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WATER QUALITY OF THE CARBONATE ROCK AQUIFER, SOUTHERN MANITOBA

By

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Water Quality of the Carbonate Rock Aquifer, southern Manitoba

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INTRODUCTION

The Carbonate Rock aquifer is the largest fresh water aquifer in Manitoba, stretching from north of The Pas southward through the Interlake region and continuing along the east side of the Red and Rat Rivers into Minnesota. The fresh water portion of the aquifer is formed by a sequence of Paleozoic limestones, dolomites and minor shales ranging in age from Ordovician to Devonian. West of the fresh water areas, there is a rapid transition to saline groundwaters and brines in the aquifer. The hydrogeology of the aquifer also becomes much more complex in this region as the Paleozoic sequence thickens with the addition of late Devonian and Mississippian age limestones, dolomites, shales and evaporites. In addition, evaporite units are present in the Ordovician and Devonian carbonates, forming laterally extensive aquitards.

The fresh to brackish water portions of the aquifer are heavily utilised for municipal, industrial, agricultural and residential water supply in the southern Interlake region and southeastern Manitoba, being the sole aquifer within extensive parts of this area. The aquifer also forms the major source of water supply to ring communities near Winnipeg and is heavily utilised for heating/cooling systems within the City. The saline water and brine portions of the aquifer have also served as sources of brines for salt extraction in the past. Oil is extracted from Mississippian age sediments in the southwestern parts of the province where the aquifer is also used as a source of water for flushing of oil fields. In some areas, the aquifer has been or is currently used as a disposal formation for industrial operations.

Due to the importance of the Carbonate Rock aquifer to Manitoba, the Geological Survey of Canada, with the cooperation of the Province of Manitoba, has initiated a study to advance our

understanding of the factors that govern the water supply, capacity, sensitivity to contamination, water quality, and dynamics of this groundwater system. An initial step in this study was to compile available data on the water chemistry. Here we present a compilation of chemical and stable isotope analyses of waters from the Carbonate Rock aquifer. DST analyses in southern Manitoba have been previously compiled by the Manitoba Department of Energy and Mines. This report differs in that data are culled for poor quality analyses.

THE CARBONATE ROCK AQUIFER

The Carbonate Rock aquifer is comprised of Middle Ordovician to Silurian and Middle Devonian to Mississippian strata. This sequence is dominated by limestones and dolomites with thin but persistent layers of shale and anhydrite. The aquifer conformably overlies the basal clastic sequence consisting of the Deadwood and Winnipeg Formations and is overlain with marked angular unconformity by Jurassic and Cretaceous sandstones and shales. The Carbonate Rock aquifer has a maximum thickness of 1200 m in southwestern Manitoba and tapers out to the east and north. The aquifer is dominated by limestones and dolomites with thin but persistent layers of shale and anhydrite.

Fractures, joints and bedding planes form primary pathways for water movement in most of the aquifer, with dissolution processes having enhanced the permeability of these fractures in some areas. While termed a single aquifer, it is recognized that the carbonate sequence should properly be referred to as an aquifer system. In the eastern portion of the aquifer (east of the Manitoba escarpment), shale and evaporite aquitards are either absent or have limited effect. Vertical profiles show little variation in water chemistry, suggesting there is little correlation between aquifer and formational boundaries. To the west, shale and evaporite beds become thicker and form more effective aquitards, reducing transformational flow. Although there are some vertical variations in salinity in this part of the province, all formations show similar east-west trends (Simpson et al., 1987).

SAMPLING METHODS

Data are derived from: 1) domestic wells and test holes, 2) saline springs, 3) oil wells, and 4) drill stem test (DST) analyses. Analyses from domestic wells, test holes, and oil well waters

were extracted from the Manitoba Water Resources Branch (MWRB) data base of groundwater analyses, whereas DST analyses were extracted from the G.S.C.'s data base. Data have been culled for poor quality and suspect analyses as discussed below. Analyses for domestic wells, springs and test holes contained in the MWRB data base have been obtained from a variety of sources dating back to the 1960's. As a result, sampling and analysis protocols are not consistent, particularly with respect to duration of pumping prior to sample collection, field analyses, filtration, preservation, and sample handling. Consistent protocols were followed in a number of water quality surveys carried out by the MWRB during the 1980's and 1990's. Wells were pumped for approximately 5 minutes or until the groundwater temperature stabilized. Sample aliquots for cation analysis were field filtered through 0.45 micron filters and collected in pre-acidified bottles or were acidified in the field or in the lab. Samples were generally kept in coolers until delivered to the lab. Field analyses for fluid conductivity, temperature and pH were carried out on most samples. Field analyses for dissolved oxygen were carried out in some sampling programs while in others separate preserved samples were collected in glass bottles for laboratory analysis of dissolved oxygen (DO).

Samples from oil wells were collected at the well head of selected producing wells having high water:oil ratios. Samples were collected from all major oil producing fields in the province. Two litres of oil/water mixtures were collected at each well and shipped to a commercial laboratory where the oil and water were separated prior to water analysis.

Water samples from DST's are collected by individual well operators. The sampling protocols used are uncertain and likely highly variable.

CULLING METHODS

Water samples are subject to many potential inaccuracies (Bachu et al., 1987, Hitcheon et al., 1987). These range from contamination during sampling to analytical and data entry errors. Charge balances were calculated for analyses of samples from domestic wells and test holes, springs and oil wells. Analyses with charge balance errors greater than 5% were rejected. DST data are derived from oil and gas operations in southwestern Manitoba. Water samples are collected by well operators not necessarily trained in proper sampling protocol. Thus analyses are subject to many potential inaccuracies. Using culling methods of Bachu et al. (1987) and Kirste et al. (1997), poor quality water samples related to contamination associated with drilling, production

and completion methods, and data entry errors, may be recognized and removed. Culling removed approximately 70% of DST analyses; a typical degree of data reduction for DST's. The remaining data can be considered representative of the aquifer on a regional scale.

MAPPING METHODS

Contour maps of major ion concentrations were generated using the commercial gridding software SURFER®. These data were gridded using kriging using a quadrant search with a search radius of 75000 m. Due to a wide range in ion concentrations for the fresh and saline water samples, a variable contour interval was used for all maps. Changes in contour intervals are indicated on the maps by a thicker contour line. For the purpose of regional mapping, DST and oil field data have not been sorted by depth, although vertical chemical stratification in the deeper parts of the aquifer have been noted.

THE DATA BASE

Analytical data for the Carbonate Rock aquifer are presented in the attached tables. In addition, the data base is contained on the attached 3½" disk as a self extracting zip file. The data file is saved in both Excel 97 and ASCII format. For the sake of clarity, there are a few important points about the data base.

- As mentioned above, data in this report are from two primary sources, 1) analyses of waters extracted from Manitoba Water Resources Branch data base, and 2) DST analyses provided by oil and gas companies. The source of data is identified by the codes MWRB and DST respectively.
- Many of the parameters listed (e.g. trace elements, stable isotopes, etc.) were only analysed for selected samples. A blank entry means there are no data available for that particular sample.
- Manitoba uses two land survey systems, 1) township and range, and 2) river lots in Parishes. Wells located under the township and range system are only identified by the quarter section (½ mile square). Latitude and longitude, and UTM, for the wells are thus taken from the centre of the quarter. For wells in Parishes, the location is provided by the Parish and river

lot number (e.g. lot 6 St. Paul). As this is the only reference in the original data base the latitude and longitude, and UTM, are taken from the centre of the lot, and thus do not necessarily reflect the exact location of the well.

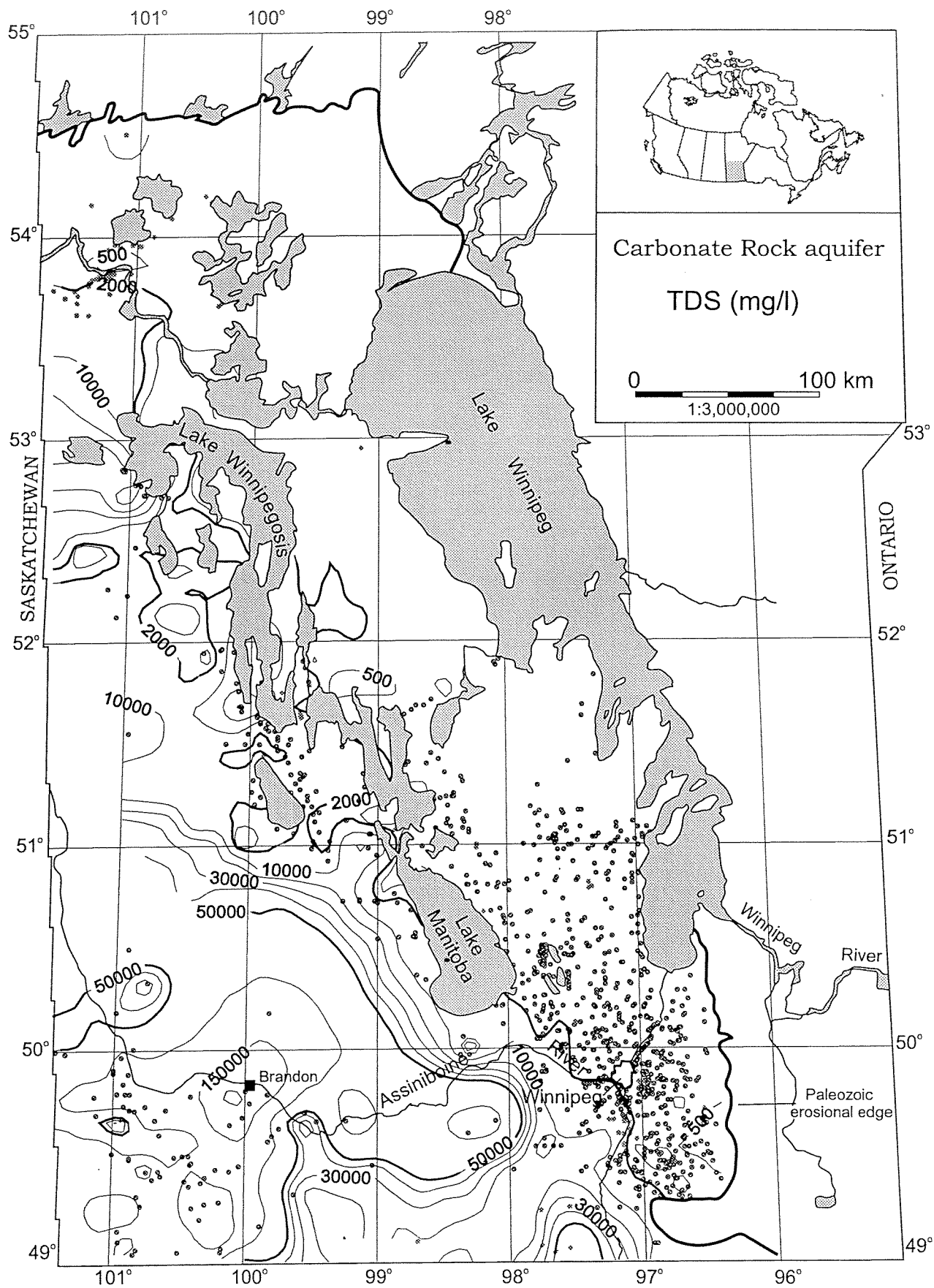
- The data base is divided into four sections: 1) water well data located by township and range, 2) water well data located by Parish, 3) oil field data ,and 4) saline springs.

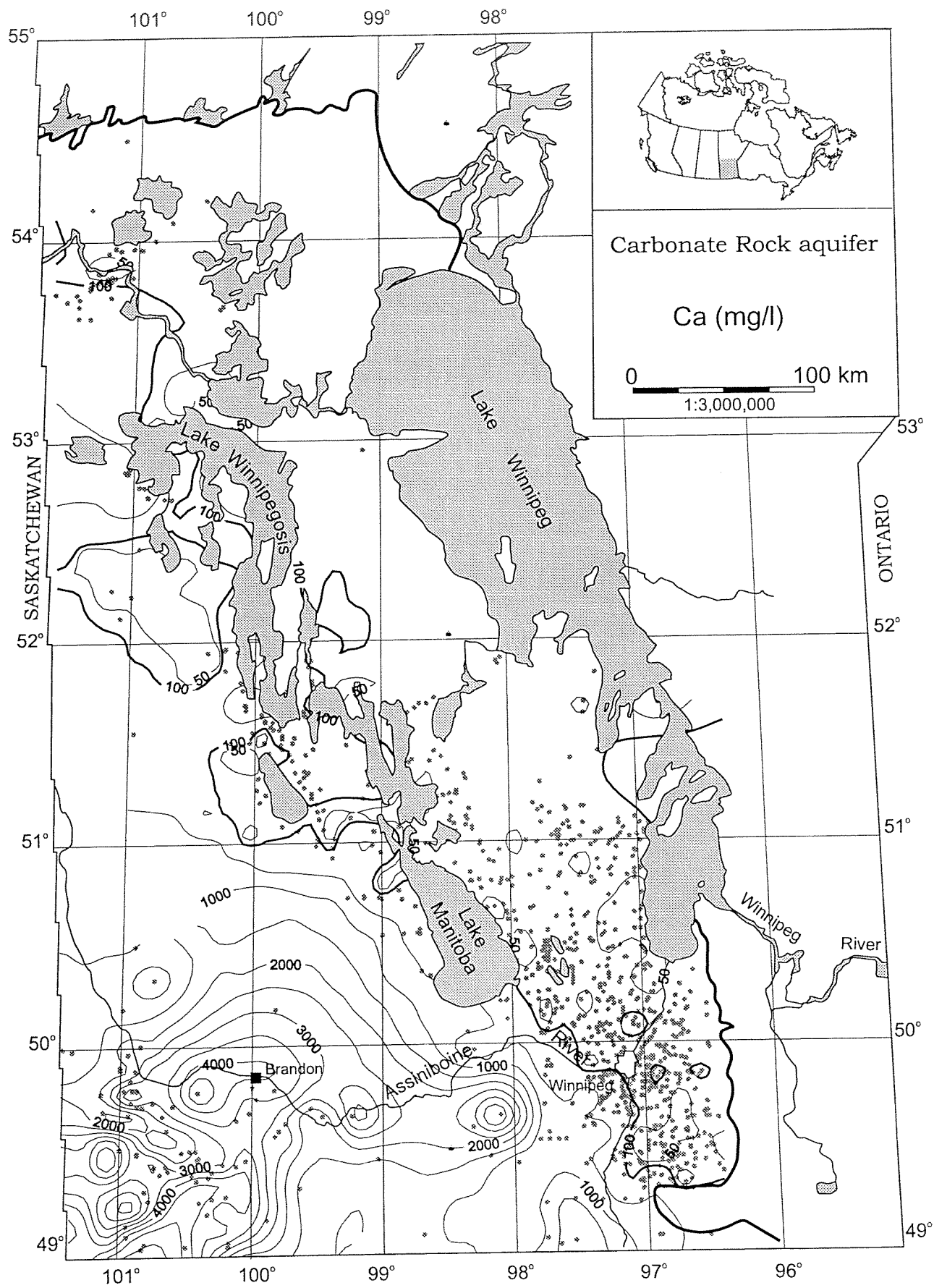
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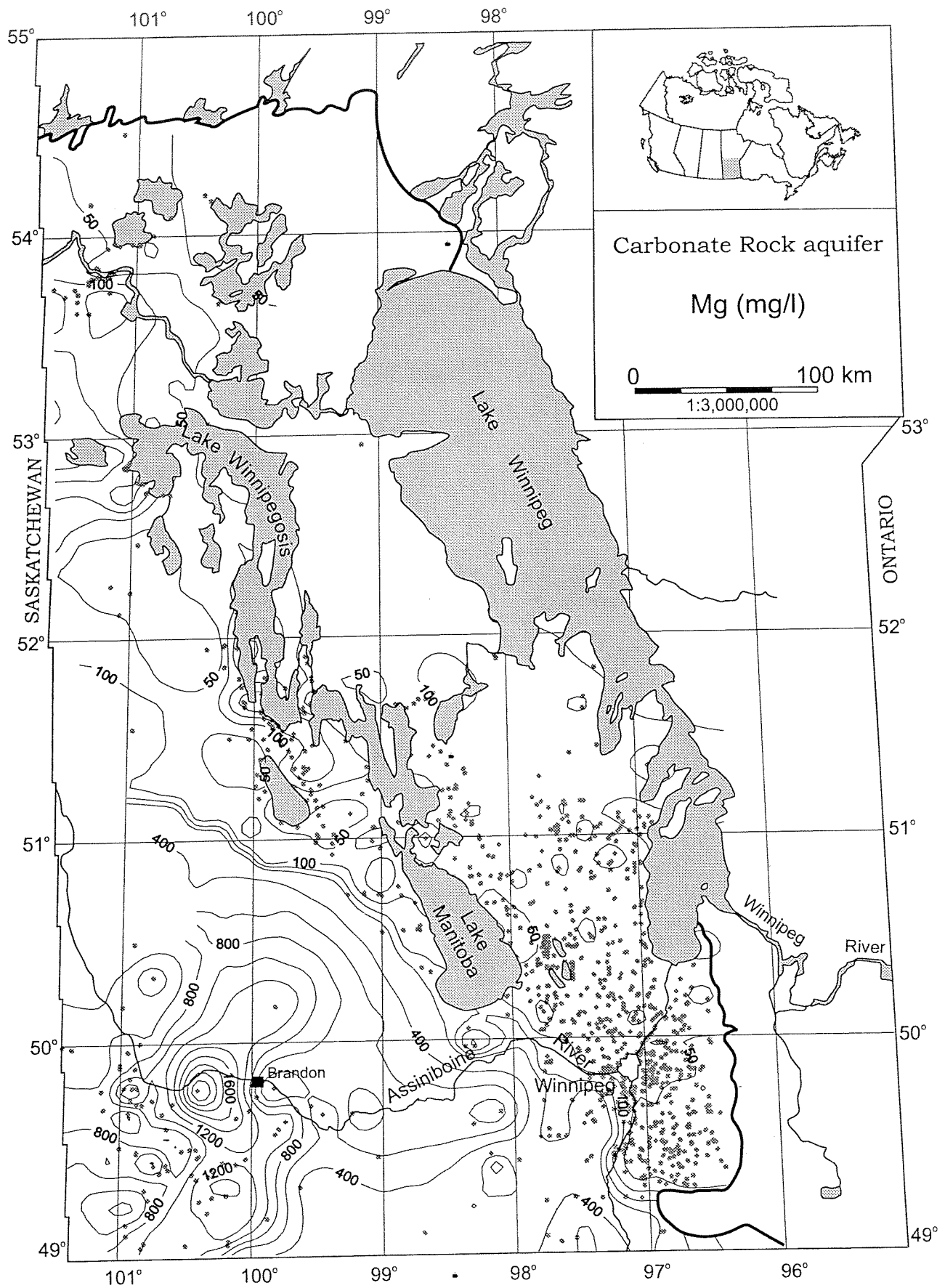
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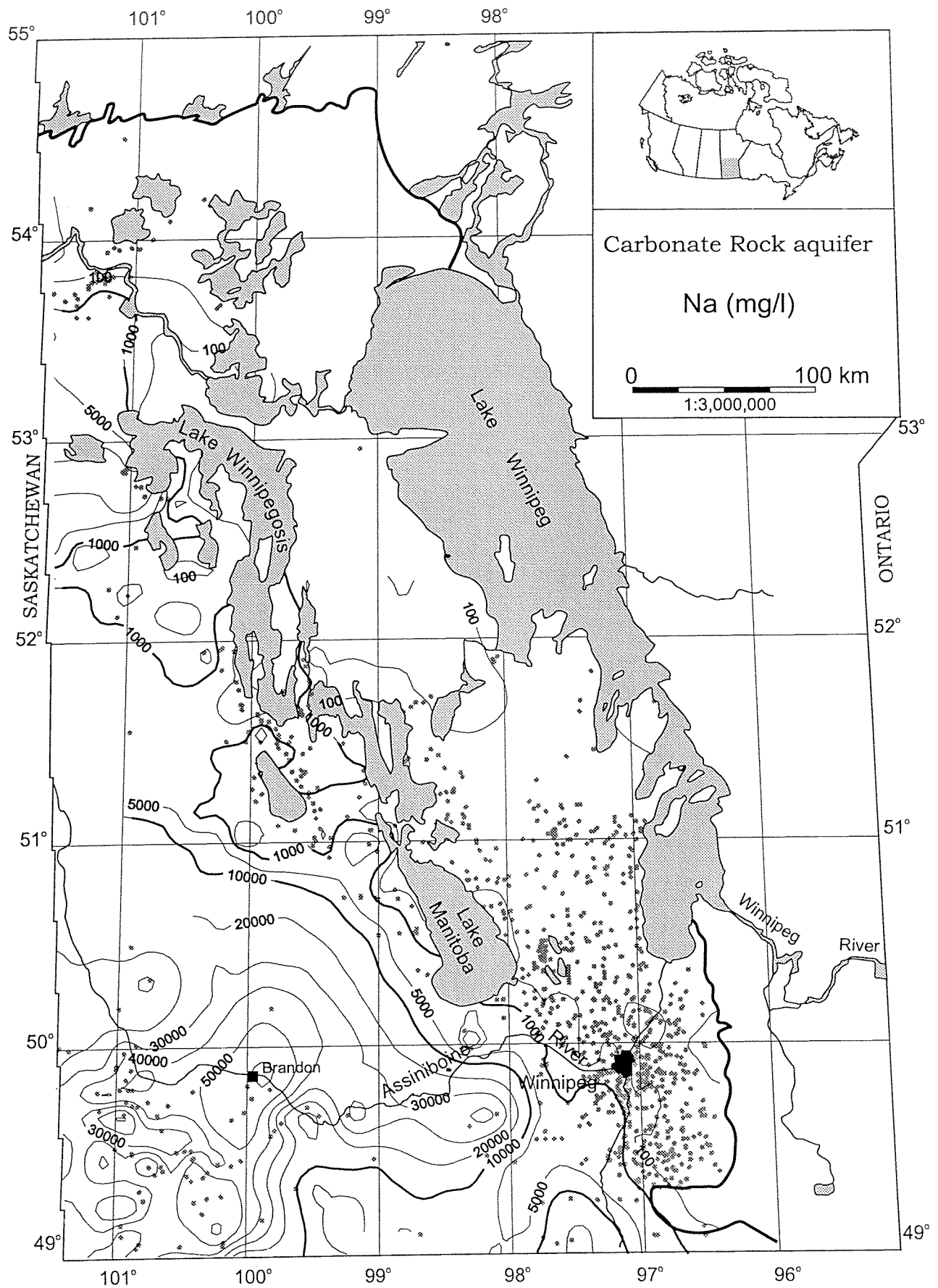
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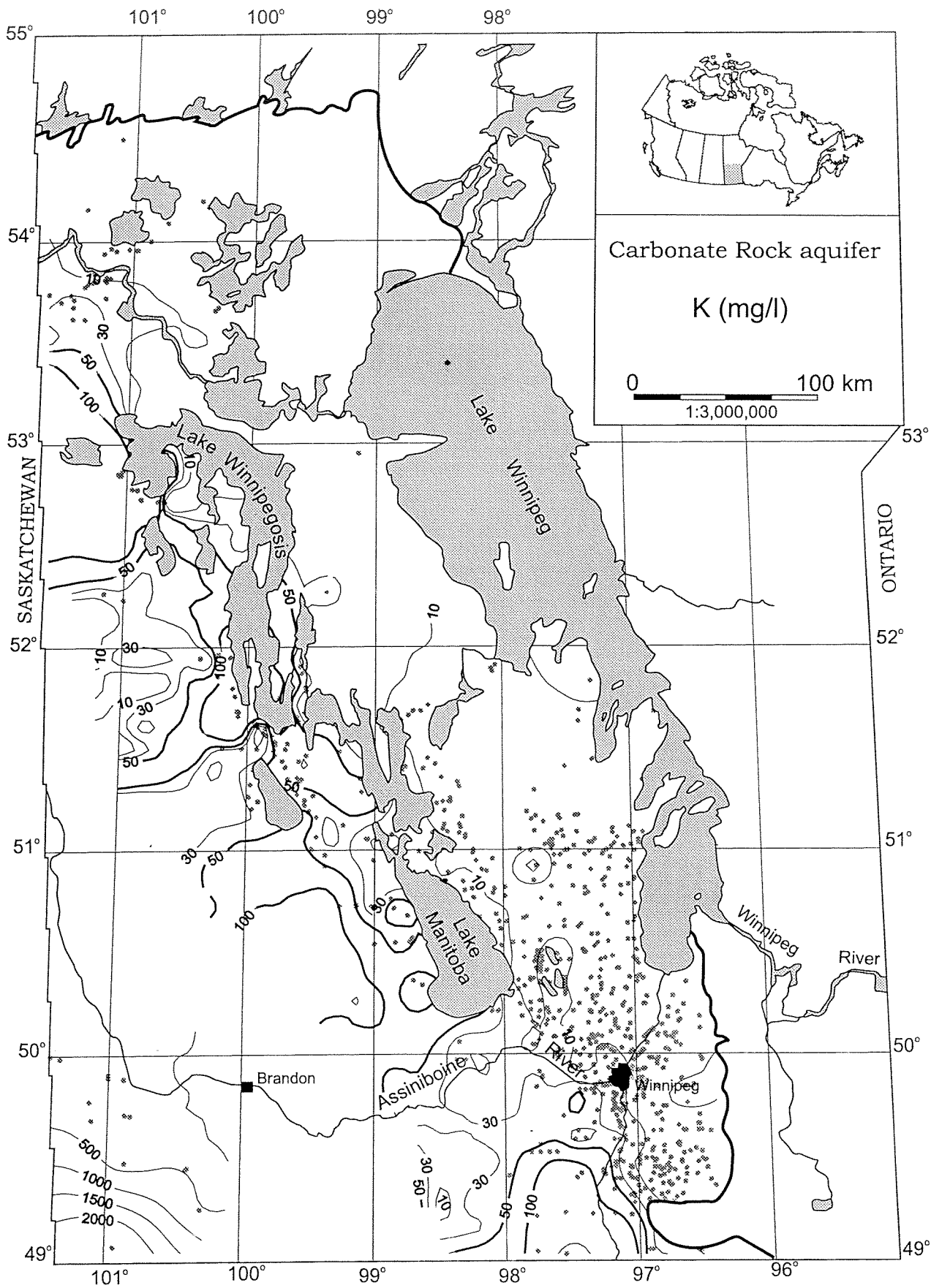
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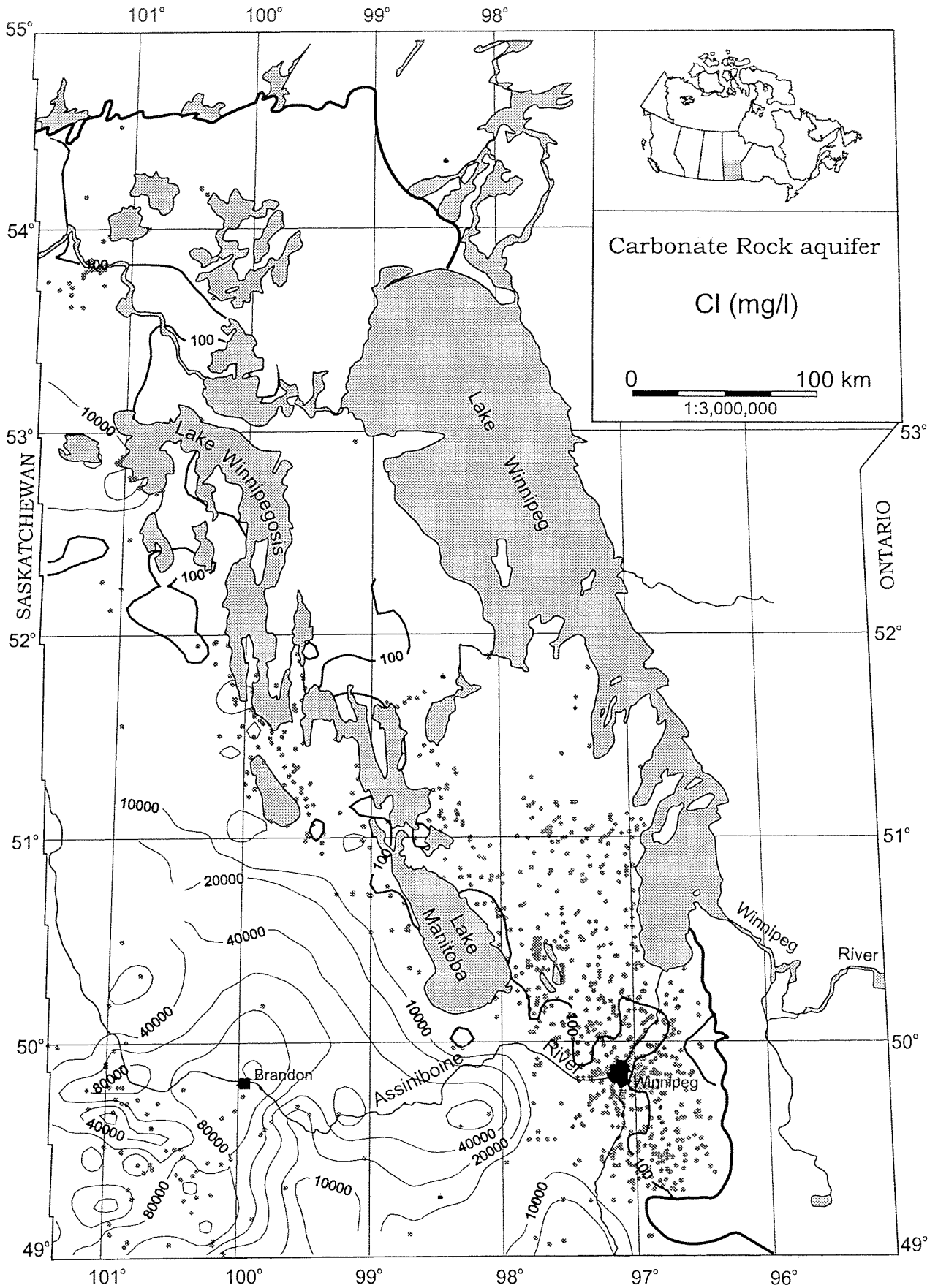


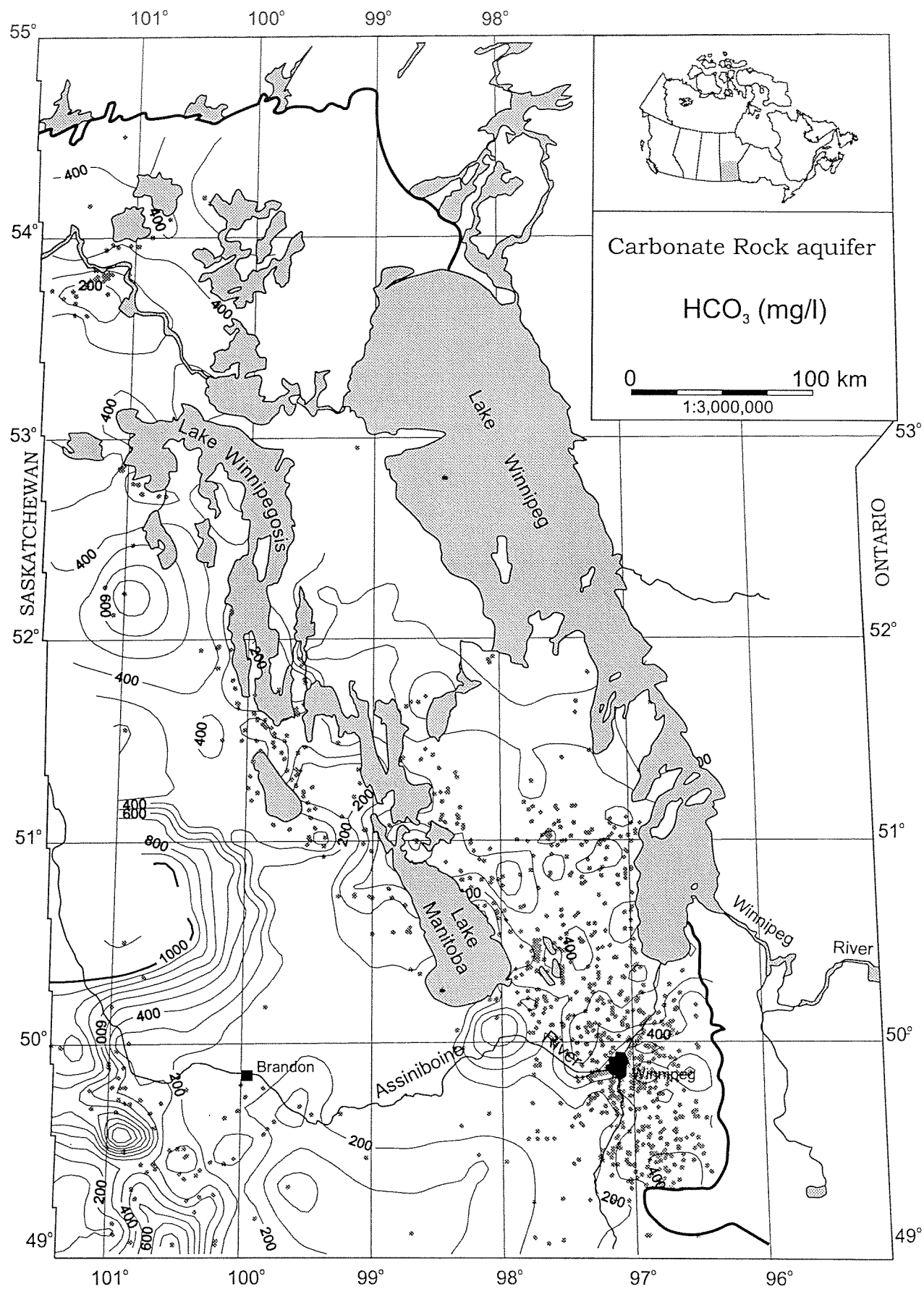












Water well data
Located by township and range

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
1	19/10/94	MWRB	NW	18	14	4	E1	50.190399	97.040083	639906	5561420	undefined	16.2	14.6	1,681	7.36		
2	19/10/94	MWRB	SW	7	15	4	E1	50.256862	97.036185	639989	5568817	undefined	18.3	4.6	1,345	7.34		
3	19/10/94	MWRB	SW	30	13	6	E1	50.124207	96.765155	659750	5554613	undefined	41.8	13.4	1,053			
4	26/10/94	MWRB	NE	5	20	4	E1	50.691529	96.998648	641362	5617215	undefined	42.7	41.1	750	7.11		
5	18/10/94	MWRB	NE	5	19	4	E1	50.603100	96.998463	641641	5607383	undefined	27.4	24.4	880	7.19		
6	19/10/94	MWRB	NE	5	18	4	E1	50.514669	97.002443	641624	5597544	undefined	30.8	15.4	965	6.87		
7	26/10/94	MWRB	SE	4	17	4	E1	50.419007	96.979178	643563	5586952	undefined	13.1		956	6.99		
8	26/10/94	MWRB	NE	28	16	4	E1	50.396763	96.979143	643633	5584479	undefined	41.8	19.2	814	7.31		
9	18/10/94	MWRB	NW	19	13	4	E1	50.116702	97.039881	640136	5553227	undefined	35.1	14.9	1,000	6.63		
10	19/10/94	MWRB	NW	3	13	3	E1	50.072500	97.108430	635359	5548186	undefined	32	14.9	1,918	6.94		
11	18/10/94	MWRB	SE	36	13	5	E1	50.138947	96.776650	658879	5556228	undefined	24.4	10.1	873	6.70		
12	19/10/94	MWRB	SE	1	20	3	E1	50.684282	97.045278	638090	5616321	undefined	48.8	46.3	775	7.36		
13	18/10/94	MWRB	NE	1	19	3	E1	50.603086	97.045268	638329	5607293	undefined	29.6	26.8	874	7.20		
14	20/10/94	MWRB	SW	21	17	3	E1	50.463222	97.128973	632798	5591590	undefined	27.1	22.9	818	7.38		
15	18/10/94	MWRB	SE	4	18	2	E1	50.507439	97.256105	623660	5596286	undefined	39.6	29.9	803	7.52		
16	20/10/94	MWRB	NE	14	16	3	E1	50.367279	97.071405	637161	5581027	undefined	21.3	12.2	846	7.20		
17	18/10/94	MWRB	NE	1	15	3	E1	50.249356	97.048349	639144	5567959	undefined	14	5.6	1,020	7.16		
18	19/10/94	MWRB	SW	7	12	3	E1	49.991550	97.176912	630679	5539065	undefined	11.6	11	1,643	7.27		
19	17/10/94	MWRB	SW	23	14	6	E1	50.197918	96.673514	666044	5563008	undefined	15.8	11	698	7.50		
20	20/10/94	MWRB	SE	14	14	5	E1	50.183175	96.799609	657094	5561096	undefined	59.4	13.3	878	7.41		
21	18/10/94	MWRB	SW	4	17	2	E1	50.419006	97.267286	623097	5586435	undefined	42.7	35.7	739	7.38		
22	20/10/94	MWRB	SW	5	16	2	E1	50.330567	97.290151	621698	5576565	undefined	41.8	28.3	846	7.20		
23	20/10/94	MWRB	NW	4	15	2	E1	50.249372	97.266980	623558	5567576	undefined	36.9	14.6	922	7.31		
24	17/10/94	MWRB	SE	1	14	2	E1	50.153686	97.188772	629392	5557070	undefined	32	13.1	855	7.31		
25	18/10/94	MWRB	SE	1	13	2	E1	50.065249	97.188761	629631	5547238	undefined	29.9	14.3	940	7.40		
26	19/10/94	MWRB	SE	2	12	2	E1	49.976820	97.211606	628231	5537367	undefined	44.2	17.1	1,150	7.34		
27	26/10/94	MWRB	NW	1	14	3	E1	50.160926	97.062660	638379	5558101	undefined	37.5	14.2	1,000	7.15		
28	19/10/94	MWRB	SE	27	21	1	E1	50.831677	97.370705	614741	5632153	undefined	34.7	21.5	658	7.64		
29	20/10/94	MWRB	SE	3	22	1	E1	50.861152	97.370738	614666	5635431	undefined	21.3	16.2	674	7.97		
30	19/10/94	MWRB	SE	1	23	1	E1	50.949561	97.323117	617794	5645336	undefined	37.8	12.5	1,479	7.85		
31	17/10/94	MWRB	SW	1	24	1	E1	51.037990	97.334600	616766	5655151	undefined	50	10.4	682	7.57		
32	20/10/94	MWRB	NW	5	25	1	E1	51.133650	97.428322	609968	5665643	undefined	19.8	7.8	693	7.59		

