3 for base case seepage are shown on Figures 27 and 28. As shown on these figures, the most conservative particle track pathway was from Unit 2 to the northern site boundary under the base case seepage scenario. The particle from Unit 1 is has a longer travel time through layer 4 than the particle from Unit 2, and hence a longer overall travel time to the site boundary. The tracks for both the Unit 1 and 2 Radwaste Buildings are shown on the figures for comparison. The figure does not depict the vertical travel through the different layers. The markers shown on the flow lines represent 5 year increments of travel.

The particles in the cut-off wall scenario travel vertically through the backfill beneath the power block and pass through model layers 3 through 6. Upon intercepting layer 7, the particles follow the groundwater flow direction to the east toward Linn Lake. The results of the particle tracking under the cut-off wall scenario indicate that the particles will not intercept the northern property boundary, but will both remain onsite before they discharge to Linn Lake on the eastern property boundary (Figure 29).

The particle tracks overlaid on the groundwater contour map for Layer 3 for the clay liner scenario are shown on Figures 30 and 31. The tracks for both the Unit 1 and 2 Radwaste Buildings are shown on the figures for comparison. The tracks are similar to those of the base case seepage scenario, but the most conservative pathway is from Unit 1 to the northern site boundary because the particle from Unit 2 remains onsite before discharging to Linn Lake. The particles released from Units 1 and 2 in the clay liner scenario travel vertically through the backfill beneath the power block and pass through model layers 3 and 4 and intercept layer 5. Upon intercepting layer 5, the particles follow the groundwater flow direction to the north, away from the cooling basin. The particle from Unit 1 passes beneath the property boundary while the particle from Unit 2 remains onsite and discharges to Linn Lake. Once offsite, the particle from Unit 1 intercepts Layer 6 and travels vertically through the confining layer until it intercepts layer 7, at which point advective flow carries it downgradient to the east toward Linn Lake.

The modeling results for the base case seepage, cut-off wall, and clay liner simulations for both scenarios suggest that travel to the northern site boundary well from Unit 2 under base case seepage would represent the shortest travel time for an accidental release.

8.0 Summary and Conclusions

A three-dimensional seven layer groundwater flow model was developed and calibrated to determine water level and flow changes associated with the operation of a cooling basin at the VCS site. Specific findings include:

- The groundwater levels in the power block area are predicted to remain approximately ten feet below final plant grade after basin filling. The maximum allowable groundwater level according to Reference 12 (Table 2.0-1) is two feet below plant grade, thus permanent dewatering is not necessary.
- The groundwater levels beneath the cooling basin will saturate the currently unsaturated sand layer referred to as the “Sand 1” aquifer after the basin is filled.
- Seepage from the cooling basin will increase groundwater contributions to the Guadalupe and San Antonio River Valleys and Kuy and Dry Kuy Creeks as much as 17 times the preconstruction seepage amounts.
- Cooling basin seepage is predicted to alter the groundwater flow directions in the site area, particularly in the power block area as a result of mounding beneath the cooling basin.
- Cut-off walls were simulated to evaluate effects on power block dewatering and seepage from the cooling basin. The greatest effect on power block dewatering resulted from a cut-off wall penetrating layer 5, which reduced the pumping rate by 38% as compared to no cut-off wall.
- The seepage from the cooling basin could be decreased by approximately 65% using a cut-off wall extending to model layer 1 and surrounding the VCS CB and the GSWR. Use of a liner over the sand area (Zone 1) in the basin would reduce the overall seepage to 6,080 gpm, or 14% of the seepage with no liner.
- Particle tracking suggests the closest receptor for an accidental release from the Radwaste Buildings under base case seepage would be a hypothetical domestic water-supply well located on the northern boundary of the site. The next closest receptor would be the edge of the model, which is the edge of the Guadalupe River Valley drainage system. Both potential receptors have travel times from the Unit 1 or Unit 2 Radwaste Buildings of more than 25 years.
- Calibration sensitivity simulations indicate an increase in the horizontal and vertical hydraulic conductivity of the clay layers at the VCS site by an order of magnitude could produce a total basin seepage rate of approximately 16,110 gpm for the VCS CB and GSWR, which is more than twice the rate simulated for the base case seepage scenario (7,040 gpm).

Table 1: VCS Monthly Groundwater Level Measurements

			25-Oct-07			17-Nov-07			18-Dec-07			30-Jan-08			18-Feb-08			31-Mar-08			26-Apr-08		
Well No.	Ref. Elev. (NAVD88)	Hydro-geologic Unit	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)	Time	Depth to Water (ftbtc)	Elevation of Water (NAVD88)
OW-2301U	83.27	Upper													7:37	33.03	50.24	7:14	32.95	50.32	9:15	33.07	50.20
OW-2301L	83.19	Deep													7:39	44.84	38.35	7:16	44.97	38.22	9:19	45.23	37.96
OW-2302U	81.99	Lower													7:53	43.10	38.89	7:26	43.22	38.77	9:39	43.49	38.50
OW-2302L	81.95	Deep													7:54	44.94	37.01	7:27	45.02	36.93	9:37	45.27	36.68
OW-2304U	70.10	Upper													8:31	33.96	36.14	11:10	34.17	35.93	16:05	34.37	35.73
OW-2304L	69.73	Lower													8:33	42.26	27.47	11:11	42.28	27.45	16:04	42.41	27.32
OW-2307U	78.59	Upper										10:44	45.77	32.82	12:29	45.91	32.68	9:03	46.09	32.50	11:23	46.32	32.27
OW-2307L	78.56	Lower										10:47	51.54	27.02	12:31	51.75	26.81	9:05	51.92	26.64	11:26	52.35	26.21
OW-2319U	75.97	Lower										9:01	40.62	35.35	8:11	40.74	35.23	11:00	40.84	35.13	14:25	41.02	34.95
OW-2319L	76.05	Deep										9:00	42.37	33.68	8:13	41.54	34.51	11:01	42.31	33.74	14:22	37.44	38.61
OW-2320U	73.50	Lower										8:09	44.59	28.91	10:27	44.69	28.81	10:34	44.70	28.80	13:52	44.86	28.64
OW-2320L	73.19	Deep										8:10	43.02	30.17	10:28	43.14	30.05	10:35	43.24	29.95	13:54	43.51	29.68
OW-2320U1	72.90	Upper										8:03	43.52	29.38	10:33	43.65	29.25	10:45	43.62	29.28	13:57	43.79	29.11
OW-2320U2	72.92	Upper										8:04	43.53	29.39	10:35	43.69	29.23	10:44	43.65	29.27	14:00	43.80	29.12
OW-2320U3	72.84	Upper										8:00	43.58	29.26	10:37	43.72	29.12	10:42	43.69	29.15	14:02	42.89	29.95
OW-2320U4	72.91	Upper										8:01	43.79	29.12	10:39	43.91	29.00	10:41	43.89	29.02	14:05	40.87	32.04
OW-2321U	73.27	Lower													9:56	51.70	21.57	12:16	51.70	21.57	13:29	51.86	21.41
OW-2321L	73.54	Deep													9:58	51.68	21.86	12:17	51.79	21.75	13:31	52.02	21.52
OW-2324U	26.17	Lower													12:02	11.28	14.89	9:28	11.38	14.79	11:53	11.54	14.63
OW-2324L	26.27	Deep													12:03	11.79	14.48	9:29	11.99	14.28	11:52	12.13	14.14
OW-2348U	52.12	Lower													9:29	39.06	13.06	11:54	39.17	12.95	14:55	39.12	13.00
OW-2348L	52.70	Deep													9:31	39.53	13.17	11:55	39.73	12.97	15:04	39.31	13.39
OW-2352U	64.47	Upper													9:02	45.09	19.38	11:38	45.00	19.47	15:32	45.08	19.39
OW-2352L	64.60	Lower													9:03	45.17	19.43	11:39	45.09	19.51	15:30	45.19	19.41
OW-2359L1	79.36	Deep													11:42	54.54	24.82	9:44	54.72	24.64	12:11	53.72	25.64
OW-2359L2	78.93	Deep													11:38	54.12	24.81	9:46	54.30	24.63	12:07	52.40	26.53
OW-2359L3	78.83	Deep													11:36	53.89	24.94	9:47	54.05	24.78	12:05	52.12	26.71
OW-2359U1	79.29	Upper													11:40	55.01	24.28	9:45	55.09	24.20	12:09	55.29	24.00
OW-01U	73.65	Upper	12:33	41.46	32.19	9:34	41.45	32.20	16:30	41.56	32.09	9:14	41.97	31.68	10:19	42.19	31.46	10:50	42.18	31.47	14:11	41.91	31.74
OW-01L	73.74	Lower	12:28	42.39	31.35	9:37	42.39	31.35	16:33	42.51	31.23	9:16	42.77	30.97	10:20	42.94	30.80	10:51	42.99	30.75	14:12	42.41	31.33
OW-02U	76.74	Upper	12:19	51.49	25.25	9:29	51.35	25.39	16:22	51.19	25.55	9:28	51.25	25.49	10:46	51.35	25.39	10:28	51.29	25.45	12:56	51.46	25.28
OW-02L	76.53	Lower	12:16	51.36	25.17	9:26	51.21	25.32	16:20	51.12	25.41	9:30	51.21	25.32	10:48	51.31	25.22	10:29	51.32	25.21	12:54	50.81	25.72
OW-03U	77.05	Upper	12:06	55.96	21.09	9:18	55.04	22.01	16:16	DRY	NA	9:40	DRY	NA	10:53	DRY	NA	10:19	DRY	NA	12:45	DRY	NA
OW-03L	76.67	Lower	12:02	55.63	21.04	9:15	55.73	20.94	16:13	55.88	20.79	9:39	56.17	20.50	10:55	56.31	20.36	10:20	56.47	20.20	12:46	56.69	19.98
OW-04U	81.08	Upper	11:49	56.15	24.93	9:04	56.02	25.06	16:07	56.06	25.02	9:47	56.20	24.88	11:00	56.32	24.76	10:09	56.44	24.64	12:39	56.70	24.38
OW-04L	80.67	Lower	11:55	56.69	23.98	9:07	56.61	24.06	16:09	56.54	24.13	9:49	56.75	23.92	11:02	56.91	23.76	10:10	56.98	23.69	12:41	57.22	23.45
OW-05U	79.55	Upper	11:44	52.71	26.84	9:00	52.48	27.07	16:02	52.31	27.24	9:56	52.33	27.22	11:06	52.45	27.10	10:03	52.50	27.05	12:36	52.75	26.80
OW-05L	79.90	Deep	0.48	53.17	26.73	8:57	53.02	26.88	16:03	52.97	26.93	9:58	53.05	26.85	11:08	53.21	26.69	10:04	53.25	26.65	12:34	53.52	26.38
OW-06U	80.77	Upper	11:18	53.59	27.18	8:49	53.38	27.39	15:51	53.20	27.57	10:12	53.23	27.54	11:22	53.35	27.42	9:53	53.43	27.34	12:23	53.66	27.11
OW-06L	81.55	Lower	11:12	54.46	27.09	8:47	54.25	27.30	15:50	53.86	27.69	10:15	54.22	27.33	11:23	54.34	27.21	9:55	54.41	27.14	12:21	54.22	27.33
OW-07U	79.02	Upper	11:04	58.02	21.00	8:42	57.99	21.03	15:42	55.98	23.04	10:24	58.17	20.85	11:48	58.30	20.72	9:18	58.39	20.63	11:42	58.55	20.47
OW-07L	79.04	Deep	11:00	57.78	21.26	8:39	57.88	21.16	15:50	53.86	25.18	10:25	58.17	20.87	11:50	58.33	20.71	9:20	58.41	20.63	11:44	58.68	20.36
OW-08U	83.88	Lower	10:03	46.26	37.62	8:21	46.24	37.64	15:26	46.36	37.52	11:05	46.49	37.39	12:38	46.64	37.24	8:53	46.79	37.09	9:54	46.98	36.90
OW-08L	84.07	Deep	10:00	49.75	34.32	8:17	49.98	34.09	15:23	50.1	33.97	11:07	50.08	33.99	12:40	50.16	33.91	8:55	50.30	33.77	9:56	50.69	33.38
OW-09U	79.24	Upper	11:32	51.77	27.47	8:51	51.37	27.87	15:55	50.83	28.41	10:04	51.31	27.93	11:13	51.46	27.78	9:58	51.32	27.92	12:28	51.71	27.53
OW-09L	80.00	Deep	11:26	52.19	27.81	8:53	51.91	28.09	15:56	51.82	28.18	10:06	51.97	28.03	11:14	52.13	27.87	9:59	52.10	27.90	12:29	46.74	33.26
OW-10U	79.53	Upper	10:50	57.24	22.29	8:34	57.04	22.49	15:37	56.92	22.61	10:33	57.00	22.53	12:14	57.04	22.49	9:11	56.83	22.70	11:35	56.91	22.62
OW-10L	79.88	Lower	10:45	54.52	25.36	8:31	54.76	25.12	15:35	54.81	25.07	10:35	54.80	25.08	12:16	54.98	24.90	9:13	55.15	24.73	11:33	53.61	26.27
OW-2150U	82.78	Upper										13:43	36.49	46.29	13:26	36.70	46.08	8:13	36.51	46.27	10:38	36.73	46.05
OW-2150L	82.45	Deep										13:46	48.01	34.44	13:27	47.90	34.55	8:15	47.87	34.58	10:40	48.11	34.34
OW-2169U	81.77	Upper										13:54	38.29	43.48	14:40	38.59	43.18	8:20	38.40	43.37	10:46	38.71	43.06
OW-2169L	81.72	Lower										13:52	44.58	37.14	14:42	44.76	36.96	8:24	44.91	36.81	10:44	45.15	36.57
OW-2181U	81.31	Upper										13:58	38.07	43.24	13:51	38.46	42.85	8:27	38.27	43.04	10:50	38.60	42.71
OW-2181L	81.32	Lower										14:00	44.87	36.45	14:04	44.74	36.58	8:29	44.78	36.54	10:51	44.86	36.46
OW-2185U	81.45	Upper										14:15	41.64	39.81	14:15	41.76	39.69	8:35	41.77	39.68	10:59	41.96	39.49
OW-2185L	81.36	Lower										14:17	45.54	35.82	14:16	45.72	35.64	8:37	45.88	35.48	11:02	46.13	35.23
OW-2253U	82.82	Upper										13:09*	49.23	33.59	14:48*	49.39	33.43	7:41	34.48	48.34	10:27	34.65	48.17
OW-2253L	82.66	Deep										13:11*	34.35	48.31	14:49*	34.82	47.84	7:43	49.52	33.14	10:29	49.82	32.84
OW-2269U	82.43	Lower										13:18	46.70	35.73	15:00	46.88	35.55	7:53	47.02	35.41	10:12	47.25	35.18
OW-2269L	82.55	Deep										13:21	48.87	33.68	15:03	48.99	33.56	7:50	49.12	33.43	10:16	49.42	33.13
OW-2284U	82.62	Upper										13:25	38.13	44.49	15:07	38.32	44.30	8:01	38.18	44.44	10:08	38.21	44.41
OW-2284L	82.74	Lower										13:28	47.40	35.34	15:09	47.58	35.16	8:03	47.73	35.01	10:06	47.96	34.78

* Wells OW-2253U/L were mislabled, sounding of the total depth of the wells on 3/31/08 indicated that the well numbers were reversed

Table 2: Summary of Aquifer Pumping Test Results

February 13-15, 2008
TW-2320U Aquifer Pumping Test 48 hour test

Observation Well	Saturated Thickness	Theis Method Transmissivity ft^2/d	Theis Method Storage Coefficient unitless	Cooper-Jacob Method Transmissivity ft^2/d	Cooper-Jacob Method Storage Coefficient unitless
OW-2320U1	7	325.3	2.61E-05	471.6	1.65E-05
OW-2320U2	7	284.0	1.68E-05	370.4	1.18E-05
OW-2320U3	7	365.8	1.98E-05	422.3	1.46E-05
Combination	7	374.0	1.80E-05	423.1	----
Combination/Recovery	7	727.9	-----	----	----
mean		415.4	1.84E-05	421.8	1.43E-05
Hydraulic Conductivity		59.3	----	60.3	----

February 4-5, 2008
TW-2359L Aquifer Pumping Test 24 hour test

Observation Well	Saturated Thickness	Theis Method Transmissivity ft^2/d	Theis Method Storage Coefficient unitless	Cooper-Jacob Method Transmissivity ft^2/d	Cooper-Jacob Method Storage Coefficient unitless
OW-2359L2	20	2228.4	3.67E-04	1402.8	7.50E-04
OW-2359L3	20	2452.5	1.92E-04	1986.2	2.73E-04
Combination	20	2311.6	2.63E-04	2032.2	4.21E-04
Combination/Recovery	20	2294.9	----	----	----
mean		2321.8	2.74E-04	1807.1	4.81E-04
Hydraulic Conductivity		116	----	90.4	----

Raw data obtained from March 12, 2008 of Appendix 2.5.4-B.

Table 3: Laboratory Hydraulic Conductivity Tests

Boring No.	Sample No.	Sample Depth	USCS Symbol	Confining Stress (psi)	Hydraulic Conductivity (cm/s)	Hydraulic Conductivity (ft/d)
B-2319UD	UD-4	25.0 – 27.0	CH	20.0	3.4×10^{-9}	9.6×10^{-6}
B-2321UD	UD-3	10.0 – 11.7	CH	10.0	8.3×10^{-6}	2.4×10^{-2}
B-2321UD	UD-6	28.5 – 30.2	CH	25.0	1.8×10^{-8}	5.1×10^{-5}
B-2321UD	UD-7	38.5 – 40.2	CH	35.0	8.4×10^{-9}	2.4×10^{-5}
B-2321UD	UD-14	128.5 – 130.3	CH	75.0	2.5×10^{-9}	7.1×10^{-6}
				minimum	2.5×10^{-9}	7.1×10^{-6}
				maximum	8.3×10^{-6}	2.4×10^{-2}
				geometric mean	2×10^{-8}	7×10^{-5}

Raw data from Appendix 2.5.4-B (Table 4.10) USCS = Unified Soil Classification System

Table 4: Field Saturated Hydraulic Conductivity Tests

Borehole Number	Northing (NAD 83 TXSC)	Easting (NAD 83 TXSC)	Surface Elevation (NAVD 88)	Test Elevation (NAVD 88)	Saturated Permeability (cm/s)	Saturated Permeability (ft/d)
B-2309P-U	13405492.3	2600435.2	76.25	71.25	1.0×10^{-8}	3.0×10^{-5}
B-2309P-L	13405491.6	2600445.1	76.13	66.13	1.44×10^{-6}	0.0041
B-2311P-U	13407705.7	2602287.6	75.71	70.71	6.94×10^{-8}	0.0002
B-2311P-L	13407703	2602296.9	75.33	65.33	1.0×10^{-8}	3.0×10^{-5}
B-2312P-U	13410699.8	2604161.2	75.46	70.46	1.76×10^{-7}	0.0005
B-2312P-L	13410694.3	2604153.2	75.5	65.5	4.00×10^{-5}	0.1134
B-2313P-U	13412117.4	2605610.9	77.88	72.88	1.0×10^{-8}	3.0×10^{-5}
B-2313P-L	13412115.6	2605606.1	77.97	67.97	2.67×10^{-6}	0.0076
B-2314P-U	13413938	2607776.5	75.48	70.48	4.73×10^{-6}	0.0134
B-2314P-L	13413940.7	2607782.6	75.42	65.42	1.0×10^{-8}	3.0×10^{-5}
B-2325P-U	13401288.3	2603699.2	73.79	68.79	1.71×10^{-6}	0.0049
B-2325P-L	13401292.3	2603696.5	73.85	63.85	4.20×10^{-4}	1.1907
B-2326P-U	13403069.2	2605616.5	70.97	65.97	1.00×10^{-8}	3.00×10^{-5}
B-2326P-L	13403074.7	2605620.4	70.76	60.76	1.44×10^{-6}	0.0041
B-2327P-U	13404711.4	2607393.8	71.24	66.24	1.0×10^{-8}	3.0×10^{-5}
B-2327P-L	13404712.2	2607384	70.81	60.81	1.60×10^{-5}	0.0454
B-2328P-U	13406233.3	2609021.3	68.13	63.13	1.60×10^{-5}	0.0454
B-2328P-L	13406222.9	2609021.2	68.42	58.42	9.70×10^{-4}	2.7500
B-2329P-U	13407878	2610791.9	68.07	63.07	1.0×10^{-8}	3.0×10^{-5}
B-2329P-L	13407871.4	2610784.7	68.06	58.06	1.0×10^{-8}	3.0×10^{-5}
B-2330P-U	13410096.3	2613184	67.89	62.89	1.88×10^{-6}	0.0053
B-2330P-L	13410088.7	2613185	68.18	58.18	5.34×10^{-7}	0.0015
B-2339P-U	13399916.5	2608670.1	68.75	63.75	1.99×10^{-6}	0.0056
B-2339P-L	13399911.2	2608674.7	68.63	58.63	2.40×10^{-5}	0.0680
B-2341P-U	13401608.5	2610954.3	65.22	60.22	2.70×10^{-6}	0.0077
B-2341P-L	13401608.5	2610954.3	65.22	55.22	1.08×10^{-5}	0.0306

Borehole Number	Northing (NAD 83 TXSC)	Easting (NAD 83 TXSC)	Surface Elevation (NAVD 88)	Test Elevation (NAVD 88)	Saturated Permeability (cm/s)	Saturated Permeability (ft/d)
B-2342P-U	13402788.9	2612523.3	67.61	62.61	1.00×10^{-8}	3.00×10^{-5}
B-2342P-L	13402761	2612526.3	67.34	57.34	1.00×10^{-8}	3.00×10^{-5}
B-2343P-U	13404159.4	2614386.7	64.62	59.62	1.00×10^{-8}	3.00×10^{-5}
B-2343P-L	13404159.4	2614395.9	64.95	54.95	1.00×10^{-8}	3.00×10^{-5}
B-2345P-U	13405835.3	2616662.5	67.91	62.91	1.00×10^{-8}	3.00×10^{-5}
B-2345P-L	13405831.4	2616657.3	67.79	57.79	1.00×10^{-8}	3.00×10^{-5}
				Minimum	1.00×10^{-8}	3.00×10^{-5}
				Maximum	9.70×10^{-4}	2.75
				Geometric Mean	3.28×10^{-7}	9.30×10^{-4}
				Count	32	32
				Standard Deviation	0.0002	0.5213
				alpha	0.05	0.05
				Confidence	6.37×10^{-5}	0.1806
				95% Upper Confidence Limit	**6.40×10^{-5}**	**0.1816**

Shaded values indicate a permeability below the method detection limit and are interpreted as 1.00×10^{-8} cm/s or 3.00×10^{-5} ft/d.

