

# **Conceptual Understanding Report**

## **Appendices**

# Appendix A

## Geology Logs

## Appendix A-1

### Geology Log of Selected MOE Wells Used for Cross-sections A-A' to F-F'

**Details of Well Records used for Cross-Section A-A'**

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1100420	CLAY		48	195	700778	5157324	Domestic	147
1100420	SANDSTONE	SHALE	49	195	700778	5157324	Domestic	147
1100423	CLAY		43	199	700784	5157746	Livestock	155
1100423	GRAVEL		46	199	700784	5157746	Livestock	153
1100929	CLAY		27	190	700113	5155354	Cooling And A/C	162
1100929	QUICKSAND		37	190	700113	5155354	Cooling And A/C	153
1100929	SANDSTONE		61	190	700113	5155354	Cooling And A/C	129
1101745	GRAVEL	BOULDERS	24	311	700441	5161016	Domestic	286
1101745	HARDPAN		37	311	700441	5161016	Domestic	274
1101745	FINE SAND		48	311	700441	5161016	Domestic	262
1101749	PREVIOUSLY DUG		16	272	700564	5160533	Domestic	257
1101749	FINE SAND	CLAY	37	272	700564	5160533	Domestic	235
1101823	FINE SAND		46	291	700556	5160866	Domestic	245
1103357	CLAY	FINE SAND	37	225	700798	5159224	Domestic	188
1103357	SAND		42	225	700798	5159224	Domestic	183
1105194	CLAY	DRY	36	230	700542	5159508	Domestic	193
1105194	SAND		38	230	700542	5159508	Domestic	191
1105413	SAND		16	242	700476	5159982	Domestic	227
1105413	CLAY		48	242	700476	5159982	Domestic	195
1105413	SAND	SILTY	56	242	700476	5159982	Domestic	186
1105413	CLAY	SAND	63	242	700476	5159982	Domestic	180
1105413	SAND		71	242	700476	5159982	Domestic	171
1105924	GRANITE		73	314	700551	5161531	Domestic	241
7127498	SAND		13	246	700432	5160142	Domestic	233
7127498	SAND	CLAY	45	246	700432	5160142	Domestic	202
7127498	CLAY		48	246	700432	5160142	Domestic	198
7127498	SAND		59	246	700432	5160142	Domestic	187
7153047	CLAY		37	219	701090	5158662	Domestic	182
7153047	SAND		41	219	701090	5158662	Domestic	178
1103007	COARSE SAND	MEDIUM-GRAINED	15	244	700448	5160024	Domestic	229
1103007	CLAY	SAND	30	244	700448	5160024	Domestic	213
1103007	SAND		38	244	700448	5160024	Domestic	206
1103007	SILT	CLAY	70	244	700448	5160024	Domestic	174
1103007	SAND		71	244	700448	5160024	Domestic	173
1100409	CLAY	MEDIUM SAND	43	223	700806	5158614	Public	180
1100409	QUICKSAND		46	223	700806	5158614	Public	177
1100409	CLAY	MEDIUM SAND	73	223	700806	5158614	Public	149
1100409	MEDIUM SAND		82	223	700806	5158614	Public	140
1100409	SANDSTONE		85	223	700806	5158614	Public	138
1101742	GRAVEL		34	318	700531	5161921		284
1101742	SAND		48	318	700531	5161921		270
1101826	GRAVEL	STONES	18	323	700718	5161885		305
1101826	FINE SAND		43	323	700718	5161885		281
1101792	CLAY	SAND	6	320	700470	5161688		314
1101792	FINE SAND	GRAVEL	49	320	700470	5161688		271
1101793	CLAY	STONES	53	316	700579	5161787		262
1101793	SANDSTONE		57	316	700579	5161787		259
1101532	MEDIUM SAND	GRAVEL	3	314	700438	5161364		311
1101532	GRAVEL	BOULDERS	5	314	700438	5161364		309
1101532	MEDIUM SAND	BOULDERS	7	314	700438	5161364		307
17000003943*	CLAY		27	197	701671	5151761		169
17000003943*	SANDSTONE		30	197	701671	5151761		166

Notes:

mbgs = meter below ground surface

masl = meter above sea level

easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database

\* geological record for well 17000003943 was retrieved from Water Well Viewer and Scanned Water Well Record Retrieval System on Michigan State University Libraries website

**Details of Well Records used for Cross-Section B-B'**

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1101039	FINE SAND		37	226	707816.1	5161466	Public	189
1101039	GRAVEL		41	226	707816.1	5161466	Public	185
1101529	FINE SAND		3	191	710418.1	5156064		188
1101529	CLAY	SILT	9	191	710418.1	5156064		182
1101529	SAND	GRAVEL	21	191	710418.1	5156064		170
1101529	CLAY	GRAVEL	95	191	710418.1	5156064		96
1101529	SANDSTONE		95	191	710418.1	5156064		96
1101572	CLAY		22	197	708097.1	5158118	Domestic	175
1101572	UNKNOWN TYPE		43	197	708097.1	5158118	Domestic	154
1101934	FINE SAND	CLAY	17	193	710018.1	5156659		175
1101934	CLAY	STONES	96	193	710018.1	5156659		96
1101934	SANDSTONE		98	193	710018.1	5156659		95
1103296	SAND	LOOSE	4	182	710398.1	5154524	Commercial	178
1103296	CLAY	HARD	53	182	710398.1	5154524	Commercial	129
1103296	SAND	COARSE SAND	61	182	710398.1	5154524	Commercial	121
1103296	GRAVEL	BOULDERS	73	182	710398.1	5154524	Commercial	109
1103296	SAND	COARSE SAND	76	182	710398.1	5154524	Commercial	106
1104203	CLAY		4	205	707889	5159443	Domestic	201
1104203	SANDSTONE		56	205	707889	5159443	Domestic	149
1106061	CLAY		8	200	707663	5159014	Domestic	192
1106061	SANDSTONE		91	200	707663	5159014	Domestic	108
7137363	CLAY		16	224	707801	5160651	Domestic	208
7137363	GRAVEL	STONES	43	224	707801	5160651	Domestic	181
7137363	SANDSTONE		91	224	707801	5160651	Domestic	133
17000004700*	SAND		2	182	711286	5153621	Domestic	180
17000004700*	SAND, ROCK, CLAY		18	182	711286	5153621	Domestic	164
17000004700*	SANDSTONE		20	182	711286	5153621	Domestic	162
17000004715*	CLAY		2	218	711129	5151496	Domestic	216
17000004715*	GRAVEL		9	218	711129	5151496	Domestic	208
17000004715*	SANDSTONE		40	218	711129	5151496	Domestic	178

Notes:

mbgs = meter below ground surface

masl = meter above sea level

easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database

\* geological record for well 17000004700 and 17000004715 was retrieved from Water Well Viewer and Scanned Water Well Record Retrieval System on Michigan State University Libraries website

**Details of Well Records used for Cross-Section C-C'**

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1100928	MEDIUM SAND		9	190	709148	5155819	Domestic	181
1100928	CLAY		12	190	709148	5155819	Domestic	178
1100928	MEDIUM SAND		15	190	709148	5155819	Domestic	175
1100928	CLAY		18	190	709148	5155819	Domestic	172
1100928	MEDIUM SAND		21	190	709148	5155819	Domestic	169
1100928	OVERBURDEN		70	190	709148	5155819	Domestic	120
1100928	SANDSTONE		73	190	709148	5155819	Domestic	117
1100934	HARDPAN	SHALE	20	197	708028	5155404	Industrial	177
1100934	SHALE		20	197	708028	5155404	Industrial	177
1101029	MEDIUM SAND	QUICKSAND	17	189	711313	5157063	Commercial	172
1101029	CLAY		26	189	711313	5157063	Commercial	163
1101029	FINE SAND	CLAY	34	189	711313	5157063	Commercial	155
1101029	CLAY		104	189	711313	5157063	Commercial	85
1101029	MEDIUM SAND	SANDSTONE	105	189	711313	5157063	Commercial	83
1101107	MEDIUM SAND		21	190	710831	5156765	Commercial	169
1101107	CLAY		112	190	710831	5156765	Commercial	78
1101107	MEDIUM SAND	GRAVEL	119	190	710831	5156765	Commercial	71
1101107	SANDSTONE		120	190	710831	5156765	Commercial	70
1101498	SAND	GRAVEL	17	191	710198	5156164	Not Used	174
1101498	CLAY	SAND	91	191	710198	5156164	Not Used	100
1101498	COARSE SAND	FINE SAND	95	191	710198	5156164	Not Used	96
1101498	CLAY		100	191	710198	5156164	Not Used	92
1101498	FINE SAND	COARSE SAND	104	191	710198	5156164	Not Used	87
1101498	GRAVEL	BOULDERS	106	191	710198	5156164	Not Used	85
1101498	SANDSTONE		107	191	710198	5156164	Not Used	84
1101700	SAND	GRAVEL	22	192	710338	5156384	Not Used	169
1101700	CLAY		93	192	710338	5156384	Not Used	99
1101700	FINE SAND	MEDIUM SAND	110	192	710338	5156384	Not Used	82
1101700	GREENSTONE		111	192	710338	5156384	Not Used	81
1104654	FINE SAND		21	193	712007	5157723	Domestic	172
1104654	SILT	SILTY	23	193	712007	5157723	Domestic	170
1105853	SAND	TOPSOIL	6	192	711731	5157515	Domestic	187
1105853	CLAY	SAND	11	192	711731	5157515	Domestic	181
1105853	COARSE SAND	GRAVEL	15	192	711731	5157515	Domestic	177
1107556	SAND		19	190	711521	5157380	Domestic	171
7042666	SAND		14	190	712208	5157585	Domestic	176
7042666	SAND	CLAY	19	190	712208	5157585	Domestic	171
7042666	CLAY	SAND	25	190	712208	5157585	Domestic	165
7042666	SAND	CLAY	42	190	712208	5157585	Domestic	149
7042666	CLAY	SAND	44	190	712208	5157585	Domestic	146
7042666	CLAY		132	190	712208	5157585	Domestic	58
7042666	STONES	CLAY	145	190	712208	5157585	Domestic	46
7042666	SANDSTONE		156	190	712208	5157585	Domestic	34
7039843	SAND		2	190	713750	5159934		188
7039843	SILT	SAND	3	190	713750	5159934		187
7039843	SAND		30	190	713750	5159934		160
7039843	SAND	CLAY	30	190	713750	5159934		160
7039843	CLAY		32	190	713750	5159934		158
1102985	SAND		14	181	713598	5157674	Domestic	167
1102985	CLAY		95	181	713598	5157674	Domestic	86
1102985	GRAVEL	BOULDERS	106	181	713598	5157674	Domestic	75
1102985	SANDSTONE		111	181	713598	5157674	Domestic	70
1100954	FINE SAND	SILT	40	191	708877	5155304		151
1100954	CLAY		52	191	708877	5155304		139
1100954	SANDSTONE		53	191	708877	5155304		137

Notes:

mbgs = meter below ground surface

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easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database

**Details of Well Records used for Cross-Section D-D'**

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1100420	CLAY		48	195	700778	5157324	Domestic	147
1100420	SANDSTONE	SHALE	49	195	700778	5157324	Domestic	147
1100476	CLAY	BOULDERS	5	194	696938	5155344	Livestock	189
1100476	SANDSTONE		10	194	696938	5155344	Livestock	183
1100545	CLAY		15	219	697619	5155604	Domestic	204
1100545	BOULDERS		21	219	697619	5155604	Domestic	199
1100545	SANDSTONE		24	219	697619	5155604	Domestic	195
1100549	CLAY	MEDIUM SAND	19	218	697682	5155603	Domestic	199
1100549	SANDSTONE		30	218	697682	5155603	Domestic	188
1102900	CLAY	SOFT	21	197	698548	5156124		175
1102900	SANDSTONE	HARD	27	197	698548	5156124		169
1100522	CLAY		25	198	698725	5156355	Domestic	173
1100522	GRAVEL		32	198	698725	5156355	Domestic	166
1100946	CLAY		24	195	699168	5156409	Domestic	171
1100946	MEDIUM SAND	STONES	30	195	699168	5156409	Domestic	166
1100946	SANDSTONE		32	195	699168	5156409	Domestic	163
1100562	CLAY		31	196	699736	5156683		166
1100562	MEDIUM SAND		48	196	699736	5156683		148
1100561	CLAY		53	195	700220	5156941	Domestic	142
1100561	GRAVEL		53	195	700220	5156941	Domestic	142
1100927	CLAY		18	201	703403	5157291	Industrial	183
1100927	GRAVEL	STONES	27	201	703403	5157291	Industrial	174
1100927	SANDSTONE		27	201	703403	5157291	Industrial	174
1100932	CLAY	MEDIUM SAND	39	243	705278	5157294	Livestock	204
1105118	CLAY	SILT	15	244	706328	5157674	Domestic	229
1105118	UNKNOWN TYPE		16	244	706328	5157674	Domestic	227
1105118	SANDSTONE	GRAVEL	56	244	706328	5157674	Domestic	187
1105118	SANDSTONE	LAYERED	56	244	706328	5157674	Domestic	187
1101572	CLAY		22	197	708097	5158118	Domestic	175
7054201	CLAY		5	193	709394	5159096	Domestic	187
7054201	SAND		8	193	709394	5159096	Domestic	185
7054201	CLAY		24	193	709394	5159096	Domestic	169
7054201	SAND		31	193	709394	5159096	Domestic	162

Notes:

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easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database