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1	8.7	1296	103.0	83.4	129.0	8.2	310	191	459	< 18.0	< 10.2	12.7	0.08	0.175	0.050	< 0.0020	0.03	0.99
2	9.5	1209	74.9	89.6	88.6	4.7	173	64	700	< 18.0	< 10.2	14.6	0.26	0.007	0.080	0.0020	0.01	0.12
3	7.5	920	73.4	89.4	18.2	3.8	41	28	649	< 18.0	< 10.2	17.3	7.11	0.006	0.020	< 0.0020	0.02	0.08
4	7.5	692	43.3	60.4	35.2	4	82	3.9	450	< 18.0	< 10.2	12.9	< 0.01	0.144	< 0.02	< 0.0020	< 0.01	0.52
5	7.3	816	52.3	75.9	29.0	5.3	60	6	573	< 18.0	< 10.2	14.1	0.02	0.149	0.020	< 0.0020	< 0.01	0.36
6	9.5	872	73.0	71.8	31.1	6.1	61	8.7	606	< 18.0	< 10.2	14.5	0.03	0.007	0.050	< 0.0020	< 0.01	0.16
7	8.6	894	133.0	68.3	16.5	4.4	61	25	572	< 18.0	< 10.2	14.0	5.97	0.006	0.410	< 0.0020	0.04	0.77
8	7.4	739	78.0	59.7	14.6	3.9	43	8.9	517	< 18.0	< 10.2	14.3	1.84	0.007	0.060	< 0.0020	< 0.01	0.06
9	7.5	1806	139.0	163.0	160.0	8.5	549	202	571	< 18.0	< 10.2	13.9	0.11	0.046	0.030	< 0.0020	0.01	0.44
10	8.3	1624	126.0	162.0	99.5	7.8	447	134	635	< 18.0	< 10.2	12.7	0.05	0.009	0.060	< 0.0020	< 0.01	0.54
11	7.0	788	62.6	81.2	8.5	4	28	10	578	< 18.0	< 10.2	15.3	2.27	0.006	0.020	< 0.0020	< 0.01	0.11
12	8.9	724	46.1	70.0	22.8	4.7	27	3.5	536	< 18.0	< 10.2	13.6	< 0.01	0.14	0.020	< 0.0020	< 0.01	1.93
13	6.5	802	50.6	73.7	32.9	5.6	68	7.6	551	< 18.0	< 10.2	13.0	0.04	0.161	0.020	< 0.0020	< 0.01	0.43
14	7.4	723	56.3	52.7	47.6	6.5	113	27	409	< 18.0	< 10.2	11.1	< 0.01	0.135	0.030	< 0.0020	< 0.01	0.26
15	8.5	706	61.3	53.0	34.1	7	70	25	446	< 18.0	< 10.2	9.4	< 0.01	0.078	0.020	< 0.0020	< 0.01	0.68
16	7.3	743	61.7	56.2	39.1	6.7	70	32	466	< 18.0	< 10.2	11.5	< 0.01	0.104	0.020	< 0.0020	< 0.01	0.44
17	7.7	891	62.4	69.4	53.3	5.6	113	42	532	< 18.0	< 10.2	13.4	< 0.01	0.135	0.080	< 0.0020	< 0.01	0.14
18	6.9	1199	80.4	63.4	162.0	12.6	197	225	448	< 18.0	< 10.2	10.1	< 0.01	0.098	0.030	< 0.0020	< 0.01	0.26
19	7.8	619	65.9	46.5	19.0	3	47	15	407	< 18.0	< 10.2	15.1	< 0.01	0.056	0.030	< 0.0020	0.02	0.53
20	7.8	753	76.8	71.4	8.5	3.3	28	8	541	< 18.0	< 10.2	15.9	7.94	0.007	< 0.02	< 0.0020	0.01	0.06
21	8.3	680	61.6	55.2	21.8	5.7	33	17	474	< 18.0	< 10.2	11.7	< 0.01	0.018	0.030	< 0.0020	< 0.01	0.17
22	8.1	769	72.0	60.6	21.5	7.3	55	15	524	< 18.0	< 10.2	13.6	0.12	0.019	< 0.02	< 0.0020	< 0.01	0.11
23	10.7	800	85.1	66.8	12.0	5.3	5	27	587	< 18.0	< 10.2	12.2	2.06	0.008	< 0.02	< 0.0020	0.01	0.06
24	8.1	756	67.3	62.5	26.5	6	38	34	510	< 18.0	< 10.2	11.4	0.69	0.008	< 0.02	< 0.0020	< 0.01	0.05
25	10.4	822	63.6	64.0	45.0	7.7	69	57	502	< 18.0	< 10.2	14.0	< 0.01	0.008	0.020	< 0.0020	< 0.01	0.06
26	7.1	1072	80.6	70.0	90.4	13.2	206	94	506	< 18.0	< 10.2	12.0	< 0.01	0.047	0.030	< 0.0020	< 0.01	0.56
27	7.3	2001	152.0	120.0	249.0	10.4	495	443	518	< 18.0	< 10.2	13.1	0.87	0.167	0.050	< 0.0020	0.01	0.11
28	7.6	580	59.0	50.5	10.1	4.3	18	2.3	426	< 18.0	< 10.2	10.1	< 0.01	0.023	< 0.02	< 0.0020	0.01	0.24
29	7.4	605	61.2	51.9	10.3	4.1	28	2.7	437	< 18.0	< 10.2	9.7	0.02	0.006	0.020	< 0.0020	< 0.01	0.8
30	8.0	1237	61.8	71.8	164.0	5.3	492	47	384	< 18.0	< 10.2	11.3	< 0.01	0.191	0.120	< 0.0020	< 0.01	0.53
31	7.3	623	59.6	55.7	9.1	4.4	34	1.6	448	< 18.0	< 10.2	11.1	< 0.01	0.052	0.060	< 0.0020	0.01	0.44
32	7.0	594	68.7	48.4	7.6	5	27	25	402	< 18.0	< 10.2	10.1	1.46	0.022	0.060	< 0.0020	0.02	0.05

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
1	< 0.05	0.09	0.002	0.064	< 0.001	< 0.005	< 0.002	< 0.001	0.017	0.4	0.29	0.15	119	5	124	1.9
2	< 0.05	0.06	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.4	0.31	0.19	153	< 5.0	157	4.1
3	0.07	0.27	< 0.001	< 0.010	0.002	< 0.005	< 0.002	< 0.001	0.001	1.3	0.37	0.07	140	< 5.0	144	19
4	< 0.05	0.03	0.006	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	1.2	0.55	0.14	97.9	< 5.0	101	0.6
5	0.05	0.42	0.004	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.6	0.34	0.13	104	5	109	0.6
6	0.05	0.48	< 0.001	0.011	< 0.001	< 0.005	< 0.002	< 0.001	0.002	1	0.65	0.1	135	< 5.0	138	3
7	0.06	0.07	< 0.001	< 0.010	0.002	< 0.005	< 0.002	< 0.001	0.003	4.1	0.68	0.05	114	< 5.0	118	32
8	0.07	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	< 0.001	3	1.3	0.05	101	< 5.0	104	5.6
9	< 0.05	0.06	< 0.001	0.03	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.5	0.22	0.16	128	< 5.0	132	11
10	< 0.05	0.05	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.001	0.5	0.18	0.15	128	8	136	11
11	0.08	0.01	< 0.001	< 0.010	0.009	< 0.005	< 0.002	< 0.001	< 0.001	0.7	0.3	0.05	129	< 5.0	132	33
12	0.06	0.12	0.006	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	0.8	0.52	0.17	109	< 5.0	112	< 0.5
13	< 0.05	0.07	0.004	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.5	0.55	0.18	113	< 5.0	114	0.5
14	< 0.05	0.03	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.2	0.31	0.24	72.3	5.7	78	1.6
15	< 0.05	0.25	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.1	0.72	0.23	84.6	< 5.0	89	< 0.5
16	< 0.05	0.16	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.006	0.6	0.34	0.22	92.6	< 5.0	96	0.6
17	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	1	0.32	0.17	104	< 5.0	107	2.6
18	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.1	0.3	0.33	72.2	< 5.0	75	1.2
19	0.06	0.01	0.002	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.2	0.22	0.07	79.1	< 5.0	82	1.7
20	0.07	0.29	< 0.001	< 0.010	0.002	< 0.005	< 0.002	< 0.001	0.009	4.8	0.24	0.05	103	< 5.0	107	7.8
21	0.05	0.52	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.8	0.4	0.14	93	< 5.0	93	0.7
22	0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.8	0.33	0.24	103	5	108	1.9
23	< 0.05	0.02	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.012	3.1	0.23	0.09	114	< 5.0	118	3.8
24	0.06	0.14	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.002	1	0.25	0.11	94	< 5.0	94	2
25	< 0.05	< 0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	1	0.27	0.17	96.4	5.6	102	1.2
26	< 0.05	0.03	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.8	0.28	0.37	105	< 5.0	108	0.8
27	< 0.05	1.28	< 0.001	0.017	< 0.001	< 0.005	< 0.002	< 0.001	0.002	1.3	0.25	0.22	99.3	< 5.0	103	7.4
28	0.06	0.12	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	1.1	0.39	0.11	86	< 5.0	86	0.7
29	0.07	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.5	0.41	0.13	93	< 5.0	93	0.7
30	< 0.05	0.04	0.003	0.012	< 0.001	< 0.005	< 0.002	< 0.001	0.006	0.5	0.37	0.24	80.7	< 5.0	83	3.4
31	0.06	0.02	< 0.001	0.017	< 0.001	< 0.005	< 0.002	< 0.001	0.006	0.4	0.36	0.13	95	< 5.0	95	< 0.5
32	0.05	0.08	< 0.001	0.032	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	3.5	0.27	0.06	80.8	< 5.0	84	3.1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1	0.089	< 0.001	< 0.005	0.68	-13.3		13	38	12	-4
2	0.074	< 0.001	< 0.005	0.4	-12.0		12	<1	<1	-6
3	0.04	< 0.001	< 0.005	0.62	-12.9		30	<1	<1	-2
4	0.033	< 0.001	< 0.005	0.38	-14.3		<6	<1	<1	-2
5	0.024	< 0.005	< 0.020	0.45	-14.0		<6	17	2	-3
6	0.025	< 0.001	< 0.005	0.34	-13.8		22	<1	<1	-2
7	0.024	< 0.001	< 0.005	0.26	-13.8		34	<1	<1	7
8	0.017	< 0.001	< 0.005	0.24	-14.2		29	<1	<1	0
9	0.17	< 0.001	< 0.005	0.97	-14.6		<6	<1	<1	2
10	0.17	< 0.001	< 0.005	0.87	-14.2		<6	28	1	1
11	0.037	< 0.001	< 0.005	0.46	-13.2		45	1	<1	0
12	0.052	< 0.001	< 0.005	0.42	-14.1		<6	<1	<1	-1
13	0.041	< 0.001	< 0.005	0.47	-13.9		<6	<1	<1	-2
14	0.043	< 0.001	< 0.005	0.32	-15.1		<6	<1	<1	-2
15	0.038	< 0.001	< 0.005	0.26	-14.8		<6	<1	<1	-2
16	0.044	< 0.001	< 0.005	0.33	-14.1		10	<1	<1	-2
17	0.051	< 0.001	< 0.005	0.3	-13.9		16	<1	<1	-4
18	0.18	< 0.001	< 0.005	0.61	-15.4		<6	<1	<1	-3
19	0.02	< 0.001	< 0.005	0.26	-14.5		<6	<1	<1	0
20	0.013	< 0.001	< 0.005	0.28	-12.9		40	14	1	2
21	0.009	< 0.001	< 0.005	0.23	-14.4		15	<1	<1	-1
22	0.009	< 0.001	< 0.005	0.31	-14.3		14	<1	<1	-2
23	0.01	< 0.001	< 0.005	0.2	-14.2		39	<1	<1	0
24	0.013	< 0.001	< 0.005	0.27	-14.2		14	<1	<1	-1
25	0.032	< 0.001	< 0.005	0.37	-14.5		6	<1	<1	-3
26	0.056	< 0.001	< 0.005	0.66	-14.3		<6	<1	<1	-4
27	0.21	< 0.001	< 0.005	1.1	-14.9		<6	<1	<1	-5
28	0.009	< 0.005	< 0.020	0.17	-14.3		10	<1	<1	2
29	0.012	< 0.001	< 0.005	0.17	-14.3		11	<1	<1	0
30	0.077	< 0.001	< 0.005	0.42	-14.6		<6	4	<1	-5
31	0.011	< 0.001	< 0.005	0.21	-15.2		<6	<1	<1	0
32	0.036	< 0.001	< 0.005	0.12	-15.0		39	1	<1	0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. µS/cm	pH
										Easting	Northing		Top	Bottom				
33	20/10/94	MWRB	SE	6	26	1	E1	51.214834	97.440465	608927	5674853	undefined			17.1	4.9	943	7.43
34	18/10/94	MWRB	NW	2	22	2	E1	50.868383	97.219454	625294	5636480	undefined			38.1	3.4	1,156	7.59
35	18/10/94	MWRB	SE	1	23	2	E1	50.949561	97.182621	627663	5645570	undefined			19.2	14.6	1,458	7.50
36	17/10/94	MWRB	NW	1	24	2	E1	51.045223	97.194106	626596	5656187	undefined			25.9	9	772	7.75
37	19/10/94	MWRB	NE	1	23	3	E1	50.956794	97.042125	637510	5646627	undefined			24.7	21.7	1,337	6.60
38	18/10/94	MWRB	NE	3	22	3	E1	50.868385	97.091878	634270	5636705	undefined			56.7	28.2	881	7.93
39	18/10/94	MWRB	NE	22	21	3	E1	50.824172	97.091828	634401	5631789	undefined					696	7.90
40	17/10/94	MWRB	NE	17	24	3	E1	51.074706	97.135708	630606	5659567	undefined			29	24.8	667	8.03
41	18/10/94	MWRB	SW	5	25	3	E1	51.126418	97.147312	629648	5665297	undefined			19.2	11.3	687	7.70
42	26/10/94	MWRB	SW	21	22	4	E1	50.905365	96.987231	641521	5641012	undefined			36.6	28.3	724	7.87
43	18/10/94	MWRB	NE	18	23	4	E1	50.986275	97.018370	639090	5649949	undefined			19.8	6.7	894	7.54
44	19/10/94	MWRB	SW	4	24	4	E1	51.038001	96.983231	641399	5655768	undefined			26.5	12.2	734	7.78
45	26/10/94	MWRB	SW	1	25	4	E1	51.126413	96.913143	646034	5665735	undefined			9.8	6.7	697	7.68
46	20/10/94	MWRB	NE	1	22	1	W1	50.870897	97.463836	608092	5636374	undefined			18.6	9.1	737	7.43
47	20/10/94	MWRB	NW	17	21	2	W1	50.811957	97.708131	591017	5629491	undefined			25.9	6.6	951	7.30
48	18/10/94	MWRB	NE	2	22	2	W1	50.870907	97.626845	596622	5636149	undefined			25.6	9.1	767	7.64
49	18/10/94	MWRB	SE	13	23	2	W1	50.979036	97.604114	597994	5648202	undefined			25.6	12.5	807	7.61
50	18/10/94	MWRB	SE	11	23	1	W1	50.964309	97.486952	606252	5646727	undefined			17.1	6.6	735	7.70
51	18/10/94	MWRB	NW	2	24	1	W1	51.045232	97.498476	605260	5655709	undefined			25.3	2.7	729	7.72
52	26/10/94	MWRB	SW	9	25	1	W1	51.141160	97.545411	601759	5666310	undefined			28.3	10.7	640	7.96
53	20/10/94	MWRB	NE	14	22	3	W1	50.900382	97.766526	586739	5639253	undefined			30.8	9.8	794	7.88
54	18/10/94	MWRB	NE	12	23	3	W1	50.971531	97.744609	588146	5647191	undefined			29	9.8	1,071	7.52
55	20/10/94	MWRB	NE	3	24	3	W1	51.045234	97.791373	584728	5655332	undefined			30.5	6.4	851	7.65
56	19/10/94	MWRB	SW	12	25	3	W1	51.141150	97.756128	587018	5666039	undefined			18.9	12.8	793	7.72
57	17/10/94	MWRB	NE	9	26	3	W1	51.236815	97.815064	582724	5676609	undefined			25.6	13.2	801	7.27
58	24/10/94	MWRB	SW	28	25	2	W1	51.185371	97.685991	591837	5671041	undefined			19.8		753	7.61
59	19/10/94	MWRB	NE	16	24	2	W1	51.074709	97.674301	592876	5658750	undefined			33.5	7.2	710	7.68
60	23/10/94	MWRB	SW	5	23	5	W1	50.949572	98.130366	561090	5644359	undefined			25.9	13.4	795	7.94
61	24/10/94	MWRB	SE	4	24	6	W1	51.038002	98.236227	553551	5654110	undefined			36	7	810	7.70
62	25/10/94	MWRB	SW	6	25	6	W1	51.126407	98.294702	549357	5663900	undefined			44.8	15.5	653	7.81
63	25/10/94	MWRB	SW	17	27	7	W1	51.304072	98.412704	540942	5683585	undefined			17.1	6.1	736	7.90
64	24/10/94	MWRB	SW	2	28	7	W1	51.362297	98.342395	545785	5690102	undefined			17.7	13.1	690	7.71

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
33	7.4	826	80.1	76.4	10.7	3.3	34	43	568	<18.0	<10.2	10.9	1.93	0.006	0.130	0.0020	0.16	0.08
34	8.0	994	79.6	88.1	36.9	5.5	136	51	585	<18.0	<10.2	11.6	6.27	0.005	0.030	<0.0020	0.01	0.08
35	6.8	1393	88.0	126.0	71.1	6.9	405	6.9	675	<18.0	<10.2	13.8	0.1	0.076	0.040	<0.0020	<0.01	0.91
36	7.4	673	80.3	55.2	7.5	2.6	28	4.4	482	<18.0	<10.2	12.6	4.27	0.005	0.020	<0.0020	0.01	0.06
37	7.1	1230	83.4	95.1	74.3	6.4	401	7.7	548	<18.0	<10.2	13.6	0.01	0.198	0.060	<0.0020	<0.01	3.23
38	7.0	801	51.1	70.8	39.1	4.8	163	4.2	455	<18.0	<10.2	12.5	0.11	0.127	0.020	<0.0020	<0.01	0.3
39	7.3	629	43.7	57.2	24.2	4.6	47	2.8	438	<18.0	<10.2	11.9	<0.01	0.117	0.020	<0.0020	<0.01	0.54
40	6.6	594	72.8	45.4	5.8	1.9	15	1.6	439	<18.0	<10.2	12.5	<0.01	0.021	0.020	<0.0020	<0.01	0.36
41	6.8	574	83.8	35.9	9.3	1.6	14	22	396	<18.0	<10.2	11.3	1.7	0.007	0.020	<0.0020	0.01	0.04
42	7.7	699	46.7	58.8	36.6	4.7	119	3.8	417	<18.0	<10.2	12.5	<0.01	0.15	0.020	<0.0020	<0.01	0.87
43	7.5	859	77.5	73.9	18.9	5	98	2	568	<18.0	<10.2	15.7	<0.01	0.082	0.030	<0.0020	<0.01	0.85
44	6.3	662	71.8	54.2	9.2	4	35	1.9	471	<18.0	<10.2	14.6	<0.01	0.029	0.070	<0.0020	<0.01	0.12
45	6.8	613	102.0	32.8	4.4	2.8	16	2.6	440	<18.0	<10.2	12.8	1.66	0.006	<0.02	<0.0020	<0.01	0.02
46	6.2	647	71.2	52.7	8.8	4.5	10	1.9	486	<18.0	<10.2	12.4	<0.01	0.016	0.020	<0.0020	<0.01	0.12
47	6.3	875	80.6	63.1	37.8	6.1	128	18	528	<18.0	<10.2	13.8	0.67	0.051	0.020	<0.0020	0.02	0.08
48	6.3	686	61.8	60.3	14.6	4.5	44	3.8	484	<18.0	<10.2	12.7	0.1	0.013	0.020	<0.0020	0.01	0.1
49	6.5	684	81.2	54.0	13.0	3.8	13	24	481	<18.0	<10.2	14.0	2.54	0.006	<0.02	<0.0020	0.02	0.07
50	6.3	636	65.6	57.2	7.8	3	12	5.5	473	<18.0	<10.2	12.1	1.31	0.006	<0.02	<0.0020	<0.01	0.06
51	6.7	613	66.0	54.1	9.3	4.1	26	6	437	<18.0	<10.2	10.0	4.38	0.006	0.020	<0.0020	0.01	0.05
52	8.0	572	53.7	38.2	31.6	4.8	70	5.9	356	<18.0	<10.2	11.9	<0.01	0.051	0.020	<0.0020	<0.01	0.16
53	6.9	729	55.0	66.3	21.0	4.5	74	6.2	488	<18.0	<10.2	13.9	<0.01	0.047	0.020	<0.0020	<0.01	0.66
54	6.9	893	109.0	59.9	11.1	43.4	35.1	31	593	<18.0	<10.2	10.5	10.3	0.014	0.030	<0.0020	0.01	0.05
55	6.9	792	68.4	54.7	39.6	7.3	132	5.5	472	<18.0	<10.2	12.0	<0.01	0.089	0.040	<0.0020	<0.01	0.08
56	7.2	708	80.4	51.8	17.2	5	65	21	454	<18.0	<10.2	14.0	<0.01	0.03	0.050	<0.0020	<0.01	0.21
57	6.8	738	66.3	59.0	24.0	7.1	79	1.9	488	<18.0	<10.2	12.5	<0.01	0.093	0.020	<0.0020	<0.01	0.5
58	6.7	682	63.7	46.4	35.5	6.9	109	4.4	404	<18.0	<10.2	11.7	<0.01	0.078	0.020	<0.0020	<0.01	0.23
59	8.1	634	75.4	48.1	10.8	2.5	36	8.8	438	<18.0	<10.2	14.4	<0.01	0.007	0.020	<0.0020	<0.01	0.06
60	8.1	740	62.2	59.9	22.0	5.8	95	4.1	479	<18.0	<10.2	12.4	<0.01	0.035	<0.02	<0.0020	0.01	0.18
61	7.9	753	73.2	55.3	21.8	10.8	59	3.6	518	<18.0	<10.2	11.3	0.14	0.052	0.030	<0.0020	<0.01	0.17
62	7.6	588	59.0	52.6	7.3	4.2	5	1.5	449	<18.0	<10.2	9.2	<0.01	0.015	<0.02	<0.0020	<0.01	0.08
63	6.7	659	53.3	61.4	17.0	4.1	76	4.8	442	<18.0	<10.2	<0.2	0.21	0.021	<0.02	<0.0020	<0.01	0.1
64	6.6	611	53.3	57.8	11.1	3.2	31	1.7	449	<18.0	<10.2	4.0	0.02	0.009	0.020	<0.0020	<0.01	0.2

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
33	0.15	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	1.5	0.2	0.06	112	< 5.0	116	1.1
34	0.06	0.03	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.008	3.1	0.31	0.1	107	6	113	5.6
35	< 0.05	0.06	0.002	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	0.6	0.27	0.22	117	8	125	2.8
36	0.05	0.01	< 0.001	0.015	0.001	< 0.005	< 0.002	< 0.001	0.002	3.8	0.57	< 0.05	91.9	5.1	97	3.4
37	< 0.05	0.02	0.005	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.013	1	0.35	0.24	99.1	< 5.0	104	0.7
38	< 0.05	0.21	0.002	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.005	1.2	0.46	0.16	87.5	< 5.0	92	0.7
39	< 0.05	0.32	0.004	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.4	0.55	0.18	81	< 5.0	84	< 0.5
40	0.07	0.11	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	2.7	0.33	< 0.05	84.2	< 5.0	88	0.9
41	0.07	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.1	0.33	< 0.05	67	< 5.0	71	1.7
42	< 0.05	0.09	0.006	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.005	0.6	0.5	0.18	92.5	< 5.0	96	< 0.5
43	< 0.05	0.01	0.006	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.008	< 0.1	0.37	0.09	119	5	124	1
44	0.05	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.7	0.44	0.06	91.5	< 5.0	94	1.7
45	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.035	0.5	0.14	< 0.05	81.6	< 5.0	85	2.9
46	0.08	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.4	0.22	0.1	95	< 5.0	95	0.8
47	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.4	0.29	0.24	90.9	5.1	96	1.6
48	0.05	0.04	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	0.5	0.19	0.14	93	< 5.0	93	1.7
49	0.06	0.05	< 0.001	0.017	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.5	0.19	0.07	83	< 5.0	84	2.5
50	0.07	0.02	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.003	2	0.23	0.06	84.8	< 5.0	88	2.5
51	0.08	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.004	2.6	0.22	0.05	80.7	< 5.0	84	2.4
52	< 0.05	0.23	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.004	4.6	0.26	0.19	70	< 5.0	70	< 0.5
53	0.05	0.29	0.001	0.01	< 0.001	< 0.005	< 0.002	< 0.001	0.005	0.8	0.26	0.12	97.1	< 5.0	100	1.1
54	0.08	0.02	< 0.001	< 0.010	< 0.001	0.006	< 0.002	< 0.001	0.045	1.1	0.15	0.05	111	11	122	2.5
55	< 0.05	< 0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	0.6	0.38	0.34	90	< 5.0	90	0.8
56	0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	3.1	0.25	0.2	82	< 5.0	83.3	2.3
57	< 0.05	0.08	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.6	0.32	0.26	93	< 5.0	93	< 0.5
58	< 0.05	0.03	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.4	0.36	0.35	76	< 5.0	76	< 0.5
59	0.06	0.04	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.4	0.21	0.05	63.8	< 5.0	68	2.4
60	< 0.05	0.02	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.005	0.5	0.23	0.2	87.6	7.4	95	0.5
61	< 0.05	0.03	< 0.001	0.011	< 0.001	< 0.005	< 0.002	< 0.001	0.039	1.7	0.48	0.5	92	< 5.0	92	1.9
62	0.07	0.16	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.7	0.22	0.13	97	< 5.0	97	0.6
63	< 0.05	0.06	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.005	0.6	0.28	0.14	91.8	< 5.0	94	1.7
64	0.05	0.05	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.6	0.27	0.08	97.7	< 5.0	100	1.7

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
33	0.08	< 0.001	< 0.005	0.18	-14.8		17	<1	<1	-2
34	0.081	< 0.001	< 0.005	0.31	-13.9		15	<1	<1	-3
35	0.065	< 0.001	< 0.005	0.55	-15.5		<6	<1	<1	-4
36	0.043	< 0.001	< 0.005	0.19	-14.0		34	<1	<1	2
37	0.042	< 0.001	< 0.005	0.42	-13.8		<6	<1	<1	-7
38	0.023	< 0.001	< 0.005	0.4	-13.9		<6	<1	<1	-4
39	0.019	< 0.001	< 0.005	0.33	-14.0		7	<1	<1	-1
40	< 0.005	< 0.001	< 0.005	0.16	-14.7		26	<1	<1	1
41	< 0.005	< 0.001	< 0.005	0.12	-15.0		33	<1	<1	1
42	0.015	< 0.001	< 0.005	0.3	-14.4		<6	<1	<1	-3
43	0.009	< 0.001	< 0.005	0.35	-13.6		<6	<1	<1	-2
44	< 0.005	< 0.001	< 0.005	0.23	-14.8		13	<1	<1	0
45	< 0.005	< 0.001	< 0.005	0.12	-14.6		45	<1	<1	3
46	< 0.005	< 0.001	< 0.005	0.16	-13.7		15	<1	<1	1
47	0.029	< 0.001	< 0.005	0.2	-13.5		8	<1	<1	-4
48	0.016	< 0.001	< 0.005	0.23	-14.5		8	<1	<1	-1
49	0.006	< 0.001	< 0.005	0.14	-14.7		31	<1	<1	2
50	< 0.005	< 0.001	< 0.005	0.16	-14.6		31	<1	<1	1
51	0.005	< 0.001	< 0.005	0.12	-14.8		26	<1	<1	2
52	0.011	< 0.001	< 0.005	0.18	-15.8		6	<1	<1	-1
53	0.027	< 0.001	< 0.005	0.33	-15.9		<6	<1	<1	-3
54	0.049	< 0.001	< 0.005	0.082	-24.6		27	<1	<1	3
55	0.017	< 0.001	< 0.005	0.28	-14.5		<6	<1	<1	-4
56	0.025	< 0.001	< 0.005	0.24	-15.8		37	<1	<1	-1
57	0.015	< 0.001	< 0.005	0.34	-14.7		14	<1	<1	-2
58	0.008	< 0.001	< 0.005	0.29	-15.6		<6	<1	<1	-2
59	0.007	< 0.001	< 0.005	0.16	-16.1		37	<1	<1	1
60	0.02	< 0.001	< 0.005	0.29	-15.0		14	<1	<1	-4
61	0.005	< 0.001	< 0.005	0.49	-13.7		<6	6	2	-2
62	< 0.005	< 0.001	< 0.005	0.17	-15.3		<6	<1	<1	1
63	0.014	< 0.001	< 0.005	0.27	-14.6		<6	<1	<1	-2
64	0.008	< 0.001	< 0.005	0.24	-15.6		9	<1	<1	0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Eastings	Northings	Formation						
65	25/10/94	MWRB	NE	1	23	6	W1	50.956794	98.166097	558571	5645133	undefined			35.7	15.5	714	7.76
66	23/10/94	MWRB	NW	20	21	4	W1	50.826694	97.987507	571312	5630823	undefined			25.3	8.8	1,380	7.88
67	19/10/94	MWRB	NW	5	22	4	W1	50.870907	97.987611	571238	5635739	undefined			19.2	15.4	1,070	7.74
68	25/10/94	MWRB	SE	3	22	5	W1	50.863680	98.069171	565509	5634860	undefined			41.8	19.5	1,145	7.50
69	23/10/94	MWRB	NW	27	21	5	W1	50.841439	98.080589	564736	5632377	undefined			39.6	15.2	706	8.08
70	24/10/94	MWRB	NW	29	12	1	E1	50.043014	97.428912	612496	5544377	undefined			43.6	13.7	821	7.70
71	26/10/94	MWRB	SE	14	13	1	E1	50.094738	97.349050	618087	5550251	undefined			25.9	5.2	860	7.45
72	24/10/94	MWRB	SW	23	14	1	E1	50.197918	97.360380	617025	5561704	undefined			34.1	17.7	838	7.50
73	26/10/94	MWRB	NW	1	15	1	E1	50.249362	97.336417	618607	5567462	undefined			35.7	9.4	742	7.50
74	24/10/94	MWRB	SE	1	16	1	E1	50.330557	97.325146	619208	5576507	undefined			57	54.3	812	7.40
75	24/10/94	MWRB	SW	1	17	1	E1	50.418996	97.336478	618181	5586322	undefined			41.8	19.8	729	7.50
76	19/10/94	MWRB	NW	15	18	1	E1	50.544150	97.382779	614589	5600165	undefined			30.5	22.6	1,071	7.70
77	24/10/94	MWRB	NE	13	19	1	E1	50.632563	97.324141	618521	5610087	undefined			33.2	26.4	685	7.60
78	19/10/94	MWRB	NE	10	12	1	W1	50.000883	97.509461	606822	5539575	undefined			31.1	11.6	1,660	6.80
79	26/10/94	MWRB	SW	2	18	1	W1	50.509519	97.498228	606487	5596142	undefined			38.1	28.3	733	7.30
80	24/10/94	MWRB	SE	9	20	1	W1	50.701565	97.533554	603560	5617446	undefined			29.9	7.6	768	7.80
81	27/10/94	MWRB	SW	4	20	1	E1	50.684298	97.405124	612670	5615713	undefined			31.4	21.4	800	7.60
82	23/10/94	MWRB	SW	24	20	2	E1	50.728501	97.196114	627315	5620967	undefined			50.3	37.2	688	7.55
83	26/10/94	MWRB	SW	1	19	2	E1	50.595858	97.196066	627678	5606219	undefined			56.7	36.6	882	7.50
84	25/10/94	MWRB	SE	7	15	1	W1	50.258951	97.578788	601307	5568170	undefined			44.2	26.2	2,010	7.35
85	23/10/94	MWRB	NE	16	16	1	W1	50.369369	97.532927	604334	5580510	undefined			32.6	15.8	788	7.15
86	27/10/94	MWRB	SW	4	17	1	W1	50.421089	97.544344	603410	5586245	undefined			32.6	8.2	691	7.50
87	25/10/94	MWRB	NW	2	14	1	W1	50.163017	97.497938	607285	5557617	undefined			18.3	7	969	6.80
88	25/10/94	MWRB	SW	6	13	1	W1	50.067332	97.589559	600943	5546851	undefined			14	10.7	4,120	6.40
89	25/10/94	MWRB	SE	33	19	1	W1	50.672089	97.533507	603628	5614168	undefined			23.8	22.3	709	7.90
90	27/10/94	MWRB	NW	18	17	2	W1	50.457785	97.729224	590207	5590084	undefined			19.8	18	842	7.65
91	27/10/94	MWRB	SW	33	16	2	W1	50.406351	97.682895	593597	5584422	undefined			44.2	11.6	1,151	7.54
92	20/10/94	MWRB	NW	20	16	3	W1	50.384101	97.844502	582151	5581758	undefined			32	25.3	726	7.54
93	24/10/94	MWRB	SW	8	18	2	W1	50.524254	97.706260	591708	5597503	undefined			41.1	20.1	640	7.53
94	24/10/94	MWRB	SW	8	18	3	W1	50.524254	97.844826	581886	5597341	undefined			32.6	14.6	679	7.60
95	25/10/94	MWRB	NW	24	17	3	W1	50.472529	97.752225	588547	5591696	undefined			50.9	28.3	980	7.61
96	26/10/94	MWRB	NW	25	13	2	W1	50.133530	97.612500	599164	5554180	undefined			30.5	13.7	4,140	7.62