Raw data obtained from Appendix 2.5.4-B, Table 5.11.

Table 5: Stratigraphic Layer Elevations

Location	X	Y	Elevations in ft NAVD 88							
			Top of Layer 1	Bottom of Layer 1	Bottom of Layer 2	Bottom of Layer 3	Bottom of Layer 4	Bottom of Layer 5	Bottom of Layer 6	Bottom of Layer 7
B-2301G	2596252	13414415	62.7	62.5	42.7	19.8	-2.3	-31.2	-43.2	-61.2
B-2302G	2598387	13407402	67.5	56.5	24	15	-3	-35	-53	-62
B-2303G	2600497	13402315	57.6	57.4	39.6	32.6	3.6	-34.4	-59.4	-75.4
B-2304G	2608710	13396542	54.6	53.1	45.1	18.1	-16.9	-25.9	-55.9	-76.9
B-2305G	2621681	13406649	54.6	54.4	33.1	14.6	7.6	-15.4	-45.4	-63.4
B-2306	2615250	13411450	64.7	46.7	38.7	16.7	6.7	-25.3	-40.3	-66.3
B-2307G	2603185	13420918	64.4	64.2	56.4	13.4	-9.6	-18.6	-23.6	-33.6
47194*	2610571	13383051	63	62	-5	-15	-80	-90	-91	-110
52185*	2592889	13400328	66	58	32	26	13	7	5	-39
37824*	2595814	13390680	63	55	25	14	-9	-25	-53	-75
83861*	2597763	13428693	53	45	15	4	-14	-28	-31	-68
56174*	2616736	13392854	60	51	-3	-23	-40	-52	-54	-69
B-2274A	2600643	13413066	56.8	39.8	0.8	-5.8	-28.2	-38.7	-87.7	-138.8
68823*	2619545	13415933	63	62	-5	-45	-55	-80	-90	-125
Mean Observed Elevations			60.9	55.6	27.6	7.9	-13.4	-31.9	-50.0	-73.7
Assigned Model Layer Elevations			100.0	50.0	30.0	10.0	-10.0	-30.0	-50.0	-140.0
* Reference 9 – TWDB WIID Database Driller's Logs										
"B" Series boreholes from Appendices 2.5.4-A and 2.5.4-B (stratigraphic picks from Exelon_Cooling_Basin_Soillayers_rev4.xls dated 5/12/08)										

Table 6: Aquifer and Aquitard Properties

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Initial Dry Unit Weight (pcf)	Initial Void Ratio	Specific Gravity	Porosity (%)
Sand 01							
B-2269UD	UD-3	30-32	CL	110.7		2.66	
B-2269UD	UD-3	30-32	CL	116.6	0.42	2.66	29.7
B-2269UD	UD-4	33-34.8	CL	116.7	0.47	2.74	31.9
B-2302UD	UD-3	13.5-16	SM	103.3			
B-2319UD	2	5.5-7.5	SC	116.2		2.73	
B-2319UD	UD 2	5.5-7.5	SC	117.1	0.46	2.73	31.3
B-2319UD	UD 3	11.0-13.0	SM	102.8		2.72	
Upper Shallow Confining layer							
B-2174UD	UD 2	30-31.7	CH	100.5	0.71		41.5
B-2182UD	UD-5	33-34.7	CH	97.2	0.78	2.77	43.8
B-2182UD	UD-6	37-38.5	CL	111	ND	2.75	
B-2269UD	UD-5	50-51.7	CH	104.9		2.7	
B-2269UD	UD-5	50-51.7	CH	103	0.64	2.7	38.9
B-2319UD	UD 4	25.0-27.0	CH	106.5		2.72	
B-2319UD	UD-4	26.65	CH	109.1		2.72	
B-2321UD	7	38.5-40.2	CH	101.9		2.78	
B-2321UD	UD 6	28.5-30.2	CH	96.4		2.72	
B-2321UD	UD 7	38.5-40.2	CH	102.8		2.78	
B-2321UD	UD 7	38.5-40.2	CH	106.6	0.63	2.78	38.6
B-2321UD	UD-6	30.2	CH	96.1		2.72	
B-2321UD	UD-8	49.75	CH	92.2		2.72	
B-2352UD	5	24.0-25.7	CH	94.4		2.67	
B-2352UD	UD 5	24-25.7	CH	100.7	0.66	2.67	39.6
B-2359UD	3	30.8-32.8	CH	91		2.78	
B-2359UD	UD-4	36.45	CH	103.96		2.73	
B-2359UD	UD-5	41.15	CH	108.96		2.71	
Upper Shallow Aquifer							
B-2302UD	UD 9	63.5-66	SP-SM	103	0.63	2.68	38.7
B-2319UD	UD 5	35.0-37.0	ML	106.2		2.72	
B-2359UD	UD 7	55.0-56.7	ML	108.4	0.53	2.65	34.6

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Initial Dry Unit Weight (pcf)	Initial Void Ratio	Specific Gravity	Porosity (%)
Lower Shallow Confining layer							
B-2174UD	UD 3	75-76.7	CL	117.1	0.47		32
B-2182UD	UD-7	65-66.7	SC	95.4		2.74	
B-2182UD	UD-7	65-66.7	SC	93.3	0.84	2.74	45.5
B-2269UD	UD-7	70-71.7	CH	84.4		2.72	
B-2269UD	UD-7	70-71.7	CH	95.5	0.78	2.72	43.7
B-2269UD	UD-8	73-74.7	CH	100.6	0.66	2.67	39.6
B-2274UD	UD-4	67-68.7	CH	89.24		2.76	
B-2274UD	UD-4	67-68.7	CH	93.6	0.84	2.76	45.7
B-2302UD	11	69.5-71.5	CH	96.8		2.74	
B-2302UD	UD 11	69.5-71.5	CH	101	0.69	2.74	40.9
B-2302UD	UD-12	80.2	CH	101.6		2.68	
B-2304UD	7	73.5-75.5	MH	92.6		2.78	
B-2304UD	UD 7	73.5-75.5	MH	92.3	0.9	2.78	46.8
B-2304UD	UD-8	85.3	CH	90.8		2.71	
B-2319UD	8	75-77	SP-SM	96.6		2.73	
B-2319UD	UD 6	55.0-57.0	ML	91.9		2.71	
B-2319UD	UD 8	75.0-77.0	SP-SM	98.7	0.73	2.73	42.1
B-2319UD	UD-7	66.6	CL	103.2		2.66	
B-2321UD	UD-10	65.05	CL	116.5		2.67	
B-2321UD	UD-9	59.45	CL	104		2.68	
B-2352UD	UD 8	68.0-69.4	SM	107.3	0.56	2.68	35.9
B-2359UD	UD-10	71.6	CH	110.7		2.72	
Lower Shallow Aquifer							
B-2174UD	UD 4	90-90.9	CL	118.1	0.44		30.7
B-2182UD	UD 12B	95-97.5	SP-SM	103.5	0.64	2.72	39
B-2182UD	UD-11	90.5-93	CL	114.3		2.77	
B-2182UD	UD-11	90.5-93.0	CL	125.6	0.38	2.77	27.3
B-2182UD	UD-12T	95-97.5	CL	117.4		2.73	
B-2302UD	UD 14	108.5-111	SM	110.2	0.54	2.71	34.9
B-2302UD	UD-16	122.2	CH	97.6		2.72	
B-2319UD	UD 10	95.0-97.0	SP	103.2		2.72	
B-2321UD	UD 12	93.0-95.7	SP-SM	101.2	0.66	2.69	39.8
B-2321UD	UD 12	93.0-95.7	SP-SM	101.9		2.69	
B-2359UD	11	77.0-78.7	SC-SM	106.2		2.72	
B-2359UD	UD 11	77.0-78.7	SC-SM	101.9	0.67	2.72	40
B-2359UD	UD 14	88.5-90.5	ML	96.6	0.78	2.74	43.8
B-2359UD	UD-12	80.25	SC	107.2		2.66	

Boring No.	Sample No.	Sample Depth (ft)	USCS Symbol	Initial Dry Unit Weight (pcf)	Initial Void Ratio	Specific Gravity	Porosity (%)
Deep Confining Layer							
B-2182UD	UD-13	120-121.7	SC	111	0.52	2.71	34.3
B-2182UD	UD-13	120-121.7	SC	104.6		2.71	
B-2269UD	UD 9	120-121.7	MH	86.5	1		50
B-2269UD	UD-10	123-123.8	CH	115.1	0.45	2.68	31.1
B-2302UD	UD-19	147	CL			2.69	
B-2304UD	9	98.5-101	CH	99.8		2.74	
B-2304UD	UD 9	98.5-101.0	CH	101.5	0.69	2.74	40.7
B-2304UD	UD-11	112.9	CH	103.6		2.71	
B-2304UD	UD-13	122.95	CH	108		2.71	
B-2321UD	14	128.5-130	CH	96.8		2.75	
B-2321UD	UD 14	128.5-130.3	CH	97		2.75	
B-2321UD	UD-15	132.5	CH	102.2		2.71	
B-2359UD	18	112-113.1	SC	92.4		2.77	
B-2359UD	UD 17	110-111.7	SM	106.9	0.58	2.71	36.8
B-2359UD	UD 19	114.0-116.6	SM	105.7	0.6	2.7	37.4
B-2182UD	UD-15	145-147.5	ML	95.4		2.7	
B-2182UD	UD-15	145-147.5	ML	102.5	0.65	2.7	39.2
B-2269UD	UD-11	150-151.7	CH	103.7		2.7	
B-2269UD	UD-11	150-151.7	CH	105	0.6	2.7	37.7
B-2359UD	UD-20	121.25	CH	85.9		2.72	
Deep Aquifer							
B-2174UD	UD 8	145-147	SM	101	0.66	2.68	39.8
B-2174UD	UD 10	183-185	SM	109.8	0.55	2.72	35.5
B-2182UD	UD 16	180-182.5	SM	107	0.57	2.68	36.3
B-2269UD	UD 16	280-281.2	SC	107.5	0.56	2.69	35.9

Table 7: Geometric Mean Specific Gravity, Total Porosity, and Effective Porosity

Layer	Description	Specific Gravity	Total Porosity	Effective Porosity(1)
1	Sand 1 aquifer	2.71	0.310	0.248
2	Upper Shallow Confining Layer	2.73	0.404	0.263
3	Upper Shallow aquifer	2.68	0.366	0.293
4	Lower Shallow Confining Layer	2.72	0.411	0.267
5	Lower Shallow aquifer	2.72	0.361	0.289
6	Deep Confining Layer	2.72	0.381	0.248
7	Deep aquifer	2.69	0.368	0.294

(1) Effective porosity for sand layers = total porosity x 0.8
Effective porosity for clay layers = total porosity x 0.65

Table 8: Summary of Model Boundary Conditions

Feature	Boundary Type	Elevation and General Location of Boundary
Guadalupe River Valley	Type 1- Specified Head	15 ft to 20 ft NAVD 88; Eastern model boundary
San Antonio River Valley	Type 1 – Specified Head	30 ft to 70 ft NAVD 88; Western model boundary
Sand 1 Seeps*	Type 3 – Head Dependent Flow – Drain	Drain elevation at 54 ft to 56 ft NAVD 88; Parallel to eastern model boundary adjacent to the VCS site
Kuy Creek*	Type 3 – Head Dependent Flow – Drain	Drain elevation at 20 ft to 55 ft NAVD 88; Southeast
Dry Kuy Creek*	Type 3 – Head Dependent Flow – Drain	Drain elevation at 20 ft to 65 ft NAVD 88; Southeast
Cooling Basin**	Type 3 – Head Dependent Flow – RIV Package	Stage = 90.5 ft NAVD 88; Bottom = 69 ft NAVD 88

* Drain boundaries also require a conductance term. This term is KLW/M; where K = vertical hydraulic conductivity, L = length of drain in a model cell, W = width of drain in model cell, and M = thickness of conductive layer. GMS computes this term with the input of a vertical hydraulic conductivity value for the drain cell. The vertical hydraulic conductivity used for all drains was 20 ft/d.

** The river boundaries also use this conductance term. The vertical hydraulic conductivities used are – Zone 1 = 20 ft/d and Zone 2 = 0.182 ft/d.

Table 9: Calibration Steps

Calibration Run	VCS Site Recharge Rate (ft/d)	Former Channels Recharge Rate (ft/d)	Mean Error (ft) (Target < 2ft)	Root Mean Square Error (ft) (Target < 5 ft)	Normalized Root Mean Square Error (%) (Target < 10%)	Mass Balance Discrepency (%) (Target < 1%)	Conclusion
1	0.000199	0.000199	1.878	5.538	11.1	0.00	Decrease recharge
2	0.001	0.001	-0.735	5.062	10.1	0.00	Increase recharge
3	0.00005	0.00005	-1.949	5.504	11.0	0.00	Increase recharge
4	0.00015	0.00015	0.461	4.996	10.0	0.00	Fit is good, but value is above regional rates
5	0.000055	0.0005	-1.300	4.957	9.9	0.00	Increase local recharge
6	0.000055	0.005	3.951	6.484	13.0	0.00	Increase local recharge
7	0.000055	0.007	6.275	9.487	19.0	0.00	Decrease local recharge
8	0.000055	0.006	5.113	7.933	15.9	0.00	Local recharge is a poor fit – try spatial variability of recharge
9	0.000055	0.000055	-1.826	5.445	10.9	0.00	Increase recharge in channels
10	0.000055	0.00009	-1.630	5.316	10.6	0.00	Increase recharge in channels
11	0.000055	0.0009	2.850	5.352	10.7	0.00	Decrease recharge in channels
12	0.000055	0.0004	0.095	4.590	9.2	0.00	Fit is good, test same scenario with groundwater divide
13	0.000055	0.001	-0.672	5.393	10.8	0.00	Increase recharge of channels
14	0.000055	0.0025	10.553	13.708	27.4	0.00	Decrease recharge of channels
15	0.000055	0.0015	3.260	6.684	13.4	0.00	Decrease recharge of channels
16	0.000055	0.0012	0.911	5.497	11.0	0.00	Use calibration run 12 as final calibrated model

Table 10: Comparison of Simulated and Measured Heads

Observation Well	Observed Head (h_m) (ft)	Simulated Head (h_s) (ft)	Residual Head (h_m-h_s) (ft)	Absolute Residual Head $\|(h_m-h_s)\|$ (ft)	Residual Head Squared $(h_m-h_s)^2$ (ft^2)
OW-2301U	50.24	39.445	10.795	10.795	116.532
OW-2301L	38.35	32.781	5.569	5.569	31.01376
OW-2307U	32.68	26.838	5.842	5.842	34.12896
OW-2307L	26.81	24.324	2.486	2.486	6.180196
OW-2324U	14.89	19.716	-4.826	4.826	23.29028
OW-2324L	14.48	19.2	-4.72	4.72	22.2784
OW-2319U	35.23	34.692	0.538	0.538	0.289444
OW-2319L	34.51	32.111	2.399	2.399	5.755201
OW-2320U	28.81	30.497	-1.687	1.687	2.845969
OW-2320L	30.05	27.752	2.298	2.298	5.280804
OW-04U	24.76	30.968	-6.208	6.208	38.53926
OW-04L	23.76	25.875	-2.115	2.115	4.473225
OW-2352U	19.38	29.855	-10.475	10.475	109.7256
OW-2352L	19.43	25.614	-6.184	6.184	38.24186
OW-2304U	36.14	35.197	0.943	0.943	0.889249
OW-2304L	27.47	32.682	-5.212	5.212	27.16494
OW-02U	25.39	32.818	-7.428	7.428	55.17518
OW-01U	31.46	35.695	-4.235	4.235	17.93523
OW-07U	20.72	25.924	-5.204	5.204	27.08162
OW-06U	27.42	30.742	-3.322	3.322	11.03568
OW-09U	27.78	31.717	-3.937	3.937	15.49997
OW-05U	27.1	31.199	-4.099	4.099	16.8018
OW-2253U	47.84	36.676	11.164	11.164	124.6349
OW-2284U	44.3	36.646	7.654	7.654	58.58372
OW-2185U	39.69	37.247	2.443	2.443	5.968249
OW-2181U	42.85	37.961	4.889	4.889	23.90232
OW-2169U	43.18	37.947	5.233	5.233	27.38429
OW-2150U	46.08	38.117	7.963	7.963	63.40937
OW-2302U	38.89	36.86	2.03	2.03	4.1209
OW-2302L	37.01	34.046	2.964	2.964	8.785296
OW-2320U1	29.25	34.75	-5.5	5.5	30.25
OW-2320U2	29.23	34.745	-5.515	5.515	30.41523
OW-2320U3	29.12	34.726	-5.606	5.606	31.42724
OW-2320U4	29	34.889	-5.889	5.889	34.68032
OW-2321U	21.57	25.789	-4.219	4.219	17.79996
OW-2321L	21.86	23.703	-1.843	1.843	3.396649
OW-2348U	13.06	16.353	-3.293	3.293	10.84385
OW-2348L	13.17	16.361	-3.191	3.191	10.18248
OW-2359L1	24.82	23.457	1.363	1.363	1.857769
OW-2359L2	24.81	23.49	1.32	1.32	1.7424
OW-2359L3	24.94	23.491	1.449	1.449	2.099601

Observation Well	Observed Head (h_m) (ft)	Simulated Head (h_s) (ft)	Residual Head (h_m-h_s) (ft)	Absolute Residual Head $|(h_m-h_s)|$ (ft)	Residual Head Squared $(h_m-h_s)^2$ (ft^2)
OW-2359U1	24.28	28.719	-4.439	4.439	19.70472
OW-01L	30.8	29.348	1.452	1.452	2.108304
OW-02L	25.22	27.438	-2.218	2.218	4.919524
OW-03L	20.36	23.587	-3.227	3.227	10.41353
OW-05L	26.69	26.958	-0.268	0.268	0.071824
OW-06L	27.21	26.847	0.363	0.363	0.131769
OW-07L	20.71	21.77	-1.06	1.06	1.1236
OW-08U	37.24	32.554	4.686	4.686	21.9586
OW-08L	33.91	29.902	4.008	4.008	16.06406
OW-09L	27.87	25.385	2.485	2.485	6.175225
OW-10U	22.49	27.831	-5.341	5.341	28.52628
OW-10L	24.9	24.703	0.197	0.197	0.038809
OW-2150L	34.55	33.79	0.76	0.76	0.5776
OW-2169L	36.96	33.605	3.355	3.355	11.25603
OW-2181L	36.58	33.598	2.982	2.982	8.892324
OW-2185L	35.64	32.891	2.749	2.749	7.557001
OW-2253L	33.43	29.708	3.722	3.722	13.85328
OW-2269U	35.55	32.651	2.899	2.899	8.404201
OW-2269L	33.56	29.855	3.705	3.705	13.72703
OW-2284L	35.16	32.378	2.782	2.782	7.739524
		$\Sigma(h_m-h_s)$	-5.774	236.748	1284.886
		n = 61			

Mean Error	0.10	ft
Mean Absolute Error	3.88	ft
Root Mean Square Error	4.59	ft

$$Mean\ Error = \frac{1}{n}\sum_{i=1}^{n}(h_m - h_s)_i$$

(Reference 4, page 238, Eq. 8.1)

$$Mean\ Absolute\ Error = \frac{1}{n}\sum_{i=1}^{n}|(h_m - h_s)|_i$$

(Reference 4, page 240, Eq. 8.2)

$$RootMeanSquareError = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(h_m - h_s)_i^2}$$

Reference 4, page 241, Eq. 8.3)