**Details of Well Records used for Cross-Section E-E'**

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1101750	HARDPAN		84	229	700672	5159509	Livestock	145
1103541	CLAY		41	238	703798	5160074	Domestic	197
1103541	SANDSTONE		69	238	703798	5160074	Domestic	170
1103662	SAND		3	230	701498	5159624	Domestic	226
1103662	CLAY		12	230	701498	5159624	Domestic	218
1103662	FINE SAND		15	230	701498	5159624	Domestic	215
1103662	FINE SAND	CLAY	18	230	701498	5159624	Domestic	212
1103927	FINE SAND		23	242	702923	5160054	Domestic	218
1103927	FINE SAND	CLAY	49	242	702923	5160054	Domestic	193
1103927	SANDSTONE		51	242	702923	5160054	Domestic	190
1104175	SAND		19	232	698971	5159299	Domestic	213
1104880	SAND		5	228	699791	5159390	Domestic	223
1104880	CLAY	LAYERED	6	228	699791	5159390	Domestic	221
1104880	SAND	LAYERED	12	228	699791	5159390	Domestic	216
1104880	CLAY	SAND	16	228	699791	5159390	Domestic	212
1104880	SAND		19	228	699791	5159390	Domestic	209
1105137	FINE SAND	CLAY	17	232	698973	5159294	Municipal	215
1105194	CLAY	DRY	36	230	700542	5159508	Domestic	193
1105194	SAND		38	230	700542	5159508	Domestic	191
1105443	SAND	LAYERED	9	233	698563	5159283	Domestic	224
1105443	CLAY	LAYERED	17	233	698563	5159283	Domestic	216
1105443	SAND		23	233	698563	5159283	Domestic	210
1105528	SAND	LAYERED	4	232	701333	5159599	Domestic	228
1105528	CLAY	LAYERED	10	232	701333	5159599	Domestic	221
1105528	SAND		19	232	701333	5159599	Domestic	213
1105925	SAND		8	226	696013	5158283	Domestic	218
1105925	CLAY		12	226	696013	5158283	Domestic	214
1105925	SAND	LAYERED	16	226	696013	5158283	Domestic	210
1105925	CLAY		16	226	696013	5158283	Domestic	210
1105925	SAND		23	226	696013	5158283	Domestic	203
1106014	SAND		16	239	702133	5159950	Domestic	223
1106014	SAND	CLAY	17	239	702133	5159950	Domestic	222
1106014	SAND		25	239	702133	5159950	Domestic	214
1106014	SAND	CLAY	26	239	702133	5159950	Domestic	213
1106014	SAND		55	239	702133	5159950	Domestic	183
1106014	FINE SAND	CLAY	56	239	702133	5159950	Domestic	183
1106731	SAND		4	237	698140	5159249	Domestic	233
1106731	CLAY	SAND	17	237	698140	5159249	Domestic	220
1106731	SAND		18	237	698140	5159249	Domestic	219
7039839	SAND		2	220	695868	5157674	Domestic	218
7039839	CLAY	SILT	60	220	695868	5157674	Domestic	160
7039839	SAND	SILT	71	220	695868	5157674	Domestic	149
7039839	SANDSTONE		79	220	695868	5157674	Domestic	141
1102709	FINE SAND	PACKED	24	231	698958	5159144	Domestic	206
1102709	CLAY	FINE SAND	50	231	698958	5159144	Domestic	180
1102709	FINE SAND	PACKED	58	231	698958	5159144	Domestic	173
1103200	SAND	SOFT	6	231	698948	5159174	Domestic	225
1103200	CLAY	SAND	52	231	698948	5159174	Domestic	179
1103200	SAND	SILT	58	231	698948	5159174	Domestic	173
7137359	SAND		5	231	701425	5159596		226
7137359	CLAY	SAND	14	231	701425	5159596		217
7137359	SAND	CLAY	35	231	701425	5159596		196
7137359	CLAY	SAND	48	231	701425	5159596		183
7137359	SAND		56	231	701425	5159596		175

Notes:

mbgs = meter below ground surface

masl = meter above sea level

easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database



## Details of Well Records used for Cross-Section F-F'

MOE Well ID	Primary Geological Material	Secondary Geological Material	Depth (mbgs)	Ground Elevation (masl)	Easting	Northing	Well Use Detail	Formation Bottom Elevation (masl)
1101039	FINE SAND		37	226	707816	5161466	Public	189
1101039	GRAVEL		41	226	707816	5161466	Public	185
1101043	STONES		7	268	705348	5161359		262
1101554	GRAVEL		5	223	708148	5161514	Domestic	218
1101554	FINE SAND		39	223	708148	5161514	Domestic	184
1101673	COARSE SAND		49	273	699458	5160224	Domestic	223
1101749	PREVIOUSLY DUG		16	272	700564	5160533	Domestic	257
1101749	FINE SAND	CLAY	37	272	700564	5160533	Domestic	235
1101852	COARSE SAND		24	254	697241	5159431	Domestic	230
1102119	FINE SAND		46	272	703598	5161224	Domestic	225
1102174	FINE SAND		47	272	703698	5161224	Domestic	225
1102178	SAND	FINE-GRAINED	49	273	699798	5160324	Domestic	224
1102866	SAND		47	272	703598	5161224	Domestic	225
1103068	SAND		31	254	698598	5159924	Domestic	223
1103401	SAND		14	273	703248	5161174	Domestic	259
1103401	CLAY		17	273	703248	5161174	Domestic	256
1103401	GRAVEL		25	273	703248	5161174	Domestic	248
1103719	CLAY	HARD	4	273	703198	5161174	Domestic	270
1103719	FINE SAND		5	273	703198	5161174	Domestic	268
1103719	CLAY	SOFT	8	273	703198	5161174	Domestic	266
1103719	MEDIUM SAND		12	273	703198	5161174	Domestic	261
1103727	SAND	HARD	4	273	703198	5161174	Domestic	270
1103727	CLAY	SOFT	9	273	703198	5161174	Domestic	264
1103727	COARSE SAND		12	273	703198	5161174	Domestic	261
1104162	FINE GRAVEL		49	277	704453	5161314	Domestic	227
1104724	SAND	LOOSE	14	258	699029	5160098	Not Used	244
1104724	GRANITE	HARD	62	258	699029	5160098	Not Used	195
1104912	SAND		49	271	699306	5160219	Domestic	222
1105724	COARSE SAND		9	257	698159	5159900	Domestic	247
1105724	CLAY	LAYERED	15	257	698159	5159900	Domestic	241
1105724	SAND		25	257	698159	5159900	Domestic	231
1105787	BOULDERS	SAND	59	276	702058	5161164	Domestic	217
1105958	CLAY		46	214	709231	5161631	Domestic	167
1105958	SANDSTONE		52	214	709231	5161631	Domestic	162
1106486	SAND	BOULDERS	45	274	702825	5161220	Domestic	230
1106514	SAND	STONES	32	251	706074	5161414		219
1106514	SANDSTONE		34	251	706074	5161414		218
1106558	STONES		48	251	706074	5161414	Domestic	203
1106706	SAND	GRAVEL	4	217	709840	5161453	Domestic	213
1106706	CLAY	SILT	38	217	709840	5161453	Domestic	179
1106706	SAND		40	217	709840	5161453	Domestic	178
1106718	SAND		8	264	701397	5161080		256
1106718	CLAY	SAND	22	264	701397	5161080		242
1106718	SAND		40	264	701397	5161080		225
1106718	CLAY	FINE SAND	53	264	701397	5161080		211
1106718	SAND		75	264	701397	5161080		190
1106769	SAND		49	272	699713	5160244	Domestic	223
1106769	CLAY		49	272	699713	5160244	Domestic	222
1106927	SAND		4	220	707730	5161448	Municipal	217
1106927	CLAY	GRAVEL	10	220	707730	5161448	Municipal	210
1106927	SAND	GRAVEL	25	220	707730	5161448	Municipal	196
7039848	SAND		40	227	708272	5161527	Domestic	187
7132283	CLAY	SILT	34	241	706685	5161271	Domestic	208
7132283	SILT	STONES	44	241	706685	5161271	Domestic	197
7132283	SANDSTONE		55	241	706685	5161271	Domestic	186
1102956	SAND	STONES	21	271	697798	5160124	Domestic	251
1102956	SANDSTONE		49	271	697798	5160124	Domestic	223
1102956	GRANITE		70	271	697798	5160124	Domestic	201
1100956	FINE SAND	SILT	51	264	699419	5160128	Domestic	213
1100956	CLAY	MEDIUM SAND	56	264	699419	5160128	Domestic	208
1100956	FINE SAND	SILT	61	264	699419	5160128	Domestic	203
1100956	CLAY	MEDIUM SAND	70	264	699419	5160128	Domestic	194
1100956	MEDIUM SAND		73	264	699419	5160128	Domestic	191
1100956	SANDSTONE		75	264	699419	5160128	Domestic	189
1101049	MEDIUM SAND	GRAVEL	17	273	705376	5161454	Public	256
1101049	CLAY	GRAVEL	34	273	705376	5161454	Public	239
1101049	GRAVEL		37	273	705376	5161454	Public	235
1101049	SANDSTONE		61	273	705376	5161454	Public	212

## Notes:

mbgs = meter below ground surface

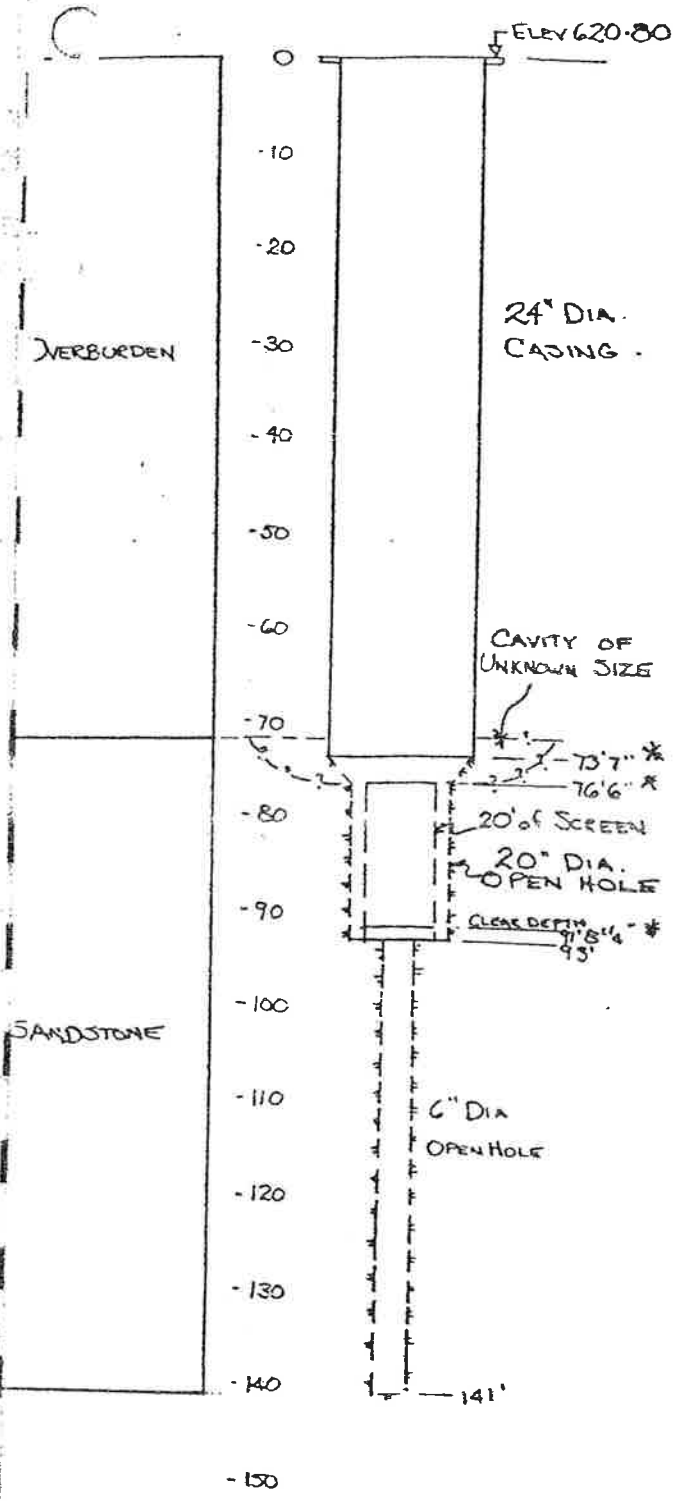
masl = meter above sea level

easting and northing coordinates are in UTM NAD83 zone 16N

geological records for private wells were retrieved from Ontario Ministry of Environment well record database

## Appendix A-2

# Geology Log of Municipal Wells



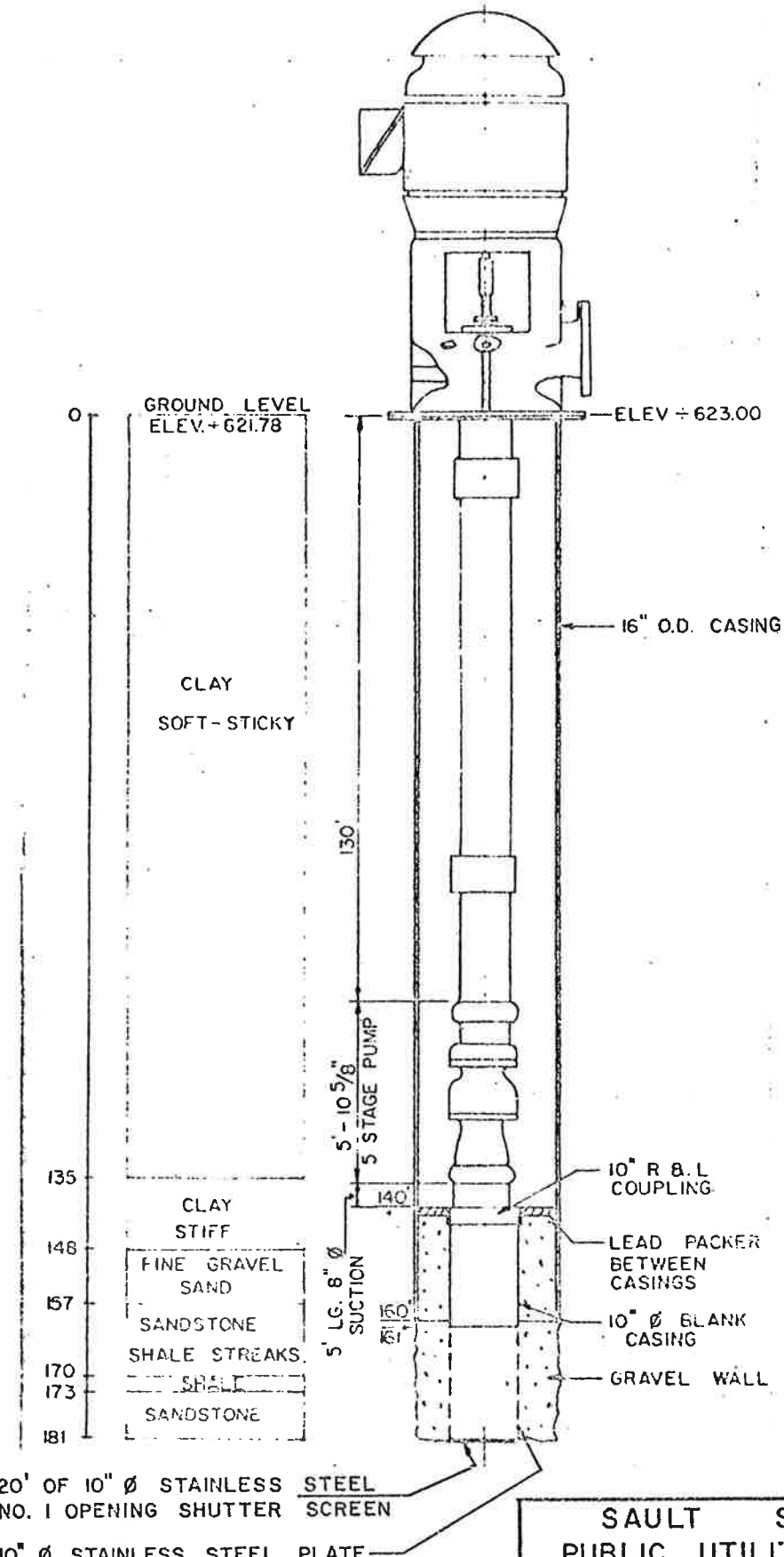
SOURCES OF DATA

- ① DRILLING REPORT BY C.F. LAYNE - 1934
- ② REPORT BY V.B. REDFERN - DEC 11/34 INCLUDING APPROX. DIMENSIONS.
- ③ IWS PRELIMINARY INSPECTION JAN/65
  - (a) 21.5" DIA DUMMY BOTTOM AT 76'6"
  - (b) 13.5" DIA DUMMY CAUGHT AT 73'7" BOTTOMED AT 83'7"
  - (c) SCREEN CLEANED WITH AIR-LIFT - CLEAR DEPTH 91'5"
- ④ IWS T.V. INSPECTION OCT 6/69.
  - (a) BOTTOM OF 24" CASING AT 76'6"
  - (b) TOP OF SCREEN AT 73'7" BOTTOM OF SCREEN AT 91'8 1/4"
  - (c) LARGE CAVITY BETWEEN 73'7" & 76'6"

\* MEASURED DEPTHS. OTHER DEPTHS FROM REPORTS BY OTHERS & UNCONFIRMED.

