Appendices

Contents

Appendix A: Location of wells with core analysis data

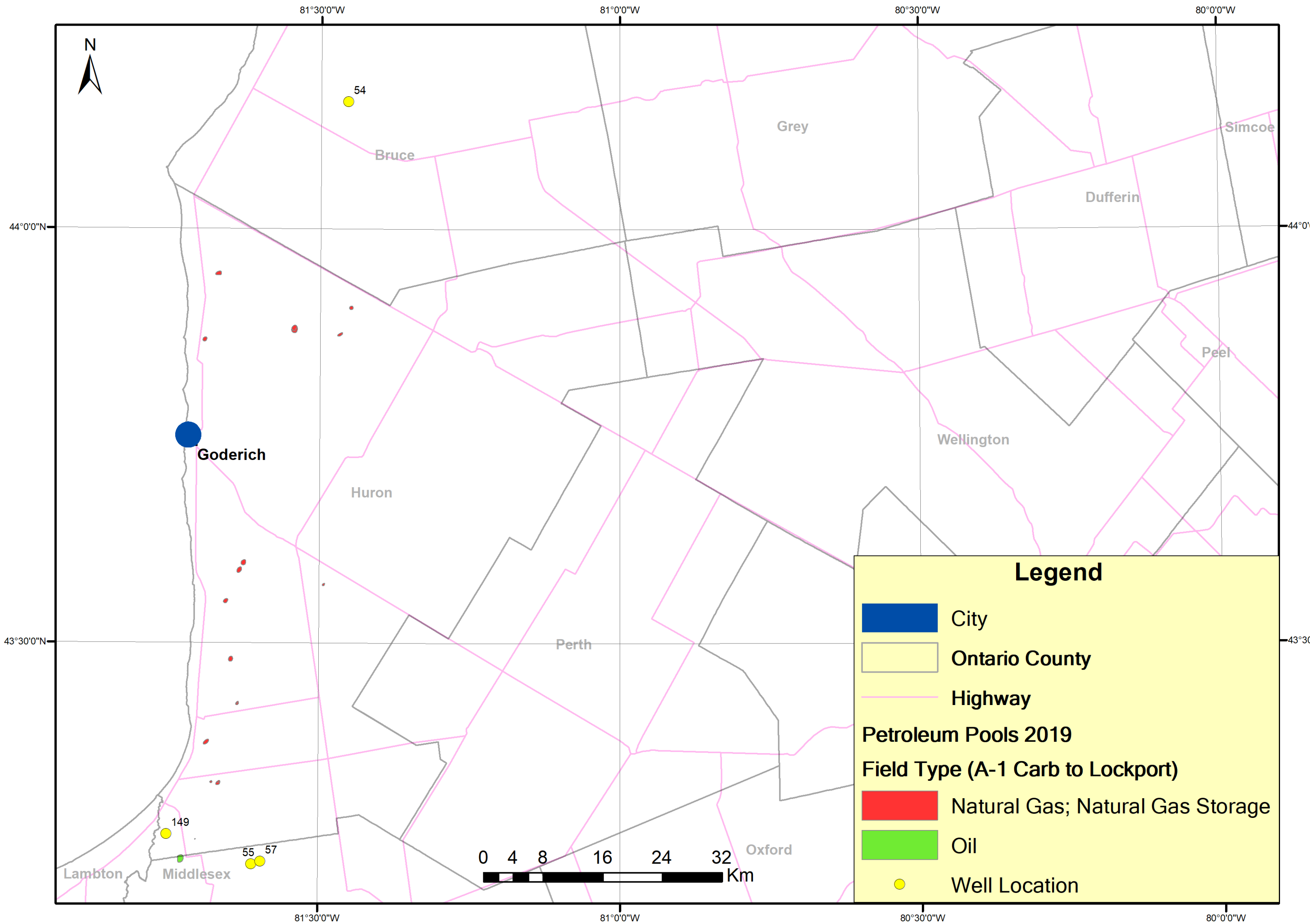

Figure A.1 Well locations in Huron-Bruce counties. See Appendix B for well ID.

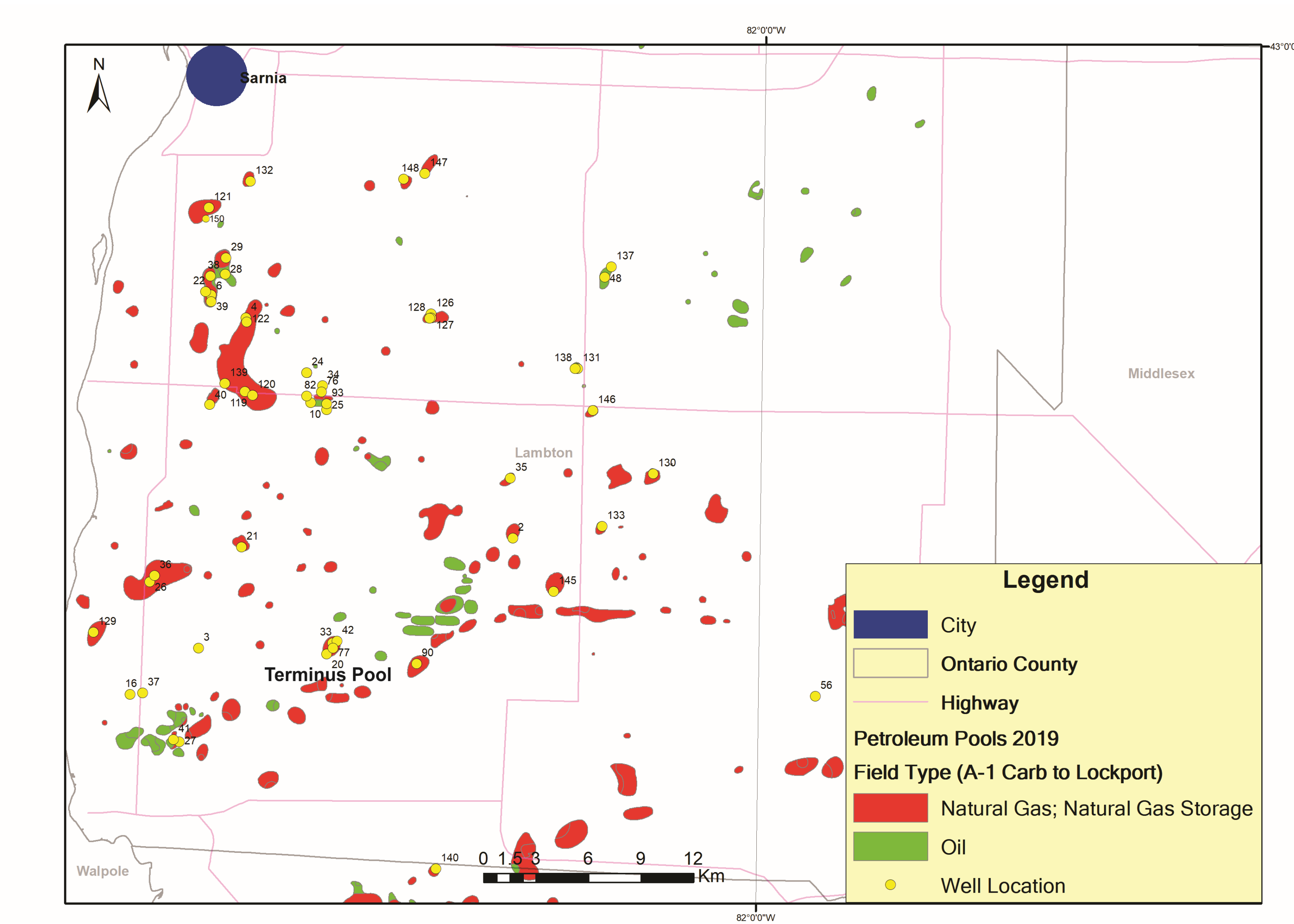

Figure A.2 Well locations in Lambton County. See Appendix B for well ID.

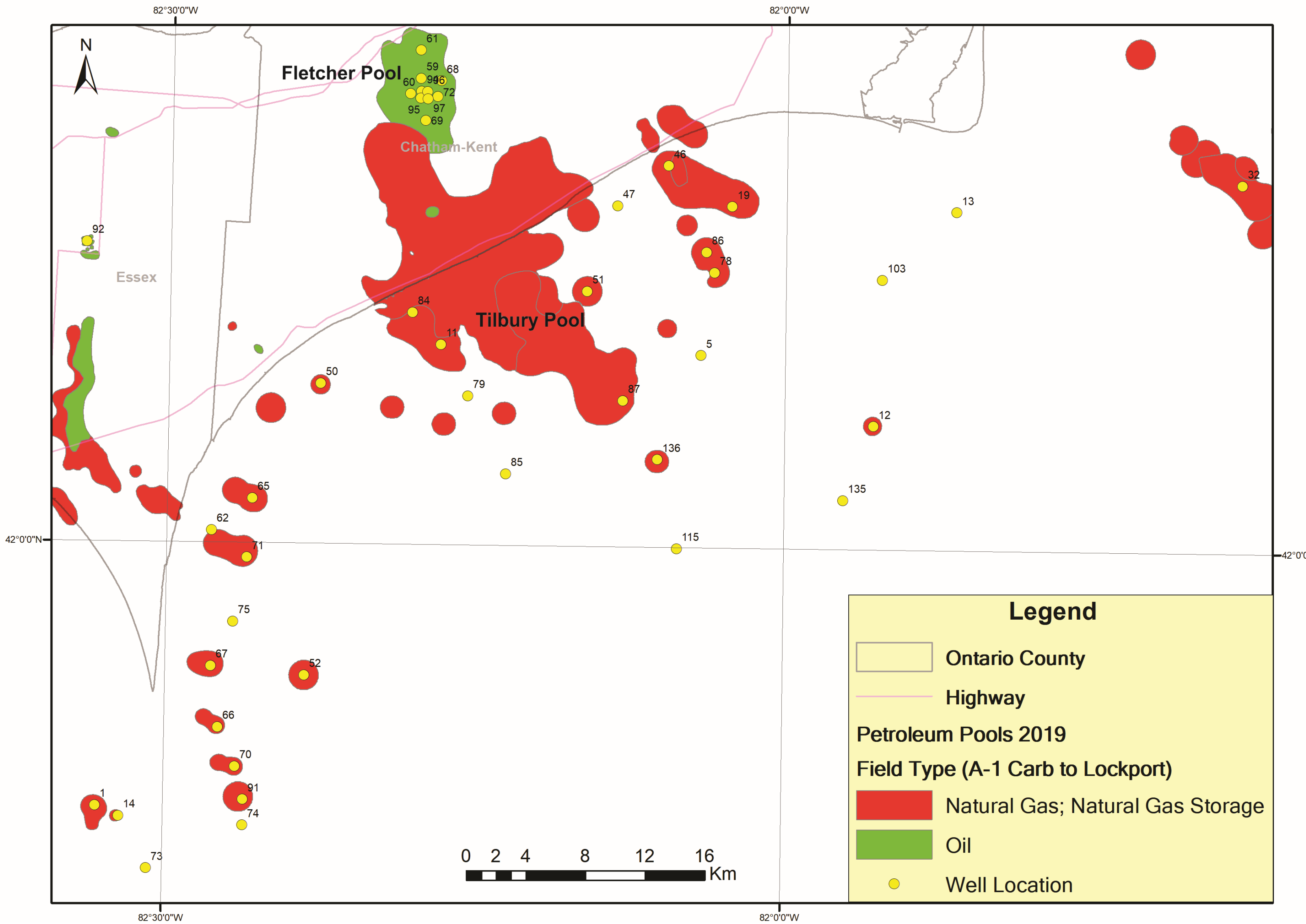

Figure A.3 Well locations in Chatham-Kent County and western Lake Erie. See Appendix B for Well ID.

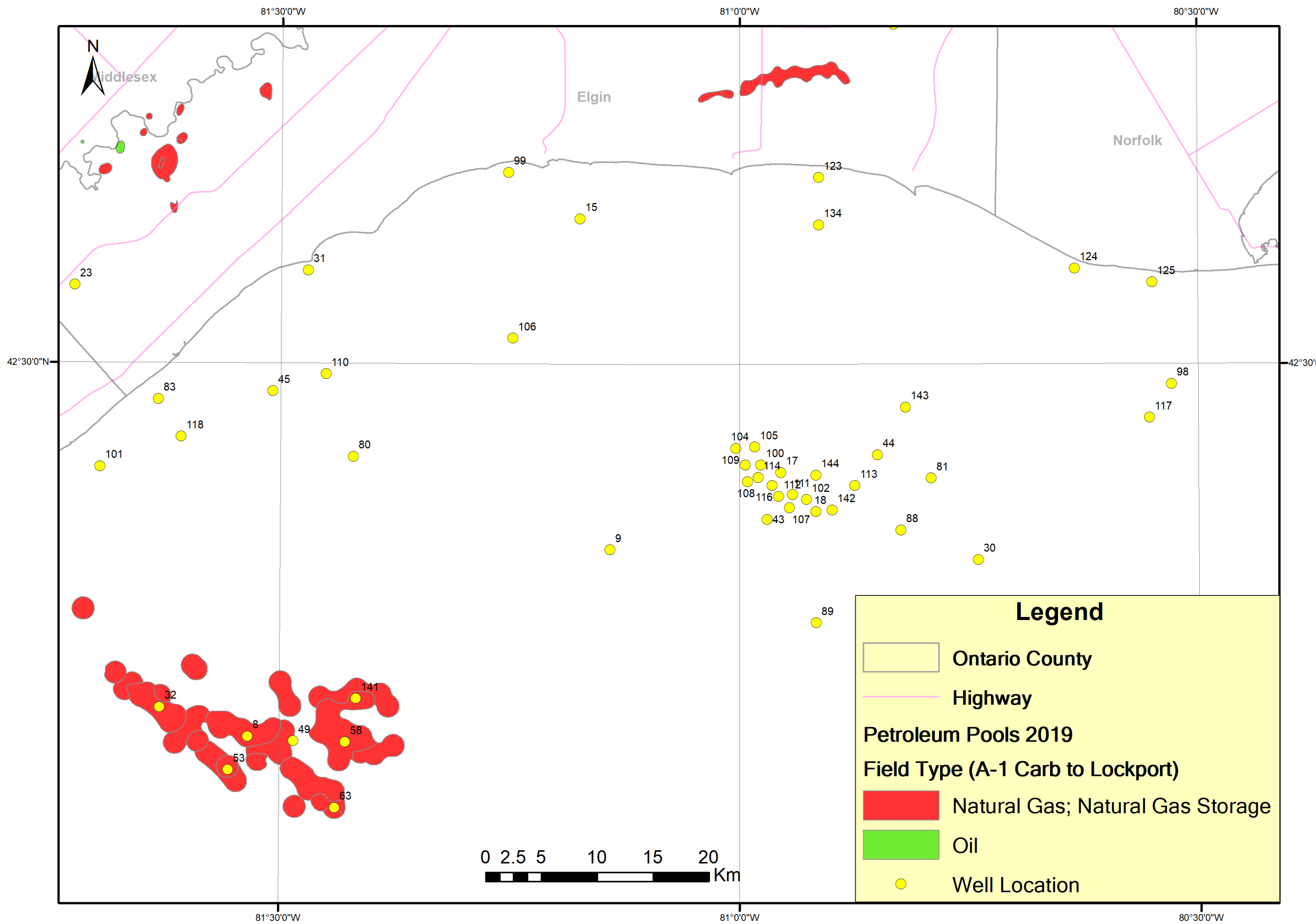

Figure A.4 Well Locations in Elgin County and western Lake Erie. See Appendix B for well ID.

Appendix B: Wells with core analysis data from A-1 Carbonate and Lockport Group, southern Ontario

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
1	T002394	Atlas Lake Erie No.6	Essex	Lake Erie				354	X	105	281.64	306.93	25.29	Density	GP - ABD
2	T003116	UNION BENTPATH NO.3	Lambton	Dawn	7	31	V			138, 138D	568	604.3	36.3	Gamma Ray Neutron Density	OBS - ACT
3	T001583	Imperial Oil No. 889 - K. Hetherington No. 2	Lambton	Sombra	6	11	IX			139	509.9	690.7	180.8	Gamma Ray Neutron Density	OSGS - ABD
4	F008231	Imperial Oil No. 430 - Colinville No. 12 - N. & C.W. Iden No. 3	Lambton	Moore	6	17	VIII			142	620	738.8	118.8		GP - ABD
5	T003105	Consumers' C.O.B.31990	Kent	Lake Erie				237	O	147	434.3	452.6	18.3	Gamma Ray Neutron Density	DH - ABD
6	T008748	Imperial 344 - R. Murray No. 1	Lambton	Moore	7	21	IX			152	655.32	794	138.68		OP - ABD
7	T002923	TOWNSEND UBR ET AL	Elgin	Bayham		114	NTR			654, 170	318.5	333.8	15.3	Gamma Ray Neutron Density	GS - ABD
8	T003646	Consumers' 13257	Kent	Lake Erie				222	R-1	172	509.6	528.8	19.2	Gamma Ray Neutron Density	GP - ACT
9	T003079	Consumers' 13123	Elgin	Lake Erie				160	Q	182, 182	467.9	486.5	18.6	Gamma Ray Neutron	GP - ABD
10	T002971	Consumers' 31868	Lambton	Moore	1	11	IV			192	648.3	656.23	7.93	Gamma Ray Neutron Density	OSGS - ABD
11	T002126	C.W.P.66-L-59	Kent	Lake Erie				234	L-3	221	327.7	408.4	80.7	Density	GP - ACT
12	T003108	Consumers' C.O.B.31994	Kent	Lake Erie				283	A-2	222	496.8	515.1	18.3	Gamma Ray Neutron Density	GP - ABD
13	T003117	Consumers' C.O.B.31995A	Kent	Lake Erie				226	L	223, 972	517.55	535.53	17.98	Gamma Ray Neutron Density	DH - ABD
14	T002508	Atlas Lake Erie No.7	Essex	Lake Erie				354	W	224	295	311.3	16.3	Density	GP - ABD
15	T002563	Consumers' Pan Am 13033	Elgin	Lake Erie				52	K	226	360.3	378.6	18.3	Gamma Ray Neutron Density	GP - ABD

Appendix B (continued)

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
16	T002738	Corden et al	Lambton	Sombra	6	5	VII			241	618.7	631.9	13.2	Gamma Ray Neutron	DH - ABD
17	T003235	Consumers' 13106	Elgin	Lake Erie				158	C	267, 267	408.1	426.4	18.3	Density Gamma Ray Neutron	GS - ABD
18	T003673	Consumers' 13273	Elgin	Lake Erie				158	K-1	305	403.25	412	8.75	Gamma Ray Neutron Density	GP - ABD
19	T002254	Midcon - Lake Erie No.16	Kent	Lake Erie				228	M	354	432.8	463.6	30.8	Density Gamma Ray	GS - ABD
20	T002488	Ram No. 4	Lambton	Sombra	6	23	IX			381	551.6	599.2	47.6	Gamma Ray Neutron Density	NGS - ABD
21	T002083	Imperial Oil No. 933 - Ozi & King No. 2	Lambton	Sombra	4	14	XIII			412	554.1	605.1	51	Gamma Ray Neutron Density	GS - ABD
22	T008747	Imperial Seckerton No. 6	Lambton	Moore	6	21	IX			523	702.87	793.39	90.52		OP - ABD
23	T001499	Canadian Kewanee No.2	Elgin	Aldborough		2	GO			533	487.7	524.6	36.9	Gamma Ray Neutron Density	BD - ACT
24	T001551	Canadian Delhi No. 36	Lambton	Moore	7	11	VI			535	648.6	659.9	11.3	Gamma Ray Neutron Density	OPGS - ACT
25	T001541	Canadian Delhi No. 34 - Brigden No. 4	Lambton	Moore	3	9	IV			536	641.9	654.1	12.2	Gamma Ray Neutron Density	GS - ABD
26	F004998	Imperial Oil No. 433 - Bickford No. 20	Lambton	Sombra	7	6	XII			539	550.2	689.2	139		GP - ABD
27	T000945	Imperial Oil No. 858 - Becher No. 77 - A. Van Dommelen	Lambton	Sombra	6	9	V			545	565.1	591	25.9	Gamma Ray Neutron Density	INJ - ABD
28	F008717	Imperial Oil No. 553 - Corunna No. 13 - J.L. Burns No. 3	Lambton	Moore	7	19	X			547	719.02	733.35	14.33	Gamma Ray Neutron	OP - ABD
29	T008860	Imperial Oil No. 419 - Corunna No. 11 - J.L. Burns No. 1	Lambton	Moore	2	19	X			557	702.87	747.67	44.8		OP - ABD
30	T002599	Consumers' Pan Am 13051	Elgin	Lake Erie				155	Y	565, 565	428.2	472.7	44.5	Gamma Ray Neutron Density	DH - ABD

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
31	T002618	Consumers' Pan Am 13054	Elgin	Lake Erie				106	D	974, 566	444.4	462.7	18.3	Gamma Ray Neutron	DH - ABD
32	T004000A	Consumers' 13351A (Cons.13363)	Kent	Lake Erie				223	H-3	567	498.65	521.21	22.56	Gamma Ray Neutron Density	GP - ACT
33	T004033	Ram No.2	Lambton	Sombra	1	23	IX			570	472.1	498.7	26.6	Density	OBS - ACT
34	T002434	Ram No. 1	Lambton	Moore	4	10	V			572, 572	640.4	689.5	49.1	Gamma Ray Neutron Density	GS - ABD
35	T003000A	Union Rosedale 1	Lambton	Enniskillen	8	9	II			578, 578D	494.1	666.6	172.5		NGS - ACT
36	T000210	Imperial Oil No. 702 - W.G. Young No. 4	Lambton	Sombra	5	6	XII			581	649.2	719.3	70.1	Neutron Gamma Ray	GPOS - ABD
37	T002878	Corden et al	Lambton	Sombra	6	6	VII			582	615.7	630.9	15.2	Gamma Ray Neutron	DH - ABD
38	T000315	Imperial Union	Lambton	Moore	8	21	X			584	733	785.2	52.2	Gamma Ray	OP - ABD
39	T008749	Imperial 656 - Seckerton #10	Lambton	Moore	1	21	VIII			592	723.6	760.8	37.2	Gamma Ray Neutron	OP - ACT
40	T002912	McClure	Lambton	Moore	3	20	IV			594	662.3	694.9	32.6	Gamma Ray Neutron	OP - ABD
41	T001623	Imperial Oil No. 849 - Becher No. 75 - H.A. Jonhston No. 3	Lambton	Sombra	3	9	V			597	566.9	588.3	21.4	Gamma Ray Neutron Density	OP - ABD
42	T002585	Ram No. 5	Lambton	Sombra	2	24	IX			604	497.4	594.1	96.7	Gamma Ray Neutron	NGS - ACT
43	T003204	Consumers' 13078	Elgin	Lake Erie				158	N	617, 617, 617D	399.9	535.6	135.7	Gamma Ray Neutron Density	DH - ABD
44	T002826	Consumers' Amoco 13105	Elgin	Lake Erie				120	U-2	649	391.7	410.6	18.9	Gamma Ray Neutron Density	GP - ABD
45	T002820	Consumers' Amoco 13103	Elgin	Lake Erie				112	J	651	477.3	501.1	23.8	Gamma Ray Neutron Density	GS - ABD
46	T002836	CIGOL D'Clute No.14	Kent	Lake Erie				229	J-2	657	426.7	445	18.3	Density	GP - ABD
47	T002824	CIGOL D'Clute No.16	Kent	Lake Erie				229	N	658	435.9	445	9.1	Density Gamma Ray	DH - ABD
48	T004132	RAM #38	Lambton	Enniskillen	4	17	X			671, 671D	556.9	632.2	75.3	Gamma Ray Neutron Density	OPGP - ACT

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
49	T003999	Consumers' 13350	Kent	Lake Erie				221	P	964, 675	516.3	533.4	17.1	Gamma Ray Neutron Density	OSGS - ABD
50	T004227	CWP TIL.76-C-73	Kent	Lake Erie				233	W	689	381	418.2	37.2	Gamma Ray Neutron Density	GP - ABD
51	T004228	C.W.P. TIL.76-L-72	Kent	Lake Erie				236	E-3	690	392.9	411.5	18.6	Gamma Ray Neutron Density	GP - ABD
52	T004820	Anschutz #4	Kent	Lake Erie				309	X	692	344.4	362.7	18.3	Gamma Ray Neutron Density	GP - ABD
53	T004206	Consumers' 13389	Kent	Lake Erie				222	X	697	506	522.7	16.7	Gamma Ray Neutron Density	GP - ABD
54	T004910	Amoco A-1	Bruce	Kincardine	2	31	V			701	331	337.8	6.8	Gamma Ray Neutron	DH - ABD
55	T004911	Amoco A-1	Middlesex	McGillivray	4	6	XVI			702	496	505	9	Gamma Ray Neutron Density	DH - ABD
56	T004912	AMOCO A-1	Lambton	Euphemia	8	18	IV			703	480	489	9	Gamma Ray	BWOP - ACT
57	T005155	Amoco	Middlesex	McGillivray	3	6	XV			704	486	495	9	Gamma Ray Neutron	DH - ABD
58	T005119	Consumers' 13624	Kent	Lake Erie				221	T-2	747	510.6	528.8	18.2	Gamma Ray Neutron Density	GP - ABD
59	T005605	Consumers' 33323	Kent	Tilbury East	7	2	VIII			750, 750D	413.4	440.7	27.3	Gamma Ray Neutron	OP - ABD
60	T005813	Consumers 33409	Kent	Tilbury East	2	4	IX			751, 751D	91.6	549.3	457.7	Compensated Neutron Formation Density	OBS - ABD
61	T005788	Consumers' 33406	Kent	Raleigh	3	1	VI			752	417.4	445	27.6	Compensated Neutron Formation Density	OBS - ABD
62	T005738	Pembina #4	Kent	Lake Erie				289	W	753	311	329.4	18.4	Gamma Ray Neutron Density	GS - ABD
63	T005730	Pembina #4	Kent	Lake Erie				244	I-4	754, 754	506	523	17	Compensated Neutron Formation Density	GP - ABD

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
64	T005732	Pembina - Canadian Superior #4	Kent	Lake Erie				409	M	755	297	315.5	18.5	Gamma Ray Neutron Density	OSGS - ABD
65	T005764	Pembina #2	Kent	Lake Erie				289	T-2	756	325	343.3	18.3	Compensated Neutron Formation Density	GP - ABD
66	T005752	Pembina - Canadian Superior #4	Kent	Lake Erie				353	H-4	757	305.5	324	18.5	Compensated Neutron Formation Density	GP - ABD
67	T005746	Pembina - Canadian Superior #2	Kent	Lake Erie				308	W-2	758	312	328.7	16.7	Gamma Ray Neutron Density	GP - ABD
68	T005789	Consumers' 33407	Kent	Tilbury East	5	1	IX			759, 759D	82.5	445.2	362.7	Compensated Neutron Formation Density	OBS - ABD
69	T005792	Consumers 33411	Kent	Tilbury East	2	9	NMR			760	404	543	139	Compensated Neutron Formation Density	OBS - ABD
70	T005731	Pembina Et Al	Kent	Lake Erie				353	S-2	765	288	307.6	19.6	Compensated Neutron Formation Density	GP - ABD
71	T005734	Pembina - Canadian Superior #4	Kent	Lake Erie				308	B-4	767	308.1	326.4	18.3	Compensated Neutron Formation Density	GP - ABD
72	T005791A	Consumers' 33408 A	Kent	Tilbury East	2	2	X			772	94.5	460	365.5	Compensated Neutron Formation Density Formation	OBS - ABD
73	T005925	Pembina #3	Essex	Lake Erie				376	J	778	309.5	327.8	18.3	Compensated Neutron Formation Density	OSGS - ABD
74	T005983	Pembina Et Al	Kent	Lake Erie				377	B	779	316	334.1	18.1	Compensated Neutron Formation Density	DH - ABD

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
75	T005990	Pembina - Canadian Superior #3	Kent	Lake Erie				308	L	780	348	363.7	15.7	Compensated Neutron Formation Density	DH - ABD
76	T002669	Consumers' 26566	Lambton	Moore	5	10	V			812	634.6	652.9	18.3	Gamma Ray Neutron Density	DH - ABD
77	T002481	Ram No. 3	Lambton	Sombra	4	23	IX			818	501.1	602	100.9	Gamma Ray Neutron Density	OBS - ABD
78	T002548	C.W.P.68 L 71	Kent	Lake Erie				228	X	819	429.8	481.9	52.1	Gamma Ray Neutron Density	GP - ABD
79	T002528	C.W.P.68-L-67	Kent	Lake Erie				234	U	820	385.6	403.9	18.3	Gamma Ray Neutron Density	GS - ABD
80	T002339	Consumers' Pan Am 13008	Elgin	Lake Erie				113	U	826	496.2	514.5	18.3	Gamma Ray Neutron Density Gamma Ray Neutron	DH - ABD
81	T002418	Consumers' Pan Am 13023	Elgin	Lake Erie				156	C	836, 836, 836D	423.6	523.8	100.2	Gamma Ray Neutron Density	GS - ABD
82	T002477	Consumers' 16285	Lambton	Moore	7	11	V			840, 840	639.78	698.3	58.52	Gamma Ray Neutron Density	DH - ABD
83	T002570	Consumers' Pan Am 13048	Elgin	Lake Erie				111	H	842, 842D	484.6	502.9	18.3	Gamma Ray Neutron Density	OS - ABD
84	T001788	C.W.P.65-L-51	Kent	Lake Erie				234	G-4	843	322.2	419.7	97.5	Gamma Ray Neutron Density	GP - ABD
85	T002804	C.W.P.Canso 69 LT 2	Kent	Lake Erie				286	N	844	380.1	398.4	18.3	Gamma Ray Neutron Density	GS - ABD
86	T002547	C.W.P.68 L 70	Kent	Lake Erie				228	X-2	852	438	456.3	18.3	Gamma Ray Neutron Density	GP - ABD
87	T002540	C.W.P.68-L-69	Kent	Lake Erie				236	W-3	853	381	399.3	18.3	Gamma Ray Neutron Density	GP - ACT
88	T002565	Consumers Pan Am 13039	Elgin	Lake Erie				156	P	857, 857	426.7	445	18.3	Gamma Ray Neutron Density	GP - ABD

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
89	T002333	Consumers' Pan Am 13002	Elgin	Lake Erie				185	O	858, 630, 858D, 630D	435.9	463.3	27.4		DH - ABD
90	T006517	Union Dawn 247	Lambton	Dawn	5	19	I			873	483.7	544.3	60.6	Gamma Ray Neutron Density	NGS - ACT
91	T006299	Pembina #1	Kent	Lake Erie				353	V	875	315	333.3	18.3	Compensated Neutron Formation Density	GS - ABD
92	T006383	Brett Gagnier No. 1	Essex	Tilbury West	2	5	XI			888, 888D	352.7	359.4	6.7	Gamma Ray Neutron Density	OP - ABD
93	T006870	Ram No. 81	Lambton	Moore	2	9	IV			889	637	644.2	7.2	Compensated Neutron Formation Density	OP - ABD
94	T006104	Consumers'40003	Kent	Tilbury East	3	3	IX			937, 937D	408	446.6	38.6	Neutron Density	OP - ABD
95	T006097	Consumers' 40001	Kent	Tilbury East	5	4	IX			938, 938D	407	438.3	31.3	Compensated Neutron Formation Density	OP - ABD
96	T006096	Consumers 40000	Kent	Tilbury East	5	3	IX			939, 939D	411	472	61	Compensated Neutron Formation Density	OP - ABD
97	T006105	Consumers 40002	Kent	Tilbury East	7	3	IX			940, 940D	401	445	44	Neutron Density Gamma Ray Neutron	OP - ABD
98	T007126	Consumers' 13905	Norfolk	Lake Erie				124	B-3	951, 951	338	352.7	14.7	Density Neutron Gamma Ray	GP - ABD
99	T002812	Consumers' Amoco 13076	Elgin	Lake Erie				51	A	957	66.1	496.5	430.4	Gamma Ray Neutron	STR - ABD
100	T003245	Consumers' 13120	Elgin	Lake Erie				119	X-3	958, 307	397.8	410.3	12.5	Gamma Ray Neutron Density	GP - ABD
101	T002815	Consumers' Amoco 13085	Kent	Lake Erie				167	B	959, 653	524.6	542.8	18.2	Gamma Ray Neutron Density	DH - ABD
102	T003434	Consumers' 13165	Elgin	Lake Erie				158	J-3	960, 342	390.1	413	22.9	Gamma Ray Neutron Density	GP - ABD

Appendix B (continued)

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
103	T003106	Consumers' C.O.B.31991	Kent	Lake Erie				238	A	961, 145	495.3	508.4	13.1	Gamma Ray Neutron Density	DH - ABD
104	T003244	Consumers' 13111	Elgin	Lake Erie				118	U-1	962, 335	406	424.3	18.3	Gamma Ray Neutron Density	GP - ABD
105	T003205	Consumers' 13079	Elgin	Lake Erie				119	P-4	963, 232	393.8	416.7	22.9	Gamma Ray Neutron Density	GP - ABD
106	T002821	Consumers' Amoco 13104	Elgin	Lake Erie				103	P	965, 655	409.9	428.2	18.3	Gamma Ray Neutron Density	DH - ABD
107	T003239	Consumers' 13109	Elgin	Lake Erie				158	I-3	269, 269, 968	402.6	420.6	18	Gamma Ray Neutron Density	GP - ACT
108	T003271	Consumers' 13135	Elgin	Lake Erie				158	E	134, 134, 969	403.9	412.1	8.2	Gamma Ray Neutron Density	GS - ABD
109	T003243	Consumers' 13110	Elgin	Lake Erie				119	Y-3	244, 244, 970, 970	395.3	425.8	30.5	Gamma Ray Neutron Density	GP - ABD
110	T002560	Consumers' Pan Am 13030	Elgin	Lake Erie				113	C	971, 568	461.8	480.1	18.3	Gamma Ray Neutron Density	DH - ABD
111	T003671	Consumers' 13272	Elgin	Lake Erie				158	I-2	973, 462	394.4	413	18.6	Gamma Ray Neutron Density	GP - ABD
112	T003274	Consumers' 13138	Elgin	Lake Erie				158	H	440, 440, 977	399.3	415	15.7	Gamma Ray Neutron Density	GS - ABD
113	T003077	Consumers' 13121	Elgin	Lake Erie				157	C-4	187, 187, 978	413.6	431.9	18.3	Gamma Ray Neutron Density	GP - ABD
114	T003675	Consumers' 13275	Elgin	Lake Erie				158	D	351, 351, 979	399	405.4	6.4	Gamma Ray Neutron Density	GS - ABD
115	T002840	Chiefco Ont-Hio Blucr Lake Erie No.5	Kent	Lake Erie				285	U	980, 606	472.7	483.4	10.7	Gamma Ray Neutron Density	DH - ABD
116	T003674	Consumers' 13274	Elgin	Lake Erie				158	C-3	413, 413, 981	399.3	409.6	10.3	Gamma Ray Neutron Density	GP - ACT
117	T003415	Consumers' 13154	Norfolk	Lake Erie				124	N	449, 449, 982	363	381	18	Gamma Ray Neutron Density Neutron	GS - ABD

Appendix B (continued)