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
65	6.8	623	62.0	54.1	9.3	6.5	5	1.5	481	< 18.0	< 10.2	3.5	< 0.01	0.04	0.040	< 0.0020	< 0.01	3.07
66	7.4	1219	88.8	121.0	45.4	6.6	246	41	655	< 18.0	< 10.2	15.2	14.2	0.009	0.110	< 0.0020	< 0.01	0.11
67	7.1	1145	65.2	102.0	31.7	5.4	82	4.3	838	< 18.0	< 10.2	16.3	0.23	0.026	0.050	< 0.0020	< 0.01	0.1
68	7.0	1116	83.3	99.8	34.7	8.5	184	7	681	< 18.0	< 10.2	17.9	< 0.01	0.094	0.030	< 0.0020	< 0.01	0.44
69	6.9	634	56.6	64.0	7.1	3.3	15	5.4	474	< 18.0	< 10.2	8.9	1.06	0.008	0.020	< 0.0020	< 0.01	0.06
70	7.0	684	53.1	72.0	12.6	5.4	35	2.7	490	< 18.0	< 10.2	13.5	5.39	0.006	< 0.02	< 0.0020	0.01	0.07
71	7.2	730	71.2	69.2	8.0	5.9	31	8.5	524	< 18.0	< 10.2	12.5	8.83	0.006	< 0.02	< 0.0020	< 0.01	0.06
72	7.0	670	62.9	65.4	11.3	3.2	16	11	487	< 18.0	< 10.2	13.6	6.3	0.005	< 0.02	< 0.0020	0.02	0.06
73	8.7	622	72.4	54.8	7.1	2.7	12	7.7	452	< 18.0	< 10.2	13.5	6.32	0.007	< 0.02	< 0.0020	0.01	0.05
74	8.2	752	71.0	63.0	14.4	8.4	48	3.5	531	< 18.0	< 10.2	13.1	0.06	0.008	0.020	< 0.0020	0.01	0.12
75	7.5	673	65.5	60.2	7.3	3.8	14	3	505	< 18.0	< 10.2	14.1	0.19	0.007	< 0.02	< 0.0020	0.02	0.06
76	6.0	939	59.2	77.3	71.0	7.6	336	23	355	< 18.0	< 10.2	10.3	1.82	0.754	0.030	< 0.0020	0.01	0.38
77	7.0	626	52.2	53.4	21.1	5.1	57	3.8	424	< 18.0	< 10.2	8.9	< 0.01	0.077	0.060	< 0.0020	< 0.01	0.73
78	6.3	1561	141.0	123.0	66.2	15.9	527	37	635	< 18.0	< 10.2	15.5	0.13	0.062	0.050	< 0.0020	0.01	0.31
79	7.6	587	63.4	55.0	10.5	2.4	7.53	31	405	< 18.0	< 10.2	12.3	7.98	0.005	0.020	< 0.0020	0.03	0.06
80	7.0	697	46.9	78.6	6.7	3.3	12	1.8	540	< 18.0	< 10.2	7.8	0.21	0.006	< 0.02	< 0.0020	< 0.01	0.07
81	6.0	701	59.5	58.2	17.8	4.2	95	18	437	< 18.0	< 10.2	11.5	0.12	0.222	0.020	< 0.0020	< 0.01	0.09
82	8.0	625	36.3	62.2	28.4	4.2	23	2.6	456	< 18.0	< 10.2	12.6	0.03	0.237	0.020	< 0.0020	< 0.01	0.2
83	7.0	808	44.3	89.5	15.0	5.2	3.82	5.2	628	< 18.0	< 10.2	16.7	< 0.01	0.263	0.020	< 0.0020	< 0.01	0.26
84	6.7	1505	83.8	61.5	253.0	16.5	458	228	393	< 18.0	< 10.2	11.0	0.08	0.176	0.020	< 0.0020	0.01	0.07
85	7.1	730	64.3	63.2	18.4	7.1	84	4.1	477	< 18.0	< 10.2	11.9	0.17	0.017	0.020	< 0.0020	< 0.01	0.15
86	7.2	617	58.3	57.2	7.6	6.5	15	7.7	454	< 18.0	< 10.2	10.8	0.51	0.005	0.020	< 0.0020	< 0.01	0.05
87	7.4	854	52.2	94.1	17.5	4.1	28	5.8	638	< 18.0	< 10.2	14.2	7.75	0.006	< 0.02	< 0.0020	< 0.01	0.08
88	6.3	2775	127.0	80.2	645.0	24.4	696	820	371	< 18.0	< 10.2	11.3	0.02	0.212	0.220	< 0.0020	0.03	0.17
89	6.7	653	49.6	53.6	33.2	4.5	95	3.4	401	< 18.0	< 10.2	12.8	0.21	0.129	0.020	< 0.0020	< 0.01	0.06
90	7.0	699	44.9	42.4	70.8	8.5	118	59	345	< 18.0	< 10.2	10.5	< 0.01	0.078	0.020	< 0.0020	< 0.01	0.05
91	6.2	878	52.3	36.6	132.0	14.7	134	142	357	< 18.0	< 10.2	8.9	< 0.01	0.083	< 0.02	< 0.0020	< 0.01	0.04
92	7.2	671	64.5	57.6	9.3	4	0	2.8	513	< 18.0	< 10.2	19.8	0.02	0.078	0.020	< 0.0020	< 0.01	0.19
93	5.5	543	55.8	42.5	10.0	7.5	13	4.6	399	< 18.0	< 10.2	11.0	< 0.01	0.018	0.030	< 0.0020	< 0.01	0.7
94	7.5	630	53.2	42.0	30.7	7.2	127	4.6	352	< 18.0	< 10.2	13.1	< 0.01	0.078	< 0.02	< 0.0020	< 0.01	0.07
95	7.0	837	62.4	57.2	66.3	6.8	272	41	320	< 18.0	< 10.2	11.0	0.02	0.062	0.020	< 0.0020	< 0.01	0.07
96	7.0	2744	109.0	76.7	660.0	29.4	651	869	339	< 18.0	< 10.2	10.2	2.85	0.326	0.020	< 0.0020	< 0.01	0.1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
65	0.06	1.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.1	0.62	0.27	102	< 5.0	102	< 0.5
66	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	1.5	0.26	0.1	144	< 5.0	147	10
67	< 0.05	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.025	0.6	0.26	0.14	173	8	181	7.6
68	0.07	0.32	0.002	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.008	0.4	0.25	0.22	134	< 5.0	138	< 0.5
69	0.05	0.44	< 0.001	0.01	< 0.001	< 0.005	< 0.002	< 0.001	0.002	2.7	0.24	0.07	96	< 5.0	96	1.9
70	0.05	0.09	< 0.001	< 0.010	0.003	< 0.005	< 0.002	< 0.001	0.001	5.5	0.37	0.08	98.9	< 5.0	102	5.3
71	0.09	0.01	< 0.001	< 0.010	0.003	< 0.005	< 0.002	< 0.001	< 0.001	5.3	0.31	0.09	104	< 5.0	107	5.5
72	0.07	0.26	< 0.001	0.011	0.002	< 0.005	< 0.002	< 0.001	0.001	7.5	0.24	< 0.05	109	< 5.0	109	4.8
73	0.05	0.02	< 0.001	< 0.010	0.002	< 0.005	< 0.002	< 0.001	0.004	5.8	0.2	0.05	93	< 5.0	93	3.6
74	0.06	0.35	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	0.8	0.39	0.31	102	< 5.0	106	1.1
75	0.05	0.12	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	< 0.001	3.3	0.2	0.05	92	7	99	3.1
76	< 0.05	1.36	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.9	0.46	0.24	78.7	< 5.0	82	0.7
77	< 0.05	0.03	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.3	0.22	0.16	93	< 5.0	93	1
78	< 0.05	0.07	< 0.001	< 0.010	0.002	< 0.005	< 0.002	< 0.001	< 0.001	0.2	0.25	0.17	123	5	128	22
79	0.05	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.013	6.3	0.18	< 0.05	77.9	< 5.0	82	1.6
80	0.09	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.001	4.1	0.34	0.05	102	< 5.0	106	1.7
81	0.07	0.49	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.009	0.5	0.27	0.12	89.1	< 5.0	93	2
82	0.06	0.05	0.004	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.005	0.3	0.5	0.19	92	< 5.0	92	3.6
83	0.07	0.02	0.007	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.008	0.4	0.34	0.1	128	6	134	1.6
84	< 0.05	0.08	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	< 0.001	6.3	0.33	0.54	76.7	< 5.0	81	1.5
85	< 0.05	0.04	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.5	0.33	0.12	97	< 5.0	97.9	0.7
86	0.06	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	1	0.3	0.05	89.7	< 5.0	94	1.8
87	0.15	0.06	< 0.001	< 0.010	0.004	< 0.005	< 0.002	< 0.001	0.001	3.7	0.33	0.08	131	5	136	8.3
88	< 0.05	0.03	< 0.001	< 0.010	< 0.001	0.005	< 0.002	< 0.001	< 0.001	0.6	0.64	1.26	76.3	< 5.0	80	10
89	< 0.05	0.12	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.5	0.31	0.16	71.4	5.6	77	2.2
90	< 0.05	0.12	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.2	0.46	0.47	62.4	< 5.0	67	0.9
91	< 0.05	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.6	0.61	0.66	63.7	< 5.0	68	< 0.5
92	0.16	0.02	0.005	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.01	0.8	0.19	0.07	87.9	< 5.0	92	1.9
93	0.06	0.01	< 0.001	0.013	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.2	0.28	0.23	63.9	< 5.0	67	0.8
94	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.3	0.29	0.27	61.9	< 5.0	66	0.8
95	< 0.05	0.32	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.6	0.45	0.33	64	< 5.0	64	1.8
96	< 0.05	0.39	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.5	0.97	1.25	59.2	< 5.0	64	2.8

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
65	< 0.005	< 0.001	< 0.005	0.34	-14.1		< 6	< 1	< 1	1
66	0.045	< 0.001	< 0.005	0.42	-14.2		10	< 1	< 1	-1
67	0.091	< 0.001	< 0.005	0.3	-12.7		17	56	36	-8
68	0.015	< 0.001	< 0.005	0.45	-13.1		< 6	< 1	< 1	-4
69	0.007	< 0.001	< 0.005	0.16	-15.0			< 1	< 1	2
70	0.029	< 0.001	< 0.005	0.38	-12.1		46	< 1	< 1	2
71	0.027	< 0.001	< 0.005	0.3	-13.4		37	< 1	< 1	1
72	0.027	< 0.001	< 0.005	0.21	-13.5		35	< 1	< 1	3
73	0.025	< 0.001	< 0.005	0.15	-13.8		41	< 1	< 1	4
74	0.039	< 0.001	< 0.005	0.36	-14.7		9	< 1	< 1	-1
75	0.023	< 0.001	< 0.005	0.2	-14.3		20	< 1	< 1	0
76	0.085	< 0.001	< 0.005	0.44	-14.2		< 6	< 1	< 1	-3
77	0.016	< 0.001	< 0.005	0.25	-14.2		< 6	< 1	< 1	-1
78	0.065	< 0.001	< 0.005	0.95	-11.9		< 6	< 1	< 1	-5
79	0.033	< 0.001	< 0.005	0.12	-14.8		45	< 1	< 1	3
80	0.011	< 0.001	< 0.005	0.19	-14.8		< 6	< 1	< 1	0
81	0.054	< 0.001	< 0.005	0.24	-14.8		23	< 1	< 1	-5
82	0.023	< 0.001	< 0.005	0.36	-14.5		< 6	< 1	< 1	2
83	0.033	< 0.001	< 0.005	0.51	-15.0		< 6	< 1	< 1	-1
84	0.23	< 0.001	< 0.005	0.84	-14.3		< 6	< 1	< 1	-4
85	0.048	< 0.001	< 0.005	0.3	-13.8		< 6	< 1	< 1	-2
86	0.026	< 0.001	< 0.005	0.13	-14.4		9	< 1	< 1	1
87	0.037	< 0.001	< 0.005	0.34	-14.4		19	< 1	< 1	0
88	0.68	< 0.001	< 0.005	1.4	-18.2		< 6	< 1	< 1	-2
89	0.035	< 0.001	< 0.005	0.31	-15.7		< 6	< 1	< 1	-1
90	0.052	< 0.001	< 0.005	0.51	-14.8		< 6	< 1	< 1	-4
91	0.16	< 0.001	< 0.005	0.53	-15.6		< 6	< 1	< 1	-4
92	0.007	< 0.001	< 0.005	0.19	-13.5		< 6	< 1	< 1	0
93	0.01	< 0.001	< 0.005	0.41	-14.3		< 6	< 1	< 1	0
94	Leaked	Leaked	Leaked	Leaked	-15.0		< 6	< 1	< 1	-6
95	0.064	< 0.001	< 0.005	0.5	-14.9		< 6	< 1	< 1	-5
96	0.72	< 0.001	< 0.005	1.4	-18.3		< 6	< 1	< 1	-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date	Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing		Well	Depth (m)	Length	Cond. μS/cm	pH
											Easting	Northing	Formation	Top	Bottom					
97	19/10/94	MWRB	NW	16	14	2	W1	50.192498	97.681489	594118	5560647	undefined			55.5	26.2	1,990	7.94		
98	27/10/94	MWRB	SW	7	15	2	W1	50.258945	97.728671	590624	5567976	undefined			43.3	42.7	1,049	7.51		
99	25/10/94	MWRB	NW	16	17	4	W1	50.457801	97.960119	573817	5589831	undefined			44.5	12.8	1,120	7.88		
100	26/10/94	MWRB	NW	36	16	4	W1	50.413574	97.890764	578813	5584985	undefined			26.8	22.3	702	7.57		
101	25/10/94	MWRB	SW	7	18	4	W1	50.524244	98.006531	570423	5597174	undefined			29	12.5	1,754	7.62		
102	19/10/94	MWRB	SE	8	20	4	W1	50.701561	97.975806	572329	5616920	undefined			18.3	8.2	837	7.60		
103	26/10/94	MWRB	NW	16	20	3	W1	50.723535	97.824345	582986	5619522	undefined			48.5	6.4	772	7.40		
104	19/10/94	MWRB	SE	14	13	3	W1	50.096821	97.761732	588566	5549911	undefined			37.6	29.6	2,760	7.67		
105	23/10/94	MWRB	NE	22	14	3	W1	50.207237	97.784790	586717	5562161	undefined			48.8	40.5	1,355	8.25		
106	24/10/94	MWRB	NW	10	15	3	W1	50.266196	97.798192	585655	5568700	undefined			61	48.8	779	8.12		
107	26/10/94	MWRB	SW	5	19	3	W1	50.598391	97.847310	581582	5605581	undefined			13.1	9.8	857	7.30		
108	24/10/94	MWRB	SE	36	18	5	W1	50.583198	98.018012	569523	5603718	undefined			18.9	10.1	1,372	7.28		
109	24/10/94	MWRB	NW	23	20	5	W1	50.738271	98.057185	566530	5620925	undefined			44.8	9.4	1,069	7.80		
110	25/10/94	MWRB	SE	3	19	4	W1	50.598396	97.929209	575785	5605495	undefined			42.7	19.2	718	7.55		
111	20/10/94	MWRB	NE	6	19	2	W1	50.605620	97.719459	590616	5606534	undefined			35.7	19.5	725	7.07		
112	24/10/94	MWRB	NE	25	19	5	W1	50.664567	98.022493	569086	5612762	undefined			85.3	33.7	1,356	7.80		
113	26/10/94	MWRB	NE	14	20	6	W1	50.723529	98.185436	557498	5619179	undefined			19.2	13.1	1,442	8.20		
114	26/10/94	MWRB	SE	21	21	6	W1	50.819468	98.232095	554094	5629812	undefined			18.3	5.5	868	6.80		
115	26/10/94	MWRB	NE	36	21	7	W1	50.856159	98.301858	549141	5633843	undefined			17.4	10.7	1,082	7.30		
116	26/10/94	MWRB	NW	13	22	7	W1	50.900378	98.313321	548289	5638753	undefined			32	6.7	758	6.90		
117	26/10/94	MWRB	SW	4	22	6	W1	50.863680	98.243613	553232	5634720	undefined			35.7	6.4	1,056	6.90		
118		MWRB	NW	31	22	7	W1	50.944584	98.430173	540033	5643598	undefined			15.2	7.2	870	7.40		
119		MWRB	NE	21	18	0	W1	50.558888	97.394580	613717	5601785	undefined					670	7.93		
120	13/1/97	MWRB	SE	25	5	6	E1	49.416666	96.651079	670367	5476210	undefined						7.90		
121	13/1/97	MWRB	SW	34	5	6	E1	49.431423	96.707375	666234	5477725	undefined						7.90		
122	13/1/97	MWRB	SE	19	5	6	E1	49.401930	96.764015	662225	5474323	undefined						7.90		
123	13/1/97	MWRB	SE	2	5	6	E1	49.357710	96.673640	668933	5469606	undefined						7.90		
124	13/1/97	MWRB	NW	30	5	5	E1	49.423901	96.910551	651526	5476461	undefined						8.00		
125	20/1/97	MWRB	NE	7	5	5	E1	49.379682	96.899353	652475	5471568	undefined						8.20		
126	20/1/97	MWRB	NE	1	5	5	E1	49.364935	96.786466	660717	5470163	undefined						7.90		
127	20/1/97	MWRB	NW	23	5	5	E1	49.409172	96.820149	658129	5475009	undefined						8.00		
128	20/1/97	MWRB	SE	3	5	5	E1	49.357715	96.831599	657463	5469265	undefined						8.00		

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/l	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
97	6.8	1270	55.6	33.2	294.0	15.2	352	282	229	<18.0	<10.2	8.9	<0.01	0.173	<0.02	<0.0020	<0.01	0.09
98	7.1	922	67.3	56.5	82.1	10.6	249	12	429	<18.0	<10.2	15.1	<0.01	0.24	0.030	<0.0020	<0.01	1.9
99	6.8	867	45.0	33.3	145.0	11.4	151	145	327	<18.0	<10.2	9.7	<0.01	0.131	0.030	<0.0020	<0.01	0.12
100	8.7	582	55.8	60.0	7.5	2.5	0	10	432	<18.0	<10.2	13.9	3.99	0.008	<0.02	<0.0020	0.07	0.05
101	7.9	1202	42.8	27.6	265.0	19.1	233	275	331	<18.0	<10.2	8.4	<0.01	0.135	0.020	<0.0020	<0.01	0.09
102	8.3	753	68.5	43.4	47.5	14.6	103	21	443	<18.0	<10.2	12.3	<0.01	0.072	0.040	<0.0020	<0.01	0.22
103	6.6	694	63.2	63.2	10.0	4.2	15	2.1	523	<18.0	<10.2	13.4	0.07	0.008	<0.02	<0.0020	0.01	0.06
104	7.0	1853	71.3	32.9	468.0	23.9	477	438	333	<18.0	<10.2	8.4	<0.01	0.428	<0.02	<0.0020	<0.01	0.2
105	7.4	1047	69.2	51.2	150.0	12.5	466	56	231	<18.0	<10.2	11.2	<0.01	0.377	0.020	<0.0020	<0.01	0.18
106	7.5	655	40.8	48.0	60.7	6.2	192	7	288	<18.0	<10.2	12.5	<0.01	0.153	0.020	<0.0020	<0.01	0.15
107	6.9	804	53.8	80.6	15.3	3	89	12	537	<18.0	<10.2	13.6	0.51	0.008	0.020	<0.0020	0.01	0.08
108	8.0	1023	42.7	32.3	198.0	12.2	223	189	316	<18.0	<10.2	9.3	0.05	0.076	0.020	<0.0020	<0.01	0.48
109	6.8	872	52.5	31.4	127.0	16.9	262	66	307	<18.0	<10.2	9.5	<0.01	0.114	<0.02	<0.0020	<0.01	0.03
110	6.7	632	49.6	39.9	46.0	6.3	64	42	370	<18.0	<10.2	14.1	<0.01	0.078	<0.02	<0.0020	<0.01	0.11
111	6.9	676	64.3	47.8	26.4	7.2	82	7.9	429	<18.0	<10.2	11.8	<0.01	0.119	0.020	<0.0020	<0.01	0.35
112	4.8	1010	20.3	9.6	255.0	17.4	209	198	294	<18.0	<10.2	6.7	<0.01	0.109	<0.02	<0.0020	<0.01	0.04
113	7.4	957	29.3	19.3	231.0	16.2	223	222	207	<18.0	<10.2	9.2	<0.01	0.109	<0.02	<0.0020	<0.01	0.08
114	7.3	796	63.8	69.4	23.5	5.5	66	14	544	<18.0	<10.2	10.2	2.05	0.008	0.020	<0.0020	<0.01	0.06
115	6.0	944	72.2	47.6	88.9	19.6	268	32	405	<18.0	<10.2	10.5	<0.01	0.072	0.030	<0.0020	0.01	0.05
116	6.3	687	60.8	51.7	22.1	16.4	47	4.4	474	<18.0	<10.2	10.3	<0.01	0.041	0.020	<0.0020	<0.01	0.23
117	6.8	985	76.5	75.5	36.7	20	70	13	681	<18.0	<10.2	12.2	0.07	0.008	0.050	<0.0020	0.01	0.14
118	6.8	774	72.9	74.3	7.2	1.9	19	23	559	<18.0	<10.2	16.3	1.51	0.009	<0.02	<0.0020	0.01	0.07
119	9.9	640	48.4	48.2	36.4	7.3	113	4.3	374	<18	<10.2	8.5	<0.01		0.030	<0.002	<0.01	2.93
120	7.5	587	55.9	37.9	28.3	3.8	2.2	4.8	454	0			<0.05	1.49	0.01			2.19
121	7.8	608	78.9	35.2	11.5	2.9	2.8	1.9	475	0			<0.05	1.19	0.027			1.37
122	7.3	548	63.3	33.3	17.3	3.7	2.4	2.7	425	0			<0.05	1.04	0.011			1.25
123	7.1	631	67.2	39.0	24.5	3.8	2.6	2.7	491	0			<0.05	1.67	0.016			1.63
124	7.2	591	64.1	29.1	37.9	5.9	38.4	10.9	405	0			<0.05	0.91	0.014			1.95
125	8.0	763	26.7	15.6	174.0	12.1	25.1	144	365	0			<0.05	1.19	0.017			0.89
126	6.9	545	54.6	34.5	31.2	4.8	1.8	5.7	412	0			<0.05	1	<0.005			1.63
127	9.4	975	160.0	24.7	75.8	7.4	306	35.3	366	0			<0.05	1.02	<0.005			0.02
128	5.5	583	43.3	20.8	79.3	7.4	12.5	19.9	400	0			<0.05	1.38	0.019			1.27

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
97	< 0.05	0.04	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	2.8	1.03	0.61	52	< 5.0	52	< 0.5
98	< 0.05	0.17	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.018	0.6	0.5	0.38	82.2	6.8	89	< 0.5
99	< 0.05	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.5	0.49	0.66	59.7	< 5.0	63	1.1
100	< 0.05	0.05	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.011	3.9	0.16	< 0.05	89	5	94	2.4
101	< 0.05	0.02	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.2	1.04	1.09	55	< 5.0	58	0.6
102	< 0.05	0.08	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	1.9	1.04	0.62	87.8	< 5.0	91	< 0.5
103	0.07	0.13	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	2.1	0.38	0.09	97.3	< 5.0	101	0.9
104	< 0.05	0.25	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	0.5	1.85	1.74	59.5	< 5.0	63	< 0.5
105	< 0.05	0.11	0.001	0.015	< 0.001	< 0.005	< 0.002	< 0.001	0.004	0.1	0.75	0.66	53	< 5.0	54	< 0.5
106	< 0.05	0.19	0.004	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.008	0.5	0.41	0.3	56	5	61	1
107	0.05	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.006	2.2	0.21	0.07	107	6	113	5.8
108	< 0.05	0.01	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.2	0.6	0.79	52	< 5.0	53.2	1.1
109	< 0.05	0.07	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	2.3	0.65	0.99	60.6	< 5.0	64	0.6
110	0.05	0.13	0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	0.2	0.4	0.33	67	5	72	< 0.5
111	< 0.05	0.12	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.007	0.2	0.6	0.31	79.2	< 5.0	83	< 0.5
112	< 0.05	0.01	0.001	0.017	< 0.001	< 0.005	< 0.002	< 0.001	0.002	2.2	3.6	1.45	51.3	< 5.0	55	< 0.5
113	< 0.05	0.03	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.001	1.7	1.75	0.95	39.2	5.8	45	< 0.5
114	0.08	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.003	4.6	0.26	0.17	105	< 5.0	108	4.1
115	< 0.05	0.05	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	1.9	0.31	0.84	86	< 5.0	86	1.2
116	< 0.05	0.14	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.003	1.5	0.36	0.54	91.6	< 5.0	95	0.7
117	< 0.05	0.04	< 0.001	< 0.010	< 0.001	< 0.005	< 0.002	< 0.001	0.002	3.1	0.41	0.73	153	< 5.0	156	< 0.5
118	0.08	0.01	< 0.001	< 0.010	0.001	< 0.005	< 0.002	< 0.001	0.01	7.1	0.18	< 0.05	101	6	107	4.7
119	< 0.05	< 0.01	< 0.001						0	0.59	0.36					
120									0.34							
121									0.21							
122									0.29							
123									0.28							
124									0.57							
125									1.44							
126									0.46							
127									0.9							
128									1.12							

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
97	0.31	< 0.001	< 0.005	0.7	-17.7		<6	<1	<1	-1
98	0.07	< 0.001	< 0.005	0.66	-13.8		<6	6	6	-3
99	0.12	< 0.001	< 0.005	0.46	-15.1		<6	<1	<1	-4
100	0.031	< 0.001	< 0.005	0.11	-16.5		44	<1	<1	5
101	0.2	< 0.001	< 0.005	0.7	-15.3		<6	<1	<1	-5
102	0.014	< 0.001	< 0.005	0.74	-14.3		<6	<1	<1	-3
103	0.008	< 0.001	< 0.005	0.19	-13.6		<6	<1	<1	0
104	0.38	< 0.001	< 0.005	1	-18.1		<6	<1	<1	-1
105	0.1	< 0.001	< 0.005	0.91	-14.7		<6	<1	<1	-2
106	0.072	< 0.001	< 0.005	0.37	-14.4		<6	<1	<1	-1
107	0.068	< 0.001	< 0.005	0.18	-15.2		16	<1	<1	-4
108	0.12	< 0.001	< 0.005	0.39	-16.4		<6	<1	<1	-5
109	0.052	< 0.001	< 0.005	0.56	-16.9		<6	<1	<1	-5
110	0.04	< 0.001	< 0.005	0.35	-15.8		<6	<1	<1	-4
111	0.019	< 0.001	< 0.005	0.34	-14.0		<6	<1	<1	-3
112	0.13	< 0.001	< 0.005	0.32	-16.9		<6	<1	<1	-5
113	0.16	< 0.001	< 0.005	0.34	-20.0		<6	<1	<1	-3
114	0.023	< 0.001	< 0.005	0.21	-15.0		45	<1	<1	-3
115	0.035	< 0.001	< 0.005	0.63	-15.4		<6	<1	<1	-5
116	0.017	< 0.001	< 0.005	0.54	-15.1		<6	<1	<1	-1
117	0.024	< 0.001	< 0.005	0.72	-12.2		<6	<1	<1	-3
118	0.019	< 0.001	< 0.005	0.15	-14.4		38	<1	<1	0
119								<1		-3
120									<1	-3
121									<1	-3
122									<1	-2
123									<1	-3
124									<1	-2
125										0
126										1
127										1
128										1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing							
129	29/1/97	MWRB SW	SW	3	6	5	E1	49.446165	96.842786	656369	5479074	undefined						8.00
130	29/1/97	MWRB NE	NE	14	6	5	E1	49.482876	96.809104	658692	5483225	undefined						7.90
131	29/1/97	MWRB NW	NW	7	6	6	E1	49.468125	96.775275	661191	5481657	undefined						7.80
132	29/1/97	MWRB NE	NE	18	7	5	E1	49.571318	96.894913	652202	5492880	undefined						8.00
133	29/1/97	MWRB SE	SE	32	6	5	E1	49.519867	96.877050	653655	5487196	undefined						7.80
134	30/1/97	MWRB NW	NW	27	7	4	E1	49.600811	96.974451	646364	5496000	undefined						8.10
135	7/2/97	MWRB SW	SW	24	4	6	E1	49.313480	96.662133	669920	5464715	undefined						7.90
136	7/2/97	MWRB NW	NW	12	7	6	E1	49.556577	96.656332	669502	5491751	undefined						8.10
137	11/2/97	MWRB NW	NW	6	6	7	E1	49.453383	96.639844	671054	5480317	undefined						7.90
138	11/2/97	MWRB NW	NW	18	6	7	E1	49.482866	96.639921	670945	5483594	undefined						8.00
139	11/2/97	MWRB NE	NE	3	6	7	E1	49.453399	96.560913	676774	5480501	undefined						8.10
140	11/2/97	MWRB NW	NW	26	6	7	E1	49.512361	96.549446	677391	5487082	undefined						8.20
141	18/2/97	MWRB SW	SW	21	6	5	E1	49.490387	96.865470	654586	5483943	undefined						8.00
142	17/2/97	MWRB SE	SE	26	7	5	E1	49.593569	96.804264	658684	5495540	undefined						8.20
143	17/2/97	MWRB SE	SE	6	9	4	E1	49.711491	97.031628	641910	5508195	undefined						8.10
144	17/2/97	MWRB SE	SE	2	8	4	E1	49.623051	96.940654	648738	5498539	undefined						8.20
145	26/2/97	MWRB NW	NW	28	5	8	E1	49.423916	96.459178	684257	5477467	undefined						8.00
146	26/2/97	MWRB NE	NE	15	5	8	E1	49.394433	96.425460	686813	5474273	undefined						8.30
147	26/2/97	MWRB SE	SE	31	6	8	E1	49.519860	96.493514	681412	5488049	undefined						8.20
148	26/2/97	MWRB NW	NW	17	6	8	E1	49.482876	96.481904	682390	5483966	undefined						8.10
149	11/3/97	MWRB SW	SW	14	5	4	E1	49.387196	96.955524	648376	5472291	undefined						8.10
150	11/3/97	MWRB NW	NW	33	5	3	E1	49.438657	97.136166	635125	5477672	undefined						7.90
151	11/3/97	MWRB NE	NE	20	4	5	E1	49.320723	96.876662	654306	5465060	undefined						7.60
152	21/3/97	MWRB NE	NE	18	6	6	E1	49.482871	96.764210	661944	5483320	undefined						8.20
153	18/3/97	MWRB NE	NE	26	4	5	E1	49.335462	96.809019	659174	5466839	undefined						7.70
154	18/3/97	MWRB NE	NE	6	5	4	E1	49.364940	97.034710	642694	5469664	undefined						8.00
155	18/3/97	MWRB NE	NE	19	4	4	E1	49.320716	97.034604	642829	5464748	undefined						7.90
156	18/3/97	MWRB SE	SE	6	7	5	E1	49.534601	96.894824	652323	5488798	undefined						7.80
157	18/3/97	MWRB SW	SW	22	6	5	E1	49.490388	96.842842	656225	5483990	undefined						7.70
158	18/3/97	MWRB SW	SW	1	8	4	E1	49.623046	96.929101	649572	5498561	undefined						8.10
159	18/3/97	MWRB NE	NE	2	6	5	E1	49.453393	96.809087	658789	5479948	undefined						8.10
160	18/3/97	MWRB SE	SE	14	7	5	E1	49.564087	96.804247	658781	5492263	undefined						8.00