NO.	WAS	BY	DATE

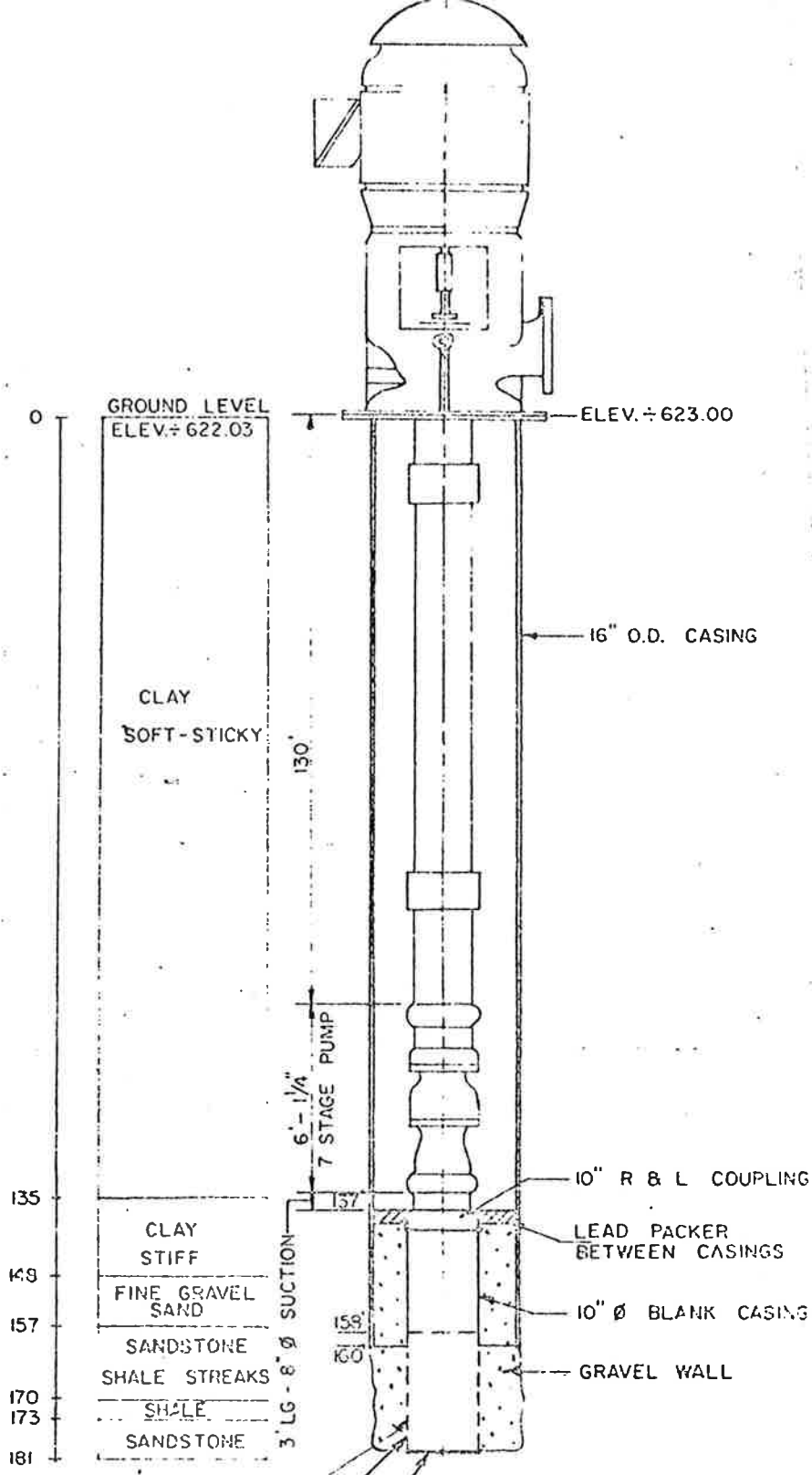
SAULT STE. MARIE ONT.  
PUBLIC UTILITIES COMMISSION  
STEELTON WELL DETAIL



20' OF 10" Ø STAINLESS STEEL NO. 1 OPENING SHUTTER SCREEN  
 10" Ø STAINLESS STEEL PLATE

SAULT STE. MARIE PUBLIC UTILITIES COMMISSION			
PROCTOR & REDFERN CONSULTING ENGINEERS			
TORONTO	SAULT STE. MARIE		
DRAWN BY <i>S.A.M.</i>	APPROVED <i>[Signature]</i>	DATE 4/69	DRAWING NO. E-66178-6

**GOULAIS AVENUE  
 DEEP WELL NO. 1  
 (CAPACITY: 900 I.G.P.M.)**



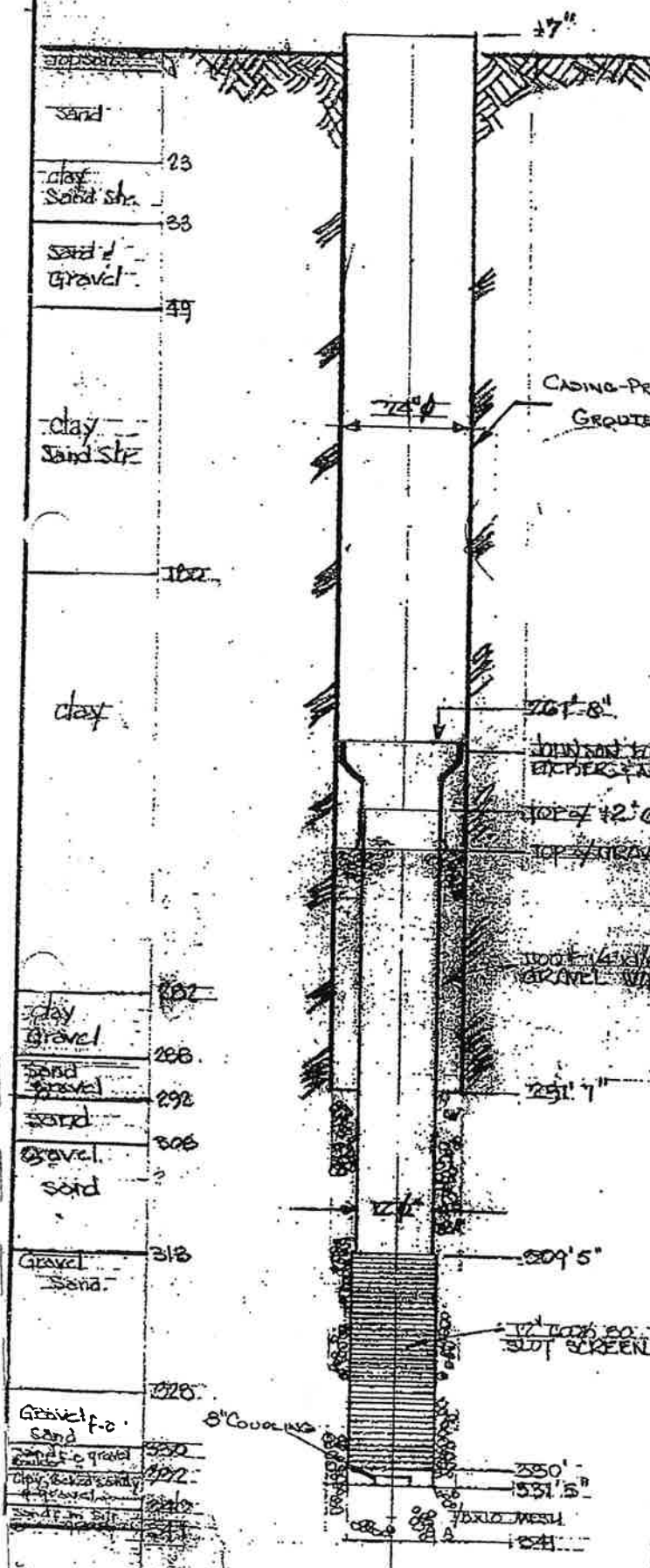
20' OF 10" Ø STAINLESS STEEL  
NO. 1 OPENING SHUTTER SCREEN  
10" Ø STAINLESS STEEL PLATE

**GOULAIS AVENUE  
DEEP WELL NO. 2  
(CAPACITY: 550 I.G.P.M.)**

**SAULT STE. MARIE  
PUBLIC UTILITIES COMMISSION**

**PROCTOR & REDFERN  
CONSULTING ENGINEERS**

TORONTO		SAULT STE. MARIE	
DRAWN BY <i>S.A.M.</i>	APPROVED <i>[Signature]</i>	DATE 6/69	DRAWING NO. E-66178--7



**Well Material**

Outer Casing - 292'-3" 19" x 24" OD x 0.375" wall st  
 Inner Casing - 46'-10" 19" x 12" I.D. x 0.375" wall st  
 Screen 20' 19" x 12" I.D. 50 slot wire wrapped stain. steel  
 Plug  
 Gravel 1100# 1/4" x 1/8"

**Pump**

No. 73347. Setting BP-MB 150'  
 No. Stages 3 Length Bowl 4'9"  
 Bowl 15 DRLC Size & Lgth. Suction 10' of  
 Head TF1018 Size Column 10" x 2 1/2" x 11"  
 Materials or setting details other than standar  
 Impellers; Trim - TUBING TAPED.

**Motor**

Make West. Phase 3  
 H. P. 150 Cycles 60  
 R. P. M. 1800 Volts 575  
 Type V.H.S. Amps.  
 Frame 444 T.P.H. Serial  
 Bearing Nos. Upper - 2 - 7222 D  
 Lower - 631422 -  
 Special Equipment

**Well No. 1 Dacey Rd.**

B.P. referred to original ground level +2.3' (Clay)  
 Clear depth below B.P. 563.3' (Clay)  
 Started x Final Test  
 Preliminary Test Sept 14, 1951 Static Level 53.65'  
 Final Test Pumping Level 73.25'  
 Guarantee 1050 IGPM Capacity 1050 IGPM  
 Contract Pressure # Pressure Pump  
 Length Air Line Main

**INTERNATIONAL WATER SUPPLY LTD.**

MONTREAL LONDON, CANADA SASKATOON  
 OAKVILLE WATER SUPPLY CONTRACTORS VANCOUVER

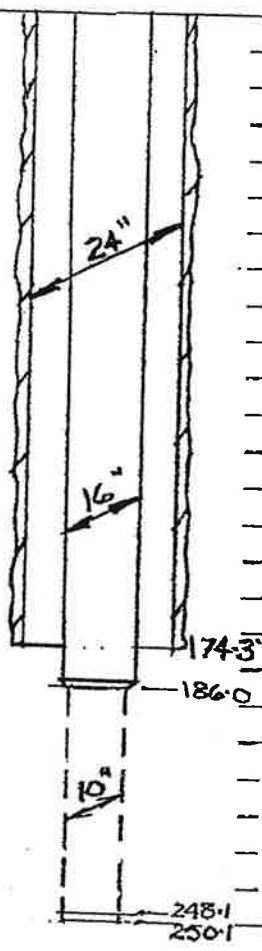
Sault Ste. Marie P.U.C.  
 SHANNON WELL  
 Dacey Road No 1 Well

DRILLED BY Thys & Gray DRAWN BY H.J. Wall  
 INSTALLED BY J Hartman. APPROVED BY  
 REVISION JUNE 21/79

**WELL DIAGRAM**

**LOG**

0' TOP SOIL  
 16' CLAY SANDY GRAVEL STREAK  
 25' SAND, CLAY LAYERS  
 CLAY SANDY SAND.  
 50-47'  
 100' CLAY SILTY.  
 150'  
 159' CLAY GRAVEL  
 178' SAND, GRAVEL  
 191'  
 200' SAND FINE GRAVEL MEDIUM  
 215' GRAVEL SAND BOULDERS  
 SAND MEDIUM GRAVEL, COARSE  
 244'  
 250' GRAVEL, SAND.  
 255'  
 300'



**WELL MATERIAL**

Outer Casing: 24" dia., 0.375" Wall Thk. Matl.: S+1  
 Cemented from 0' 0" to 174.3"  
 Inner Casing: 16" dia., 0.375" Wall Thk. Matl.: S+1  
 Screen: Make Cook 10" dia., Opening & Matl.: 20 Slot - S.S.  
 Plug: Type PLATE Matl. S.S. Other:  
 Gravel: Type SILICA, Size 0.8mm, Quantity 16+ (T<sub>a</sub> 135')

**WELL TEST DATA**

Preliminary Test Date: SEPT 12/77 by J. GRAY  
 Static Level: 33.19' below M.P. + 2.0'  
 Pumping Rate IGM: 1200 IGM.  
 Pumping Duration: 24 hrs. min.  
 Pumping Level at Test End: 62.24'  
 Performance Plots: dd-t Dwg. A77413.  
 dd-r Dwg. A77414  
 step-test A78007

Final Test: Date \_\_\_\_\_ by \_\_\_\_\_  
 Rated Well Capacity IGM 1050  
 Pumping Rate IGM \_\_\_\_\_ Static level 33.13 1/2"  
 Pumping level \_\_\_\_\_ at \_\_\_\_\_ hrs. min.  
 Pump pressure \_\_\_\_\_ psi; Main pressure \_\_\_\_\_ psi  
 Shut off: AGH \_\_\_\_\_ psi; W.L. \_\_\_\_\_"  
 Clear Well Depth from B.P. 253.9' Air Line 125' PLASTIC

**PUMP & MOTOR DATA**

Pump Make LTB Rating 1050 IGM @ 326 TH  
 Head: Type TFI018 S.N. 86584  
 Column: 125" x 10" x 2 1/2"; Shaft Mtl: 1 1/2" C.S.  
 Bowl: 12TLC Stage 6; Curve: 15040  
 Suction: 10" dia. 5" 0" Long  
 Special: Zinc Sleeves \_\_\_\_\_ Taped Oil Line YES  
 Other \_\_\_\_\_  
 Motor Make: US Frame: 444TP SN: CD1040LS4  
 150 HP, 3 ph, 60 hz, 1770 rpm 575"  
 Bearing No. Upper 7322-M.  
 Lower 6215-J