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
118	T002340	Consumers' Pan Am 13009	Elgin	Lake Erie				111	S	983, 270	512.7	549.2	36.5	Gamma Ray Neutron Density	OS - ABD
119	T007380	Tecumseh Kimball-Colinville No. 54	Lambton	Moore	8	17	V			984, 984D	652.5	725.5	73	Gamma Ray Neutron Density	OBS - ACT
120	T007381	Tecumseh Kimball-Colinville No. 55	Lambton	Moore	7	16	V			991	645	680.5	35.5	Gamma Ray Neutron Density	OBS - ACT
121	T007292	Tec. Dow 7	Lambton	Moore	2	21	XII			992	684	774.4	90.4	Compensated Neutron Formation Density	OBS - ABD
122	T003400	Tecumseh Kimball-Colinville No. 35	Lambton	Moore	7	17	VIII			993	603.2	612.34	9.14	Density Gamma Ray Neutron	NGS - ACT
123	T002759	Consumers' Pan Am 13057	Elgin	Lake Erie				56	E	999	76.2	426.38	350.18	Gamma Ray Neutron	STR - ABD
124	T002803	Consumers' Amoco 13102	Norfolk	Lake Erie				96	D	1001	100.6	473.7	373.1	Gamma Ray Neutron	STR - ABD
125	T002760	Consumers' Amoco 13061	Norfolk	Lake Erie				95	H	1002	113.7	471.5	357.8	Gamma Ray Neutron	STR - ABD
126	T007460	Union Enniskillen 60	Lambton	Enniskillen	1	1	VIII			1003	548.8	616.5	67.7	Gamma Ray Neutron Density	NGS - ACT
127	T007450	Union Enniskillen 54	Lambton	Enniskillen	4	1	VIII			1004	624	641.5	17.5	Density Neutron Neutron	OBS - ACT
128	T007457	Union Enniskillen 55	Lambton	Enniskillen	4	1	VIII			1005	556	643.2	87.2	Density Gamma Ray Neutron	OBS - ABD
129	T007499	Union Sombra 11	Lambton	Sombra	2	1	IX			1006	540	592.2	52.2	Neutron Density Gamma Ray Density	NGS - ACT
130	T007551	ICG 2	Lambton	Enniskillen	4	22	II			1007	503	525	22	Gamma Ray Neutron Density	NGS - ACT
131	T007673	Ram 101	Lambton	Enniskillen	1	15	VI			1014, 1014D	564	610.5	46.5	Compensated Neutron Formation Gamma Ray	OPGP - ACT
132	T007706	Dow Sarnia 3	Lambton	Sarnia	2	8	BA			1025, 1025	670	758.7	88.7	Compensated Neutron Formation Density	NGS - ACT

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
133	T007795	Edys Mills 1	Lambton	Dawn	3	32	VIII			1026, 1026	481.4	526.1	44.7	Gamma Ray Neutron Density	NGS - ACT
134	T005337	Consumers' 13707	Elgin	Lake Erie				56	P-2	1027	325	343.4	18.4	Gamma Ray Neutron Density	GP - ABD
135	T008336	West Central	Kent	Lake Erie				283	R-1	1047	490	508.1	18.1	Gamma Ray Neutron Density	DH - ABD
136	T008335	West Central	Kent	Lake Erie				285	I-4	1048	398.5	414.1	15.6	Gamma Ray Neutron Density	GS - ABD
137	T008471	CanEnerco No. 3	Lambton	Enniskillen	7	18	XI			1050, 1050D	579	633.4	54.4	Gamma Ray Neutron Density	OPGP - ACT
138	T008468	CanEnerco #2	Lambton	Enniskillen	2	15	VI			1053, 1053D	545	612	67	Gamma Ray Compensated Neutron Formation Density	OPGP - ACT
139	T008427	Tecumseh Kimball-Colinville No. 56	Lambton	Moore	4	19	V			1055	656	669.9	13.9	Compensated Neutron Formation Density Gamma Ray Neutron	OBS - ACT
140	T008622	CanEnerco #4	Kent	Chatham	7	17	XII			1058, 1058D	429	456	27	Gamma Ray Neutron Density	NGS - ABD
141	T008529	Pembina West Central	Kent	Lake Erie				221	J-1	1061	495	531	36	Density Gamma Ray Neutron	GS - ABD
142	T002587	Consumers' Pan Am 13019	Elgin	Lake Erie				157	N	823, 1065, 1065D, 823D	403.3	421.5	18.2	Gamma Ray Neutron Density	GP - ABD
143	T002396	Consumers' Pan Am 13020	Elgin	Lake Erie				121	O	816, 1067, 816D, 1067D			0	Gamma Ray Neutron Density	DH - ABD
144	T002524	Consumers' Pan Am 13037	Elgin	Lake Erie				158	A-1	976, 627, 856, 1068, 976	416.1	439.5	23.4	Gamma Ray Neutron	GP - ACT
145	T008854	Union Bentpath East 2	Lambton	Dawn	2	26	VI			1083	485.75	554.3	68.55	Gamma Ray Neutron	NGS - ACT
146	T008888	Union Oil City 1	Lambton	Enniskillen	7	17	V			1084	523	553.2	30.2	Gamma Ray Neutron Density	NGS - ACT

Appendix B (continued)

ID	licence	Well Name	county	township	tract	lot	conc	le_block	le_tract	core_number	core_top (m)	core_bottom (m)	core_thickness (m)	logs	status
147	T008929	Union Mandaumin 4	Lambton	Sarnia	3	1	II			1087	624.5	696.5	72	Gamma Ray Compensated Neutron Formation Density	STR - ABW
148	T008958	Union Bluewater 1	Lambton	Sarnia	5	3	II			1088	625.5	730	104.5	Compensated Neutron Formation Density Gamma Ray Neutron	NGS - ACT
149	T008954	Daybreak et al Ausable No. 2	Huron	Stephen	5	11	XXII			1089	457	583	126	Gamma Ray Neutron	GP - ABW
150	T007209	Tec. Dow 4	Lambton	Moore		21	XII			996	750	833	83	Gamma Ray Neutron	OBS- ABW

Appendix C: Geology QA/QC and Data Entry Protocol

The following instructions are the internal procedure followed by staff of the Oil Gas and Salt Resources Library to review formation top picks for this project.

Before beginning the editing process for the Lockport Project, QGIS layer must be properly set-up to allow for multiple spreadsheets to become attribute tables of the spatial files. This allows the geologist to be able to edit and save any data directly to the server and limits the number of files used during the project. Once the layers for the project have been added to the QGIS Map project, time should be taken to set-up the base layers and symbologies. Be sure to colour code completed and uncompleted wells to avoid any confusion.

The Lockport schema on the QGIS database contains the shapefiles for editing. They include: 150 cored wells with core analysis plotted geographically in North America UTM83 coordinate system.

When editing the shapefiles, care should be taken to standardize information being entered into the columns (this ensures accurate sorting and use post-project). Use the updated shapefiles to strategize next wells to pick. Right-click layer for editing and select *Open Attribute Table.* This is the spreadsheet that accompanies the data.

Always ensure you are reviewing the location of the wells you are updating, enter your changes into the shapefile right away so the other geologists can compare.

The following steps outline the process of properly editing and making formation top picks. These steps are to be followed in order to ensure the accuracy of any confirmed or updated picks and any data entry.

Step 1: Retrieving Data
Once a set of wells is selected, retrieve all data to QA them including sample trays, rock cores and logs (gamma ray and neutron density). This data can be located in the shapefile and on our website by searching through Well Cards. Be sure to check the most recent Geology QA Table found on the server to determine the correct QA code to use (Table 4.1).

Step 2: Well editing
Start working through and repicking the top of formations (Top of A-2 Shale – Rochester). Specific criteria are to be followed for each formation. This will be outlined in the next section of the procedure. Use both cores/samples and logs to confirm/revised formational top picks. Keep in mind that logs are more reliable as samples can be lost / dissolved in the drilling process.

Step 3: Entering data
As you make your picks, enter them into the attribute table on QGIS by following the proper editing process by editing the following columns:

1) **geologist** – Indicates which geologist is responsible for the edit, text field
2) **opds** – Indicates data-entry stage, text field

a. *<blank>* -- indicates no confirmation or updates have occurred and no changes are necessary for MNRF picks in OPDS
   - *Pending* – this indicates a change or confirmation has taken place and changes need to be reflected in OPDS
   - *Complete* – this indicates the data changes and QA codes have been entered into OPDS

3) <u>**comments** – Describes the changes that have occurred, text field</u>
   a. If the *opds* field is populated, comments are required. The comments should specify details in the following format: **<confirmed/updated> <start formation name>-<end formation name> using <poor/null><logs/samples/core, select all that apply><(missing interval: top-bottom)>**
   b. Note that the comment field should **always list values in metres.**
   c. Logs for this project are assumed to be gamma ray or neutron logs, only specify type if a different log type than the assumed type.
   d. For example: updated A-2 Shale to Rochester using logs and poor samples (missing interval: 120-140m)
   e. The range of formations should always be inclusive, and geologists should ensure to check that a new top is not below the next formations top

4) <u>**EditDate** – Describes the date the edit was made, date field</u>
   a. YYYY-MM-DD
   b. Specific formation picks will also be edited in the attribute table (tops in metres), ensure that if they are changed the changes are reflected in the *comments* column as well as in the QA codes (which should be edited for each confirmation or update).

5) <u>**Entering Picks**</u>
   a. Formation top picks will be edited for each formation specified by the geologist in the comments field.
   b. Use the units used in your data (logs and cores/samples).
   c. Be sure to enter your top pick value in the metre column and delete the value in the feet column, or vice versa. Do this to ensure consistency and to avoid future data entry error into OPDS. Enter your QA code following your pick.
   d. Picks made with uncertainty must be QA'ed with the proper code. Make note of your pick and the criteria used to make it.
   e. Be sure to QA any NULL formations to inform the user that the non-existence of a particular formation has been verified by a geologist as this is important for different research objectives.
   f. Save after each edit and ensure the OPDS column specifies "*Pending*" so the other geologist may see your progress .

6) <u>**After entering picks**</u>
   a. Refresh layers after each set of wells to see what the other geologist has completed and is currently working on
   b. Always communicate with each other about where you will be picking next and what you have completed to ensure consistency. Be sure to work out problems together as well

c. For already QA'ed wells in which you did not agree with certain picks, be sure to have them reviewed by a professional geologist once a week (Fridays)

d. Once picks are complete, the geologist who made the picks must enter them in OPDS to avoid any data errors

Appendix D: Formation Top Pick Criteria

D.1 Area 1 (Inter-pinnacle Karst Area)

In the inter-pinnacle region of Area 1 the Gasport Formation sits disconformably on the Lions Head Formation in the north (including Bruce and Huron counties) and the Rochester Formation in the southern portion of this area (Brunton 2009; Brunton et al. 2012; Brunton and Brintnell 2020). The thickness of the Lockport Group ranges between 25–30m. The Guelph Formation is overlain by A-0 Carbonate and A-1 Evaporite. Two reference wells for formation top pick criteria using well logs and drill core are presented in Figure D.1 and D.2.

Lions Head Formation

The Lions Head Formation is present in northern Bruce County. It consists of light grey to grey-brown, fine-crystalline dolostone with local chert nodules. When the Lions Head is present. It is overlain by the clean crinoid-rich carbonates of Gasport Formation, with a gradual decrease in gamma-ray response. In drill cuttings, grain size increases upwards into the Gasport with a colour change to light grey to white . In drill core, the Lions Head Formation is darker grey than the Gasport Formation, more finely crystalline, has a more elevated gamma signature, and is thinly bedded – quite distinctive from units below and above.

Rochester Formation

The Rochester Formation consists of dark grey to black, calcareous shale. It is readily picked in geophysical logs by its elevated response on gamma-ray logs. In drill cuttings and core, the top is picked at the topmost occurrence of the shaly carbonates.

Gasport Formation

The Gasport Formation consists of coarsely crystalline, blueish grey to pinkish grey dolostone and dolomitic limestone, with a very low gamma-ray response. In drill cuttings, Gasport Formation is dominated by white to light grey, coarsely crystalline crinoidal grainstone. In cored wells in this area, the Gasport Formation is dominated by bluish grey, bioturbated crinoidal grainstone. Stylolites are common. The stylolite pattern is usually peaked in the Gasport Formation compared to the horsetail stylolite pattern in the Goat Island Formation. The top is readily picked in geophysical logs where the lower gamma-ray response of the Gasport Formation changes upward into the higher response of the Goat Island Formation.

Goat Island Formation

The Goat Island Formation consists of dark to light grey, very fine to fine crystalline, argillaceous dolostone. It has moderately elevated gamma-ray response relative to the underlying Gasport Formation and the overlying Guelph Formation. In geophysical logs the top is picked at the inflection point of a relatively sharp upward decrease in gamma ray intensity. In cuttings, formational top is placed where the grey dolostone of the Goat Island changes into the brown dolostone of the Guelph. In drill core, the top of the Goat Island Formationis variably karstic with brown dolostone rubble infilled into the light grey dolostone matrix of the Goat Island Formation. The lower Goat Island Formation is light grey to white, finely crystalline, bioturbated grainstone. It is similar to the crinoidal grainstones in the Gasport Formation, but it can be recognized by its more intensely bioturbated nature with less common and generally smaller crinoid pluricolumnals and the slightly higher response in the gamma-ray log and lower response in neutron porosity log, in part due to presence of more clay and diagenetic minerals phases.

Guelph Formation

The inter-pinnacle Guelph Formation consists of light to medium brown, highly karstic and brecciated carbonates. It has a very subdued expression on the gamma-ray log. Its upper contact with the overlying A-0 Carbonate can be distinguished at the upward positive gamma-ray transition. In drill cuttings, the light brown carbonates of Guelph Formation changes upwards into the dark grey laminites of the A-0 Carbonate Formation. The top of the Guelph Formation shows strong dissolution and brecciated features. Most of the formation is a karstic rubble of pebble-sized dolostone fragments in a dolomudstone matrix.

A-0 Carbonate Unit

A-0 Carbonate Unit is a dark brown, thinly laminated, bituminous carbonate underlying the A-1 Evaporite and overlying the karstic dolostone of the Guelph Formation. It averages 2 m thick in Ontario. In previous work, it was regarded as the uppermost facies of the Guelph Fm and was not picked. It has a relative higher gamma-ray value and lower neutron porosity compared to that of the Guelph Formation and A-1 Evaporite. In drill core, the crinkly laminated nature of the dolomites can be distinguished from the underlying highly karstic dolostones of the Guelph Fm. In well logs the top is picked at the inflection point where the carbonate changes into the non-responsive A-1 Evaporite.

A-1 Evaporite Unit

The A-1 Evaporite Unit is comprised of beds of anhydrite with minor dolostone and halite. It has a low gamma-ray response and a high neutron porosity response. The upper contact is picked at the contact with the overlying limestones and dolostones of the A-1 Carbonate.

A-1 Carbonate Unit

The A-1 Carbonate consists of tan-grey to black, finely crystalline, variably organic-rich limestone and/or dolostone. Where the overlying A-2 Evaporite is present, the top of the A-1 Carbonate can easily be picked at the sharp transition upward into the anhydrite and/or halite beds of the A-2 Evaporite, with a decreased response on gamma-ray logs.

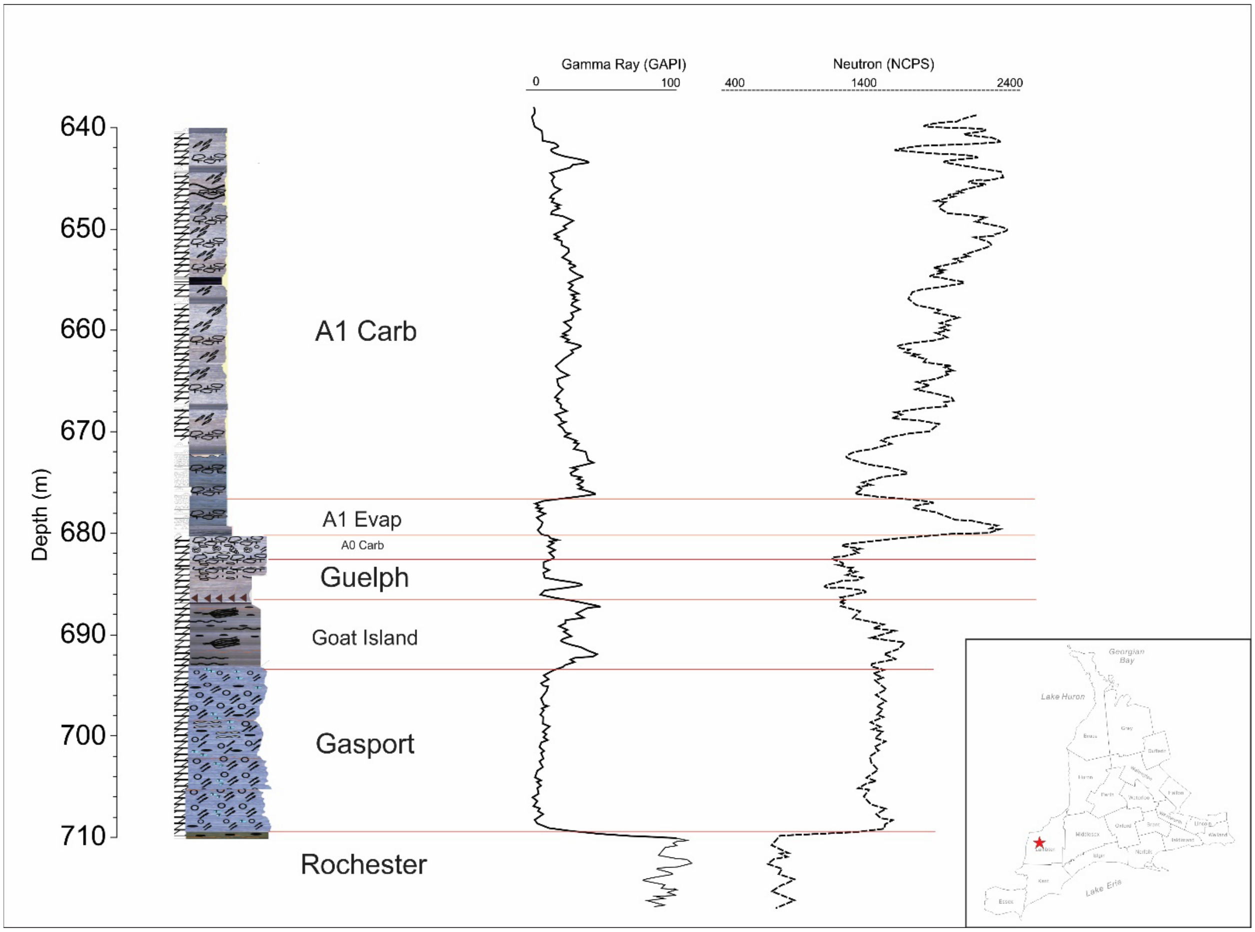

Figure D.1 Reference well T002477 located within the inter-pinnacle region in Area 1.

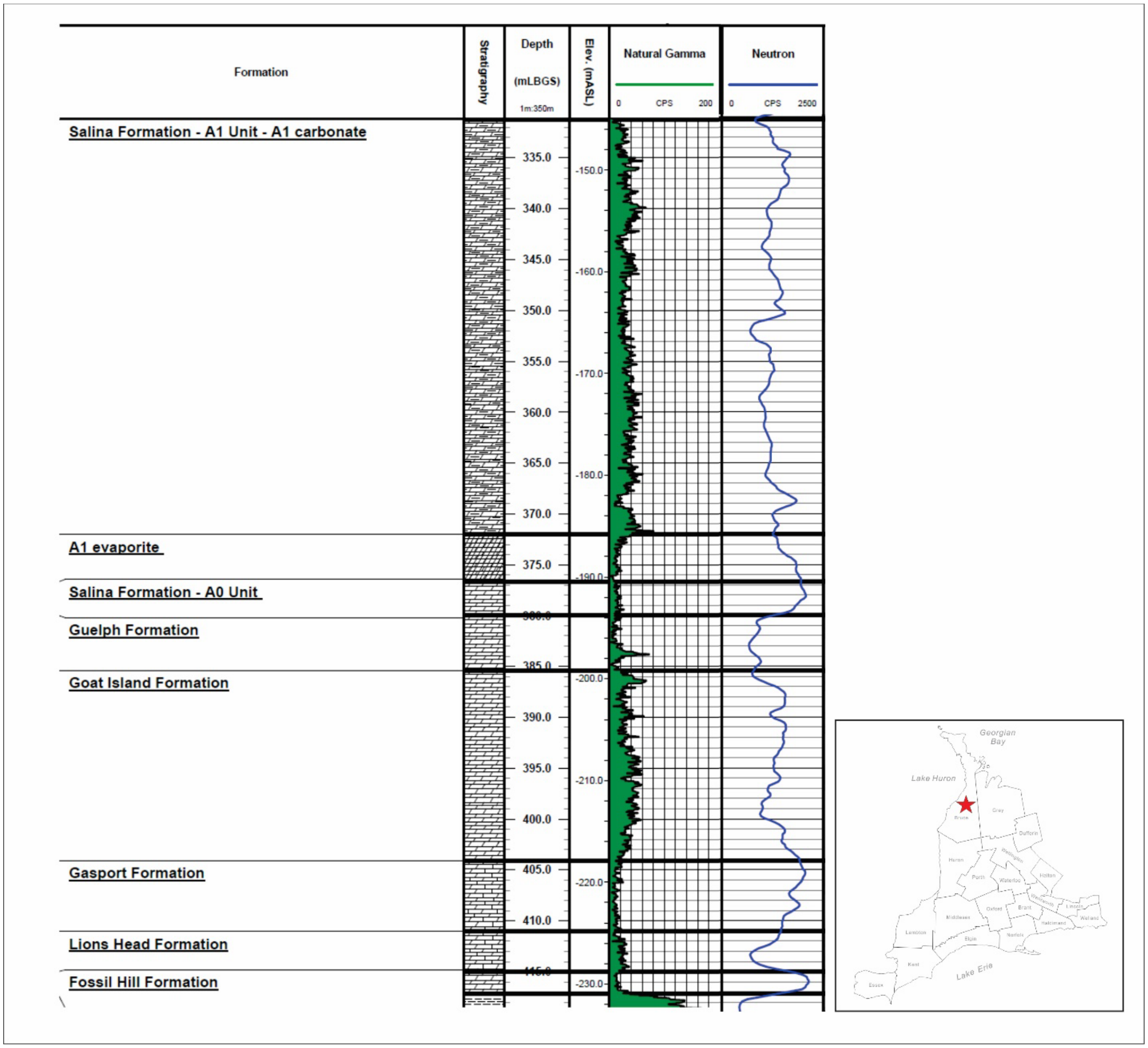

Figure D.2 Reference well DGR-8 at the Bruce nuclear site within the inter-pinnacle region in Area 1. Note the Rochester Formation is not present and is replaced by its stratigraphic counterpart of Lions Head Formation.

D.2 Area 1 (Pinnacle Structures)

Within the pinnacle structures (see Figure 2.6), the Lockport Group is usually thickened to 80-120 m. The Guelph Formation is partly or completely preserved showing regionally correlative and traceable lithofacies recognized by Brintnell (2012). In the pinnacle structures, the A-0 Carbonate and A-1 Evaporite are absent. The top of the Guelph Formation is overlain by microbialites of the A-1 Carbonate. The underlying Rochester or Lions Head pick criteria is the same as in the inter-pinnacle region. A reference well for formation top pick criteria using well logs and rock core has been given in Figure D.3.

Gasport Formation
The Gasport Formation ranges in thickness from 6-12 m, is white to light grey, coarsely crystalline, crinoid-rich dolostone. The contact with the overlying Goat Island Fm is defined by the change from crinoidal grainstone into the finely crystalline, highly bioturbated dolomudstone, which is similar to that in the inter-pinnacle region. Both the lower Goat Island and the upper Gasport formations are crinoidal grainstones.

Goat Island Formation
The Goat Island Formation consists of dark to light grey, fine- to medium- crystalline, argillaceous dolostone. It has a moderately elevated gamma-ray response relative to the underlying Gasport Formation and overlying Guelph Formation. In some wells, the slight increase in gamma-ray response is too subtle to recognize. The neutron porosity of the Goat Island Formation is usually lower than that of the overlying Guelph Formation and the underlying Gasport Fm.

The top is picked at the inflection point of a relatively sharp increase in gamma followed by fairly consistently high gamma (often following a sharp gamma peak in Guelph). In samples, the brown carbonate of Goat Island Formation changes upward into the light grey or white, coarsely crystalline carbonates of Guelph Formation.

Guelph Formation
In the pinnacle structures, the Guelph Formation is 60-100m thick. It consists of the lower creamy, light grey to white, coarsely crystalline, fossiliferous (coral-stromatoporoid-algae) limestone and the upper light- to medium- grey, moderate fossiliferous (mollusc-bryozoan) limestone. The upper contact with the A-1 Carbonate is placed at the first occurrence of medium- to dark- brown, laminated limestone above a sharp karst surface. In gamma-ray logs, there is a slight increase in radioactivity.

A-1 Carbonate Unit
The A-1 Carbonate consists of tan-grey to black, crinkly laminated limestone and dolostone. Microbialites are very common with variable moldic vugs dispersed in the matrix. Porosity is enhanced locally by karstic dissolution such that the A-1 Carbonate. The pinnacles are overlain by up to several metres of anhydrite of the A-2 Evaporite. The top of the A-1 Carbonate Unit can easily be picked in gamma ray logs at the sharp transition from overlying non-responsive anhydrite into the underlying carbonates.

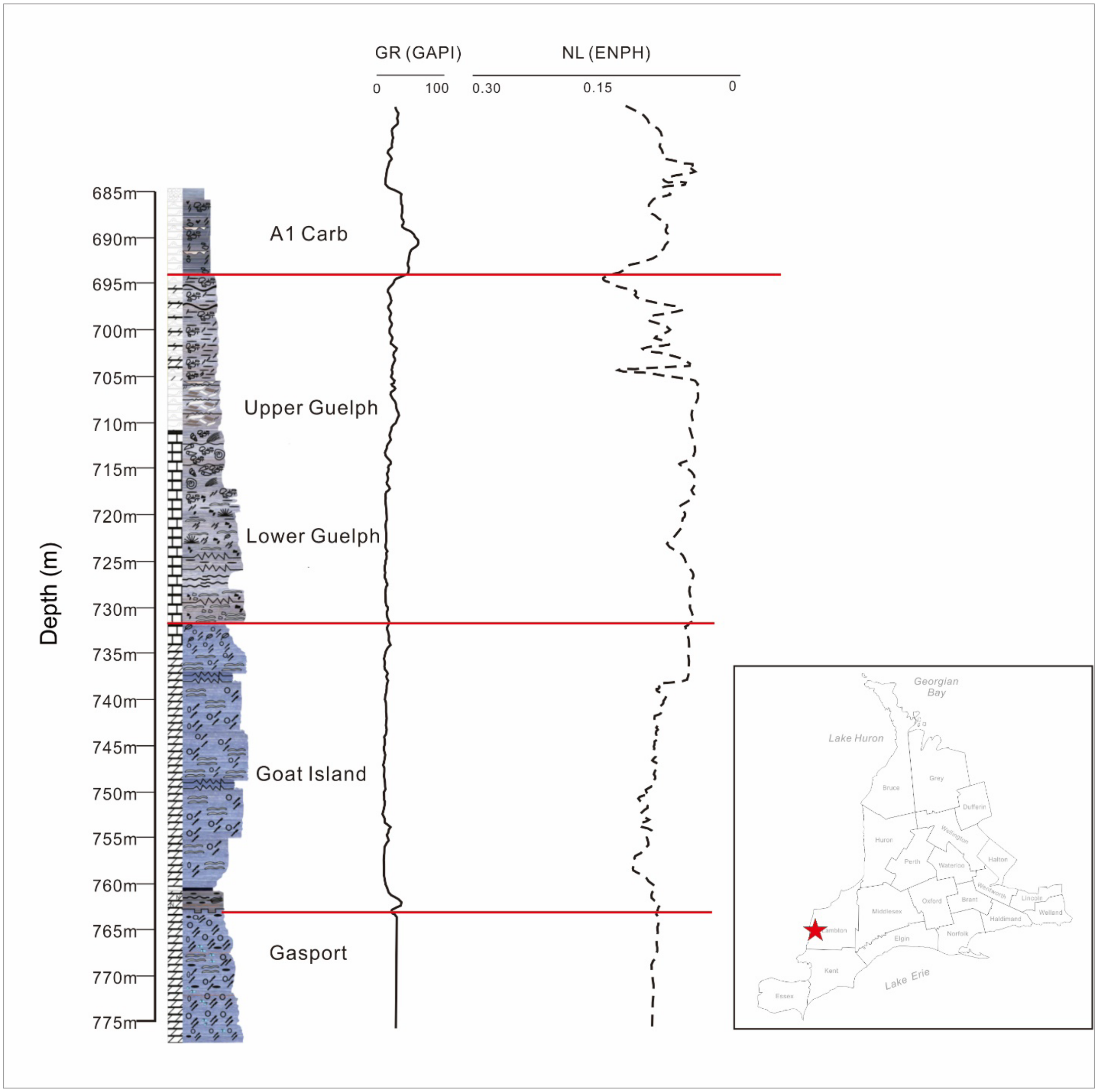

Figure D.3 A reference well of T007292 located within pinnacle structure in Area 1.

D.3 Area 3 (Welland, Norfolk, Western Lake Erie, Elgin and Essex)

In this area although the thickness of each formation within the Lockport Group changes rapidly across a short distance, the lithofacies and the corresponding well log patterns indicate predictable top pick criteria. A reference well for formational top pick criteria using well logs and rock core has been given in Figure D.4.

Rochester Formation
The Rochester Formation consists of dark grey to black, calcareous shale. It is readily picked in well logs by having a very high response on gamma-ray. Its top is picked at the top of the shale deposits overlain by the finely crystalline, tan to buff limestone of DeCew or Gasport with shale rip-up clasts.

DeCew Formation
The DeCew Formation is restricted to the eastern part of the area beneath Lake Erie and the Niagara Peninsula. It has been recognized in the study area as a light tan, medium- to finely- crystalline dolostone that disconformably sits on the Rochester Fm and possesses rip-up clasts of Rochester.

In the gamma-ray log, the DeCew has upward decreasing trend (Figure D.4). The contact is place at the inflection point where the shales of Rochester changes into the carbonates of DeCew. In drill cuttings, upper contact is subtle and can be placed at the finely, darker colored DeCew changes into the coarsely crystalline, light grey limestone of the Gasport Fm.

Gasport Formation
Both members of the Gasport Fm are present in this part of study area (as defined by Brett et al. 1995). The lower Gothic Hill Member of the Gasport Fm consists of coarsely crystalline, blueish grey to pinkish grey, crinoidal dolostone and dolomitic limestone (crinoidal base). Reef mounds may develop in the Gothic Hill Member of the lower Gasport Formation. The upper Pekin Member of the Gasport Fm consists of dark grey, finely- to medium- crystalline fossiliferous limestone, with common corals and crinoids. Though having similar lithological features to the upper Goat Island Fm, the Pekin Member contains no evaporites and no siliceous sponge megafauna.

The lower Gasport Fm yields a very low gamma-ray response and high neutron porosity. The gamma-ray profile increases slightly into the upper Gasport. The contact with the overlying Goat Island is placed where the gamma-ray log decreases into the crinoidal base of Goat Island. The Gasport-Goat Island formations in the study area represents at least two shallowing-upwards/mounding facies. They both have a lower crinoidal base and an upper fossiliferous mound facies. The only difference is the fossil contents – the Gasport contains a coral-dominated mound facies and the Goat Island has a sponge-dominated mound facies.

Goat Island Formation
The Goat Island Formation consists of dark to light grey, very fine to fine crystalline, argillaceous dolostone. The lower Goat Island Formation is light brown, coarsely crystalline, crinoidal packstone to grainstone with minor evaporite and chert. The upper Goat Island Formation is medium brown, finely crystalline, fossiliferous limestone/dolostone with common stromatoporoids and sponges and very rare corals.

Its gamma-ray response has a similar pattern with the underlying Gasport Formation. The lower half has relative low gamma-ray values and increases slightly into the upper Goat

Island Formation. Its neutron porosity is slightly lower than the average of Gasport Formation. The top is picked at the inflection point of a relatively decrease in the neutron log upward into the Guelph Fm. In samples, the medium brown limestone of Goat Island Formation changes upwards into the brownish grey, finely crystalline dolostone or limestone Guelph Formation.

Guelph Formation

The Guelph Formation is 9-15m thick, consisting of light to medium brown, medium- to coarsely- crystalline limestone/dolostone. The top of the Guelph Formation shows dissolution and brecciated features.

It has a very subdued expression on the gamma-ray log. In neutron log, its upper contact with the overlying A-1 Carbonate can be distinguished at the positive transition upwards. In cutting samples, the light brown carbonates of Guelph Formation changes upwards into the light grey, sucrosic, evaporitic dolostone. In cores, the upper microbialites/stromatolites in Guelph Formation are overlain by the brown, algal laminites with common diagenetic vugs of A-1 Carbonate.

A-1 Carbonate Unit

The A-1 Carbonate consists of light grey, finely crystalline, sucrosic, dolomitic limestone to dolostone with evaporite minerals. In drill core, the A-1 Carbonate is present as either dark grey and very bituminous dolostone or dark brown, algal laminites with common diagenetic vugs.

The A-1 Carbonate has a relative flat gamma-ray profile. The lower A-1 Carbonate has moderate to high neutron porosity values and decreases into the upper A-1 Carbonate. Commonly it has higher gamma-ray and neutron porosity than the underlying Guelph Formation. The top is picked at the slight decrease in gamma-ray log and decrease in neutron upward into the A-2 Evaporite. In drill cuttings, the fine crystalline, light grey dolostone can be easily distinguished from the overlying dark brown, evaporitic dolostone of A-2 Unit and the underlying brown, coarsely crystalline Guelph Formation.

The A-1 Evaporite and A-0 Carbonate are not present in this area.