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
129	7.4	560	42.2	28.1	54.7	6.5	1.9	18.3	408	0	0	0	<0.05	1.12	0.005			1.26
130	5.9	557	69.8	33.5	18.6	3.8	2.5	4.1	425	0	0	0	<0.05	1.06	0.01			1.34
131	7.5	567	74.6	34.6	15.7	3.4	3.2	3	432	0	0	0	<0.05	1.13	0.02			1.57
132	6.5	662	42.6	22.2	122.0	7.9	12.5	110	345	0	0	0	<0.05	0.88	0.023			0.47
133	6.1	550	58.1	32.0	35.0	5	2.1	14.2	404	0	0	0	<0.05	1.06	<0.005			1.72
134	6.8	933	44.6	21.9	208.0	11.3	68.1	276	303	0	0	0	<0.05	0.56	0.017			0.26
135	6.9	621	74.2	41.1	19.1	3.8	2.5	2.6	478	0	0	0	<0.05	1.15	0.013			1.47
136	6.6	615	43.8	22.4	99.3	5.8	19.2	77.7	347	0	0	0	<0.05	0.49	0.014			1.31
137	7.4	612	85.1	37.9	13.2	3.3	3	1.5	468	0	0	0	<0.05	1.2	0.049			2.38
138	6.0	533	61.0	35.8	22.5	3.8	2	3.2	405	0	0	0	<0.05	1.16	0.016			1.62
139	6.4	572	66.3	39.3	18.5	3.3	2.2	1.8	441	0	0	0	<0.05	0.78	0.015			1.19
140	7.5	366	41.4	19.9	20.1	2.8	2	4.4	275	0	0	0	<0.05	0.65	0.046			1.04
141	8.6	585	69.3	36.6	27.1	4.6	2.2	5.1	440	0	0	0	<0.05	0.99	0.015			1.8
142	44.5	591	41.2	20.1	105.0	8	15.6	76.6	324	0	0	0	<0.05	0.77	0.019			0.93
143	43.2	1129	85.8	63.9	167.0	9	309	152	342	0	0	0	<0.05	0.54	0.024			0.27
144	55.0	686	38.8	18.9	142.0	8.6	33.3	126	318	0	0	0	<0.05	0.64	0.027			0.37
145	44.2	477	59.3	29.8	14.8	3.6	2.7	1.6	365	0	0	0	<0.05	0.56	0.012			1.2
146	5.0	431	34.4	30.4	27.7	4.2	0	3.2	331	0	0	0	<0.05	1	0.01			0.56
147	41.9	403	40.0	22.8	28.3	3.5	1.5	6.3	301	0	0	0	<0.05	0.81	0.013			1.47
148	46.2	431	55.5	26.0	12.4	2.9	1.7	1.8	331	0	0	0	<0.05	0.85	0.024			3.52
149	41.2	661	30.3	16.5	125.0	10.6	55.5	50.9	372	0	0	0	<0.05	1.11	0.016			2.6
150	41.7	5174	155.0	63.8	1550.0	42	906	2130	327	0	0	0	<0.05	2.18	0.033			1.3
151	41.5	3480	473.0	144.0	371.0	11.8	2020	206	254	0	0	0	<0.05	4.24	0.155			2.82
152	49.0	603	75.1	40.1	18.3	3	2.9	3.8	460	0	0	0	<0.05	0.79	0.014			1.6
153	50.0	600	48.5	29.7	57.3	6.9	11.9	20.3	425	0	0	0	<0.05	0.56	<0.005			0.43
154	45.0	1933	57.7	24.6	563.0	21.6	288	617	361	0	0	0	0.14	0.69	0.005			0.04
155	44.0	3111	105.0	49.1	903.0	33	606	1060	355	0	0	0	<0.05	1.25	0.042			4.91
156	48.0	549	53.4	32.1	35.3	5.5	2.9	13.6	406	0	0	0	<0.05	1.22	0.006			1.73
157		584	67.9	38.1	23.2	4.2	2.5	8.3	440	0	0	0	<0.05	1.32	0.013			2.46
158	50.0	668	36.5	18.2	139.0	8.7	31.8	117	317	0	0	0	<0.05	0.64	0.019			0.56
159		622	68.0	39.3	28.8	4.6	7.2	6.8	467	0	0	0	<0.05	1.24	0.009			0.93
160		593	39.5	23.7	92.6	7.2	7.8	74.3	348	0	0	0	<0.05	1.05	0.009			1.03

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
129											0.61					
130											0.28					
131											0.24					
132											0.73					
133											0.4					
134											0.89					
135											0.26					
136											0.5					
137											0.22					
138											0.31					
139											0.24					
140											0.35					
141											0.33					
142											0.69					
143											0.5					
144											0.83					
145											0.34					
146											0.51					
147											0.37					
148											0.28					
149											1.44					
150											2.3					
151											0.39					
152											0.25					
153											0.74					
154											2.08					
155											1.72					
156											0.47					
157											0.34					
158											0.92					
159											0.41					
160											0.65					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
129								<1	<1	-2
130								<1	<1	0
131								<1	<1	1
132								<1	<1	2
133								<1	<1	1
134								<1	<1	-3
135								<1	<1	0
136								<1	<1	1
137								<1	<1	2
138								<1	<1	2
139								<1	<1	1
140								<1	<1	0
141								<1	<1	2
142								<1	<1	4
143								<1	<1	2
144								<1	<1	2
145								<1	<1	1
146								<1	<1	0
147								<1	<1	1
148								<1	<1	0
149								<1	<1	-1
150								<1	<1	-2
151								<1	<1	0
152								<1	<1	1
153								<1	<1	-2
154								<1	<1	1
155								<1	<1	1
156								<1	<1	-1
157								<1	<1	1
158								<1	<1	2
159								<1	<1	0
160								<1	<1	1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
161	18/3/97	MWRB	SE	22	8	5	E1	49.667279	96.827017	656803	5503687	undefined						8.10
162	21/3/97	MWRB	SW	30	5	6	E1	49.416666	96.775139	661369	5475937	undefined						8.20
163	21/3/97	MWRB	SW	16	6	6	E1	49.475646	96.730052	664442	5482591	undefined						8.20
164	21/3/97	MWRB	SE	33	4	6	E1	49.342975	96.718752	665706	5467868	undefined						8.20
165	21/3/97	MWRB	NE	20	4	6	E1	49.320723	96.741269	664145	5465345	undefined						8.30
166	21/3/97	MWRB	SW	35	8	7	E1	49.696758	96.542731	677208	5507596	undefined						8.40
167	21/3/97	MWRB	SW	23	8	7	E1	49.667277	96.542707	677316	5504318	undefined						8.40
168	21/3/97	MWRB	SW	13	7	7	E1	49.564083	96.519961	679336	5492901	undefined						8.50
169	21/3/97	MWRB	SW	20	8	5	E1	49.667273	96.883583	652721	5503569	undefined						8.40
170		MWRB	SW	27	23	5	W1	51.008528	98.083788	564280	5650954	undefined	12	51				7.75
171		MWRB	SE	22	34	5	W1	51.929847	98.077762	563413	5753419	undefined	14	37				7.80
172		MWRB	SW	27	34	5	W1	51.944492	98.089425	562590	5755038	undefined	5	40				7.60
173		MWRB	SE	35	34	5	W1	51.958949	98.054145	564994	5756677	undefined	13	24				7.60
174		MWRB	NE	22	23	6	W1	51.001022	98.212812	555237	5650015	undefined	11	55				7.30
175		MWRB	SE	9	24	6	W1	51.052739	98.236251	553533	5655749	undefined	5	13				7.40
176		MWRB	SW	31	24	6	W1	51.111670	98.294659	549376	5662261	undefined	9	28				7.60
177		MWRB	NE	30	24	7	W1	51.104172	98.423646	540353	5661349	undefined	6	18				7.40
178		MWRB	NW	2	25	7	W1	51.133654	98.341532	546073	5664675	undefined	6	24				7.50
179		MWRB	SW	7	25	7	W1	51.141144	98.435241	539510	5665454	undefined	10	14				7.45
180		MWRB	NE	14	25	7	W1	51.163124	98.330055	546846	5667960	undefined	1	21				7.80
181		MWRB	NW	23	25	7	W1	51.177864	98.341571	546026	5669592	undefined	14	49				7.90
182		MWRB	SW	1	26	7	W1	51.214834	98.318141	547626	5673718	undefined	5	27				7.60
183		MWRB	SE	31	26	7	W1	51.288517	98.424136	540158	5681849	undefined	8	63				7.50
184		MWRB	SE	31	26	7	W1	51.288517	98.424136	540158	5681849	undefined	6	36				7.30
185		MWRB	SW	32	26	7	W1	51.288521	98.412170	540993	5681856	undefined	19	51				7.60
186		MWRB	NE	10	28	7	W1	51.383997	98.354258	544938	5692508	undefined	7	76				7.50
187		MWRB	SW	24	24	8	W1	51.082202	98.458588	537925	5658887	undefined	6	10				7.45
188		MWRB	NW	5	25	8	W1	51.133650	98.552294	531326	5664564	undefined	6	18				7.30
189		MWRB	SE	14	25	8	W1	51.155891	98.470547	537028	5667076	undefined	8	9				7.30
190		MWRB	NW	24	25	8	W1	51.177856	98.458623	537844	5669524	undefined	7	10				7.48
191		MWRB	SW	13	26	8	W1	51.244307	98.458648	537788	5676914	undefined	3	9				7.40
192		MWRB	NE	28	26	8	W1	51.281025	98.517620	533645	5680969	undefined	0	58				7.40

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
161	50.0	921	62.4	40.2	163.0	9.8	164	157	325	0	0	0.29	0.67	0.022	0.022	0	0	0.39
162		544	64.2	34.2	22.2	4.1	2	3.3	414	0	0	<0.05	0.98	0.005	0.005			1.02
163	47.0	577	76.0	37.9	14.4	3.5	3.2	2.8	439	0	0	<0.05	0.93	0.019	0.019			2.07
164		582	69.7	38.5	25.6	4.1	2.7	5	436	0	0	<0.05	1.19	0.026	0.026			0.05
165	45.0	685	67.4	37.3	60.3	5.5	3.4	13.7	497	0	0	<0.05	1.79	0.019	0.019			1.36
166		489	64.7	31.8	20.4	3.1	27	2.6	339	5	5	<0.05	0.47	0.028	0.028			2.6
167		524	66.8	41.3	6.8	2.7	5.6	1.8	399	6	6	<0.05	0.57	0.011	0.011			1.27
168		442	47.3	25.7	32.7	3.5	4.1	10.2	318	9	9	<0.05	0.63	0.017	0.017			1.77
169		903	66.0	43.2	150.0	9.2	174	161	300	6	6	<0.05	0.47	0.019	0.019			0.09
170	6.0	591	53.5	69.8	6.9	0	17	12	420	0	0	12.2	4	0	0	0	0	0
171		889	65.0	65.0	91.0	7	148	70	443	0	0	0.05	0.05	0	0			2.2
172		883	66.0	62.0	88.0	7	151	72	437	0	0	0.05	0.05	0	0			0.23
173		730	60.0	58.0	46.0	6	78	26	456	0	0	0.05	0.05	0	0			1.21
174	8.0	698	67.8	71.7	8.9	5.2	20	2	512	0	0	10.5	0.2	0.04	0.04	0	0	0 0.13
175	6.0	1034	94.4	110.0	71.5	0	17	230	498	0	0	13.0	11	0	0	0	0	0 0
176	7.0	597	59.7	62.5	6.0	0	15	2	444	0	0	8.0	0.04	0	0	0	0	0 0.07
177	5.0	787	74.2	67.3	29.9	10.4	62	12	520	0	0	11.1	0.12	0.03	0.03	0.011	0.02	0.02 0.03
178	7.0	1188	100.0	98.0	120.0	20	50	270	517	0	0	13.3	8.2	0	0	0	0.03	0 0
179	7.0	626	60.9	63.0	8.7	5.3	17	2	459	0	0	10.1	0	0.02	0.02	0	0	0 0.33
180		694	100.0	40.0	3.0	1	14	7	529	0	0	1.6	1.6	0	0			0.19
181		718	74.0	51.0	24.0	5	43	43	478	0	0	2.4	2.4	0	0			1.02
182	5.0	578	72.5	56.8	3.6	0	8	7	417	0	0	12.8	0.7	0	0	0	0	0 0
183		648	67.0	56.0	14.0	5	76	7	423	0	0	0.07	0.07	0	0			0.1
184		628	64.0	55.0	12.0	4	78	6	409	0	0	0.5	0.5	0	0			0.2
185		679	73.0	56.0	16.0	4	96	7	427	0	0	0.53	0.53	0	0			2.6
186	4.0	502	65.2	45.3	2.6	0	8	0	371	0	0	10.1	0.08	0	0	0	0	0 0
187	5.0	760	65.6	57.9	57.5	11.5	72	13	473	0	0	9.6	0	0.04	0.04	0	0	0 0.06
188	8.5	617	61.8	47.0	24.8	9.6	36	8	420	0	0	9.5	0	0	0	0	0	0 0.63
189	7.0	578	56.0	57.5	10.8	6.5	21	3	415	0	0	8.0	0	0	0	0	0	0 0.07
190		630	67.2	53.8	9.0	5.3	22	4	469	0	0			0	0			0.56
191	5.5	1350	89.5	140.0	95.8	5.4	250	83	673	0	0	12.8	5.2	0	0	0	0	0 0
192	5.8	573	69.7	52.5	3.1	0	14	3	422	0	0	8.2	0.35	0	0	0	0	0 0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
161											0.97					
162											0.37					
163											0.3					
164											0.36					
165											0.43					
166											0.28					
167											0.23					
168											0.39					
169											0.85					
170											0.16	0.06				
171											0.31					
172											0.37					
173											0.25					
174											0.26	0.21				
175											0.13	0.05				
176											0.26	0.13				
177											0.45	0.36				
178											0	0.15				
179											0.39	0.21				
180											0.08					
181											0.13					
182											0	0				
183											0.43					
184											0.46					
185											0.26					
186											0	0.05				
187											0.52	0.67				
188											1.04	0.56				
189											0.62	0.27				
190																
191											0.22	0.45				
192											0.32	0.17				

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
161									<1	2
162									<1	1
163									<1	2
164									<1	3
165									<1	3
166									<1	5
167									<1	3
168									<1	3
169									<1	2
170					-14.3	-103.0				7
171										2
172										0
173										0
174										5
175										6
176										5
177										3
178										5
179										5
180										-4
181										-5
182					-14.9	-103.0				8
183										0
184										-1
185										-1
186					-14.0	-114.0				6
187					-14.1	-117.0				6
188					-14.7	-100.0				3
189										5
190										0
191										4
192					-15.7	-115.0				4

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing							
193		MWRB	NE	28	26	8	W1	51.281025	98.517620	533645	5680969	undefined	145	171				7.35
194		MWRB	SE	30	26	8	W1	51.273780	98.564593	530373	5680143	undefined	11	36				7.80
195		MWRB	SE	35	26	8	W1	51.288521	98.470631	536916	5681825	undefined	17	36				7.45
196		MWRB	SW	23	28	8	W1	51.405873	98.483013	535960	5694870	undefined	2	15				7.40
197		MWRB	NW	9	29	8	W1	51.471330	98.529886	532653	5702127	undefined	18	35				7.40
198		MWRB	NW	19	32	8	W1	51.762411	98.585382	528615	5734477	undefined	24	124				7.75
199		MWRB	NE	4	24	9	W1	51.045235	98.657728	523995	5654692	undefined	21	40				7.30
200		MWRB	SW	2	29	9	W1	51.449630	98.623631	526154	5699676	undefined	10	26				7.50
201		MWRB	NE	24	29	9	W1	51.500424	98.588622	528556	5705338	undefined	20	31				7.35
202		MWRB	NW	8	32	9	W1	51.733312	98.703467	520479	5731201	undefined	5	8				7.80
203		MWRB	NE	10	32	9	W1	51.733318	98.644570	524546	5731219	undefined	14	34				7.20
204		MWRB	NE	3	28	10	W1	51.369532	98.776113	515586	5690725	undefined	6	18				7.40
205		MWRB	NW	34	28	10	W1	51.442220	98.787686	514756	5698806	undefined	19	32				7.55
206		MWRB	NW	2	29	10	W1	51.456862	98.764250	516380	5700440	undefined	11	29				7.70
207		MWRB	NW	27	31	10	W1	51.689746	98.797935	513968	5726333	undefined	12	33				7.40
208		MWRB	SE	1	32	10	W1	51.711605	98.739038	518031	5728777	undefined	64	65				7.40
209		MWRB	SE	1	25	11	W1	51.126407	98.868600	509196	5663672	undefined	11	30				7.45
210		MWRB	SE	1	32	11	W1	51.711605	98.880740	508240	5728751	undefined	25	34				7.45
211		MWRB	NE	24	23	12	W1	51.001006	99.009081	499363	5649718	undefined	74	76				7.60
212		MWRB	NE	27	24	12	W1	51.104182	99.055907	496086	5661193	undefined	8	25				7.55
213		MWRB	NW	27	24	12	W1	51.104183	99.067395	495281	5661194	undefined	95	142				7.65
214		MWRB	NW	27	24	12	W1	51.104183	99.067395	495281	5661194	undefined	0	71				7.35
215		MWRB	SE	29	27	12	W1	51.333186	99.104222	492739	5686664	undefined	64	77				7.55
216		MWRB	SE	29	27	12	W1	51.333186	99.104222	492739	5686664	undefined	22	58				7.45
217		MWRB	NW	17	28	12	W1	51.398638	99.115795	491944	5693944	undefined	32	38				7.45
218		MWRB	SE	20	25	13	W1	51.170632	99.243360	482986	5668610	undefined	52	59				7.90
219		MWRB	NE	24	26	13	W1	51.266271	99.149610	489562	5679228	undefined	57	60				7.85
220		MWRB	NW	31	29	13	W1	51.529534	99.279850	480587	5708533	undefined						7.50
221		MWRB	SE	32	23	14	W1	51.023262	99.383541	473100	5652263	undefined	64	67				7.55
222		MWRB	SW	16	24	14	W1	51.067475	99.371726	473953	5657176	undefined	47	50				7.73
223		MWRB	NW	33	23	15	W1	51.030497	99.512153	464085	5653123	undefined	54	57				7.50
224		MWRB	SW	10	24	15	W1	51.052739	99.488814	465738	5655585	undefined		18				7.45

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
193	6.0	776	71.5	48.4	76.3	11.9	135	39	386	0	0	7.8	0	0	0	0	0	0.11
194		557	39.0	20.0	88.0	13	62	115	220	0	0		0.49		0			7
195	5.5	766	83.3	63.0	35.0	6.6	195	15	356	0	0	11.8	0	0	0	0	0	0.28
196	5.0	655	66.0	66.0	13.5	0	71	4	425	0	0	9.1	0.26	0	0	0	0	0.38
197	7.0	669	68.4	51.0	32.4	7.8	100	9	390	0	0	10.2	0	0	0.02	0	0	0.3
198	9.0	2451	96.0	160.0	377.0	5	940	120	737	0	0	16.0	6.1	0.02	0.02	0.005	0.01	0.02
199	5.0	1488	102.0	170.0	86.6	18.3	85	280	732	0	0	14.2	3	0.19	0	0	0.04	0.05
200	5.0	675	44.6	85.2	5.8	7.5	18	4	498	0	0	11.8	0.38	0.02	0.02	0	0	0.05
201		584	67.5	50.0	0.0	4.4	25	0	437	0	0							
202	3.9	665	59.0	53.0	23.0	7.8	55	3	454	0	0	10.0	0.01	0.02	0.02	0.005	0.01	1.79
203	7.2	1013	65.0	91.0	48.2	5.3	79	7	700	0	0	17.0	0	0.02	0.02	0.005	0.01	0.82
204	8.0	730	65.0	53.0	41.8	13.5	130	16	400	0	0	10.2	0	0	0	0	0	0.6
205	7.0	713	72.6	31.3	70.2	9.8	115	47	356	0	0	11.4	0	0.06	0.06	0.006	0	0.82
206		720	57.0	39.0	64.0	22	45	56	437	0	0		5.78	0	0			4.8
207	5.0	809	62.7	89.7	8.1	0	10	3	620	0	0	15.0	0.17	0	0	0.1	0	0.19
208	6.0	772	69.8	59.7	37.1	10.1	72	7	508	0	0	8.4	0.41	0.03	0.03	0	0	3.4
209		1108	56.5	75.9	136.0	6.1	135	200	486	0	0	12.6	0	0	0	0	0	0.02
210	4.0	619	62.8	45.0	19.5	8.2	43	3	425	0	0	12.4	0	0.02	0.02	0	0	0.11
211	6.8	1004	34.3	18.4	201.0	22.4	200	125	393	0	0	9.8	0	0.02	0.02	0	0	4.18
212		1030	77.7	96.4	84.0	5.6	96	130	530	0	0	10.6	1.42	0	0	0	0	0
213		1025	70.3	50.0	162.0	28.4	220	140	354	0	0		0	0	0	0	0.03	0.06
214	7.2	4843	142.0	59.0	1460.0	51.3	750	2200	176	0	0	4.3	0	0.34	0.34	0	0	4.35
215		5799	263.0	120.0	1580.0	138	710	2900	83	0	0	5.2	0	0.09	0.09	0	0.01	0.25
216		7753	300.0	178.0	2180.0	100	1170	3700	117	0	0	7.6	0	0.05	0.05	0	0.01	0.45
217	9.1	4613	197.0	110.0	1100.0	38.1	650	2430	81	0	0	6.6	0	0.05	0.05	0	0	0.94
218	8.3	1729	40.0	18.0	485.0	37	420	500	222	0	0	7.0	0	0	0	0	0	0.36
219		2034	87.0	62.0	625.0		225	930	105	0	0		0	0.02	0.02			0.67
220		2320	112.0	90.0	495.0	39	278	790	516	0	0		0	0.05	0.05			0.22
221	9.0	1689	46.2	25.7	400.0	29.4	450	190	539	0	0	9.0	0	0.02	0.02	0	0	0.15
222		1269	60.8	43.2	260.0		430	104	371	0	0			0	0			0.06
223	6.7	4439	192.0	53.9	1300.0		961	1600	332	0	0		0	0	0			0.14
224		2171	98.0	43.0	550.0	47	480	675	278	0	0		0.2	0	0			0.4

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
193											1.85					
194											0.09					
195											0.32	0.52				
196											0.35	0.26				
197											1.02	0.49				
198											0.41	1.1				
199											0.36	0.33				
200											0.23	0.08				
201											0.52					
202											0.41	0.41				
203											0.64	0.35				
204											0.7	0.72				
205											0.35	0.7				
206											0.1					
207											0.23	0.09				
208											0.8	0.74				
209											0.17	0.15				
210											0.68	0.55				
211											1.8	1.7				
212											0.14	0.18				
213												0.96				
214											1.5	2.95				
215											0.53	2.15				
216											0.67	1.8				
217											0.31	0.82				
218											1.72	2				
219											0.86					
220																
221											2.5	2.05				
222																
223																
224											1.9					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
193					-14.4	-114.0				4
194										-2
195										3
196										4
197										3
198										-1
199					-15.6	-110.0				4
200					-15.4	-113.0				6
201										-1
202										-1
203										-1
204										0
205					-15.3	-123.0				0
206										-1
207					-14.6	-112.0				2
208										1
209										-4
210					-15.2	-120.0				0
211					-16.3	-129.8				-6
212										4
213										4
214					-18.9	-136.0				-2
215					-21.2	-151.0				-1
216					-21.0	-151.0				-1
217					-21.3	-157.3				-10
218					-19.1	-143.3				-2
219										6
220										-1
221										-2
222										0
223										0
224										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. μ S/cm	pH
										Easting	Northing	Formation						
225		MWRB	SE	16	24	15	W1	51.067476	99.500743	464913	5657229	undefined	47	50				7.71
226		MWRB	SE	35	24	15	W1	51.111680	99.453395	468219	5662124	undefined	37	39				7.60
227		MWRB	NW	15	25	15	W1	51.163131	99.488966	465809	5667861	undefined	20	27				7.50
228		MWRB	SE	33	25	15	W1	51.200109	99.500961	464998	5671979	undefined	46	52				7.75
229		MWRB	NE	35	25	15	W1	51.207334	99.454055	468280	5672761	undefined	28	34				8.20
230		MWRB	NW	9	26	15	W1	51.236814	99.512543	464217	5676066	undefined	17	43				7.70
231		MWRB	NW	9	26	15	W1	51.236814	99.512543	464217	5676066	undefined	89	122				7.40
232		MWRB	NW	9	26	15	W1	51.236814	99.512543	464217	5676066	undefined	123	124				7.45
233		MWRB	NE	19	26	15	W1	51.266276	99.548048	461763	5679361	undefined	25	28				7.70
234		MWRB	SE	31	26	15	W1	51.288517	99.548108	461777	5681834	undefined	38	45				7.55
235		MWRB	NE	15	27	15	W1	51.311310	99.479204	466599	5684335	undefined	17	20				7.60
236		MWRB	SW	29	29	15	W1	51.507847	99.537650	462686	5706221	undefined	10	13				7.55
237		MWRB	NW	5	32	15	W1	51.718848	99.553679	461751	5729695	undefined	27	41				8.10
238		MWRB	NW	28	32	15	W1	51.777072	99.530062	463429	5736159	undefined	28	33				7.50
239		MWRB	SE	17	33	15	W1	51.828055	99.542016	462647	5741835	undefined	51	54				7.40
240		MWRB	SE	17	33	15	W1	51.828055	99.542016	462647	5741835	undefined	10	13				8.10
241		MWRB	SE	17	33	15	W1	51.828055	99.542016	462647	5741835	undefined	22	27				8.10
242		MWRB		20	33	15	W1	51.846134	99.547848	462260	5743849	undefined	14	18				7.80
243		MWRB		20	33	15	W1	51.846134	99.547848	462260	5743849	undefined	8	13				7.50
244		MWRB	SW	18	34	15	W1	51.915367	99.577296	460292	5751564	undefined	0	59				7.60
245		MWRB	SW	18	34	15	W1	51.915367	99.577296	460292	5751564	undefined	31	37				8.25
246		MWRB	SW	29	34	15	W1	51.944485	99.553679	461942	5754790	undefined	15	18				7.40
247		MWRB	NW	28	24	16	W1	51.104182	99.652788	454296	5661395	undefined	40	43				7.50
248		MWRB	NW	12	26	16	W1	51.236803	99.582617	459325	5676102	undefined	82	92				7.45
249		MWRB	SW	17	27	16	W1	51.304072	99.678268	452717	5683640	undefined	56	62				7.80
250		MWRB	SW	23	27	16	W1	51.318540	99.607959	457631	5685206	undefined	34	40				7.75
251		MWRB	SE	33	27	16	W1	51.347655	99.643258	455200	5688465	undefined	8	9				7.70
252		MWRB	NW	2	28	16	W1	51.369530	99.607959	457678	5690876	undefined	29	39				7.60
253		MWRB	NW	12	28	16	W1	51.383987	99.584523	459323	5692471	undefined	36	37				7.65
254		MWRB	SE	13	28	16	W1	51.391394	99.572949	460134	5693288	undefined	19	20				7.50
255		MWRB	NW	14	28	16	W1	51.398641	99.607959	457705	5694114	undefined	19	41				7.50
256		MWRB	SW	17	28	16	W1	51.391405	99.678268	452806	5693352	undefined	0	16				7.70

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
225		1845	117.0	48.2	410.0		534	385	351	0	0	0.0			0			0.1
226		1653	56.0	29.0	430.0	33.5	520	345	239	0	0	0.0			0			0.4
227		932	55.0	34.0	165.0		175	85	418	0	0				0.0		0	8
228		2832	108.0	62.6	830.0		437	1250	144	0	0		0					0.2
229	5.9	1023	10.4	4.9	287.0	21	230	220	244	0	0	6.0	0.01		0.02	0	0	0.02
230	6.0	3988	150.0	96.0	1130.0	83.3	480	1900	142	0	0	6.8	0		0.04	0	0.07	0.72
231	7.0	7997	340.0	150.0	2280.0	100	1470	3500	151	0	0	6.4	0		0.04	0	0.02	0.02
232	7.0	7586	300.0	146.0	2140.0	97.2	1340	3400	156	0	0	6.4	0		0.06	0	0.05	0.64
233	5.8	3174	151.0	108.0	918.0	30	480	1350	137	0	0	0.1	0.01			0.01	0	0.54
234	6.9	3143	130.0	73.1	826.0	34	420	1450	203	0	0	6.8	0.11		0.07	0	0.01	0.06
235	6.8	3330	181.0	123.0	855.0	36	480	1550	98	0	0	7.2	0.1		0.05	0.014	0.01	0.27
236		8751	440.0	184.0	2370.0	98	1435	3950	274	0	0		0		0			0.24
237		1026	27.0	14.0	300.0	25	125	337	198	8	8		0.26		0			0.68
238	6.0	818	48.7	105.0	9.0	0	22	13	608	0	0	12.7	0.27		0	0	0	0
239		8330	492.0	190.0	2200.0	170	768	4412	98	0	0		0.07		0		0.54	
240		7341	337.0	179.0	2170.0	114	697	3755	89	6	6		0.08		0		0.28	
241		982	13.0	9.0	287.0	17	58	421	177	0	0		0.33		0.9		0.7	
242		7392	349.0	177.0	2076.0	50	765	3863	112	0	0		0.61		0		6.3	
243		8515	376.0	167.0	2495.0	48	923	4352	154	0	0		0.57		0		2.4	
244		2591	121.0	60.0	680.0	48	206	1293	183	0	0		0.57		0.27		0.21	
245		1078	42.0	44.0	216.0	20	408	146	202	5	5		0.89		0		4.9	
246		975	83.0	51.0	89.0	25	40	99	588	0	0		0.26		0.03		2.75	
247		1170	92.8	40.8	210.0		292	190	344	0	0		0				0.12	
248	6.0	4471	134.0	61.3	1200.0	61.8	1250	1450	307	0	0	6.8	0.01		0.03	0.011	0.01	4.56
249	7.3	1779	95.0	59.4	413.0	17	540	510	137	0	0	7.6	0.01		0.02	0.005	0.01	1.5
250	9.5	1260	92.0	68.0	218.0	10.7	350	390	122	0	0	9.0	0.01		0.02	0.005	0.01	0.31
251	6.2	1746	130.0	142.0	128.0	8	1130	55	144	0	0	8.7	0.04		0.02	0	0	0.09
252		4701	212.0	115.0	1274.0	71	934	1900	195	0	0		0		0		0.04	
253		1525	113.0	83.2	275.0	16.6	340	570	127	0	0		0		0		0.08	
254		10968	576.0	233.0	2975.0	139	1700	5150	195	0	0		0		0		0.68	
255		1346	104.0	74.7	218.0	23	445	340	141	0	0		0		0		0.02	
256		8054	352.0	199.0	2100.0	108	1330	3300	665	0	0		0					280

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
225											0.62					
226											2.6	2.1				
227																
228											1.22	2.25				
229											1.3	2.5				
230											1.44	2.6				
231											0.53	1.3				
232											0.56	1.2				
233											0.43	0.77				
234																
235																
236																
237											1.26					
238											0.21	0.12				
239											0.46					
240											0.45					
241																
242											0.18					
243											0.29					
244											1.72					
245											1.55					
246																
247											1.72					
248											2.16	3.1				
249											0.68	0.78				
250											0.38	0.7				
251											0.36	0.46				
252																
253																
254																
255																
256																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
225										0
226										1
227										-1
228										0
229										-4
230					-21.6	-151.0				1
231					-21.0	-152.0				0
232										-1
233										6
234										-4
235					-22.4	-167.2				2
236										-1
237										3
238					-15.6	-122.0				3
239										-1
240										3
241										-5
242										-1
243										-1
244										-2
245										-1
246										-2
247										0
248					-20.5	-152.3				-5
249					-23.0	-173.6				0
250										-1
251										-7
252										1
253										-1
254										-1
255										1
256										-1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Eastings	Northings	Formation						
257		MWRB SW		6	29	16	W1	51.449616	99.701705	451238	5699841	undefined	12	23				7.55
258		MWRB SE		14	29	16	W1	51.478737	99.596386	458583	5703015	undefined	5	17				7.25
259		MWRB SW		6	30	16	W1	51.536947	99.701705	451331	5709553	undefined	5	18				7.20
260		MWRB NE		23	31	16	W1	51.675094	99.612867	457621	5724862	undefined	39	43				7.40
261		MWRB NE		23	31	16	W1	51.675094	99.612867	457621	5724862	undefined	32	43				7.80
262		MWRB NW		24	31	16	W1	51.675089	99.600913	458448	5724854	undefined	25	31				7.90
263		MWRB SW		24	31	16	W1	51.667857	99.600913	458441	5724050	undefined	0	20				8.00
264		MWRB NE		26	31	16	W1	51.689739	99.612867	457635	5726491	undefined	41	55				8.50
265		MWRB SE		35	31	16	W1	51.696971	99.612867	457642	5727295	undefined	22	42				7.45
266		MWRB		25	34	16	W1	51.948094	99.595082	459099	5755214	undefined	0	44				8.00
267		MWRB		25	34	16	W1	51.948094	99.595082	459099	5755214	undefined	0	41				8.00
268		MWRB SE		4	25	17	W1	51.126424	99.781833	445287	5663956	undefined	76	79				7.83
269		MWRB NW		19	28	17	W1	51.413092	99.842323	441419	5695882	undefined	31	38				7.55
270		MWRB SW		13	29	17	W1	51.478732	99.725141	449641	5703095	undefined	18	20				7.35
271		MWRB SE		28	29	17	W1	51.507854	99.783877	445597	5706376	undefined	4	20				7.45
272		MWRB NW		33	29	17	W1	51.529550	99.795450	444820	5708797	undefined	5	8				7.30
273		MWRB NE		9	30	17	W1	51.558661	99.783877	445657	5712026	undefined	1	19				7.75
274		MWRB NE		16	30	17	W1	51.573307	99.783877	445675	5713655	undefined	0	53				7.90
275		MWRB NE		35	32	17	W1	51.791530	99.754569	447957	5737903	undefined	41	43				7.80
276		MWRB SW		17	26	18	W1	51.244312	99.957524	433163	5677211	undefined	56	59				8.00
277		MWRB NW		27	26	18	W1	51.281025	99.910620	436487	5681252	undefined	0	70				7.90
278		MWRB SW		18	27	18	W1	51.304061	99.982941	431478	5683879	undefined	124	128				7.80
279		MWRB SE		6	28	18	W1	51.362289	99.971368	432370	5690343	undefined	50	61				8.10
280		MWRB SE		32	28	18	W1	51.434984	99.947931	434106	5698406	undefined	20	46				7.73
281		MWRB NW		14	29	18	W1	51.485973	99.889196	438258	5704026	undefined	48	49				8.10
282		MWRB SE		4	30	18	W1	51.536964	99.924495	435879	5709727	undefined	36	39				7.65
283		MWRB NE		25	30	18	W1	51.602399	99.854186	440840	5716945	undefined	6	30				8.10
284		MWRB NE		35	30	18	W1	51.616874	99.877622	439236	5718574	undefined	9	10				7.65
285		MWRB SE		10	31	18	W1	51.638758	99.919888	436341	5721044	undefined	5	8				
286		MWRB NE		10	31	18	W1	51.645990	99.919888	436351	5721848	undefined	5	31				7.10
287		MWRB NE		10	31	18	W1	51.645990	99.919888	436351	5721848	undefined	5	6				
288		MWRB SW		7	24	3	W1	51.052722	97.872999	578993	5656074	undefined	29	95				7.60