Table 11: Summary of Predictive Cooling Basin Seepage Simulations

Scenario	Flow Error (%)	Total Basin Seepage (gpm)	Exelon Basin Seepage (gpm)	GSWR Seepage (gpm)	Kuy/Dry Kuy Creek Drains (gpm)	Flow to Guadalupe River (gpm)	Flow from San Antonio River (gpm)	Sand 1 Seeps (gpm)	Approximate Groundwater Elevation at Power Block (ft NAVD88)
Preconstruction	0.00	0	0	0	80	2,870	1,720	0	35-40
Base case seepage	-0.36	7,040	3,530	3,510	1,360	5,590	760	2,130	75-80
Sensitivity Analyses									
Basin bottom in clean sand	-0.55	7,890	4,000	3,890	1,840	5,680	720	2,380	75-80
No GBRA Basin	-0.29	4,940	0	4,940	1,310	5,230	780	450	75-80
Cooling basin Zone 1 bottom at 75 ft NAVD88	-0.36	7,040	3,530	3,510	1,360	5,590	760	2,130	75-80
Basin level held at maximum normal operating level of 91.5 ft NAVD88	-0.36	7,290	3,650	3,640	1,420	5,650	730	2,240	75-80
Power block backfill has a recharge rate 2 x the assumed rate	-0.36	7,000	3,490	3,510	1,360	5,600	760	2,140	75-80
River conductance values increased an order of magnitude	-0.41	7,620	3,830	3,790	1,670	5,660	730	2,300	75-80
Horizontal and vertical conductivity of clay layers increase 10 x the assumed rate	-0.17	16,110	9,110	7,000	1,980	12,690	-1,420	1,280	75-80
Drain conductance values increased an order of magnitude	-6.46	7,920	3,430	4,490	1,580	5,450	840	3,880	75-80

Table 12: Summary of Predictive Dewatering Simulations

Scenario (one unit)	Simulated Pumping Rate (gpm)	Estimated Pumping Rate (gpm) [1]	Dewatering Elevation (ft NAVD88)
Basin Empty	310	60-880	19
Basin Empty	660	Not Applicable	-20
Basin Full	720	970	19
Basin Full	870	Not Applicable	-20
Basin Full Sensitivity (cut-off wall through layer 3)	720	Not Applicable	-20
Basin Full Sensitivity (cut-off wall through layer 5)	540	Not Applicable	-20

[1] Pumping rates calculated using analytical dewatering equations

Table 13: Summary of Predictive Cut-Off Wall Simulations around the Cooling Basin

Condition	Total Basin Seepage (gpm)	Exelon Basin Seepage (gpm)	GSWR Seepage (gpm)
Base case seepage	7,040	3,530	3,510
Cut-off wall through Layer 1	2,430	1,370	1,060
Cut-off wall through Layer 3	1,690	880	810
Cut-off wall through Layer 5	1,400	670	730
Clay liner	6,080	3,400	2,680

Table 14: Travel Time Analysis

Scenario	Flowpath Length to Black Bayou [ΔL] (ft)	Flowpath Length to Northern Property Boundary Hypothetical Pumping Well [ΔL] (ft)	Travel Time [t] to Black Bayou (days [years])	Travel Time to Northern Property Boundary Hypothetical Pumping Well [t] (days [years])
Base Case Seepage Layer 2 Particles	17,980	7,490	74,300 [204]	9,400 [26]
Cut-off Wall Through Layer 3 Flow to Black Bayou Layer 2 Particles	11,050	Not Applicable	29,600 [81]	Not Applicable
Clay Liner Flow to Black Bayou Layer 2 Particles	11,260	6,520	15,300 [42]	9,500 [26]

Figure 1: Exelon VCS Site General Location Map

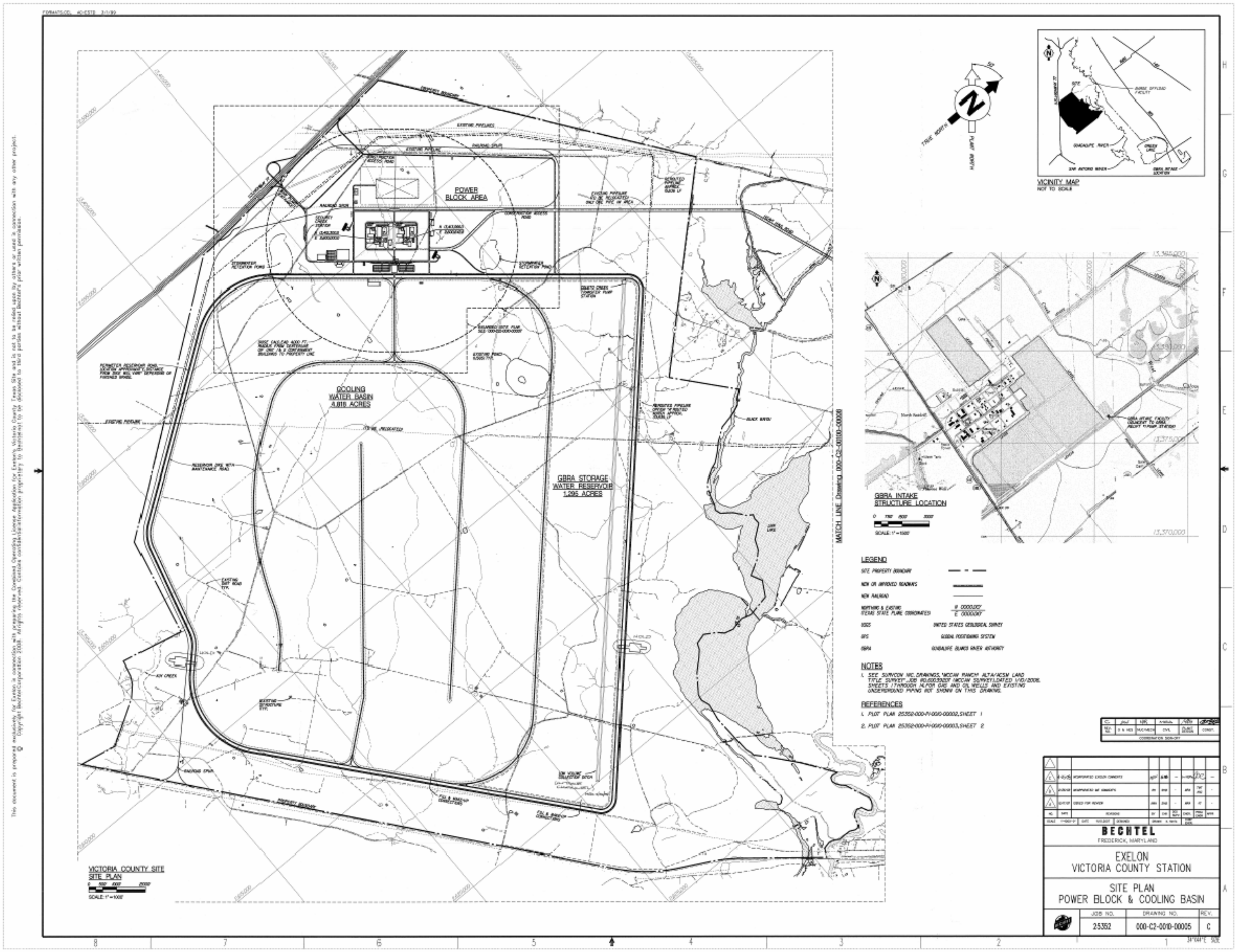


Figure 2: Exelon VCS Site Plan

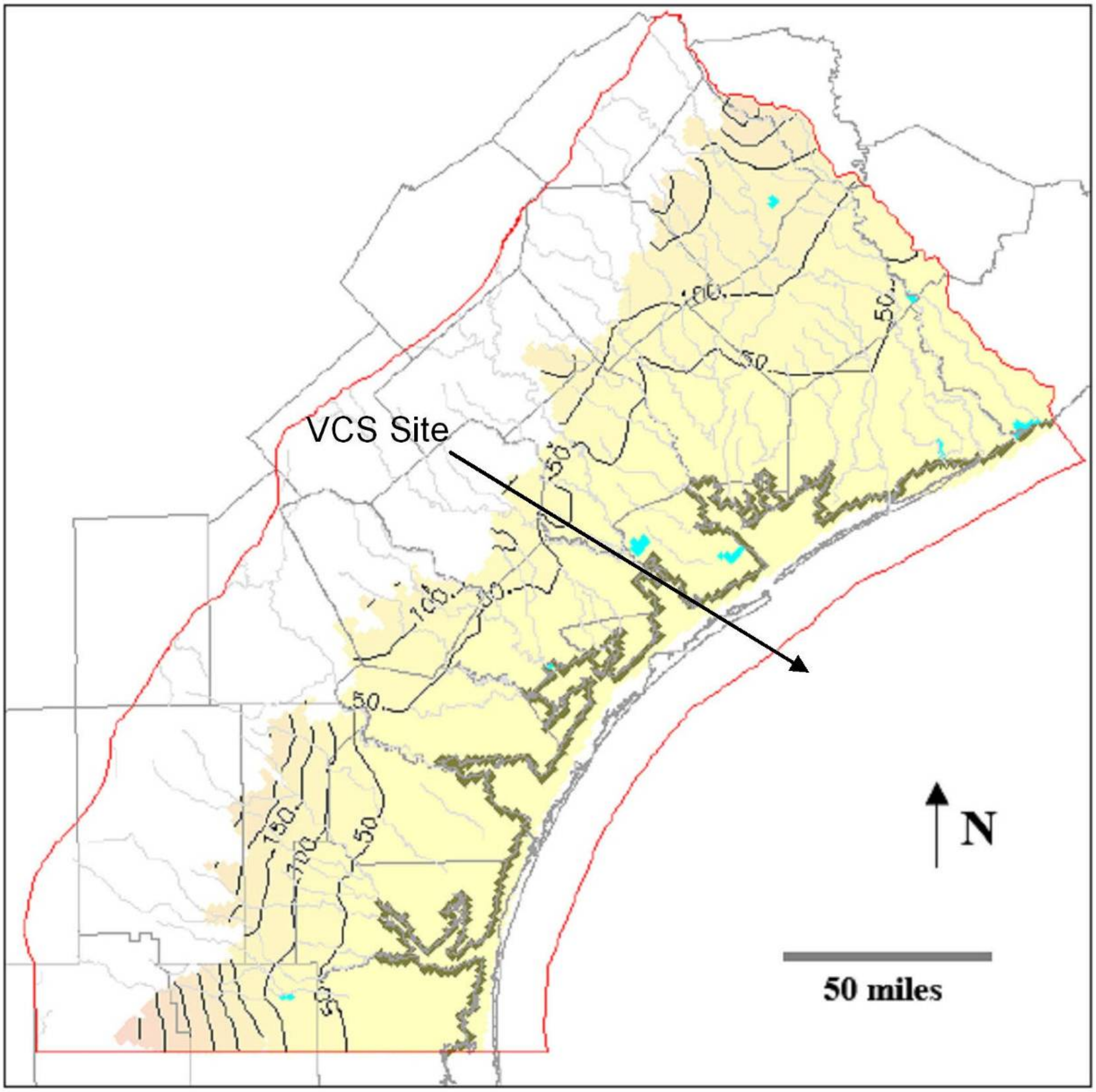


Figure 3: 1999 Potentiometric Surface in the Chicot Aquifer (Reference 7)

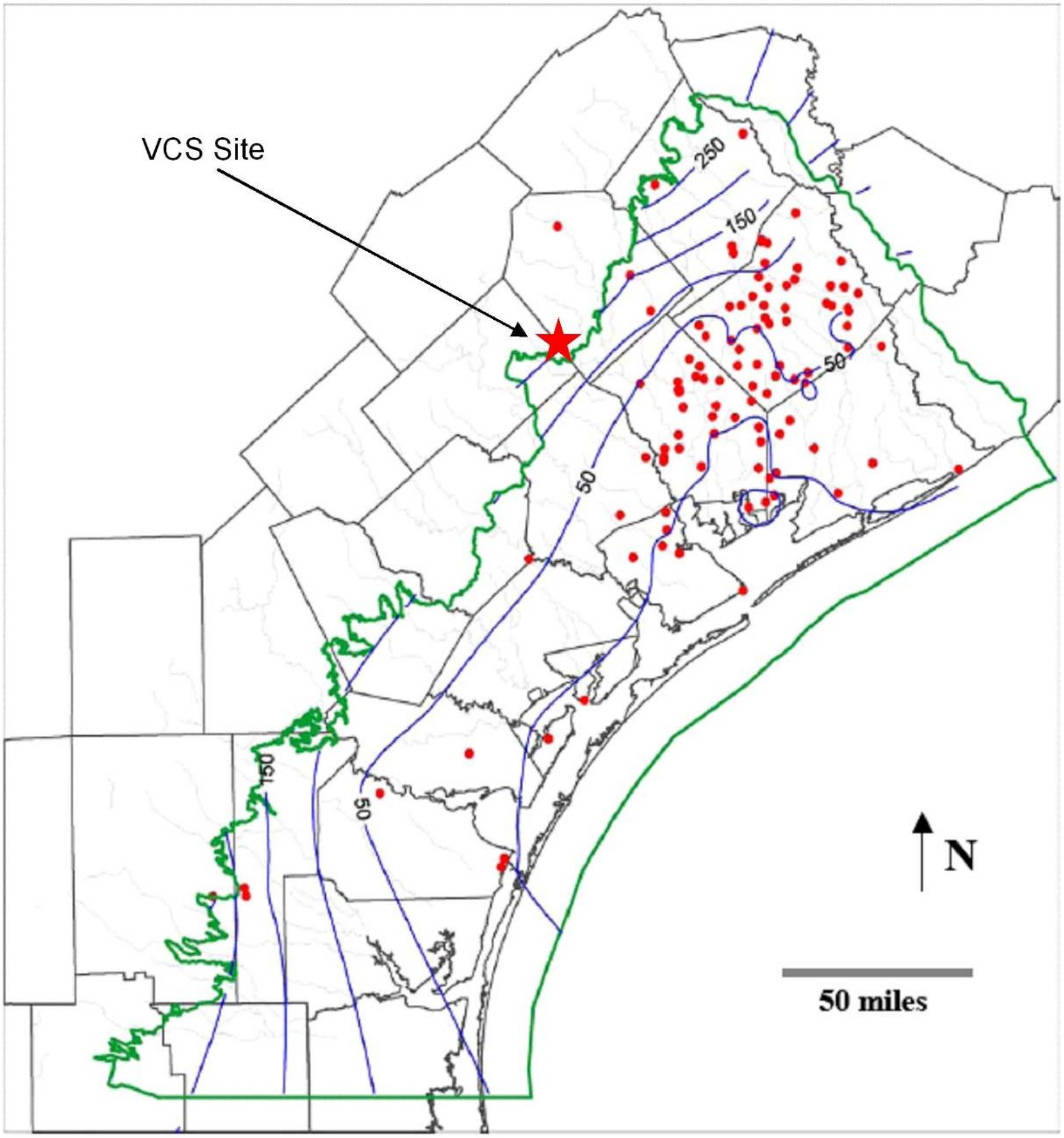


Figure 4: Simulated Water Levels for GAM Steady-State Model (Reference 7)