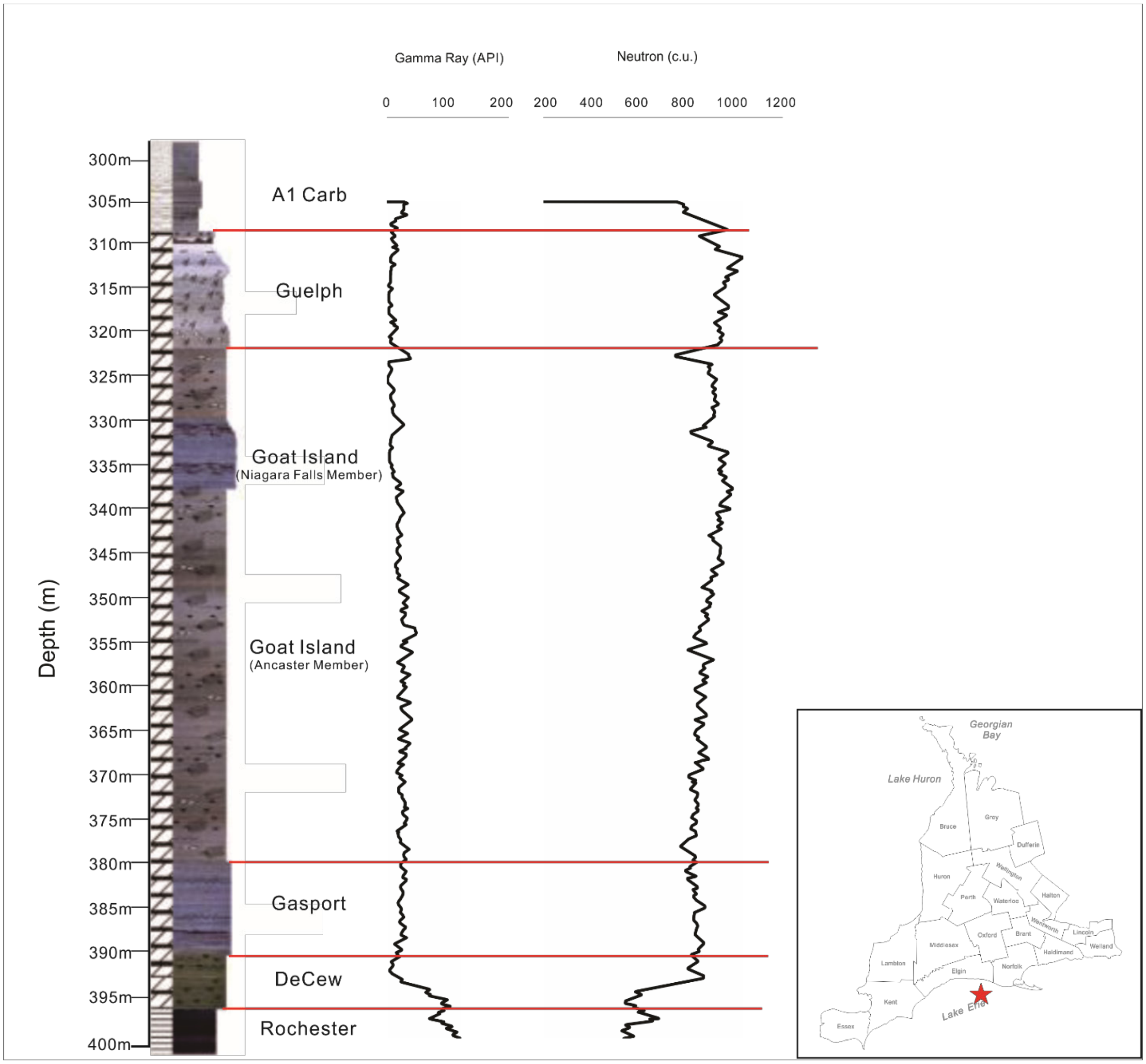

Figure D.4 Reference well T002759 located in central Lake Erie in Area 3

Appendix E: Geology QA Result

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
1	T002394	Atlas Lake Erie No.6	41.84032	-82.55462	181.97	307.24	370926.825	4633215.488	275.23			281.33					
2	T003116	UNION BENTPATH NO.3	42.74280	-82.17243	202.1	644.65	404038.950	4732919.923	547.42			570.00	599.85	620.57			637.90
3	T001583	Imperial Oil No. 889 - K. Hetherington No. 2	42.68372	-82.39056	184.1	690.07	386077.585	4726630.980	516.03			527.30	662.94	671.17			676.35
4	F008231	Imperial Oil No. 430 - Colinville No. 12 - N. & C.W. Iden No. 3	42.85416	-82.36134	199.3	738.84	388776.578	4745518.857	615.39			637.34	656.65	727.86			
5	T003105	Consumers' C.O.B.31990	42.11718	-82.06850	181.36	568.45	411671.090	4663339.544	424.59			430.38	456.59	513.59			546.20
6	T008748	Imperial 344 - R. Murray No. 1	42.86556	-82.38579	200.6	765	386799.688	4746817.384				638.39	707.14	769.47			787.60
7	T002923	TOWNSEND UBR ET AL	42.77417	-80.83139	227.4	449.58	513793.440	4735750.668	307.20			311.20	330.40	380.09			387.40
8	T003646	Consumers' 13257	42.19926	-81.53416	182.58	528.83	455900.083	4672038.645	501.40			509.32					
9	T003079	Consumers' 13123	42.35057	-81.14101	181.66	612.65	488386.273	4688710.863	456.29			465.43	483.11	511.91			547.73
10	T002971	Consumers' 31868	42.81095	-82.31495	193.9	727.56	392491.875	4740660.071	647.09	683.67	688.24	689.15	694.33	702.87			719.00
11	T002126	C.W.P.66-L-59	42.12171	-82.27990	182.27	408.43	394203.149	4664082.438	346.86			352.65	402.64				
12	T003108	Consumers' C.O.B.31994	42.07546	-81.92786	181.66	632.76	423247.293	4658571.135	491.90			497.10	542.85	601.98			621.79
13	T003117	Consumers' C.O.B.31995A	42.20513	-81.86202	181.66	624.84	428838.797	4672911.399	515.11			523.04	554.74	594.36			616.61
14	T002508	Atlas Lake Erie No.7	41.83421	-82.53545	182.27	316.69	372506.079	4632508.334	282.55			292.30					
15	T002563	Consumers' Pan Am 13033	42.61739	-81.17417	182.58	508.1	485716.195	4718342.608	359.05			370.64	382.52	438.30			445.00
16	T002738	Corden et al	42.65936	-82.43775	185.3	669.04	382165.056	4723990.516	584.60	615.70	619.96	622.10	630.00	641.90			665.10
17	T003235	Consumers' 13106	42.41292	-80.95524	185.93	570.59	503683.266	4695625.378	401.73			407.21	432.21	456.90			489.51
18	T003673	Consumers' 13273	42.38140	-80.91679	188.06	556.26	506850.019	4692127.086	395.63			401.42	429.77	459.64			499.26

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
19	T002254	Midcon - Lake Erie No.16	42.20727	-82.04461	182.27	467.87	413768.493	4673317.448	434.95			445.92					
20	T002488	Ram No. 4	42.68186	-82.30111	191.4	833	393402.321	4726307.599	543.46			567.84	592.23				
21	T002083	Imperial Oil No. 933 - Ozi & King No. 2	42.73614	-82.36181	181.4	665.07	370926.825	4732413.238	559.92			586.13	634.59				644.65
22	T008747	Imperial Seckerton No. 6	42.86731	-82.38970	200.6	792.48	386483.550	4747016.087	703.02	743.10	747.37	749.20	758.34	772.67			787.70
23	T001499	Canadian Kewanee No.2	42.56253	-81.72511	212.1	524.87	440479.685	4712490.872	504.75			527.91					
24	T001551	Canadian Delhi No. 36	42.82631	-82.31823	193.9	727	392250.530	4742369.293	648.90	685.80	689.76	691.29	695.55	704.70			722.07
25	T001541	Canadian Delhi No. 34 - Brigden No. 4	42.80753	-82.30378	192	722.38	393399.595	4740266.161	642.06	680.31	684.58	685.50	690.68	699.21			716.58
26	F004998	Imperial Oil No. 433 - Bickford No. 20	42.71744	-82.42544	186.8	723.9	383282.430	4730423.304	555.65			575.85	627.30	636.00			717.80
27	T000945	Imperial Oil No. 858 - Becher No. 77 - A. Van Dommelen	42.63539	-82.40308	178.3	591.92	384962.138	4721280.799	566.00			591.31					
28	F008717	Imperial Oil No. 553 - Corunna No. 13 - J.L. Burns No. 3	42.87632	-82.37634	198.42	733.35	387590.917	4747999.545	723.00								
29	T008860	Imperial Oil No. 419 - Corunna No. 11 - J.L. Burns No. 1	42.88485	-82.37584	199.95	786.69	387647.457	4748945.777	702.60			720.70					
30	T002599	Consumers' Pan Am 13051	42.34254	-80.74021	187.45	603.5	521399.308	4687842.358	428.24			432.51	473.66	493.17			512.98
31	T002618	Consumers' Pan Am 13054	42.57532	-81.47043	183.55	585.22	461392.884	4713763.945	435.25			446.84	464.52	515.72			522.12
32	T004000A	Consumers' 13351A (Cons.13363)	42.22249	-81.62972	180.89	521.2	448030.462	4674671.592	492.56			501.09					
33	T004033	Ram No.2	42.68761	-82.29711	190.5	565.7	393739.840	4726941.066	488.60			498.35					
34	T002434	Ram No. 1	42.81988	-82.30694	198.4	689.46	393162.509	4741641.685	640.38	676.05	680.62	681.53	686.71				
35	T003000A	Union Rosedale 1	42.77372	-82.17478	200.9	666.9	403894.642	4736356.675	502.92			525.46	583.10	646.80			662.30
36	T000210	Imperial Oil No. 702 - W.G. Young No. 4	42.72075	-82.42219	188.4	719.33	383554.732	4730785.884	557.17			568.45	591.30	623.32			718.10
37	T002878	Corden et al	42.66025	-82.42917	185	630.94	382870.208	4724077.294	582.78	614.80	618.44	621.18	628.20				
38	T000315	Imperial Union	42.87538	-82.38655	202.7	785.17	386755.279	4747908.226	652.10			660.60	728.60	736.20			

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev (m)	tvd (m)	UTM (NAD83) Northing	UTM (NAD83) Easting	A1-Carb top (m)	A1-Evap top (m)	A0-Carb top (m)	Guelph top (m)	Goat_Island top (m)	Gasport top (m)	Lions_Head top (m)	DeCew top (m)	Rochester top (m)
39	T008749	Imperial 656 - Seckerton #10	42.86221	-82.38592	199.6	762	386783.228	4746444.741	638.70			660.70					
40	T002912	McClure	42.80930	-82.38558	194.16	694.9	386713.790	4740568.827	656.54			667.82					
41	T001623	Imperial Oil No. 849 - Becher No. 75 - H.A. Jonhston No. 3	42.63647	-82.40711	178.3	614.17	384633.899	4721406.583	568.50	598.60		607.47	611.40				
42	T002585	Ram No. 5	42.68856	-82.29411	190.5	595.27	393987.212	4727042.174	500.05			527.00					
43	T003204	Consumers' 13078	42.37506	-80.97001	187.45	594.36	502468.742	4691420.293	395.94			399.29	420.90	496.95		509.45	517.05
44	T002826	Consumers' Amoco 13105	42.42716	-80.84986	187.76	551.69	512351.144	4697216.154	400.81			407.52	416.66	441.96		467.56	479.15
45	T002820	Consumers' Amoco 13103	42.47782	-81.50849	182.88	613.87	458204.737	4702955.556	452.32			467.86	480.67	534.92			542.85
46	T002836	CIGOL D'Clute No.14	42.23143	-82.09656	182.88	466.34	409514.905	4676054.637	415.44			425.81					
47	T002824	CIGOL D'Clute No.16	42.20699	-82.13767	182.88	445.01	406086.087	4673384.869	424.89			436.47					
48	T004132	RAM #38	42.87777	-82.11082	207	643.43	409279.610	4747840.180	544.10			556.87	617.83	621.79			
49	T003999	Consumers' 13350	42.19569	-81.48464	181.66	700.43	459986.454	4671617.869	511.45			521.51	549.55	571.50		622.40	625.45
50	T004227	CWP TIL.76-C-73	42.09727	-82.37712	181.66	445.01	386122.640	4661493.212	388.92			398.37	413.92	423.67			
51	T004228	C.W.P. TIL.76-L-72	42.15504	-82.16156	181.97	441.96	404035.412	4667643.793	395.33			400.81					
52	T004820	Anschutz #4	41.92088	-82.38712	187.8	566.9	384978.520	4641921.503	341.68			346.56	436.47	448.67			492.86
53	T004206	Consumers' 13389	42.17217	-81.55530	181.36	690.68	454135.710	4669041.719	506.58			517.25	640.38	648.31		652.58	656.54
54	T004910	Amoco A-1	44.15381	-81.45464	287	909	463644.013	4889056.394	294.80			303.50	379.50	392.90	427.50		
55	T004911	Amoco A-1	43.23347	-81.60964	243.1	581.8	450497.834	4786922.415	428.50			441.90	532.50	557.20			569.40
56	T004912	AMOCO A-1	42.66339	-81.96018	201.9	588	421311.104	4723883.278	452.20			463.10	536.60	561.40			582.00
57	T005155	Amoco	43.23661	-81.59453	237.3	573	451727.324	4787262.167	412.50			435.60	495.20	543.40			560.50
58	T005119	Consumers' 13624	42.19491	-81.42841	181.3	534	464628.182	4671506.049	499.00			507.80					
59	T005605	Consumers' 33323	42.28227	-82.29935	183.5	559	392867.254	4681933.972	416.00			431.70	493.00	531.50			542.00

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
60	T005813	Consumers 33409	42.27293	-82.30757	184.9	549	392173.442	4680908.034	400.20			414.90	487.00	525.30			538.30
61	T005788	Consumers' 33406	42.29932	-82.29968	179.8	533.8	392868.635	4683828.162	423.70			436.70	476.50				
62	T005738	Pembina #4	42.00780	-82.46360	180.2	507	378801.377	4651678.511	316.00			324.20	406.10	427.70			469.00
63	T005730	Pembina #4	42.14208	-81.43955	180.2	736	463678.521	4665644.667	504.10			507.80	556.80	601.70		645.50	650.00
64	T005732	Pembina - Canadian Superior #4	41.70611	-82.45530	181.6	535	378921.409	4618169.974	299.20			304.50	327.00	358.20		447.50	458.60
65	T005764	Pembina #2	42.02743	-82.43110	180.3	502	381529.642	4653812.639	324.00			330.00	409.50	441.30			472.00
66	T005752	Pembina - Canadian Superior #4	41.88868	-82.45632	182.1	483	379179.994	4638442.034	306.90			311.60	403.50	434.00			453.10
67	T005746	Pembina - Canadian Superior #2	41.92567	-82.46279	180.6	493.5	378713.141	4642557.774	308.10			313.90	342.00	407.80		463.20	470.20
68	T005789	Consumers' 33407	42.28102	-82.28240	183.6	555.3	394262.346	4681773.994	412.50			424.40	499.60	533.40			547.80
69	T005792	Consumers 33411	42.25699	-82.29509	186.2	543.2	393175.135	4679121.927	406.80			413.70	427.70	501.60			534.50
70	T005731	Pembina Et Al	41.86515	-82.44201	181.7	485	380322.954	4635809.659	286.80			292.50	300.60	323.50			452.80
71	T005734	Pembina - Canadian Superior #4	41.99157	-82.43480	181.6	505	381156.431	4649835.983	309.80			314.60	340.80	351.10			473.30
72	T005791A	Consumers' 33408 A	42.27129	-82.28554	185.8	460.8	393987.258	4680698.400	407.60			414.90	432.50				
73	T005925	Pembina #3	41.80282	-82.51243	180.6	460	374356.800	4628989.311	303.00			319.00	374.70	386.50		421.00	425.80
74	T005983	Pembina Et Al	41.82962	-82.43537	181.3	483.5	380808.228	4631855.160	315.90			323.50	386.10	426.70		440.00	445.20
75	T005990	Pembina - Canadian Superior #3	41.95271	-82.44518	180.6	504	380223.823	4645536.197	342.30			351.80	413.80	442.40			466.10
76	T002669	Consumers' 26566	42.81658	-82.30762	192.9	711.71	393100.452	4741275.302	636.73	673.00	676.66	677.57	682.90	691.90			707.74
77	T002481	Ram No. 3	42.68497	-82.29697	191.7	601.98	393747.005	4726647.174	498.04			528.83	587.35	600.20			
78	T002548	C.W.P.68 L 71	42.16727	-82.05822	182.88	481.89	412589.723	4668889.928	443.79			453.30					
79	T002528	C.W.P.68-L-67	42.09088	-82.25740	182.88	434.34	396012.652	4660631.275	370.03			375.51					
80	T002339	Consumers' Pan Am 13008	42.42524	-81.42062	182.58	629.41	465397.744	4697077.238	474.27			487.07	495.00	558.09			564.18

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
81	T002418	Consumers' Pan Am 13023	42.40838	-80.79152	182.88	568.45	517155.007	4695141.226	423.37			426.26	431.90	472.44		484.33	484.60
82	T002477	Consumers' 16285	42.81445	-82.31794	193.2	721.16	392253.527	4741051.997	640.70	676.70	680.31	680.92	686.70	693.70			709.57
83	T002570	Consumers' Pan Am 13048	42.47088	-81.63321	182.58	628.5	447946.985	4702253.526	474.57			479.76	502.01	552.91			561.14
84	T001788	C.W.P.65-L-51	42.14088	-82.30351	182.2	426.7	392283.902	4666240.096	332.23			335.80	387.81				
85	T002804	C.W.P.Canso 69 LT 2	42.04421	-82.22601	182.88	441.96	398534.292	4655412.026	386.79			395.33					
86	T002547	C.W.P.68 L 70	42.17949	-82.06517	182.88	471.53	412033.035	4670254.154	431.29			441.66					
87	T002540	C.W.P.68-L-69	42.08921	-82.13156	182.4	416	406417.134	4660300.799	388.62			397.46					
88	T002565	Consumers Pan Am 13039	42.36652	-80.82458	186.8	1383.79	514443.792	4690486.292	422.76			427.63	452.93	491.64		499.57	509.02
89	T002333	Consumers' Pan Am 13002	42.29172	-80.91653	182.58	608.08	506881.422	4682169.422	440.13			444.70	462.08	502.00			526.69
90	T006517	Union Dawn 247	42.67753	-82.23829	190.2	544.3	398542.258	4725749.687	479.80			503.95					
91	T006299	Pembina #1	41.84526	-82.43537	180.7	465.9	380837.029	4633592.161	311.50			319.80	393.40	424.00		438.50	448.80
92	T006383	Brett Gagnier No. 1	42.18088	-82.56880	187.7	359.4	370442.978	4671050.113	341.30			352.96					
93	T006870	Ram No. 81	42.81046	-82.30397	185.3	1291	393388.520	4740591.408	640.80	677.10	681.20	682.80	687.60	695.30			712.00
94	T006104	Consumers'40003	42.27449	-82.29879	186.5	446.6	392899.935	4681069.682	402.70			413.40	422.50				
95	T006097	Consumers' 40001	42.27032	-82.29935	185.8	458.2	392847.086	4680607.726	401.30			409.60					
96	T006096	Consumers 40000	42.27421	-82.29379	187.3	470	393311.803	4681032.561	402.30			413.70					
97	T006105	Consumers 40002	42.27004	-82.29351	186.3	445	393327.705	4680569.559	399.80			410.30					
98	T007126	Consumers' 13905	42.48389	-80.52917	181.1	353	538696.658	4703611.976	332.60			347.80					
99	T002812	Consumers' Amoco 13076	42.65471	-81.25206	179.22	495.91	479339.969	4722503.160	341.38			357.23	373.99	409.96		424.89	430.07
100	T003245	Consumers' 13120	42.41902	-80.97680	187.15	416.05	501908.941	4696301.964	394.11			402.03					
101	T002815	Consumers' Amoco 13085	42.41624	-81.69624	182.88	688.85	442715.864	4696227.236	521.82			526.69	552.30	603.81			612.65

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
102	T003434	Consumers' 13165	42.39107	-80.92723	187.76	413	505989.962	4693200.544	388.62			392.89					
103	T003106	Consumers' C.O.B.31991	42.16380	-81.92178	181.66	623.32	423856.472	4668373.617	489.81			494.69	548.03	594.06			611.43
104	T003244	Consumers' 13111	42.43239	-81.00404	188.06	424.59	499667.463	4697785.845	402.64			407.52					
105	T003205	Consumers' 13079	42.43348	-80.98337	187.45	421.23	501368.144	4697907.526	388.32			392.89					
106	T002821	Consumers' Amoco 13104	42.52099	-81.24718	187.45	556.26	479697.147	4707653.413	396.24			412.00	445.62	479.76			487.98
107	T003239	Consumers' 13109	42.38449	-80.94584	187.45	583.69	504458.276	4692469.028	395.33			400.20	469.09	475.79			497.43
108	T003271	Consumers' 13135	42.40564	-80.99125	187.15	579.12	500719.988	4694815.080	397.46			404.16	418.49	440.13			510.54
109	T003243	Consumers' 13110	42.41903	-80.99375	187.76	582.17	500514.132	4696302.616	392.58			396.24	414.53	441.96		490.12	497.13
110	T002560	Consumers' Pan Am 13030	42.49171	-81.45043	186.9	606.55	462984.986	4704470.760	448.67			460.25	475.49	530.05			538.28
111	T003671	Consumers' 13272	42.39513	-80.94225	180.5	553.8	504753.381	4693649.910	389.53			393.95	484.33	501.40			507.49
112	T003274	Consumers' 13138	42.39365	-80.95761	187.15	579.73	503489.124	4693485.355	393.40			398.37	462.38	478.54		488.90	509.63
113	T003077	Consumers' 13121	42.40230	-80.87458	187.15	565.4	510321.420	4694452.322	409.65			414.83	445.62	456.59		480.06	487.98
114	T003675	Consumers' 13275	42.40898	-80.97987	188.37	551.38	501656.675	4695186.904	393.40			402.03	418.49	430.07		493.78	500.48
115	T002840	Chiefco Ont-Hio Blucr Lake Erie No.5	42.00032	-82.08656	182.88	592.23	410013.427	4650382.980	465.70			473.05	501.40	558.09			581.30
116	T003674	Consumers' 13274	42.40255	-80.96435	188.67	548.03	502933.584	4694473.325	395.63			401.42	444.70	461.16		494.69	502.92
117	T003415	Consumers' 13154	42.45676	-80.55334	187.76	537.97	536725.246	4700588.466	356.01			367.59	382.26	423.56		445.76	450.56
118	T002340	Consumers' Pan Am 13009	42.44071	-81.60828	181.97	660.5	449972.458	4698889.187	519.99			531.57	545.59	598.32			605.64
119	T007380	Tecumseh Kimball-Colinville No. 54	42.81622	-82.36118	195.1	731	388721.742	4741305.377	657.00	691.50	698.90	700.30	703.50	708.50			
120	T007381	Tecumseh Kimball-Colinville No. 55	42.81424	-82.35581	195.6	682.8	389157.402	4741078.672	652.80								
121	T007292	Tec. Dow 7	42.91045	-82.38840	193.3	774	386669.165	4751805.983	683.80			706.30	730.80	761.80			
122	T003400	Tecumseh Kimball-Colinville No. 35	42.85198	-82.36064	195.99	700.43	388829.875	4745275.447	610.80			622.70					

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
123	T002759	Consumers' Pan Am 13057	42.65088	-80.91375	178.92	462.38	507070.153	4722050.437	304.80			309.75	319.74	376.43		388.50	395.63
124	T002803	Consumers' Amoco 13102	42.57727	-80.63457	179.22	473.66	529989.285	4713938.041	332.23			333.85	355.70	379.48		397.30	402.34
125	T002760	Consumers' Amoco 13061	42.56588	-80.54984	179.22	477.62	536949.061	4712706.838	334.67			339.24	351.00	378.90		397.40	401.70
126	T007460	Union Enniskillen 60	42.85771	-82.23179	198.2	626.1	399366.738	4745750.205	563.80			579.00					
127	T007450	Union Enniskillen 54	42.85560	-82.23185	197.4	641.5	399358.329	4745515.073	571.00			581.50					
128	T007457	Union Enniskillen 55	42.85532	-82.23296	199.1	643.2	399267.099	4745485.555	566.00			586.35	604.4				
129	T007499	Union Sombra 11	42.69106	-82.46422	182.9	591.3	380056.390	4727547.267	558.60			565.60					
130	T007551	ICG 2	42.77695	-82.07502	203	570	412059.792	4736606.318	516.40			530.50	540.30				
131	T007673	Ram 101	42.83050	-82.12891	203.8	690.5	407731.328	4742610.394	548.50			559.60	622.60	662.90			676.60
132	T007706	Dow Sarnia 3	42.92434	-82.35979	197	757.2	389029.190	4753310.317	691.80			708.20					
133	T007795	Edys Mills 1	42.74961	-82.11036	202.4	527.5	409128.991	4733608.185	493.50			519.50					
134	T005337	Consumers' 13707	42.61263	-80.91373	180.5	343.4	507075.578	4717803.146	319.00			325.20					
135	T008336	West Central	42.03054	-81.95209	180.9	648	421187.528	4653605.709	491.30			497.40	574.30	594.40			622.30
136	T008335	West Central	42.05394	-82.10318	180.9	450	408714.028	4656354.029	393.00			399.00					
137	T008471	CanEnerco No. 3	42.88307	-82.10623	208.6	715	409661.524	4748423.189	561.60			568.20	678.10	691.00			705.00
138	T008468	CanEnerco #2	42.83041	-82.13064	204.9	688.8	407590.206	4742602.414	539.90			551.80	619.30	665.50			679.00
139	T008427	Tecumseh Kimball-Colinville No. 56	42.82011	-82.37534	192.6	694.1	387571.308	4741756.018	655.50	692.50							
140	T008622	CanEnerco #4	42.57211	-82.22301	182.6	456	399625.070	4714025.040	440.00			447.50					
141	T008529	Pembina West Central	42.23004	-81.41682	180.5	545	465604.517	4675402.183	496.30			502.40					
142	T002587	Consumers' Pan Am 13019	42.38277	-80.89908	182.88	579.73	508307.817	4692280.724	402.03			407.52	454.15	488.29			490.73
143	T002396	Consumers' Pan Am 13020	42.46549	-80.81927	182.67	538.28	514858.073	4701477.464	395.33			401.42	427.33	450.49		462.38	471.83

Table Appendix E (continued)

ID	licence	well_name	latitude	longitude	kb_elev	tvd	UTM (NAD83)		A1-Carb	A1-Evap	A0-Carb	Guelph	Goat_Island	Gasport	Lions_Head	DeCew	Rochester
					(m)	(m)	Northing	Easting	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)	top (m)
144	T002524	Consumers' Pan Am 13037	42.41072	-80.91700	183.12	561.75	506829.735	4695382.569	410.26			416.97	443.18	463.91		472.44	477.10
145	T008854	Union Bentpath East 2	42.71569	-82.14357	203.5	559	406360.198	4729877.279	489.10			501.80					
146	T008888	Union Oil City 1	42.80906	-82.11799	202.3	572	408592.677	4740217.130	525.20			536.60					
147	T008929	Union Mandaumin 4	42.92981	-82.23771	199.1	698.5	399001.160	4753763.186	630.60			645.90					
148	T008958	Union Bluewater 1	42.92681	-82.25242	200.1	730	397795.891	4753447.561	634.70			643.30					
149	T008954	Daybreak et al Ausable No. 2	43.26900	-81.74980	186	610	439152.621	4790960.702	487.50			503.20	575.50				
150	T007290	Tec. Dow 4	42.90453	-82.39052	195.6	833	386485.730	4751184.140	754.50	790.3	796.8	799.00	805.3	814			830

Appendix F: Core Analysis QA/QC and Data Entry Protocol

The following is an internal procedure used by staff of the Oil, Gas and Salt Resources Library to create a digital tabular database from scans of drill core analyses located at OGSR Library

Iterating Through Core Analysis Index

A list of core analyses was generated using the following steps:

1. **Created a new database from all known cores in Ontario Petroleum Data System (OPDS), including the core analyses indicator field. This database was created as: Core Analysis Index.xlsx**
2. **Sorted the table by core analysis indication and core number so that all cores with supposed core analyses are at the top of the spreadsheet.**
3. **Iterated through rows and search for core analysis in core analysis scans for data entry, if core analysis not found in scan folder, proceed to step 4.**
4. **If no core analysis scan is found and core analysis indication is yes, then check http://www.ogsrlibrary.com/wellcards/index.php for core analysis by searching the license number and looking under 'Scans' AND 'Core Analysis' tabs on the well card.**
5. **In core analysis index.xlsx indicate if core analysis was found by entering Y or N in "Analysis Found?" field.**
6. **Perform data entry using steps in data entry section below.**
7. **Complete data entry field in core analysis index spreadsheet to mark data entry as complete.**
8. **Once all rows are complete where core analysis indication is yes, stop iterating through spreadsheet.**
9. **If the scan is unreadable, mark "scan unreadable" in the analysis found column in core analysis index.xls spreadsheet.**
10. **Update and save the latest version of your Core Analysis Index onto the server at the end of each day.**

Data Entry

1. If data is not provided, missing from scans, dash "-" or "N/A", field should be left blank. If "0" (zero) is given enter as is.
2. For licence core_num field, enter the numbers found in the respective fields in Core Analysis index.xlsx.
3. top_depth and bot_depth in meters, and inches should only be filled out if it is provided in the scan. Otherwise, enter the top_depth and bot_depth in the field for feet.
4. For the depth_UOM field enter the unit of measurement used in the scan, either "ft" or "m"
5. For the perm_horizontal field, enter the horizontal K (permeability)length. Also called horizontal perm to air in millidarcys
6. For the perm_horizontal_90 field, enter the horizontal K at 90 degrees.
7. For the perm_vert field, enter the vertical K.
8. For perm units, it will always be Md (millidarcy)
9. For horiz_perm_length, enter the length of the horizontal permeability. Be sure not to confuse this with the perm_horizontal and perm_horizontal_90 field.
   a) Reported as horz. perm x feet or perm x feet or permeability feet/meters.
10. For vert_perm_length, enter the vertical permeability length, however, this data is seldom recorded in the scans.
    a) Reported as vert perm x feet.
11. For Porosity_Percent field and porosity length, enter the porosity percent and porosity length (also reported as porosity x feet). If both Fluid and Gas percent porosity are given, only enter fluid porosity values as % porosity. Remember that porosity PERCENT needs to be a percentage – commonly when the units are in meters it is not given as a percentage. In these cases multiple the value by 100 to get it into a percentage (i.e., 0.015 becomes 1.5%)
12. For bulk_density and grain_density fields, enter the bulk density and grain density. This information is seldom found in the scans. In analysis using meters, divide the number by 1000 to get into consistent units (i.e., 2770 becomes 2.77)
13. In sat_oil field and sat_water field, enter the oil saturation and water saturation
14. probable_production
15. In the remarks section, enter any extra remarks the geologist included on the data sheet scan

Daily QA Procedure

Approximately 10-15 minutes before finishing data entry for the day, go through the following QA for each core completed that day:

1. **Visually check the 3rd, and 3rd last line of each core entry to ensure all data points line up correctly. If they do not, correct the data.**
    a. **Complete a visual check that there are no extra spaces, incorrect punctuation (',' instead of '.')**
    b. **Ensure license number and core number are different from previous core analyzed.**
2. **If data is correct proceed to QA the next core completed.**
3. **Update Core Analysis Index with what was completed. If a core has been started but not completed, type 'in progress' into the date box and complete the next day.**
4. **Save the updated versions of Core Analysis Index AND Ontario Rock Core Analysis spreadsheets onto the server at the end of each day under Z:\resources\core-analysis\Core Analysis Database.**

Additional QA

1. **Fill in top/bottom depths when only one or the other was recorded on analysis.**
2. **Check each column by filtering for extreme max/min values and fixing the data accordingly.**
3. **Incorporate thickness columns to search for extreme max/min values and fix those typos accordingly.**
4. **Convert Porosity values into percentages from analysis done in meters**
5. **Convert bulk density and grain density into same units g/m3 from kg/m3.**
6. **Added Company Name and Date of Analysis columns for core analysis after data input.**

Special Characters in Permeability Database

1. *** = core too broken for full diameter analysis**
2. **Plug**
3. **<0.1**
4. **<0.01**
5. **-0.01**
6. **Vert Break**
7. **Tr/Trace**
8. **H/h**
9. **Broken Sample**
10. **Broken**
11. **>10K**
12. **>1000**
13. **No recovery**

Processing of final database with formation top names:

core_analyses_with_formations.xlsx

SUMMARY

1. Extract formation *QA Data* sheet
2. Confirm top and bottom depth available for every interval
3. Calculate fields: top (m), bot (m), interval (m)
4. Convert text to number for all numeric fields by replacing non-numeric symbology used in reports with closest approximate number
5. Import data in to mysql
6. Run formation at depth function to append formation name field
7. Add latitude longitude fields
8. Export to table

Procedure:

1. Extract formation *QA Data* sheet
    a. Copy QA Data sheet to new spreadsheet document.
2. Confirm top and bottom depth available for every interval
    a. Sort sheet by top and bottom depth, ensure all fields have a value. If values are missing interpret values from top / bottom of next / previous interval or extrapolate based on average interval length used in the report.
3. Calculate fields: top (m), bot (m), interval (m)
    a. If OUM is ft then fill with converted ft to m otherwise fill with m.
    b. This requires OUM field to be populated in every row with either “ft” or “m”, check this
4. Convert text to number for all numeric fields by replacing non-numeric symbology used in reports with closest approximate number
    a. *, ** -> null
    b. >1000 -> 1000
    c. >10K -> 10K
    d. Vert Break, Tr, No Recovery, H, h, Broken Sample, Broken, Plug, Plug* -> null
    e. <x -> x
    f. -x -> null
    g. 0 -> null

    Oil saturation column
        T, trc, tr, trace -> 0.01
5. Import data in to mysql
    a. Add index to licence number for faster query

i. **CREATE INDEX qa_data_index ON qa_data (licence) ;**

6. **Run formation at depth function to append formation name field**
   i. **ALTER TABLE qa_data ADD COLUMN formation VARCHAR(60);**
   ii. **UPDATE qa_data SET formation = geoFormation(licence, top_calc_m + (thickness_calc_m/2));**
7. **Add latitude longitude fields**
   i. **ALTER TABLE qa_data ADD COLUMN latitute decimal(12,8);**
   ii. **ALTER TABLE qa_data ADD COLUMN longitude decimal(12,8);**
   iii. **UPDATE qa_data SET latitude = (SELECT wells.sur_lat83 FROM wells WHERE wells.lic_number = qa_data.licence LIMIT 1);**
   iv. **UPDATE qa_data SET longitude = (SELECT wells.sur_long83 FROM wells WHERE wells.lic_number = qa_data.licence LIMIT 1);**
8. **Export to table**

Appendix G.1: Conventional Core Analysis Procedure

Core Sampling and Preparation

A full-diameter core sample is typically 89 mm in diameter and up to 18.29 m (60 ft) in length. The core was exposed to the coring fluid, pressure and temperature while it is cut and brought to the surface. Therefore, loss of reservoir fluid or gas may occur during sampling that influences the oil/water saturation parameter. The core is then transported to the core processing labs. A gamma-ray log may or may not be run along the length of the cored interval to correlate its true depth. This is helpful as during sampling incomplete core recovery may happen.

Drill core acquired by petroleum well operators has been analysed at one of ten commercial laboratories. The commercial analyses for this study were completed over a 46-year period between 1954 and 1999. Reports from all labs confirm that analytical protocols followed the conventional or full diameter core analysis procedures of the American Petroleum Institute (1960, 1998; see Appendix G for details).

The general procedures for core sample preparation are similar in each core lab. In four labs fluid samples were extracted using the solvent toluene. Three labs, AGAT Laboratories, Chemical & Geological Laboratories and Geotech Core Services used only Vapor Phase extractor with a drying time of usually 36 or 48 hours at a temperature of 108°C or 120°C. The Core Laboratories used either Vapor Phase or CO_2 extraction equipment and either Gravity Oven or Conventional Oven for sample drying. Drying time ranges from 36 to 288 hours at the drying temperature from 115° C to 120°C.