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/l	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
257	7.0	5077	155.0	93.1	1610.0	62.9	850	2100	198	0	0	8.0	0	0	0	0	0	0.05
258	9.1	5146	230.0	112.0	1350.0	50.3	720	2400	276	0	0	7.8	0.01	0	0.02	0	0.03	0.24
259	8.0	2554	148.0	127.0	453.0	54.7	300	940	520	0	0	10.8	2.07	0	0.03	0	0	0.06
260		1971	136.0	183.0	191.0	12	378	376	695	0	0		16.3	0	0			0.64
261	7.0	821	56.2	100.0	26.5	0	68	20	544	0	0	6.4	0.01	0	0.04	0	0	0.2
262	12.0	1331	62.0	66.0	240.0	28	585	184	166	0	0		0.75	0	0			0.82
263		2011	84.0	143.0	359.0	18	414	473	520	24	24		21.2	0.3	0.3			8.6
264		840	17.0	11.0	241.0	25	49	367	130	37	37		0.08	0	0			0.47
265	7.0	1594	98.8	119.0	201.0	27.5	380	450	310	0	0	7.8	0.58	0	0	0	0	0.04
266		990	30.0	116.0	55.0	3	76	17	693	0	0		0.04	0				0.24
267		2851	203.0	81.0	635.0	48	118	1621	145	0	0		0.01	0				0.24
268		1388	52.8	45.6	300.0		528	96	366	0	0		0	0	0			0.18
269	9.0	1795	80.9	62.4	456.0		220	730	239	0	0	6.4	0.03	0.02	0.02	0	0	0.05
270	7.0	983	83.9	60.1	118.0	9.3	65	190	444	0	0	12.7	0	0.04	0.04	0	0	0.99
271		2561	107.0	143.0	503.0	50.6	300	1040	408	0	0	9.8	0.3	0.03	0.03	0	0	0.08
272		3610	192.0	26.2	1005.0	47	524	1450	366	0	0		0	0	0			0.02
273		7559	330.0	157.0	2070.0	102	1180	3100	620	0	0		0	0	0			0.84
274		8506	408.0	126.0	2425.0	100	1330	3800	317	0	0		0	0	0			0.2
275	6.0	4693	253.0	133.0	1300.0	83	540	2267	117	0	0		0.03	0	0			1.4
276		1161	58.0	61.0	182.0	24.8	438	85	312	0	0		0	0	0			0.08
277		2980	101.0	49.0	810.0	38.5	940	660	381	0	0		0	0	0			0.98
278		2368	134.0	64.0	520.0	29	925	430	266	0	0		0	0	0.07			1.68
279	6.1	4743	35.6	19.2	1500.0	50	1810	840	488	0	0		0	0	0			17.5
280		2554	84.6	68.7	708.0	43.5	496	970	183	0	0		0	0				0.1
281		3146	84.8	52.9	920.0	38.8	670	1120	259	0	0		0	0	0			0.1
282	8.9	1082	76.8	81.5	90.0	14	170	60	590	0	0		0	0	0			0.08
283		5830	192.0	116.0	1785.0	20	750	2800	167	0	0		0	0	0			0.02
284		2311	122.0	176.0	360.0	22	480	620	531	0	0			0	0			0.02
285		1000	126.0	60.0	74.0		197	123	420	0	0							1.56
286		744	18.0	84.0	87.0		42	145	368	19	19		0.21					0.16
287		1075	122.0	36.0	131.0	1.8	196	87	501	0	0		0.1					
288	6.8	498	37.0	40.6	24.9	0	23	2	359	0	0	11.8			0			0.22

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
257											0.44	1.8				
258											0.38	1.3				
259											0.24	0.46				
260											0.42					
261											0.17	0.07				
262											0.58					
263											0.26					
264											1.1					
265											0.53	0.76				
266											0.35					
267											1.1					
268											0					
269											0.64	1.2				
270											0.18	0.26				
271											0.2	0.72				
272																
273																
274																
275											0.44					
276																
277																
278																
279																
280																
281																
282																
283																
284																
285											0.35					
286																
287																
288											0.82	0.18				

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
257										4
258						-18.8		-139.6		-4
259										-3
260										1
261						-14.3		-113.0		6
262										-1
263										3
264										-2
265										-3
266										0
267										-5
268										-1
269					-22.2	-148.0				0
270					-14.3	-102.0				2
271										-2
272										-1
273										0
274										0
275										3
276										0
277										1
278										-1
279										0
280										1
281										0
282										0
283										0
284										1
285										0
286										3
287										0
288					-15.8	-120.0				-1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S}/\text{cm}$	pH
										Easting	Northing	Formation						
289		MWRB	SE	24	24	3	W1	51.082196	97.744623	587935	5659497	undefined	6	19				7.70
290		MWRB	SW	12	25	3	W1	51.141150	97.756128	587018	5666039	undefined	13	19				7.50
291		MWRB	SW	35	25	3	W1	51.200105	97.779605	585267	5672567	undefined	25	58				7.50
292		MWRB	SE	1	26	3	W1	51.214828	97.744640	587682	5674245	undefined	9	39				7.40
293		MWRB	NW	25	27	3	W1	51.340411	97.756486	586618	5688197	undefined	4	14				7.35
294		MWRB	SE	36	23	2	W1	51.023247	97.604119	597901	5653119	undefined	4	13				7.60
295		MWRB	SE	11	24	2	W1	51.052732	97.627504	596200	5656367	undefined	11	51				7.90
296		MWRB	SE	11	24	2	W1	51.052732	97.627504	596200	5656367	undefined	51	68				7.70
297		MWRB	SW	13	24	2	W1	51.067465	97.615604	597003	5658020	undefined	6	31				7.50
298		MWRB	NW	13	24	2	W1	51.074698	97.615606	596988	5658825	undefined	6	14				7.70
299		MWRB	NW	14	24	2	W1	51.074706	97.638998	595349	5658795	undefined	7	14				7.90
300		MWRB	NE	23	24	2	W1	51.089439	97.627527	596122	5660448	undefined	5	14				7.70
301		MWRB	NW	23	24	2	W1	51.089443	97.639011	595318	5660434	undefined	7	10				8.20
302		MWRB	SW	25	24	2	W1	51.096939	97.615615	596941	5661298	undefined	6	10				8.20
303		MWRB	SE	26	24	2	W1	51.096943	97.627532	596106	5661283	undefined	6	55				7.60
304		MWRB	SE	32	23	1	W1	51.023262	97.557087	601199	5653184	undefined	5	33				7.45
305		MWRB	NW	3	24	1	W1	51.045235	97.521853	603621	5655676	undefined	3	31				7.50
306		MWRB	SE	33	24	1	W1	51.111687	97.533866	602632	5663049	undefined	3	41				7.30
307		MWRB	SE	6	25	1	W1	51.126413	97.580726	599320	5664622	undefined	3	30				7.30
308		MWRB	SE	32	25	1	W1	51.200105	97.557466	600787	5672848	undefined	6	20				7.45
309		MWRB	SW	5	26	1	W1	51.214838	97.569014	599948	5674471	undefined	15	16				7.31
310		MWRB		3	29	1	W1	51.453249	97.516335	603092	5701056	undefined	8	20				7.60
311		MWRB	SE	34	23	1	E1	51.023264	97.369859	614330	5653458	undefined	13	28				7.60
312		MWRB	SW	18	24	1	E1	51.067459	97.451552	608497	5658249	undefined	3	26				7.75
313		MWRB	SW	18	24	1	E1	51.067459	97.451552	608497	5658249	undefined	3	43				7.95
314		MWRB	SW	18	24	1	E1	51.067459	97.451552	608497	5658249	undefined	43	125				7.55
315		MWRB	SW	24	24	1	E1	51.082202	97.334616	616653	5660067	undefined	13	20				7.50
316		MWRB	NW	5	25	1	E1	51.133650	97.428322	609968	5665643	undefined	8	20				7.30
317		MWRB	SE	5	26	1	E1	51.214842	97.417002	610565	5674689	undefined	15	17				7.60
318		MWRB	NW	21	31	1	E1	51.675100	97.404532	610321	5725890	undefined	14	56				7.25
319		MWRB		9	32	1	E1	51.729703	97.398701	610591	5731971	undefined	17	36				7.25
320		MWRB	SE	34	23	2	E1	51.023264	97.229362	624183	5653685	undefined	10	71				7.55

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
289	7.0	11								0		11.0	0			0.006	0.03	0.07
290	7.0	668	80.2	49.8	13.1	0	58	11	442	0		13.9	0		0.03	0	0.03	0.04
291	6.8	1000	71.2	105.0	73.5	7.6	220	46	466	0		10.4	8		0	0	0.02	0
292	8.5	749	91.5	71.2	4.7	0	19	24	525	0		14.0	0.91		0			0.04
293	6.9	768	98.9	71.7	8.6	5.9	25	21	522	0		14.6	18		0			0.04
294	9.5	643	73.6	57.1	5.3	0	22	2	471	0		12.0	2.4		0			0.03
295	7.2	663	69.1	58.5	9.8	0	31	2	481	0		11.8	0.54		0			0.03
296	6.2	617	63.2	52.3	11.7	5.5	29	3	442	0		10.4	0		0			0.28
297		577	57.0	46.0	18.0	3	62	4	387	0			0.9		0			0.9
298		634	79.0	47.0	11.0	3	46	6	442	0			1.3		0			0.12
299		630	65.0	49.0	18.0	3	72	7	416	0			1.2		0			0.17
300		637	65.0	53.0	17.0	3	55	4	440	0			1		0			0.96
301		514	64.0	43.0	8.0	3	52	10	334	18			0.4		0			0.16
302		576	58.0	53.0	25.0	3	96	6	335	18			0.2		0			0.43
303		1009	119.0	91.0	10.0	3	30	66	690	0			5		0.1			0.49
304	7.5	886	72.9	98.2	21.0	0	40	22	617	0		14.4	17		0	0	0.02	0
305	6.8	848	81.3	99.0	18.2	0	96	22	520	0		11.6	17		0			0.03
306	8.2	738	106.0	52.7	6.5	9.7	31	11	508	0		12.8	6.1		0.02			0.08
307	6.8	835	104.0	59.8	4.5	7.5	25	21	600	0		13.1	1.9		0.26	0	0.04	0.2
308	7.8	617	69.3	51.2	13.4	0	31	3	437	0		11.6	0		0			0.2
309		616	68.0	44.0	12.0	5	39	3	445	0			0		0.05			1.12
310	7.0	661	74.1	52.8	7.7	0	37	3	471	0		15.2	0.05		0	0	0.06	0.08
311	10.0	522	57.8	44.1	8.9	0	25	2	373	0		11.0	0		0			0.78
312	8.1	503	75.7	37.6	0.0	0	6	5	371	0		8.1	0.72		0			0.03
313	7.0	531	77.4	40.9	0.0	0	5	0	400	0		8.0	0.1		0	0	0	0
314	7.1	496	59.7	37.8	1.8	0	6	0	381	0		9.6	0		0			0.3
315	9.0	634	97.0	47.0	1.0	0	10	2	468	0		8.9	1.1		0			0.02
316	10.2	1599	173.0	216.0	38.8	0	94	380	681	0		16.2	17		0			0.04
317	9.1	773	75.4	86.3	15.4	5.3	38	27	517	0		8.4	14		0			0.04
318	7.6	1190	89.8	118.0	59.8	0	290	8	610	0		14.8	0		0	0	0	1.18
319	10.0	1088	111.0	97.3	43.5	7.3	295	4	517	0		12.6	0		0			1.24
320	9.3	1030	82.9	107.0	36.3	6.8	275	0	508	0		13.6	0		0.02			1.44

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
289											0.24	0.4				
290											0.22	0.36				
291											0.56	0.22				
292											0.21					
293											0.15					
294											0.23					
295											0.25	0				
296											0.26	0.18				
297											0.26					
298											0.18					
299											0.16					
300											0.18					
301											0.12					
302											0.26					
303											0.08					
304											0.23	0.2				
305											0.25					
306											0.15					
307											0.15	0.14				
308											0.33					
309																
310											0.27	0				
311											0.38					
312											0.12	0.16				
313											0.1	0.1				
314											0.21	0				
315											0.2	0.12				
316											0.15					
317											0.2					
318											0.82					
319											0.31					
320											0.38					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
289					-14.7	-109.0				0
290										7
291										5
292					-14.2	-107.0				8
293										2
294					-15.6	-113.0				1
295					-15.4	-118.0				1
296					-15.5	-118.0				-2
297										0
298										-2
299										0
300										2
301										5
302										1
303										4
304										8
305										5
306										-2
307					-12.8	-94.0				2
308					-14.8	-109.0				-3
309										-1
310					-16.3	-121.0				2
311					-15.2	-112.0				4
312										4
313					6.0					-2
314					-15.0	-109.0				5
315										8
316										8
317										2
318					-10.2	-91.0				3
319										2
320					-15.1	-111.0				2

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
321		MWRB	SW	2	24	2	E1	51.037999	97.217477	624977	5655344	undefined	10	13				7.40
322		MWRB	SW	29	24	2	E1	51.096944	97.287738	619899	5661781	undefined	3	63				7.65
323		MWRB	SW	19	24	2	E1	51.082196	97.311098	618300	5660104	undefined	63	126				7.50
324		MWRB	NE	18	29	2	E1	51.485965	97.299621	618064	5705021	undefined	21	42				7.30
325		MWRB	NE	18	29	2	E1	51.485965	97.299621	618064	5705021	undefined	26	39				7.40
326		MWRB	NE	18	29	2	E1	51.485965	97.299621	618064	5705021	undefined						7.50
327		MWRB		31	33	2	E1	51.875233	97.304233	616739	5748302	undefined						7.70
328		MWRB	SW	30	23	3	E1	51.008511	97.170389	628359	5652146	undefined	10	24				7.35
329		MWRB	NE	7	24	3	E1	51.059961	97.159061	629011	5657887	undefined	28	37				7.35
330		MWRB	NE	11	24	3	E1	51.059965	97.065523	635566	5658055	undefined	9	43				7.75
331		MWRB	NE	28	24	3	E1	51.104183	97.112364	632157	5662887	undefined	15	17				7.50
332		MWRB	NW	8	25	3	E1	51.148387	97.147365	629583	5667740	undefined	12	22				7.50
333		MWRB	SW	19	23	4	E1	50.993773	97.029850	638262	5650761	undefined	5	6				7.40
334		MWRB	NE	15	24	4	E1	51.074708	96.948427	643725	5659916	undefined	11	18				7.40
335		MWRB	SW	17	24	4	E1	51.067470	97.006675	639667	5658999	undefined	11	23				7.45
336		MWRB	NE	22	24	4	E1	51.089445	96.948444	643678	5661555	undefined	9	44				7.65
337		MWRB	SW	1	25	4	E1	51.126413	96.913143	646034	5665735	undefined	7	10				7.50
338		MWRB	SW	4	25	4	E1	51.126423	96.983398	641118	5665599	undefined	3	13				7.40
339		MWRB	SE	18	25	4	E1	51.155887	97.018818	638551	5668808	undefined	22	27				7.50
340		MWRB		12	28	4	E1	51.380368	96.906989	645659	5693985	undefined	8	22				7.00
341		MWRB	SW	30	24	5	E1	51.096933	96.889652	647771	5662504	undefined	14	17				7.45
342		MWRB		3	32	5	E1	51.715239	96.808276	651413	5731422	undefined	6	10				7.60
343		MWRB	SE	17	24	6	E1	51.067473	96.714203	660157	5659595	undefined	3	17				7.70
344		MWRB	NE	25	25	6	E1	51.192587	96.620665	666260	5673714	undefined	21	24				7.40
345		MWRB	SE	13	12	7	E1	50.006290	96.501888	679005	5542102	undefined	29	37				7.60
346		MWRB	SW	24	12	7	W1	50.023118	98.300212	550129	5541217	undefined	23	26				7.60
347		MWRB	NW	1	14	7	E1	50.160926	96.513167	677624	5559265	undefined	15	21				7.20
348		MWRB	NW	25	14	7	E1	50.219883	96.513188	677404	5565820	undefined	19	28				7.40
349		MWRB	NE	31	12	6	E1	50.057749	96.753737	660788	5547250	undefined	21	63				7.20
350		MWRB	SW	27	15	3	W1	50.303179	97.798240	585585	5572812	undefined	23	27				7.50
351		MWRB	SE	14	14	3	W1	50.185258	97.761784	588400	5559744	undefined	39	60				7.95
352		MWRB	NW	31	14	3	W1	50.236700	97.865132	580934	5565346	undefined	45	50				8.00

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
321	10.0	713	69.4	69.9	6.4	0	31	0	525	0	0	11.4	0	0	0	0	0	0.81
322	7.8	629	59.8	63.2	1.7	0	16	0	481	0	0	7.1	1.1	0	0	0	0	0
323		623	67.8	63.8	3.8	0	25	0	454	0	0	8.5	0.1	0	0	0	0.1	0.1
324		670	93.0	42.0	5.0	3	41	5	481	0	0		0.2	0	0	0	3	3
325		733	96.0	52.0	7.0	3	67	3	505	0	0		0.1	0	0	0	1.8	1.8
326		686	97.0	44.0	4.0	3	39	3	496	0	0		0.1	0	0	0	1.2	1.2
327	10.0	662	62.8	41.9	36.4	17.6	65	6	420	0	0	12.4	0.06	0	0.02	0	0.92	0.92
328	10.0	814	99.1	63.0	11.2	6.2	46	6	566	0	0	16.8	0.05	0	0.99	0	0.19	0.19
329	9.1	646	85.8	51.5	4.4	0	31	6	454	0	0	13.5	3.6	0	0	0	0.03	0.03
330	5.8	583	70.0	45.0	5.8	2.1	25	0	422	0	0	13.4	0	0	0	0	0	0.4
331	9.5	551	78.8	39.0	3.1	0	28	0	390	0	0	11.6	0.33	0	0	0	0.02	0.02
332	9.0	435	76.2	22.0	1.2	0	7	0	320	0	0	9.0	0.28	0	0	0	0.03	0.03
333	8.8	814	73.6	71.1	14.7	0	72	2	564	0	0	16.4	0.01	0	0.05	0	0.02	0.52
334	13.8	613	90.2	35.3	4.1	0	33	4	432	0	0	14.0	3.7	0	0.01	0.005	0.05	0
335	7.0	554	82.7	36.2	3.3	0	31	0	388	0	0	12.8	0	0	0.02	0	0.25	0.25
336	6.0	468	84.8	21.6	3.7	0	22	16	310	0	0	9.4	3.7	0	0	0	0	0
337	7.0	653	110.0	31.8	10.0	0	33	15	439	0	0	13.9	12	0	0	0	0.03	0
338	7.0	583	105.0	30.0	4.7	0	28	4	398	0	0	13.2	6	0	0	0	0.03	0.03
339	7.0	534	78.9	32.6	2.6	0	25	0	382	0	0	13.0	0	0	0	0	0.38	0.38
340		1574	173.0	140.0	44.0	7	580	12	618	0	0		1.1	0	0	0		
341	7.0	565	87.6	36.1	3.8	0	34	3	388	0	0	12.9	0	0	0.02	0	1.25	1.25
342		1066	3.0	3.0	301.0	2	46	8	703	0	0		0.09	0	0	0	1.28	1.28
343	6.9	579	104.0	27.1	4.0	0	25	16	390	0	0	12.8	0.04	0	0.32	0	11	11
344		1333	223.0	74.0	20.0	16	505	6	489	0	0			0	0.5		1.35	1.35
345		1925	30.0	9.0	637.0	15	289	669	276	0	0						1.1	1.1
346		619	52.0	30.0	74.0	4	47	61	351	0	0		0.14				3.5	3.5
347		1447	116.0	143.0	83.0	7	712	24	362	0	0		0.49				1.02	1.02
348	7.0	575	58.0	36.0	25.8	0	21	13	405	0	0	16.6	0	0	0.03	0	0	0.48
349		1286	94.0	110.0	90.0	9	254	95	634	0	0		0.47		0		1.42	1.42
350		786	54.0	72.0	55.0	7	89	19	490	0	0		0.13		0		0.72	0.72
351	7.4	879	52.0	46.5	123.0	7.6	400	55	181	0	0	14.0	0	0	0	0.005	0	0.03
352		1044	62.0	25.0	207.0	18	477	39	216	0	0		1.06		0		3.1	3.1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
321											0.38					
322											0.19	0				
323											0.32	0.18				
324											0.26					
325											0.42					
326											0.29					
327											0.4					
328											0.38					
329											0.6					
330											0.39	0.16				
331											0.43					
332											0.32					
333											0.44	0.18				
334											0.21	0				
335											0.4					
336											0.16	0.16				
337											0.13	0.12				
338											0.3					
339											0.4					
340											0.05	0				
341											0.24					
342											0.31					
343											0.12	0.14				
344											0.13					
345																
346											0.26					
347											0.16					
348											0.24	0.18				
349											0.26					
350											0.22					
351											0.73	0.42				
352											0.29					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
321					-14.4	-110.0				1
322										0
323					-15.1	-116.0				5
324										-3
325										-2
326										-2
327										1
328					-13.9	-106.0				2
329										3
330										0
331										2
332					-15.0	-110.0				3
333										-3
334					-14.9	-110.0				-2
335					-15.5	-113.0				2
336					-14.4	-107.0				2
337										1
338										5
339					-15.3	-110.0				0
340										-1
341					-15.6	-113.0				2
342										3
343										2
344										0
345										2
346										0
347										0
348					-14.4	-106.0				-3
349										-1
350										4
351					-14.9	-119.7				-4
352										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM Easting	UTM Northing	Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
353		MWRB SE		36	14	3	W1	50.229466	97.738808	589957	5564687	undefined	34	43				7.90
354		MWRB SE		15	13	3	W1	50.096827	97.784671	586926	5549885	undefined	42	49				7.65
355		MWRB NE		24	13	3	W1	50.118785	97.738795	590166	5552381	undefined	46	61				8.20
356		MWRB NW		13	16	4	W1	50.369357	97.890748	578888	5580068	undefined	5	32				7.30
357		MWRB NE		24	15	4	W1	50.295657	97.879417	579817	5571886	undefined	18	48				7.35
358		MWRB SW		28	19	4	W1	50.657350	97.963890	573239	5612015	undefined	2	18				7.45
359		MWRB SW		8	22	3	W1	50.878412	97.847967	581050	5636718	undefined	19	22				8.05
360		MWRB SW		17	20	3	W1	50.716296	97.847585	581358	5618691	undefined	13	56				7.20
361		MWRB SW		8	18	3	W1	50.524254	97.844826	581886	5597341	undefined	14	33				7.55
362		MWRB SW		2	17	3	W1	50.421087	97.775302	587003	5585949	undefined	13	20				7.85
363		MWRB NE		13	17	3	W1	50.457785	97.740876	589380	5590070	undefined		15				7.75
364		MWRB NE		35	17	3	W1	50.502011	97.764016	587655	5594960	undefined	13	16				7.48
365		MWRB NE		1	18	3	W1	50.516739	97.740883	589268	5596625	undefined	9	32				7.58
366		MWRB SE		13	18	3	W1	50.538982	97.740885	589226	5599098	undefined	6	33				7.36
367		MWRB NE		13	18	3	W1	50.546216	97.740886	589212	5599903	undefined	24	32				8.10
368		MWRB SW		12	18	3	W1	50.524249	97.752243	588449	5597447	undefined		9				7.59
369		MWRB SE		24	18	3	W1	50.553721	97.740887	589198	5600737	undefined	21	49				7.63
370		MWRB SE		24	18	3	W1	50.553721	97.740887	589198	5600737	undefined	21	50				7.73
371		MWRB SE		12	18	3	W1	50.524244	97.740884	589254	5597459	undefined		5				7.61
372		MWRB SW		3	17	3	W1	50.421090	97.798397	585363	5585922	undefined	12	25				7.71
373		MWRB NW		34	16	3	W1	50.413585	97.798387	585377	5585088	undefined	13	22				7.84
374		MWRB NW		34	16	3	W1	50.413585	97.798387	585377	5585088	undefined	12	40				7.92
375		MWRB NW		10	17	3	W1	50.443063	97.798426	585321	5588365	undefined	12	37				7.88
376		MWRB NW		12	22	2	W1	50.885640	97.614973	597427	5637803	undefined	3	13				8.65
377		MWRB NE		26	14	2	W1	50.221971	97.624244	598143	5563998	undefined	28	38				8.20
378		MWRB SE		34	19	2	W1	50.672088	97.649949	595400	5614012	undefined	23	43				7.29
379		MWRB SE		28	14	2	W1	50.214744	97.670241	594876	5563135	undefined	24	47				7.30
380		MWRB NE		36	12	2	W1	50.059827	97.601222	600124	5546001	undefined	13	49				7.38
381		MWRB NE		31	13	2	W1	50.148270	97.716074	591734	5555686	undefined	33	36				7.39
382		MWRB NE		26	13	2	W1	50.133535	97.624192	598328	5554165	undefined	18	31				7.71
383		MWRB SE		25	12	2	W1	50.037853	97.601219	600169	5543558	undefined	11	47				7.20
384		MWRB NE		20	16	2	W1	50.384104	97.694608	592808	5581934	undefined		27				7.53

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/l	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
353		1008	64.0	46.0	168.0	16	458	58	198	0	0		0.57		0			7.8
354	6.3	1053	58.3	58.0	145.0	0	180	148	444	0	0	19.2	0		0	0	0	1.39
355		1060	58.0	34.0	202.0	20	253	149	344	14			0.22		0			
356		755	67.5	84.1	19.3	0	32	27	525	0	0		0.22		0.05			1.23
357	6.5	1034	81.6	56.8	90.6	10.7	300	67	415	0	0	12.6	0		0	0	0	2.41
358		662	64.0	57.0	22.0		58	7	454	0	0		0		0		0	0.9
359		925	51.0	103.0	35.0		198	13	525	0	0		0					8.64
360	6.0	739	68.0	72.0	15.7	0	50	4	517	0	0	12.4	0		0	0	0	0.51
361	6.0	569	52.7	45.3	27.6	0	76	4	351	0	0	12.5	0.01		0	0	0	0.05
362		1206	74.0	90.0	148.0	8	620	62	204	0								
363		762	46.0	60.0	67.0	9	160	44	376	0								
364	4.5	727	60.0	55.0	34.0	5	85	16	472	0								
365	5.0	601	64.0	41.0	30.0	7	53	8	398	0								
366		628	26.0	73.0	22.0	8	65	10	424	0								
367	5.5	516	38.0	44.0	22.0	9	7	16	380	0								
368	4.0	1212	90.0	111.0	67.0	10	350	82	502	0								
369		806	66.0	61.0	48.0	29	86	64	452	0								
370		579	62.0	40.0	26.0	9	30	12	400	0								
371		664	66.0	56.0	19.0	9	28	14	472	0								
372		1028	80.0	80.0	111.0	9	380	64	304	0								
373		983	76.0	70.0	114.0	9	400	56	258	0								
374		1033	78.0	52.0	151.0	10	430	92	220	0								
375		642	36.0	50.0	60.0		180	12	304	0								
376		239	32.0	22.0	5.0		62	8	110	12								2.25
377		567	17.0	57.0	32.0	7	27	1	426	5			0.49		0			0.92
378	5.9	726	59.0	67.6	37.3	0	130	4	417	0		11.4	0		0.04	0	0	3.29
379	7.5	687	45.3	46.2	69.0	0	180	32	303	0		11.2	0.02		0	0	0	0.11
380	4.5	3198	121.0	82.3	841.0	18.7	770	1000	354	0		10.8	0.05		0.03	0	0	0.16
381	6.0	783	50.8	57.3	58.7	0	125	31	442	0		18.0	0		0	0	0	0.51
382	6.0	2765	83.7	44.7	828.0	27.2	530	1020	224	0		7.5	0		0	0	0	0.66
383		3980	200.0	121.0	865.0	20	1020	1340	400	0		14.0	0.03		0.05	0	0	0.39
384		1931	144.0	212.0	163.0	2	775	255	380	0								

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
353											0.18					
354											0.71	0.46				
355											1.1					
356											0.16					
357											0.42	0.69				
358												0				
359											0.59					
360											0.4	0.14				
361											0.27	0.22				
362																
363																
364																
365																
366																
367																
368																
369																
370																
371																
372																
373																
374																
375																
376											0.36					
377											0.14					
378											0.33	0.24				
379											0.49	0.38				
380											0.78	1.5				
381											0.53	0.45				
382											1.3	1.4				
383											0.32	1.1				
384																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
353										1
354										-4
355										0
356										5
357										-7
358										0
359										-2
360					-13.1	-109.1				2
361					-15.0	-120.6				1
362										-1
363										-2
364										-4
365										1
366										-1
367										-1
368										-3
369										1
370										2
371										1
372										3
373										2
374										-1
375										-3
376										4
377										-3
378					-15.0	-119.0				2
379					-15.0	-123.7				-3
380					-18.1	-135.9				0
381					-16.2	-127.3				-4
382					-18.8	-144.1				1
383										-6
384										4

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
385		MWRB NE		30	16	2	W1	50.398835	97.717727	591136	5583544	undefined		5				7.81
386		MWRB NE		27	16	2	W1	50.398846	97.648460	596059	5583632	undefined	24	55				7.88
387		MWRB NW		30	16	2	W1	50.398830	97.729059	590331	5583529	undefined	17	46				8.00
388		MWRB SW		31	16	2	W1	50.406335	97.729080	590315	5584364	undefined		49				7.96
389		MWRB NE		30	15	2	W1	50.310402	97.717502	591321	5573711	undefined	18	23				7.35
390		MWRB NW		30	15	2	W1	50.310396	97.728813	590516	5573697	undefined	15	20				7.54
391		MWRB NE		9	15	2	W1	50.266196	97.671341	594696	5568854	undefined		21				7.93
392		MWRB NW		3	15	2	W1	50.251457	97.659597	595562	5567230	undefined		35				8.04
393		MWRB SE		16	15	2	W1	50.273701	97.671352	594680	5569688	undefined	5	26				7.75
394		MWRB NE		16	17	2	W1	50.457802	97.671642	594294	5590157	undefined	9	11				7.47
395		MWRB SE		18	17	2	W1	50.450557	97.717859	591027	5589294	undefined	12	37				7.59
396		MWRB SE		19	17	2	W1	50.465295	97.717897	590996	5590933	undefined	12	27				7.91
397		MWRB NW		18	17	2	W1	50.457785	97.729224	590207	5590084	undefined	13	25				7.81
398		MWRB SW		30	17	2	W1	50.480028	97.729286	590160	5592557	undefined		9				8.63
399		MWRB SE		30	17	2	W1	50.480034	97.717934	590965	5592572	undefined	7	15				7.60
400		MWRB SW		31	17	2	W1	50.494767	97.729327	590129	5594196	undefined	30	49				7.83
401		MWRB NW		32	17	2	W1	50.502011	97.706208	591755	5595030	undefined	15	36				7.63
402		MWRB SW		8	18	2	W1	50.524254	97.706260	591708	5597503	undefined	15	18				7.54
403		MWRB NW		7	18	2	W1	50.531478	97.729430	590052	5598278	undefined		30				7.40
404		MWRB NW		18	18	2	W1	50.546216	97.729472	590021	5599916	undefined		3				7.96
405		MWRB SE		19	18	2	W1	50.553726	97.718123	590810	5600765	undefined	18	26				7.64
406		MWRB SW		20	18	2	W1	50.553731	97.706328	591646	5600780	undefined	17	18				7.53
407		MWRB SW		15	18	2	W1	50.538999	97.659979	594959	5599201	undefined		30				7.38
408		MWRB NE		2	18	2	W1	50.516749	97.625442	597452	5596771	undefined		20				7.44
409		MWRB SW		12	15	1	W1	50.258950	97.475000	608705	5568316	undefined	31	44				7.20
410		MWRB NE		11	14	1	W1	50.177753	97.486672	608057	5559272	undefined	22	57				7.80
411		MWRB SW		33	13	1	W1	50.141046	97.543840	604055	5555109	undefined	8	32				7.50
412		MWRB NE		28	13	1	W1	50.133541	97.532559	604877	5554291	undefined	6	43				
413		MWRB SE		28	13	1	W1	50.126307	97.532548	604894	5553486	undefined	9	37				7.80
414		MWRB NW		19	12	1	W1	50.030347	97.589458	601027	5542739	undefined	12	55				7.40
415		MWRB NE		36	12	1	W1	50.059827	97.463680	609968	5546194	undefined	12	44				7.20
416		MWRB SE		33	16	1	W1	50.406352	97.532986	604249	5584622	undefined	7	18				7.23

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
385		940	47.0	40.0	160.0	17	160	140	376	0								
386		860	50.0	40.0	136.0	16	114	128	376	0								
387		966	53.0	48.0	163.0	12	230	138	322	0								
388		1046	53.0	24.0	208.0	15	250	164	332	0								
389		1597	92.0	102.0	178.0	21	300	154	750	0								
390		1050	51.0	104.0	56.0	9	104	26	700	0								
391		901	55.0	74.0	114.0	5	350	30	273	0								
392		968	68.0	74.0	122.0	10	430	22	242	0								
393		1661	90.0	134.0	205.0	16	490	114	612	0								
394	5.0	771	58.0	44.0	80.0	12	77	64	436	0								
395		661	48.0	28.0	67.0	11	68	50	389	0								
396		744	48.0	48.0	73.0	8	145	50	372	0								
397		701	48.0	43.0	72.0	10	110	46	372	0								
398	5.0	577	12.0	55.0	70.0	6	230	20	184	0								
399	6.0	655	55.0	47.0	39.0	8	72	20	414	0								
400		586	50.0	44.0	34.0	7	38	16	397	0								
401	5.0	575	42.0	46.0	19.0	6	26	7	429	0								
402	5.0	543	54.0	40.0	22.0	10	20	8	389	0								
403		653	61.0	53.0	15.0	8	90	8	418	0								
404	5.0	622	44.0	40.0	48.0	13	65	34	378	0								
405		582	70.0	50.0	15.0	8	23	8	408	0								
406		525	60.0	44.0	7.0	5	5	4	400	0								
407		561	60.0	58.0	7.0		21	3	412	0								
408		554	56.0	51.0	7.0		17	2	421	0								
409		898	34.0	60.0	116.0	10	220	69	389	0					0			6.7
410		582	48.0	68.0	10.0	7	38	27	384	0			2.05					0.92
411		741	54.0	82.0	9.0	3	15	10	568	0			0.02					0.95
412		743	44.0	100.0	8.0	3	21	7	560	32			0.12					0.53
413		1393	65.0	186.0	35.0	5	40	131	931	0			1.04					0.1
414		3817	200.0	146.0	840.0	37	889	1334	371	0			0.49					0.12
415		785	60.0	75.0	21.0	9	61	10	549	0			0.12					2.7
416	6.0	664	53.7	72.0	4.9	0	16	12	493	0		12.6	2		0	0	0.01	0.02