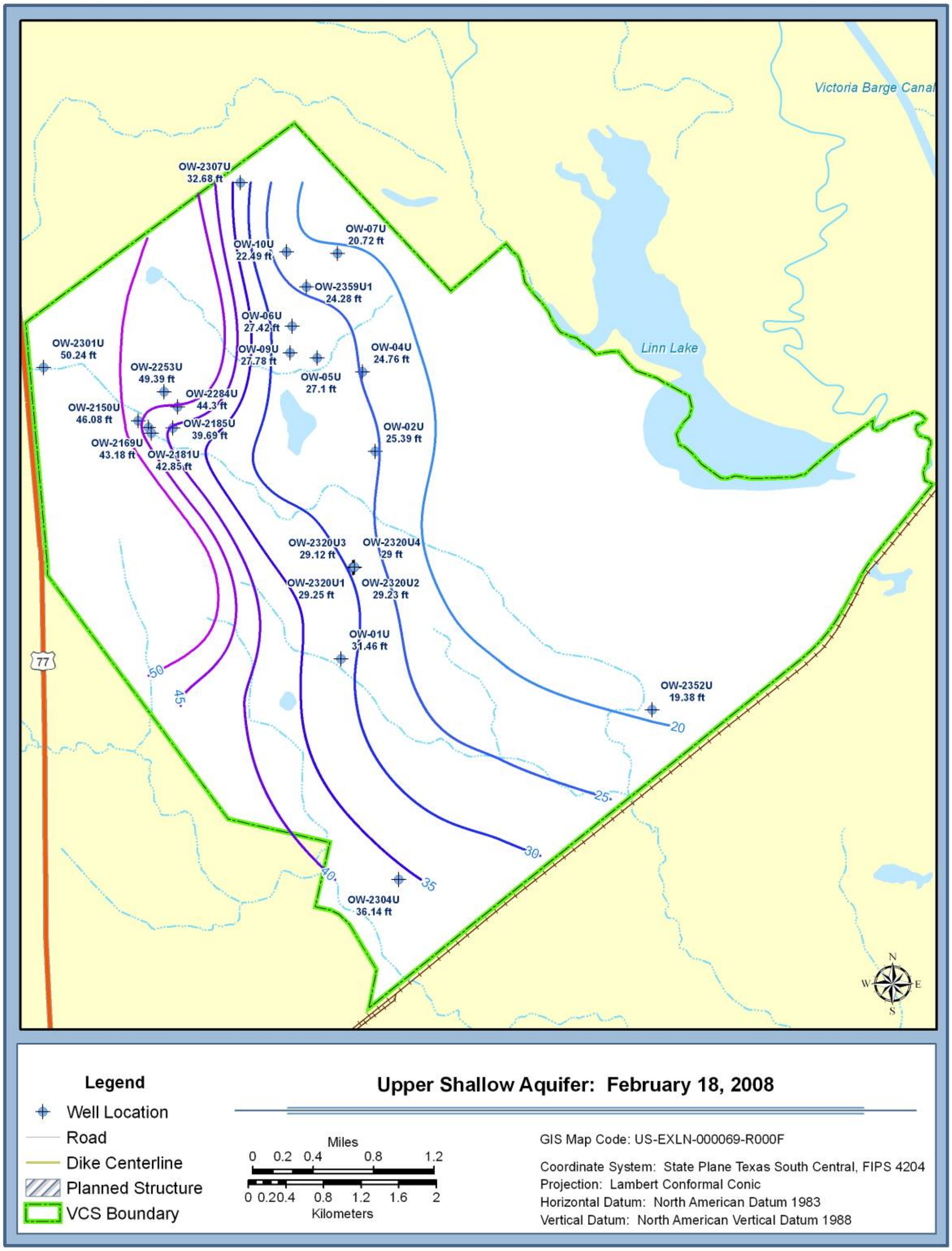


Figure 5: Upper Shallow Aquifer Potentiometric Surface Map

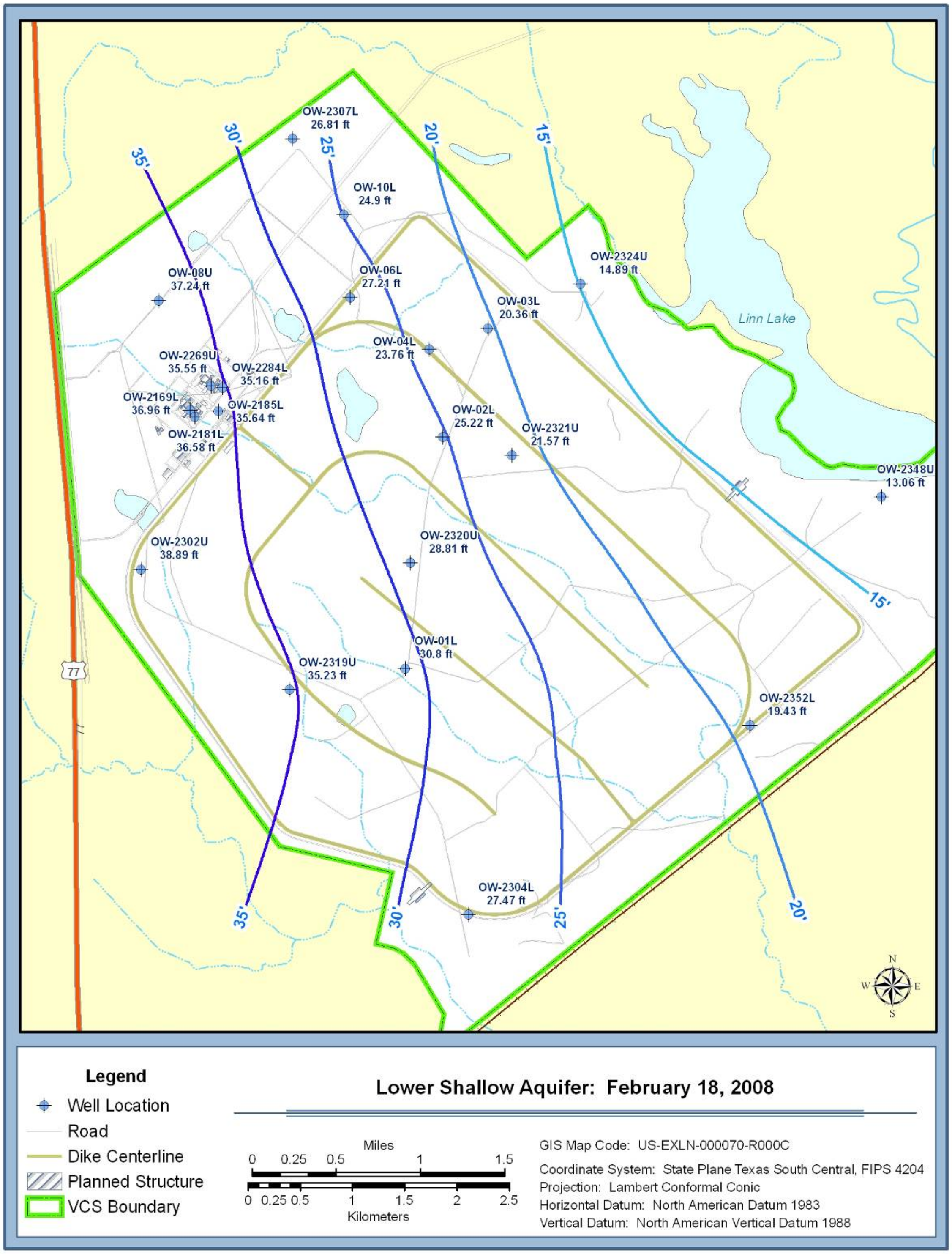


Figure 6: Lower Shallow Aquifer Potentiometric Surface Map

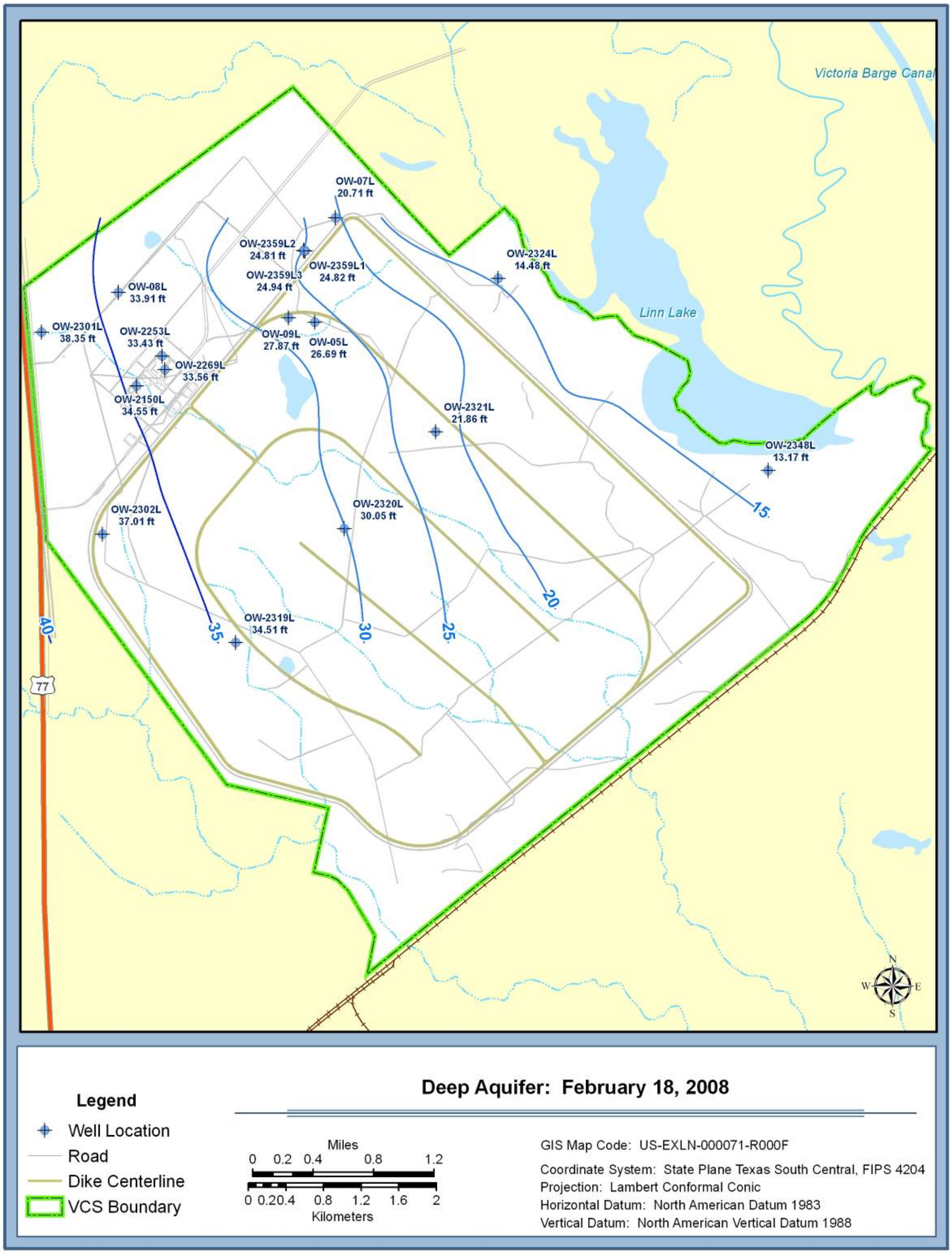


Figure 7: Deep Aquifer Potentiometric Surface Map

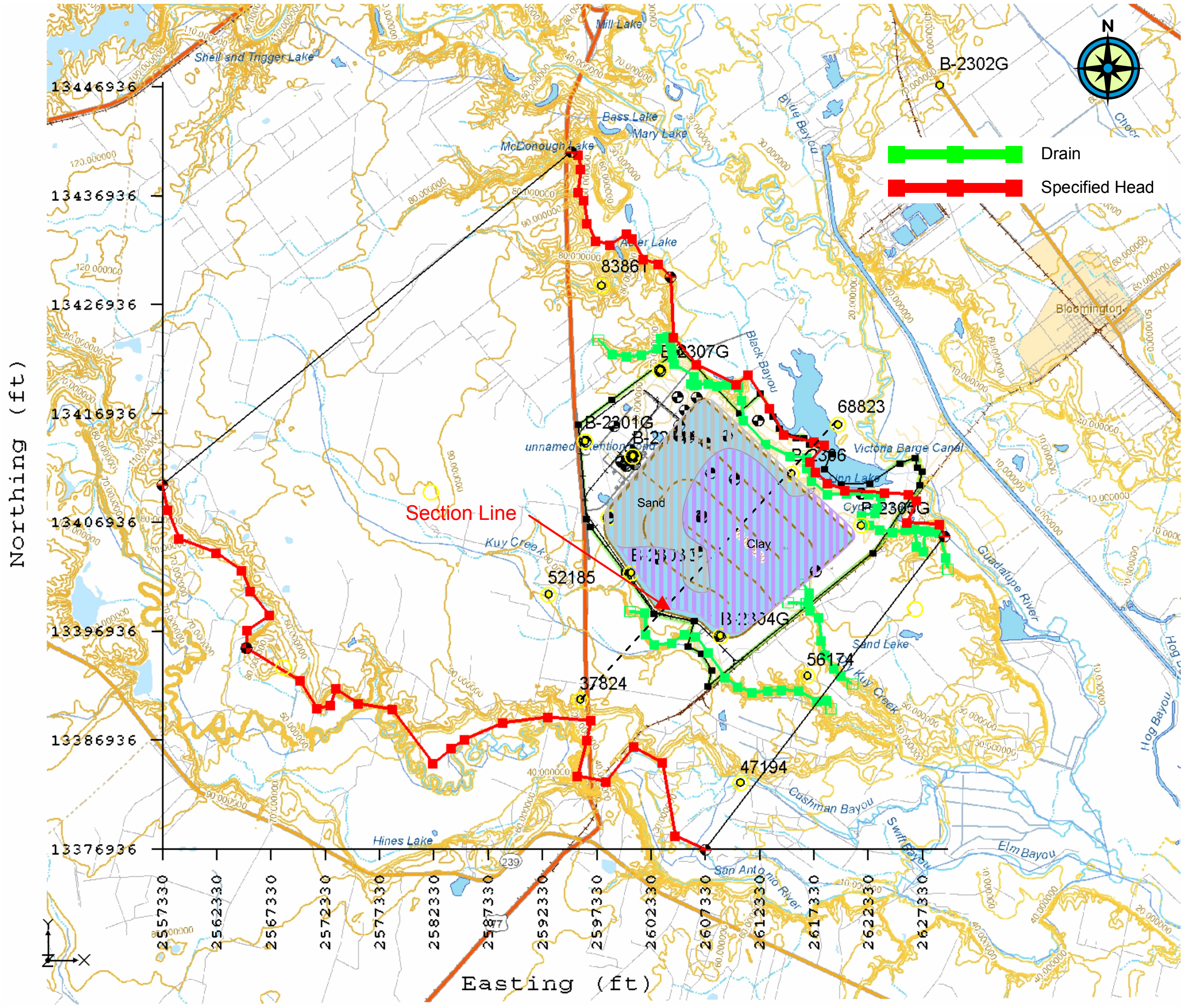


Figure 8: Plan View of Site Groundwater Modeling Area and Location Map of Stratigraphic Data Points used to define layering in the Model

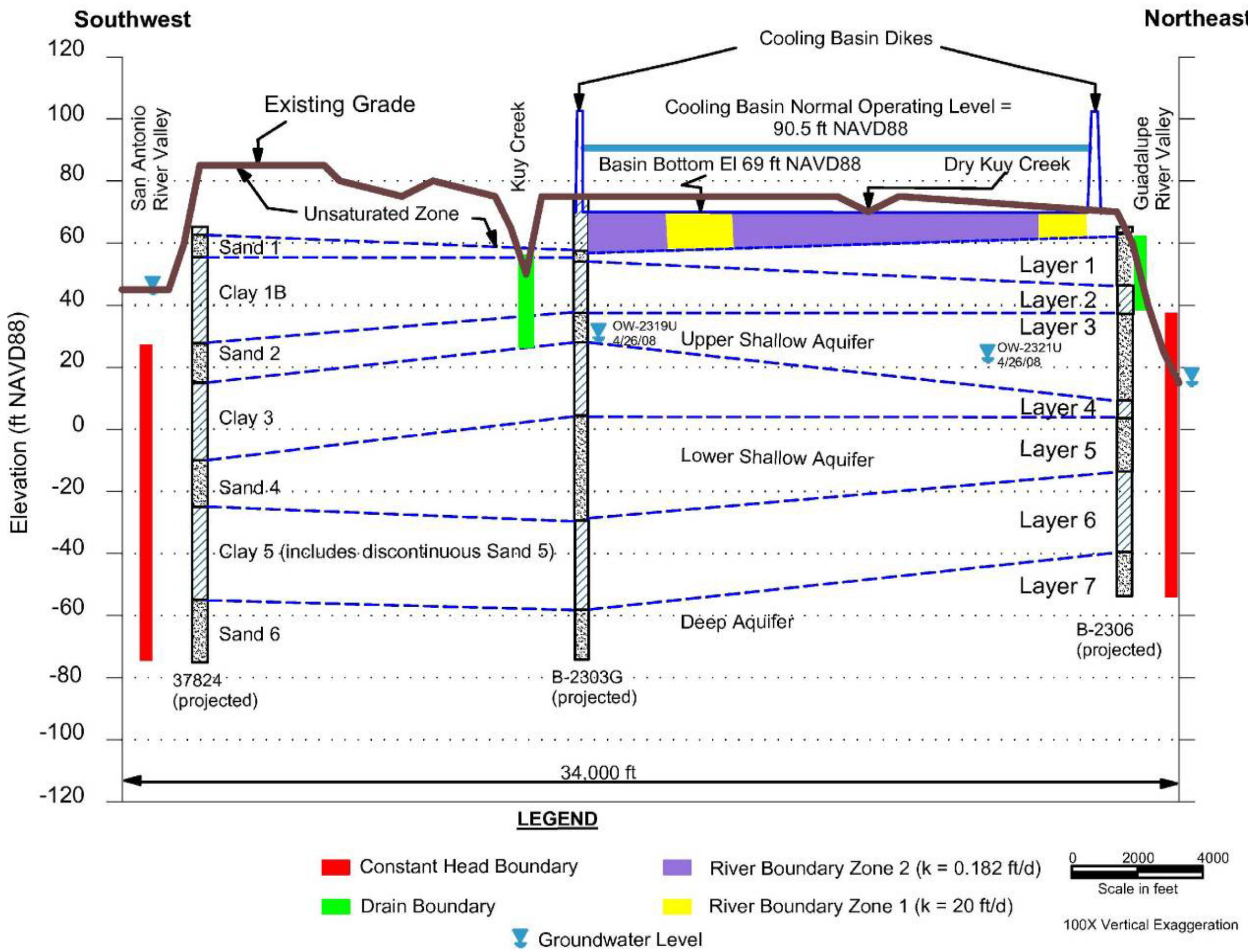
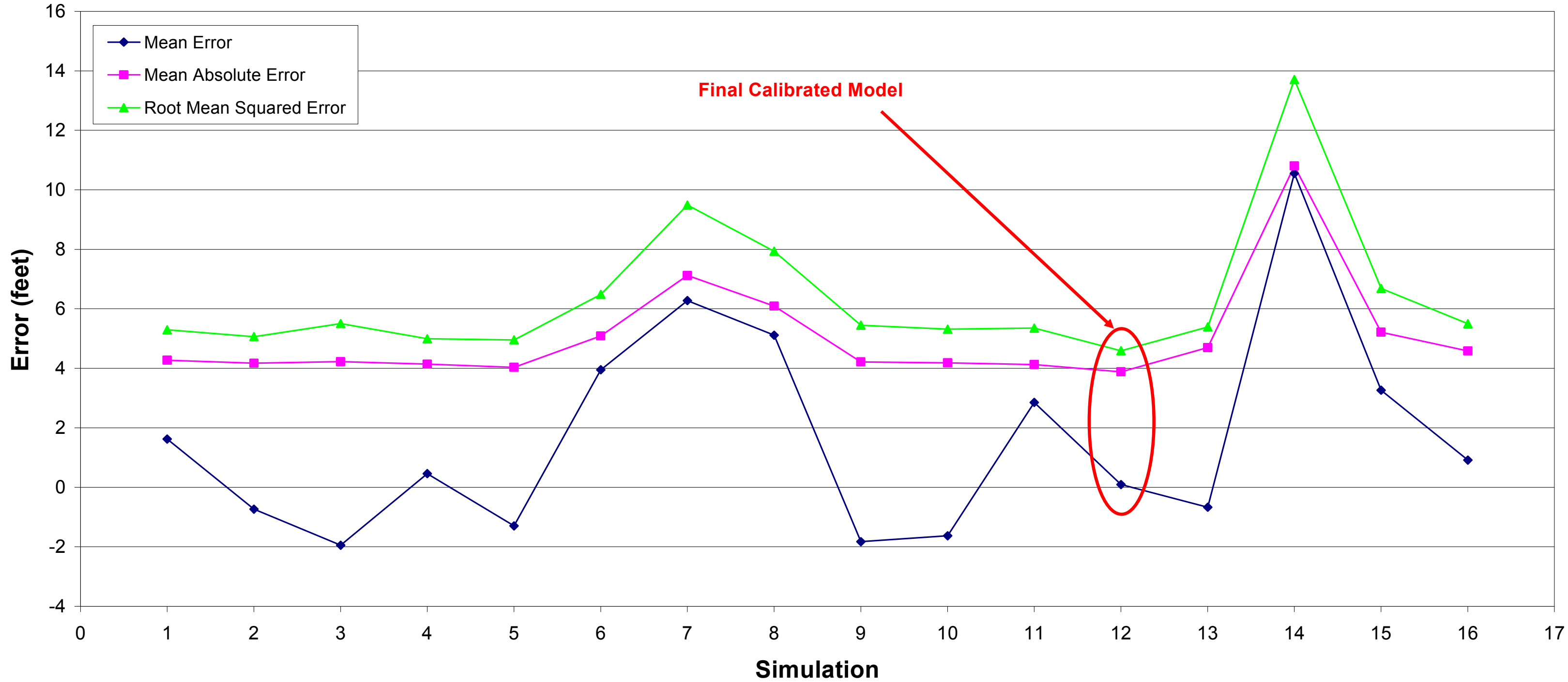


Figure 9: Section View of Conceptual Model of the Groundwater Flow System



Simulation 1: Site recharge = 0.000199 ft/day
Simulation 2: Site recharge = 0.0001 ft/day
Simulation 3: Site recharge = 0.00005 ft/day
Simulation 4: Site recharge = 0.000150 ft/day
Simulation 5: Local recharge = 0.0005 ft/day
Simulation 6: Local recharge = 0.005 ft/day
Simulation 7: Local recharge = 0.007 ft/day
Simulation 8: Local recharge = 0.006 ft/day
Simulation 9: Channels recharge = 0.000055 ft/day
Simulation 10: Channels recharge = 0.00009 ft/day
Simulation 11: Channels recharge = 0.0009 ft/day
Simulation 12: Channels recharge = 0.0004 ft/day
Simulation 13: Channels recharge = 0.001 ft/day + Groundwater Divide
Simulation 14: Channels recharge = 0.0025 ft/day + Groundwater Divide
Simulation 15: Channels recharge = 0.0015 ft/day + Groundwater Divide
Simulation 16: Channels recharge = 0.0012 ft/day + Groundwater Divide

Figure 10: Error vs. Simulation Number for Calibration

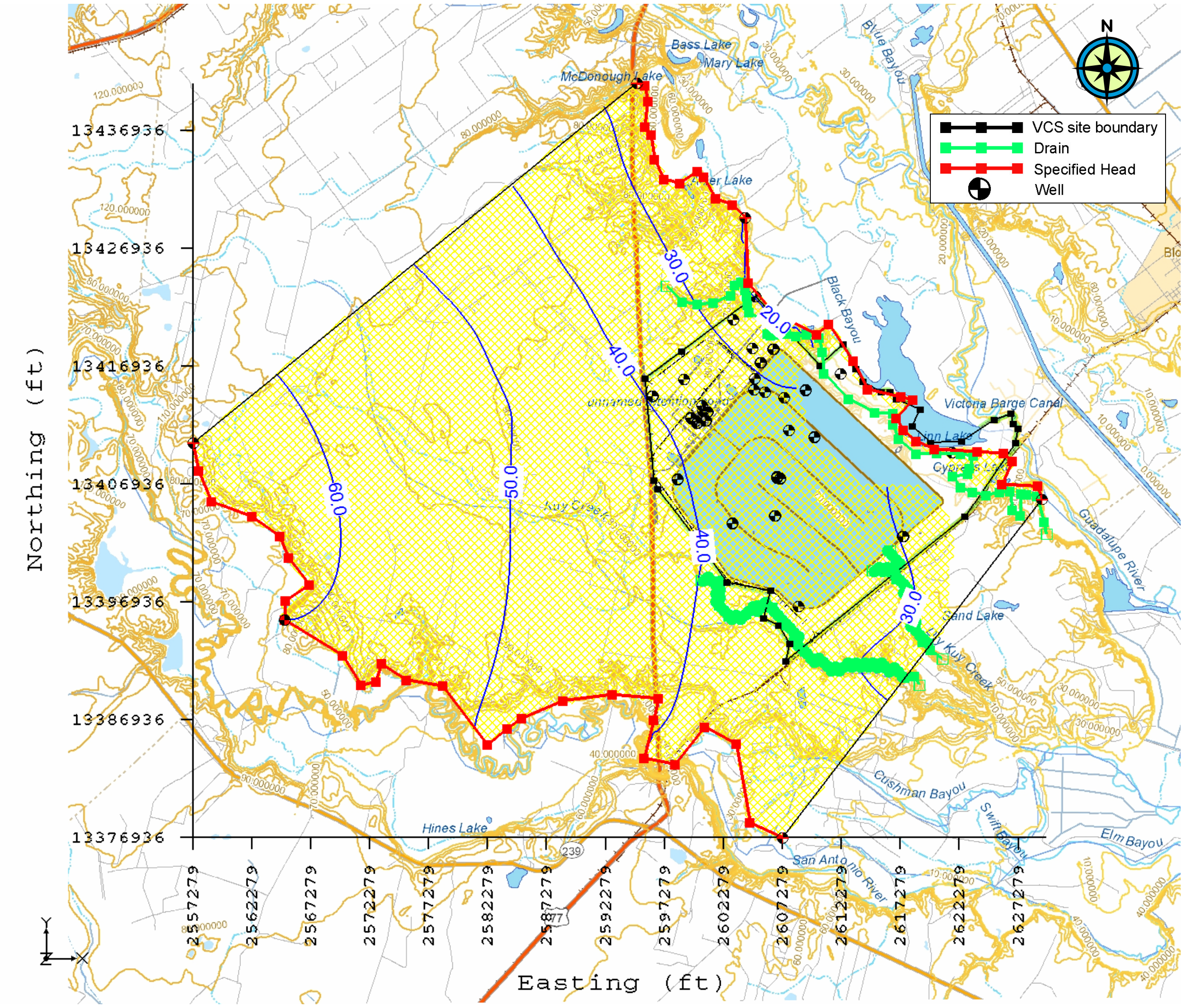
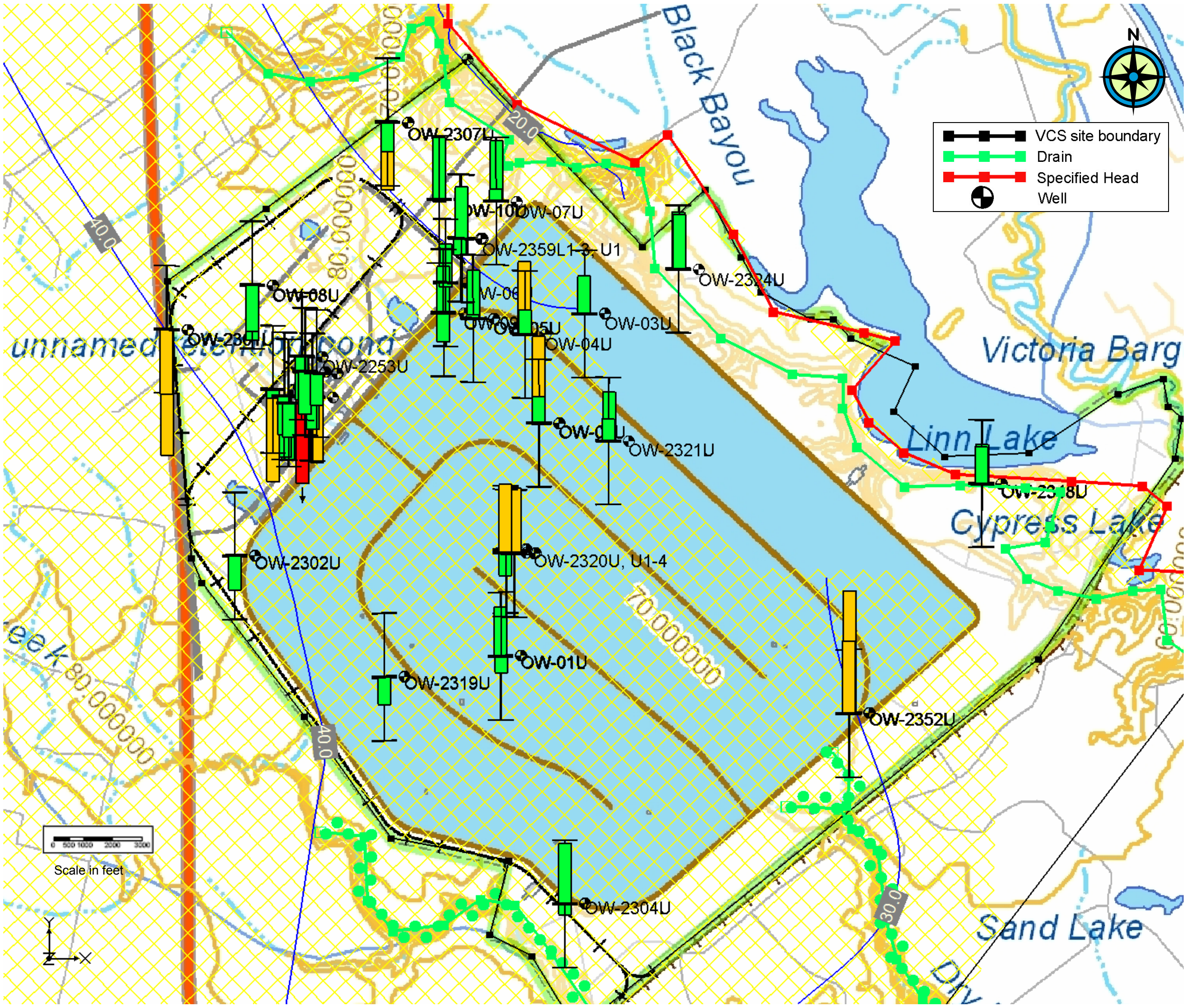