Core Sample Testing

The key core analysis parameters for this study include porosity, permeability, bulk density, grain density and oil/gas or water saturations. The general core sample testing procedures start when the samples are received by the core labs. Petrophysical properties and core description are conducted before further tests. Firstly, the wet bulk density was measured on each sample. After the removal of oil using toluene and drying of the core samples, the pore volume was measured by the Boyle's Law gas expansion method at room pressure and temperature. The oil content was calculated by the difference of the weight of water recovered from the total weight loss after extraction and drying. Grain volume was determined for each sample by placing it into a stainless steel matrix cup. It was injected with He from reference cells of known volume and pressure using the auto-porosimeter. Grain volume (g/cm^3) was calculated using Boyle's law of gas expansion. Grain density was calculated by dividing sample dry weight by grain volume. Permeability is determined by flowing a fluid through the core and measuring the pressure drop at different flow rates (KH). The core is rotated 90° to measure horizontal permeability (KH_90°) and vertical permeability (Kv). In all the available test reports, grain volumes were all measured by Boyle's Law using helium porosimeter. Bulk Volume were all measured by calipering sample dry weight and grain volume. Air or nitrogen was used as the fluid to measure permeabilities. The Core Laboratories and AGAT used retort edge piece to measure the residual saturations in some wells, meanwhile no oil saturation was measured in samples tested in the other labs.

Porosity

Porosity is calculated using the ratio of pore volume to the bulk volume. The bulk volume is measured in a displacement test by immersion into a fluid. To avoid fluid penetration, all labs used mercury as the immersion fluid because its surface tension and wetting behaviour prevent it from entering the core sample. The pore volume is measured based on the introduction or extraction of a fluid from the pore space. No lab has reported the extraction method, which involves the extraction of the infilled helium in the core plug placed in a vacuum chamber. The volume of the gas equals the pore volume determined from the change using Boyle's law. All reported analyses in the database used a gas (air or nitrogen) of known density to saturate the clean dry core sample. The gas volume, which equals to the pore volume, is determined from the gas density and the mass difference between the dry and the saturated core plug. The pore volume only represents the connected pore system, so the calculated porosity indicates the effective porosity. Anomalously high porosity values may be encountered in vuggy rock which does not represent the regionally connected pore system.

Bulk Density and Grain Density

The bulk density is determined by the ratio of the clean core sample mass and the bulk volume. The grain density calculated by the ratio of the clean core sample mass and the true volume of the irregular rock sample. The true volume of the sample is calculated by bulk volume minus by pore volume (Figure G.1).

$$\rho_{bulk} = \frac{m_{core}}{BV_{core}}$$

$$\rho_{grain} = \frac{m_{core}}{BV_{core} - PV_{core}}$$

Figure G.1 Calculation formula for bulk density and grain density, where m_{core} is the mass, BV_{core} is the bulk volume, and PV_{core} is the pore volume of the core sample.

The grain density is always larger or equal to the bulk density. Values in the database are marked invalid when the grain density is smaller than the bulk density. The grain density is the average density of the rock sample. If the core sample is dominated by one rock type, the grain density may indicate the lithology and can calibrate density-porosity well logs.

Permeability

Conventional core analysis process is undertaken at room temperature and pressure. Special core analysis process can measure the permeability at various pressure conditions. Permeability is measured by flowing a fluid through a core sample and recording the pressure drop at different flow rates. Three sets of permeability data are measured, horizontal permeability (KH), horizontal permeability 90° (KH_90°) and vertical permeability (Kv). Two perpendicular measurements are made in the horizontal direction (horizontal to the formational bedding planes), and one measurement is taken in the vertical direction. This is because the permeability may vary due to depositional lithofacies variations, such as laminations and oriented minerals. Usually the KH represents the larger of the two horizontal permeabilities and KH_90° represents the lesser one. In some wells, only one horizontal permeability is measured. In this case, we can only assume the KH represents the larger horizontal permeability value.

Typically, air or nitrogen is used to determine permeability in a clean, dry core sample. This can avoid the interaction between the rock and the test fluid and ensure the flow is single phase. To obtain accurate data, the testing flow must be laminar and there should be no slip condition during the measurement. To avoid turbulence, the flow rate of air or nitrogen must be low enough. Hence in some lab reports a range of rate and pressure points has been collected to ensure that some data fall in the laminar flow regime when tested. No slip boundary condition means that the velocity of the gas at the rock surface is zero. However, gas can move at the wall so slippage occurs. Therefore, the measured permeability is usually higher than would be observed in no slip conditions. Klinkenberg (1941) developed corrections to convert permeability measured by gas to non-slip permeability. In the core analysis database, documentation of implementation of the Klinkenberg formula is incomplete. Therefore, we have not run any corrections to the reported permeability values and assumed the measured permeability values are slightly higher than true values.

Rock Compressibility and Overburden Pressure

Rock compressibility was not measured in the conventional core analysis, but it may affect the measured parameters. It can be determined by hydrostatic or triaxial tests (Newman 1973). There are no hydrostatic tests done on the samples in the core analysis database for this study. Rock compressibility depends on the type of rock, the porosity, and on consolidation of the rock. In general, carbonate rocks are almost always consolidated. While the extent of consolidation certainly affects compressibility, the effects of pressure and porosity are less certain (Baker et al. 2015). Both Newman's (1973) and Hall's (1953) correction fails to calculate the rock compressibility (*see* Baker et al. 2015), so no correction has been done on our reported core analysis data.

Overburden pressure is the pressure applied on the rock from the overlying rock and unconsolidated soils. In the deep subsurface , the porosity, permeability and compressibility are reduced when the overburden pressure is high. In a conventional core test, the measurements are conducted at near atmospheric pressure and with no overburden pressure. The overall effect of net overburden pressure on the porosity and permeability for typical consolidated rock (e.g. carbonate rock) is commonly negligible because very little deformation occurs when the pressure is less than 2000 Kpa (*see* Baker et al. 2015; Tavakoli 2018). Therefore, no overburden pressure corrections have been made.

Appendix G.2: Summary of core analysis procedures of the 150 reported wells

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measuremen t
1	T002394	Maness Petroleum Laboratories Inc.	1967										
2	T003116	Maness Petroleum Laboratories Inc.	1970										
3	T001583	Core Laboratories	1965	Full Diameter									
4	F008231		1950										
5	T003105	Maness Petroleum Laboratories Inc.	1970										
6	T008748	Core Laboratories	1957										
7	T002923	Maness Petroleum Laboratories Inc.	1969										
8	T003646	Core Laboratories	1973	Full Diameter									
9	T003079	Maness Petroleum Laboratories Inc.	1970										
10	T002971	Maness Petroleum Laboratories Inc.	1970										
11	T002126	Maness Petroleum Laboratories Inc.	1969										
12	T003108	Maness Petroleum Laboratories Inc.	1970										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
13	T003117	Maness Petroleum Laboratories Inc.	1970										
14	T002508	Core Laboratories	1968	Full Diameter									
15	T002563	Core Laboratories	1969	Full Diameter									
16	T002738	Core Laboratories	1969										
17	T003235	Core Laboratories	1971										
18	T003673	Maness Petroleum Laboratories Inc.	1971										
19	T002254	Maness Petroleum Laboratories Inc.	1966										
20	T002488	Maness Petroleum Laboratories Inc.	1968										
21	T002083	Core Laboratories	1966										
22	T008747	Core Laboratories	1959	Full Diameter									
23	T001499	Core Laboratories	1964										
24	T001551	Core Laboratories	1964	Full Diameter									
25	T001541	Core Laboratories	1964	Full Diameter									
26	F004998	Core Laboratories	1954										
27	T000945	Clearbeach Resources Inc.	1964										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
28	F008717	Core Laboratories	1963	Full Diameter									
29	T008860	Core Laboratories	1963	Full Diameter									
30	T002599	Core Laboratories	1968	Full Diameter									
31	T002618	Core Laboratories	1968	Full Diameter									
32	T004000 A	Core Laboratories	1975										
33	T004033	Maness Petroleum Laboratories Inc.	1968										
34	T002434	Maness Petroleum Laboratories Inc.	1968										
35	T003000 A	Maness Petroleum Laboratories Inc.	1970										
36	T000210	Hycalog, Inc.	1959										
37	T002878	Core Laboratories	1969										
38	T000315	Core Laboratories	1959										
39	T008749	Core Laboratories	1958										
40	T002912	Maness Petroleum Laboratories Inc.	1969										
41	T001623	Core Laboratories	1963										
42	T002585	Maness Petroleum	1968										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
		Laboratories Inc.											
43	T003204	Maness Petroleum Laboratories Inc.	1971										
44	T002826	Core Laboratories	1969										
45	T002820	Core Laboratories	1969										
46	T002836	Core Laboratories	1969										
47	T002824	Core Laboratories	1969										
48	T004132	Core Laboratories	1976										
49	T003999	Core Laboratories	1975										
50	T004227	Core Laboratories	1978										
51	T004228	Core Laboratories	1976										
52	T004820	Core Laboratories	1977		Air								
53	T004206	Core Laboratories	1979										
54	T004910	Core Laboratories	1981										
55	T004911	Core Laboratories	1981										
56	T004912	Core Laboratories	1981		Toluene	Vapor Phase Extractor			140°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
57	T005155	Core Laboratories	1981										
58	T005119	Core Laboratories	1981										
59	T005605	Core Laboratories	1981		Toluene	Vapor Phase Extractor	5 Days	48 Hours	132°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
60	T005813	Core Laboratories	1982										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
61	T005788	Core Laboratories	1982										
62	T005738	Core Laboratories	1982										
63	T005730	Core Laboratories	1982										
64	T005732	Core Laboratories	1981										
65	T005764	Core Laboratories	1981										
66	T005752	Core Laboratories	1981										
67	T005746	Core Laboratories	1971										
68	T005789	Core Laboratories	1971										
69	T005792	Core Laboratories	1982										
70	T005731	Core Laboratories	1981										
71	T005734	Core Laboratories	1981										
72	T005791 A	Core Laboratories	1982										
73	T005925	Core Laboratories	1982										
74	T005983	Core Laboratories	1982										
75	T005990	Core Laboratories	1982										
76	T002669	Core Laboratories	1969										
77	T002481	Maness Petroleum Laboratories Inc.	1968										
78	T002548	Core Laboratories	1968										
79	T002528	Core Laboratories	1968										
80	T002339	Core Laboratories	1967										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
81	T002418	Core Laboratories	1967										
82	T002477	Core Laboratories	1968										
83	T002570	Core Laboratories	1968										
84	T001788	Maness Petroleum Laboratories Inc.	1965										
85	T002804	Core Laboratories	1969										
86	T002547	Core Laboratories	1968										
87	T002540	Core Laboratories	1968										
88	T002565	Core Laboratories	1968										
89	T002333	Core Laboratories	1967										
90	T006517	Core Laboratories	1984										
91	T006299	Core Laboratories	1983										
92	T006383	Core Laboratories	1984										
93	T006870	Core Laboratories	1985										
94	T006104	Core Laboratories	1983	89mm	Toluene	Vapor Phase Extractor	96 Hours	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
95	T006097	Core Laboratories	1983	89mm	Toluene	Vapor Phase Extractor	96 Hours	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
96	T006096	Core Laboratories	1983	89mm	Toluene	Vapor Phase Extractor	96 Hours	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
97	T006105	Core Laboratories	1983	89mm	Toluene	Vapor Phase Extractor	96 Hours	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
98	T007126	Robertson Research Canada Limited	1987										
99	T002812	Core Laboratories	1969										
100	T003245	Maness Petroleum Laboratories	1971										
101	T002815	Core Laboratories	1969										
102	T003434	Core Laboratories	1972										
103	T003106	Maness Petroleum Laboratories	1970										
104	T003244	Maness Petroleum Laboratories	1971										
105	T003205	Maness Petroleum Laboratories	1971										
106	T002821	Core Laboratories	1969										
107	T003239	Maness Petroleum Laboratories	1971										
108	T003271	Maness Petroleum Laboratories	1971										
109	T003243	Maness Petroleum Laboratories Inc. and Core Laborotary	1971										
110	T002560	Core Laboratories	1968										
111	T003671	Maness Petroleum Laboratories	1973										

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
112	T003274	Maness Petroleum Laboratories	1971										
113	T003077	Maness Petroleum Laboratories	1970										
114	T003675	Maness Petroleum Laboratories	1973										
115	T002840	Core Laboratories	1969										
116	T003674	Core Laboratories	1973										
117	T003415	Core Laboratories	1972										
118	T002340	Core Laboratories	1967										
119	T007380	Core Laboratories	1988		Toluene	CO2 Extractor	20 Days	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
120	T007381	Core Laboratories	1988		Toluene	CO2 Extractor	20 Days	48 Hours	120°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
121	T007292	Geotech Core Services	1988		Toluene	Vapor Phase	9 Days	24 Hours	150°			Boyle's Law, using helium porosimeter	Caliper, Archimees and Sanding
122	T003400	Geo-Engineering Laboratories Inc	1972										
123	T002759	Core Laboratories	1969										
124	T002803	Core Laboratories	1969										
125	T002760	Core Laboratories	1969										
126	T007460	Core Laboratories	1989		Toluene	CO2 Extractor	72 Hours	48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
127	T007450	Core Laboratories	1989		Toluene	CO2 Extractor	144 Hours	2 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
128	T007457	Core Laboratories	1989		Toluene	CO2 Extractor	168 Hours	48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
129	T007499	Core Laboratories	1989		Toluene	CO2 Extractor/Vapor Phase	144 Hours	48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
130	T007551	Core Laboratories	1990		Toluene	CO2 Extractor/Vapor Phase	240 Hours	48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
131	T007673	Geotech Core Services	1991		Toluene	Co2 Saturated Toluene Pressure Core Cleaner	240 Hours	24 Hours	110°	by helium using Boyle's Law	Steady State; Nitrogen to Air	Boyle's Law using helium porosimeter	Caliper and Archimees
132	T007706	Core Laboratories	1990		Toluene	CO2 Extractor	15 Days	48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
133	T007795	Core Labortories	1991					48 Hours	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
134	T005337	Core Laboratories	1991										
135	T008336	Chemical & Geological Laboratories Inc.	1994		Toluene	Vapor Phase	192 Hours	36 Hours	120°	by helium using Boyle's Law	Sandlasted and Nitrogen	Boyle's Law using helium porosimeter	Caliper

Appendix G.2 (continued)

ID	licence	Laboratory	Analysis Date	Core Size	Solvent	Extraction Equipment	Extraction Time	Drying Time	Drying Temperature	Pore Volume measurement	Permeability measurement	Grain Volume measurement	Bulk Volume measurement
136	T008335	Chemical & Geological Laboratories Inc.	1994		Toluene	Vapor Phase	264 Hours	36 Hours	120°		Sandlasted and Nitrogen	Boyle's Law using helium porosimeter	Caliper
137	T008471	AGAT Laboratories	1996		Toluene	CO2-toluene	408 Hours	48 Hours	108°	by helium using Boyle's Law	Sandlasted	Boyle's Law using helium porosimeter	Caliper
138	T008468	AGAT Laboratories	1997		Toluene	CO2-toluene	360 Hours	48 Hours	108°		Sandlasted	Boyle's Law using helium porosimeter	Caliper
139	T008427	Core Laboratories	1997		Toluene	Vapor Phase	12 Days	7 Days	115°	by helium using Boyle's Law		Boyle's Law in modified U.S.B.M. porosimeter using helium	Caliper
140	T008622												
141	T008529	AGAT Laboratories	1996		Toluene	CO2-toluene	264 Hours	48 Hours	108°		Sandlasted	Boyle's Law using helium porosimeter	Caliper
142	T002587	Core Laboratories	1997										
143	T002396	Core Laboratories	1997										
144	T002524	Core Laboratories	1968										
145	T008854	AGAT Laboratories	1993		Toluene	CO2-toluene	288 Hours	48 Hours	108°		Sandlasted	Boyle's Law using helium porosimeter	Caliper
146	T008888	AGAT Laboratories	1999		Water			48 Hours	108°		Sandlasted	Boyle's Law using helium porosimeter	Caliper
147	T008929	AGAT Laboratories	1999		Water			48 Hours	108°		Sandlasted	Boyle's Law using heliu porosimeter	Caliper
148	T008958	AGAT Laboratories	1999		Water			48 Hours	108°		Sandlasted	Boyle's Law using helium porosimeter	Caliper
149	T008954	AGAT Laboratories	1999										
150	T007290	Core Laboratories	1988	88mm									

Appendix H: Porosity and Permeability Variation in Key Wells

H.1 Pinnacle Structures (Area 1)

Carbonates of the Lockport Group in Area 1 have been variably dolomitized and salt-plugged. Porosity and permeability variations are quite heterogeneous due to cyclic deposition and subsequent diagenetic karstification. Samples less than 30 cm apart can vary in porosity from 3% to 26%.

Porosity measured on full-diameter core samples ranges from 0.1–38.2%, and permeability ranges from less than 0.01 mD to 12 800 mD. Reservoir porosity occurs in 1-9m thick intervals that are stratigraphically discontinuous. Porosity of 4–26% and permeabilities of 0.1–12800 mD (millidarcy) are typical in pay intervals. Principal reservoir development within pinnacles is comprised of a 40–60 m thick gross pay interval within the Guelph Formation and overlying A-1 Carbonate. Porous and non-porous carbonates occur in all depositional facies, and karstic surfaces play a major role in porosity enhancement that correspond to greater porosity and permeability. Porosity and permeability increase toward the west into the highly karstic restricted marine facies belt. In the main pay intervals, the southern-most cored wells have an average porosity of 3.9% and average permeability of 0.44 mD. The main pay intervals in the northernmost cored well has an average porosity of 13.2% and average permeability of 18.4 mD.

Terminus Pool

The Terminus Pool is located in southeastern Lambton County (Figure A.2). Three wells with core analysis data have been drilled in this pool. These are, from west to east, T002488 (Ram No.4, Core ID: 20), T002481 (Ram No.3, Core ID: 77) and T002585 (Ram No.5, Core ID: 42). A total of 510 datasets, ranging from depths of 298.3–408.2 m have tested four stratigraphic units, that stratigraphicaly upward are, Goat Island, lower Guelph, upper Guelph, and A-1 Carbonate formations.

Three distinct lithofacies variations occur in the Guelph Formation of this pool. In Ram No. 4 (T002488), the Microbial-Laminated Mudstone (LF7) is present overlying the Gastropod-Bryozoan-Algal Wackestone to Mudstone (LF 4). The lower Guelph Formation is dominated by the Skeletal-Algal Wackestone to Mudstone (LF 3). In Ram No. 3 (T002481) and Ram No. 5 (T002585), both LF 7 and LF3 are absent, and the Coral-Stromatoporoid-Skeletal Floatstone (LF 2) occurs in the lower Guelph Formation.

Stromatolitic Boundstone (A-1 Carbonate): the densely spaced, horizontal to inclined laminae with common evaporitic laths and streaks have formed a stromatolitic texture of the boundstone. The brownish grey inter-mat, microbial-induced layers are typically 0.5-5 cm thick. Evaporitic moldic porosity is highly enhanced by dissolution during early burial. Whole-core porosity ranges between 0.5–16.2% in Ram No.4, 0.2–26.7% in Ram No.3 and 8.2–28% in Ram No.5. Kmax range between 0.1–37.4 mD in Ram No.4, 0.1–305 mD in Ram No.3 and 8.3–273 mD in Ram No.5. No distinct trend has been recognized in this unit.

Microbial Laminites (A-1 Carbonate): the brownish grey microbial laminite beds are 5-10 cm thick. Individual laminae range in character from dispersed and discontinuous to well-developed, horizontal and planar. Mottle or clotted fabric occurs locally. Sparse peaked stylolites with low relief of 1–4 cm occur between laminae. Small evaporitic moldic pores are present with large-scale brecciations comprised of laminite clasts floating in the mudstone matrix. Visible pore-filling cement is limited to bluish white anhydrite. Calcite spar is rare in larger dissolved cavities. Whole-core porosity ranges between 1–19.2% in Ram No.4, 9.7–21.4% in Ram No.5 and 4.2–13.6% in Ram No.4. Kmax range between 0.1–855 mD in Ram No.4, 0.1–32.5 mD in Ram No.5 and 0.3–35.7 mD in Ram No.3. No distinct trend has been recognized in this unit. The average porosity and permeability are similar to, if not lower than, that of the stromatolitic boundstone.

Brecciated Microbial Laminites (LF 8, upper Guelph): the brecciated microbial laminites cap the Guelph Fm. It is less than 75 cm thick, clast-supported with angular clasts internally preserving a microbially laminated fabric in a medium grey to brown recrystallized matrix. Near the base of the unit, pebble-size clasts show imbricated fabrics, with the orientation nearly parallel to bedding planes. The clasts consist of limestone with patches of dolomitized matrix (Brintnell 2012). Fragments of stromatolites are variably large near the base. This lithofacies has low intercrystalline porosity with patches of non-selective fenestral porosity along laminae enhanced by karstic dissolution. Whole-core porosity ranges between 6.8–11.3% in Ram No.4, 3.2–6.7% in Ram No.5 and 7–8.4% in Ram No.4. Kmax range between 32.5–50.3 mD in Ram No.4, 0.1–32.5 mD in Ram No.5 and 0.3–35.7 mD in Ram No.3.

Microbial Laminites (LF 7, upper Guelph): this facies is a medium to dark grey or brown, thinly laminated, variably bioturbated, pelletal calcareous mudstone with very thin undulating microbial laminae. In only occurs in Ram No.4 in the Terminus Pool. The microbial laminations commonly show a planar to convoluted stromatolitic fabric that is often disrupted by centimetre-sized small cracks. Facies 7 has low intercrystalline porosity, but locally shows evidence of karstic dissolution along and between laminations, highlighting fenestral porosity. Whole-core porosity ranges between 10 to 21.9% in Ram No.4, and Kmax range between 14–206 mD.

Gastropod-Bryozoan-Algal Wackestone to Mudstone (LF 4, upper Guelph): this facies is medium to dark greyish brown wackestone to mudstone, with patches of moldic porosity created by small gastropods and/or brachiopods. Bryozoans are always fragmented, scattering throughout the mud matrix. Laminar stromatoporoids are common, forming white- to grey- streaks. Fragmented brachiopods are thick-walled. Overturned small rugose corals and *Favosites* corals are less than 5 cm in diameter. Brecciation is pervasively present in this facies. Breccias consist of angular, poorly sorted clasts of fossils of mudstone. Both matrix and clasts are dolomitized and recrystallized. Variably karstic dissolution or leaching has enhanced the moldic or intercrystalline porosity throughout the facies. Stromatoporoid fabrics are locally developed. It is the dominating facies of the upper Guelph and is present regionally in all wells that intersect the Guelph Fm. Whole-core porosity ranges between 14.3–26.7% in Ram No.4, 0.9–5.4% in Ram No.5 and 4.5–14.4% in Ram No.3. Kmax range between 33.1–226 mD in Ram No.4, 0.1–250 mD in Ram No.5 and 0.2–27.4 mD in Ram No.3.

Skeletal-Algal Wackestone to Mudstone (LF 3, lower Guelph): this facies only occurs in Ram No.4. In general, it consists of light to medium brownish grey, finely crystalline, bioturbated and pelletal mudstone to wackestone with skeletal fragments and clotted fabric with black, low-relief stylolites. Small *Favosites* and laminar stromatoporoids are locally present. Local brecciation are well developed associated with moldic porosity. Bluish mottles have contributed to the clotted appearance of this facies. Whole-core porosity ranges between 9.9–23.1% in Ram No.4, and Kmax range between 9.5–112 mD. LF 3 shows low intercrystalline porosity throughout, but the moldic porosity has developed significantly in leached horizons associated with brecciated zones. Portions of the brecciated zones are completely dissolved and re-precipitated, thus having obliterated all evidence of any primary depositional fabric that existed prior to dissolution.

Coral-Stromatoporoid-Skeletal Floatstone (LF 2, lower Guelph): this facies is featured by the overturned corals and stromatoporoids in a thick- to massive-bedded, light to medium tan to brown, finely crystalline, bioturbated, pelletal mudstone matrix. Brachiopods, bivalves and bryozoans may occur, but are uncommon. Corals and stromatoporoids are dispersed and fragmented, indicating a disturbance after deposition by waves or storms. Gastropod and megalodont shells are found in the uppermost portion of this facies. Whole-core porosity ranges between 3.3–22.8% in Ram No.5 and 2.5–12.7% in Ram No.3. Kmax range 0.5–687 mD in Ram No.5 and 0.3–113 mD in Ram No.3. This facies has good intercrystalline porosity and may show hydrocarbon staining. Patches of small vugs and moldic porosity are common. Peaked stylolites with low relief (less than 0.5 cm) are common throughout. In the uppermost of this facies, 3–6 cm thick cracks with isopachous cement fill and brecciated intervals are common. The clasts composed of angular, poorly sorted Coral-Stromatoporoid-Skeletal Floatstone and the matrix is the same pelletal mudstone with micrite layers.

Stromatoporoid-Algal-Skeletal Packstone to Wackestone (LF 1, lower Guelph): this facies occurs in all three wells as the basal unit of Guelph Fm. Is is featured by a light to medium grey or brown, massive, finely- to medium-crystalline, bioturbated, skeletal wackestone. The mud matrix is pelletal with common peaked and wispy stylolites. Laminar or low domical stromatoporoid, as well as small tabulate and rugose corals and bryozoans are common. Skeletal allochems are concentrated in intervals alternating with near-barren carbonate mudstone to wackestone intervals, indicating periodic storm events. Whole-core porosity ranges between 4.1–13.9% in Ram No.4, 0.4–16.1% in Ram No.5 and 13.1–19.2% in Ram No.3. Kmax range between 0.1–79 mD in Ram No.4, 0.1–552 mD in Ram No.5 and 4.1–247 mD in Ram No.3. The porosity of the muddy matrix is generally intercrystalline that has been recrystallized due to dolomitization and karstification. Patches of moldic porosity are locally developed. Vugs can be plugged by halite and/or anhydrite; or filled in by isopachous calcite, scalenohedral calcite, and/or saddle dolomite; or unfilled.

Crinoidal Grainstone (Niagara Falls Member, Goat Island Fm): this member is is a blue-grey to bleached white and gray, sucrosic and bioturbated encrinite with a diagnostic cross laminated pin-stripe pattern. This member has relatively low porosity, hydraulic conductivity and transmissivity (Brunton 2009). Whole-core porosity ranges between 4.9–13.9% in Ram No.4 and 0.8–1.3% in Ram No.5. Kmax range between 0.1–47 mD in Ram No.4 and 0.1–17.3 mD in Ram No.5.

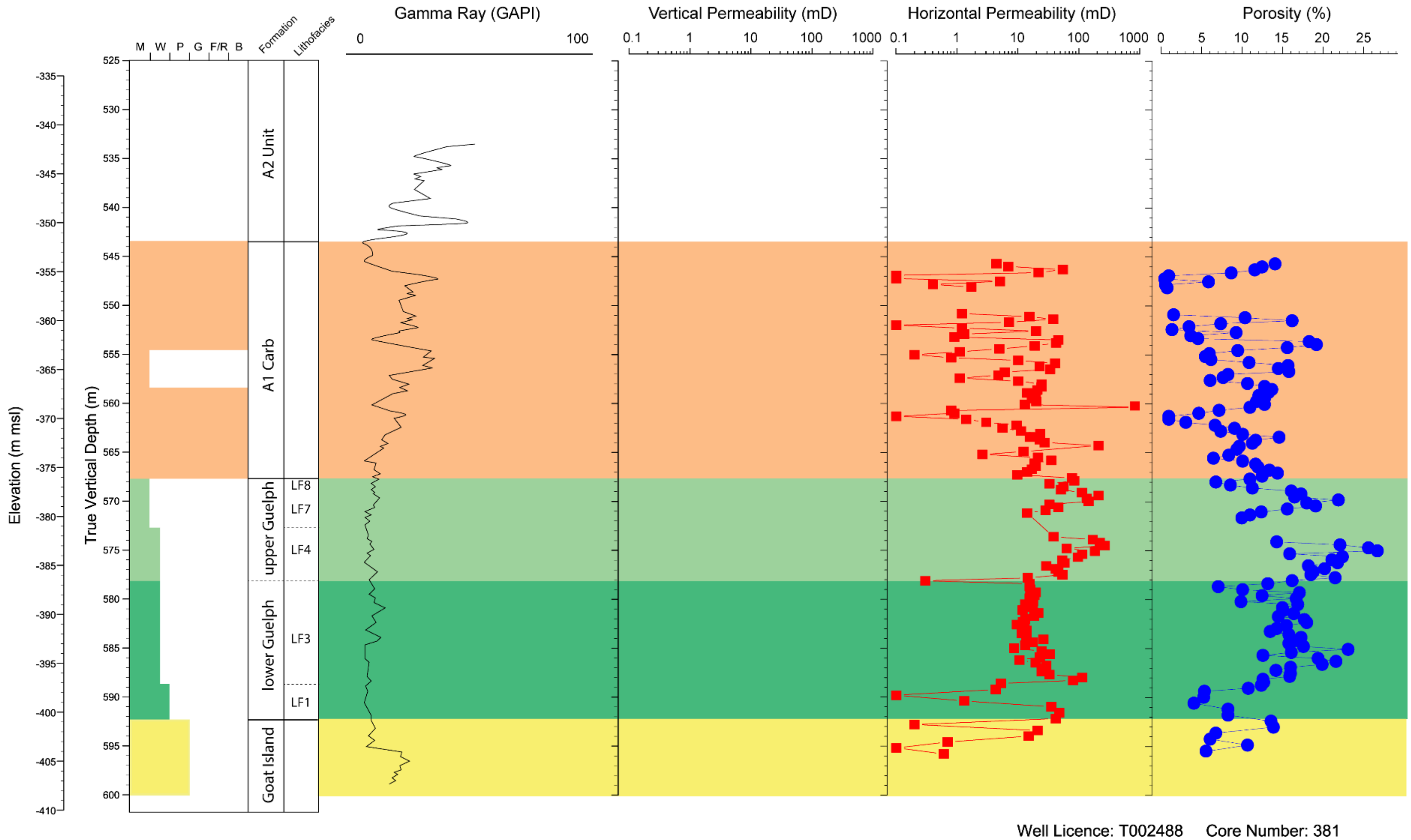

Figure H.1 Lithofacies, porosity and permeability variation of Ram No.4 (T002488) in Area 1 (pinnacle structure).

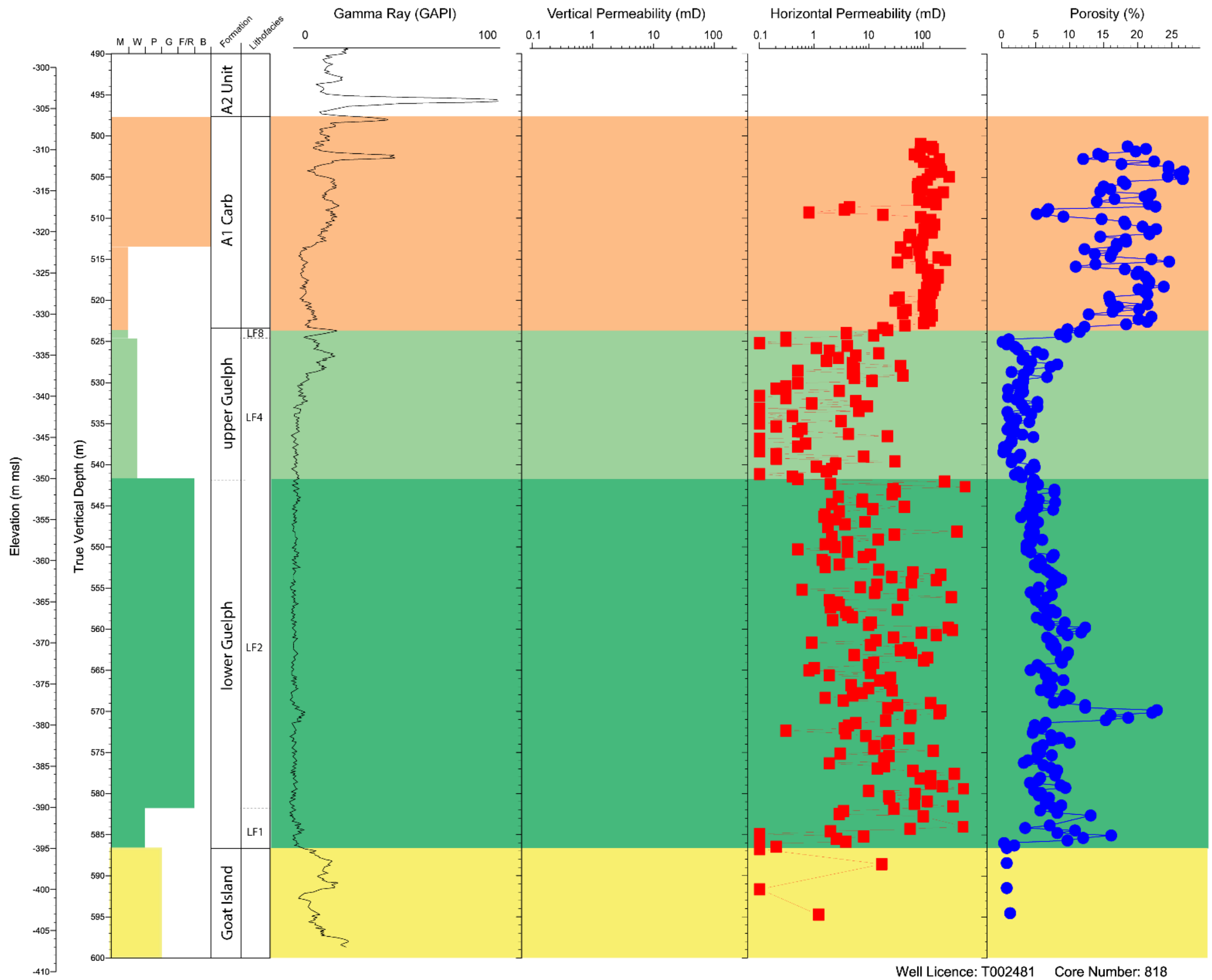

Figure H.2 Lithofacies, porosity and permeability variation of Ram No.5 (T002481) in Area 1 (pinnacle structure).