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
385																
386																
387																
388																
389																
390																
391																
392																
393																
394																
395																
396																
397																
398																
399																
400																
401																
402																
403																
404																
405																
406																
407																
408																
409																
410											0.08					
411											0.24					
412											0.38					
413											0.38					
414											0.47					
415											0.51					
416											0.18					
											0.26					
												0				

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
385										-2
386										0
387										0
388										-4
389										-4
390										-2
391										5
392										5
393										3
394										-1
395										-8
396										-4
397										-2
398										0
399										-2
400										0
401										-6
402										1
403										-4
404										-4
405										7
406										2
407										5
408										0
409										-4
410										5
411										0
412										5
413										1
414										-2
415										-1
416										0

-14.8 -116.3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM Easting	UTM Northing	Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
417		MWRB NW		5	21	1	W1	50.782481	97.568399	600925	5626395	undefined	8	31				7.04
418		MWRB SE		30	16	1	W1	50.391602	97.579124	601002	5582918	undefined	4	29				7.41
419		MWRB NW		6	17	1	W1	50.428307	97.590555	600112	5586984	undefined		18				7.38
420		MWRB SW		5	18	1	W1	50.509516	97.567643	601565	5596045	undefined	5	16				7.18
421		MWRB NE		16	16	1	W1	50.369369	97.532927	604334	5580510	undefined	12	32				7.32
422		MWRB SE		4	17	1	W1	50.421090	97.533009	604215	5586261	undefined	18	49				7.39
423		MWRB NE		4	16	1	W1	50.339891	97.532881	604402	5577233	undefined	6					7.44
424		MWRB SE		30	16	1	W1	50.391602	97.579124	601002	5582918	undefined	4					7.39
425		MWRB SE		28	16	1	W1	50.391613	97.532962	604283	5582983	undefined	6	20				7.48
426		MWRB SW		4	17	1	W1	50.421089	97.544344	603410	5586245	undefined	3	30				7.33
427		MWRB NE		33	16	1	W1	50.413585	97.532997	604232	5585426	undefined		18				7.56
428		MWRB SW		18	18	1	W1	50.538982	97.590864	599857	5599289	undefined		29				7.35
429		MWRB SE		15	18	1	W1	50.538998	97.510043	605584	5599403	undefined	3	20				7.46
430		MWRB SE		5	18	1	W1	50.509519	97.556287	602370	5596061	undefined	5	26				7.28
431		MWRB NE		12	17	1	W1	50.443046	97.463726	609086	5588801	undefined		24				7.55
432		MWRB SW		35	18	1	W1	50.583211	97.498291	606317	5604336	undefined		27				7.51
433		MWRB NW		21	18	1	W1	50.560970	97.544599	603087	5601797	undefined	4	26				7.56
434		MWRB SW		15	19	1	W1	50.627874	97.521618	604566	5609269	undefined	4	21				7.41
435		MWRB NE		33	17	1	W1	50.502017	97.533137	604028	5595259	undefined	6	31				7.46
436		MWRB NE		34	17	1	W1	50.502016	97.510002	605669	5595291	undefined		20				7.49
437		MWRB NW		3	13	2	E1	50.072500	97.245804	625530	5547947	undefined	12	73				7.70
438		MWRB NE		5	13	2	E1	50.072496	97.280366	623057	5547889	undefined	34	42				8.20
439		MWRB SE		9	13	2	E1	50.080005	97.257476	624675	5548761	undefined	17	41				8.00
440		MWRB SW		9	13	2	E1	50.080004	97.268718	623871	5548743	undefined	5	41				8.20
441		MWRB NE		4	13	2	E1	50.072500	97.257465	624695	5547927	undefined	29	40				8.00
442		MWRB NE		19	15	2	E1	50.293579	97.301782	620964	5572434	undefined	26	38				7.65
443		MWRB NW		30	13	2	E1	50.131441	97.314667	620454	5554386	undefined	0	21				8.20
444		MWRB NW		11	13	2	E1	50.087236	97.222915	627129	5549624	undefined	28	85				7.70
445		MWRB SW		11	13	2	E1	50.080002	97.222909	627148	5548819	undefined	26	55				7.60
446		MWRB NE		21	16	2	E1	50.382024	97.255907	624001	5582343	undefined	33	49				8.10
447		MWRB NW		7	14	1	E1	50.175660	97.452162	610526	5559090	undefined	63	91				7.45
448		MWRB SE		11	15	1	E1	50.256872	97.348126	617754	5568278	undefined	26	38				7.60

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
417	6.4	638	76.0	55.0	24.1	0	32	35	403	0	0	12.5	13.4	0	0	0.006	0	0
418		620	50.0	58.0	32.0	6	35	16	423	0	0							
419		1421	96.0	144.0	56.0	19	130	104	872	0	0							
420		699	68.0	65.0	16.0	10	26	38	476	0	0							
421	4.5	1114	92.0	115.0	45.0	22	160	86	594	0	0							
422	5.0	809	62.0	95.0	19.0	1	34	58	540	0	0							
423		763	70.0	75.0	19.0	5	41	8	545	0	0							
424	5.5	640	62.0	53.0	19.0	6	34	6	460	0	0							
425	5.0	768	60.0	70.0	19.0	7	48	8	556	0	0							
426	4.5	979	87.0	85.0	15.0	40	76	78	598	0	0							
427		624	48.0	69.0	15.0	2	8	4	478	0	0							
428		865	72.0	91.0	11.0	31	38	46	576	0	0							
429		545	82.0	47.0	8.0		5	17	386	0	0							
430		681	68.0	69.0	26.0		46	52	420	0	0							
431		620	48.0	53.0	43.0		150	5	321	0	0							
432		476	61.0	39.0	3.0		3	4	366	0	0							
433		587	52.0	72.0	6.0		21	21	415	0	0							
434		610	80.0	52.0	12.0		11	31	424	0	0							
435		506	32.0	64.0	4.0		20	8	378	0	0							
436		512	56.0	40.0	8.0		11	16	381	0	0							
437		871	74.0	61.0	60.0	15	74	68	519	0	0		0.2	0	0			0.68
438		716	64.0	66.0	24.0	4	35	12	511	0	0		1.15	0	0			0.46
439		806	71.0	64.0	42.0	10	58	33	528	0	0		0	0	0			0.59
440		803	68.0	67.0	41.0	12	56	33	526	0	0		0	0	0			0.6
441		822	71.0	59.0	44.0	13	57	38	540	0	0		0.07	0	0			0.33
442		555	38.0	49.0	10.0	12	26	11	409	0	0		0.98	0	0			6.1
443		600	82.0	43.0	13.0	6	46	44	366	19	0		0.03	0	0			
444		591	58.0	49.0	21.0	7	36	13	407	0	0		0.13	0	0			0.14
445		850	65.0	72.0	37.0	8	111	73	484	0	0		1.08	0	0			0.47
446		717	63.0	51.0	28.0	6	55	19	495	11	0		0.01	0	0			1.16
447		899	71.0	60.0	97.0		75	130	466	0	0		0.01	0	0			0.13
448		635	42.0	59.0	22.0	9	56	16	431	0	0		1.95	0	0			

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
417											0.12					
418																
419																
420																
421																
422																
423																
424																
425																
426																
427																
428																
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Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
417										6
418										4
419										-1
420										1
421										3
422										3
423										3
424										0
425										-3
426										-2
427										4
428										3
429										9
430										5
431										1
432										2
433										6
434										4
435										1
436										-4
437										-1
438										2
439										0
440										1
441										-2
442										-6
443										1
444										1
445										-6
446										-6
447										-1
448										-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
449		MWRB SW		36	13	1	E1	50.138952	97.337399	618811	5555185	undefined	45	61				7.08
450		MWRB SE		25	13	1	E1	50.124207	97.326142	619652	5553563	undefined	56	57				8.00
451		MWRB SW		3	21	2	E1	50.772727	97.242612	623917	5625805	undefined	35	36				7.50
452		MWRB NE		17	19	2	E1	50.632576	97.277394	621827	5610165	undefined	44	48				7.29
453		MWRB NW		2	18	2	E1	50.514669	97.221232	626113	5597149	undefined	28	31				7.11
454		MWRB NE		30	18	2	E1	50.573615	97.302496	620202	5603568	undefined	36	43				7.17
455		MWRB SE		30	16	7	E1	50.389518	96.610057	669889	5584452	undefined	6	16				6.94
456		MWRB NE		13	15	6	E1	50.278834	96.633172	668637	5572095	undefined	19	24				7.59
457		MWRB NW		33	15	6	E1	50.323068	96.713539	662761	5576833	undefined	11	20				6.90
458		MWRB SW		32	19	1	E1	50.669554	97.428287	611069	5614039	undefined	20	29				7.66
459		MWRB NE		26	21	1	E1	50.838904	97.347440	616361	5632993	undefined	16	25				7.55
460		MWRB NW		7	22	1	E1	50.883107	97.452084	608890	5637749	undefined	4	5				7.59
461		MWRB SW		19	22	2	E1	50.905349	97.312713	618637	5640437	undefined	7	16				8.50
462		MWRB		23	22	2	E1	50.908977	97.213769	625584	5641004	undefined	9	15				7.90
463		MWRB SE		10	15	2	E1	50.256877	97.232722	625980	5568467	undefined	10	18				8.45
464		MWRB SE		28	16	2	E1	50.389530	97.255919	623981	5583177	undefined	27	45				8.15
465		MWRB NE		18	13	2	E1	50.101968	97.303340	621338	5551128	undefined	5	24				7.75
466		MWRB NE		15	22	2	E1	50.897860	97.231345	624378	5639738	undefined	40	56				8.03
467		MWRB NE		32	18	2	E1	50.588361	97.279383	621801	5605245	undefined						8.20
468		MWRB NE		15	18	1	E1	50.544148	97.371428	615393	5600182	undefined						8.30
469		MWRB NW		10	15	2	E1	50.264112	97.244014	625156	5569253	undefined						8.30
470		MWRB NW		35	14	2	E1	50.234630	97.223037	626729	5566010	undefined						8.30
471		MWRB NW		21	14	2	E1	50.205154	97.268941	623532	5562656	undefined						8.30
472		MWRB NE		20	13	1	E1	50.116715	97.417828	613116	5552587	undefined						8.30
473		MWRB NW		20	15	1	E1	50.293584	97.428460	611942	5572236	undefined						8.40
474		MWRB SE		36	15	1	E1	50.315818	97.325144	619245	5574868	undefined						8.30
475		MWRB SE		16	16	2	E1	50.360052	97.255872	624061	5579900	undefined						8.50
476		MWRB SE		15	16	1	E1	50.360051	97.371227	615856	5579713	undefined						8.40
477		MWRB NE		16	17	2	E1	50.455718	97.256023	623801	5590536	undefined						8.30
478		MWRB SW		29	14	3	E1	50.212654	97.154549	631674	5563686	undefined	17	27				7.20
479		MWRB SW		17	14	3	E1	50.183175	97.154482	631760	5560409	undefined	6	18				7.50
480		MWRB SW		20	14	3	E1	50.197914	97.154516	631717	5562047	undefined	10	20				7.30

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
449		728	77.6	74.3	0.0	0	49	27	500	0	0		1.6		0			0.75
450		648	70.0	43.0	47.0	12	63	61	352	34			0.09		0			0.22
451	5.0	630	59.0	58.5	19.0	5.5	61	4	412	0		11.3	0		0	0	0	0.24
452	7.5	585	49.0	51.0	26.1	5.2	52	4	388	0		10.0	0		0	0.027	0	0.28
453	6.4	681	60.4	63.1	31.9	7.1	65	17	425	0		11.7	0		0.03	0.006	0	0.12
454	7.9	660	61.0	53.8	25.8	8.4	62	11	429	0		8.8	0.01		0	0	0	0.15
455	4.9	1094	89.0	117.0	36.8	0	160	33	642	0		16.6	3.8		0.24	0	0	0.46
456	7.0	335	53.0	19.4	6.5	0	25	2	217	0		11.8	0		0	0	0.14	0.98
457	5.9	850	99.0	78.3	11.6	0	68	9	566	0		17.6	0.12		0.1	0	0	0.04
458		600	54.4	57.3	9.0	3.8	20	4	451	0			0		0			0.02
459		529	50.0	50.0	0.0	3.1	15	0	411	0			0.14		0.02			0.05
460		1236	31.0	146.0	80.0		230	5	744	0								0
461		338	26.0	30.0	24.0		19	7	232	12			0					0.38
462		1430	98.0	143.0	92.0	0	504	27	566	0			0		0	0		0.34
463		650	75.0	64.0	15.0		40	14	442	19.2			1.7		0.			0.05
464		506	29.6	51.4	26.0	7.5	38	18	335	0			0		0			0.2
465		711	88.0	75.0	5.0	4.5	50	15	473	0			11.24		0			0
466		1251	109.0	110.0	100.0	9.5	455	12	455	0			0		0			0.1
467	5.6	519	39.7	52.9	9.0	3.5	35	3	367	0		8.6	0.05		0.01			0.06
468	8.9	915	63.4	81.1	61.0	7	294	6	391	0		11.0	0		0.02			2.2
469	7.0	686	54.4	66.1	26.0	5.1	50	20	453	0		11.0	5.62		0			0.03
470	6.1	734	48.3	60.8	58.0	7.5	70	56	424	0		9.8	0.02		0.03			0.1
471	10.6	632	36.8	73.9	12.0	4.2	28	3	463	0		11.0	4.27		0			0.02
472	6.7	681	53.6	76.1	11.0	6.9	30	7	482	0		14.0	8.76		0.01			0.03
473	7.2	729	52.0	67.9	33.0	8.3	80	13	463	12		12.0	0.02		0.03			3.03
474	7.2	593	56.9	59.0	5.5	4.9	16	11	430	0		10.0	6.52		0.01			0.03
475	8.3	689	54.8	90.4	9.3	7.6	43	33	441	22.8		10.0	11.69		0			0.03
476	6.1	716	59.7	82.1	21.3	7.3	149	8	378	4.2		11.0	1.44		0			0.3
477	10.0	595	46.1	55.1	18.0	5.3	29	13	419	0		9.4	0		0.01			0.76
478		925	74.0	59.0	95.0	9	81	115	492	0					0.1			0.1
479		844	43.2	59.2	91.0	11.3	62	89	488	0					0.05			0.02
480		884	76.0	60.0	72.0	10.7	70	105	490	0			0.09		0.02			0.05

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
449																
450																
451											0.45	0.15				
452											0.53	0.17				
453											0.43	0.22				
454											0.62	0.25				
455											0.32	0.19				
456											0.16	0.06				
457											0.27	0.09				
458																
459											0.38					
460																
461																
462											0					
463											0.24					
464																
465											0.26					
466																
467											0.43					
468											0.43					
469											0.26					
470											0.22					
471											0.23					
472											0.24					
473											0.28					
474											0.25					
475											0.31					
476											0.22					
477											0.42					
478											0.26					
479																
480											0.27					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
449										0
450										3
451					-14.0	-113.5				4
452					-14.4	-115.8				2
453					-14.7	-113.8				5
454					-14.3	-107.6				1
455										3
456										5
457										4
458										0
459										-3
460										0
461										5
462										0
463										7
464										2
465										8
466										5
467										0
468										0
469										2
470										1
471										2
472										5
473										1
474										2
475										9
476										7
477										-1
478										0
479										-2
480										-1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
481		MWRB		35	13	3	E1	50.142576	97.079960	637196	5556029	undefined						7.40
482		MWRB	NW	1	14	3	E1	50.160926	97.062660	638379	5558101	undefined						7.25
483		MWRB	SW	9	14	3	E1	50.168441	97.131502	633442	5558811	undefined	21	25				7.30
484		MWRB	SW	6	15	3	E1	50.242123	97.174538	630168	5566927	undefined	12	13				7.40
485		MWRB	NE	1	15	3	E1	50.249356	97.048349	639144	5567959	undefined	12	13				8.00
486		MWRB	NE	1	15	3	E1	50.249356	97.048349	639144	5567959	undefined	8	31				7.60
487		MWRB	NE	1	15	3	E1	50.249356	97.048349	639144	5567959	undefined	89	113				7.25
488		MWRB	NW	23	15	3	E1	50.293587	97.082653	636572	5572813	undefined	11	20				7.55
489		MWRB		26	13	3	E1	50.127836	97.079949	637239	5554391	undefined						8.00
490		MWRB	SE	7	18	3	E1	50.522166	97.163970	630152	5598081	undefined						8.20
491		MWRB	NE	15	15	3	E1	50.278850	97.094352	635781	5571154	undefined						8.20
492		MWRB	SE	21	17	3	E1	50.463223	97.117641	633602	5591610	undefined						8.30
493		MWRB	NW	6	16	3	E1	50.337791	97.174802	629888	5577563	undefined						8.20
494		MWRB	SE	18	16	3	E1	50.360041	97.163557	630627	5580056	undefined						8.20
495		MWRB	SW	13	16	3	E1	50.360040	97.059669	638016	5580244	undefined						8.40
496		MWRB	NW	16	22	4	E1	50.897860	96.987217	641545	5640178	undefined	22	23				8.00
497		MWRB	SW	7	22	4	E1	50.875874	97.033760	638337	5637645	undefined	33	35				7.70
498		MWRB	SW	6	17	4	E1	50.418990	97.036634	639482	5586841	undefined	12	83				7.09
499		MWRB	SW	6	17	4	E1	50.418990	97.036634	639482	5586841	undefined	83	108				7.18
500		MWRB	NW	18	22	4	E1	50.897844	97.033823	638268	5640088	undefined	39	40				8.02
501		MWRB	SW	19	23	4	E1	50.993773	97.029850	638262	5650761	undefined	5	6				7.25
502		MWRB	NE	20	19	4	E1	50.647315	96.998556	641502	5612299	undefined	40	61				7.85
503		MWRB	NE	20	19	4	E1	50.647315	96.998556	641502	5612299	undefined	32	33				7.80
504		MWRB	SW	16	20	4	E1	50.713774	96.986875	642126	5619710	undefined	42	45				7.80
505		MWRB	SW	30	13	4	E1	50.124207	97.039901	640112	5554062	undefined						8.15
506		MWRB	SW	23	14	4	E1	50.197918	96.948260	646437	5562432	undefined	42	44				7.90
507		MWRB	SW	23	14	4	E1	50.197918	96.948260	646437	5562432	undefined	67	85				8.05
508		MWRB	SW	21	14	4	E1	50.197920	96.994182	643160	5562343	undefined	13	31				7.75
509		MWRB	SE	13	14	4	E1	50.183165	96.914029	648926	5560860	undefined	17	26				8.00
510		MWRB	NE	14	14	4	E1	50.190409	96.936987	647265	5561620	undefined	17	32				7.25
511		MWRB	NW	14	14	4	E1	50.190412	96.948254	646460	5561598	undefined	11	13				7.95
512		MWRB	SE	10	15	4	E1	50.256877	96.955935	645709	5568972	undefined						

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
481		1376	135.0	130.0	60.0		210	150	691	0			80.2					
482		2089	171.0	118.0	282.0	9.6	545	480	483	0			0.04		0.04			0.64
483		903	74.0	63.0	84.0	4	73	89	516	0			0.05		0			2.4
484		778	48.0	60.0	56.0	9	76	36	493	0			1.06		0			6.6
485		937	47.0	80.0	57.0	7	102	50	594	0			0.4		0			32
486	6.0	923	61.8	79.3	68.3	0	105	35	561	0		13.0	0.03		0.05	0	0	0.23
487	6.7	1701	93.8	111.0	245.0	12.1	260	310	669	0			0		0.02	0	0	0.06
488		1316	98.0	120.0	90.0	10	310	77	611	0			0		0.02			0
489	5.6	1485	124.0	104.0	150.0	11	483	115	485	0		13.0	0.02		0.05			0.99
490	9.6	551	29.8	43.9	50.0	5.1	70	11	333	0		8.5	0.02					1.8
491	5.0	1557	121.0	120.0	160.0	12	498	216	419	0		11.0	0					1.1
492	5.0	639	43.5	51.4	46.0	6.6	94	26	361	0		10.0	0					0.52
493	6.1	650	51.4	59.0	24.0	6	36	17	446	0		11.0	0					2.43
494	5.0	639	45.4	58.8	29.0	8.5	44	10	432	0		11.0	0					0.15
495	6.7	527	29.2	45.4	36.0	7	47	25	327	4.4		10.0	0					3.53
496		528	77.0	29.0	8.0	3	32	9	370	0			0.49		0			3.7
497		655	45.0	60.0	37.5	4.7	0	86	410	0		11.4	0.5		0.02	0.005	0.01	3.7
498	6.0	803	84.7	70.5	18.0	0	45	12	561	0		12.0	0.16		0	0	0	0.2
499	6.8	875	71.6	68.0	29.0	5.5	45	14	630	0		12.0	0.02		0	0	0	0.69
500		793	54.0	81.0	48.0		180	25	405	0			0					
501	8.8	814	73.6	71.1	14.7	0	72	2	564	0		16.4	0.01		0.05	0	0.02	0.52
502		761	54.4	78.6	22.5		46	6	553	0			0				0	
503		828	60.0	83.0	27.5		85	5	551	0		16.0	0		0		0.5	
504		730	47.0	71.0	32.0	4	46	15	515	0					0		0.18	
505		1757	122.0	147.0	175.0	10	540	220	543	0			0				2.1	
506		1136	43.0	107.0	115.0		198	127	546	0								
507		1283	113.0	65.0	173.0		230	180	522	0								
508		1486	74.0	117.0	194.0		420	174	507	0			0		0		0	
509		1173	72.0	117.0	98.0		202	99	585	0			0		0		0.03	
510		1045	133.0	47.0	79.0		110	66	610	0			0		0			
511		936	56.0	100.0	48.0		116	65	551	0			0		0		0.01	
512		776	67.2	68.0	39.0		56	53	493	0			9.89		0		0.11	

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
481											0.24					
482											0.17					
483											0.09					
484											0.13					
485											0.26					
486											0.28					
487																
488																
489											0.2					
490											0.46					
491											0.18					
492											0.33					
493											0.35					
494											0.33					
495											0.32					
496											1.1					
497											4					
498											0.52		0.11			
499											0.45		0.28			
500											0.64					
501											0.44		0.18			
502																
503											0.44					
504																
505																
506																
507																
508																
509																
510																
511											0.36					
512											0.3					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
481										0
482										-3
483										1
484										-3
485										-7
486					-13.0	-96.0				1
487					-11.5	-96.0				-1
488										1
489										1
490										1
491										0
492										0
493										0
494										2
495										-1
496										-2
497										-1
498					-13.5	-96.0				2
499					-13.6	-109.0				-5
500										2
501										-3
502										0
503										0
504										-1
505										-1
506										-2
507										0
508										0
509										3
510										-1
511										-1
512										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM Easting	UTM Northing	Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
513		MWRB SW		3	15	4	E1	50.242139	96.967198	644951	5567312	undefined						7.36
514		MWRB NW		3	15	4	E1	50.249373	96.967208	644929	5568116	undefined	12	20				7.32
515		MWRB NW		27	17	4	E1	50.485196	96.967520	644190	5594334	undefined	22	26				
516		MWRB NW		4	21	4	E1	50.779959	96.986998	641918	5627069	undefined		42				7.90
517		MWRB NW		31	21	4	E1	50.853632	97.033697	638408	5635172	undefined	17	18				9.10
518		MWRB SW		24	15	4	E1	50.286345	96.921250	648090	5572317	undefined						8.30
519		MWRB SE		23	15	4	E1	50.286350	96.932963	647256	5572294	undefined						8.40
520		MWRB NE		36	15	4	E1	50.323052	96.909964	648780	5576420	undefined						8.70
521		MWRB NE		35	16	4	E1	50.411495	96.933039	646864	5586207	undefined						8.70
522		MWRB SE		21	18	4	E1	50.551654	96.979388	643147	5601700	undefined						8.60
523		MWRB NE		33	17	4	E1	50.499934	96.979306	643309	5595950	undefined						8.50
524		MWRB NE		3	17	4	E1	50.426240	96.956118	645179	5587801	undefined						8.60
525		MWRB SE		11	13	6	E1	50.079998	96.662175	667264	5549924	undefined	7	56				8.40
526		MWRB NE		23	14	6	E1	50.205148	96.662249	666823	5563837	undefined	15	45				7.70
527		MWRB NE		30	14	6	E1	50.219883	96.754143	660217	5565274	undefined	21	59				7.15
528		MWRB SE		13	12	5	E1	50.006290	96.776635	659320	5541480	undefined	19	25				8.10
529		MWRB SW		24	12	7	E1	50.021035	96.513118	678146	5543714	undefined	23	26				7.60
530		MWRB SE		1	13	5	E1	50.065249	96.776642	659124	5548034	undefined	17	31				7.35
531		MWRB NW		4	13	6	E1	50.072499	96.719211	663209	5548964	undefined	6	24				8.45
532		MWRB SE		29	13	6	E1	50.124221	96.730977	662193	5554689	undefined	5	27				7.50
533		MWRB NW		21	13	6	E1	50.116717	96.719290	663054	5553880	undefined	15	20				7.20
534		MWRB NW		21	13	6	E1	50.116717	96.719290	663054	5553880	undefined	16	22				7.60
535		MWRB SW		15	13	6	E1	50.094745	96.696340	664770	5551488	undefined	22	24				7.20
536		MWRB SE		11	13	6	E1	50.079998	96.662175	667264	5549924	undefined	16	24				7.30
537		MWRB NE		4	13	6	E1	50.072500	96.707972	664014	5548989	undefined	7	20				8.35
538		MWRB NE		35	15	6	E1	50.323062	96.656198	666842	5576960	undefined	14	27				8.25
539		MWRB SE		33	13	6	E1	50.138963	96.708075	663779	5556378	undefined						7.80
540		MWRB SW		34	13	6	E1	50.138963	96.696397	664614	5556403	undefined						7.80
541		MWRB SE		3	15	6	E1	50.242138	96.679132	665490	5567912	undefined						8.00
542		MWRB NE		7	15	6	E1	50.264101	96.748133	660497	5570203	undefined						7.90
543		MWRB NW		21	13	6	E1	50.116717	96.719290	663054	5553880	undefined	16	22				7.45
544		MWRB SW		22	12	5	E1	50.021046	96.833617	655189	5543001	undefined	51	72				7.95

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
513		992	76.8	97.5	33.0		40	24	721	0	0		0		0			0.22
514		1041	97.8	90.5	47.0		50	82	674	0			9.89		0			0.31
515		791	76.8	66.3	21.0	5	55	12	555	0			0		0.05			6.3
516		768	45.0	78.0	28.0	4	54	9	550	0			0.82		0.1			0.43
517		494	23.0	75.0	19.0		148	14	215	48			0					13.6
518	8.9	990	47.3	102.0	77.0	7.7	219	58	467	0		12.0	0		0.02			0.99
519	12.0	1021	52.6	104.0	89.0	8.4	231	68	456	11.4		12.0	0		0.02			0.86
520	5.6	617	19.3	76.0	29.0	5.6	71	16	388	10.4		12.0	0		0.01			0.36
521	5.6	482	13.0	64.5	19.0	4.3	39	12	317	14.3		13.0	0		0.04			1.03
522	6.1	674	41.4	67.7	36.0	5.8	73	13	424	15.5		13.0	0		0.03			0.72
523	5.6	619	40.5	57.3	20.0	4.3	55	10	419	0		13.0	0.13		0.01			0.13
524	5.0	532	54.0	44.0	15.0	4.4	55	10	337	13		13.0	0.58		0.03			0.03
525		1197	64.0	52.0	232.0	14	119	226	490	14			1.7		0			0.39
526		802	40.4	20.6	181.0	10.5	84	200	256	0		9.0	0		0	0	0	0.21
527	6.0	858	78.1	78.4	24.6	0	80	17	564	0		16.2	0		0	0	0	0.12
528		478	34.0	35.0	57.0	5	60	60	227	11			0.15		0			2.2
529		619	52.0	30.0	74.0	4	47	61	351	0			0.03					3.5
530		1269	93.3	143.0	76.5	6.3	260	48	642	0					0.05			0.02
531		624	66.0	52.0	42.0		58	34	372	30			0					
532		890	67.5	72.0	80.0	6.9	95	120	449	0			0.33		0.02			0.08
533		855	105.0	80.0	15.0	6.4	60	33	556	0			20.04		0			0.02
534		763	60.0	72.0	30.0	4	65	32	500	0			0.14					
535		677	85.0	60.0	10.0	3.7	55	12	451	0			2.2		0			0
536		945	62.0	93.0	24.0	3	76	25	656	0		5.6	1.11		0.6			0.22
537		558	67.0	50.0	19.0		82	23	317	24								
538		15								0		15.0	0.01		0.04			0.32
539	6.1	680	74.7	51.1	24.5	3.9	41	35	438	0		12.0	0.16		0			0.03
540		594	60.5	51.0	13.5	3.7	37	16	401	0		11.0	0.01		0			0.08
541	5.6	604	58.3	58.8	8.7	4.5	43	9	411	0		11.0	0.02		0			0.12
542	5.6	702	71.9	54.8	25.5	4.8	73	19	439	0		14.0	0.1		0			5.1
543		1009	78.7	85.9	91.0	8.4	135	100	510	0			0.34					1.38
544		368	41.2	26.5	6.0	2	10	4	268	0		10.4	0		0			0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
513											0.22					
514											0.3					
515																
516											0.33					
517											0.8					
518											0.43					
519											0.37					
520											0.4					
521											0.84					
522											0.51					
523											0.68					
524											0.92					
525											0.36					
526											0.28	0.45				
527											0.39	0.11				
528											0.32					
529											0.26					
530																
531																
532											0.33					
533											0.31					
534																
535											0.15					
536											0.44					
537																
538											9.7					
539											0.25					
540											0.34					
541											0.16					
542											0.1					
543																
544																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
513										0
514										0
515										-1
516										-2
517										8
518										2
519										4
520										2
521										4
522										3
523										-4
524										1
525										3
526										1
527					-14.0	-105.0				0
528										4
529										0
530										7
531										6
532										1
533										6
534										-1
535										5
536										-5
537										5
538					-14.1	-103.1				0
539										1
540										2
541										0
542										4
543										-2
544										

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
545		MWRB	SE	16	12	5	E1	50.006306	96.845243	654404	5541338	undefined	44	48				8.20
546		MWRB	SW	19	12	5	E1	50.021030	96.902246	650273	5542858	undefined	39	81				7.65
547		MWRB	SW	20	12	5	E1	50.021040	96.879370	651912	5542906	undefined	51	60				7.90
548		MWRB	NE	16	12	5	E1	50.013541	96.845254	654380	5542142	undefined	45	81				7.70
549		MWRB	NW	14	2	7	E1	49.129079	96.555873	678305	5444463	undefined	88	89				7.70
550		MWRB	NE	35	1	7	E1	49.084849	96.544824	679271	5439573	undefined	88	90				7.90
551		MWRB	SW	31	6	8	E1	49.519854	96.504627	680608	5488022	undefined	40	43				7.90
552		MWRB	NW	16	8	8	E1	49.659773	96.451741	683908	5503703	undefined	37	49				8.30
553		MWRB	NE	36	6	7	E1	49.527089	96.515699	679780	5488799	undefined	44	67				7.80
554		MWRB	SW	22	7	7	E1	49.578835	96.565304	676004	5494434	undefined	30	62				7.90
555		MWRB	SW	17	7	7	E1	49.564088	96.610610	672782	5492690	undefined	43	56				8.50
556		MWRB	SW	24	8	7	E1	49.667269	96.519997	678955	5504371	undefined	36	43				
557		MWRB	NE	27	8	7	E1	49.689254	96.554294	676401	5506734	undefined	31	37				7.80
558		MWRB	SE	14	9	7	E1	49.740976	96.531603	677848	5512537	undefined	36	43				8.20
559		MWRB	NW	31	10	7	E1	49.880864	96.634121	669972	5527850	undefined	17	43				7.80
560		MWRB	SW	33	10	7	E1	49.873645	96.588488	673276	5527152	undefined	22	30				8.12
561		MWRB	SE	6	10	7	E1	49.799934	96.622726	671076	5518879	undefined	13	23				7.92
562		MWRB	SE	35	8	7	E1	49.696755	96.531578	678012	5507622	undefined	31	37				7.65
563		MWRB	SE	4	11	7	E1	49.888387	96.570315	674528	5528833	undefined	22	28				7.05
564		MWRB	SE	14	11	6	E1	49.917860	96.662079	667835	5531900	undefined						7.60
565		MWRB	SW	33	11	6	E1	49.962086	96.719016	663598	5536690	undefined						7.90
566		MWRB	NW	31	11	6	E1	49.969305	96.764732	660295	5537394	undefined						7.90
567		MWRB	NE	27	11	6	E1	49.954580	96.684945	666067	5535931	undefined						7.90
568		MWRB	SW	2	11	6	E1	49.888383	96.673258	667134	5528598	undefined						8.10
569		MWRB	SE	14	11	6	E1	49.917860	96.662079	667835	5531900	undefined		37				7.50
570		MWRB	NW	15	11	6	E1	49.925101	96.696119	665367	5532629	undefined						7.60
571		MWRB	SE	32	10	6	E1	49.873643	96.736474	662643	5526820	undefined						7.59
572		MWRB		23	10	6	E1	49.847778	96.673633	667248	5524083	undefined						7.48
573		MWRB	SW	17	10	6	E1	49.829419	96.747569	661994	5521880	undefined						7.60
574		MWRB		31	10	6	E1	49.877250	96.764887	660590	5527160	undefined						7.70
575		MWRB	NE	20	10	6	E1	49.851397	96.736430	662721	5524347	undefined						7.82
576		MWRB	SE	6	7	6	E1	49.534601	96.758451	662189	5489083	undefined	33	37				8.40

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
545		384	48.0	21.0	14.0	3	23	4	271	7			0		0			
546		380	39.0	29.0	13.0	3	30	16	250	0					0			1.6
547		422	52.8	32.7	4.0	2.5	19	6	305	0			0		0			0.68
548		358	36.0	30.0	9.0	2	17	5	259	0			0.11		0			0.35
549		2687	513.0	108.0	129.0	7	1662	51	217	0			0.19		0.1			4.8
550		1741	165.0	84.0	237.0	7	964	69	215	0			0.11		0			5.6
551		408	40.0	22.0	27.0	3	6	19	291	0			0.02		0			1.1
552		404	58.0	24.0	9.0	3	7	10	293	11			0.14		0			2.8
553		574	62.0	30.0	40.0	3	2	17	420	0					0			3.3
554		475	38.0	24.0	44.0	3	7	28	331	0			0.02		0			3.36
555		428	56.0	32.0	7.0	3	10	3	317	11			0.1		0			0.6
556		464	67.0	31.0	0.0	2.7	11	2	350	0			0					
557		476	63.9	28.0	20.0		18	2	333	0		11.1						0.11
558		529	69.0	37.0	12.0	3	19	10	379	10			0.25		0			2
559		572	68.0	42.0	7.0	4	18	15	418	0			0.02		0			0
560		389	31.0	40.0	0.0	33	30	5	250	0								0.05
561		710	73.6	62.1	26.0	4	156	3	385	0			0					0.2
562		512	58.4	27.6	24.0	3	20	7	360	0		12.0						0.07
563		731	121.0	35.2	6.5	8.9	7	10	542	0			0.44		0.13			0.67
564		571	60.0	41.0	16.0	3	30	6	415	0			0.07		0			3.6
565		717	64.0	72.0	36.0		181	13	351	0			0					0.52
566		705	68.8	62.4	39.0		206	29	300	0			0					0.29
567		673	72.0	58.5	30.2		117	7	388	0			0					0.16
568		688	68.8	77.0	20.2		82	15	425	29			0		0			0.35
569		560	54.0	44.0	21.0	5	31	11	394	0			0.13		0			11.9
570		585	58.0	50.0	24.0		47	16	390	0			0		0			0.36
571		959	84.8	97.5	44.5		287	9	436	0			0		0			0.18
572		554	67.2	40.0	12.5		53	5	376	0			0		0			0.2
573		478	60.8	25.3	30.0		49	4	309	0			0		0			0.62
574		711	60.8	63.1	56.0		208	19	304	0					0			0.16
575		681	92.8	60.0	22.5		120	13	373	0					0			0.9
576		452	49.0	31.0	33.0	4	15	13	307	22			0.19		0			