Figure 11a: Layer 3 Simulated Preconstruction Potentiometric Surface (without Calibration Markers)



- Green calibration markers indicate the simulated head is within the target error.
- Yellow calibration markers indicate the simulated head is within 200 percent of target error.
- Red calibration markers indicate the simulated head is greater than 200 percent of the target error.

Figure 11b: Layer 3 Simulated Preconstruction Potentiometric Surface (with Calibration Markers)

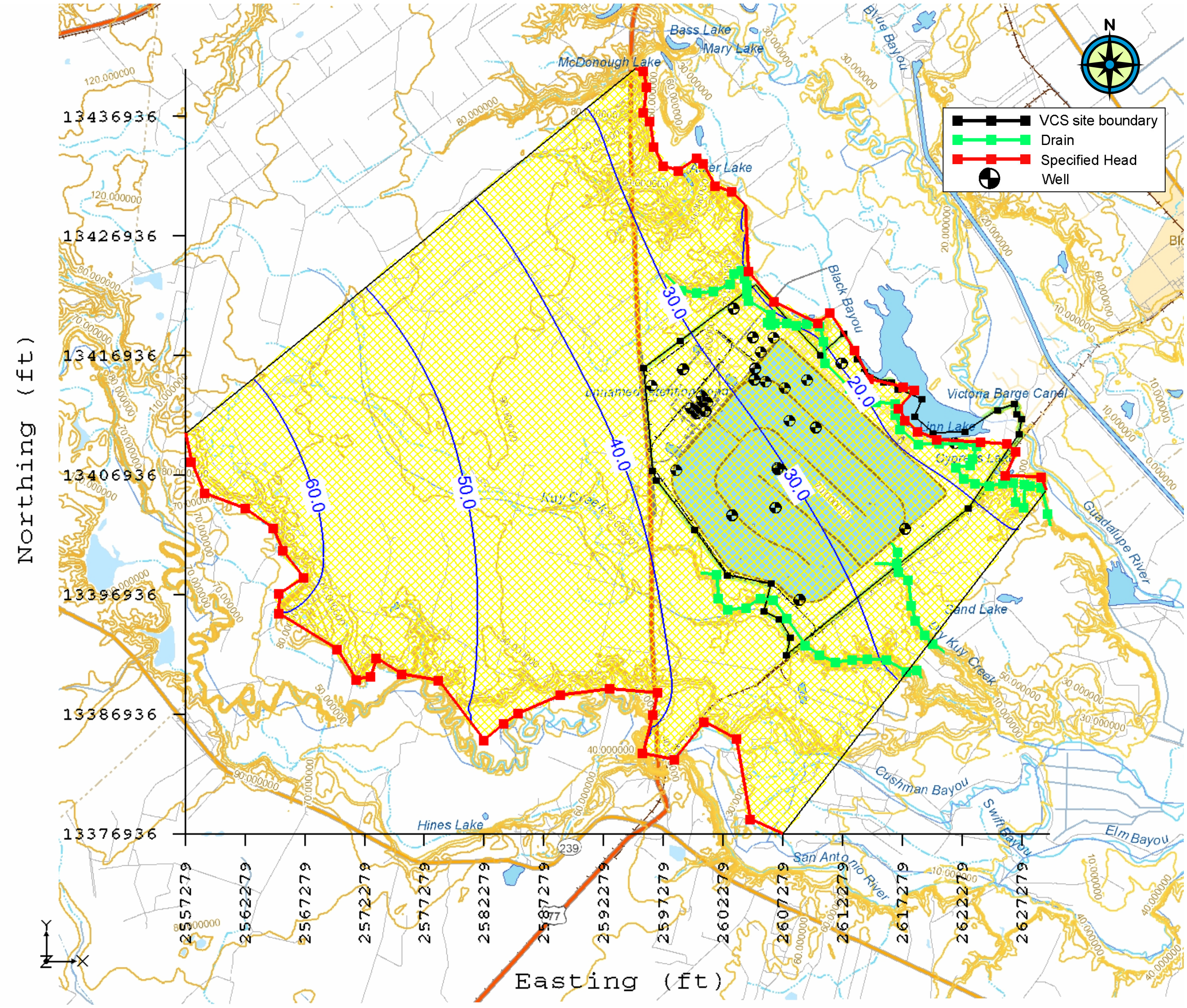


Figure 12: Layer 5 Simulated Preconstruction Potentiometric Surface with Calibration Wells

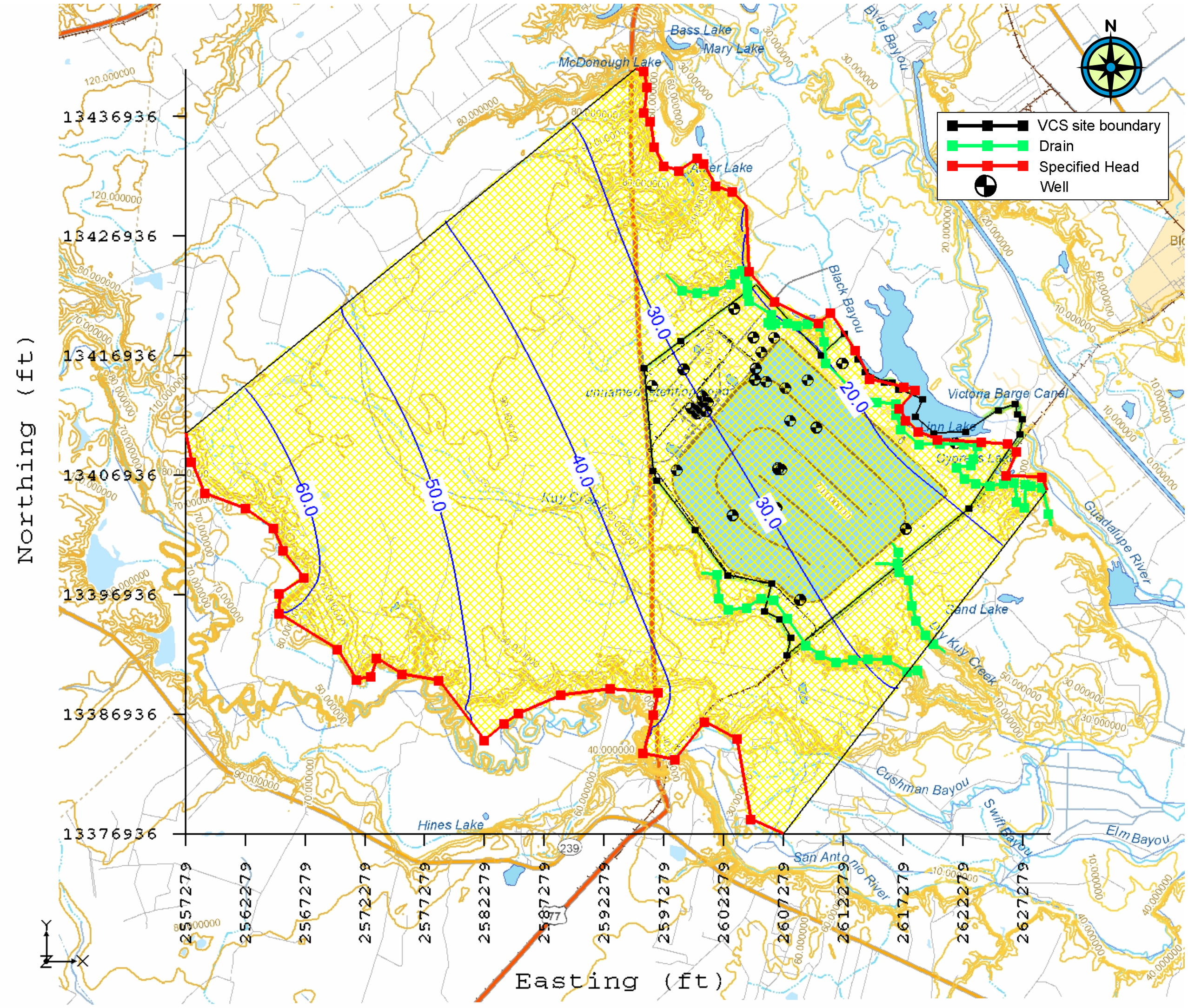


Figure 13: Layer 7 Simulated Preconstruction Potentiometric Surface with Calibration Wells