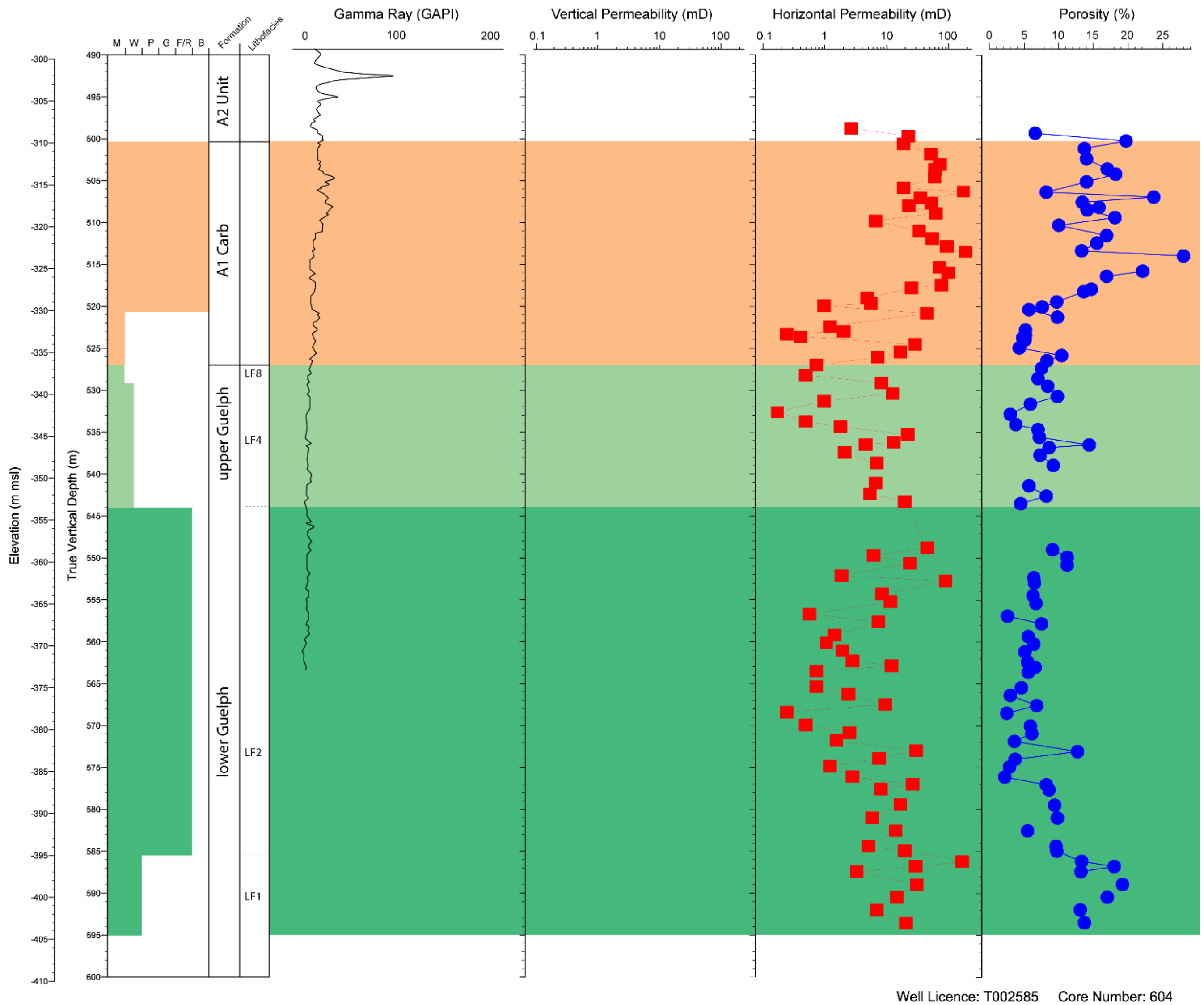

Figure H.3 Lithofacies, porosity and permeability variation of Ram No.3 (T002585) in Area 1 (pinnacle structure).

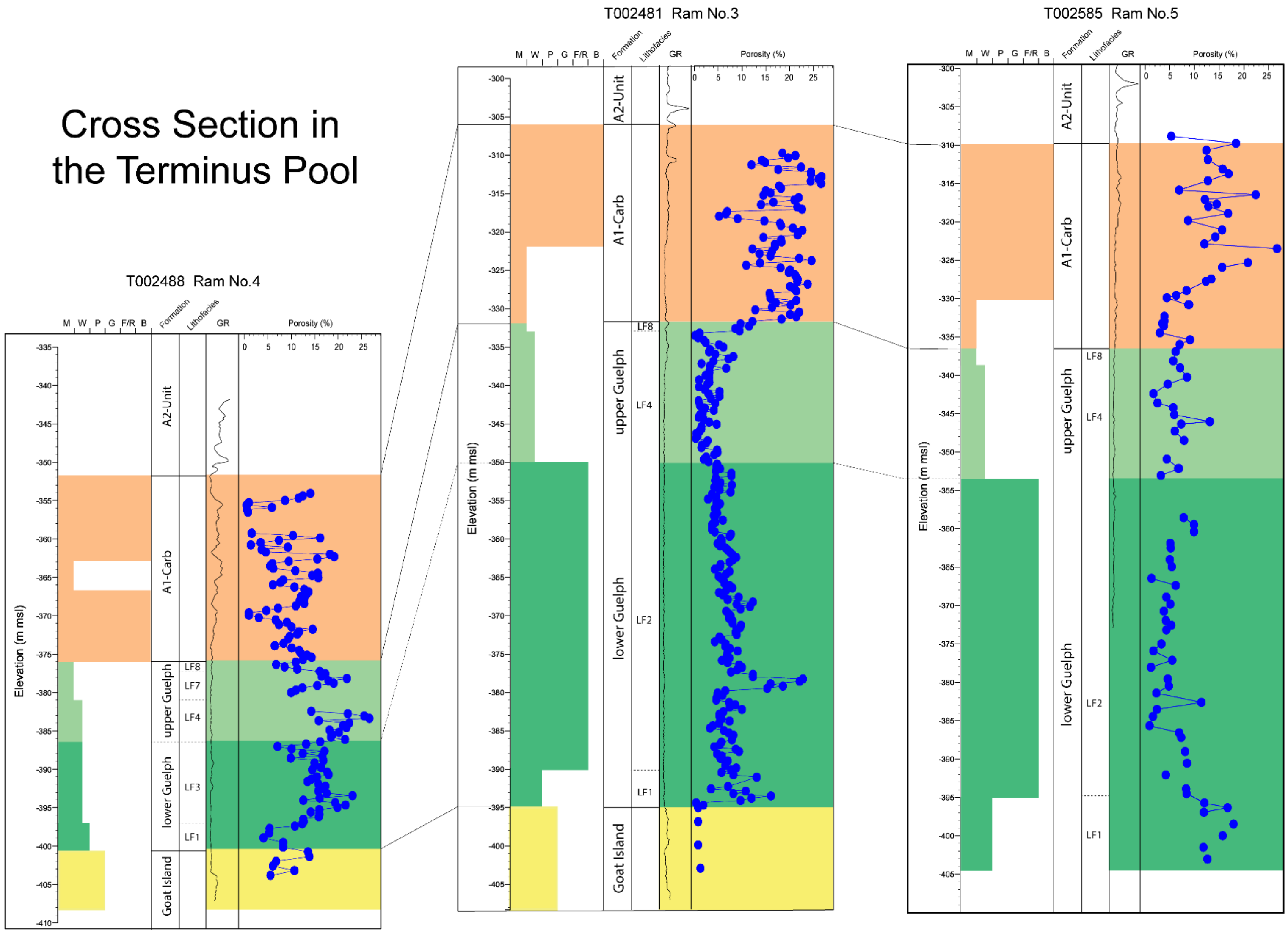

Figure H.4 Structural correlation of lithofacies, porosity and permeability of Ram No.4 (T002488), Ram No.5 (T002481) and Ram No.3 (T002585), in Terminus Pool pinnacle structure in Area 1.

Middlesex-Huron-Bruce counties

In this area, similar to the complex mosaic of paleokarsted Lockport Group in Lambton County, pinnacle structures and inter-pinnacle karsts areas have been subdivided. Well data density is smaller in that only four wells (Figure A.1) with core analysis data have been documented. All the four wells are located within pinnacle structures with only short cored intervals. The shales and shaly carbonates of the Rochester Formation pinch out in this area and are replaced by its equivalent Lions Head Formation that underlies the basal Gasport Formation by an unconformity.

Amoco A (T005155, Core ID: 57) and Amoco A-1 (T004910, Core ID: 54) have been selected as reference wells to show the porosity-permeability variations in the cored Guelph Formation (Figure H.5 and H.6). In well of Amoco A (T005155), a total of 43 core analysis samples are measured from lower LF4 and upper LF2 of the Guelph Fm (Figure H.7). The dolostone of the Guelph Fm consists of abundant vugs and cavities that are partly plugged by secondary calcite. Karstic conduits are present commonly infilled by undissolved residues. Whole core porosity ranges from 2.7–13.3% and Kmax between 0.04–1790 mD. In Amoco A-1 (T004910), a total of 26 core analysis samples are measured from lower LF4 of the Guelph Fm (Figure H.6). Similar to Amoco A (T005155), the porosity types are dominated by diagenetic vugs and cavities with presence of karstic conduits. Whole core porosity ranges from 1–14% and Kmax between 0.04–3500 mD.

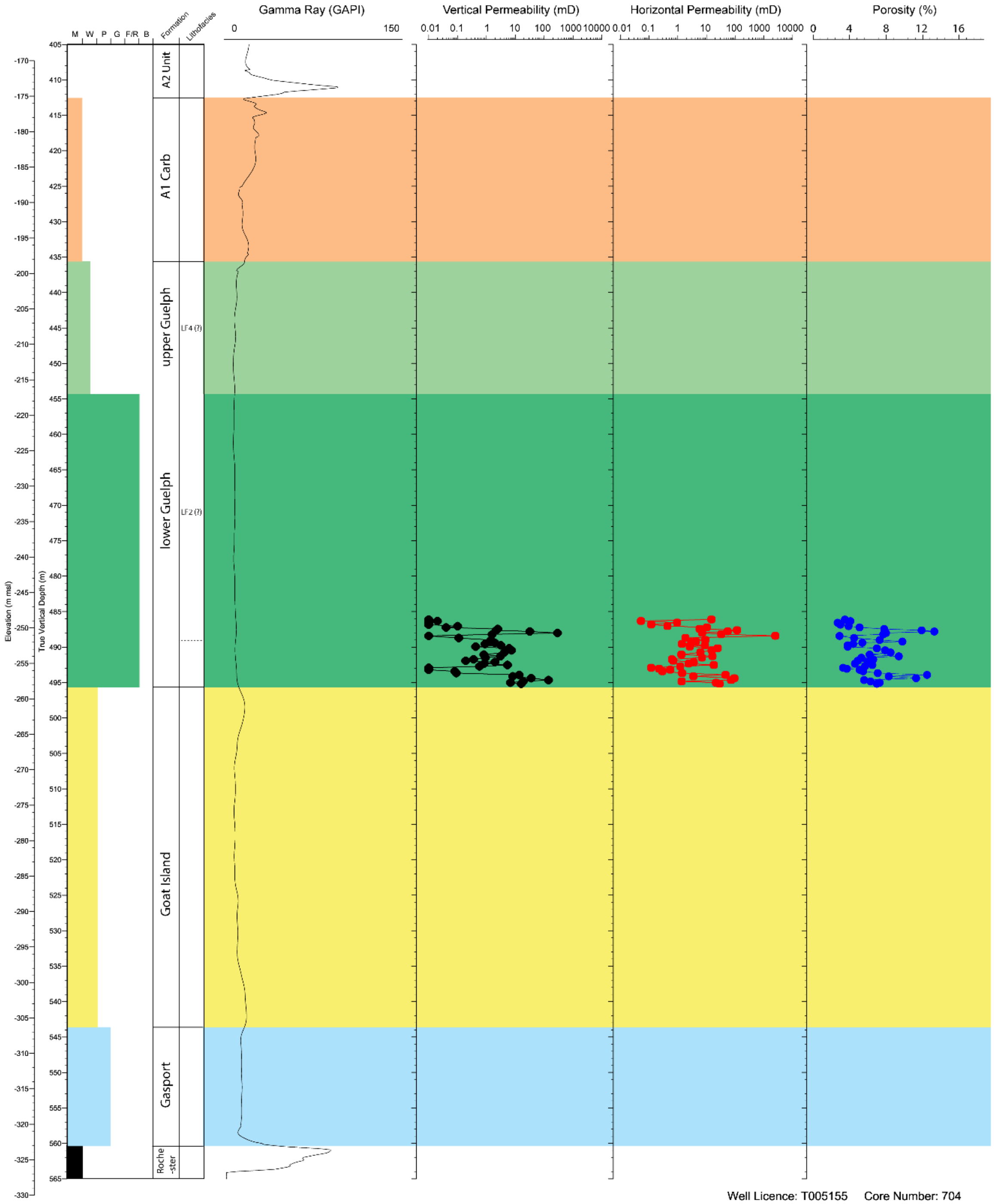

Figure H.5 Lithofacies, porosity and permeability variation of Amoco A (T005155) in Area 1 (pinnacle structure).

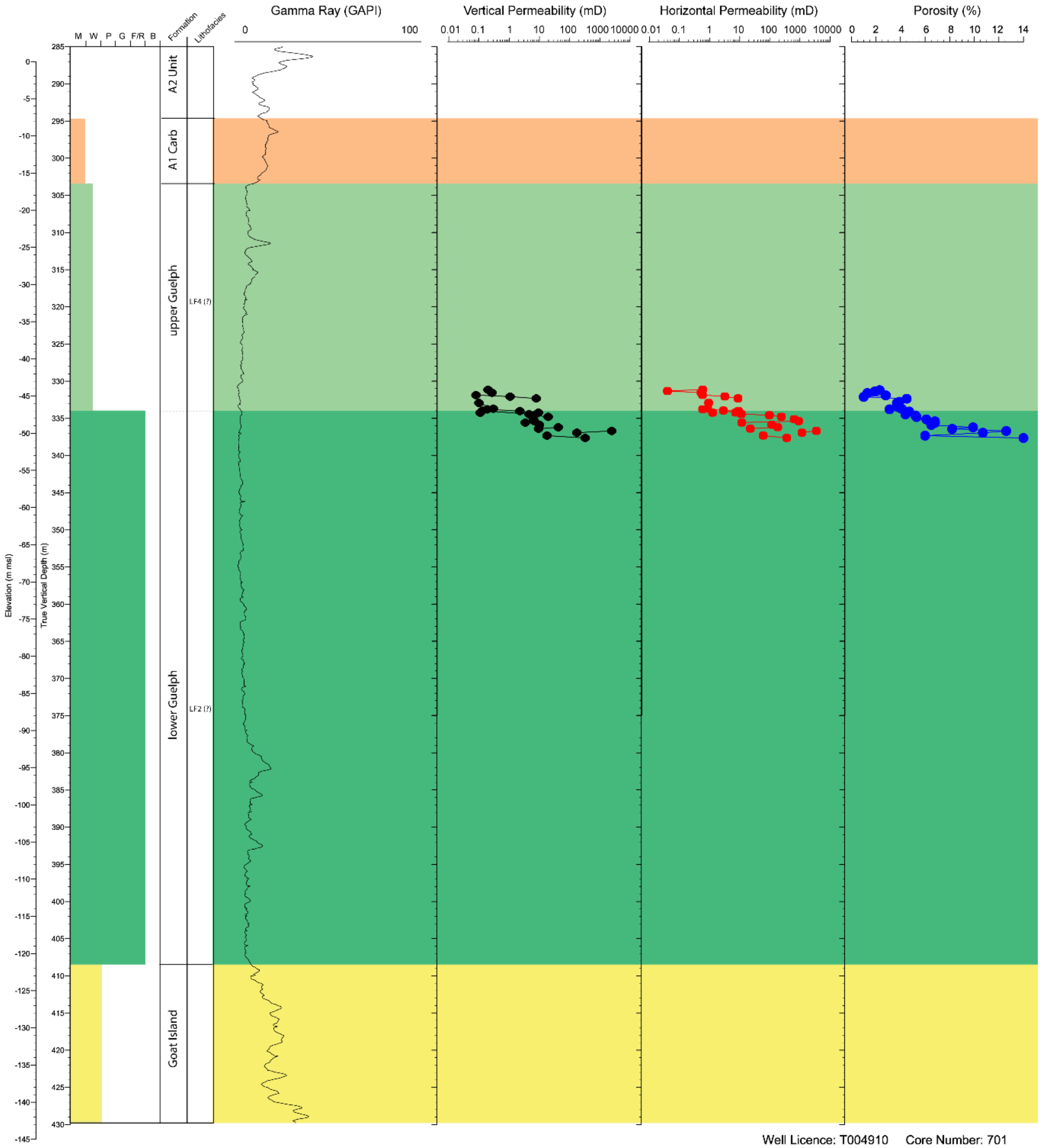

Figure H.6 Lithofacies, porosity and permeability variation of Amoco A-1 (T004910) in Area 1 (pinnacle structure).

H.2 Inter-pinnacle Karst, Area 1

In the inter-pinnacle karst area, the cumulative thickness of the Lockport Group ranges between 18–27m. The Guelph Formation shows strong evidence of diagenetic dissolution and karstification. It is overlain by the dark brown, thinly laminated A-0 Carbonate. A-1 Carbonate Unit thickens to over 40m and is variably bituminous. The present-day top of the Guelph Formation in the inter-pinnacle area is structurally 70–90 m lower than within the pinnacle structures, which contributed to the accommodation space for deposition of the A-0 Carbonate, A-1 Evaporite and thick A-1 Carbonate in a restricted, sabkha environment. Only three wells with core analysis data are available in this inter-pinnacle karst area. These are, Imperial Seckerton No.6 (T008747, Core ID: 22) and Consumers' 16285 (T002477, Core ID: 82) (Figure H.7 to H.9). T007290 has been described in detail in Carter et al (1994) and is not included here. A fourth well (T001992 Argor 65-1) recovered drill core from interpinnacle Guelph Formation as described by Carter et al (1996) but no core analysis was completed.

Inter-pinnacle Lithofacies, Lambton County

Stromatolitic Boundstone: this facies occurs in the upper A-1 Carbonate Fm. Similar to that of A-1 Carbonate within pinnacle structures, the Stromatolitic Boundstone features densely spaced, horizontal or inclined inter-mat layers with very common diagenetic anhydrite nodules or laths. Vugs and moldic cavities are very common distorting the stromatolitic layers. Desiccation cracks and brecciated mat layers are common in anhydrite-rich intervals. Thin dark black shale partings (1–3 cm) and pyrite are pervasive with rare low relief peaked stylolites. This unit can be variably bituminous thoughout. Whole-core porosity ranges between 0.4–4.2% in Consumers' 16285, and Kmax range between 0.05–2.65 mD.

Laminated Mudstone: this facies forms the lower A-1 Carbonate. It is anhydritic at the base with thin blue anhydrite beds interbedded in the tan to brown, very thinly laminated to thin to medium bedded, bituminous dolomudstone. Karstic dissolution, anhydrite nodules (< 1cm in diameter) and blocky anhydrite laths occur throughout. No porosity or permeability data has been recovered in this unit.

A-1 Evaporite: this is a blue- or white-coloured anhydrite unit. The texture forms range from nodular to interlaminated anhydrite and dolomicrite. The nodular anhydrite has crypto-crystalline dolomicrite wisps between nodules that commonly appear distorted and flattened. The carbonate laminations encrusting the massive anhydrite nodules are tan to brown, thin (<0.1 mm) dolomites. Chicken wire, enterolithic, mosaic, and felted textures are seen throughout this unit indicating complete/incomplete shallowing upward sabkha cycles. No porosity-permeability data has been recovered from this unit.

A-0 Carbonate: this is a light brown dolomudstone with thin, dark brown, crinkly horizontal laminae with submillimeter-scale spacing. The upper A-0 Carb is dominated by thinly laminated dolomudstone. The lower A-0 consists of crinkly laminated, algal laminites. Desiccation cracks and thin blue anhydrite beds occur in the uppermost beds. Whole-core porosity ranges between 7.7–8.7% in Consumers' 16285, and Kmax range between 0.21–1.58 mD. Karstic dissolution (leaching) has served to enhance intercrystalline porosity.

Upper Guelph: the upper Guelph consists of highly karstic, medium to dark brown, poorly bedded dolostone. Pebble-sized dolostone clasts float in a dolomudstone matrix. Karstic conduits and rubbles are very common. Depositional structures have been altered by the diagenetic features of dissolution and karstification. Whole-core porosity ranges between 1.9–13.1% in Imperial Seckerton No.6 and 4.9–11.6% in Consumers' 16285. Kmax range 3.36–13.28 mD in Imperial

Seckerton No.6 and 0.09–21.2 mD in Consumers' 16285. Vugs and dissolution-enhanced cavities are very common.

Lower Guelph: the lower Guelph is medium to dark brownish grey, poorly bedded dolostone. Dolostone clasts of Guelph Fm float in the medium grey, recrystallized dolostone of the Goat Island lithology. Karst rubbles are very common. Whole-core porosity ranges between 2.2–12.1% in Imperial Seckerton No.6 and 0.7–8.1% in Consumers' 16285. Kmax range 2.2–14.52 mD in Imperial Seckerton No.6 and 0.01–0.36 mD in Consumers' 16285.

Goat Island Fm: this formation in the inter-pinnacle area is featured as light- to medium- brown, finely crystalline, thin- to medium- bedded, variably argillaceous and bioturbated dolostone. Bluish grey mottle are very common with horsetail patterned stylolites. Crinoid grains are dominating. Rugosans and laminar stomatoporoid fragments are rare. Only one dataset is recovered in Consumers' 16285, with porosity of 2% and Kmax of 5.98.

Gasport Fm: this formation in the inter-pinnacle area is light grey, thick- to massive- bedded, fine- to coarsely- crystalline crinoidal grainstone with blue-grey to white pinkish mottles. Small tabulate corals and rugosans are rare. Peaked stylolites and horizontal planar laminations are present. Whole-core porosity ranges between 0.2–1.4% in Consumers' 16285, and Kmax range between 0.04–1.19 mD.

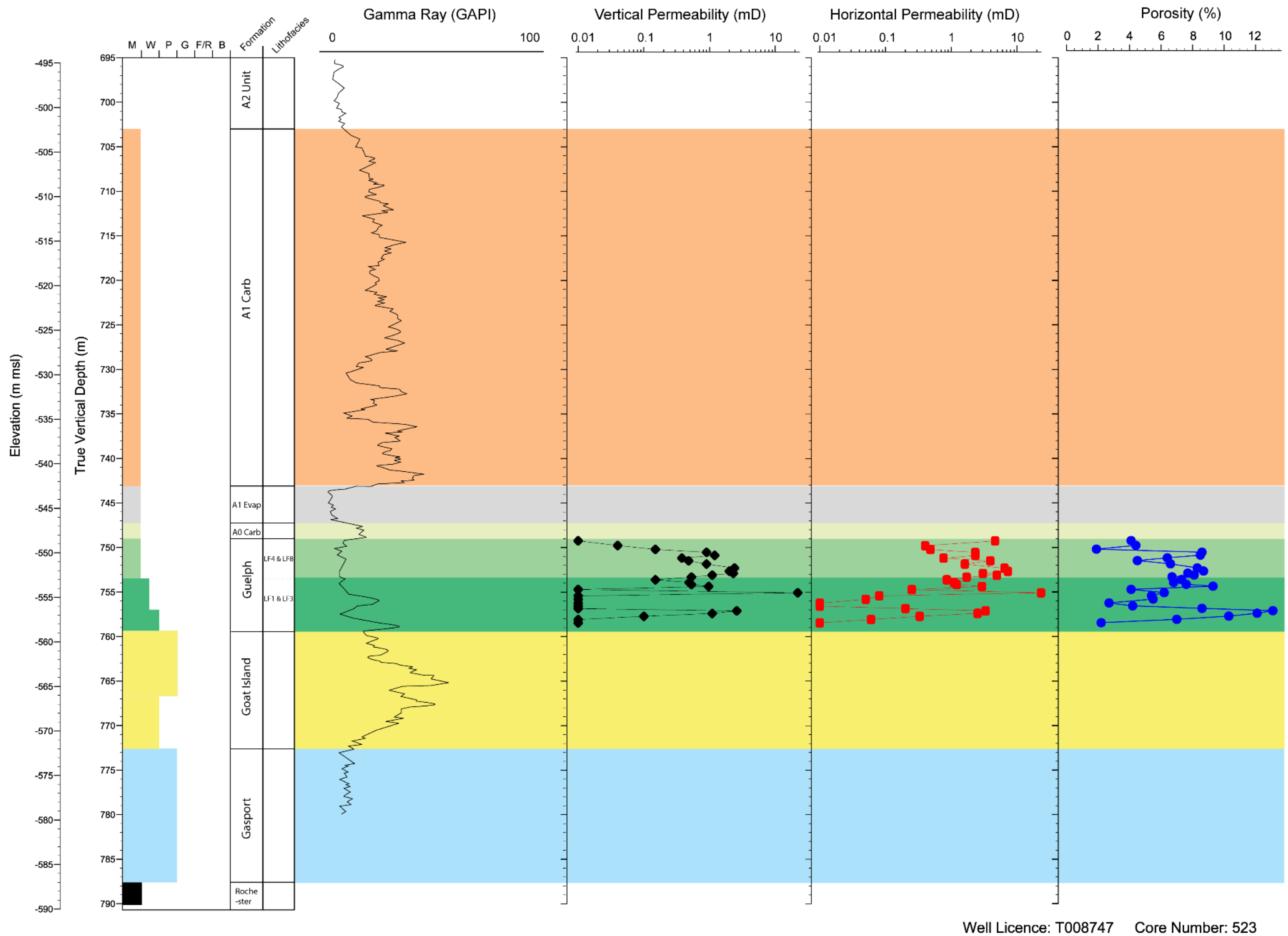

Figure H.7 Lithofacies, porosity and permeability variation of Imperial Seckerton No.6 (T008747) in Area 1 (inter-pinnacle).

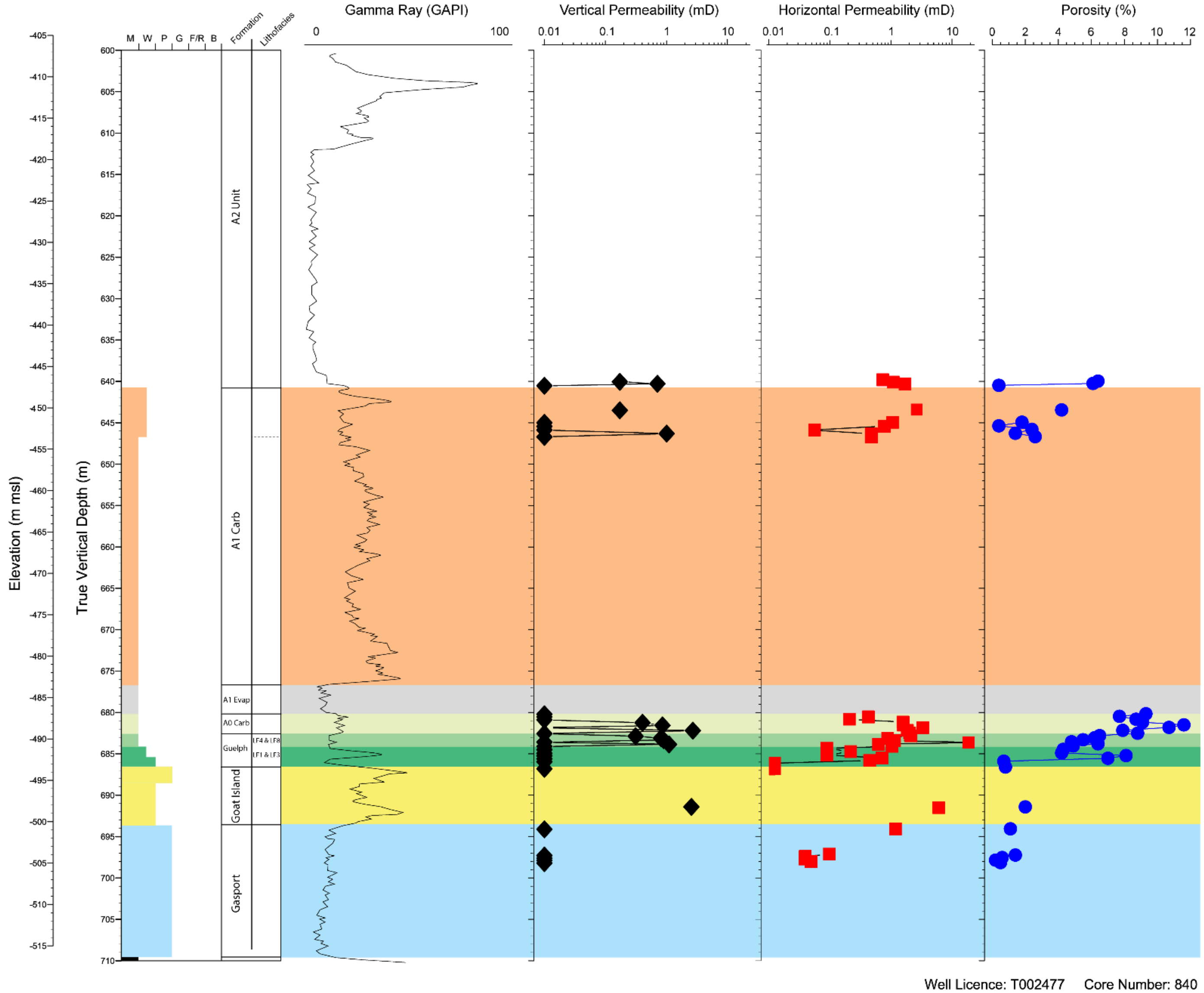

Figure H.8 Lithofacies, porosity and permeability variation of Consumers' 16285 (T002477) in Area 1 (inter-pinnacle).

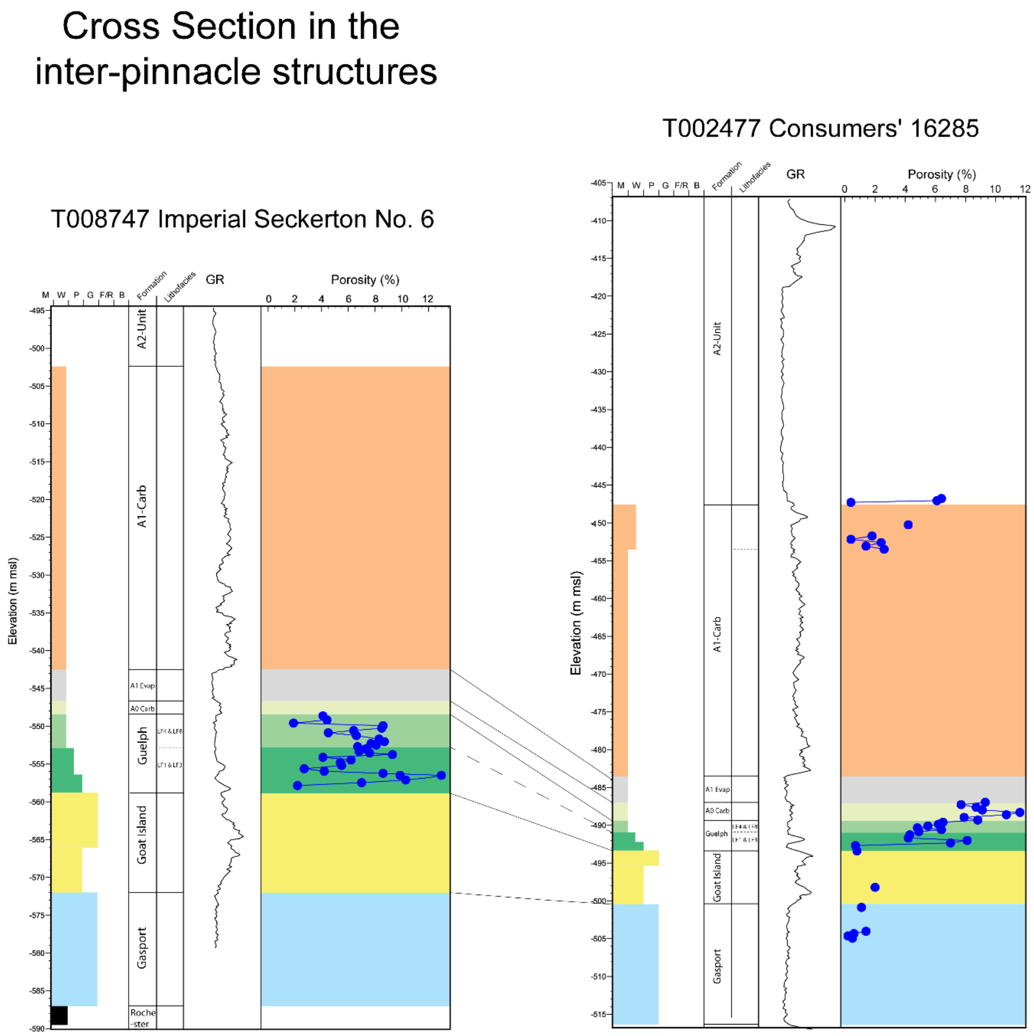

Figure H.9 Stratigraphic correlation of lithofacies, porosity and permeability variation of Imperial Seckerton No.6 (T008747) and Consumers' 16285 (T002477) within the inter-pinnacle karsts in Area 1.

H.3 Middle to outer ramp, Area 3

In this area, overlying a complex mosaic of Gasport and Goat Island Formation paleo-highs, the thickness of Guelph Formation varies from 8m to over 50m that reflects a period of mid-outer ramp deposition (Brunton et al. 2012; Brunton and Brintnell 2020; Figure A.3). Karstification is rare.

The A-1 Carbonate has two lithofacies present – the algal laminites with rare evaporites and dolo-mudstone. The upper Guelph Fm comprises of lagoonal to open marine lithofacies of LF 8 and LF4. The lower Guelph Fm consists of dominantly LF 2 and locally occurred LF 3. The Goat Island Fm comprises of the Niagara Falls Member that is rich in stromatoporoids, corals and crinoids and the Ancaster Member of finely crystalline grainstone. The Gasport Fm is dominated by coarsely crystalline, crinoidal grainstone that represents an open-marine, sublittoral environment. Reef mounds occur locally near the base of Guelph, Goat Island and Gasport formations.

Porosity measured on full-diameter core samples ranges from 0.1–15.2%, and permeability ranges from less than 0.01–10800 mD. An average of approximately 45m of porous calcitic dolostone or limestone is present from lower A-1 Carbonate to uppermost Goat Island Fm is present in the natural gas fields. Porosity of 4–18.9% and permeabilities of 0.1–10800 mD are typical in pay intervals. Most reservoirs have been produced from a 40–60 m main pay intervals. Porous and non-porous carbonates occur in all depositional facies, and karstic surfaces play a major role in porosity enhancement that correspond to greater porosity and permeability. Porosity and permeability decrease toward the east into the open marine facies.

Fletcher Pool

The Consumers 33411 (T005792, Core ID: 69), Consumers 40000 (T006096, Core ID: 96) and Consumers' 33408 A (T005791A, Core ID: 72) wells are located in the Fletcher Pool (Figure A.3). Overall, 78 core analysis samples are measured from the A-1 Carbonate and 135 samples from the Guelph Fm (Figure H.10–H.13). The A-1 Carbonate comprises of algal laminites with rare evaporites. Only the lower dolostone have been measured, with whole core porosity ranging from 1.8–5.8% and Kmax between 0.01 mD to 0.14 mD. The Guelph Formation is characterized by two distinct lithologies and depositional environments, including LF4 and LF2. Whole core porosity ranges from 1.6–8.9%, with an average of 3.25%, 3.44% and 5.15%, respectively. Kmax ranges between 0.01–10200 mD, with an average of 154.191 mD, 120.688 mD and 32.356 mD. Consumers 33411 (T005792) and Consumers 40000 (T006096) have high variations of porosity and permeability in the Guelph Formation corresponding to gas-bearing intervals, and Consumers' 33408 A (T005791A) possesses relatively low values with no initial gas shows in this well.

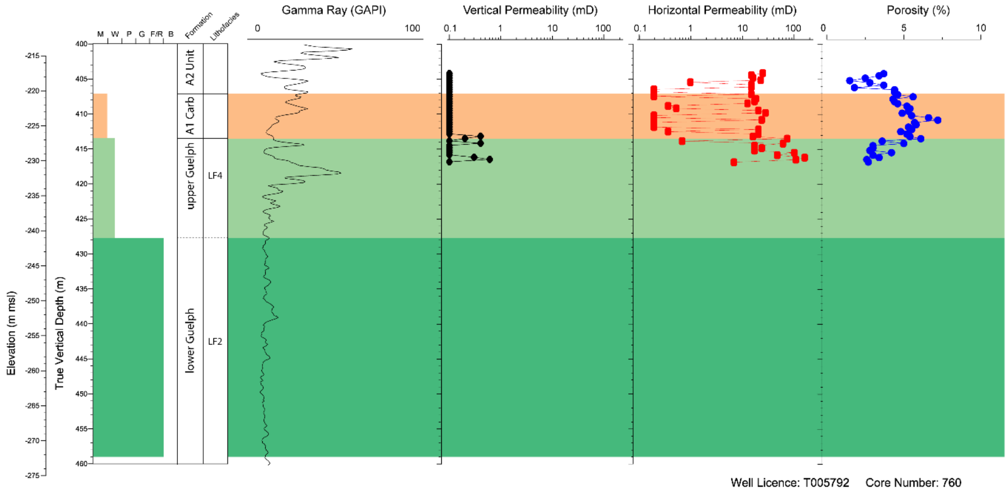

Figure H.10 Lithofacies, porosity and permeability variation of Consumer 33411 (T005792) in Area 3.