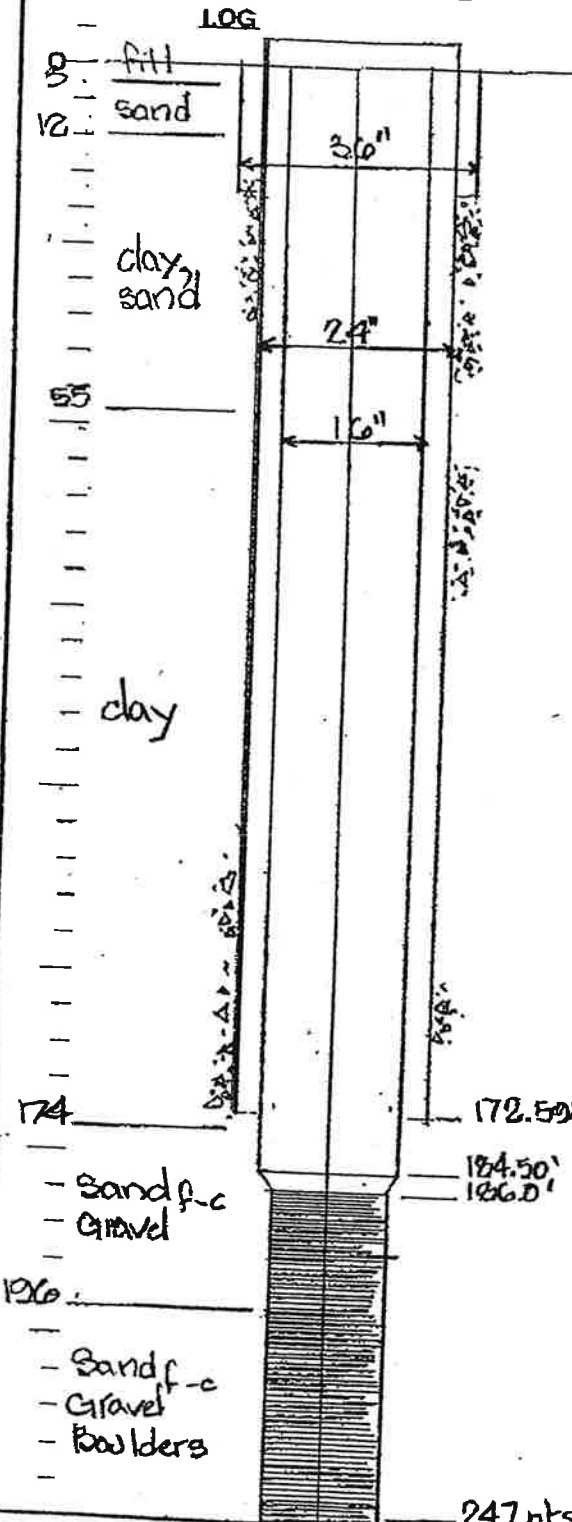
Special Equipment  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**WELL REVISIONS AND REHABILITATION**

DATE	WORK DONE	BY

**International Water Supply Limited**  
 SASKATOON - BARRIE - MONTREAL  
 CLIENT: SAULT STE MARIE P.U.C.  
 WELL NO: 3 - QUEEN ST.  
 LORNA WELL No. 1  
 DRILLED BY: J. GRAY DATE: SEPT 17/77 DRAWN: LP.  
 INSTALLED BY: DATE: DATE: JAN 18/78

**WELL DIAGRAM**



**WELL MATERIAL**

Outer Casing: 24" dia., 3/8" Wall Thk. Matl: steel  
 Cemented from 0' to 172'  
 Inner Casing: \_\_\_\_\_" dia., \_\_\_\_\_" Wall Thk. Matl: \_\_\_\_\_  
 Screen: Make Smith 10" dia., Opening & Matl: 20 stainless  
 Plug: Type plate Matl: stain. steel Other: \_\_\_\_\_  
 Gravel: Type silica Size 0.8 Quantity 20 ton

**WELL TEST DATA**

Preliminary Test Date: March 8, 1982 by J. Gray  
 Static Level: 40.42' below M.P.  
 Pumping Rate IGM: 1200  
 Pumping Duration: 24 hrs min.  
 Pumping Level at Test End: 80.84'  
 Performance Plots: dd-t Dwg. \_\_\_\_\_  
 dd-r Dwg. \_\_\_\_\_

Final Test: Date \_\_\_\_\_ by \_\_\_\_\_  
 Rated Well Capacity IGM \_\_\_\_\_  
 Pumping Rate IGM \_\_\_\_\_ Static level \_\_\_\_\_'  
 Pumping level \_\_\_\_\_' at \_\_\_\_\_ hrs \_\_\_\_\_ min.  
 Pump pressure: \_\_\_\_\_ psi Main pressure \_\_\_\_\_ psi  
 Shut off: AGH \_\_\_\_\_ psi; W.L. \_\_\_\_\_'  
 Clear Well Depth from B.P. \_\_\_\_\_' Air Line \_\_\_\_\_'

**PUMP & MOTOR DATA**

Pump Make Lorne Rating 1260 IGM @ 327' TH  
 Head: Type TF 1010 S.N. 99303  
 Column: 124" x 2 1/2" x 1 1/2" Shaft Mtl: steel  
 Bowl: 12 TLC Stage 6 Curve: \_\_\_\_\_  
 Suction: 10" dia. 5" Long  
 Special: Zinc Sleeves \_\_\_\_\_ Taped Oil Line Yes  
 Other \_\_\_\_\_  
 Motor Make: U.S. Frame: 444 TP SN: 9803219  
 150 HP, 3 ph, 60 Hz, 575 rpm  
 Bearing No. Upper: 7322 M  
 Lower: 6215 J

Special Equipment  
 200' Gauge  
 200' Gauge  
 125' - 3/8" plastic air line

**WELL REVISIONS AND REHABILITATION**

DATE	WORK DONE	BY

**International Water Supply Limited**

SASKATOON - BARRIE - MONTREAL

CLIENT: Sault St. Marie

WELL NO: Lorna Drive No 4  
 LORNA WELL No. 2

DRILLED BY: J. Wall

DATE: 3/82

DRAWN: J. Wall

INSTALLED BY:

DATE:

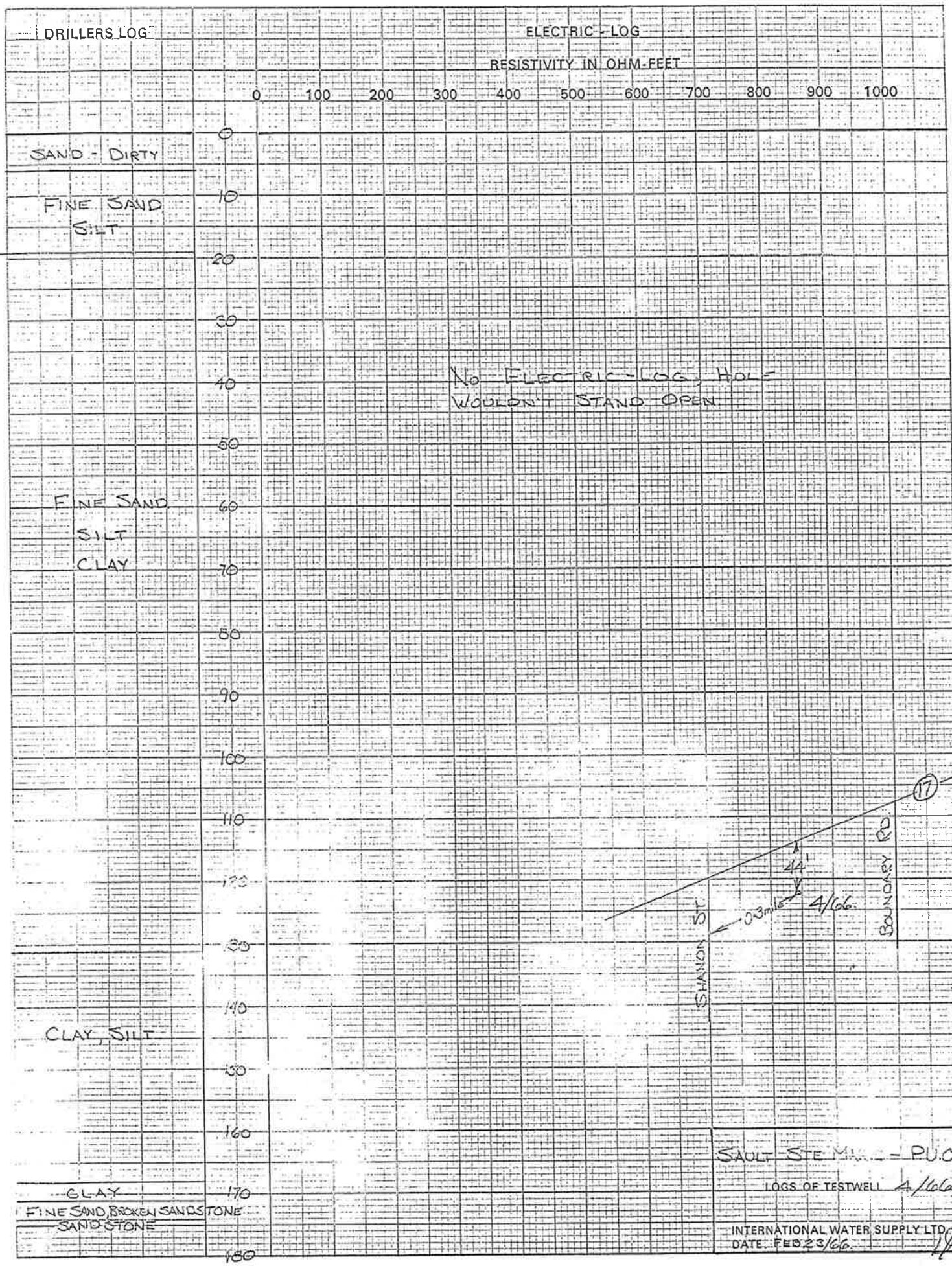
DATE: 2/83



## Appendix A-3

### Geology Log of IWS Test Wells

G.S.-12 G  
 10 X 10 TO THE 1/2 INCH  
 MADE IN CANADA



SAULT STE MARIE - PUC  
 LOGS OF TESTWELL 4/66  
 INTERNATIONAL WATER SUPPLY LTD  
 DATE FEB 23/66

A71035

DRILLERS LOG

ELECTRIC - LOG

DRILLER: *Y" O*  
 HOLE DIAM: *R. STEPH*  
 ELEVATION: *588.06*

RESISTIVITY IN OHM-Feet

0 100 200 300 400 500 600 700 800 900 1000

FILL - GRAVEL + BOULDER

S.L.T.  
GRAY

① MUD RECORD

*84' to 93' 4" MUD*  
*95' to 103' 2" MUD*  
*103' to 107' 2" MUD*

② STATIC LEVEL *4.44 (AUG 21 - 0700)*

PUMPING LEVEL *33.99' @ 20 GPM - 4 HRS*

WATER CLOUDY - SOME SAND

APPARENT TRANSMISSIBILITY *1700 cm<sup>2</sup>/day*

CLAY

Red

BOULDER

SAND FINE TO COARSE

GRAVEL BOULDER

BOULDER

SAND FINE TO COARSE

GRAVEL BOULDER

DITTO

~~GRAVEL BOULDER~~

SANDSTONE

PULLED

*2" 1 1/4"*

*92'*

*103'*

ATLAS

DRAKE

18 CLARK CR.

2170

QUEEN ST.

INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TESTWELL

*2170*

SAULT STE MARIE P.O.C

SITE E

AUG 1970

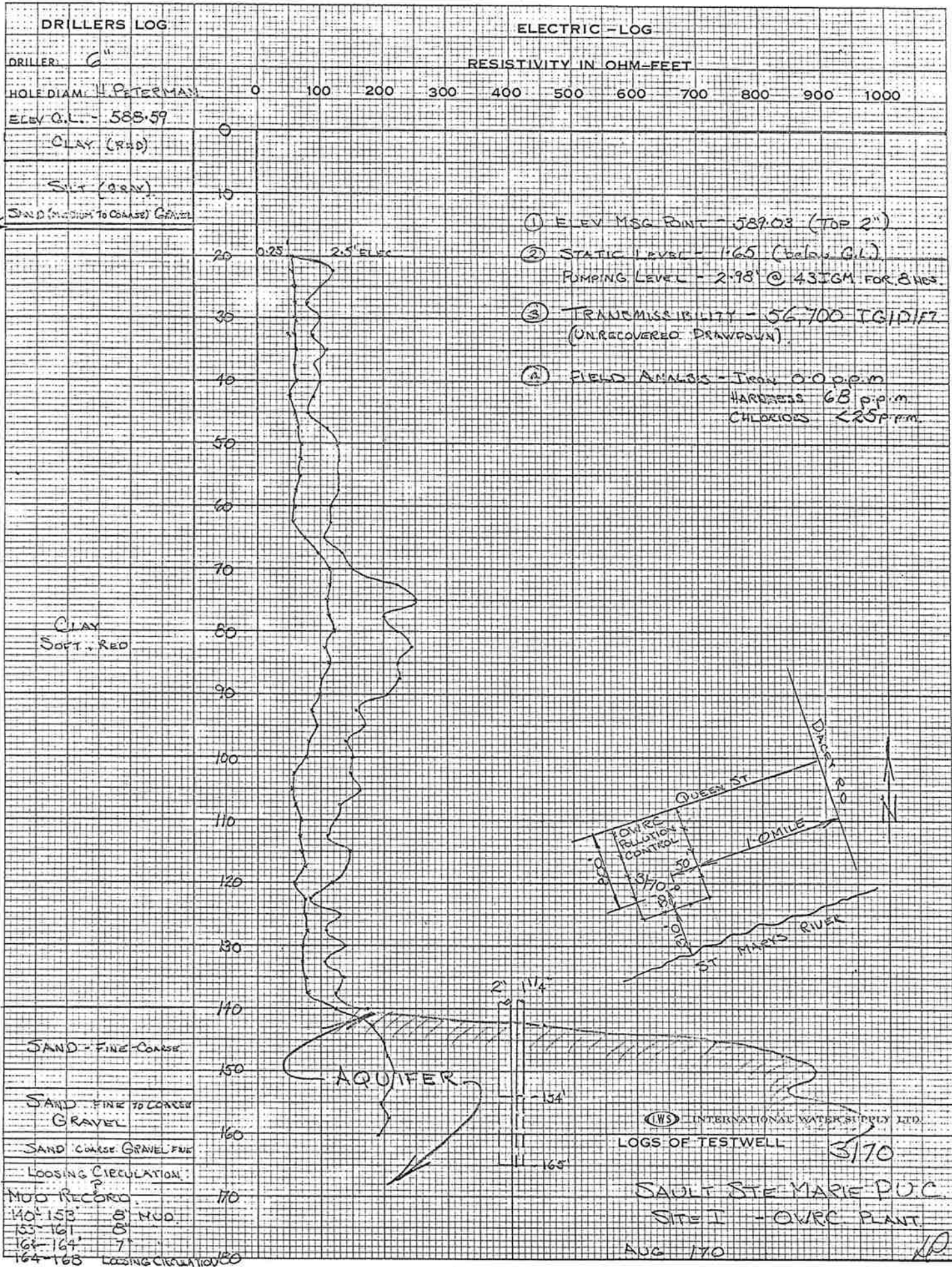
*KP*

G9-12G IWS #3  
 10 x 10 TO THE 1/2 INCH  
 MADE IN CANADA



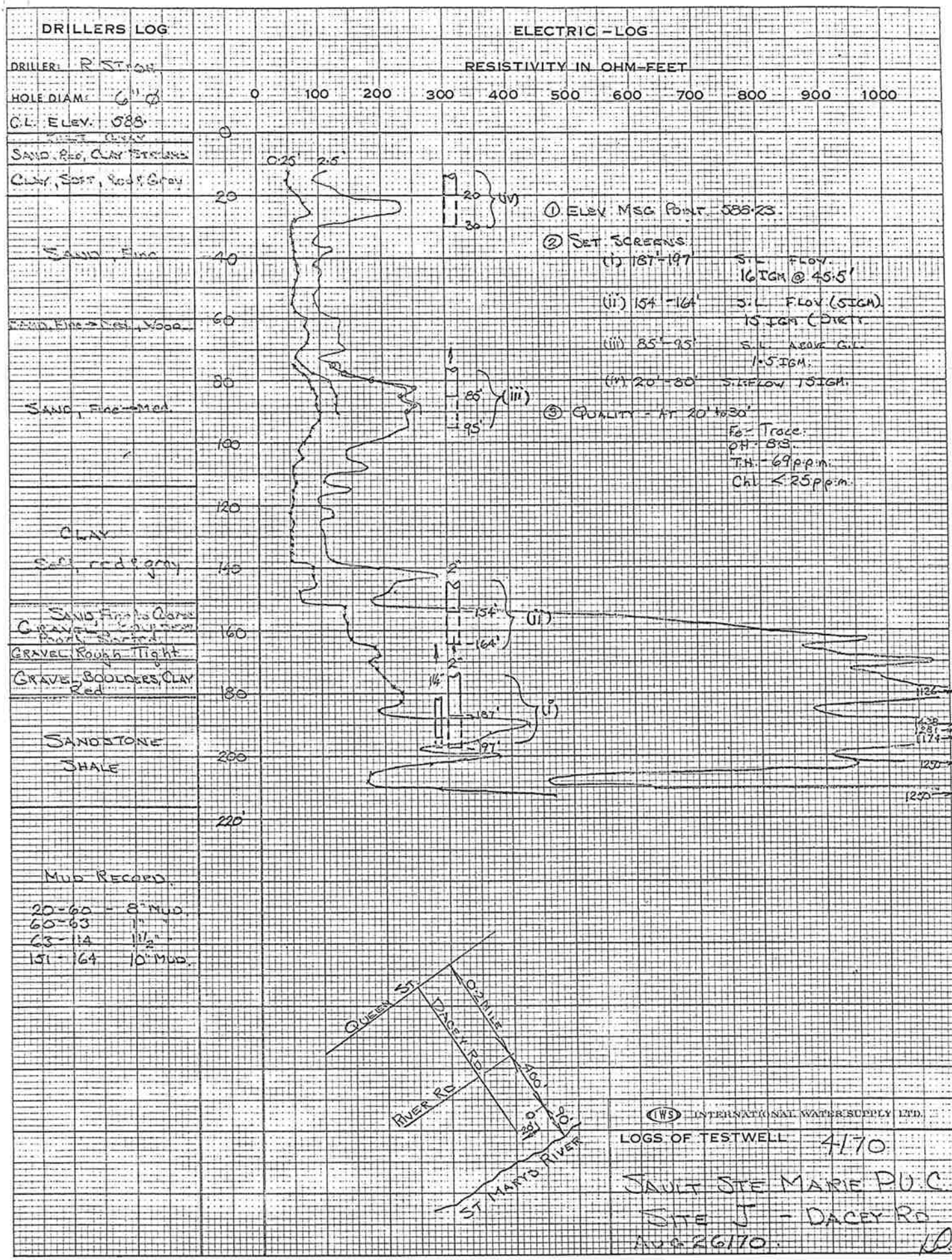
A71036.

G9-12G IWS #3  
 10 x 10 TO THE 1/2 INCH  
 MADE IN CANADA



A71037

G9-12G IWS #3  
10 x 10 TO THE 1/2 INCH  
MADE IN CANADA



A71038

DRILLER R. STROM

HOLE NO. 97 1/2, 77 1/2, 6 1/4"

ELEV. GROUND - 636.11

SAND, SILT.

SAND  
Fine.

SAND  
Fine to Coarse

SAND, Fine to Coarse, GRAVEL, FINE

CLAY

SAND, Fine to Coarse, GRAVEL, FINE

CLAY

SAND  
Fine

CLAY  
Streaks

CLAY

CLAY  
Red & Gray

CLAY  
Red.

SAND, Fine to Med, Packed

BOULDER, Round

SAND, Fine to Med, Packed

SAND, GRAVEL, Fine to Coarse

SILT, SAND, Fine

SAND, GRAVEL, Fine to Coarse

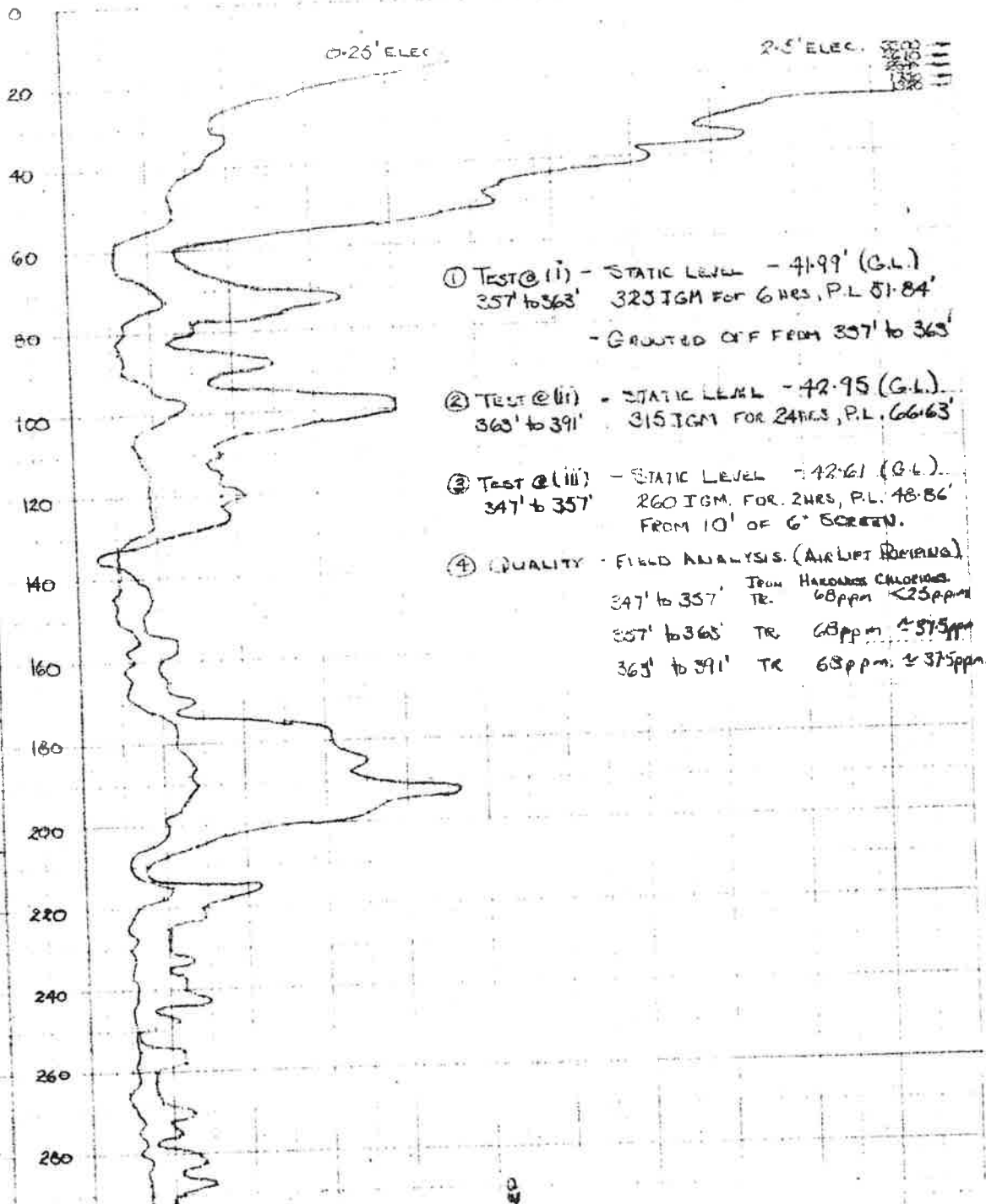
SAND, Fine, GRAVEL, Packed

SAND, STONE  
GRAVEL

SAND, STONE &  
SHALE  
Layered.

MUD RECORD.

5' to 27'	Took 5" Mud.
27' - 53'	8"
53' - 56'	4"
63' - 75'	4"
81' - 130'	4"
294' - 311'	2"
311' - 314'	1"
314' - 320'	2"
320' - 323'	24" Heavy

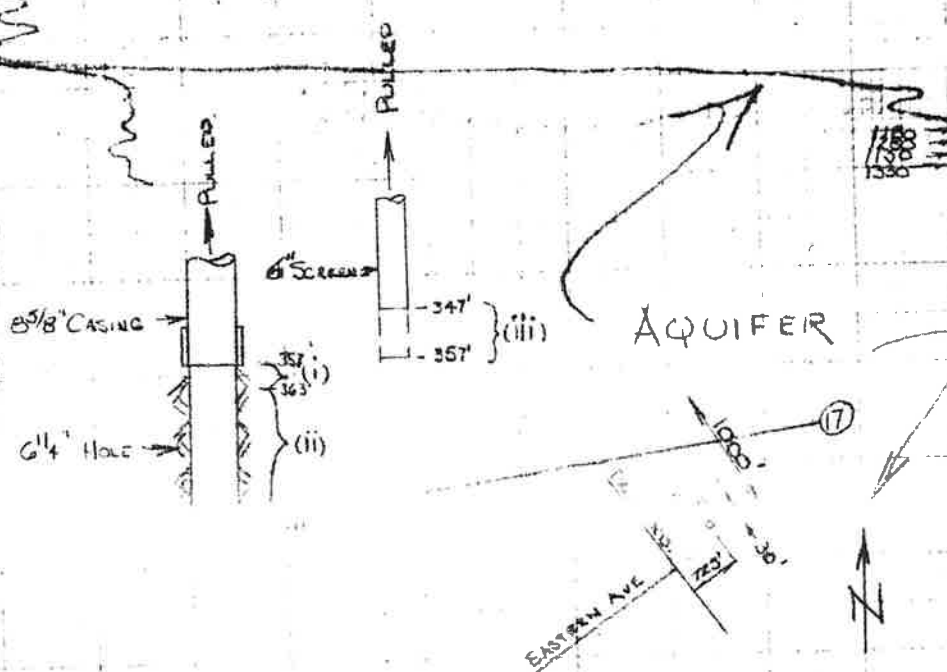


① TEST @ (i) - STATIC LEVEL - 41.99' (G.L.)  
357' to 363' 325 IGM FOR 6 HRS, P.L. 51.84'  
- GROUTED OFF FROM 357' to 363'

② TEST @ (ii) - STATIC LEVEL - 42.95' (G.L.)  
363' to 391' 315 IGM FOR 24 HRS, P.L. 66.63'

③ TEST @ (iii) - STATIC LEVEL - 42.61' (G.L.)  
347' to 357' 260 IGM FOR 2 HRS, P.L. 48.86'  
FROM 10' OF 6" SCREEN.

④ QUALITY - FIELD ANALYSIS (AIR LIFT RETURNS)  
347' to 357' TR. 68 ppm  $\pm$  375 ppm  
357' to 363' TR. 68 ppm  $\pm$  375 ppm  
363' to 391' TR. 68 ppm  $\pm$  375 ppm



(1WS) ...  
LOGS OF TESTWELL 5/70  
SAULT STE MARIE PUC  
SITE F - FINNISH CLUB  
OCT 7/70

A71039

DRILLERS LOG

ELECTRIC LOG

DRILLER: J. Gray

RESISTIVITY IN OHM-Feet

HOLE DIAM: 10" 8" 7"

0 100 200 300 400 500 600 700 800 900 1000

ELEV. 590 TOPO

Clay - Brown

SAND - Medium

Clay - Red

SAND - Clay Strake  
Red

Clay - Red - Gray

Clay - Red

Clay - Red - Firm

SAND - Fine

SANDSTONE

SANDSTONE  
Coarse - Hard - Orange

SL 28 05 Oct 16/78

10" CASING  
(PULLED)

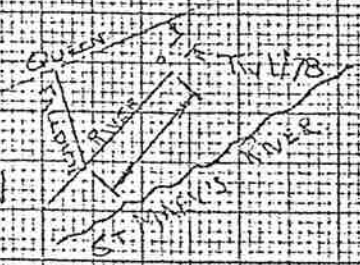
3" 9/16" CASING  
(PULLED)

7" 9/16" CASING  
(PULLED)

2" Observation Well

6 1/2" Observation Well

Oct 16/78 SL 28-05 (G.L.)  
Q = 210 GPM  
E = 12.19 ft. Str.  
① 7' 9/16" casing 4' 10"  
② 2" casing 20' 3 1/2'



INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TEST WELL 1/78

SAULT STE MARIE 476

1-2-12-1903-20

River Road Site

Oct 178

1/4

MADE IN CANADA

SPECIALTY TRAINING OR DRAWING PAPER

DRILLERS LOG

ELECTRIC LOG

DRILLER: J. Gen.

RESISTIVITY IN OHM-Feet

HOLEDIAM: 8 1/2"

ELEV.: 630 (Top)

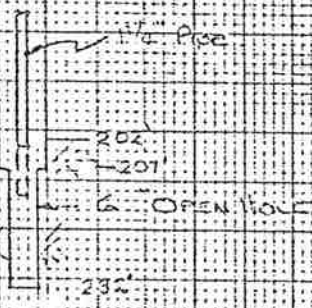
0 100 200 300 400 500 600 700 800 900 1000

Clay S.T

Sand Fine

SAND Fine - Med

SANDSTONE



Oct 24/78  
 ① Static Level - 16.83 (7115)  
 Pumping Level - 16.83 (7115)  
 Capacity - 224 GPM  
 ② Piled 8" x 10" Casing  
 Set 1 1/4" Screws 2035-213

1/2 MILE  
 1/2 MILE

INTERNATIONAL WATER SUPPLY LTD.  
 LOGS OF TESTWELL 2/78  
 SAULT STE MARIE D.C.  
 1-2-12-1903-20  
 Oct 24/78

MADE IN CANADA  
 SPECIALLY MANUFACTURED FOR DRAWING PAPER



DRILLERS LOG

ELECTRIC LOG

DRILLER: Gray

RESISTIVITY IN OHM-Feet

HOLE DIAM: 6 1/4"

0 100 200 300 400 500 600 700 800 900 1000

ELEV: 630 (Topo)

TOPSOIL

0

20

40

CLAY SILT

60

80

100

120

140

SAND-Fine  
Red

160

180

SANDSTONE  
Reddish

200

220

PULLED

1 1/4" Pipe

-179'

-187'

① Nov 178

S. 1/4 333' AC (21805000)

② Screen pulled & hole grouted

TW 3/78

0.3 MILE

119

SECOND LINE

ALLEN

COLEMAN

INTERNATIONAL WATER SUPPLY LTD.

LOGS OF TESTWELL

3/78

SAULT STE MARIE P.L.C.