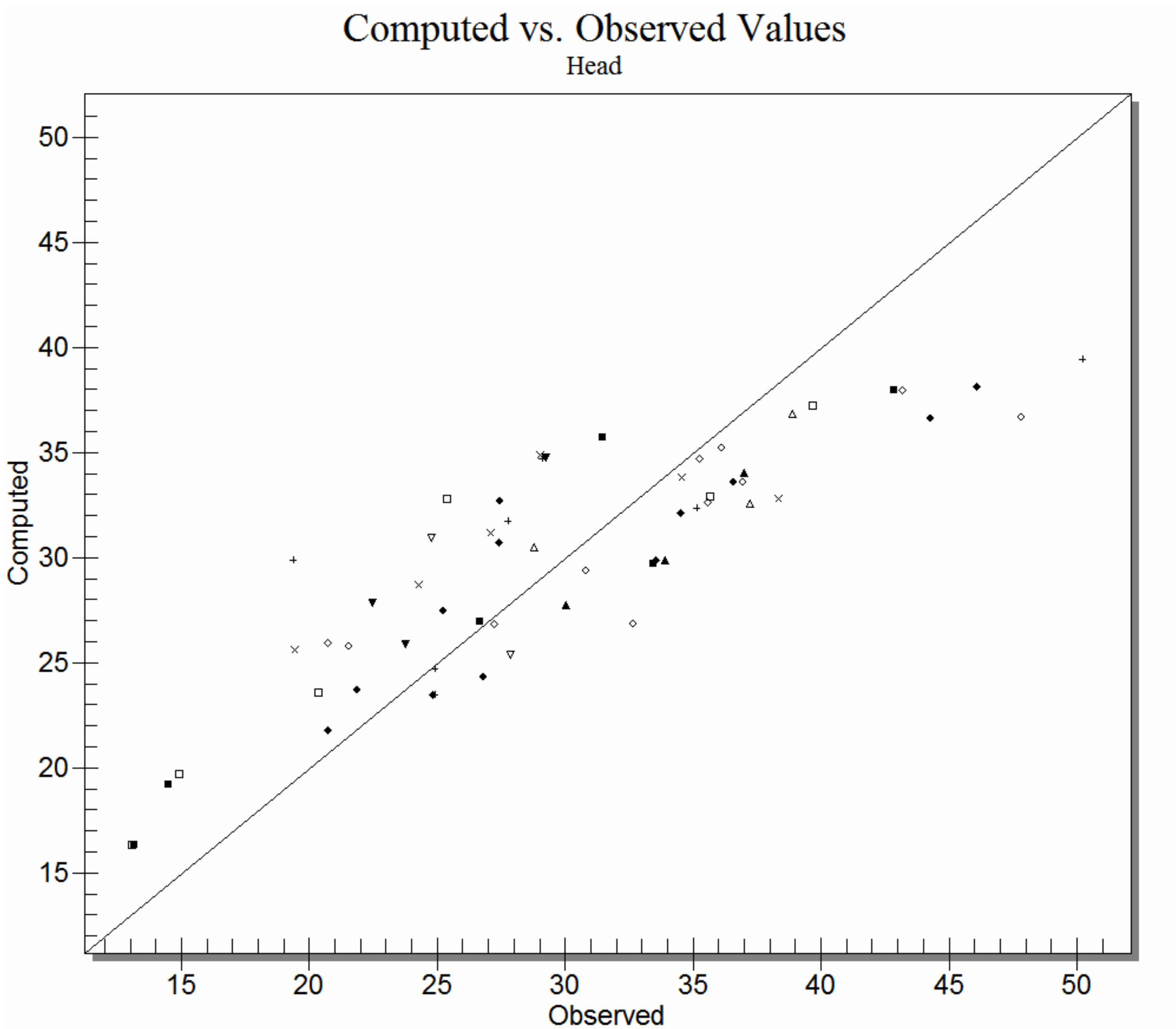


Figure 14: Computed vs. Observed Hydraulic Head Values

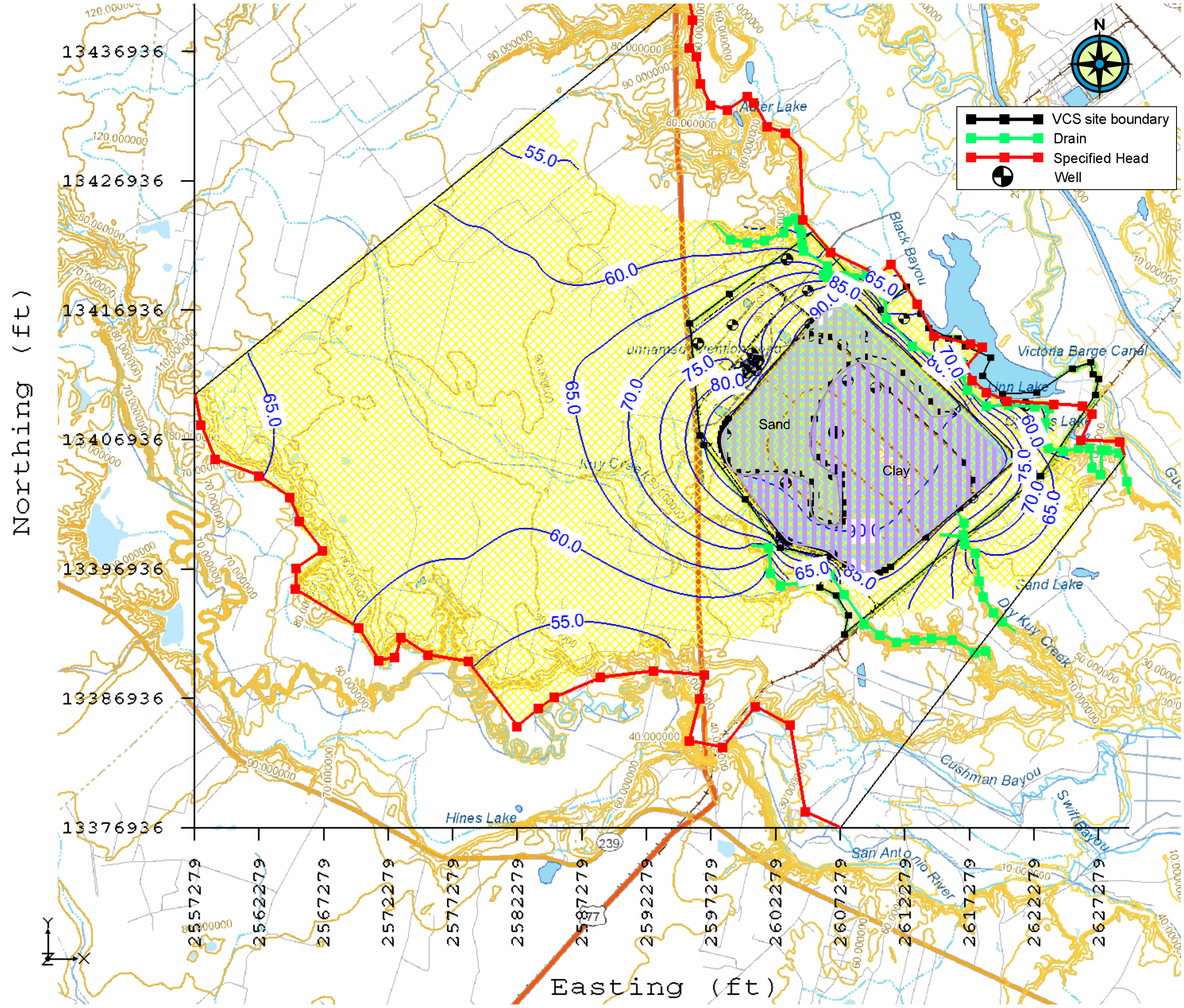


Figure 15: Layer 1 Simulated Heads for Base Case Cooling Basin Seepage

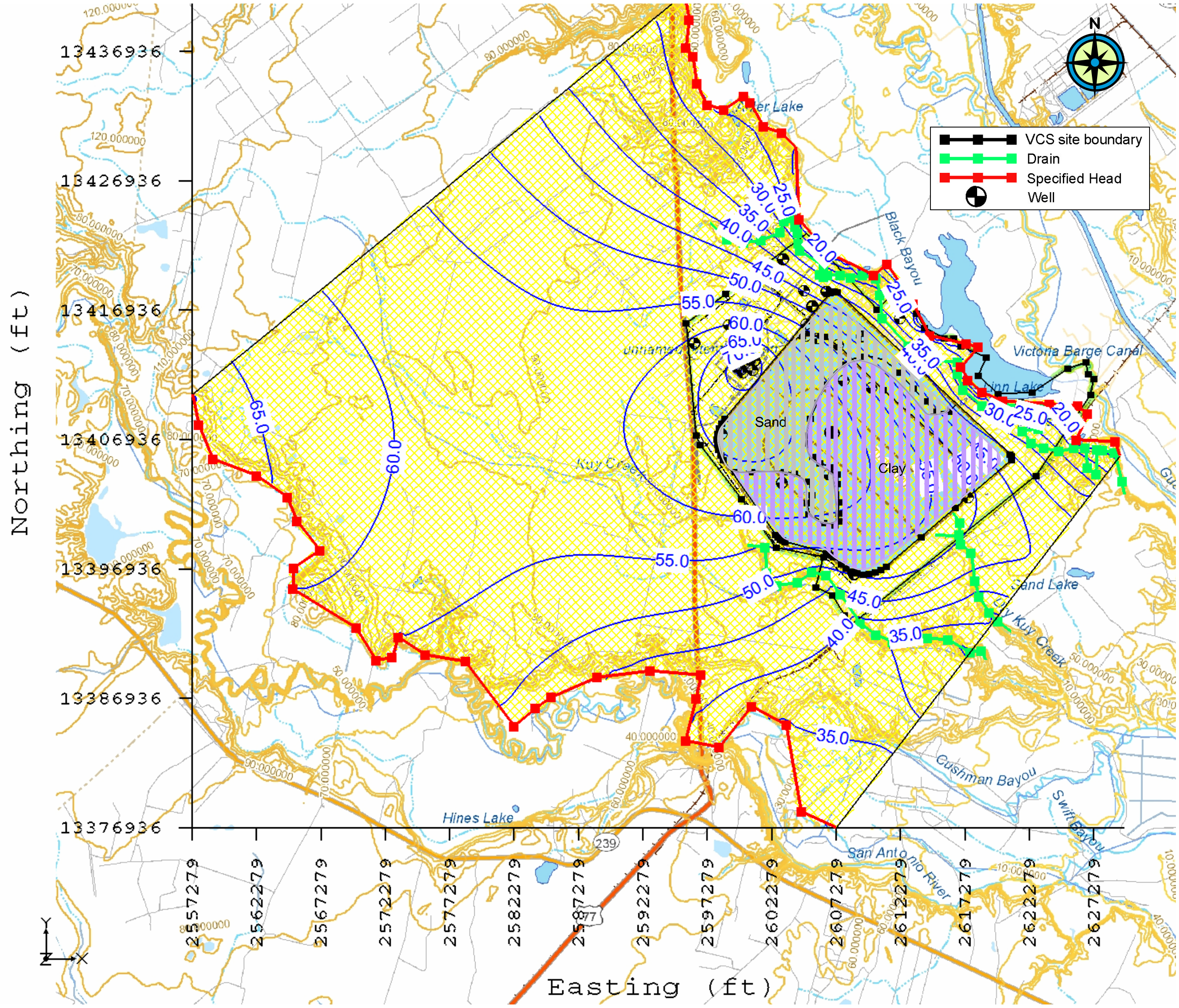


Figure 16: Layer 3 Simulated Heads for Base Case Cooling Basin Seepage

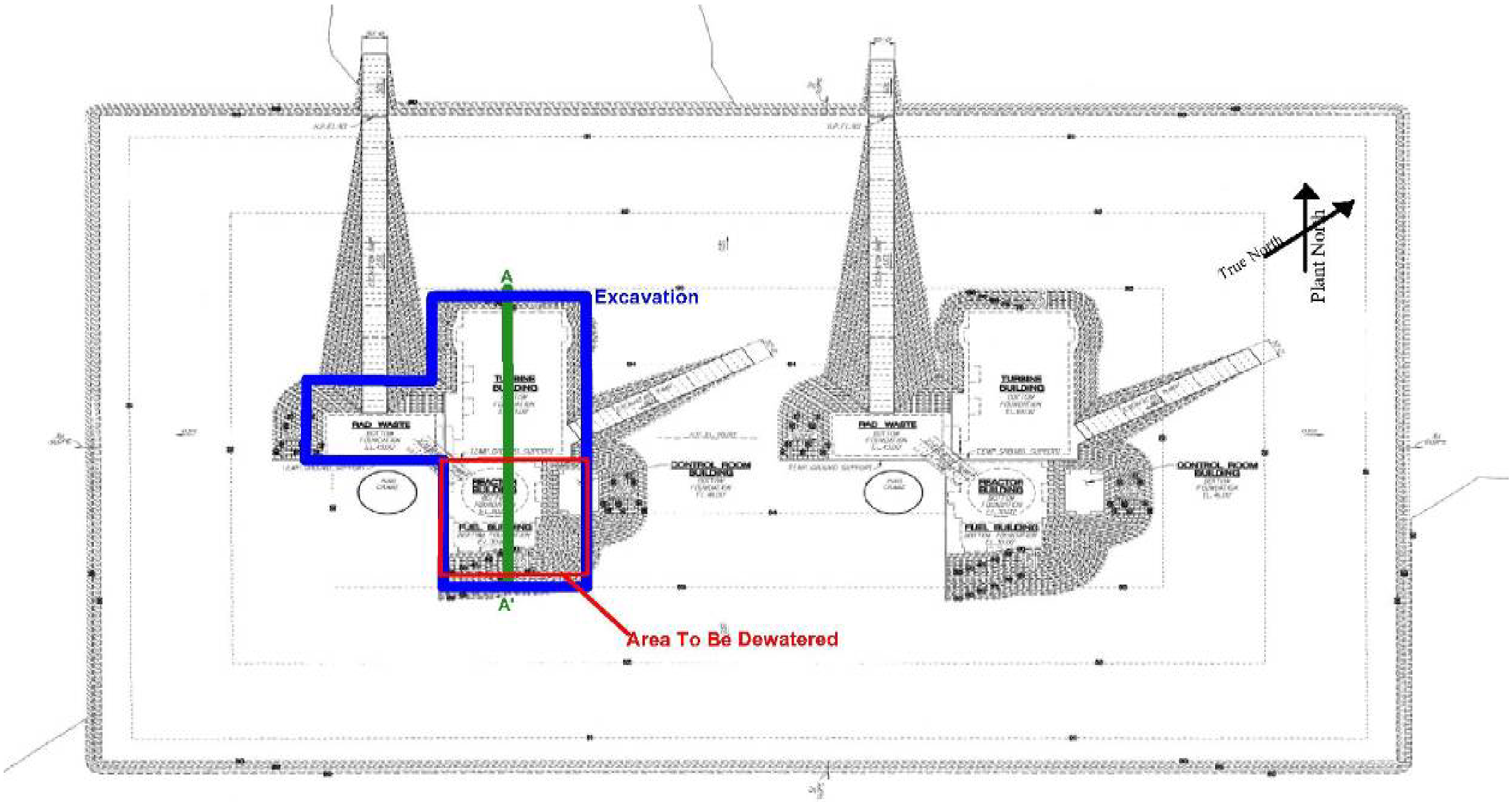


Figure 17: Excavation Plan for Power Block Area (approximate scale 1" = 350 ft)

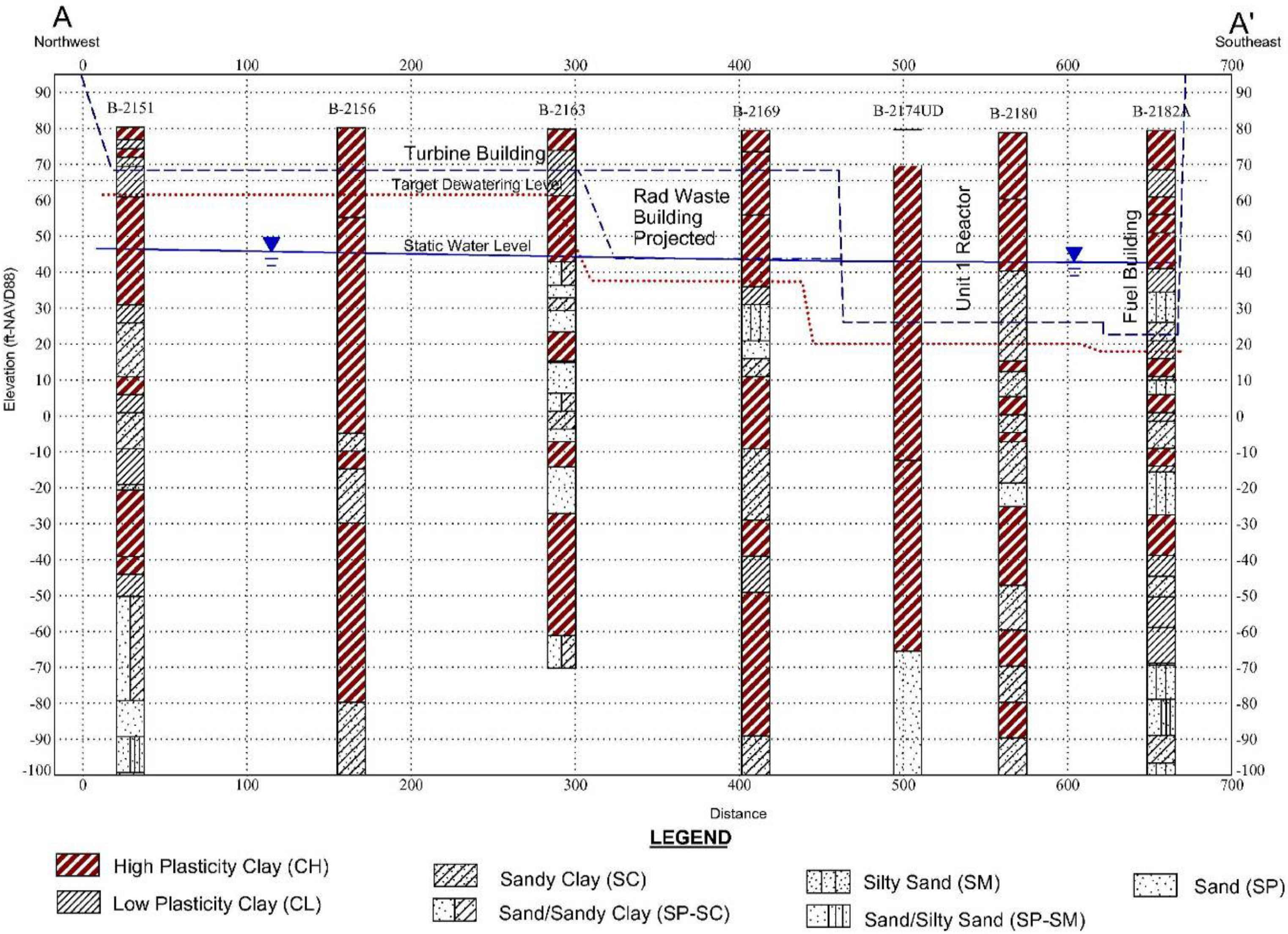


Figure 18: Cross Section of Unit 1 Excavation

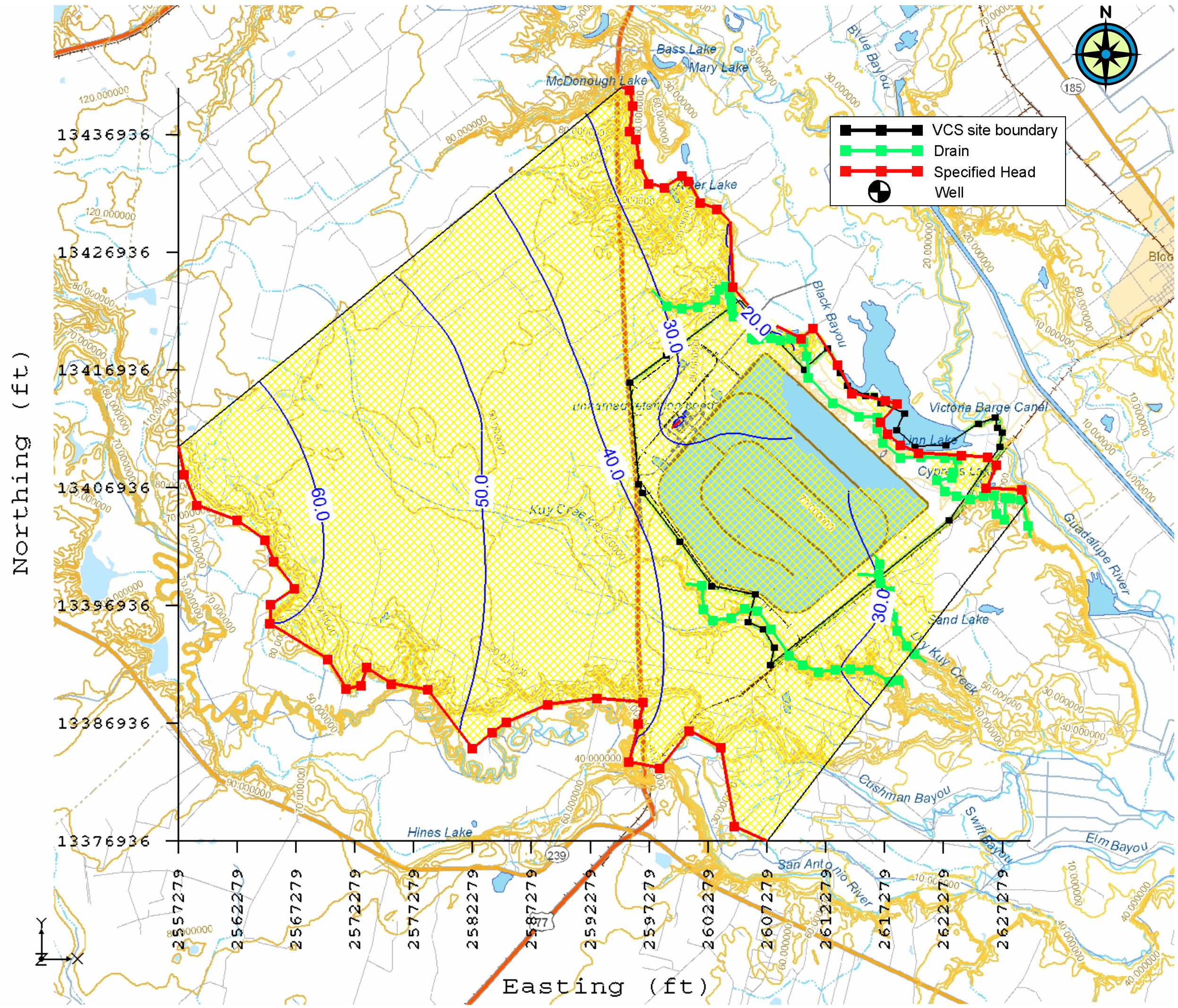


Figure 19: Layer 3 Simulated Heads for Dewatering to 19 ft NAVD 88 under Preconstruction Conditions

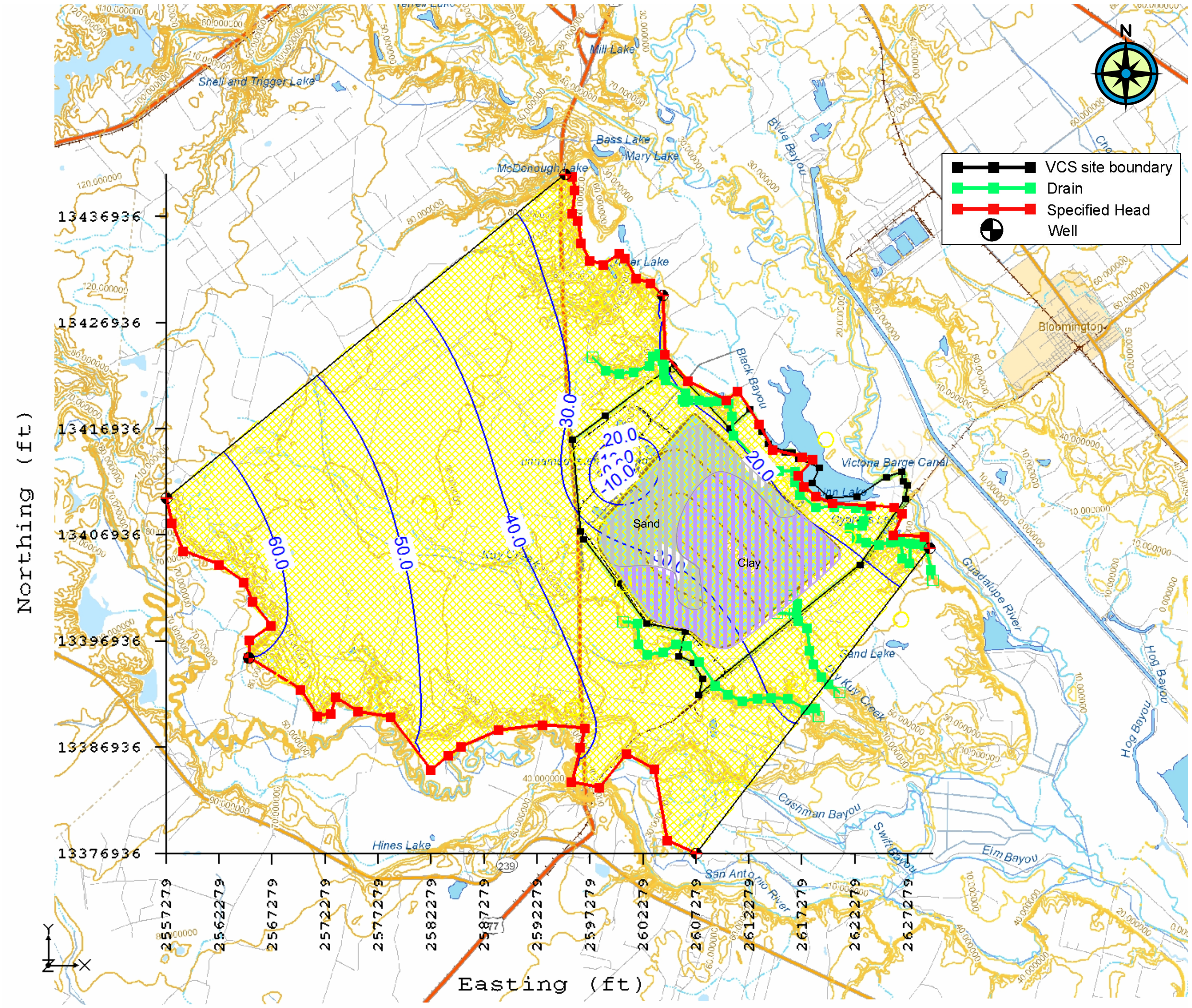


Figure 20: Layer 5 Simulated Heads for Dewatering to -20 ft NAVD 88 under Preconstruction Conditions

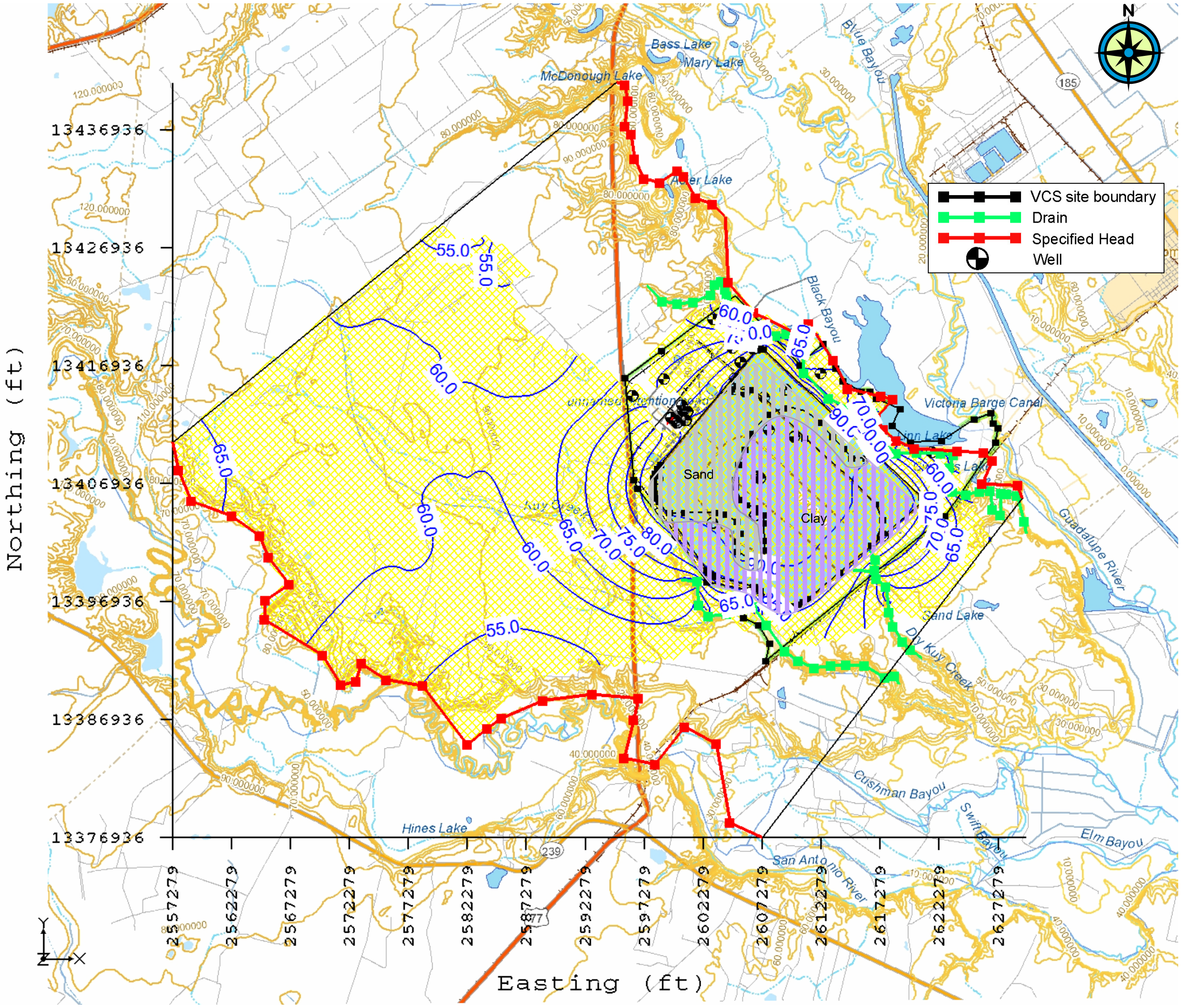


Figure 21: Layer 3 Simulated Heads for Dewatering to 19 ft NAVD 88 with Cooling Basin Influence