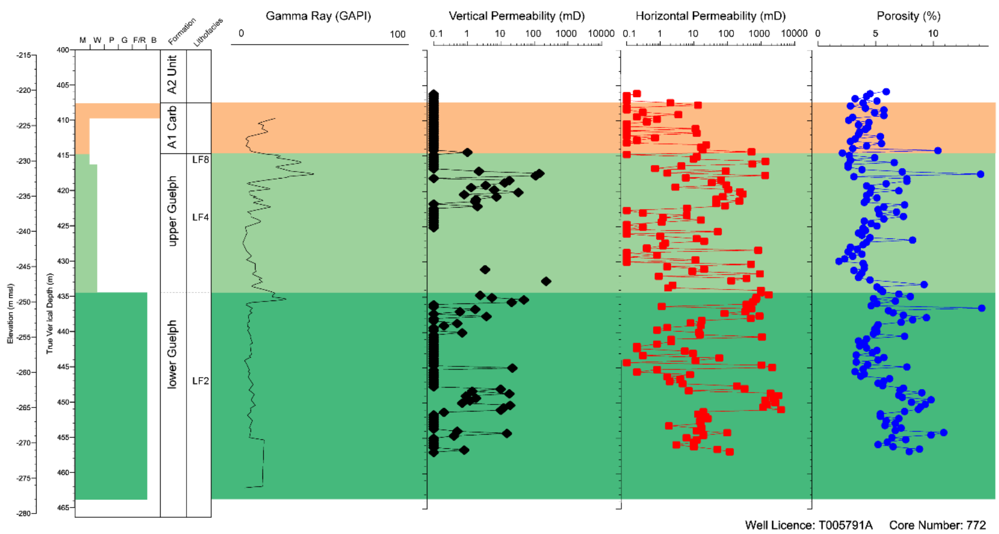

Figure H.11 Lithofacies, porosity and permeability variation of Consumer 33408 (T005791A) in Area 3.

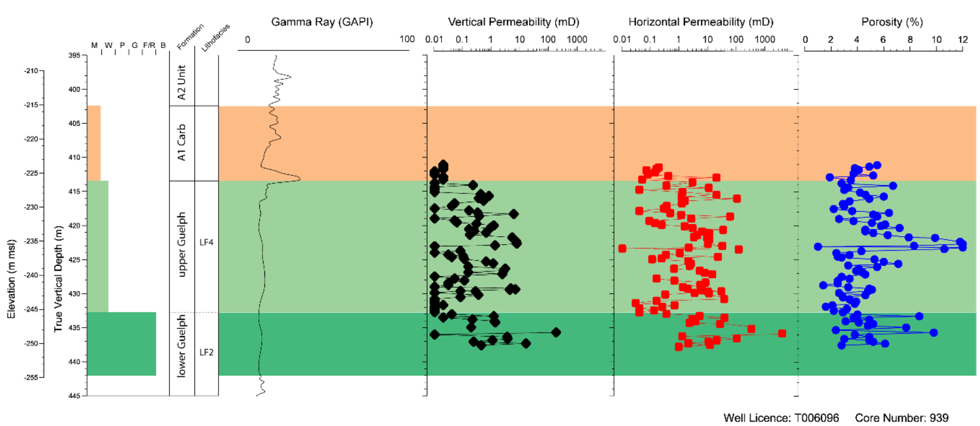

Figure H.12 Lithofacies, porosity and permeability variation of Consumer 40000 (T006096) in Area 3.

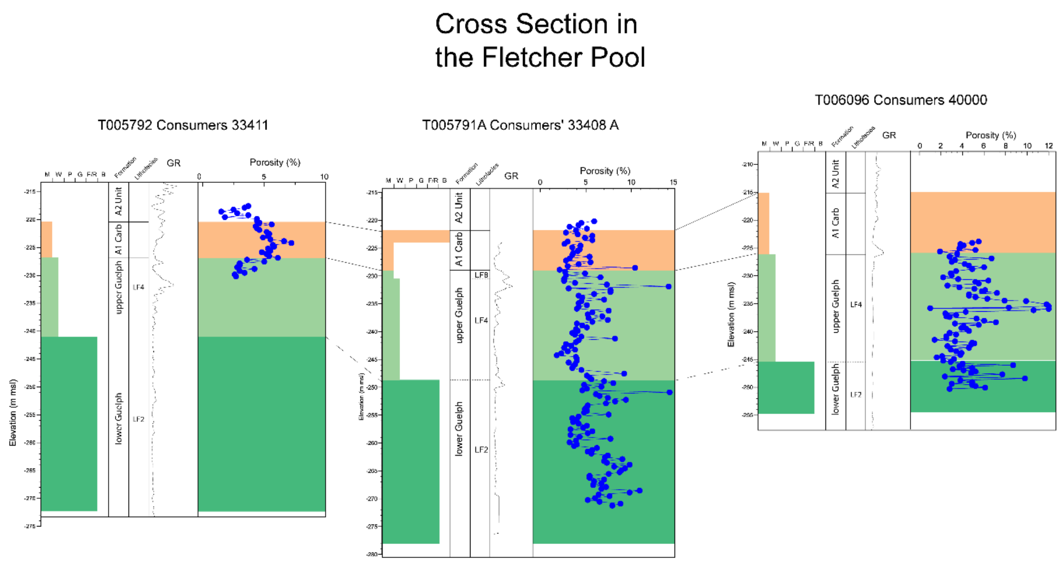

Figure H.13 Stratigraphic correlation of lithofacies, porosity and permeability variation of Consumes 33411 (T005792), Consumers' 33408 (T005791A) and Consumers 40000 (T006096) within Area 3.

Tilbury Pool

C.W.P.66-L-59 (T002126, Core ID: 11) and Consumers' 16285 (T001788, Core ID: 84) have been selected as reference wells to show the porosity-permeability variations in the Tilbury Pool (Figure A.3). In total, 148 core analysis tests, ranging from 465.23–504.7 m were performed within the A-1 Carbonate, Guelph and Goat Island (Figure H.14 to H.16). The A-1 Carbonate (683.8–706.3 m) is characterized algal laminites with very common vugs and moldic porosity. The dense matrix of the lower 1.7 m of the A-1 Carbonate Unit reduces the whole core porosity (0.2–0.4%). In A-1 Carbonate, whole core porosity ranges from 0.4–17.2%, with an average of 8.36%; Kmax ranges between 0.01–1100 mD, with an average of 212.56 mD. The Guelph Formation (476.3–490.8 m) is characterized by distinct lithologies of LF4 and LF2. The upper 5.7 m of the Guelph Fm is dominated by fenestral vugs and dissolution-enhanced moldic porosity are common. Intercrystalline porosity within fossils (tabulate corals and laminar stromatoporoids) and moldic porosity of gastropods are dominating through LF4 and LF2. Whole core porosity ranges from 0.1–7.9%, with an average of 4.965%; Kmax ranges between 0.01–718.12 mD, with an average of 121.37 mD. Two members of the Goat Island Formation are present (490.8–504.7 m). The Ancaster Member is characterized by medium brown, medium to thick bedded, bioturbated stromatoporoid and crinoidal wackestone to packstone. The formation top is marked by an undulatory surface with karstic clasts supported by wackestone matrix below. Vugs and intercrystalline porosity is pervasive in this member. The Niagara Falls Member is comprised of light bluish grey, highly bioturbated, argillaceous, crinoidal dolo-grainstone. Whole core porosity ranges from 0.1– 7.9%, with an average of 3.591%; Kmax ranges between 0.01–288.16 mD, with an average of 29.292 mD. The highest porosity and permeability sample is taken from the lower Niagara Falls Member, where intergranular porosity and pinpoint vugs are common. Naturalgas is reported from A-1 Carbonate to the upper Gasport Fm (684.00–774.00 m) corresponding to the pervasively high porosity and permeability in all units. The highest porosity unit occurs in the A-1 Carbonate (685.93–697.57 m), with an average porosity of 21.205%. Average porosity and permeability values decrease downward from lower A-1 Carbonate to upper Goat Island.

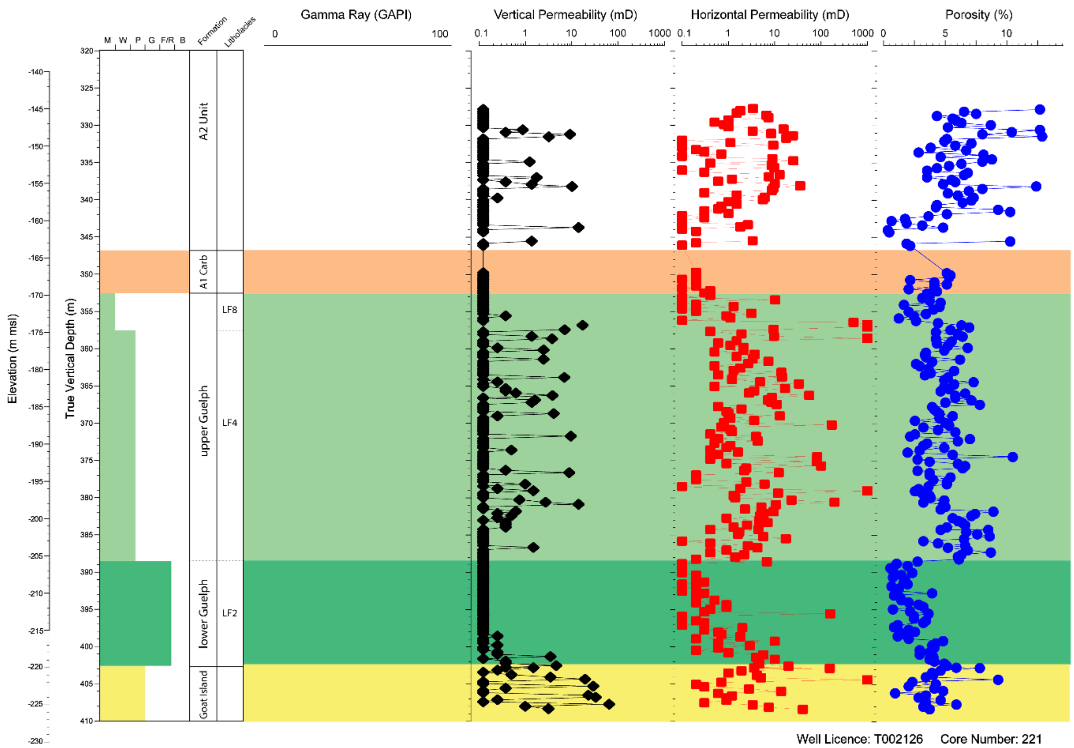

Figure H.14 Lithofacies, porosity and permeability variation of C.W.P.66-L-59 (T002126) in Area 3.

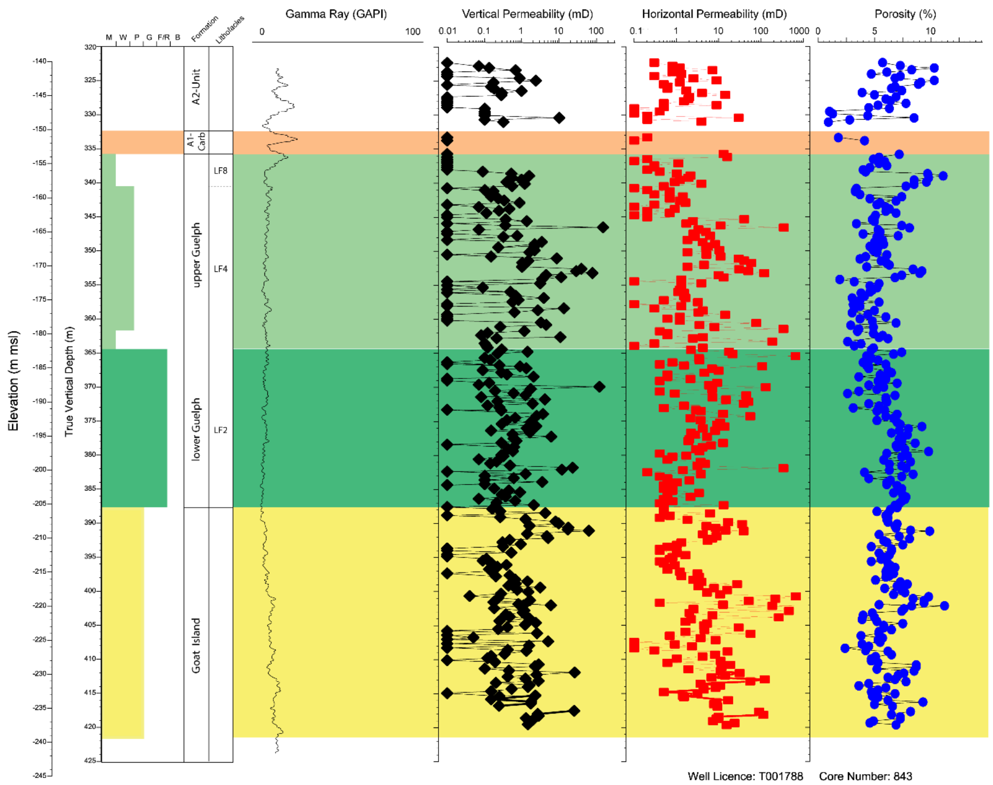

Figure H.15 Lithofacies, porosity and permeability variation of Consumers' 16285 (T001788) in Area 3.

Cross Section in the Lake Erie - Tilbury Pool

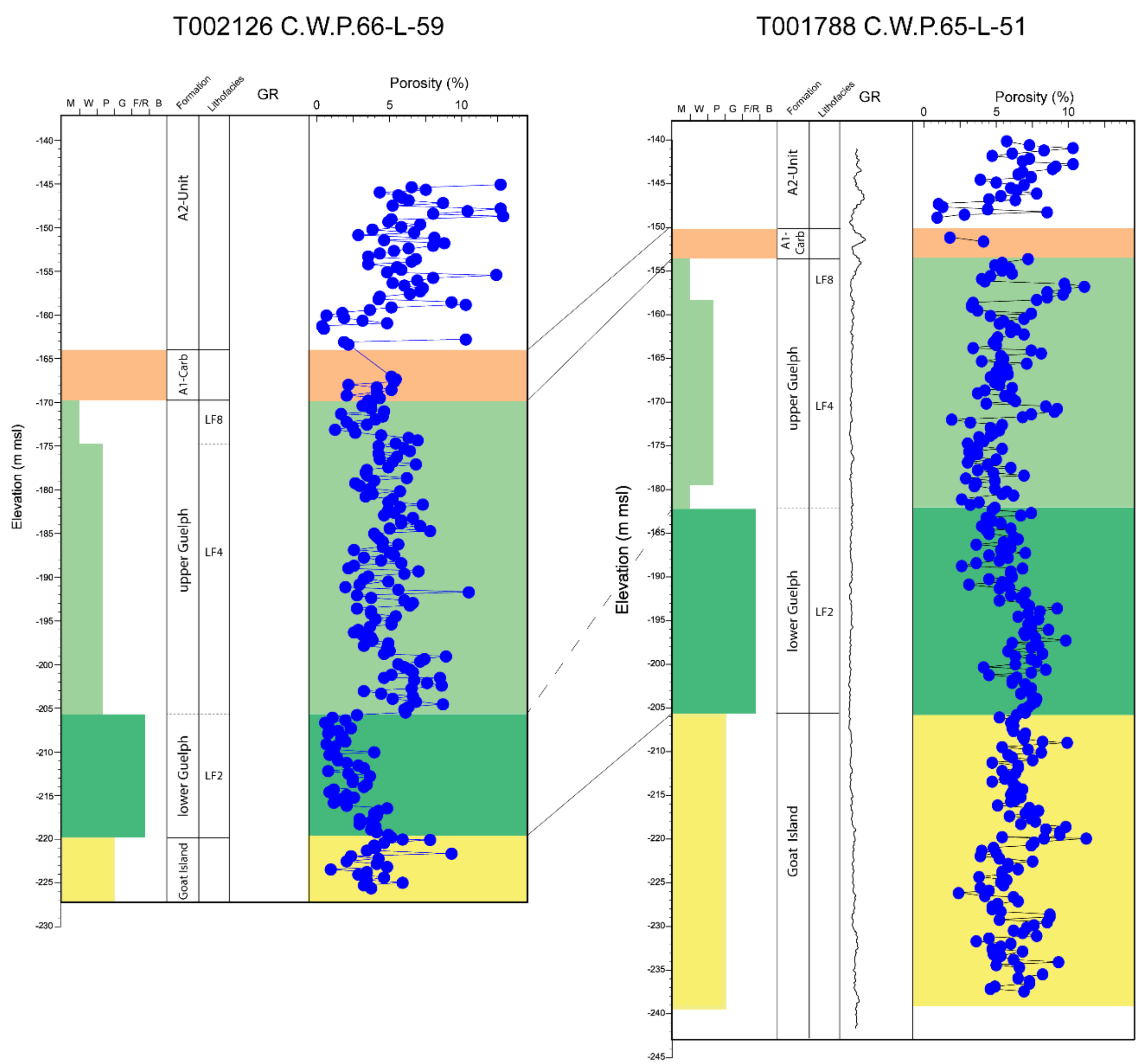

Figure H.16 Stratigraphic correlation of lithofacies, porosity and permeability variation of C.W.P.65-L-51 (T001788) and C.W.P.66-L-59 (T002126) in Area 3.

Appendix I: Summary of the formation-scale porosity and permeability (*Kmax, KVer*) of Gasport Formation and its relationship to formation thickness

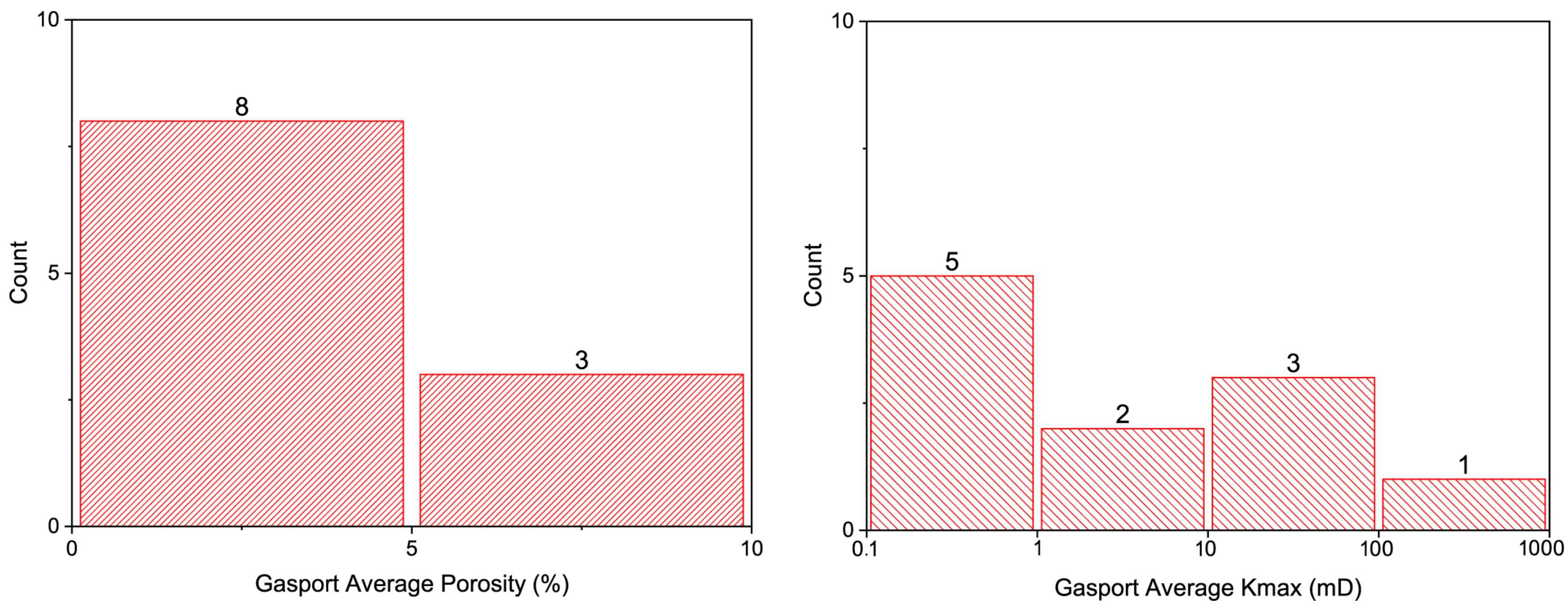

Figure I.1 Histogram of the distribution of the average porosity and permeability ranges of Gasport Fm, southern Ontario

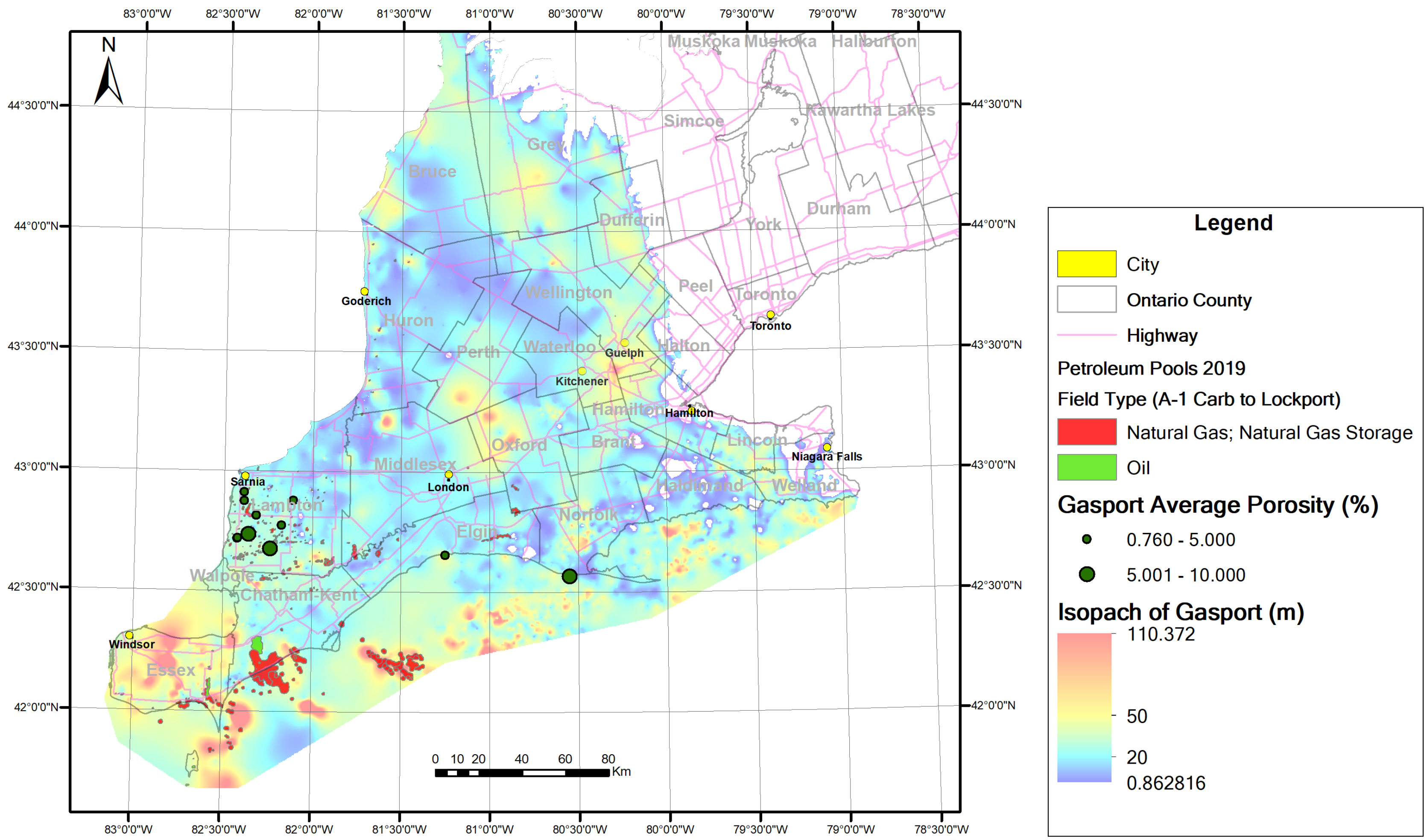

Figure I.2 Isopach map of Gasport Formation and the average porosity (%) of wells with core analysis data, southern Ontario.

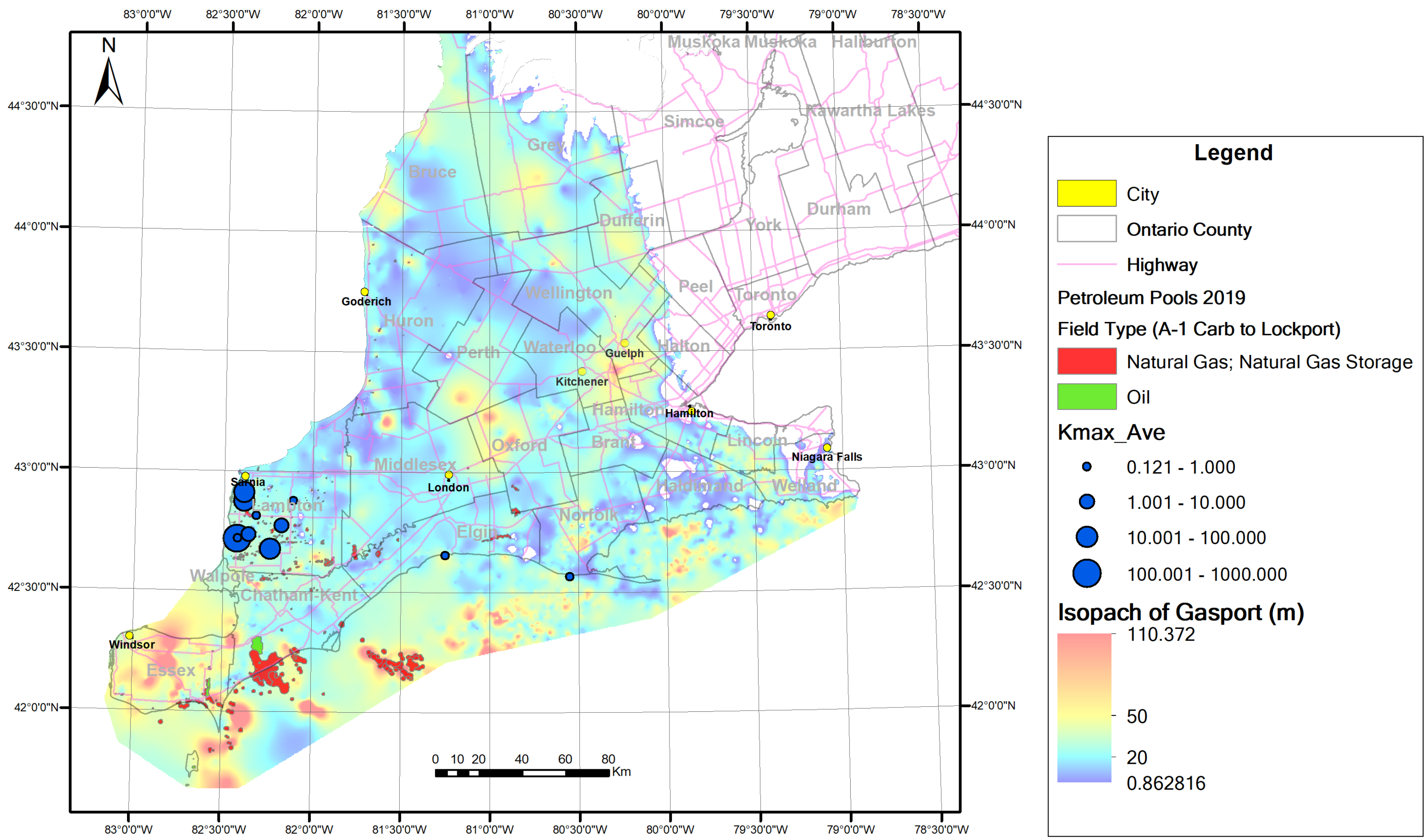

Figure I.3 Isopach map of Gasport Formation and the average Kmax (mD) of wells with core analysis data, southern Ontario.

Table I.1 Summarized core analysis data of Gasport Fm, southern Ontario

Well ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
21	T002083	8	4.4	12.4	9.40	7.334	0.02	44	7.79	2.052	5.398	0.01	0.01	0.01				0.27	-2.366	0.8088
26	F004998	70	0.3	14.1	3.87	7.004	0.01	9850	150.58	5.014	14.074	0.01	142.62	4.54	1.512	6.293	0.716	0.0269	-1.327	0.216
35	T003000A	51	0.8	7.3	3.23	2.131	0.1	31.5	2.48	0.906	3.341							0.2582	-1.134	0.2294
36	T000210	68	1.2	5.2	2.86	0.844	0	5.7	0.16	-1.844	-0.682							0.165	-0.978	0.1387
38	T000315	116	0.9	12.3	4.67	3.681	0.01	1360	32.11	3.469	10.111	0	192	4.23	1.443	6.037	0.238	-0.002	0.2643	0.0074
48	T004132	20	3.2	6.4	4.55	0.61	0.1	0.5	0.12	-2.115	-4.831							0.0089	-1.004	0.002
82	T002477	5	0.2	1.4	0.76	0.186	0.04	1.19	0.28	-1.259	-1.581	0.01	0.01	0.01				0.7838	-1.599	0.3661
90	T006517	105	0.3	19.7	6.85	13.7	0.1	1242	15.13	2.717	9.581	0.1	51	1.85	0.613	3.663	0	0.0483	-0.087	0.0795
99	T002812	11	1.1	4.4	2.46	0.893	0.01	6.9	0.67	-0.409	1.359	0.14	0.69	0.34	-1.078	-2.786	0.997	0.4706	-2.68	0.2563
121	T007292	41	0.2	9.9	3.46	3.4	0.01	204.83	17.29	2.85	7.399	0.01	7.87	1.33	0.285	1.264	0.007	0.5115	-1.603	0.5408
125	T002760	15	2.3	8.6	5.39	2.961	0.01	8.02	0.73	-0.317	1.369							0.4889	-3.806	0.8512
150	T007290	5	0.5	3.6	1.58	1.13	0.01	0.02	0.01	-4.423	-11.043	0.01	0.01	0.01				0.1077	-2.110	0.9031

Appendix J.: Summary of the formation-scale porosity and permeability (*Kmax, KVer*) of Goat Island Formation and its relationship to formation thickness

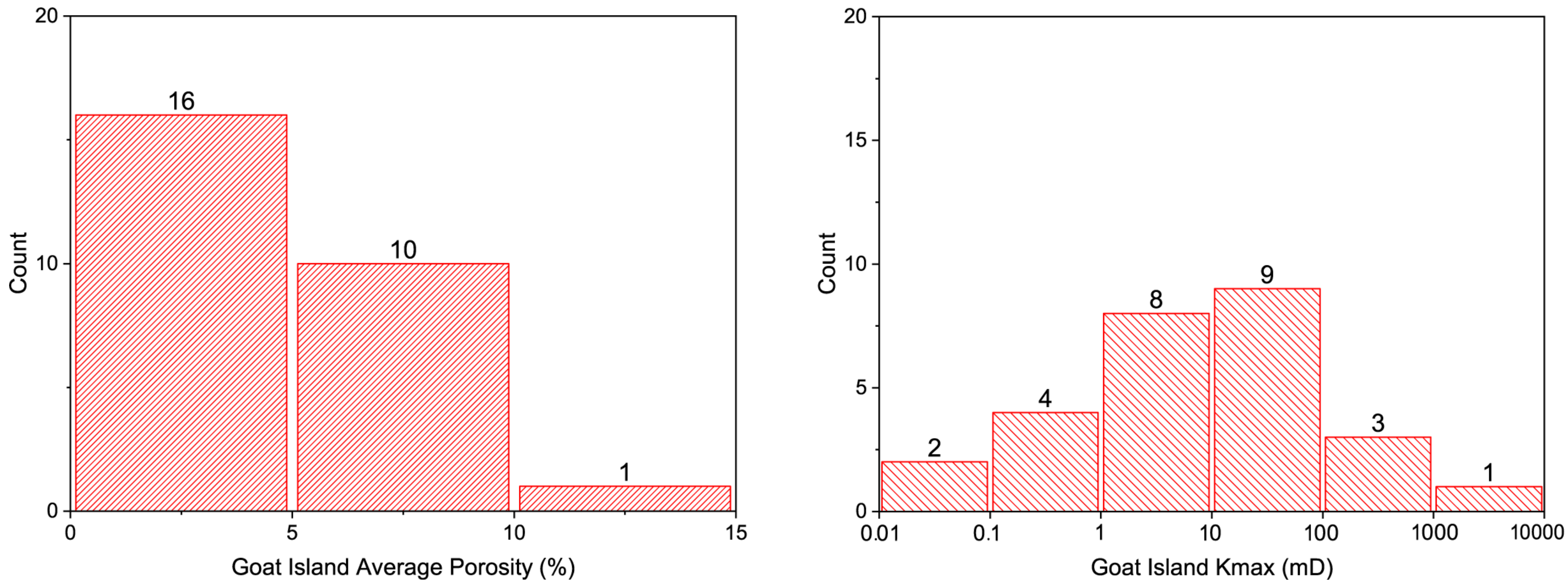

Figure J.1 Histogram of the distribution of the average porosity and permeability ranges of Goat Island Fm, southern Ontario

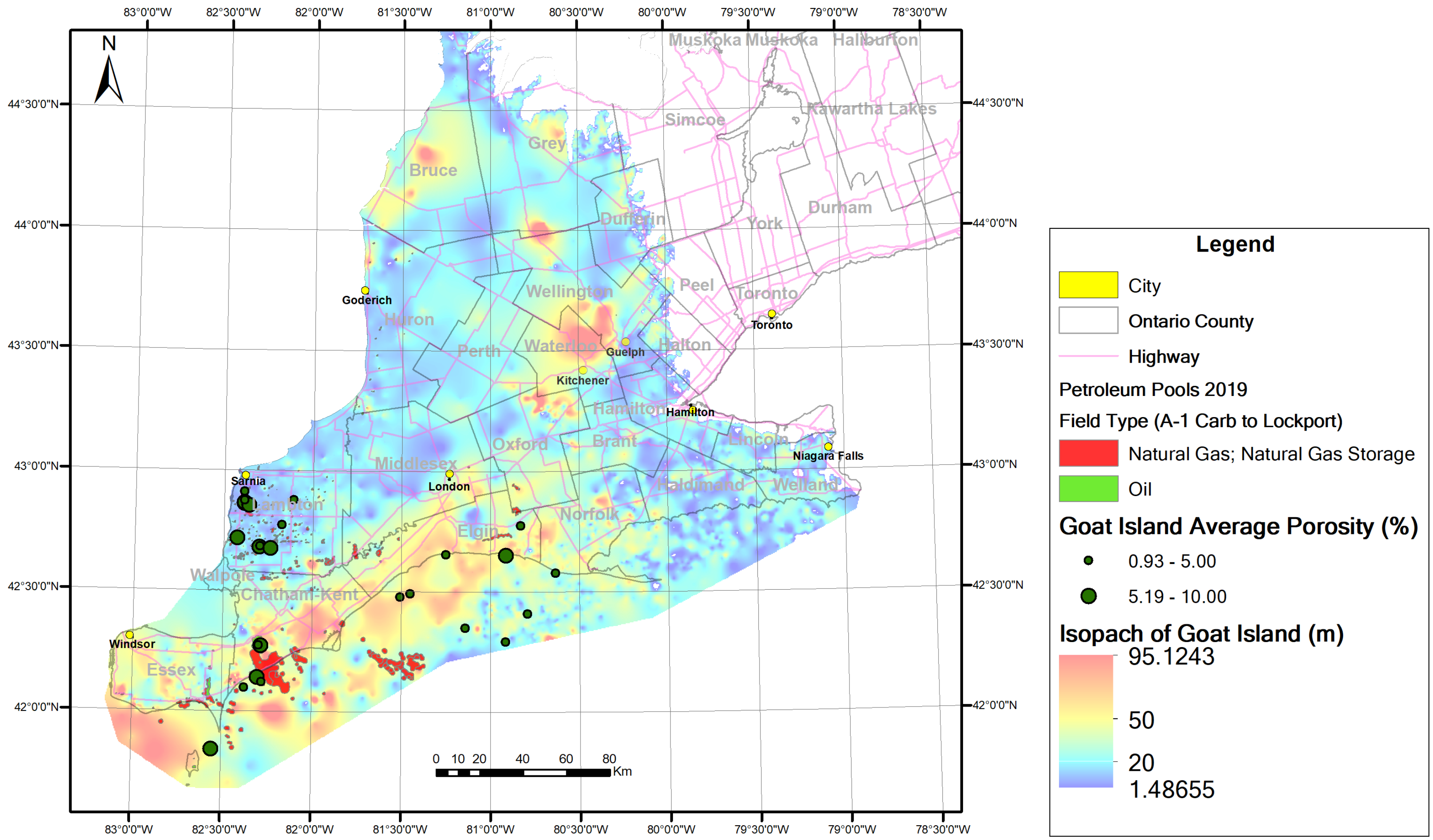

Figure J.2 Isopach map of Goat Island Fm and the average porosity (%) of wells with core analysis data, southern Ontario.