1-2-12-1903-20

WALKER SITE

Nov 178

17

MADE IN CANADA

STURTEWANT MANUFACTURING COMPANY  
SPECIALTY TRADING OR DRAWING PAPER

DRILLERS LOG

ELECTRIC LOG

DRILLER: J. GRAY

RESISTIVITY IN OHM-Feet

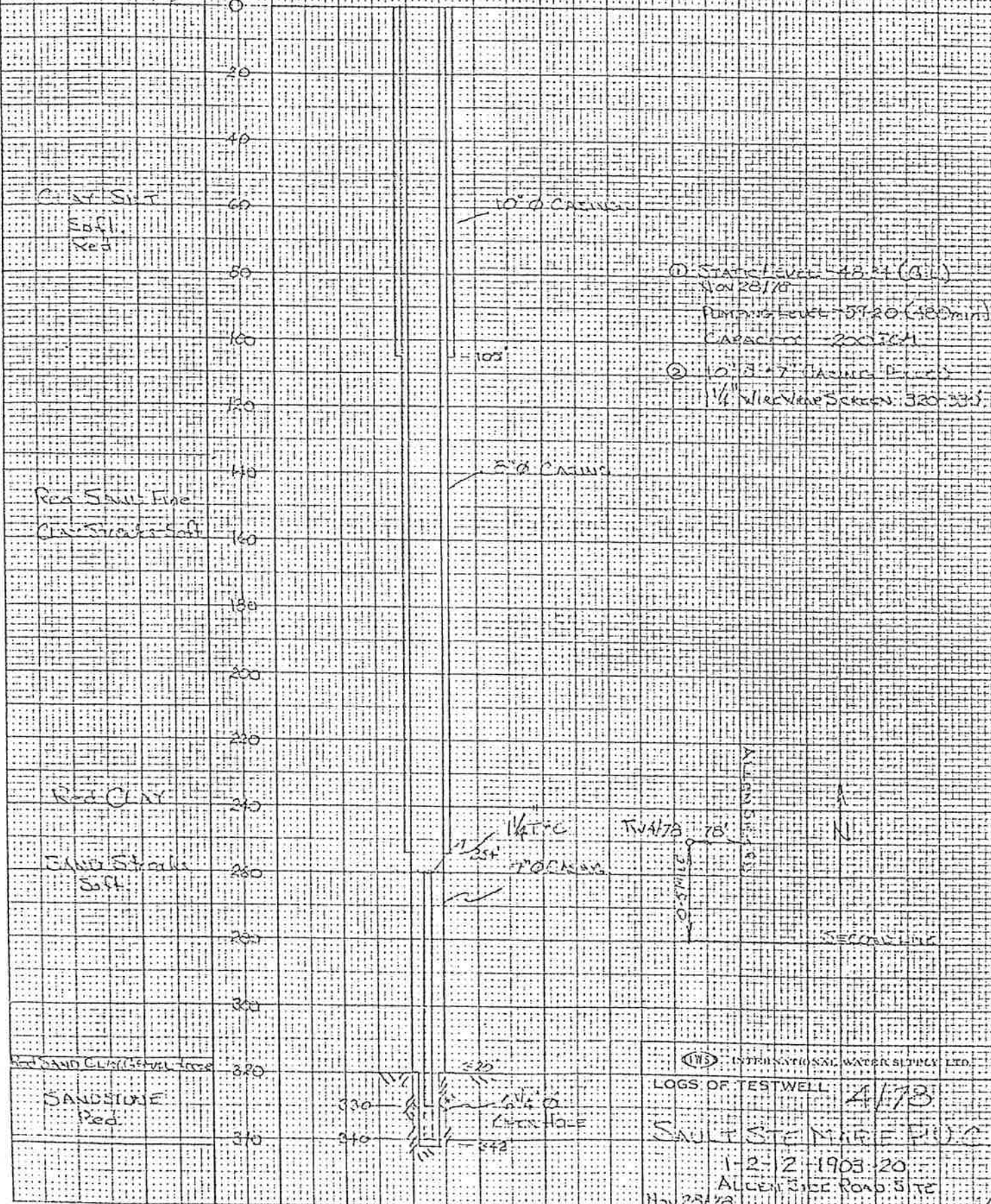
HOLE DIAM: 10 3/4"

ELEV: 685 (Top)

0 100 200 300 400 500 600 700 800 900 1000

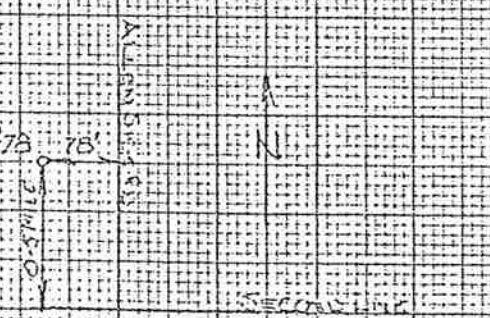
MADE IN CANADA

SPECIFY FRACS OR DRAWING PAPER



① STATIC LEVEL 43.24 (B.L.)  
 NON 20/10  
 PUMPING LEVEL 57.20 (400min)  
 CAPACITY 200 GPM

② 10 3/4" CASING DIA.  
 1/4" WIRE MESH SCREEN 320-330'



INTERNATIONAL WATER SUPPLY LTD.  
 LOGS OF TEST WELL 4/73  
 SAULT STE MARIE PULP  
 1-2-2-1903-20  
 ALLEN SIDE ROAD SITE  
 Nov 25/78

DRILLERS LOG

ELECTRIC LOG

DRILLER: A. Ormister

RESISTIVITY IN OHM-FeET

HOLE DIAM: 5 7/8"

0 100 200 300 400 500 600 700 800 900 1000

topsoil: ELEY 596

silty red clay str. of sand & gravel

sand - m.; silty clay str.

soft silty red clay

soft silty gray clay

soft silty red clay

soft silty red & gray clay

soft silty red & gray clay & gravel

soft silty red & gray clay

fine to med. angular sand

fine to med. angular sand

fine to med. angular sand & gravel

fine to med. angular sand

med. gravel & sand

fine to coarse angular gravel & sand

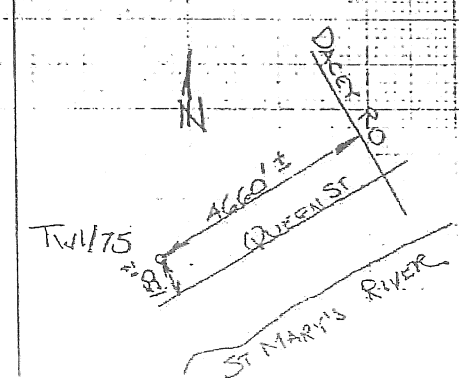
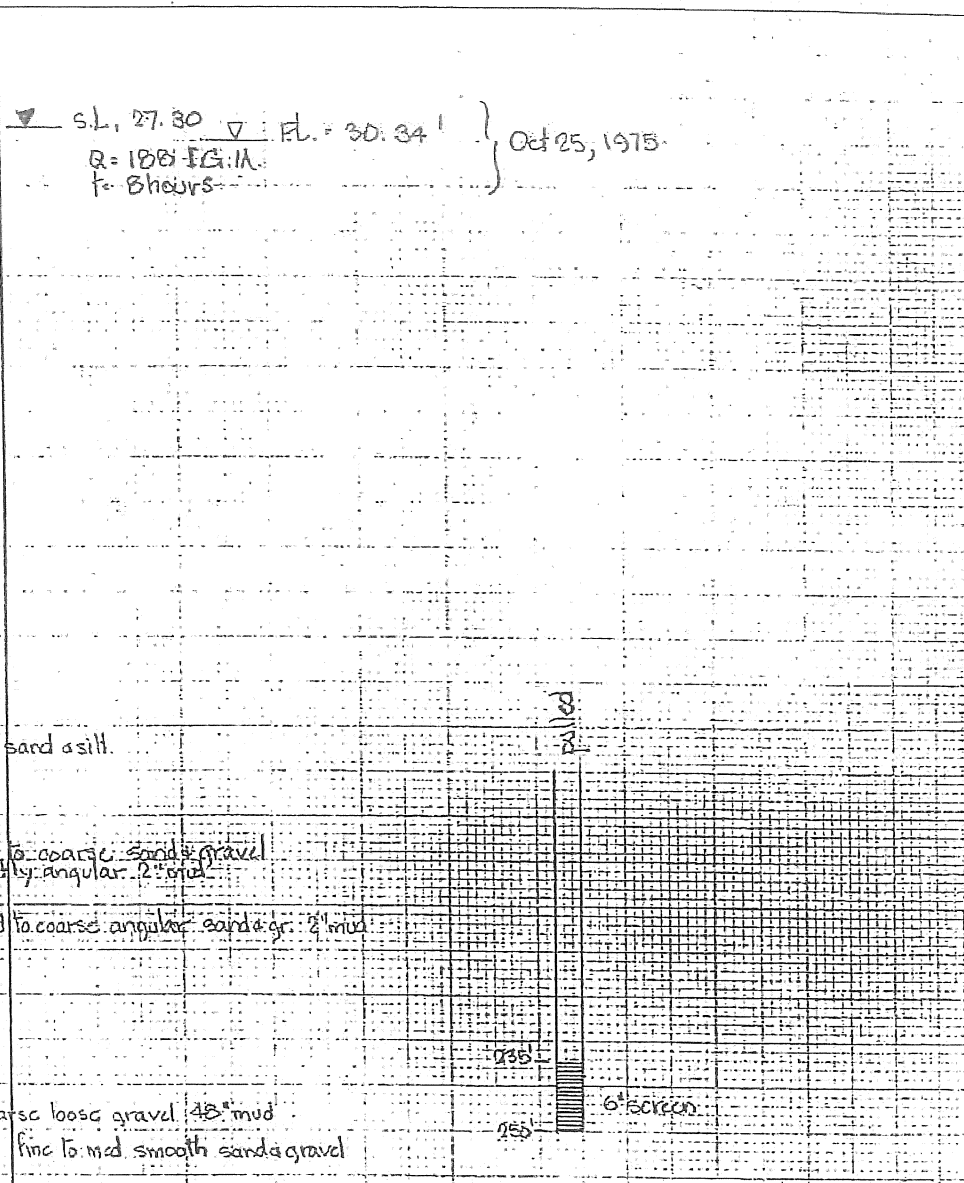
fine to med. angular sand & gravel

fine to coarse angular sand

fine to coarse angular sand

coarse loose gravel & mud

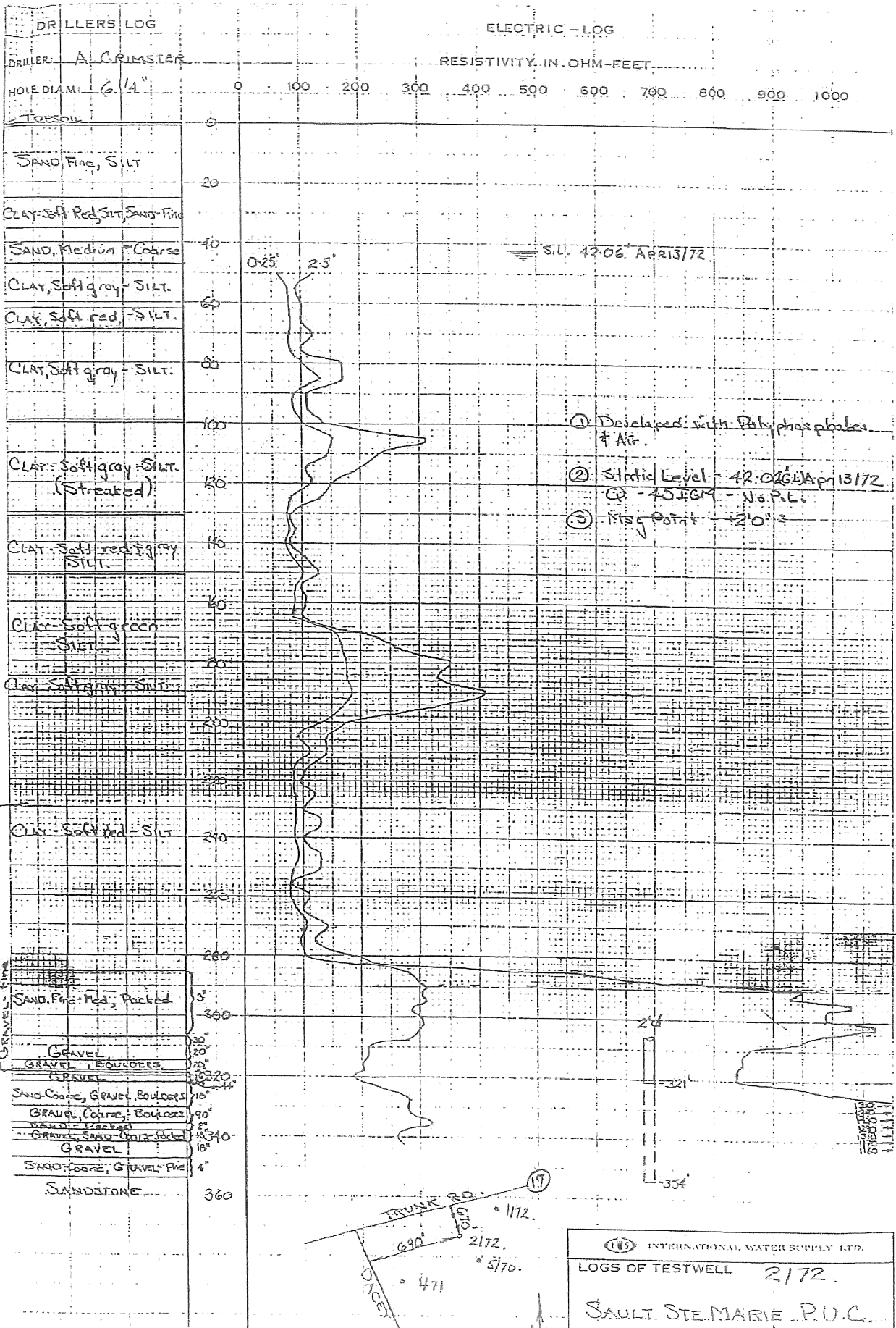
sand stone



IWS INTERNATIONAL WATER SUPPLY LTD.  
 LOGS OF TESTWELL 1/75  
 SAULT STE MARIE PUC  
 1-2-12-1903-20  
 J. Wall Oct 15/75

A76026

G9-12G IWS #3  
10 X 10 TO THE 1/2 INCH  
MADE IN CANADA












INTERNATIONAL WATER SUPPLY LTD.  
LOGS OF TESTWELL 2172  
SAULT STE. MARIE P.U.C.

**Appendix A-4**  
**Geology Log of CEG/Kresin Monitoring Well**






## Symbols and Abbreviations used on Borehole Logs

### LITHOLOGIC SYMBOLS








(Unified Soil Classification System)

	ASPHALT: Asphalt
	SW-SM: USCS Well-graded Sand with Silt
	CL: USCS Low Plasticity Clay
	CH: USCS High Plasticity Clay
	SHALE: Shale
	GW-GC: USCS Well-graded Gravel with Clay
	SC: USCS Clayey Sand
	CLS: USCS Low Plasticity Sandy Clay
	SP: USCS Poorly-graded Sand

### SAMPLER SYMBOLS

	Grab Sample
	Standard Penetration Test
	Shelby Tube
	Rock Core
	Split Spoon

### WELL CONSTRUCTION SYMBOLS

	Cement Seal: 1 pipe group, 1 pipe
	Bentonite Seal: 1 pipe group, 1 pipe
	Filter Pack: 1 pipe group, 1 pipe
	Slotted Pipe: 1 pipe group, 1 pipe
	Pipe Cap: 1 pipe group, 1 pipe
	Bentonite: Bottom of hole
	Cement: Bottom of hole

### STANDARD PENETRATION RESISTANCE

**(N VALUE)** – The number of blows by a 63.6 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) Split Spoon Sampler for a distance of 300 mm (12 in.). For samples where full penetration is not achieved, the number of blows is reported over the sample penetration in millimeters (e.g. 50/75).