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
545											0.3					
546																
547																
548																
549																
550												0.69				
551												0.84				
552												0.12				
553												0.15				
554												0.23				
555												0.15				
556												0.18				
557																
558											0.08					
559											0.09					
560																
561																
562																
563												0.18				
564											0.2					
565											0.54					
566											0.17					
567											0.36					
568											0.33					
569											0.2					
570											0.33					
571											0.3					
572											0.38					
573											0.45					
574											0.33					
575											0.35					
576											0.36					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O} \text{‰}$ SMOW	$\delta\text{D} \text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
545										-2
546										-2
547										0
548										0
549										1
550										0
551										-4
552										1
553										0
554										-4
555										3
556										0
557										4
558										1
559										-3
560										8
561										2
562										-2
563										1
564										-3
565										4
566										1
567										4
568										8
569										0
570										1
571										3
572										-1
573										2
574										4
575										8
576										7

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Casing Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
577		MWRB SW		30	6	6	E1	49.505113	96.775373	661062	5485769	undefined	40	44				
578		MWRB SW		12	12	6	E1	49.991555	96.650481	668410	5540118	undefined	21	24				7.60
579		MWRB NW		36	10	6	E1	49.880869	96.656443	668368	5527800	undefined	12	49				7.70
580		MWRB SW		12	9	6	E1	49.726231	96.656390	668909	5510610	undefined	22	31				7.70
581		MWRB SE		34	7	6	E1	49.608316	96.690582	666848	5497426	undefined	31	35				7.40
582		MWRB SE		27	7	6	E1	49.593575	96.690567	666900	5495787	undefined	29	30				7.60
583		MWRB NW		27	7	6	E1	49.600811	96.701705	666070	5496567	undefined	33	45				7.70
584		MWRB NE		27	7	6	E1	49.600810	96.690574	666874	5496591	undefined	27	28				7.80
585		MWRB NE		10	7	6	E1	49.556587	96.690528	667029	5491675	undefined	30	46				7.92
586		MWRB SE		35	6	6	E1	49.519864	96.673732	668370	5487631	undefined	41	73				7.55
587		MWRB NE		26	6	6	E1	49.512358	96.673728	668396	5486796	undefined						8.00
588		MWRB SW		20	5	6	E1	49.401934	96.752513	663059	5474348	undefined	62	77				7.90
589		MWRB SE		21	4	6	E1	49.313491	96.718708	665809	5464591	undefined	68	71				8.30
590		MWRB NW		33	6	5	E1	49.527104	96.865533	654466	5488024	undefined	27	31				7.50
591		MWRB NE		24	6	5	E1	49.497607	96.786481	660282	5484911	undefined	43	44				8.40
592		MWRB SE		20	6	5	E1	49.490385	96.876992	653752	5483919	undefined	35	37				7.40
593		MWRB SE		15	6	5	E1	49.475646	96.831721	657077	5482374	undefined	53	54				8.10
594		MWRB SW		8	6	5	E1	49.460899	96.888034	653044	5480619	undefined	69	99				7.75
595		MWRB NW		20	7	5	E1	49.586063	96.883404	652988	5494542	undefined	29	82				8.20
596		MWRB SE		22	8	5	E1	49.667279	96.827017	656803	5503687	undefined	23	49				7.80
597		MWRB SW		20	8	5	E1	49.667273	96.883583	652721	5503569	undefined	26	96				7.55
598		MWRB NW		32	9	5	E1	49.792432	96.883860	652309	5517482	undefined	20	29				7.20
599		MWRB SE		35	9	5	E1	49.785198	96.804375	658053	5516843	undefined	17	55				7.93
600		MWRB SE		22	9	5	E1	49.755722	96.827109	656511	5513518	undefined	20	32				7.55
601		MWRB SE		8	10	5	E1	49.814682	96.872729	653040	5519978	undefined	18	52				7.45
602		MWRB SW		10	10	5	E1	49.814685	96.838351	655513	5520050	undefined	22	28				7.20
603		MWRB NW		30	10	5	E1	49.866124	96.906827	650427	5525628	undefined	19	25				7.00
604		MWRB NE		33	10	5	E1	49.880881	96.850051	654460	5527384	undefined	17	32				7.80
605		MWRB NE		33	10	5	E1	49.880881	96.850051	654460	5527384	undefined						7.92
606		MWRB NW		34	10	5	E1	49.880881	96.838437	655294	5527408	undefined	13	38				8.10
607		MWRB NW		35	10	5	E1	49.880877	96.815626	656933	5527455	undefined	14	20				7.30
608		MWRB SW		3	11	5	E1	49.888387	96.833445	655629	5528253	undefined	12	21				7.50

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
577		534	62.0	34.0	23.0	3	6	7	399	16			0.14		0			6.3
578		606	60.0	55.0	20.0		95	10	366	0			0.27		0			0.02
579		718	60.0	48.0	82.0	7.4	80	31	410	0			0.01		0.05			2.1
580		583	50.0	40.0	45.0		55	15	378	0			0		0.03			2.2
581		526	48.0	34.0	49.0	5	23	25	342	0					0			1.02
582		415	36.0	22.0	34.0	4	11	10	298	0					0			0.65
583		753	72.0	46.0	69.0	8	63	73	422	0					0			2.6
584		627	48.0	40.0	62.0	5	51	39	382	0					0			2.1
585		411	48.8	26.1	19.0		30	9	278	0			0					0.18
586		468	73.6	13.6	22.0	5	14	8	332	0			0		0			1.73
587		506	52.0	31.0	18.0	4	1	15	385	0			0.21		0			1.32
588		538	62.0	35.0	20.0	3	2	4	412	0					0			1.5
589		455	47.2	35.4	36.0		10	9	317	36			0		0			0.32
590		530	48.0	30.0	45.0	6.6	0	17	383	0					0.03			0.7
591		531	66.0	33.0	18.0	3	9	7	395	11			0.13					2.05
592		564	53.0	38.0	28.0	4.2	0	6	435	0					0			1.79
593		610	71.0	37.0	23.0	3	7	7	462	0			0.1		0			0.87
594		553	58.0	27.0	37.0	6	6	10	409	11			0.03		0			0.63
595		801	31.0	18.0	175.0	9.9	38	195	334	0					0.09			8.58
596		777	43.0	26.0	149.0	12	106	139	302	10			0.21		0			
597		828	58.0	31.0	129.0	7	124	161	318	0			0.02		0			0.33
598		978	61.6	52.8	134.0	7.8	300	90	332	0			0.01		0.02			0.64
599		643	37.6	31.7	100.0	9	120	62	283	0					0			0.08
600		973	62.5	51.5	143.0	9.5	275	82	349	0			0.01		0.05			1.14
601		1278	113.0	85.0	140.0		540	66	334	0			0.01		0.03			0.45
602		2015	164.0	187.0	179.0		998	21	466	0			0.56					0.34
603		1728	147.0	151.0	127.0		767	49	487	0			0.02					0.07
604		2251	171.0	179.0	227.0	10	960	137	567	0			0.12		0			1.76
605		1798	96.0	125.0	350.0		680	252	295	0								11
606		1689	17.0	12.0	560.0	21	267	524	288	13			0.12		0			0.37
607		2097	207.0	183.0	79.0		935	6	687	0			0.34					1.16
608		1465	185.0	76.0	100.0		480	68	556	0			0.01		0.66			0.86

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
577											0.29					
578											0.21					
579											0.59					
580											0.38					
581											0.52					
582											0.44					
583											0.3					
584											0.52					
585											0.37					
586											0.4					
587											0.32					
588											0.27					
589											0.41					
590											0.47					
591											0.29					
592											0.36					
593											0.28					
594											0.52					
595											0.72					
596											0.62					
597											0.86					
598											0.56					
599																
600											0.85					
601											0.31					
602																
603																
604											0.48					
605																
606											3.1					
607																
608																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O} \text{‰}$ SMOW	$\delta\text{D} \text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
577										1
578										1
579										7
580										0
581										5
582										-2
583										1
584										1
585										0
586										-1
587										-6
588										0
589										9
590										2
591										0
592										-1
593										-2
594										-2
595										-4
596										0
597										-5
598										-3
599										1
600										0
601										0
602										4
603										0
604										0
605										7
606										3
607										-3
608										-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Casing Cond. $\mu\text{S/cm}$	pH
										Easting	Northing							
609		MWRB NE		3	12	5	E1	49.984060	96.822350	656116	5538912	undefined	39	50				7.98
610		MWRB SE		9	12	5	E1	49.991567	96.845220	654453	5539699	undefined	38	46				7.80
611		MWRB NE		16	11	4	E1	49.925101	96.982491	644813	5532036	undefined						7.95
612		MWRB NE		26	11	4	E1	49.954574	96.936847	647999	5535401	undefined						7.69
613		MWRB NW		26	11	4	E1	49.954578	96.948059	647195	5535380	undefined						7.78
614		MWRB NE		16	11	4	E1	49.925101	96.982491	644813	5532036	undefined						8.29
615		MWRB NE		15	11	4	E1	49.925100	96.959660	646452	5532080	undefined						7.88
616		MWRB		16	11	4	E1	49.921484	96.988088	644422	5531623	undefined	17	23				8.19
617		MWRB NW		35	11	4	E1	49.969318	96.948071	647149	5537018	undefined						7.75
618		MWRB NW		12	11	4	E1	49.910350	96.925199	648971	5530508	undefined						7.40
619		MWRB NE		15	11	4	E1	49.925100	96.959660	646452	5532080	undefined						7.45
620		MWRB SW		2	11	4	E1	49.888383	96.948005	647400	5528021	undefined						7.35
621		MWRB SW		33	11	4	E1	49.962086	96.993762	643894	5536126	undefined	30	37				7.55
622		MWRB NW		2	11	4	E1	49.895618	96.948011	647378	5528825	undefined						7.40
623		MWRB NE		35	11	4	E1	49.969314	96.936856	647953	5537040	undefined	25	31				7.80
624		MWRB NW		18	11	4	E1	49.925085	97.039359	640732	5531925	undefined	19	23				7.55
625		MWRB NW		14	10	4	E1	49.836657	96.951963	647273	5522263	undefined						7.25
626		MWRB SE		1	2	4	E1	49.092346	96.925674	651441	5439575	undefined						7.56
627		MWRB NE		25	4	4	E1	49.335452	96.921855	650977	5466606	undefined	101	117				
628		MWRB NE		31	4	4	E1	49.350199	97.034675	642739	5468026	undefined	87	113				7.90
629		MWRB NW		31	5	4	E1	49.438642	97.045982	641663	5477836	undefined	72	107				8.40
630		MWRB NE		32	5	4	E1	49.438655	97.012284	644106	5477901	undefined	70	112				7.90
631		MWRB SE		9	5	4	E1	49.372458	96.989581	645948	5470586	undefined	76	110				8.00
632		MWRB SW		21	5	4	E1	49.401940	97.000710	645053	5473842	undefined	61	64				8.20
633		MWRB SE		32	5	4	E1	49.431420	97.012269	644128	5477097	undefined	87	93				7.20
634		MWRB NE		33	6	4	E1	49.527105	96.989811	645473	5487777	undefined	33	37				7.95
635		MWRB SW		19	6	4	E1	49.490372	97.046119	641504	5483586	undefined	30	47				8.10
636		MWRB SE		9	7	4	E1	49.549353	96.985922	645688	5490258	undefined	35	52				7.70
637		MWRB SE		2	7	4	E1	49.534605	96.940603	649011	5488707	undefined	34	37				7.39
638		MWRB NW		30	7	4	E1	49.600794	97.042489	641448	5495868	undefined	26	37				8.30
639		MWRB SE		3	9	4	E1	49.711501	96.963436	646826	5508327	undefined	25	31				7.80
640		MWRB SW		8	10	4	E1	49.814679	97.020282	642425	5519687	undefined	22	27				7.55

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
609		453	47.2	37.4	13.8		4	17	334	0	0		0		0			0.06
610		592	56.0	49.0	17.0	4	36	3	427	0			0.03		0			6.8
611		577	57.0	41.0	43.0	0	48	73	315	0			0					0
612		405	59.2	31.2	3.2		19	4	288	0					0			0.02
613		397	48.0	36.0	4.0		19	4	286	0					0			0
614		463	51.0	44.0	19.0		50	28	271	19			0					1.7
615		467	34.0	43.0	16.0		24	26	324	0			0					1.8
616		365	37.6	38.1	21.0		40	34	194	12					0			0.04
617		414	53.6	30.5	7.0	2.5	24	4	283	0		9.6	0					0
618		843	100.0	66.0	30.0	7.6	125	16	498	0					0.09			2.8
619		455	50.0	34.0	10.0	3.5	37	8	312	0					0.02			7.3
620		1933	163.0	120.0	275.0	13.8	650	325	386	0					0.08			3.15
621		348	39.6	22.0	12.0	4	4	14	250	0		2.4	0					0.2
622		715	78.0	58.0	36.0	4.7	140	37	361	0					0			0.05
623	7.6	1335	151.0	120.0	66.0	4.4	690	9	295	0			0					0
624	7.6	813	70.0	60.0	80.0	6.2	145	120	332	0			0.4		0.02			0.19
625		1164	93.0	85.0	108.0	9.6	420	94	354	0					0.04			0.15
626		8747	691.0	200.0	1965.0	42.5	2350	3200	298	0								0.11
627		3538	541.0	72.0	452.0	28	1843	361	241	0			0.26		0			2.45
628		1719	64.0	26.0	439.0	24	374	426	366	0			0.14		0			0.46
629		1538	54.0	20.0	459.0	17	254	379	355	11			0.37		0			0.25
630		932	34.0	16.0	230.0	12	87	192	361	0			0.17		0			1.3
631		1223	43.0	20.0	325.0	17	104	279	435	0			0.07		0			0.35
632		792	34.0	14.0	179.0	11	91	119	344	11			0.15		0			0.21
633		2986	158.0	45.0	784.0		1085	693	221	0			0.17		0.8			2.6
634		530	27.4	22.7	76.6	9.5	2	36	356	0					0.03			1.81
635		982	21.0	10.0	260.0	12	42	277	360	11			0.09		0			0.17
636		511	28.6	26.7	62.3	8	2	32	351	0			0		0.02			1.33
637		543	53.0	35.0	40.0	5.4	0	10	400	0			0.24		0			2.87
638		1116	43.0	22.0	299.0	13	87	356	296	5			0.08		0			0.33
639		1132	93.0	71.0	132.0		413	60	363	0			0.13					0.85
640		1012	70.0	63.0	159.0	5	260	130	325	0			0.01		0.03			2.79

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
609											0.21					
610											0.49					
611											0.42					
612											0.17					
613											0.2					
614																
615																
616																
617											0.29					
618											0.43					
619											0.26					
620											0.36					
621																
622											0.28					
623																
624											0.32					
625											0.29					
626											1.15					
627											1.7					
628											1.9					
629											2.7					
630											1.9					
631											1.5					
632											1.9					
633											0.5					
634											0.75					
635											2.21					
636											0.63					
637											0.45					
638											1.2					
639																
640											0.37					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O} \text{‰}$ SMOW	$\delta\text{D} \text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
609										0
610										-1
611										-1
612										4
613										3
614										5
615										-5
616										9
617										3
618										3
619										-2
620										2
621										-2
622										2
623										2
624										1
625										-2
626										-2
627										1
628										-1
629										6
630										1
631										3
632										0
633										0
634										-1
635										-4
636										-1
637										4
638										2
639										0
640										4

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Formation	Casing		Well Depth (m)	Casing Length (m)	Cond. μ S/cm	pH
										Eastings	Northings	Top	Bottom						
641		MWRB	SE	8	10	4	E1	49.814682	97.009102	643229	5519709	22	23	undefined					7.70
642		MWRB	SW	23	10	4	E1	49.844162	96.951969	647250	5523097	20	26	undefined					8.10
643		MWRB	SW	20	10	4	E1	49.844159	97.020348	642334	5522965	21	27	undefined					7.40
644		MWRB	NW	34	10	4	E1	49.880881	96.974810	645497	5527134	32	108	undefined					
645		MWRB	NW	34	10	4	E1	49.880881	96.974810	645497	5527134	21	27	undefined					7.35
646		MWRB	NE	35	10	4	E1	49.880874	96.940804	647940	5527200	26	30	undefined					7.80
647		MWRB	NE	9	11	4	E1	49.910361	96.982469	644859	5530397	17	23	undefined					7.60
648		MWRB	SE	33	11	4	E1	49.962087	96.982548	644698	5536147	22	32	undefined					7.40
649		MWRB	SE	6	2	5	E1	49.092352	96.903476	653061	5439620	111	116	undefined					7.56
650		MWRB	SE	6	8	5	E1	49.623047	96.895039	652032	5498630	27	31	undefined					7.65
651		MWRB	SE	36	9	5	E1	49.785188	96.781610	659691	5516890			undefined					7.81
652		MWRB		22	10	5	E1	49.847783	96.832800	655806	5523741			undefined					7.52
653		MWRB	SW	5	11	5	E1	49.888380	96.879072	652351	5528159			undefined					7.95
654		MWRB	SW	9	11	5	E1	49.903126	96.856285	653941	5529844			undefined					7.90
655		MWRB	NW	20	11	5	E1	49.939835	96.879187	652181	5533879			undefined					7.92
656		MWRB	NE	28	11	5	E1	49.954581	96.845163	654575	5535588			undefined					7.85
657		MWRB	NE	35	11	5	E1	49.969314	96.799482	657804	5537321	25	31	undefined					7.55
658		MWRB	NE	13	10	4	E1	49.836643	96.917989	649716	5522329			undefined					7.99
659		MWRB	NW	26	10	4	E1	49.866137	96.951987	647182	5525540	23	29	undefined					7.40
660		MWRB	NW	21	10	4	E1	49.851399	96.997568	643950	5523813	21	26	undefined					7.00
661		MWRB	NW	34	10	4	E1	49.880881	96.974810	645497	5527134			undefined					7.50
662		MWRB	NW	32	10	4	E1	49.880874	97.020430	642220	5527046	18	121	undefined					7.85
663		MWRB	SW	14	10	4	E1	49.829422	96.951957	647296	5521458			undefined					7.35
664		MWRB	NW	34	10	4	E1	49.880881	96.974810	645497	5527134	53	108	undefined					7.93
665		MWRB	SW	22	10	4	E1	49.844166	96.974762	645611	5523053			undefined					7.45
666		MWRB	SW	22	10	4	E1	49.844166	96.974762	645611	5523053			undefined					7.45
667		MWRB	SW	11	10	4	E1	49.814682	96.951945	647341	5519820			undefined					7.80
668		MWRB	SE	12	10	4	E1	49.814669	96.917987	649784	5519886			undefined					7.85
669		MWRB	SW	23	10	4	E1	49.844162	96.951969	647250	5523097			undefined					8.10
670		MWRB	SW	3	10	4	E1	49.799945	96.974705	645748	5518137			undefined					7.90
671		MWRB	SE	32	10	4	E1	49.873643	97.009220	643047	5526264			undefined					
672		MWRB	SW	14	10	4	E1	49.829422	96.951957	647296	5521458			undefined					7.45

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/l	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
641		1159	88.0	85.0	129.0	8	362	98	389	0	0		0.06					0.73
642		1170	92.0	96.0	111.0	7	454	90	320	8			0.04					
643		1246	98.0	98.0	134.0		416	127	373	0			3.73					0.43
644		565	52.0	37.4	59.0	8.4	152	66	190	0			0					0.34
645		1421	112.0	119.0	114.0	6.5	600	71	398	0					0.04			17.8
646		1682	139.0	155.0	110.0	8	739	63	468	0			0		0.3			3.1
647		519	46.4	44.8	19.8	0	55	19	334	0			0.37		0			0.24
648		445	58.0	34.0	10.0	3	36	8	296	0					0			0.03
649		8747	691.0	200.0	1965.0	42.5	2350	3200	298	0			0.03		0			0.11
650		651	32.3	20.0	127.0		30	130	312	0								1.08
651	6.7	475	36.3	29.0	54.0	4.9	81	11	259	0			0					0
652		1491	171.0	131.0	62.0		589	12	526	0			0					0.62
653		1024	94.4	96.5	65.0		442	34	292	0			0		0			1
654		2086	164.0	229.0	139.0		903	74	577	0			0.01		0			0.47
655		471	59.2	40.0	8.5		35	4	324	0			0					0.44
656		428	35.2	34.1	33.5		56	17	252	0			0					0.2
657		1346	114.0	142.0	69.0	4	675	13	329	0			0					
658		1058	92.8	86.5	100.0		422	67	290	0			0					
659		1519	132.0	114.0	137.0	8.6	600	65	451	0		11.0						1.96
660		1304	104.0	86.0	155.0		450	121	383	0		4.6	0.09					0.26
661		1390	106.0	120.0	100.0	6.6	585	72	400	0			0		0.03			1.9
662	8.9	1202	83.0	93.0	150.0		389	186	293	0		8.0	0					0.01
663	8.1	1232	109.0	99.7	105.0	7.3	465	65	381	0			0.01		0.02			1.2
664		570	52.0	37.4	59.0	8.4	152	66	190	0		5.4	0					0.34
665		1106	82.2	88.3	114.0		370	105	346	0			0		0.04			0.78
666		1175	84.6	97.4	112.0		430	100	351	0			0		0.03			0.93
667		1390	131.0	96.0	112.0		520	160	371	0			0					0.18
668		1093	117.0	72.0	118.0		365	78	343	0			0		0			0.18
669	5.9	1154	88.0	97.0	104.0	8.5	426	73	346	0		11.1	0					0
670		1110	82.0	61.0	163.0		398	76	330	0			0		0			0.28
671		1132	102.0	86.5	115.0		403	142	283	14.8					0			0.33
672		1267	122.0	113.0	92.5	6.8	485	92	356	0			0.01		0.04			0.64

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
641											0.29					
642																
643																
644																
645											0.25					
646											0.16					
647											0.28					
648											0.16					
649											1.15					
650											0.81					
651																
652											0.27					
653											0.33					
654											0.47					
655																
656											0.49					
657																
658											0.27					
659																
660																
661											0.27					
662													0.4			
663											0.3					
664																
665											0.28					
666											0.29					
667											0.32					
668											0.34					
669																
670											0.63					
671											0.31					
672											0.28					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
641										2
642										1
643										1
644										2
645										-1
646										0
647										-2
648										3
649										-2
650										-3
651										3
652										2
653										2
654										4
655										4
656										2
657										2
658										2
659										1
660										0
661										-3
662										0
663										2
664										2
665										0
666										-1
667										-5
668										5
669										2
670										1
671										1
672										3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing							
673		MWRB SE		10	10	4	E1	49.814684	96.963545	646507	5519797	undefined						7.60
674		MWRB SE		32	5	4	E1	49.431420	97.012269	644128	5477097	undefined	85	93				7.20
675		MWRB SE		28	6	4	E1	49.505129	96.989779	645540	5485334	undefined						7.90
676		MWRB SE		32	5	4	E1	49.431420	97.012269	644128	5477097	undefined	71	78				7.90
677		MWRB NE		1	9	4	E1	49.718720	96.917976	650081	5509219	undefined						7.82
678		MWRB NE		30	9	4	E1	49.777687	97.031790	641705	5515553	undefined						7.70
679		MWRB NW		29	9	4	E1	49.777692	97.020200	642540	5515576	undefined						8.35
680		MWRB SE		4	9	4	E1	49.711502	96.986167	645187	5508283	undefined						7.91
681		MWRB SW		8	6	4	W1	49.462066	97.972426	574463	5479112	undefined	121	127				7.75
682		MWRB NW		35	3	3	W1	49.262923	97.768637	589592	5457195	undefined	109	115				7.58
683		MWRB SW		2	2	3	W1	49.092359	97.766299	590071	5438237	undefined	120	126				7.10
684		MWRB NE		16	7	3	W1	49.573190	97.804756	586417	5491645	undefined	65	91				7.60
685		MWRB NW		14	9	3	W1	49.750075	97.770650	588562	5511350	undefined	46	51				7.70
686		MWRB SE		36	7	3	W1	49.610161	97.736680	591270	5495836	undefined	48	54				7.40
687		MWRB NE		13	7	3	W1	49.573173	97.736676	591340	5491724	undefined	47	70				8.10
688		MWRB SW		24	11	3	W1	49.934679	97.749994	589707	5531898	undefined	14	15				
689		MWRB SE		2	11	3	W1	49.890463	97.761610	588955	5526968	undefined	26	59				7.30
690		MWRB SE		2	11	3	W1	49.890463	97.761610	588955	5526968	undefined	24	98				7.60
691		MWRB SE		2	11	3	W1	49.890463	97.761610	588955	5526968	undefined	25	105				7.95
692		MWRB SE		36	11	3	W1	49.964153	97.738777	590457	5535189	undefined	16	17				7.90
693		MWRB NE		19	11	2	W1	49.941914	97.715559	592165	5532744	undefined	24	25				7.95
694		MWRB NW		13	7	2	W1	49.573179	97.611299	600404	5491884	undefined	35	137				7.35
695		MWRB NE		16	7	2	W1	49.573190	97.668229	596288	5491811	undefined	43	104				7.30
696		MWRB SE		19	11	2	W1	49.934679	97.715541	592180	5531940	undefined	22	26				7.30
697		MWRB SW		19	11	2	W1	49.934674	97.726764	591374	5531926	undefined	13	15				7.57
698		MWRB NE		19	11	2	W1	49.941914	97.715559	592165	5532744	undefined	14	17				7.50
699		MWRB SW		19	11	2	W1	49.934674	97.726764	591374	5531926	undefined	14	16				7.80
700		MWRB SE		32	1	1	W1	49.077617	97.553441	605642	5436873	undefined	53	56				7.05
701		MWRB SE		1	6	1	W1	49.447315	97.463698	611361	5478099	undefined	34	40				7.70
702		MWRB		17	9	1	W1	49.746457	97.560329	603720	5511217	undefined	28	81				7.20
703		MWRB NW		1	8	1	W1	49.632142	97.474782	610141	5498630	undefined	48	54				7.68
704		MWRB NW		2	12	1	W1	49.986141	97.497791	607691	5537952	undefined	20	30				8.20

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
673		1191	115.0	85.0	110.0		446	72	363	0	0		0		0			0.1
674		2994	158.0	45.0	784.0		1085	693	221	0	0	8.0	0		0.8			2.6
675		603	20.3	17.3	126.0	7.3	3	73	356	0	0		0		0			0.57
676		696	35.0	20.0	140.0	13	60	91	337	0	0		0.01		0			0.38
677		912	85.0	58.0	95.0		306	39	329	0	0							
678		770	37.0	44.0	125.0		186	120	258	0	0							0.6
679		890	61.0	40.0	163.0		192	156	278	0	0				0			0.5
680		1802	125.0	110.0	290.0		296	430	551	0	0		5.61		0			0.5
681		14711	680.0	252.0	4280.0	40	3800	5400	259	0	0							0
682		20680	1131.0	275.0	6400.0	120	2850	9700	204	0	0				0.05			0.43
683	8.9	23091	866.0	404.0	7240.0	125	1324	12950	182	0	0		0.05		0			0.1
684		10214	787.5	200.0	2500.0	63	2590	3900	173	0	0				0.16			1.55
685		9774	608.0	194.0	2500.0		2400	3920	152	0	0							3.4
686	5.6	9614	632.0	40.0	2520.0	26	2110	4150	136	0	0		2		0			1.75
687		11149	650.0	260.0	3000.0	61	2200	4800	178	0	0		0.2		0.14			0.64
688		1066	89.0	59.0	160.0		199	248	311	0	0							
689		6092	410.0	172.0	1390.0	35.5	1650	2300	134	0	0		0.01		0.03			1.05
690		5589	393.0	141.0	1190.0	42.5	1480	2200	142	0	0		0.01		0.05			7.68
691		7159	363.0	225.0	1700.0	64	2120	2530	157	0	0		0		0.05			0.19
692	6.7	5129	360.0	206.0	1100.0	32	1359	1806	266	0	0		0.5		0			0.8
693		1100	86.1	74.7	124.0	9.3	250	180	376	0	0		0		0.02			0.62
694		10767	550.0	233.0	3200.0	70	1280	5300	134	0	0		0.36		0.06			0.54
695		11845	600.0	92.0	3500.0	94	1670	5750	139	0	0		0.01		0.09			2
696		3213	245.0	153.0	610.0	18.5	890	1020	276	0	0		0		0.04			5.8
697		813	80.0	57.2	64.5		158	73	380	0	0		0		0			0.08
698		4183	315.0	229.0	780.0		1303	1340	216	0	0		0.01		0.2			1.95
699		704	82.0	53.0	30.0		89	49	401	0	0		0.01					0.06
700		79875	2160.0	764.0	27500.0	706	3050	45500	195	0	0		0					2.34
701		9570	536.0	330.0	2560.0	150	860	5000	134	0	0		5.96		0.85			0
702		7721	600.0	220.0	2000.0	50	1700	3000	151	0	0		0.02		0.2			6.2
703	5.6	10936	704.0	228.0	3200.0	26	1170	5450	158	0	0		5.96		0.35			0.77
704		898	69.0	89.0	45.0	0	199	28	468	0	0		0					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
673											0.85					
674											0.5					7
675											0.94					
676											1.3					
677											0.47					
678											0.44					
679											0.59					
680											0.94					
681																
682											1.61					
683																
684											0.38					
685											1.29					
686																
687											0.54					
688																
689											1.13					
690											1.4					
691											0.88					
692											0.34					
693											0.5					
694											0.47					
695											0.68					
696											0.51					
697											0.39					
698											0.3					
699																
700																
701											0.3					
702											0.84					
703																
704																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
673										1
674										0
675										1
676										2
677										1
678										-3
679										2
680										1
681										1
682										4
683										0
684										0
685										-2
686										-6
687										1
688										0
689										-3
690										-6
691										-3
692										0
693										-1
694										3
695										-2
696										0
697										0
698										0
699										0
700										1
701										2
702										5
703										4
704										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	UTM			Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
								Longitude	Easting	Northing	Top	Bottom				
705		MWRB NE		5	4	1	W1	97.553984	605178	5459110	116	122				7.33
706		MWRB SW		8	12	1	E1	97.428796	612625	5538656	14	36				7.60
707		MWRB SE		9	8	1	E1	97.395174	615876	5499378	20	22				7.66
708		MWRB NE		6	12	1	E1	97.440419	611809	5537804	8	12				7.80
709		MWRB SE		21	11	1	E1	97.394623	615215	5532154	7	104				7.60
710		MWRB SE		21	11	1	E1	97.394623	615215	5532154	7	29				7.60
711		MWRB SE		1	9	1	E1	97.327094	620609	5507677		18				7.00
712		MWRB SE		14	9	1	E1	97.349842	618897	5510920	12	33				7.20
713		MWRB NW		19	8	1	E1	97.451804	611703	5503373	21	23				7.60
714		MWRB NW		8	6	1	E1	97.429619	613783	5480464	33	37				6.70
715		MWRB SE		2	4	1	E1	97.350551	619995	5458479	91	98				7.22
716		MWRB NW		30	11	2	E1	97.314185	620932	5534722	9	17				7.50
717		MWRB SW		34	8	2	E1	97.247320	626399	5506172	24	35				7.65
718		MWRB SE		30	9	2	E1	97.304519	622089	5514270	30	45				7.50
719		MWRB SW		11	9	3	E1	97.088247	637787	5509729	18	47				7.35
720		MWRB SE		32	9	2	E1	97.281790	623688	5515946	30	52				6.93
721		MWRB SE		35	8	2	E1	97.213443	628842	5506229	15	27				7.60
722		MWRB SE		30	9	2	E1	97.304519	622089	5514270						7.40
723		MWRB SE		29	11	2	E1	97.280113	623395	5533975	30	45				7.30
724		MWRB NE		36	3	3	E1	97.057239	641353	5458150	114	120				7.50
725		MWRB SW		6	4	3	E1	97.180930	632334	5458761	127	136				7.40
726		MWRB SE		1	5	3	E1	97.057250	641078	5468817	86	120				8.00
727		MWRB SW		18	5	3	E1	97.181239	631996	5471870	87	98				7.90
728		MWRB NE		31	5	3	E1	97.170280	632652	5477610	83	91				8.00
729		MWRB SE		1	6	3	E1	97.057260	640824	5478649	73	98				7.90
730		MWRB SW		12	6	3	E1	97.068360	639977	5480268	69	92				8.10
731		MWRB NE		19	6	3	E1	97.170423	632483	5484165	33	64				7.50
732		MWRB SE		30	6	3	E1	97.170441	632461	5484999	28	34				7.60
733		MWRB NE		24	6	3	E1	97.057265	640676	5484370	30	73				8.30
734		MWRB SW		34	6	3	E1	97.113664	636530	5486741	25	26				8.20
735		MWRB SE		31	6	3	E1	97.170476	632419	5486638	28	31				8.00
736		MWRB NW		33	6	3	E1	97.136318	634871	5487504	24	26				8.00