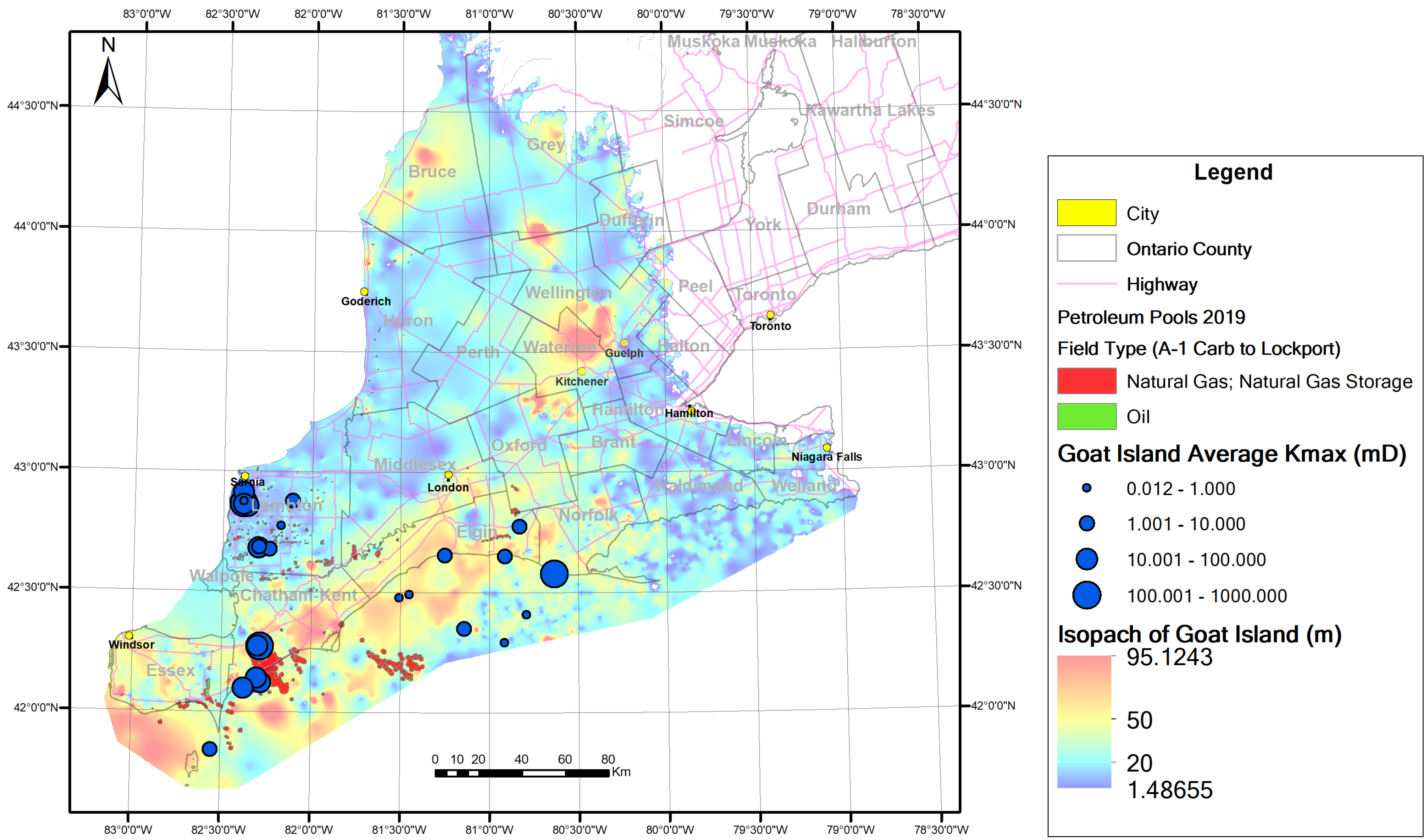

Figure J.3 Isopach map of Goat Island Fm and the average Kmax (mD) of wells with core analysis data, southern Ontario.

Table J.1 Summarized core analysis data of Goat Island Fm, southern Ontario

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)*		
																		a	*b*	R^2
1	T002394	14	2.9	6.4	5.19	1.147	0.1	11.6	2.37	0.865	2.205							0.1851	-0.989	0.0971
4	F008231	252	0.2	19.5	5.88	14.798	0.01	1790	66.48	4.197	11.001	0.01	140	3.55	1.266	5.494	0.339	0.2042	-0.901	0.4718
6	T008748	25	0.9	11.4	6.44	3.217	0.01	15700	801.66	6.687	16.134	0.01	110	4.98	1.605	6.14	0.996	0.0357	0.4941	0.0057
7	T002923	10	1.6	8.6	4.16	3.564	0.1	48	3.07	1.122	5.305							0.2431	-1.26	0.2971
9	T003079	11	0.9	4.1	2.36	2.47	0.1	15.7	2.47	0.904	3.004							0.9658	-0.83	0.4514
11	T002126	19	0.9	9.3	4.12	3.528	0.2	1000	65.33	4.179	10.815	0.1	51.8	7.61	2.029	5.194	0.118	0.3844	-1.098	0.6004
20	T002488	8	4.9	13.9	8.46	11.957	0.1	47	15.68	2.752	5.781							0.2361	-1.535	0.6379
21	T002083	54	1.9	23.6	10.14	22.735	0.2	843	59.95	4.093	9.917	0.01	213	18.46	2.916	7.717	0.343	0.0726	0.3429	0.1986
26	F004998	12	2.4	14.1	7.31	11.72	0.43	9850	1277.79	7.153	15.99	0.01	140	16.85	2.824	7.354	0.985	0.2644	-0.482	0.5351
35	T003000A	40	0.3	2.5	0.97	0.19	0.1	0.6	0.14	-1.966	-4.519	0.1	9.8	1.81	0.594	2.211		0.1782	-1.07	0.1232
38	T000315	12	1.2	9	3.32	4.061	0.03	3.9	0.58	-0.54	0.151	0.01	2.4	0.32	-1.137	-0.695	0.84	0.1485	-1.268	0.2179
39	T008749	56	1	13	6.71	9.233	0.13	149	13.04	2.568	6.596	0.01	49	2.93	1.074	4.041	0.469	0.0842	-0.059	0.1354
45	T002820	36	0.5	6.3	2.20	1.74	0.01	7.09	0.68	-0.385	0.677	0.01	0.01	0.01				0.1455	-1.546	0.0372
48	T004132	13	3.3	6.1	4.86	0.438	0.1	81	6.80	1.916	6.129							0.4233	-2.275	0.1467
50	T004227	22	3.3	8.9	4.85	2.048	0.01	108	12.36	2.515	6.849	0.01	2.02	0.34	1.09	-0.718	0.861	0.5493	-2.746	0.4671
72	T005791A	145	3.2	14.2	6.36	4.088	0.1	3893	432.15	6.069	13.374	0.01	224	4.33	1.466	5.966	0.096	0.3593	-0.805	0.3464
77	T002481	4	0.8	1.3	0.93	0.047	0.1	17.3	4.68	1.542	3.977							0.6663	-0.787	0.0243
81	T002418	61	0.1	6.9	1.41	1.413	0.01	20.2	0.64	-0.44	2.061	0.01	0.01	0.01				0.4952	-2.14	0.3088
84	T001788	104	2.4	11.2	6.31	2.266	0.1	846	35.74	3.576	9.521	0.01	61.2	2.56	0.917	3.939	0.013	0.2773	-1.058	0.2717
89	T002333	2	0.5	1.6	1.05	0.303	0.04	0.04	0.04	-3.219		0.01	0.01	0.01						
90	T006517	23	4	8.5	6.76	1.329	0.3	31	8.72	2.165	4.478	0.1	37	1.97	0.68	4.039	0	0.1229	-0.225	0.0547
94	T006104	62	0.7	7.3	3.36	2.264	0.01	1350	36.74	3.604	10.421	0.01	97.4	2.35	0.854	5.094	0.036	0.4846	-1.504	0.383
99	T002812	6	0.9	5.2	2.42	2.091	0.09	44.13	7.54	2.02	5.59	0.09	44.13	7.54	2.02	5.59	0.999	0.2463	-0.964	0.1432
110	T002560	5	1	1.8	1.46	0.082	0.01	0.02	0.01	-4.423	-11.043							0.1754	-2.195	0.1748
121	T007292	68	0.01	10.9	4.59	8.322	0.01	588.16	49.29	3.898	9.63	0.01	12.87	1.13	0.118	2.002	0.501	0.3486	-1.528	0.4351
123	T002759	30	3.2	15.7	7.10	9.604	0.01	37.56	3.00	1.1	4.34							0.243	-2.415	0.7163
124	T002803	3	2.8	4.2	3.43	0.336	0.01	633	220.77	5.397	11.352							-3.479	1.2704	0.9924
150	T007290	5	0.5	3.6	1.58	1.13	0.01	0.02	0.01	-4.423	-11.043	0.01	0.01	0.01				0.1077	-2.110	0.9031

Appendix K: Summary of the formation-scale porosity and permeability (*Kmax, KVer*) of Guelph Formation and its relationship to formation thickness

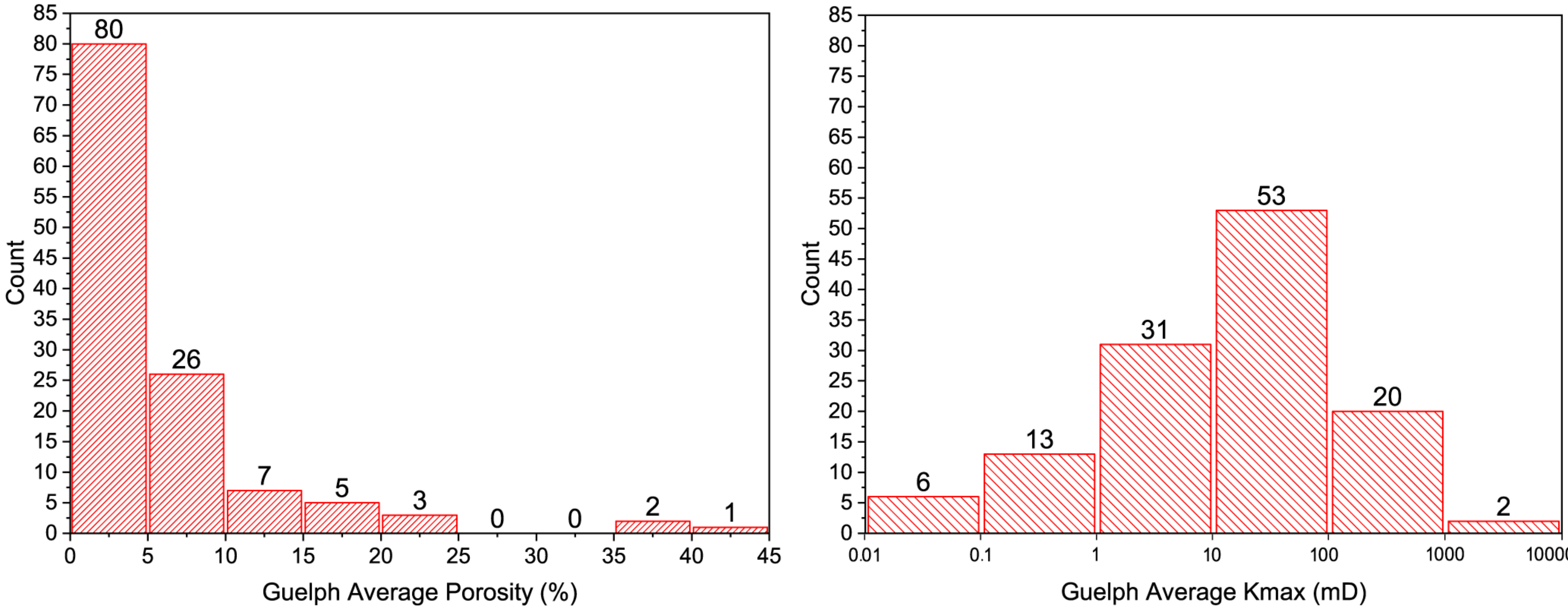

Figure K.1 Histogram of the distribution of the average porosity and permeability ranges of Guelph Fm, southern Ontario

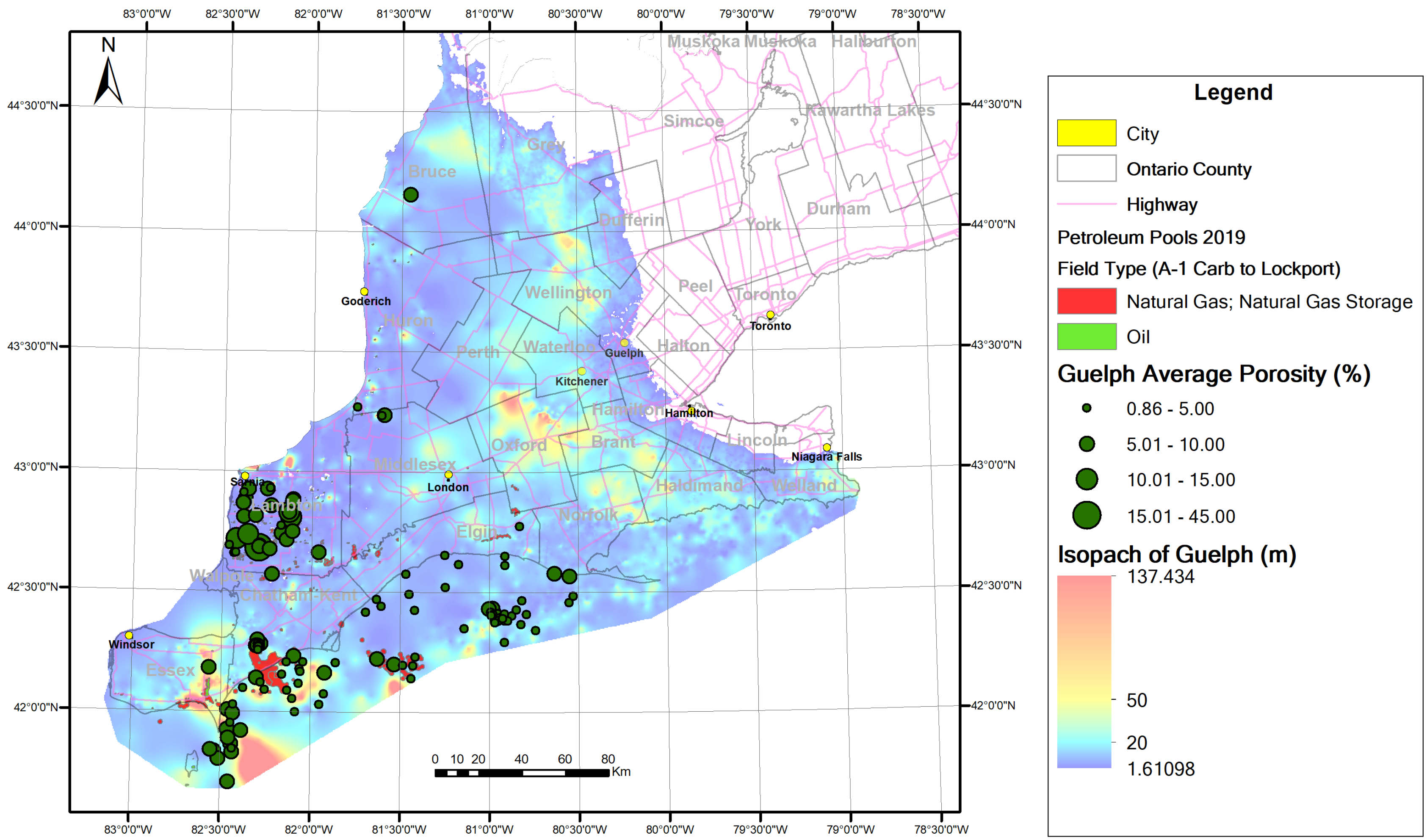

Figure K.2 Isopach map of Guelph Fm and the average porosity (%) of key wells with core analysis data, southern Ontario.

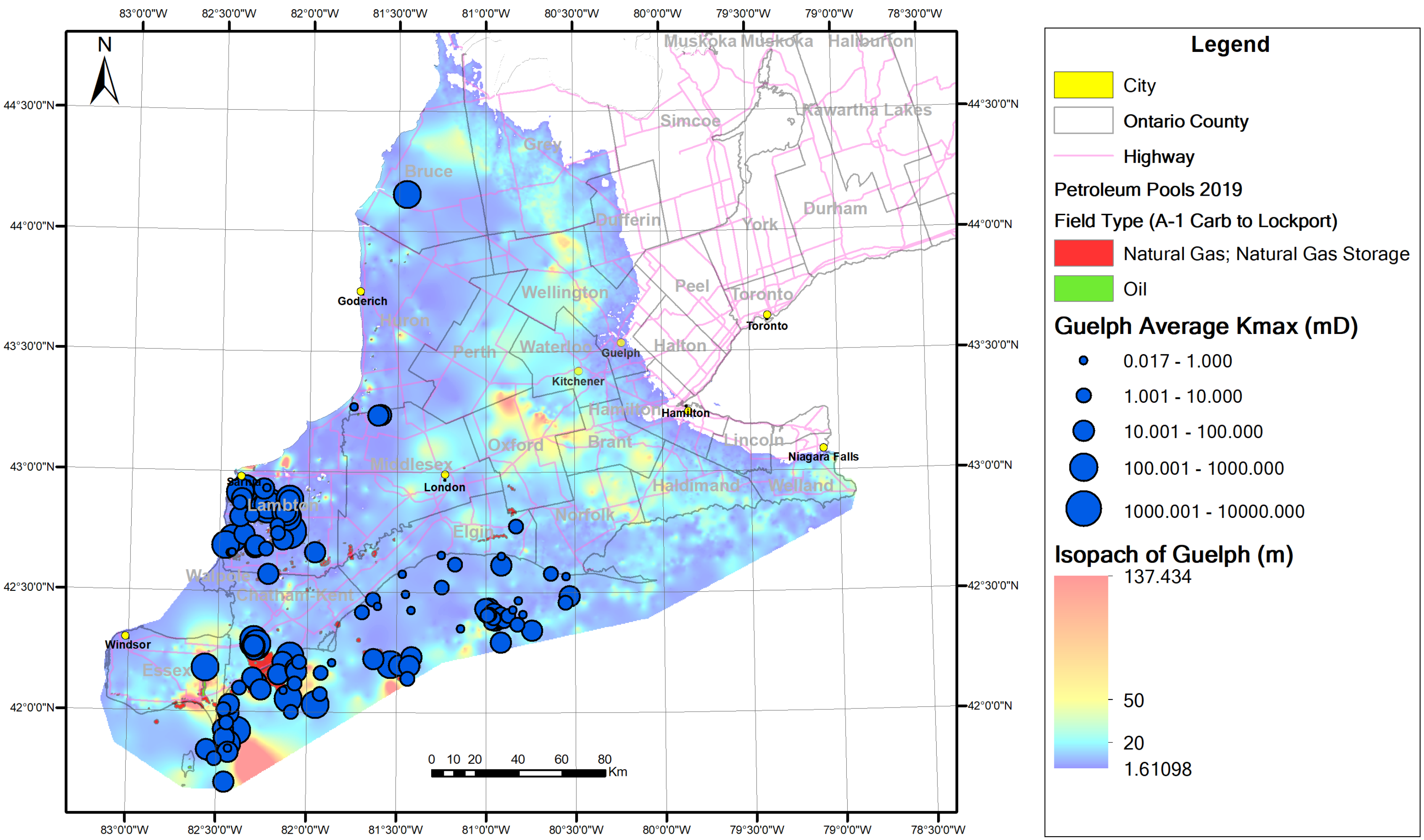

Figure K.3 Isopach map of Guelph Fm and the average Kmax (mD) of key wells with core analysis data, southern Ontario.

Table K.1 Summarized core analysis data of Guelph Fm, southern Ontario

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
1	T002394	81	1.8	12.4	5.92	6.47	0.2	208	26.08	3.261	7.226	0.1	242	17.92	2.886	7.675	0.138	0.1563	0.0796	0.3135
2	T003116	97	2.8	12.3	8.47	5.113	0.1	11.8	3.81	1.337	2.101	0.1	60	1.81	0.059	3.743	0.2	0.1099	-0.515	0.315
5	T003105	30	1.8	8.1	4.73	2.375	0.1	52	5.39	1.684	5.053							0.1859	-0.877	0.1377
7	T002923	18	1.2	7.4	4.82	3.772	0.1	7.7	1.54	0.425	1.384							0.121	-0.747	0.1548
8	T003646	68	2.7	27.6	6.58	11.294	0.12	3000	195.03	5.273	12.633							0.0584	0.8924	0.041
9	T003079	50	0.6	4.9	2.17	0.974	0.1	9.4	0.97	-0.025	1.38							0.0036	-0.513	0.0087
11	T002126	166	0.5	10.5	4.17	3.832	0.1	1000	35.14	3.56	10.13	0.1	13.7	0.60	-0.504	1.119	0.425	0.2117	-0.655	0.2165
12	T003108	59	1	9	4.27	3.387	0.1	115	6.90	1.931	5.772							0.1654	-0.589	0.1422
13	T003117	41	1	9.9	3.91	2.553	0.1	13.3	0.97	-0.032	1.763							0.0344	-0.659	0.01
14	T002508	49	2.4	13.2	6.80	6.045	0.01	426.24	40.71	3.926	9.098	0.01	54.75	4.18	1.431	4.728	0.395	0.2172	-0.496	0.3794
15	T002563	22	1.4	6.6	3.35	1.969	0.01	55.07	6.91	1.933	5.161	0.01	14.61	1.02	0.015	2.27	0.321	0.4447	-1.606	0.3286
16	T002738	8	3.8	6.8	4.86	1.206	0.01	1.58	0.45	-0.79	-1.069							0.7253	-4.486	0.7988
17	T003235	60	0.8	11.7	4.22	3.289	0.1	255	11.70	2.46	7.197							0.1516	-0.373	0.1231
18	T003673	20	2.1	6.9	4.41	1.687	0.1	94	7.55	1.021	6.028							0.2378	-1.098	0.1202
19	T002254	58	0.3	7	2.34	2.391	0.1	50	3.97	1379	4.242	0.1	75	1.73	0.55	4.559	0.76	0.1589	-0.298	0.1482
20	T002488	68	4.1	26.7	15.43	22.793	0.1	260	47.62	3.863	8.03							0.073	0.2781	0.3659
21	T002083	54	1.9	23.6	10.14	22.735	0.2	843	59.93	4.093	9.917	0.01	213	18.46	2.916	7.717	0.342	0.0726	0.3429	0.1986
22	T008747	29	1.9	13.1	6.89	7.001	0.01	23	2.53	0.928	2.954	0.01	22	1.44	0.367	2.788	0.952	0.1887	-1.473	0.3145
26	F004998	165	0.5	38.8	11.57	39.972	0.1	3590	204.73	5.322	12.332	0.01	2380	106.42	4.667	11.469	0.628	0.0007	1.4728	0.0014
29	T008860	82	1.3	19.6	8.79	23.145	0.1	5355	98.56	4.591	12.76	0.01	93	10.60	2.361	5.994	0.441	0.1472	-0.423	0.5598
30	T002599	27	0.7	9.7	3.27	2.787	0.01	646	21.78	3.089	9.129	0.01	189	2.11	0.748	5.66	0.124	0.35	-1.511	0.2626
31	T002618	10	1	5.3	3.06	2.3	0.01	0.08	0.02	-3.73	-7.317							0.0382	-1.911	0.028
32	T004000A	89	2.2	14.9	5.42	4.667	0.2	508	20.32	3.012	8.215							0.1354	0.0717	0.2335
35	T003000A	299	0.2	13.3	4.34	8.106	0.1	145	8.22	2.106	5.719	0.1	60.4	4.37	1.475	4.096	0.467	0.2395	-0.909	0.546
37	T002878	5	3.8	6.8	4.86	1.206	0.01	1.58	0.45	-0.79	-1.069							0.7253	-4.486	0.7988
40	T002912	65	0.9	13.2	6.35	10.182	0.1	350	44.22	3.789	8.57							0.1812	-0.141	0.3891
42	T002585	56	2.2	19.2	7.90	14.964	0.2	247	17.30	2.851	7.16							0.1019	-0.021	0.3628
43	T003204	114	0.9	9	3.56	1.982	0.1	117	6.82	1.92	5.876							0.1932	-0.843	0.0913
44	T002826	9	0.4	3.4	1.46	0.851	0.01	0.23	0.06	-2.89	-5.325	0.01	0.01	0.01				0.1389	-1.771	0.0627
46	T002836	62	1.5	14.6	5.46	6.413	0.01	6000	133.71	4.896	13.283	0.01	1220	22.02	3.092	10.068	0.981	0.3567	-1.481	0.5077
47	T002824	34	0.4	16.2	3.94	9.606	0.01	478	19.74	2.983	8.83	0.01	16	0.50	-0.685	1.986	0.048	0.249	-1.491	0.4334
48	T004132	133	1.8	9.2	5.86	2.716	0.1	572	28.00	3.332	8.987							0.2015	-0.56	0.1852
49	T003999	43	1	5.5	3.11	1.241	0.1	1767	98.10	4.586	11.61							0.3261	-0.782	0.0733
50	T004227	88	0.1	6.8	2.46	2.85	0.01	156	7.19	1.973	6.546	0.01	1.67	0.05	-2.986	-2.725	0	0.5156	-2.284	0.4758
51	T004228	51	0.3	4.9	3.06	0.999	0.01	396	18.26	2.905	8.486	0.01	16.6	1.27	0.24	2.451	0.017	0.7973	-2.328	0.5438

Table K.1 (continued)

ID	Licence	No. of	Φ_Min	Φ_Max	Φ_Ave	Φ_Var	*Kmax*_Min	*Kmax*_Max	*Kmax*_Ave	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min	*Kver*_Max	*Kver*_Ave	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)*		
		Values	(%)	(%)	(%)		(mD)	(mD)	(mD)			(mD)	(mD)	(mD)				*a*	*b*	R^2
52	T004820	36	1.8	9.3	5.66	3.577	0.7	1347	419.17	6.038	11.947							0.4067	0.013	0.709
53	T004206	42					0.1	265	17.58	2.867	8.145	0.1	3.1	0.59	-0.527	0.035	0.552			
54	T004910	26	1	14	5.54	10.395	0.04	3500	282.77	5.645	13.123	0.08	2460	124.25	4.822	12.356	0.928	0.3159	-0.586	0.6506
55	T004911	42	0.3	4.9	1.41	0.671	0.01	413	23.84	3.171	8.531	0.01	5.61	0.26	-1.334	-0.093	0.448	0.5241	-0.385	0.2
56	T004912	43	2.2	13	5.50	4.614	0.1	867	48.92	3.89	10.155	0.01	214	10.00	2.302	7.033	0.218	0.3316	-1.218	0.5667
57	T005155	43	2.7	13.3	6.38	6.691	0.04	1790	52.55	3.962	11.187	0.01	285	13.96	2.636	7.705	0	0.1732	-0.584	0.2411
58	T005119	55	1.4	5.6	3.12	1.132	0.1	172	15.61	2.748	7.212	0.1	16	0.98	-0.026	2.131	0.589	0.4365	-1.076	0.2574
59	T005605	17	2.4	11.2	4.89	5.614	0.14	5380	332.04	5.805	14.282	0.03	142	10.32	2.333	7.012	0.993	0.3727	-1.183	0.6494
60	T005813	122	1.9	19.8	6.59	9.801	0.1	471	40.40	3.699	8.588	0.1	1355	41.56	3.727	10.634	0.275	0.1503	-0.024	0.2568
61	T005788	27	3.5	12.5	6.90	6.17	1.2	1174	179.37	5.189	10.983	0.1	4030	150.73	5.015	13.269	0	0.0934	1.1087	0.0829
62	T005738	14	2.9	9.7	7.29	2.824	0.5	77	8.80	2.175	5.898	0.2	27	2.91	1.07	3.827	0.99	-0.091	1.1589	0.0761
63	T005730	52	1.4	8.8	4.27	4.626	0.1	61	4.30	1.459	4.366	0.1	36	2.40	0.875	3.449	0.227	0.1939	-0.794	0.2733
64	T005732	33	3	10.7	6.14	3.213	0.1	384	37.26	3.618	8.989	0.1	26	2.43	0.888	3.741	0.536	0.1774	-0.403	0.1211
65	T005764	39	2.8	7.1	4.97	0.959	0.1	389	20.39	3.015	8.488	0.1	2582	66.70	4.2	12.022	0.86	0.3755	-1.73	0.1651
66	T005752	37	2	10.6	5.75	3.239	0.1	143	26.82	3.29	7.11	0.1	3356	127.80	4.85	12.703	0.208	0.3262	-1.121	0.3633
67	T005746	47	2.1	16.3	6.45	5.429	0.1	988	56.96	4.094	10.432	0.1	2583	113.56	4.732	12.253	0	0.2464	-0.852	0.3757
68	T005789	62	1.2	18	7.14	19.465	0.1	1847	124.08	4.82	11.378	0.1	125	3.90	1.361	5.658	0.032	0.0627	0.7523	0.0659
69	T005792	9	2.6	5	3.30	0.564	5.1	165	58.23	4.064	7.883	0.1	0.6	0.21	-1.556	-3.51	0.566	0.2678	0.6643	0.1803
70	T005731	90	3.3	11.2	7.00	3.605	0.1	3038	317.66	5.761	12.721	0.1	63	10.83	2.382	5.55	0.43	0.2922	-0.381	0.3014
71	T005734	72	2.1	9.3	5.58	2.551	0.1	660	46.60	3.84	9.596	0.1	26	2.06	0.724	3.214	0.013	0.2257	-0.366	0.0812
72	T005791A	107	1.8	14.1	4.69	4.098	0.1	1317	137.41	4.923	11.403	0.01	224	8.53	2.143	6.919	0.206	0.183	0.897	0.0891
73	T005925	54	2.8	9.2	5.93	2.749	0.1	35	9.74	2.277	4.533							-0.008	0.7504	0.0005
74	T005983	62	2.1	8.4	5.05	2.964	0.1	397	22.20	3.1	8.5							0.3504	-1.388	0.4087
75	T005990	88	2.7	7.6	4.88	1.588	0.1	46	4.31	1.461	4.549							0.4767	-2.603	0.5179
77	T002481	185	0.3	22.8	6.15	12.287	0.1	687	47.10	3.852	9.288							0.1546	-0.101	0.3224
78	T002548	136	0.7	7.4	3.11	2.965	0.01	594	10.30	2.332	8.131	0.01	51	0.58	-0.539	2.994	0.127	0.4781	-2.144	0.4723
79	T002528	48	1.1	8.3	3.69	3.297	0.01	212	10.43	2.344	7.01	0.01	4.49	0.47	-0.763	0.439	0	0.3321	-1.488	0.2804
80	T002339	50	0.1	3.2	1.45	1.023	0.01	1.2	0.08	-2.592	-3.354	0.01	0.01	0.01	-4.605		0	0.3415	-2.105	0.3398
81	T002418	11	0.1	1.8	0.90	0.333	0.01	0.03	0.02	-4.094	-9.616	0.01	0.01	0.01				-0.044	-1.814	0.178
82	T002477	17	0.7	11.6	6.32	8.397	0.01	21.2	2.20	0.787	3.151	0.01	2.62	0.42	-0.88	-0.816	0.265	0.2228	-1.671	0.5919
83	T002570	30	0.7	8.5	3.96	3.34	0.01	66	4.24	1.445	5.032	0.01	4	0.19	-1.655	-0.624	0.177	0.187	-1.562	0.0749
84	T001788	171	1.9	11.1	5.80	2.923	0.1	746	19.31	2.961	8.606	0.01	147.2	3.60	1.281	5.553	0.729	0.101	-0.182	0.0494
86	T002547	45	0.7	8.2	3.55	3.11	0.01	405	16.59	2.809	8.464	0.01	162	4.22	1.439	6.36	0.617	0.5213	-2.404	0.6833
87	T002540	5	2.3	6.4	4.28	1.782	0.01	1.63	0.36	-1.033	-0.898	0.01	0.01	0.01				0.4804	-3.398	0.5283
88	T002565	44	1.1	5.6	2.80	1.045	0.01	18	1.89	0.634	2.951	0.01	0.76	0.11	-2.218	-3.237	0.442	0.4463	-1.874	0.2208
89	T002333	52	0.1	4.3	1.61	1.42	0.02	1665	35.05	3.557	10.901	0.01	13	0.31	-1.165	1.196	0	0.395	-1.203	0.2446
90	T006517	511	3.4	8.1	5.96	1.405	0.2	16	1.83	0.603	1.639	0.1	0.1	0.10				0.0152	0.022	0.003
91	T006299	40	1.9	8.5	4.88	2.498	0.1	2.1	0.21	-1.585	-2.112	0.1	116	3.40	1.223	5.793	0	0.0055	-0.91	0.0008
92	T006383	21	3.6	10.7	5.40	2.413	2.5	475	144.62	4.974	9.875	1.7	23	9.65	2.267	4.024	0.863	0.1302	1.1242	0.0968
94	T006104	31	1.3	9.5	5.06	6.019	0.07	369	20.43	3.017	8.411	0.01	9.31	1.54	0.432	1.845	0.431	0.2056	-0.622	0.3608
95	T006097	106	1	32	4.71	12.169	0.01	1260	30.59	3.421	9.987	0.01	10.9	0.38	-0.959	0.681	0.175	0.2789	-1.101	0.2293
96	T006096	87	1	14	4.74	5.863	0.01	4410	75.05	4.318	12.48	0.01	178	3.64	1.292	6.06	0.99	0.2712	-0.898	0.3799