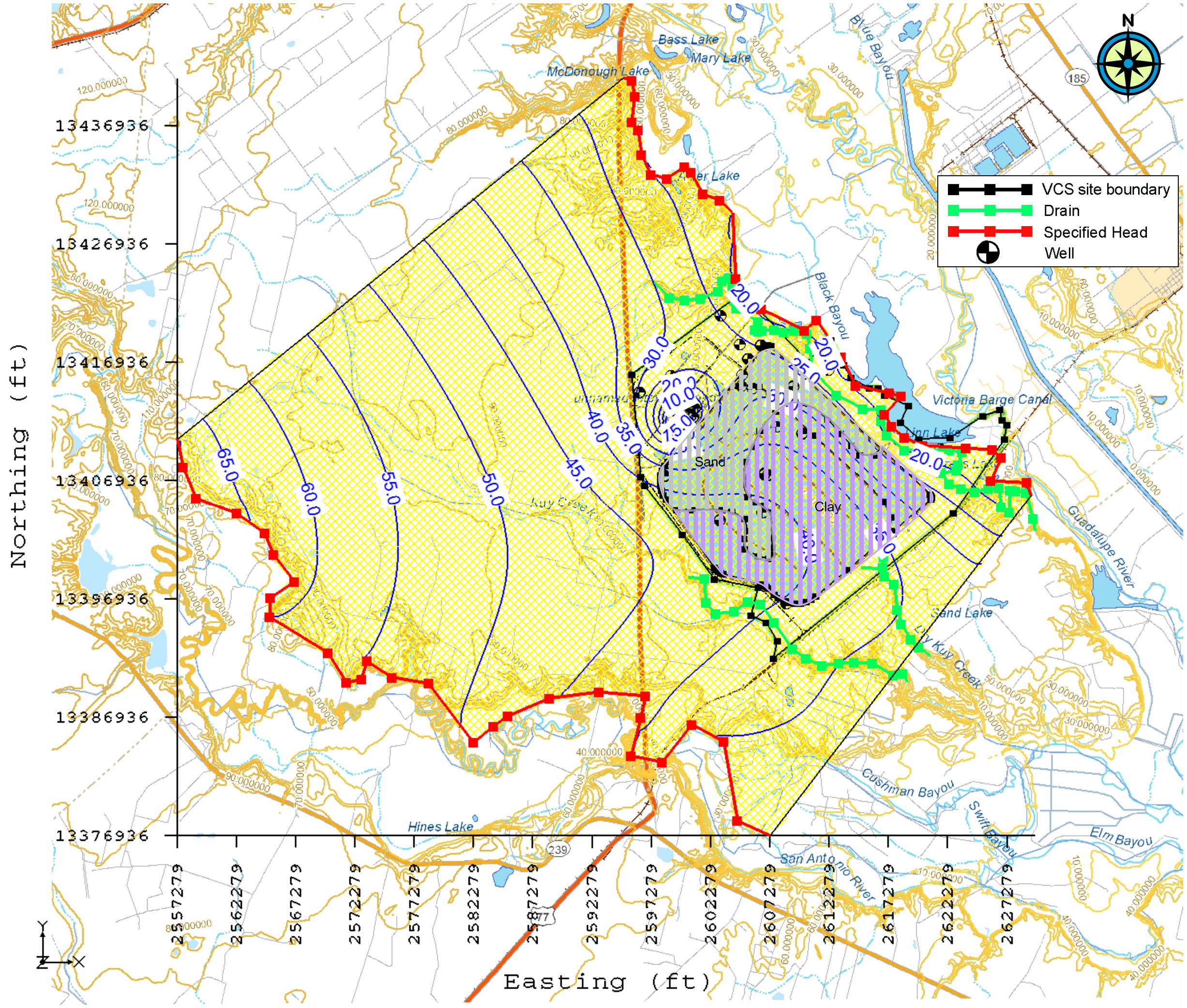


Figure 22: Layer 5 Simulated Heads for Dewatering to -20 ft NAVD 88 with Cooling Basin Influence

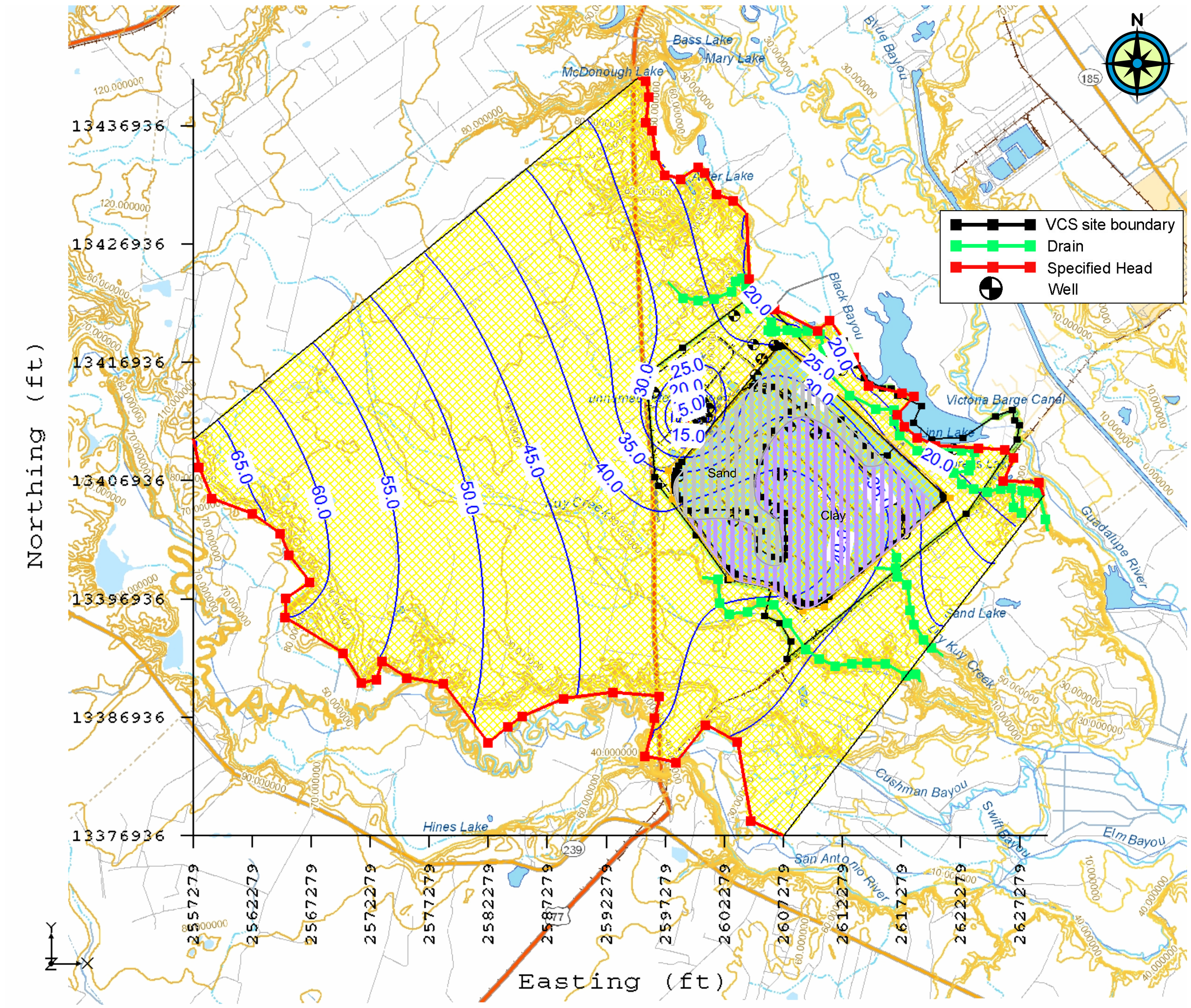


Figure 23: Layer 5 Simulated Heads for Dewatering to -20 ft NAVD 88 with Cut-Off Wall Penetrating Layer 3

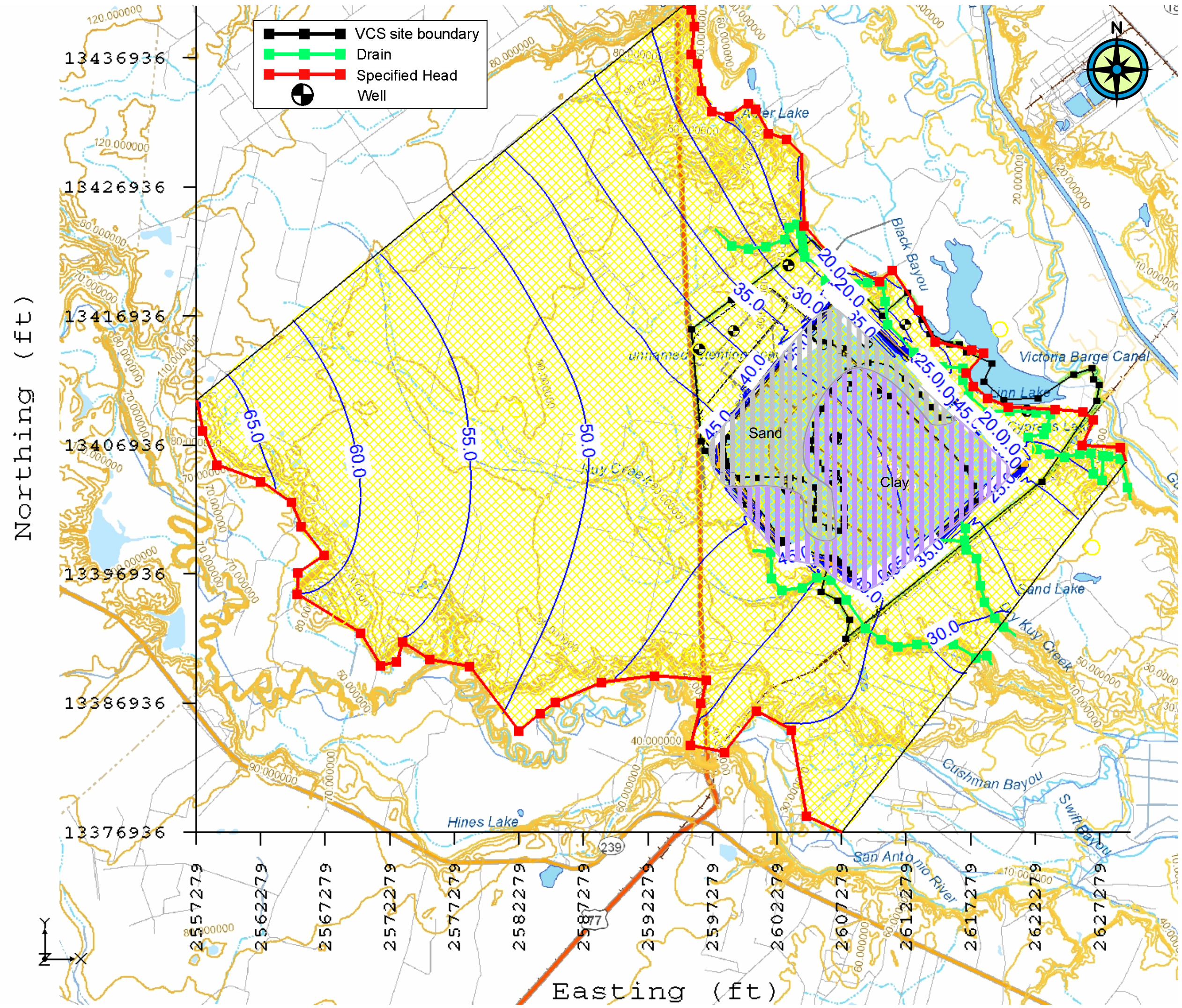


Figure 24: Layer 3 Simulated Heads for Cut-Off Wall Penetrating Layer 3 Surrounding the Cooling Basin

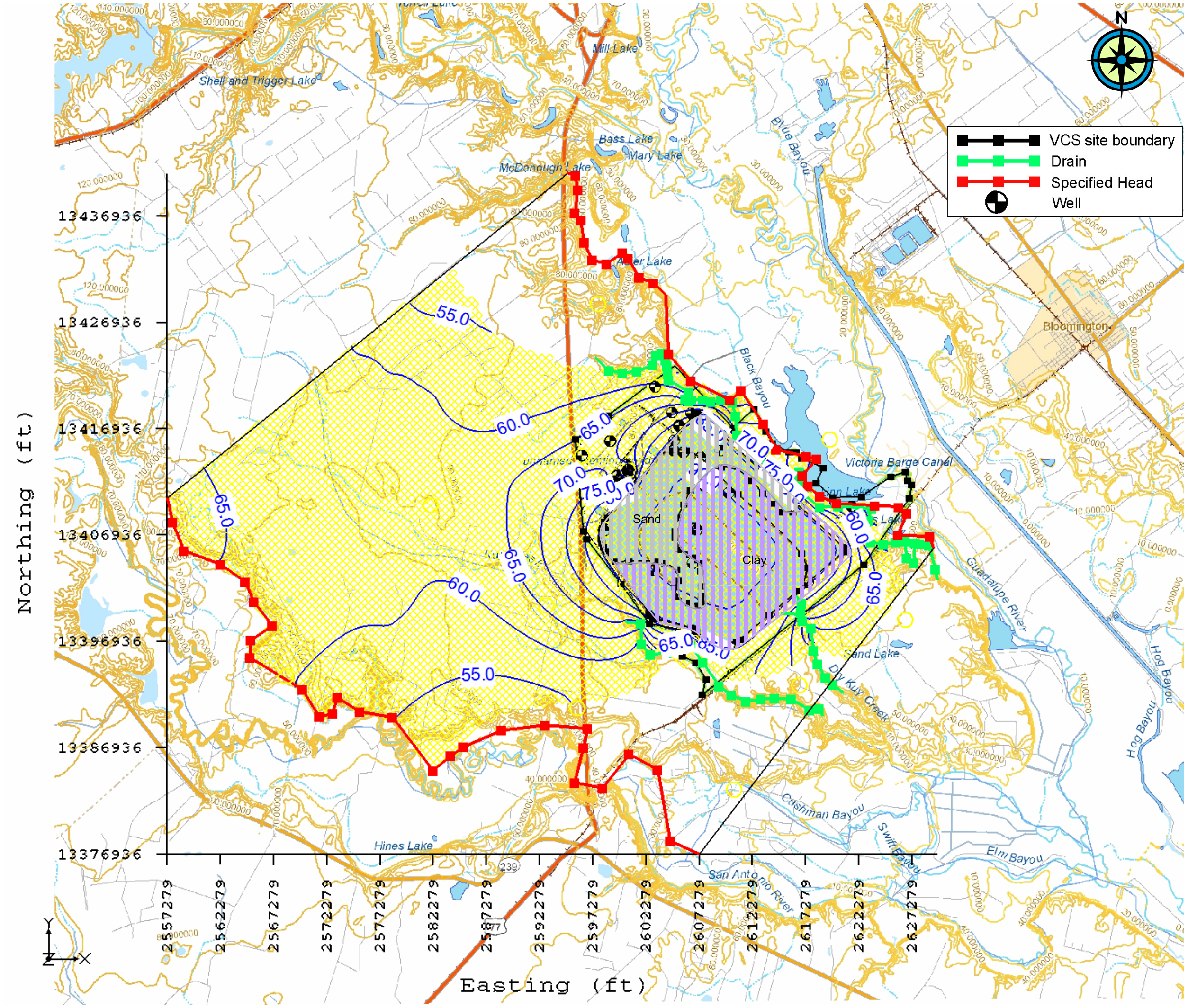


Figure 25: Layer 1 Simulated Heads for Zone 1 Liner in Basin Bottom

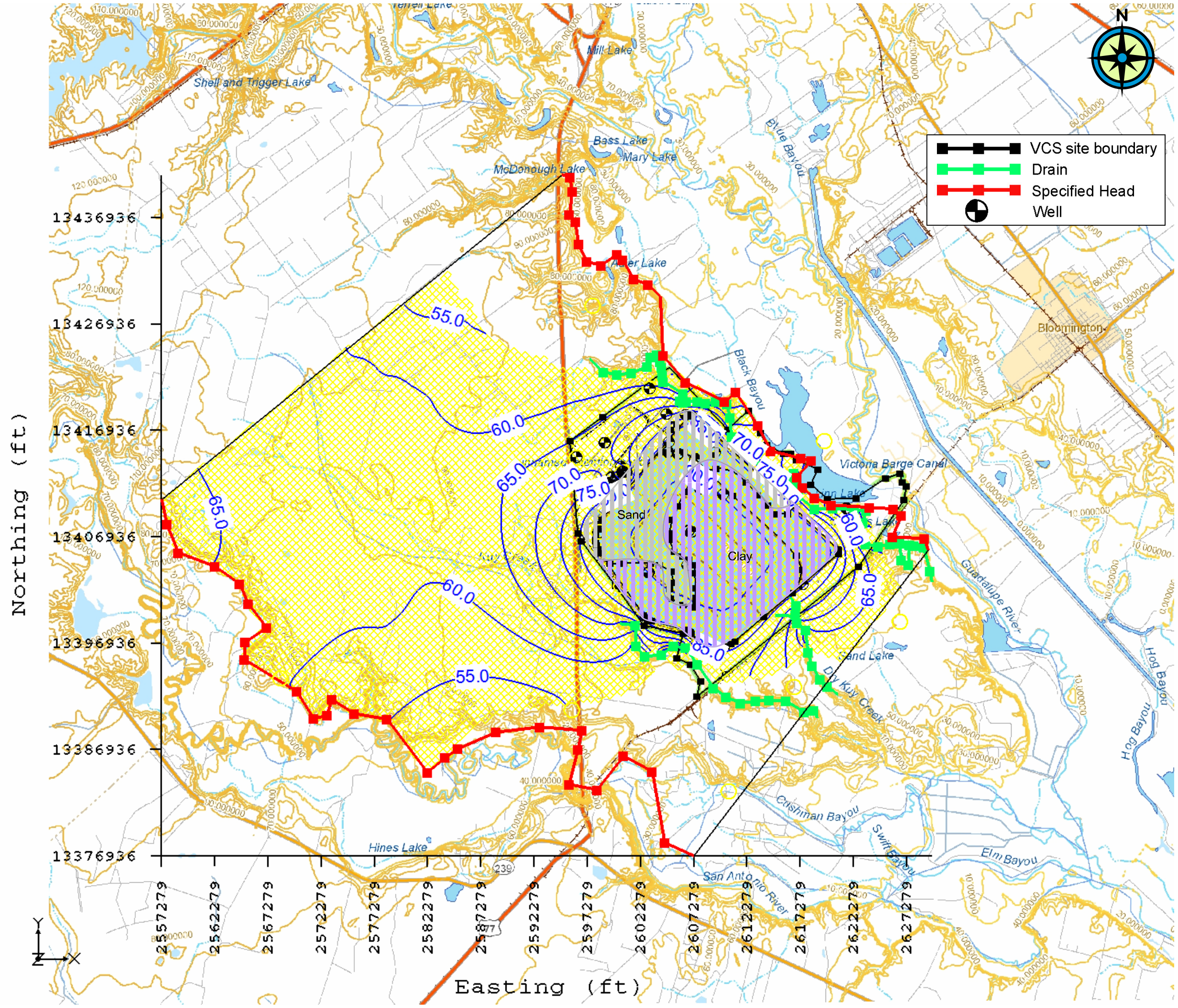


Figure 26: Layer 3 Simulated Heads for Zone 1 Liner in Basin Bottom

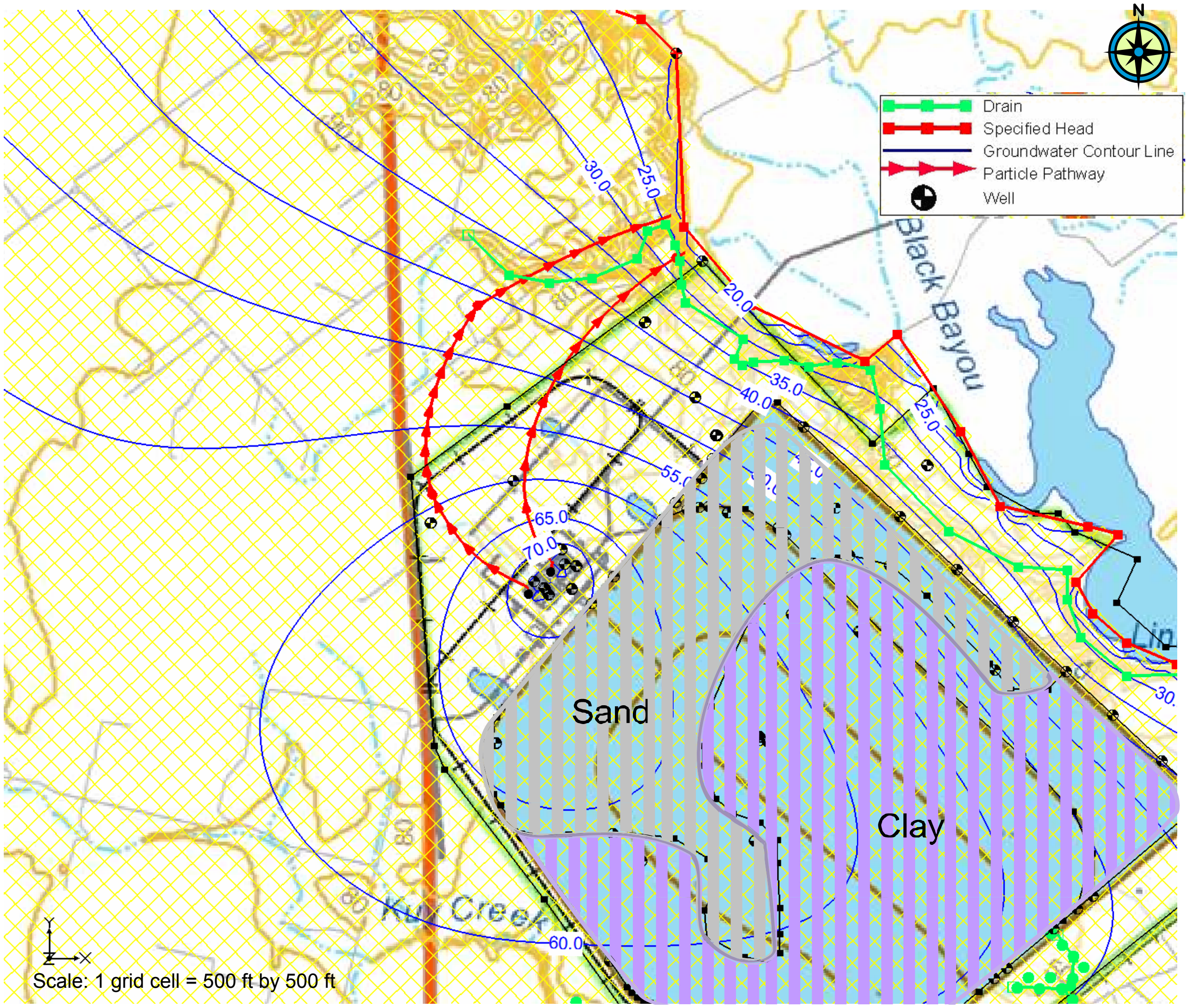


Figure 27: Layer 3 Base Case Seepage Simulated Particle Release from Units 1 and 2 Radwaste Buildings to Model Boundary