#### COHESIONLESS SOILS

Relative Density	N Value
Very Loose	0 - 4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

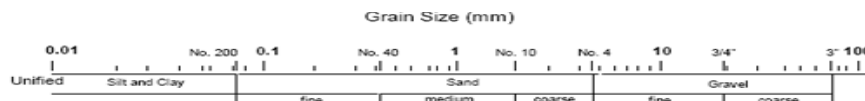
#### COHESIVE SOILS

Consistency	Cu(kPa)	N Value
Very Soft	0 - 12	0 - 2
Soft	12 - 25	2 - 4
Firm	25 - 50	4 - 8
Stiff	50 - 100	8 - 15
Very Stiff	100 - 200	15 - 30
Hard	>200	>30

All sample descriptions included in this report follow the **Unified Soil Classification System (USCS)**. Unless stated, samples are classified visually. Visual classification may not be accurate enough to provide precise grain sizing.

#### DESCRIPTORS FOR SOIL CLASSIFICATION (USCS)

	%
Trace (e.g. "trace sand")	1 - 10
Some (e.g. "some sand")	10 - 20
Adjective (e.g. "sandy")	20 - 35
And (e.g. "and sand")	35 - 50
Noun (e.g. "sand")	>50



*Borehole logs are to be used for environmental purposes only.*

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON


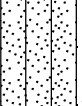
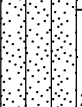

**DATE STARTED** 31/5/10 **COMPLETED** 31/5/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 267 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** AR/JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at East Balfour / Goulais Site West **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1	0.18		TOPSOIL Dark brown, with gravel and silty sand no odour (SM) silty SAND brown	Casing Top Elev: (m) Cement seal	SS 1	3-4-7-8/ 0.27	
2							
3	1						
4							
5	1.30		(SM)	Bentonite grout	SS 2	1-1-1-3 (2)	
6							
7	2.04		(SP-SC) sandy CLAY reddish brown with traces of silty sand				
8							
9	2.57		(CH) CLAY reddish brown clay with lateral layers of grey clay and traces of silt	Sand	SS 3	0-0-0-2 (0)	
10							
11			Moist				
12							
13	4			Screen installed with Geo-membrane			
14							
15	4.57		(CH) CLAY reddish brown clay		SS 4	0-0-0-2 (0)	
16							
17							
18							
19							
20	6.10		(CH) CLAY reddish brown clay Wet		SS 5	0-0-0-0 (0)	
21							
22							
23	7						
24							
25	7.62		(CH) CLAY reddish brown clay Moist		SS 6	0-0-0-4 (0)	
26							
27							
28							
29							
30	9				SS 7	0-0-1-3 (1)	
31							
32							
10							


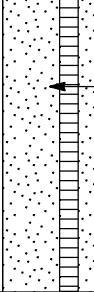
COLE TEMPLATE KRESIN BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22/7/10

**CLIENT** Sault Ste. Marie Regional Conservation Authority

**PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439

**PROJECT LOCATION** Sault Ste. Marie, ON

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
34			(CH) CLAY reddish brown clay Moist ( <i>continued</i> )		SS 8	0-1-2-2 (3)	
35							
36	11						
37							
38							
39	12		12.19				

Bottom of borehole at 12.19 meters.



**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON


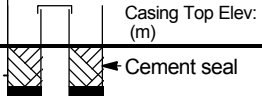














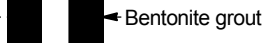








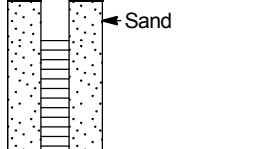
**DATE STARTED** 1/6/10 **COMPLETED** 1/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** AR/JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at Wright / Second Line **AFTER DRILLING** ---


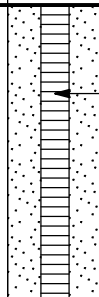
DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1	0.22		TOPSOIL Light brown, no odour, some pebbles		SS 1	6-6-8-15/- 0.23	
2			sandy SILT				
3							
4							
5							
6	1.63		sandy CLAY reddish brown, some pebbles intermittent layers of dark brown sandy CLAY		SS 2	1-2-2- 2/0.08	
7							
8							
9							
10	3.05		(SP) medium SAND dark brown, no odour, some pebbles wet		SS 3	6-3-2-1/- 0.04	
11	3.25		(CH) CLAY reddish brown, with some traces of sand moist				
12							
13							
14							
15	4.57		(CH) CLAY reddish brown with traces of medium sand moist		SS 4	0-0-0-1/- 0.15	
16							
17							
18							
19							
20	6.10		(CH) CLAY reddish brown moist		SS 5	1-0-0-1 (0)	
21							
22							
23	7.62		(CH) CLAY reddish brown with traces of grey silt moist		SS 6	1-1-0-2 (1)	
24							
25							
26	8.23		(CH) CLAY reddish brown, no odour				
27							
28							
29							
30					SS 7	5-5-5-5/- 0.22	
31							
32			wet				

**CLIENT** Sault Ste. Marie Regional Conservation Authority

**PROJECT NAME** Zone of Influence Study for Municipal Wells

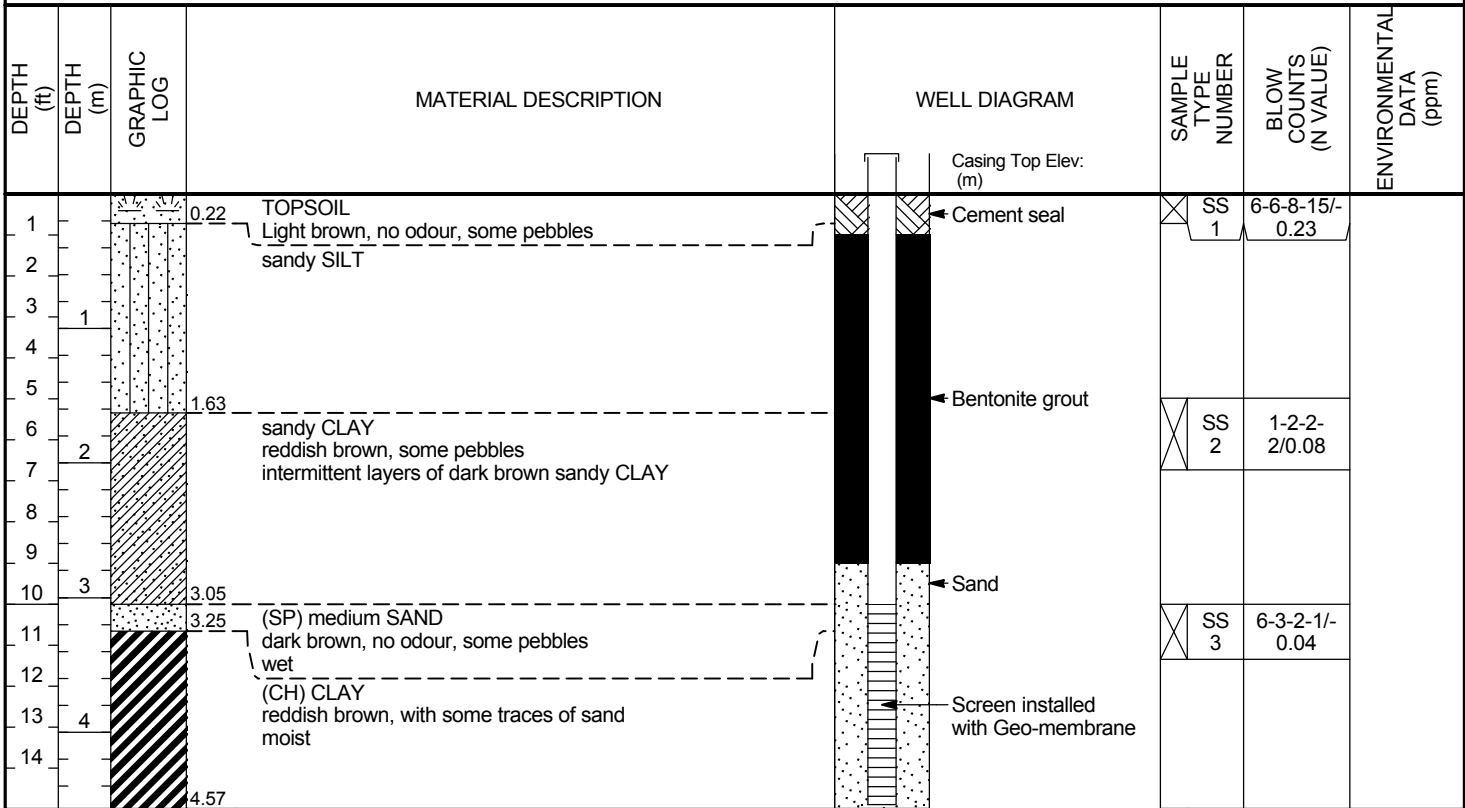
**PROJECT NUMBER** E09-439

**PROJECT LOCATION** Sault Ste. Marie, ON

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
34			(CH) CLAY reddish brown, no odour ( <i>continued</i> )		SS 8	0-0-2-2 (2)	
35							
36	11						
37			small traces of grey silt				
38							
39	12						
			12.19				

Bottom of borehole at 12.19 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells  
**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON  
**DATE STARTED** 1/6/10 **COMPLETED** 1/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)  
**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**  
**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---  
**LOGGED BY** AR/JR **CHECKED BY** TL **AT END OF DRILLING** ---  
**NOTES** Installed at Wright / Second Line **AFTER DRILLING** ---



Bottom of borehole at 4.57 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON

**DATE STARTED** 1/6/10 **COMPLETED** 2/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** AR/JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at Wright / Second Line **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1	0.08		TOPSOIL light brown, dry, poor recovery		SS 1	4-5-6-4/- 0.37	
2			sandy SILT light brown				
3	1						
4							
5	1.52		CLAY reddish brown with traces of grey silt		SS 2	2-2-2-3/- 0.15	
6							
7	2						
8							
9							
10	3						
11	3.05		moist CLAY reddish brown with traces of grey silt		SS 3	1-1-1-2 (2)	
12							
13	4						
14							
15	4.57		CLAY reddish brown with traces of grey silt		SS 4	0-0-1-1 (1)	
16							
17	5						
18							
19							
20	6						
21	6.10		CLAY reddish brown with traces of grey silt		SS 5	0-0-0-2 (0)	
22							
23	7						
24							
25	7.62		CLAY reddish brown with traces of grey silt		SS 6	0-0-1-2 (1)	
26							
27	8						
28							
29							
30	9						
31	9.14		CLAY reddish brown with traces of grey silt		SS 7	0-0-2-2 (2)	
32							
33	10						


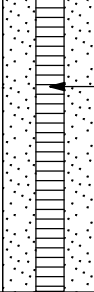
(Continued Next Page)

**CLIENT** Sault Ste. Marie Regional Conservation Authority

**PROJECT NAME** Zone of Influence Study for Municipal Wells

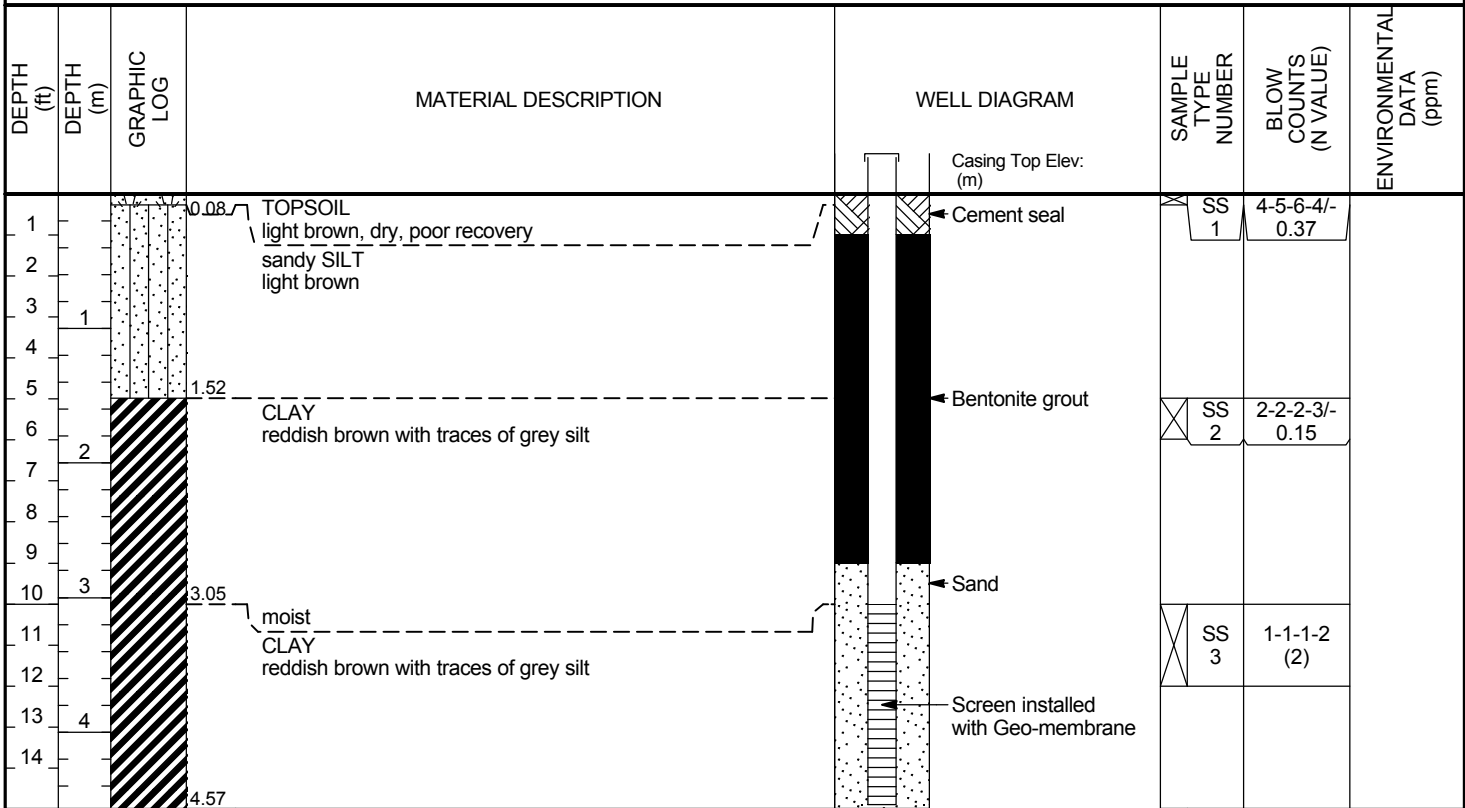
**PROJECT NUMBER** E09-439

**PROJECT LOCATION** Sault Ste. Marie, ON

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)			
34			CLAY reddish brown with traces of grey silt ( <i>continued</i> )							
35			10.67					Screen installed with Geo-membrane		
36	11		CLAY reddish brown with traces of grey silt						SS 8	0-1-1-2 (2)
37										
38										
39										
			12.19							