Table K.1 (continued)

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
97	T006105	107	0.5	15	3.93	3.51	0.01	2230	87.56	4.472	11.544	0.01	294	3.17	1.155	6.731	0.671	0.2532	-0.59	0.1669
98	T007126	17	2.4	7.6	5.00	2.787	0.1	102	15.19	2.721	6.676	0.01	12.5	2.24	0.807	2.549	0.076	0.2208	-0.69	0.1801
99	T002812	39	0.9	6.3	2.36	1.867	0.01	4.56	0.26	-1.357	-0.392	0.09	4.56	0.89	-0.12	0.611	1	0.2859	-2.251	0.2739
100	T003245	27	3.2	12.1	6.38	4.673	0.1	58.2	13.73	2.62	5.685	0.4	1.6	0.96	-0.042	-2.956	0.184	0.2181	-0.876	0.263
101	T002815	54	1	5.8	2.67	0.717	0.01	33.1	5.44	1.694	4.268	0.01	0.65	0.07	-2.608	-3.907	0.347	0.533	-1.823	0.1081
102	T003434	59	0.1	10.4	2.77	5.068	0.01	199	13.24	2.583	7.333	0.01	15.1	0.89	7.354	-0.12	1.995	0.2146	-1.1	0.1223
103	T003106	43	2.2	8.6	5.93	2.516	0.1	67.5	7.50	2.015	5.21							0.2332	-1.251	0.1789
104	T003244	55	2.4	10.1	5.05	2.907	0.1	235	12.44	2.521	7.272							0.1219	-0.234	0.085
105	T003205	90	1.8	14.9	5.79	5.418	0.1	634	36.96	3.61	8.866							0.1871	-0.197	0.2561
106	T002821	48	1.2	10.2	4.70	5.873	0.01	9.1	1.14	0.13	1.602	0.01	0.1	0.01	-4.382	-8.663	0.457	0.1181	-1.532	0.0749
107	T003239	59	1.1	7.9	3.57	2.353	0.1	505	13.87	2.63	8.351							0.1981	-0.534	0.1211
108	T003271	16	1.2	7.6	3.79	3.191	0.1	6.2	1.08	0.072	1.295	0.6	2.3	1.19	0.172	-1.688	0.051	0.0875	-0.885	0.0572
109	T003243	96	1.2	20.4	4.98	6.574	0.01	404	14.98	2.707	7.801							0.1943	-0.847	0.2413
110	T002560	15	1.2	3.7	2.20	0.524	0.01	2.9	0.29	-1.224	-0.643							0.1059	-1.629	0.0096
111	T003671	95	43	44	73.00	3.551	0.1	252	23.12	3.141	7.906	0.1	6.5	0.53	-0.636	0.286	0	0.1586	-0.159	0.1027
112	T003274	26	2.6	12.6	5.81	4.043	0.1	61.5	5.45	1.696	5.144	0.4	2.1	1.07	0.071	-1.894	0.253	0.1213	-0.645	0.1028
113	T003077	54	0.7	8.4	4.19	2.953	0.1	73	4.66	1.539	5.041							0.2434	-1.069	0.3311
114	T003675	11	1.5	5.3	3.90	0.911	0.1	9.7	2.53	0.928	2.518	0.1	11.2	2.00	0.693	2.697	0.9	-0.038	-0.044	0.0023
115	T002840	9	0.7	3.9	1.96	0.894	0.01	56.3	7.40	2.001	5.717							0.9949	-2.732	0.4347
116	T003674	25	0.9	9.4	4.88	2.907	0.1	144.2	14.86	2.699	7.119	0.01	4.3	0.31	-1.176	-0.371	0.844	0.159	-0.751	0.0687
117	T003415	14	2	5.6	3.56	1.369	0.06	30.9	5.89	1.772	4.44	0.08	3.92	1.14	0.131	0.799	0.781	0.0395	-0.148	0.0026
118	T002340	48	0.1	7	2.67	4.43	0.01	0.6	0.08	-2.552	-4.192	0.01	0.01	0.01				0.0985	-1.73	0.1566
121	T007292	72	0.1	13.9	4.97	7.817	0.01	1918.12	121.37	4.799	11.813	0.01	627.02	14.65	2.684	8.794	0.009	0.2988	-0.988	0.4481
123	T002759	7	2.4	11.2	4.76	7.488	0.11	0.97	0.18	-1.699	-2.26							0.1833	-2.109	0.6371
124	T002803	68	2.5	9.8	5.50	3.858	0.01	42.2	1.84	0.61	3.714							0.1466	-1.748	0.0935
125	T002760	6	3.2	6.3	5.42	1.151	0.01	0.42	0.16	-1.843	-3.885							0.4901	-3.784	0.6644
126	T007460	80	2.8	17.6	7.72	7.87	0.01	10200	654.19	6.483	15.395	0.01	4710	92.69	4.529	12.563	0.623	0.0409	-0.619	0.4949
127	T007450	41	2.2	19.7	9.34	16.651	0.13	10200	1250.69	7.131	15.885	0.03	5260	235.56	5.462	13.498	0.73	0.2984	-1.27	0.7441
128	T007457	54	1.6	6.9	3.52	1.394	0.01	5.58	0.32	-1.131	-0.381	0.01	0.54	0.08	-2.535	-4.027	0.672	0.1203	-1.392	0.0641
129	T007499	63	1.6	13.5	4.73	3.651	0.01	10200	202.17	5.309	14.302	0.01	394	11.83	2.471	8.121	0.873	0.4941	-2.169	0.4712
131	T007673	41	4.3	17.1	10.11	9.583	0.37	5641.11	335.58	5.816	14.089	0.01	297.95	15.28	2.727	7.806	0.896	0.0172	1.0756	0.0031
132	T007706	123	1.7	20.6	7.21	11.641	0.01	10240	878.96	6.779	15.396	0.01	578	17.14	2.841	8.437	0.016	0.2005	0.3442	0.2972
133	T007795	15	0.6	20.5	7.47	40.661	0.01	10240	1520.31	7.327	16.044	0.01	494	65.38	4.18	9.903	0.324	0.2625	-1.36	0.8093
134	T005337	54	1.6	9.4	4.82	1.861	0.01	1911	81.89	4.405	11.47	0.1	122	2.64	0.972	5.598	0.515	0.3929	-1.427	0.2285
135	T008336	26	0.1	6.3	1.68	2.504	0.01	2556	106.66	4.67	12.389	0.01	13	0.62	-0.483	1.845	0	0.8745	-1.974	0.7515
136	T008335	38	0.1	12	3.20	3.417	0.01	3958	132.97	4.89	12.908	0.01	27	1.81	0.595	3.208	0	0.2729	-0.588	0.1389
137	T008471	118	0.8	18.2	9.42	17.233	0.03	7860	353.64	5.868	14.779	0.01	5520	158.27	5.064	13.033	0.847	0.2264	-0.574	0.6851
138	T008468	115	1.9	36.5	6.67	19.962	0.03	3240	68.74	4.23	11.556	0.01	195	8.16	2.099	6.549	0.16	0.1182	-0.109	0.2778
140	T008622	43	2.7	9.6	5.90	3.215	0.68	2740	85.30	4.446	12.037							0.1564	0.0524	0.1507
141	T008529	90	0.8	11.2	3.53	2.791	0.01	390	27.45	3.312	8.485	0.01	76.2	5.32	1.671	5.566	0.357	0.3684	-1.052	0.2774
142	T002587	46	0.9	13.9	3.33	6.537	0.01	232	6.77	1.912	7.086	0.01	1.1	0.08	-2.494	-3.182	0.094	0.2369	-1.353	0.4341
143	T002396	38	0.01	4	1.46	0.955	0.01	5.45	0.24	-1.434	-0.11	0.01	0.01	0.01	-4.605	-79.594	0	0	-2.135	0.1846

Table K.1 (continued)

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
144	T002524	66	0.8	13.1	3.68	5.205	0.01	310	9.86	2.289	7.425	0.01	182	7.21	1.976	6.555	0.873	0.2854	-1.558	0.3025
145	T008854	166	3	18.5	8.28	6.768	0.04	2550	80.26	4.385	11.275	0.02	2470	29.31	3.378	10.58	0.708	0.2597	-1.269	0.4735
146	T008888	50	1.3	35	13.70	38.79	1.93	10001	832.28	6.724	14.847	0.01	11007	800.34	6.685	15.184	0.594	0.0665	1.3286	0.2343
147	T008929	119	0.5	2.5	0.86	0.237	0.01	3.8	0.35	-1.061	-0.665	0.01	0.37	0.03	-3.473	-6.243	0.464	0.6784	-1.593	0.2607
148	T008958	292	0.1	16.2	5.87	19.034	0.01	2050	53.74	3.984	10.542	0.01	2550	35.28	3.563	10.547	0.359	0.2904	-1.79	0.7388
149	T008954	4	0.8	1.9	1.48	0.167	0.01	0.13	0.09	-2.465	-6.202	0.01	0.01	0.01				0.0838	-2.82	0.96
150	T007290	18	2.4	12	6.63	8.953	0.01	12.2	2.57	0.944	2.678	0.01	6.5	1.33	0.2823	1.166	0.9286	0.2487	-1.804	0.7417

Appendix L: Summary of the formation-scale porosity and permeability (*Kmax, KVer)*) of A-1 Carbonate Unit and its relationship to formation thickness

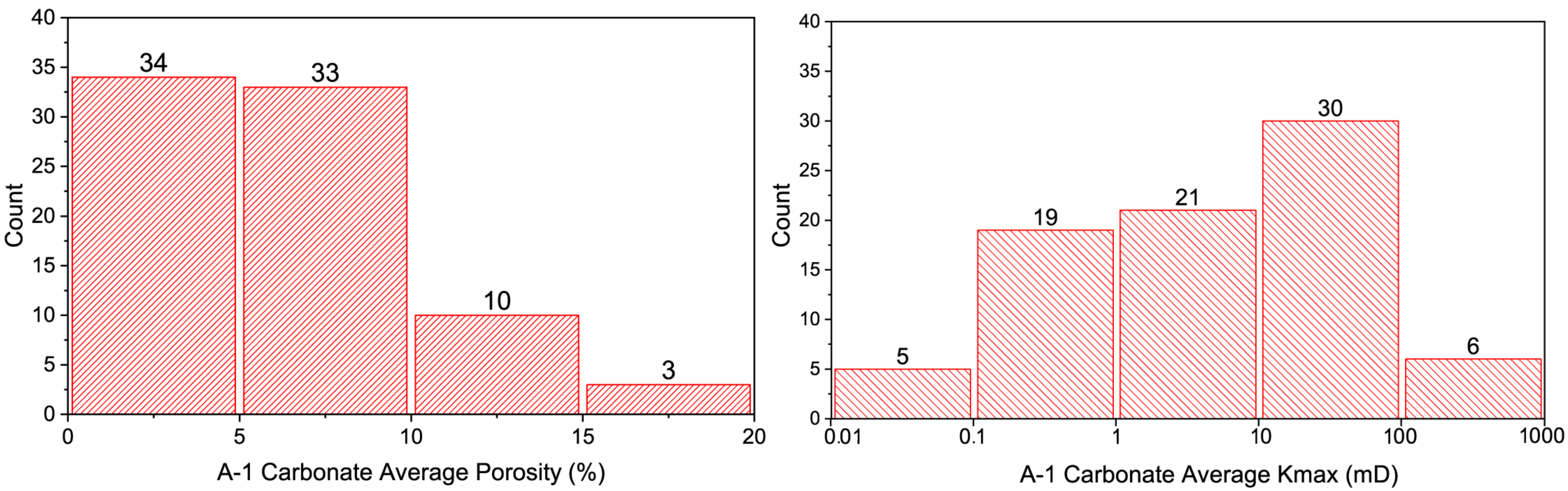

Figure L.1 Histogram of the distribution of the average porosity and permeability ranges of A-1 Carbonate Fm, southern Ontario

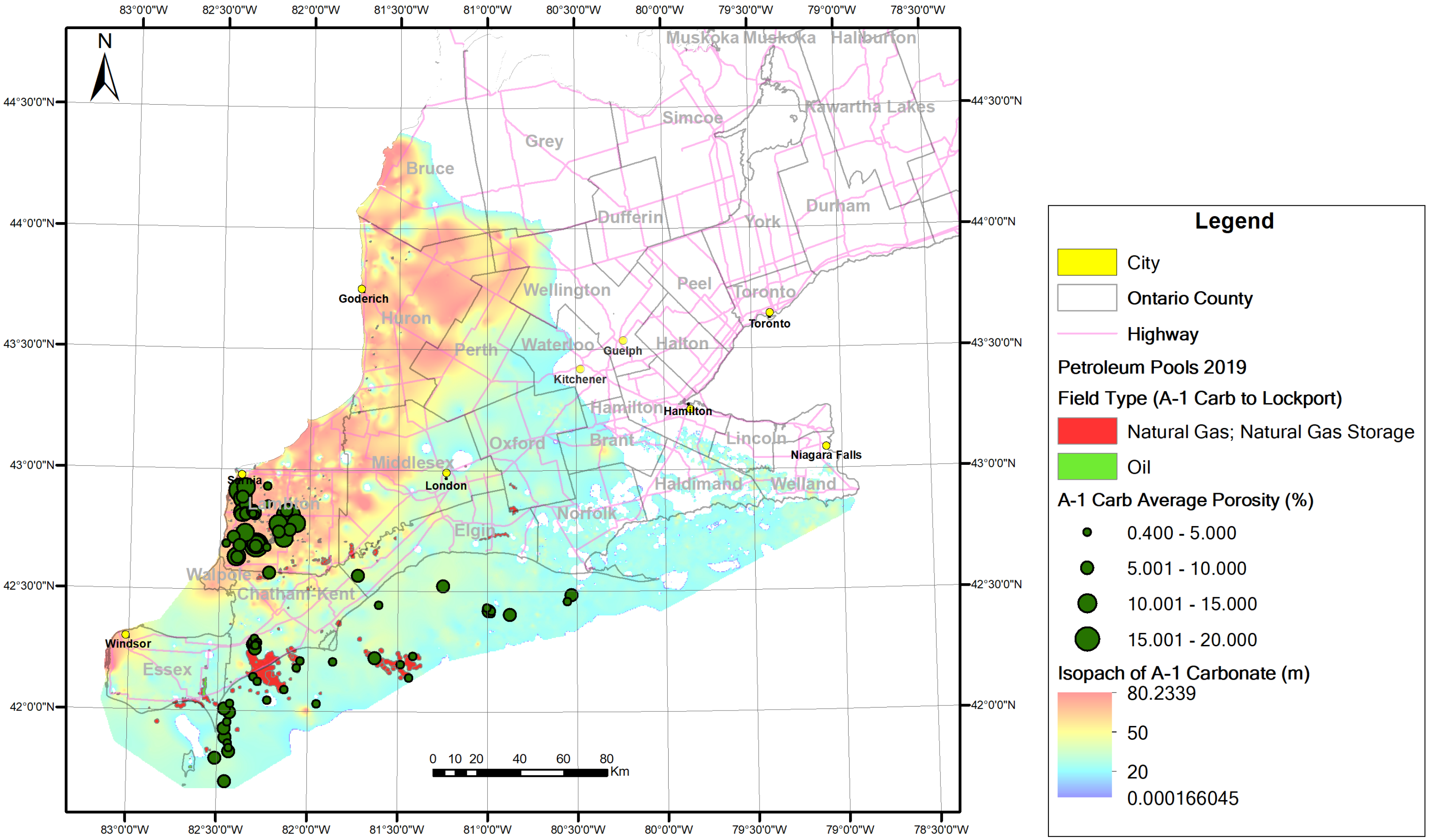

Figure L.2 Isopach map of A-1 Carbonate and the average porosity (%) of key wells with core analysis data, southern Ontario.

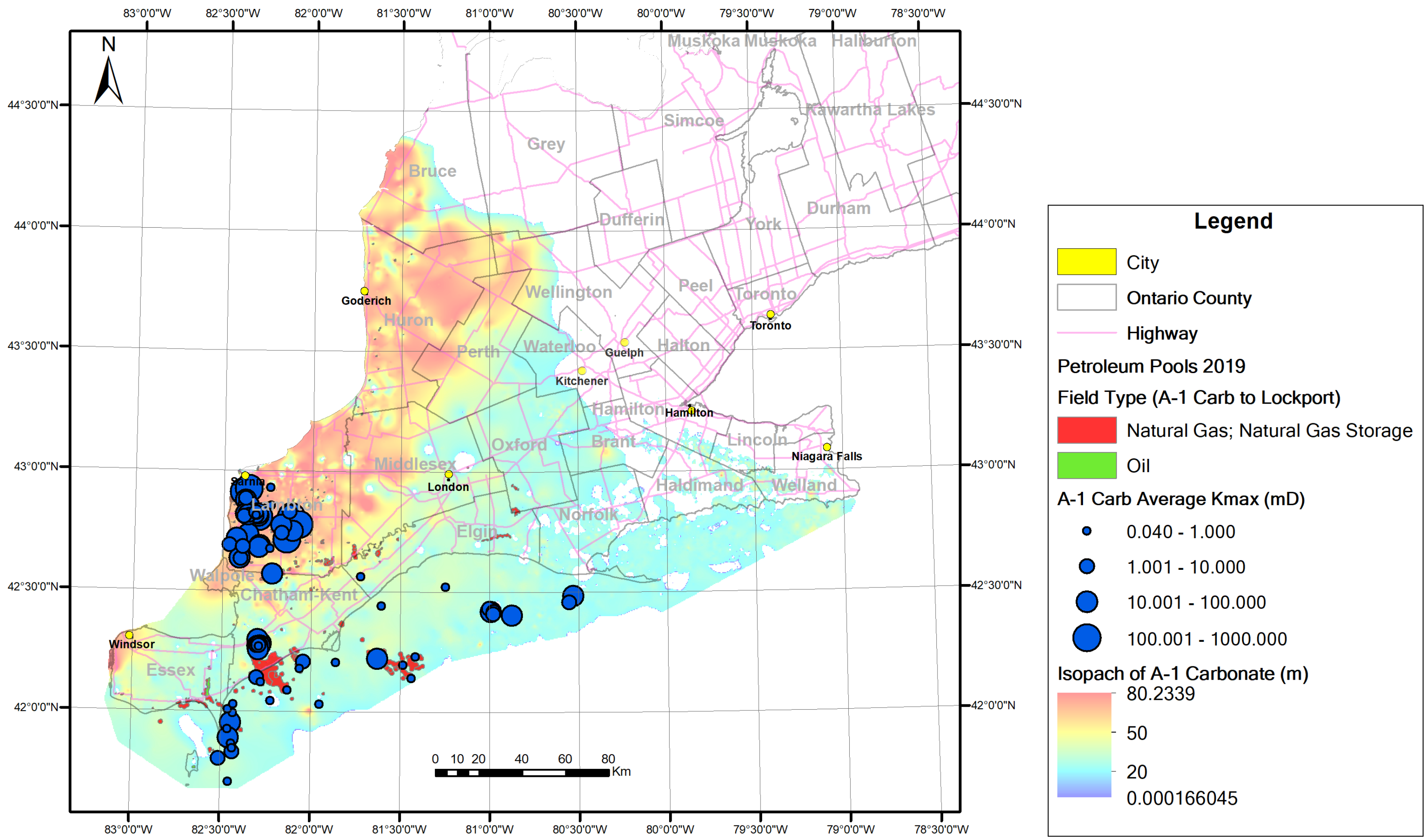

Figure L.3 Isopach map of A-1 Carbonate and the average Kmax (mD) of key wells with core analysis data, southern Ontario.

Table L.1 Summarized core analysis data of A-1 Carbonate Unit, southern Ontario

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
2	T003116	7	5.3	12	7.27	4.822	0.3	11.8	3.00	1.099	2.189	0.1	2.5	0.44	-0.815	-0.349	-0.3	-0.035	0.5029	0.0318
3	T001583	17	3.4	8.3	5.24	1.417	6.7	0.19	2.21	0.791	1.223	0.01	2.7	0.22	-1.517	-0.939	0.07	0.0398	-0.04	0.0127
4	F008231	45	3.4	17.2	9.56	16.25	0.25	71	17.10	2.839	5.976	0.01	65	9.73	2.275	5.733	0.81	0.1665	-0.854	0.7313
10	T002971	14	1.5	8.9	3.86	5.481	0.1	29.6	5.74	1.747	4.2							0.0665	-0.067	0.0348
11	T002126	10	2	5.4	4.10	1.394	0.1	0.4	0.21	-1.56	-4.976	0.1	0.1	0.10	-2.302	-77.632	0	0.0853	-1.061	0.3365
13	T003117	18	1	4.3	2.09	0.676	0.1	7.6	0.90	-0.105	1.174							-0.243	-0.051	0.1142
19	T002254	39	0.2	5.6	2.47	1.57	0.1	137	5.92	1.779	6.198	0.1	45.2	2.07	0.729	4.273	0.898	-0.014	-0.266	0.0005
20	T002488	65	0.5	19.2	9.24	21.972	0.1	855	39.69	3.391	9.354							0.014	0.3507	0.1098
21	T002083	69	1.4	21.8	10.75	29.138	0.01	2100	96.83	4.573	11.353	0.01	320	19.54	2.972	7.843	0.117	0.1398	-0.351	0.6146
23	T001499	17	3.1	9.3	5.51	3.625	0.1	2.3	0.33	-1.109	-0.839							0.0341	-1.152	0.4581
24	T001551	15	0.4	13.7	5.83	12.934	0.01	19	2.39	0.871	3.143	0.01	7.4	0.87	-0.142	1.255	0.992	0.2391	-1.81	0.7442
25	T001541	13	0.9	14	3.61	10.578	0.12	2430	190.38	5.249	12.94	0.01	136	10.85	2.384	7.175	0.999	0.2847	-0.838	0.716
26	F004998	5	7.3	13.3	9.72	4.61	5.8	63	24.00	3.178	6.075	0.23	31	7.16	1.968	4.96	0.928	0.0783	0.4615	0.2069
27	T000945	16	0.2	14.33	7.11	16.075	0.01	37.8	5.24	1.657	4.58	0	22.8	2.06	0.724	3.491	0.947	0.2112	-1.683	0.6279
28	F008717	31	5	29.6	13.84	22.122	0.18	104	23.35	3.151	6.296	0.03	62	13.82	2.626	5.768	0.741	0.0703	0.154	0.3444
29	T008860	43	1.7	17.3	7.28	13.523	0.01	79	6.40	1.856	5.48	0.01	41	1.98	0.68	3.735	0.653	0.1028	-0.71	0.2205
32	T004000A	8	4	8.1	5.45	2.335	0.4	56	16.46	2.801	5.961							0.3372	-1.15	0.4397
33	T004033	31	2.6	22.7	12.64	28.942	1	210	84.91	4.442	8.307							0.109	0.2762	0.7733
34	T002434	25	1.9	9.6	5.64	5.634	0.1	195	15.53	2.743	7.349							0.0296	0.3337	0.0083
35	T003000A	76	4.8	18.9	11.65	9.945	0.8	67.5	16.17	2.783	4.676	0.1	148	19.43	2.967	6.51	0.429	0.0826	0.1331	0.5146
40	T002912	6	2.3	14.8	6.85	17.609	0.1	15.1	2.93	1.076	3.395							0.1803	-1.527	0.8823
41	T001623	37	1	24.4	13.66	25.856	0.01	87.3	17.64	2.87	6.484	0.01	58	11.58	2.45	5.85	0.992	0.2167	-2.644	0.8059
42	T002585	33	4.3	28	12.84	33.92	0.3	273	55.25	4.012	8.253							0.1022	0.0454	0.6471
49	T003999	17	2.2	5.2	3.43	0.533	0.1	0.1	0.10									0	-1	1
53	T004206	44					0.1	253	14.74	2.691	8.114	0.1	1.7	0.20	-1.609	-2.12	0.974			
59	T005605	15	2.8	10.4	5.17	5.137	0.04	51.1	5.21	1.651	5.106	0.01	22.5	2.54	0.933	3.513	0.981	0.0781	-0.328	0.069
60	T005813	13	2	9.1	5.55	3.359	0.1	25	5.39	1.684	3.837	0.1	1.6	0.22	-1.535	-1.834	0.039	0.0423	-1.092	0.008
61	T005788	30	1.7	11.2	4.97	4.535	0.1	391	43.06	3.763	9.404	0.1	5607	488.50	6.191	14.61	0	0.026	0.5939	0.0027
62	T005738	23	1.7	14.5	5.72	8.255	0.1	6	0.54	-0.61	0.522	0.1	0.4	0.13	-2.071	-5.396	0.564	0.1111	-1.421	0.398
63	T005730	3	0.8	2.9	2.07	0.829	0.1	0.1	0.10		0.1	0.1	0.1				1	0	-1	1
64	T005732	16	3.2	16.5	6.74	18.405	0.1	9.1	0.74	-0.304	1.546	0.1	0.1	0.10			0	-0.028	-0.546	0.0572

Table L.1 (continued)

ID	Licence	No. of Values	Φ_Min (%)	Φ_Max (%)	Φ_Ave (%)	Φ_Var	*Kmax*_Min (mD)	*Kmax*_Max (mD)	*Kmax*_Ave (mD)	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min (mD)	*Kver*_Max (mD)	*Kver*_Ave (mD)	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)* *a*	*b*	R^2
65	T005764	15	3.1	5.5	4.49	0.461	0.1	1.2	0.26	-1.347	-2.449	0.1	0.1	0.10			0	0.1175	-1.274	0.0577
66	T005752	14	0.3	22.3	6.59	24.187	0.1	254	18.91	2.94	8.355	0.1	229	16.46	2.801	8.153	0.999	0.0595	-0.641	0.1044
67	T005746	5	5.1	6.6	6.12	0.286	0.1	0.8	0.54	-0.616	-2.712	0.1	0.6	0.34	-1.079	-3.161	0.837	0.5933	-3.991	0.8906
68	T005789	36	1.9	8.3	4.64	1.81	0.1	399	43.31	3.768	8.908	0.1	537	18.86	2.937	8.992	0.308	-0.076	0.6701	0.0062
69	T005792	22	3.6	7.2	5.25	0.609	0.1	70	10.49	2.35	5.457	0.1	0.4	0.12	-2.136	-5.469	0.307	-0.04	0.4141	0.0009
70	T005731	26	3.3	7.1	4.96	1.204	0.1	7	0.77	-0.262	1.192	0.1	88	6.87	1.927	6.307	0	0.0932	-1.083	0.0386
71	T005734	10	4.2	9.7	6.92	4.422	0.1	1.9	0.82	-0.198	-0.251	0.1	0.9	0.26	-1.347	-2.279	0.612	0.2753	-2.393	0.854
72	T005791A	44	2.1	10.4	4.23	2.804	0.1	511	27.76	3.324	9.321	0.1	1	0.14	-1.96	-3.348	0.998	0.3588	-1.53	0.3123
73	T005925	58	2.8	10.1	5.31	3.14	0.1	104	5.07	1.624	5.908							0.1776	-1.248	0.1571
74	T005983	46	0.9	14.7	5.07	8.759	0.1	66	9.11	2.209	5.961							0.1825	-1.188	0.3013
75	T005990	24	3	5.9	4.04	0.804	0.1	272	51.79	3.947	9.208							-0.655	2.7391	0.2034
76	T002669	27	3.3	17.7	9.38	14.93	0.01	1095	53.56	3.981	10.768	0.01	139	7.77	2.05	6.642	0.988	0.2114	-1.88	0.3763
77	T002481	91	0.2	26.7	15.61	47.274	0.1	305	93.90	4.542	8.449							0.1006	0.0926	0.8292
82	T002477	6	0.4	4.2	2.13	1.369	0.05	2.65	0.92	-0.085	-0.362	0.01	0.99	0.20	-1.609	-2.054	0	0.0962	-0.47	0.0457
84	T001788	3	1.8	7.2	4.37	4.9	0.1	12.8	4.37	1.474	3.571	0.01	0.01	0.01				0.3539	-1.742	0.7081
85	T002804	17	0.3	6.2	2.75	3.032	0.01	0.55	0.09	-2.436	-3.598	0.01	0.01	0.01				0.2273	-2.21	0.3858
86	T002547	11	1.2	5.8	3.54	2.557	0.01	0.71	0.16	-1.827	-3.313	0.01	0.15	0.02	-3.784	-6.425	0.074	0.3395	-2.439	0.6441
87	T002540	15	1	5.3	2.35	1.614	0.01	1.3	0.12	-2.087	-2.282	0.01	0.01	0.01				0.1394	-1.901	0.0798
90	T006517	3	2.7	4.8	3.83	0.749	0.1	0.6	0.43	-0.836	-2.89	0.1	0.1	0.10				-0.057	-0.259	0.0185
91	T006299	3	3.1	3.7	3.50	0.08	0.1	0.1	0.10			0.1	0.1	0.10						
93	T006870	7	0.5	11.9	3.09	13.993	0.1	92	15.79	2.759	6.901							-0.062	0.2683	0.0484
94	T006104	23	1.5	8.5	5.54	4.864	0.15	1540	69.40	4.24	11.496	0.01	8.54	0.71	-0.34	1.066	0.979	0.0251	-0.06	0.0044
95	T006097	11	1.6	5.4	3.96	1.139	0.02	197	18.29	2.907	8.069	0.01	9.18	0.89	-0.119	1.93	0.999	-0.086	-0.134	0.0076
96	T006096	9	1.9	5.5	4.04	1.036	0.05	20.1	2.68	0.985	3.655	0.01	0.02	0.02	-4.094	-10.714	0	0.3165	-1.785	0.1589
97	T006105	31	0.5	4.7	3.03	1.114	0.01	0.5	0.07	-2.66	-4.433	0.01	0.24	0.03	-3.657	-5.9	0.464	0.1471	-1.938	0.0925
98	T007126	11	3.7	9.7	6.10	4.145	0.05	146	16.01	2.773	7.441	0.01	106	10.65	2.366	6.815	0.999	0.4056	-2.34	0.6812
100	T003245	6	2.6	5	3.48	0.741	0.4	4.1	1.65	0.5	0.411	0.1	4	1.01	0.014	-0.179	0	0.0066	-0.006	0.0153
104	T003244	4	1.9	4.2	3.25	0.983	0.1	15.6	4.63	1.531	3.7							0.6348	-1.942	0.6574
106	T002821	6	3.5	7.4	6.15	1.823	0.01	0.09	0.04	-3.219	-6.875	0.01	0.01	0.01				-0.067	-1.166	0.0467
109	T003243	3	3.4	8	5.53	3.582	0.01	88.8	29.61	3.388	7.468							0.9063	-5.698	0.8493
113	T003077	4	2.6	10.5	5.90	8.885	0.1	42	11.83	2.47	5.723							0.2695	-1.278	0.7102
114	T003675	10	0.2	8.3	4.52	5.432	0.1	10.5	1.47	0.385	2.227	0.1	7.1	0.80	-0.223	1.484	0.988	0.0853	-0.762	0.1069
117	T003415	4	0.6	5.5	2.98	3.027	0.06	8.27	4.12	1.415	2.419	0.43	0.44	0.44	-0.832	-10.597	1	0.2253	-0.595	0.2296
118	T002340	10	0.1	8.7	3.27	9.002	0.06	3.1	0.62	-0.486	-0.332	0.01	1.2	0.15	-1.917	-2.07	0.977	0.0814	-0.731	0.2942
119	T007380	35	0.3	15.9	7.12	30.369	0.01	71.1	11.57	2.448	5.547	0.01	24.9	5.21	1.65	4.196	0.8	0.1769	-1.041	0.714
120	T007381	41	0.5	14.6	6.26	425.33	0.01	22.2	4.24	1.443	3.541	0.01	10.5	1.59	0.464	2.004	0.776	0.1785	-1.242	0.7224
121	T007292	67	0.4	35.2	17.16	66.518	0.01	5128.06	937.72	6.843	14.249	0.01	3571.81	521.80	6.257	13.631	0.912	0.1027	0.4874	0.4515
128	T007457	6	1.8	5.8	3.37	1.776	0.01	0.14	0.05	-3.065	-6.14	0.01	0.04	0.02	-4.2	-8.987	0.899	0.2858	-2.5	0.8151
129	T007499	10	3	7.5	4.34	2.778	0.01	15.4	2.63	0.965	3.111	0.01	1.62	0.33	-1.1	-0.882	0.282	0.5748	-3.376	0.6296
130	T007551	14	3.9	18.9	11.28	20.145	1.59	767	159.49	5.072	10.849	0.01	92	20.33	3.012	6.519	0.681	0.0483	1.1866	0.0903
132	T007706	45	0.6	18.1	12.06	22.127	0.01	470	123.19	4.814	9.467	0.01	365	55.95	4.024	8.397	0.678	0.1912	-0.686	0.6684

Table L.1 (continued)

ID	Licence	No. of	Φ_Min	Φ_Max	Φ_Ave	Φ_Var	*Kmax*_Min	*Kmax*_Max	*Kmax*_Ave	ln(*Kmax*_Ave)	ln(*Kmax*_Var)	*Kver*_Min	*Kver*_Max	*Kver*_Ave	ln(*Kver*_Ave)	ln(*Kver*_Var)	R^2(Km_Kh)	*log(Kmax) = aΦ + b (md)*		
		Values	(%)	(%)	(%)		(mD)	(mD)	(mD)			(mD)	(mD)	(mD)				*a*	*b*	R^2
133	T007795	44	0.9	16.2	8.14	8.622	0.12	685	26.88	3.291	9.285	0.01	35.9	3.08	1.126	3.954	0.552	0.0766	0.0028	0.0985
135	T008336	10	0.1	0.9	0.40	0.098	0.01	2.3	0.25	-1.386	-0.761	0.01	0.02	0.01	-4.343	-10.771	0.517	0.3462	-1.349	0.0284
138	T008468	24	2.6	8.7	5.54	3.122	0.11	104	9.21	2.22	6.19	0.01	26.9	1.44	0.363	3.351	0.894	0.215	-0.855	0.3163
139	T008427	20	2.9	20	11.52	19.821	0.21	59.4	16.09	2.778	5.681	0.01	54	11.18	2.414	5.347	0.967	0.1476	-0.947	0.7183
140	T008622	10	6.1	12.8	8.16	4.082	5	79	32.07	3.468	6.385							0.0519	0.9124	0.0615
141	T008529	8	0.5	2.8	1.09	0.599	0.01	0.29	0.08	-2.526	-4.795	0.01	0.06	0.02	-4.066	-8.092	0.878	0.1738	-1.628	0.0538
145	T008854	31	3.1	13.9	10.09	3.51	0.3	552	123.52	4.816	9.593	0.02	73.1	10.46	2.347	5.673	0.6	0.2319	-0.515	0.48
146	T008888	37	5	39.8	18.08	68.957	1.06	6890	545.07	6.301	14.2	0.01	6120	363.68	5.896	13.896	0.978	0.0945	0.3005	0.7795
147	T008929	44	0.5	3	1.11	0.373	0.01	1.88	0.15	-1.891	-2.137	0.01	0.07	0.02	-4.094	-8.738	0.026	0.2694	-1.544	0.1046
150	T007290	39	0.5	11.2	4.20	12.844	0.01	40.6	1.94	0.662	3.862	0.01	12.2	0.69	-0.371	1.484	0.368	0.1688	-1.43	0.4245