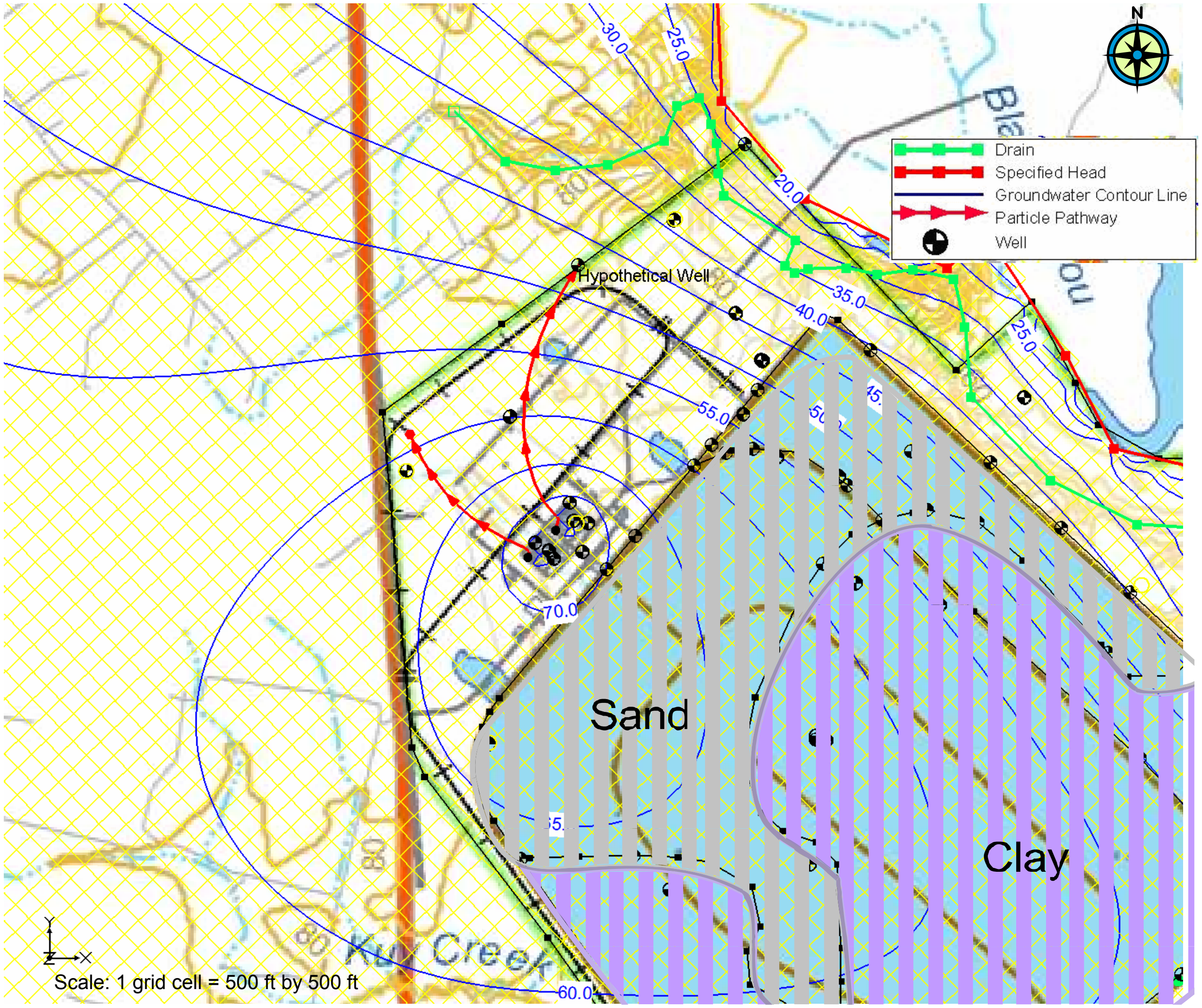


Figure 28: Layer 3 Base Case Seepage Simulated Particle Release from Units 1 and 2 Radwaste Buildings to Property Line Hypothetical Domestic Water Supply Well

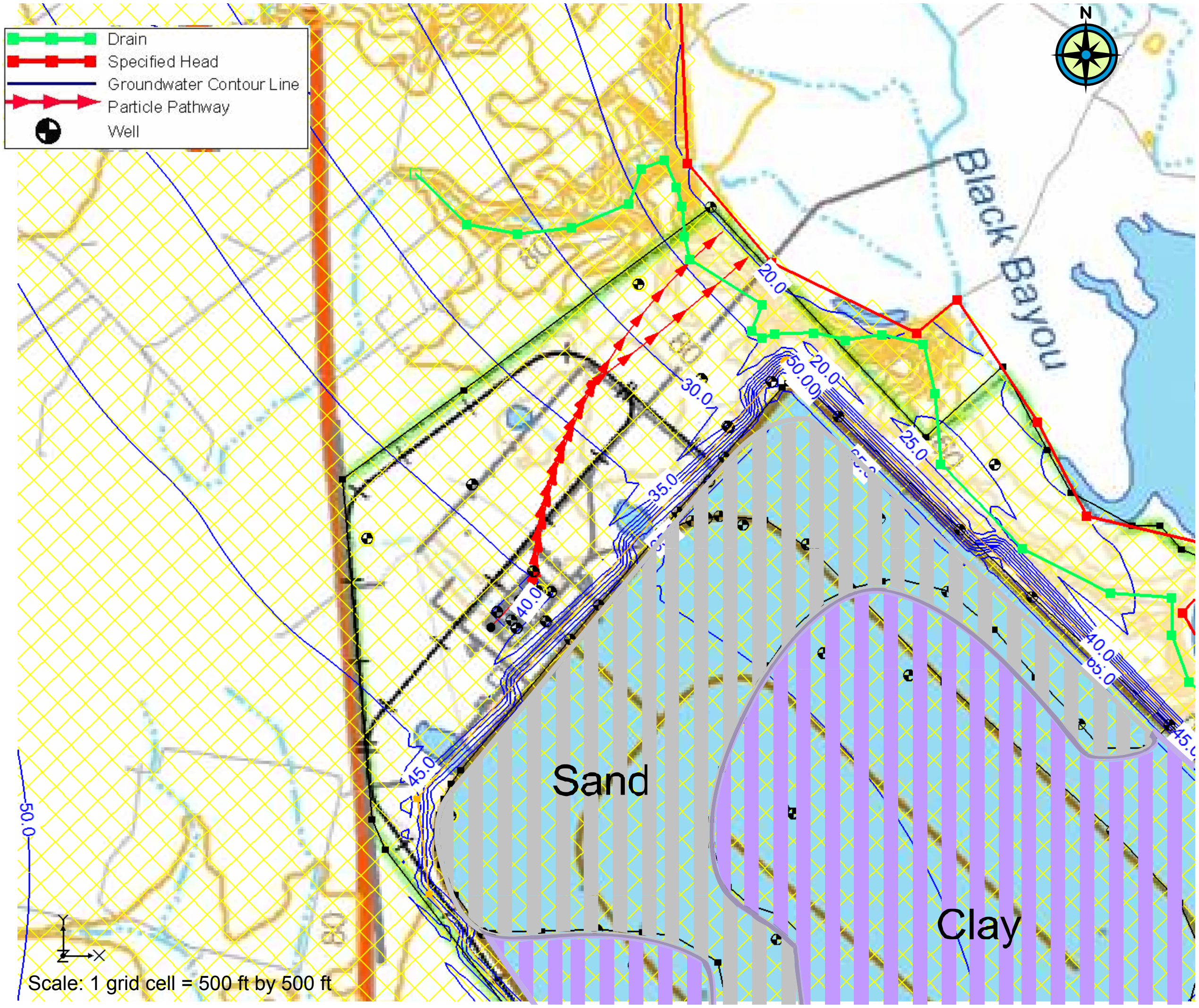


Figure 29: Layer 3 Cut-off Wall through Layer 3 Simulated Particle Release from Units 1 and 2 Radwaste Buildings to Model Boundary

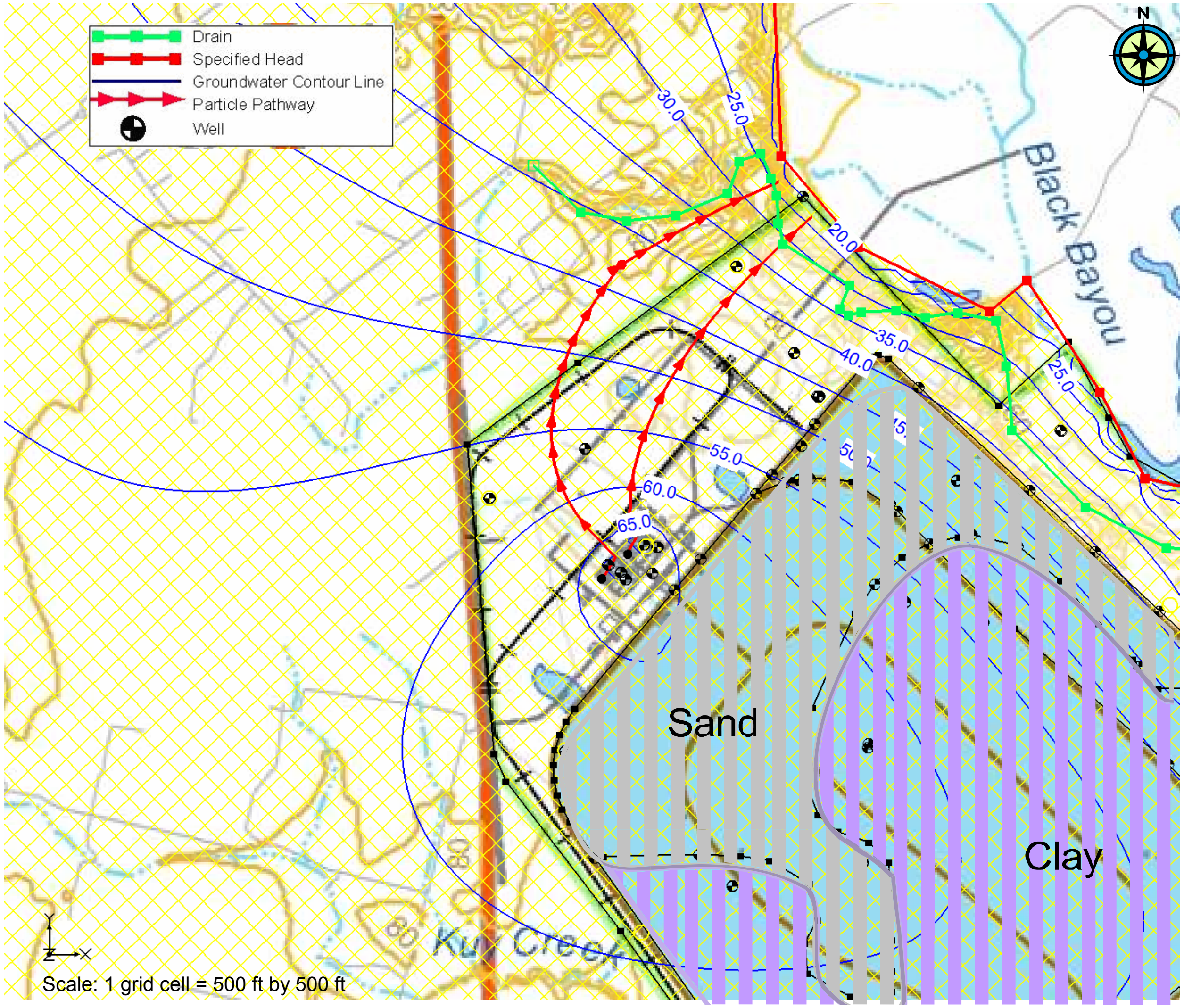


Figure 30: Layer 3 Clay Liner Simulated Particle Release from Units 1 and 2 Radwaste Buildings to Model Boundary

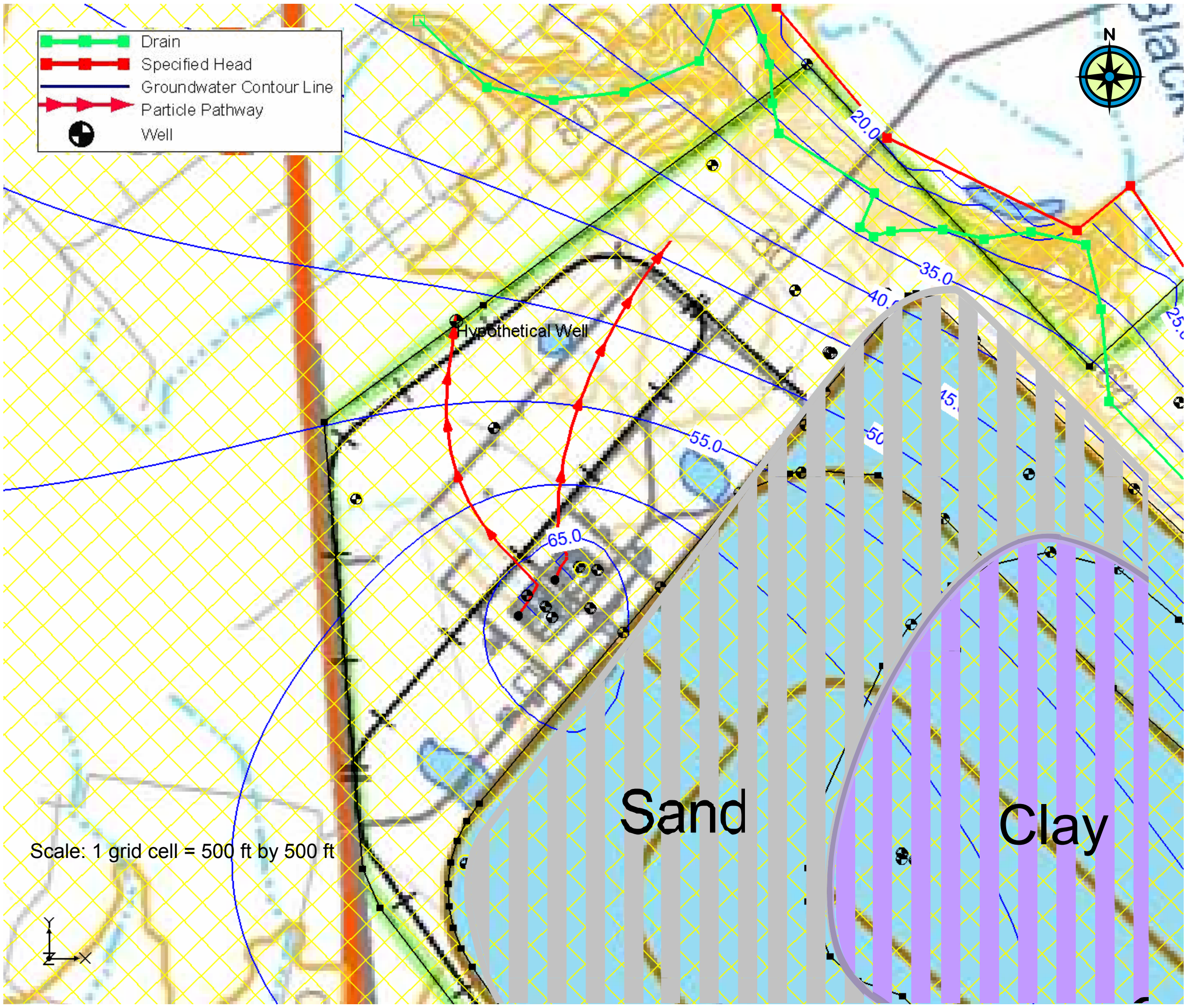
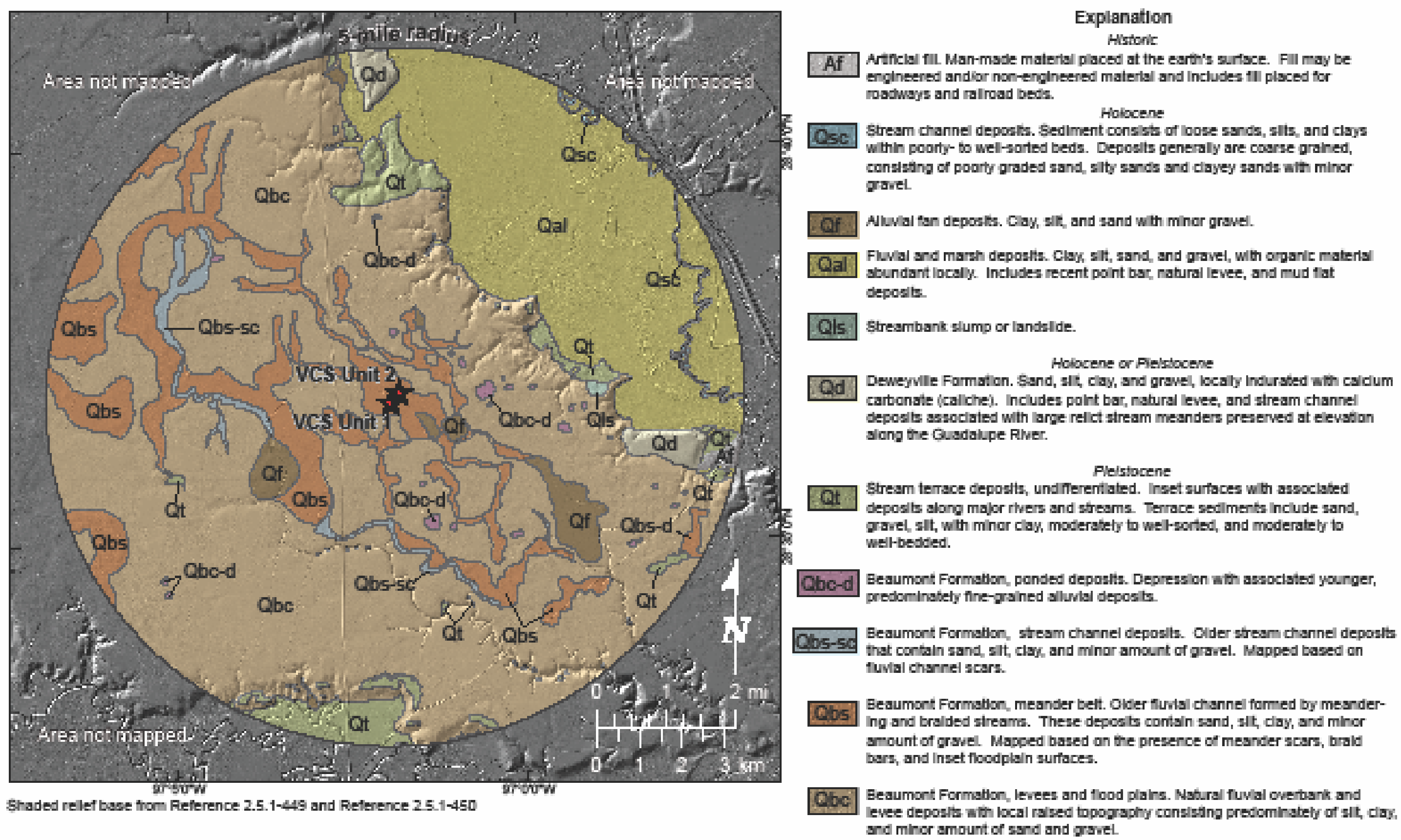


Figure 31: Layer 3 Clay Liner Simulated Particle Release from Units 1 and 2 Radwaste Buildings to Hypothetical Property Line Domestic Water Supply Well



Site Area Geologic Map (5-mile radius)

1903 Exelon Victoria
Figure 2.5.1-WLA013

Attachment 1: Site Area Geologic Map (Subsection 2.5.1 Figure 2.5.1-204)