Bottom of borehole at 12.19 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells  
**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON  
**DATE STARTED** 2/6/10 **COMPLETED** 2/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)  
**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**  
**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---  
**LOGGED BY** AR/JR **CHECKED BY** TL **AT END OF DRILLING** ---  
**NOTES** Installed at Wright / Second Line **AFTER DRILLING** ---



Bottom of borehole at 4.57 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON


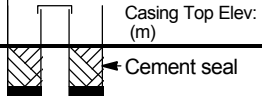








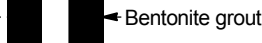













**DATE STARTED** 2/6/10 **COMPLETED** 2/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at Steelton East Site **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1			TOPSOIL brown silty sand, some pebbles, no odour		SS 1	5-6-7-3/- 0.12	
2	0.61		silty SAND brown, dry				
3			SAND brown, moist		SS 2	3-1-2-2/- 0.15	
4	1.57		CLAY reddish brown with layers of grey silt moist				
5	1.65		CLAY reddish brown with layers of grey silt moist				
6			CLAY reddish brown with layers of grey silt moist		SS 3	3-1-1-3 (2)	
7	3.05		CLAY reddish brown with layers of grey silt moist				
8			CLAY reddish brown with layers of grey silt moist				
9	4.57		CLAY reddish brown with layers of grey silt moist		SS 4	1-1-2-2 (3)	
10			CLAY reddish brown with layers of grey silt moist				
11	6.10		CLAY reddish brown with layers of grey silt moist		SS 5	1-1-2-3 (3)	
12			CLAY reddish brown with layers of grey silt moist				
13	7.62		CLAY reddish brown with layers of grey silt moist		SS 6	1-2-2-3 (4)	
14			CLAY reddish brown with layers of grey silt moist				
15	9.14		CLAY reddish brown with layers of grey silt moist		SS 7	1-1-3-4 (4)	
16			CLAY reddish brown with layers of grey silt moist				
17			CLAY reddish brown with layers of grey silt moist				
18			CLAY reddish brown with layers of grey silt moist				
19			CLAY reddish brown with layers of grey silt moist				
20			CLAY reddish brown with layers of grey silt moist				
21			CLAY reddish brown with layers of grey silt moist				

COLE TEMPLATE KRESIN BOREHOLE LOGS.GPJ GINT STD CANADA LAB.GDT 22/7/10

Cole Engineering Group  
 70 Valleywood Drive, Markham, ON  
 L3R 9R6  
 Telephone: 905-940-6161  
 Fax: 905-940-2064



**BOREHOLE NUMBER MW4-D**

**CLIENT** Sault Ste. Marie Regional Conservation Authority

**PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439

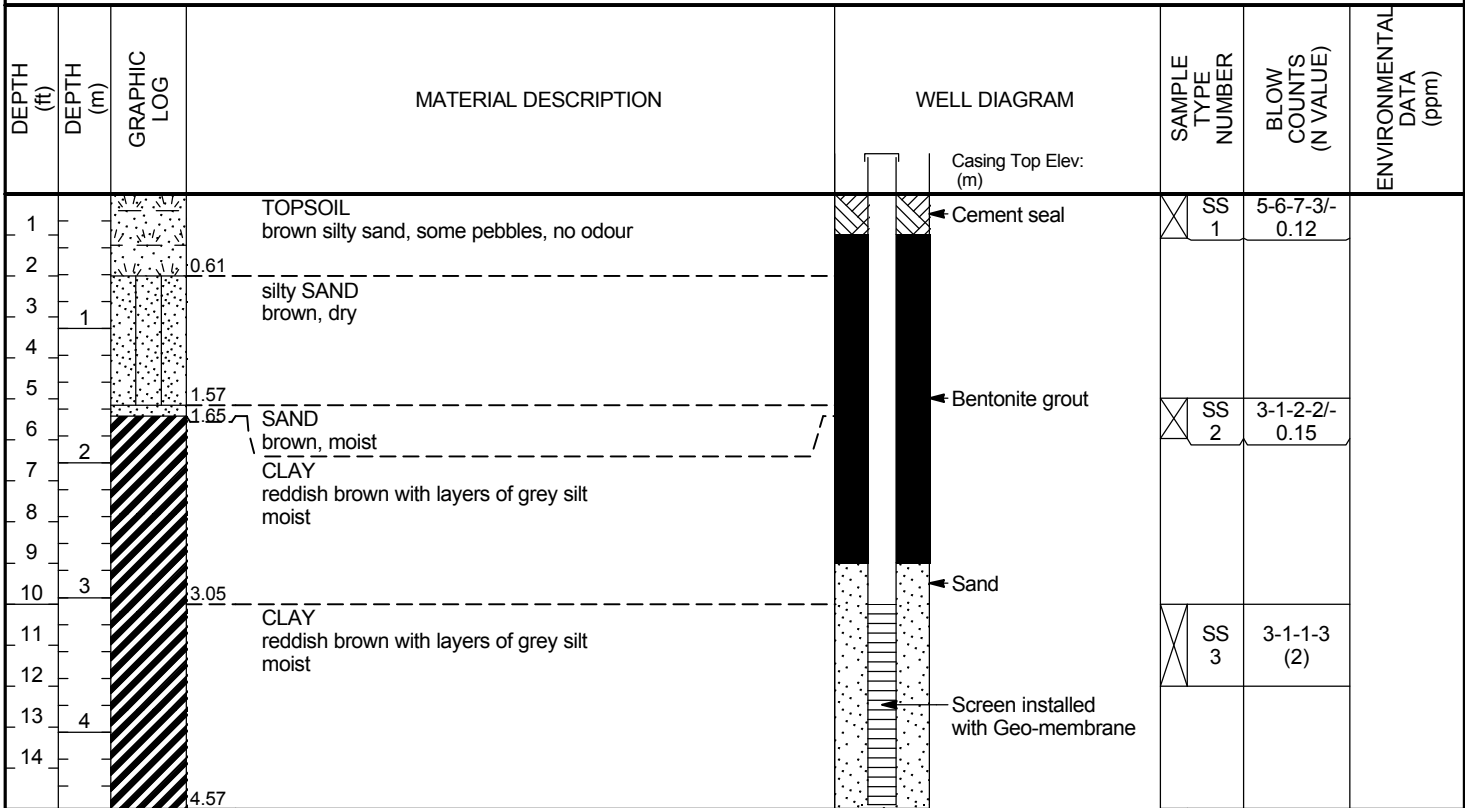
**PROJECT LOCATION** Sault Ste. Marie, ON

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)	
34			CLAY reddish brown with layers of grey silt moist <i>(continued)</i>		SS 8			
35			10.67					
36	11		CLAY reddish brown with layers of grey silt moist					Screen installed with Geo-membrane
37								
38								
39	12		12.19					

Bottom of borehole at 12.19 meters.



**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells  
**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON  
**DATE STARTED** 2/6/10 **COMPLETED** 2/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)  
**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**  
**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---  
**LOGGED BY** JR **CHECKED BY** TL **AT END OF DRILLING** ---  
**NOTES** Installed at Steelton East Site **AFTER DRILLING** ---



Bottom of borehole at 4.57 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON

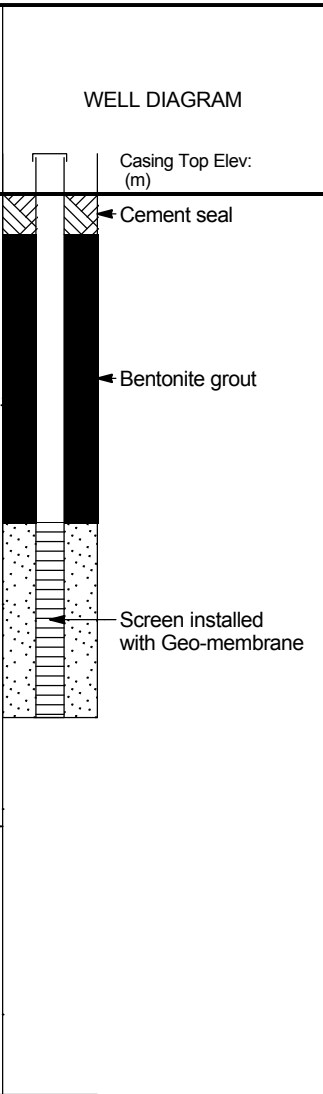
**DATE STARTED** 3/6/10 **COMPLETED** 3/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at Lorna Site. **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)	
1			sandy SILT dark grey, odour of compost/organic material	 <p>Casing Top Elev: (m)</p> <p>Cement seal</p> <p>Bentonite grout</p> <p>Screen installed with Geo-membrane</p>	SS 1			
2			very gravelly					
3	1							
4								
5	1.52							
6	1.57		SAND with traces of silt greyish brown, moist no odour, some pebbles			SS 2	5-6-5-2/0.01	
7	2		SILT brownish grey, moist, no odour,					
8								
9								
10	3							
11	3.05		SAND with traces of clay brown, moist, no odour			SS 3	2-1-1-1/-0.15	
12								
13	4							
14								
15	4.57							
16	4.70		SAND fine, brown, wet, no odour			SS 4	2-1-1-4/0.06	
17			SAND coarse, brown, wet, no odor traces of black, yellow and red sand particles					
18								
19								
20	6							
21	6.10		SAND medium, brown, wet, no odour			SS 5	0-1-1-2/-0.02	
	6.70							

Bottom of borehole at 6.70 meters.

Cole Engineering Group  
 70 Valleywood Drive, Markham, ON  
 L3R 9R6  
 Telephone: 905-940-6161  
 Fax: 905-940-2064



# BOREHOLE NUMBER MW5-S

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON

**DATE STARTED** 3/6/10 **COMPLETED** 3/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**

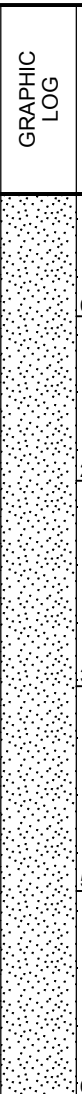
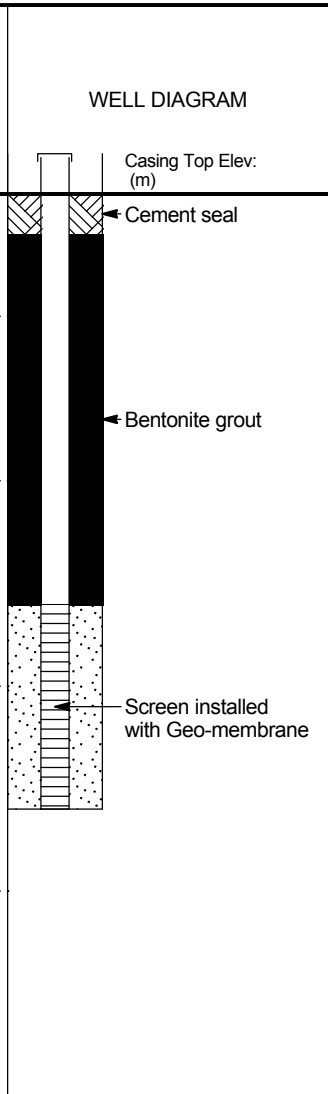
**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---

**LOGGED BY** JR **CHECKED BY** TL **AT END OF DRILLING** ---

**NOTES** Installed at Lorna Site. **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1			sandy SILT dark grey, odour of compost/organic material	<p>Casing Top Elev: (m)</p> <p>Cement seal</p> <p>Bentonite grout</p> <p>Screen installed with Geo-membrane</p>	SS 1		
2			very gravelly				
3							
4	1.52		SAND with traces of silt greyish brown, moist no odour, some pebbles		SS 2	5-6-5-2/0.01	
5			SILT brownish grey, moist, no odour,				
6	2.13		Bottom of borehole at 2.13 meters.				

**CLIENT** Sault Ste. Marie Regional Conservation Authority **PROJECT NAME** Zone of Influence Study for Municipal Wells  
**PROJECT NUMBER** E09-439 **PROJECT LOCATION** Sault Ste. Marie, ON  
**DATE STARTED** 3/6/10 **COMPLETED** 3/6/10 **GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 210 mm (Outer Dia.)  
**DRILLING CONTRACTOR** Abraflex Drilling **GROUND WATER LEVELS:**  
**DRILLING METHOD** Track Mounted Rig CME 65 **AT TIME OF DRILLING** ---  
**LOGGED BY** JR **CHECKED BY** TL **AT END OF DRILLING** ---  
**NOTES** Installed at Shannon Site. **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)		
1			(SP) SAND brown, coarse, with small pebbles		SS 1	1-1-1-2/- 0.37			
2									
3	1		0.91		(SP) SAND fine, brown, moist, no odour		SS 2	2-1-1-1/- 0.40	
4									
5									
6	2		2.13		(SP) SAND medium, greyish brown, moist, no odour		SS 3	0-0-0-1/- 0.40	
7									
8									
9									
10	3								
11									
12			3.66		(SP) SAND medium, brown, no odour		SS 4	0-2-2-3/- 0.02	
13	4								
14									
15									
16	5		5.18		(SP) SAND medium, brown, no odour		SS 5	0-0-0-0 (0)	
17									
18									
19	6								
20									
21									
22			6.71						

Bottom of borehole at 6.71 meters.

**CLIENT** Sault Ste. Marie Regional Conservation Authority      **PROJECT NAME** Zone of Influence Study for Municipal Wells

**PROJECT NUMBER** E09-439      **PROJECT LOCATION** Sault Ste. Marie, ON

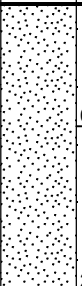
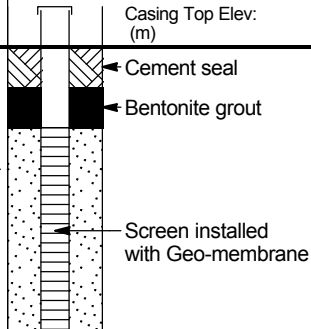
**DATE STARTED** 3/6/10      **COMPLETED** 3/6/10      **GROUND ELEVATION** \_\_\_\_\_      **HOLE SIZE** 210 mm (Outer Dia.)

**DRILLING CONTRACTOR** Abraflex Drilling      **GROUND WATER LEVELS:**

**DRILLING METHOD** Track Mounted Rig CME 65      **AT TIME OF DRILLING** ---

**LOGGED BY** JR      **CHECKED BY** TL      **AT END OF DRILLING** ---

**NOTES** Installed at Shannon Site.      **AFTER DRILLING** ---

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	ENVIRONMENTAL DATA (ppm)
1			(SP) SAND brown, coarse, with small pebbles		SS 1	1-1-1-2/- 0.37	
2							
3	1		0.91				
4			(SP) SAND fine, brown, moist, no odour				
5							
6	2		2.13			SS 2	2-1-1-1/- 0.40

Bottom of borehole at 2.13 meters.