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
705	7.8	4544	1852.0	450.0	15000.0	300	2700	25000	142	0	0				0	0		0.57
706		963	81.0	84.8	45.8	8.8	155	32	556	0			0.6		0			0.24
707		8362	648.0	310.0	1940.0	8	1000	4300	156	0			0					1.8
708		927	70.0	85.0	48.0	11	163	36	514	0			0.18		0			0.2
709		1652	102.0	71.0	338.0	20	247	424	450	0			0.05		0			0.15
710		920	77.0	78.0	49.0	9	122	65	520	0			0.09		0			0.24
711		5367	412.0	172.0	1200.0	31	860	2475	217	0			0					4
712		6386	640.0	301.0	1150.0		1540	2450	305	0			0					
713		6236	456.0	344.0	1296.0	38	902	3041	159	0			0.05		0			0.7
714		17437	666.0	287.0	5200.0	150	1642	9388	104	0			0.04					28
715	5.6	17670	634.0	238.0	6000.0	128	594	9900	176	0					0			0.25
716	6.5	1210	110.0	106.0	81.0	11	300	60	542	0			1.8					
717		9010	404.0	181.0	2600.0		1770	3900	155	0								2.36
718		3582	218.0	98.0	930.0	36	500	1700	100	0								
719		5353	326.0	206.0	1300.0		965	2375	181	0								0.9
720		5390	304.0	131.0	1500.0		616	2700	139	0			0		0		0	0.5
721		8148	388.0	178.0	2300.0		1900	3250	132	0								8.5
722	6.7	3474	193.0	84.0	950.0	40	580	1450	177	0					0.03			0.67
723	6.2	1196	83.0	59.0	190.0		205	191	467	0		1.0						3
724	8.9	6748	550.0	166.0	1520.0	48	2013	2277	174	0			0.01		1.6			
725	13.9	14207	291.0	103.0	4743.0	128	2020	6733	189	0			0.02		4.5			15
726		1430	54.0	25.0	359.0	19	279	388	306	10			0.08		0			0.86
727		5904	188.0	83.0	1795.0	60	706	2768	304	0			0.05					6
728		4943	138.0	66.0	1479.0	52	581	2321	306	5			0.05					3.1
729		1380	35.0	17.0	400.0	18	170	390	350	0			0		0			0.22
730		1315	30.0	12.0	380.0	16	95	440	342	0			0.13		0			0.17
731		2566	80.0	34.0	762.0	33	292	1025	340	0			0		0			1.73
732		2669	80.0	32.0	790.0	33	300	1100	334	0			0		0			0.48
733		1078	26.0	10.0	310.0	17	72	312	331	5			0.02		0			0.9
734		1892	43.0	15.0	600.0	20	188	697	329	16			0.09		0			0.5
735		4194	122.0	46.0	1320.0	43	409	1921	333	0			0.02		0			1.35
736		2892	80.0	30.0	869.0	31	291	1252	339	0			0.08		0			1.07

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
705											1.35					
706											0.33					
707																
708												0.13				
709																
710																
711																
712																
713											0.2					
714																
715											2.1					
716											0.28					
717																
718																
719																
720											1.1		0			
721																
722											1.1					
723																
724																
725																
726											1.2					
727																
728																
729																
730											2.1					
731											2.3					
732											1.85					
733											1.9					
734											2.3					
735											2.2					
736											2					
											2.3					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
705										2
706										0
707										-1
708										0
709										3
710										-1
711										-2
712										0
713										1
714										-2
715										3
716					-22.1	-165.0				3
717										0
718					-22.1	-165.0				0
719										0
720					9.0					0
721										0
722										3
723										0
724										0
725										0
726										-2
727										-1
728										-3
729										2
730										-1
731										0
732										-1
733										1
734										2
735										0
736										-2

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date	Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
											Eastng	Northing		Top	Bottom				
737			MWRB SW		18	6	3	E1	49.475631	97.181472	631741	5481702	undefined	65	68				7.60
738			MWRB NE		4	7	3	E1	49.541847	97.122284	635846	5489168	undefined	23	25				7.95
739			MWRB NE		19	6	3	E1	49.497612	97.170423	632483	5484165	undefined	33	64				7.50
740			MWRB NW		33	5	3	E1	49.438657	97.136166	635125	5477672	undefined	85	91				7.50
741			MWRB NW		27	24	12	W1	51.104183	99.067395	495281	5661194	undefined	49	71				7.55
742			MWRB NE		28	26	8	W1	51.281025	98.517620	533645	5680969	undefined	58	104				7.40
743			MWRB NE		28	26	8	W1	51.281025	98.517620	533645	5680969	undefined	114	145				7.50
744			MWRB NW		28	46	12	W1	52.999518	99.144322	490314	5872009	undefined	14	74				8.00
745			MWRB NW		28	46	12	W1	52.999518	99.144322	490314	5872009	undefined	107	134				7.90
746			MWRB SE		14	14	3	W1	50.185258	97.761784	588400	5559744	undefined	39	98				7.85
747			MWRB SE		14	14	3	W1	50.185258	97.761784	588400	5559744	undefined	98	141				7.78
748			MWRB SE		14	14	3	W1	50.185258	97.761784	588400	5559744	undefined	152	173				7.87
749			MWRB NE		9	16	1	W1	50.354630	97.532904	604368	5578872	undefined	7	51				7.15
750			MWRB NE		9	16	1	W1	50.354630	97.532904	604368	5578872	undefined	51	96				7.29
751			MWRB NE		9	16	1	W1	50.354630	97.532904	604368	5578872	undefined	101	113				7.18
752			MWRB NW		6	8	3	E1	49.630276	97.178940	631509	5498898	undefined	22	84				7.30
753			MWRB NW		6	8	3	E1	49.630276	97.178940	631509	5498898	undefined	96	121				7.55
754			MWRB SE		25	12	2	W1	50.037853	97.601219	600169	5543558	undefined	56	84				7.35
755			MWRB SE		25	12	2	W1	50.037853	97.601219	600169	5543558	undefined	96	106				7.30
756			MWRB SW		19	24	2	E1	51.082196	97.311098	618300	5660104	undefined	3	63				7.40
757			MWRB		29	8	1	E1	49.685633	97.423540	613717	5504653	undefined						7.30
758			MWRB		24	9	1	E1	49.759327	97.332683	620088	5512987	undefined						7.40
759			MWRB NW		9	8	1	E1	49.645032	97.406326	615054	5500166	undefined						7.40
760			MWRB		3	10	2	E1	49.803562	97.241868	626514	5518054	undefined						7.40
761			MWRB		32	9	2	E1	49.788817	97.287384	623276	5516339	undefined						7.40
762			MWRB NW		25	9	1	E1	49.777687	97.338273	619641	5515019	undefined						7.00
763			MWRB		11	9	2	E1	49.729855	97.219042	628351	5509899	undefined						7.30
764			MWRB SE		12	12	1	E1	49.991550	97.326126	619984	5538815	undefined						8.00
765			MWRB S		26	12	1	E1	50.035781	97.354630	617832	5543687	undefined						7.60
766			MWRB SW		5	13	1	W1	50.067342	97.566634	602583	5546883	undefined		15				8.20
767			MWRB NE		22	12	2	E1	50.028279	97.234517	626454	5543049	undefined						7.50
768			MWRB E		31	12	3	E1	50.054132	97.165847	631301	5546042	undefined						8.00

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
737	7.2	3287	282.0	58.0	739.0		1085	850	273	0	0		0.09		0.7			
738		1225	36.0	17.0	350.0		144	370	308	0	0		0		0			0.34
739		2566	80.0	34.0	762.0	33	292	1025	340	0	0		0.01		0			1.73
740		3206	95.0	37.0	1000.0		395	1315	364	0	0		0		0.02			1.71
741		2152	89.2	42.2	624.0	33.5	385	670	298	0	0	10.0	0		0	0	0	0.06
742	6.0	605	69.3	51.7	20.3	0	50	12	393	0	0	8.6	0		0	0	0	0.04
743	5.8	699	66.9	44.0	63.8	13.9	135	33	334	0	0	8.0	0		0	0	0	0.26
744	4.7	589	55.5	42.7	61.1	0	33	80	307	0	0	9.6	0.01		0			0
745	4.9	771	56.3	43.6	119.0	0	63	180	300	0	0	8.6	0		0			0
746	6.7	972	46.8	34.5	184.0	12.6	380	122	181	0	0	11.0	0		0	0	0	0.02
747	7.0	1210	44.8	20.7	303.0	23	395	200	217	0	0	6.2	0		0	0	0	0.26
748		1563	54.0	26.5	434.0	24	450	360	207	0	0	7.2	0		0.02	0	0	0.6
749	6.0	743	69.5	59.9	29.0	7	65	42	459	0	0	12.0	0		0	0.021	0.01	0.15
750	6.8	744	66.0	48.0	60.0	10.5	60	42	449	0	0	8.2	0		0.02	0	0	0.08
751	6.2	717	64.0	50.0	40.0	8.5	58	40	447	0	0	9.0	0		0.02	0	0	0.61
752		10322	312.0	120.0	3380.0	50	1180	5100	172	0	0	8.2	0.02		0.03	0	0	0.93
753		10479	378.0	135.0	3350.0	55	1370	5000	183	0	0	8.0	0.11		0.04	0	0	1.31
754		5135	225.0	105.0	1355.0	35	1240	1900	266	0	0	8.6	0		0	0	0	0.77
755		2346	113.0	64.8	600.0	23	465	670	403	0	0	6.8	0		0	0	0	0.91
756	7.8	629	59.8	63.2	1.7	0	16	0	481	0	0	7.1	1.1		0			0
757	7.6	5788	554.0	260.0	1166.0		838	2735	235	0	0		2.2					3.92
758	5.2	6213	559.0	371.0	1030.0		1716	2177	360	0	0		0.47					17.4
759		8395	634.0	264.0	2054.0		1050	4152	241	0	0		0.04					40
760	6.9	4997	339.0	191.0	1124.0		1299	1784	260	0	0		0.02					2.3
761		5569	288.0	130.0	1552.0		953	2491	155	0	0		0.02					2.4
762		6700	567.0	278.0	1374.0		1611	2579	291	0	0		0.01					7
763	7.5	5258	346.0	164.0	1307.0		974	2276	191	0	0		0.05					2.6
764		1206	102.0	87.0	94.0	11	191	170	551	0	0		1.17					5.8
765	7.0	897	83.0	86.0	18.0	7	126	16	561	0	0		0.41					0.01
766	6.0	768	77.0	80.0	10.0	5	30	10	556	0	0		2.4					0.04
767		1206	81.0	65.0	175.0	14	187	252	432	0	0		0.04					1.8
768		866	62.0	61.0	85.0	3	67	138	450	0	0		0.03					3.09

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
737											1.7					
738											1.85					
739											1.75					
740												1.03				
741													1.4			
742											0.71	0.25				
743											1.33					
744											0.37	0.16				
745											0.4	0.06				
746											1.09	0.61				
747											1.6	1.1				
748											2	1.3				
749											0.37	0.22				
750											0.61	0.26				
751											0.54	0.28				
752											0.96	1.9				
753											1	2.2				
754											0.12	1.5				
755											1.1	1.2				
756											0.19	0				
757																
758																
759																
760																
761																
762																
763																
764																
765																
766																
767																
768																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
737										0
738										0
739										0
740										0
741					-17.6	-127.0				6
742					-15.5	-119.0				5
743					-15.6	-116.0				5
744					-13.7	-112.6				6
745					-13.9	-113.7				1
746					-15.6	-122.3				-3
747					-16.1	-133.0				1
748					-17.2	-132.4				3
749					-13.5	-111.5				-1
750					-13.8	-112.8				2
751					-13.6	-113.1				-2
752					-18.7	-142.1				1
753										1
754					-19.1	-144.6				-2
755					-16.5	-127.1				3
756					-15.5	-122.0				0
757					-21.1					1
758					-17.8	-162.0				0
759					-21.2	-162.0				0
760					-19.1					0
761					-21.7					0
762					-19.8					0
763					-21.0					0
764					-13.5					-3
765					-13.6					0
766					-13.2					5
767					-15.1					-2
768					-14.5					-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM Easting	UTM Northing	Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
769		MWRB	NW	17	12	3	E1	50.013534	97.154099	632254	5541549	undefined						8.00
770		MWRB	N	4	13	1	E1	50.072499	97.400458	614463	5547698	undefined						8.00
771		MWRB	NW	23	13	1	E1	50.116715	97.360313	617228	5552676	undefined						7.30
772		MWRB	S	32	13	2	E1	50.138959	97.286128	622475	5555268	undefined						7.70
773		MWRB	NE	28	13	2	E1	50.131458	97.257556	624536	5554482	undefined						7.80
774		MWRB	NW	2	9	5	E1	49.718733	96.815494	657468	5509431	undefined						7.70
775		MWRB		9	15	5	W1	50.262578	98.092693	564671	5568001	undefined	35	38				7.60
776		MWRB	NE	11	15	5	W1	50.266189	98.040999	568350	5568449	undefined	24	50				7.40
777		MWRB		11	15	5	W1	50.262574	98.046647	567953	5568041	undefined	37	51				
778		MWRB	SE	12	18	5	W1	50.524244	98.018005	569610	5597163	undefined	11	27				7.90
779		MWRB	NW	8	19	5	W1	50.620363	98.126702	561779	5607754	undefined	15	61				7.85
780		MWRB		1	20	5	W1	50.690429	98.028200	568645	5615632	undefined	24	43				7.70
781		MWRB	SW	12	20	5	W1	50.701553	98.033907	568226	5616864	undefined	20	44				8.05
782		MWRB	SW	12	20	5	W1	50.701553	98.033907	568226	5616864	undefined	67	69				8.00
783		MWRB	NE	36	21	5	W1	50.856159	98.022517	568803	5634066	undefined	15	18				9.10
784		MWRB	NW	31	21	5	W1	50.856159	98.150578	559789	5633955	undefined	7	8				7.40
785		MWRB	SW	21	12	7	W1	50.023129	98.368925	545207	5541174	undefined	43	46				8.10
786		MWRB	SW	22	13	7	W1	50.111568	98.346136	546753	5551021	undefined	36	40				10.21
787		MWRB	NW	36	21	7	W1	50.856165	98.313304	548335	5633836	undefined	7	9				8.80
788		MWRB	NE	36	21	7	W1	50.856159	98.301858	549141	5633843	undefined	11	17				7.55
789		MWRB	SW	6	19	9	W1	50.598381	98.708528	520629	5604987	undefined	39	42				7.65
790		MWRB	NW	7	19	9	W1	50.620353	98.708590	520615	5607430	undefined	42	58				7.40
791		MWRB	NW	31	16	9	W1	50.413569	98.699078	521381	5584439	undefined	93	98				7.57
792		MWRB	SW	27	16	9	W1	50.391613	98.629774	526318	5582020	undefined	67	70				7.70
793		MWRB	NE	36	21	8	W1	50.856159	98.441541	539309	5633759	undefined	8	9				7.80
794		MWRB	NW	13	21	11	W1	50.811952	98.871970	509020	5628703	undefined	34	58				7.34
795		MWRB		1	19	10	W1	50.602000	98.726542	519353	5605384	undefined	48	58				7.40
796		MWRB	NW	31	20	10	W1	50.767733	98.848666	510672	5623789	undefined	35	40				7.55
797		MWRB	SE	6	19	10	W1	50.598386	98.836804	511550	5604959	undefined	77	80				7.80
798		MWRB	SE	23	20	10	W1	50.731034	98.744123	518059	5619728	undefined	32	39				7.35
799		MWRB	SE	2	21	12	W1	50.775248	99.023491	498344	5624614	undefined	63	68				7.89
800		MWRB	NE	36	20	12	W1	50.767733	99.000212	499985	5623778	undefined	54	57				7.55

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
769		1133	81.0	60.0	139.0	9	148	259	437	0	0	0.06						3.4
770		752	81.0	60.0	16.0	5	51	27	512	0	0	0.18						0.1
771		826	96.0	75.0	7.0	10	27	40	571	0	0	1.5						0.02
772		701	77.0	70.0	5.0	2	51	17	479	0	0	0.03						0.02
773		723	70.0	68.0	11.0	4	33	30	507	0	0	0.42						0.07
774		1054	83.0	65.0	119.0	9	364	49	365	0	0	0.07						0.45
775		3741	237.0	100.0	870.0	57	1073	1250	154	0	0	0.25						
776		2539	155.0	62.0	600.0	40	811	659	212	0	0				0			0.8
777		2169	146.0	44.0	570.0	38	717	434	220	0	0	1.4			0			0.3
778		1325	36.5	22.7	356.0	20.4	232	350	307	0	0	0.01			0.02			0.41
779		1996	81.0	70.0	560.0	19	118	980	168	0	0	0.01			0.03			0.69
780		747	54.5	39.7	93.6		110	51	398	0	0	0.01			0.4			5.03
781		683	48.8	26.7	82.0	23.5	91	16	395	0	0				0			0.34
782		680	50.4	42.2	55.0	25	94	18	395	0	0				0			0.14
783		494	23.0	75.0	19.0		148	14	215	48	0							13.6
784		1060	90.0	66.0	105.0		216	46	537	0	0							
785		4355	134.0	86.0	1275.0	25	1188	1540	107	0	0				0.4			14.7
786		4339	750.0	138.0	393.0	17.9	2740	220	80	8	0							
787		685	17.0	92.0	35.0		14	15	512	24	0							1.78
788	6.8	919	74.0	50.8	85.5	18.5	248	29	403	0	0	9.8	0.01		0.02	0.005	0.01	0.02
789		4231	464.0	131.0	670.0	31.8	2200	490	244	0	0		0		0			0.14
790		3503	309.0	134.0	544.0	62	1815	457	182	0	0				0.7			7
791		6626	432.0	150.0	1585.0	110	2060	2100	189	0	0		0					0.08
792		9216	528.0	184.0	2312.0	134	3082	2770	206	0	0				0.9	0		3.1
793		719	72.0	66.0	14.0		96	7	464	0	0		0					2.5
794	8.6	1270	127.0	66.0	109.0	27	530	13	390	0	0	8.3	0.01		0.02	0	0	1.12
795		6661	448.0	155.0	1534.0	105	2395	1820	204	0	0				0.6			3.4
796		3365	424.0	136.0	360.0	70	2180	43	152	0	0		0		0			0.2
797		8274	456.0	121.0	2200.0	9.5	3150	2100	237	0	0		0		0			0.16
798		1484	216.0	72.9	51.0	61	675	18	390	0	0		0		0.06			20
799	9.3	934	43.5	21.7	176.0	19	300	45	320	0	0				0.02	0	0.02	2.06
800		1654	197.0	84.3	151.0	21.6	790	26	384	0	0		9.2	0.02	0			0.04

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
769																
770																
771																
772																
773																
774																
775																
776											1.4					
777											2					
778											0.57					
779											0.63					
780											1.45					
781											0.57					
782											0.55					
783											0.8					
784																
785											1					
786																
787																
788											0.28	0.85				
789																
790											2.5					
791																
792											3					
793											0.28					
794											1.75	1.85				
795											3.1					
796																
797																
798																
799																
800											2.1	1.2				

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
769					-15.2					-7
770					-13.8					-2
771					-12.9					2
772					-13.0					3
773					-13.7					-1
774					-14.0					0
775										-1
776										1
777										9
778										0
779										3
780										-1
781										0
782										0
783										8
784										0
785										0
786										1
787										4
788										-2
789										0
790										-2
791										0
792										0
793										-1
794										-2
795										0
796										1
797										0
798										-1
799										-3
800										1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length (m)	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
801		MWRB	NW	36	18	12	W1	50.590437	98.999392	500043	5604063	undefined	86	89				7.40
802		MWRB	NE	1	21	13	W1	50.782471	99.139872	490139	5625426	undefined	91	95				8.35
803		MWRB	SE	1	21	13	W1	50.775237	99.139871	490138	5624622	undefined	85	88				7.90
804		MWRB	SW	6	21	13	W1	50.775238	99.267711	481124	5624646	undefined	98	104				7.45
805		MWRB	NE	8	23	14	W1	50.971546	99.383430	473078	5646512	undefined	50	53				7.98
806		MWRB	SE	3	30	19	W1	51.536963	100.041677	427751	5709836	undefined	46	49				7.80
807		MWRB	NE	23	30	19	W1	51.587764	100.018240	429455	5715463	undefined	15	17				7.55
808		MWRB	SW	8	35	19	W1	51.988057	100.141268	421629	5760107	undefined						6.92
809		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	4	21				7.60
810		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	10	13				8.00
811		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	5	27				7.30
812		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	9	12				7.50
813		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	3	6				8.20
814		MWRB	SW	17	37	19	W1	52.177345	100.141268	421960	5781159	undefined	18	21				8.20
815		MWRB	NW	8	37	19	W1	52.169933	100.141268	421947	5780335	undefined	19	21				8.00
816		MWRB	NW	17	37	19	W1	52.184577	100.141268	421973	5781964	undefined	20	23				8.00
817		MWRB	NW	3	32	19	W1	51.718855	100.073253	425858	5730096	undefined	0	0				6.95
818		MWRB	NE	9	35	20	W1	51.995296	100.248521	414278	5761033	undefined	23	45				8.10
819		MWRB	SW	15	35	20	W1	52.002708	100.236473	415119	5761843	undefined	43	49				7.80
820		MWRB	NW	4	34	20	W1	51.893507	100.238572	414768	5749701	undefined	20	23				7.80
821		MWRB	SW	3	30	20	W1	51.536964	100.193868	417196	5709997	undefined	82	85				8.20
822		MWRB		21	60	20	W1	54.203456	100.394152	409060	6006840	undefined	23	31				7.50
823		MWRB		31	60	20	W1	54.232537	100.444133	405866	6010141	undefined	12	25				
824		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	12	20				7.50
825		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	6	17				7.60
826		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	12	20				7.50
827		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	6	9				7.60
828		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	11	23				7.50
829		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	9	21				7.70
830		MWRB		35	54	20	W1	53.708784	100.296455	414425	5951685	undefined	6	15				7.60
831		MWRB		27	54	20	W1	53.694330	100.321032	412773	5950107	undefined	18	31				7.70
832		MWRB	NW	36	47	21	W1	53.101276	100.401245	406182	5884237	undefined	32	37				7.10

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
801		22810	888.0	247.0	7300.0	75	3800	10250	250	0	0		0	0	0		0.18
802	8.5	1844	9.6	4.4	528.0	19	434	250	593	0	0	5.8	0.03	0	0	0	0.12
803		836	16.0	7.3	210.0	11.9	90	44	457	0	0		0	0			1.26
804		23967	936.0	233.0	7600.0	142	1925	12950	181	0	0			0	0		7.1
805		2559	94.4	53.1	864.0	52	0	1450	45	0	0		0	0	0		0.06
806	8.9	993	34.8	17.7	240.0	18.3	210	170	302	0	0		0	0	0		0.06
807		2691	70.4	43.7	800.0		497	880	400	0	0		0	0	0		0.3
808		23666	728.0	260.0	7800.0	180	1630	12800	268	0	0		0				7.8
809		3134	136.0	101.0	830.0	41	250	1364	412	0	0		0.17				1.06
810	5.0	1102	128.0	100.0	71.0	14	75	143	571	5	5		31	6			8.3
811		1626	168.0	161.0	92.0	7	97	390	711	0	0			1			30
812		3384	202.0	131.0	780.0	58	316	1443	454	0	0		6.3	0			0.15
813	6.0	827	75.0	70.0	65.0	5	44	91	477	25	25		1.46	0.5			26
814	6.2	1291	72.0	75.0	240.0	10	92	357	445	18	18		0.17	3.1			80
815	8.2	5699	213.0	101.0	1700.0	142	323	3025	195	5	5		0.05	0			13
816	7.8	6320	209.0	138.0	1920.0	78	447	3228	300	0	0		0.05	0			102
817		32834	1140.0	310.0	10500.0	240	2600	17800	244	0	0		0				3.5
818		1485	14.0	7.5	435.0	39	115	410	464	0	0		0.01	0.02			1.8
819	7.0	4405	121.0	47.0	1364.0	81	451	1957	384	0	0		0.07	0			0.74
820		1305	54.0	40.0	270.0	39	375	110	417	0	0		0.01	0.02			0.34
821	6.7	1178	12.4	6.3	320.0	19.9	288	48	483	0	0		0	0			0.16
822		811	74.0	85.0	16.0	1	35	34	566	0	0		0.2	0			0.33
823		731	68.0	69.0	11.0	2	9	2	570	0	0		0.21	0.3			0.23
824		565	67.0	47.0	2.0	1	9	10	429	0	0		0.08	0.1			0.57
825		572	62.0	53.0	5.0	1	12	15	424	0	0		1.89	0.2			0.6
826		635	79.0	54.0	11.0	3	21	17	450	0	0		4.67	0.2			1.07
827		553	67.0	47.0	3.0	1	8	7	420	0	0		0.12	0			0.47
828		550	71.0	41.0	2.0	1	14	8	413	0	0		0.17	0			1.06
829		573	69.0	49.0	5.0	2	9	5	434	0	0		0.02	0.2			0.35
830		658	83.0	60.0	5.0	2	40	11	457	0	0		4.27	0.2			0.67
831		528	60.0	42.0	9.0	3	19	6	389	0	0		0.01	0			0.6
832		1998	90.0	52.0	559.0	25	370	759	143	0	0		0.9	0			0.1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
801																
802												10	3.25			
803																
804																
805																
806																
807																
808																
809																
810																
811											0.06					
812											0.3					
813											0.32					
814											0.37					
815											1.05					
816											0.24					
817											1.2					
818											1.2					
819											2.8					
820											0.62					
821																
822											0.22					
823											0.3					
824											0.13					
825											0.08					
826											0.09					
827											0.08					
828											0.2					
829											0.11					
830											0.08					
831											0.11					
832											1.2					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
801										2
802										-3
803										1
804										-1
805										7
806										0
807										0
808										0
809										2
810										9
811										2
812										1
813										5
814										3
815										1
816										1
817										-1
818										-1
819										0
820										3
821										1
822										2
823										0
824										-1
825										1
826										4
827										1
828										-2
829										2
830										4
831										0
832										4

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Casing Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
833		MWRB		36	47	21	W1	53.097658	100.395226	406577	5883827	undefined	5	6				7.80
834		MWRB	NW	3	35	21	W1	51.980832	100.379281	405270	5759587	undefined	60	66				8.00
835		MWRB	SW	4	58	24	W1	53.981700	100.970512	370780	5983067	undefined	9	16				7.80
836		MWRB	SE	5	58	24	W1	53.981698	100.983056	369958	5983089	undefined	7	18				8.05
837		MWRB	NW	20	59	22	W1	54.119772	100.725203	387240	5998007	undefined	4	23				7.80
838		MWRB		19	58	23	W1	54.028857	100.865265	377820	5988126	undefined	11	44				7.40
839		MWRB	SW	35	43	23	W1	52.744816	100.691935	385786	5845009	undefined	28	46				7.50
840		MWRB	SW	35	43	23	W1	52.744816	100.691935	385786	5845009	undefined	9	10				7.50
841		MWRB	SE	15	55	29	W1	53.748913	101.676953	323486	5958696	undefined	16	20				7.60
842		MWRB	SE	25	56	27	W1	53.865290	101.330005	346784	5970834	undefined	75	118				7.68
843		MWRB	SW	27	55	27	W1	53.778013	101.391807	342394	5961262	undefined	55	56				7.52
844		MWRB	SW	34	55	27	W1	53.792472	101.391807	342448	5962870	undefined	61	70				8.50
845		MWRB	SW	2	56	27	W1	53.807108	101.367025	344134	5964443	undefined	62	76				8.35
846		MWRB	NE	24	56	27	W1	53.857880	101.330005	346757	5970010	undefined	82	91				7.65
847		MWRB	SW	4	54	27	W1	53.632515	101.383939	342369	5945061	undefined	37	47				8.20
848		MWRB	NE	1	56	27	W1	53.814322	101.330005	346598	5965165	undefined	50	51				8.20
849		MWRB		11	60	27	W1	54.174354	101.393783	343754	6005351	undefined	6	11				7.50
850		MWRB	SE	14	55	28	W1	53.748906	101.503479	334922	5958278	undefined	84	90				7.66
851		MWRB	SW	2	54	28	W1	53.632513	101.482250	335869	5945283	undefined	28	30				7.70
852		MWRB	NW	31	54	28	W1	53.712386	101.580561	329693	5954398	undefined	37	41				7.45
853		MWRB	SW	26	54	28	W1	53.690711	101.482250	336096	5951756	undefined	23	34				7.39
854		MWRB	NE	1	55	28	W1	53.727025	101.478697	336471	5955787	undefined	31	32				7.63
855		MWRB	NW	11	55	26	W1	53.741500	101.218333	353696	5956829	undefined	64	69				
856		MWRB	SE	3	37	26	W1	52.148244	101.081567	357575	5779352	undefined	34	37				
857		MWRB	NE	19	38	26	W1	52.286355	101.152971	353146	5794853	undefined	51	54				7.80
858		MWRB	SW	10	56	26	W1	53.821571	101.243115	352343	5965787	undefined	50	58				6.90
859		MWRB	SW	10	56	26	W1	53.821571	101.243115	352343	5965787	undefined	49	68				7.90
860		MWRB	SW	10	56	26	W1	53.821571	101.243115	352343	5965787	undefined	49	55				8.00
861		MWRB	SW	10	56	26	W1	53.821571	101.243115	352343	5965787	undefined	52	73				8.00
862		MWRB	NE	10	56	26	W1	53.828799	101.230877	353174	5966565	undefined	42	42				
863		MWRB		1	58	26	W1	53.985301	101.187432	356570	5983885	undefined	22	55				7.70
864		MWRB	NW	27	57	26	W1	53.959833	101.243115	352830	5981166	undefined	50	75				7.90

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
833		629	66.0	37.0	47.0	3	16	71	389	0			0.55		0			
834	9.0	1071	13.0	7.0	300.0	15	269	19	448	11			0.7		0			1.2
835	5.6	584	62.3	55.0	4.0	0.8	5	26	431	0					0			0.46
836		566	55.0	56.0	7.0	2	17	11	418	5			0.19		0			0.45
837		459	58.0	36.0	3.0	1	10	2	349	0					0.2			1.3
838	4.0	588	72.0	46.0	5.0	1	5	3	456	0					0			
839		15443	409.0	219.0	5090.0	176	850	8464	235	0			0.03		0			0.36
840		638	81.0	48.0	10.0	1	15	18	465	0			0.65		0			0.26
841	4.4	2149	152.0	109.0	410.0	23.5	160	1045	249	0					0.07			1.44
842		1190	84.8	136.0	30.0		192	50	697	0			2.47		0			0.2
843		1006	72.0	58.4	205.0		50	464	157	0					0			0.12
844		380	10.0	16.3	100.0	2.5	50	78	123	24					0.2			1.12
845	7.2	655	35.6	37.8	145.0	6	40	245	146	9.6			0		0			0.16
846		624	54.4	47.0	41.0		91	11	380	0			0		0			0.18
847	4.4	7696	258.0	161.0	2375.0	35	580	4100	187	0			0		0			0.36
848	4.4	1488	96.0	83.7	305.0	15.7	50	780	158	0			0		0			2
849		624	74.0	44.0	14.0	3	20	10	459	0			0.29		0			0.24
850		2000	150.0	95.9	428.0	35	65	1090	136	0			0		0			3.6
851	5.0	4831	176.0	121.0	1370.0	37.5	420	2350	356	0			0		0			0.58
852	4.4	6437	420.0	296.0	1510.0	38.5	265	3775	132	0					0			1.58
853		10147	432.0	233.0	3050.0	71.2	510	5700	151	0			0		0			0.84
854		2217	174.0	125.0	452.0	32	30	1275	129	0			0		0.1			14
855	7.2	5838	274.0	216.0	1580.0	29.8	260	3350	128	0			0		0			1.88
856	7.2	3408	91.0	58.0	949.0		1232	420	658	0			2		0			0.14
857		3357	28.0	19.0	1120.0	13	471	1172	522	0		11.6	0.21					1.35
858		2733	174.0	138.0	639.0		100	1542	140	0			0.01					0.46
859		3253	203.0	149.0	797.0		117	1871	116	0			0.02					1.1
860		2679	164.0	132.0	640.0		109	1516	118	0			0.02					0.05
861		1194	110.0	31.0	270.0		110	486	187	14			0.02					0.56
862		1281	72.0	70.4	272.0	13.4	98	565	190	0			0		0			0.14
863		570	50.0	36.0	40.0	7	28	14	395	0					0			0.18
864		449	42.0	30.0	29.0	4	41	10	293	0					0			0.3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
833											0.46					
834											1.29					
835																
836											0.12					
837											0.11					
838											0.14					
839											0.11					
840											0.14					
841																
842											0.24					
843											0.55					
844																
845																
846											0.36					
847																
848																
849											0.12					
850																
851																
852																
853																
854																
855																
856																
857																
858																
859																
860																
861																
862																
863																0.52
864																0.24

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
833										-1
834										4
835										0
836										1
837										0
838										0
839										1
840										0
841										-3
842										0
843										2
844										9
845										6
846										0
847										0
848										0
849										-1
850										1
851										-1
852										-1
853										0
854										1
855										0
856										2
857										1
858										0
859										0
860										0
861										2
862										1
863										0
864										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing		Top	Bottom				
865		MWRB	NW	14	56	26	W1	53.843436	101.218333	354050	5968168	undefined	47	75				8.20
866		MWRB	SW	15	56	26	W1	53.836210	101.243115	352395	5967415	undefined	50	79				7.95
867		MWRB	NW	19	56	26	W1	53.857880	101.317461	347582	5969983	undefined	65	67				8.20
868		MWRB	SW	15	56	26	W1	53.836210	101.243115	352395	5967415	undefined	43	62				7.91
869		MWRB	SE	16	56	26	W1	53.836210	101.255659	351569	5967441	undefined	30	43				7.80
870		MWRB		13	56	26	W1	53.839809	101.187432	356071	5967701	undefined	31	34				7.40
871		MWRB	SE	4	56	26	W1	53.807112	101.255659	351466	5964205	undefined	45	47				8.00
872		MWRB	SE	4	56	26	W1	53.807112	101.255659	351466	5964205	undefined	41	44				7.40
873		MWRB	NE	9	56	26	W1	53.828800	101.255659	351543	5966617	undefined	47	59				8.00
874		MWRB	SE	10	56	26	W1	53.821569	101.230877	353149	5965761	undefined						7.70
875		MWRB	SW	11	56	26	W1	53.821567	101.218333	353974	5965735	undefined	46	51				7.90
876		MWRB	SE	7	56	26	W1	53.821558	101.305223	348255	5965916	undefined	84	88				7.85
877		MWRB	NE	7	56	26	W1	53.828788	101.305223	348281	5966721	undefined	59	62				7.94
878		MWRB		24	46	25	W1	52.981247	100.951961	368949	5871750	undefined	15	26				7.50
879		MWRB		11	64	25	W1	54.523507	101.124919	362471	6043631	undefined	17	20				7.90
880		MWRB		1	58	25	W1	53.985301	101.038739	366319	5983594	undefined	24	30				7.40
881		MWRB	NW	32	57	25	W1	53.974284	101.143987	359381	5982572	undefined	20	31				7.70
882		MWRB	NW	13	56	25	W1	53.843427	101.044859	365462	5967824	undefined	19	20				7.80
883		MWRB	SE	12	48	25	W1	53.123142	100.974266	367886	5887573	undefined	0	9				7.30
884		MWRB	SE	12	48	25	W1	53.123142	100.974266	367886	5887573	undefined	15	18				7.50
885		MWRB	NW	8	38	25	W1	52.257253	100.998115	363618	5791314	undefined	77	84				8.30
886		MWRB	SE	2	41	25	W1	52.497513	100.942281	368147	5817931	undefined	15	30				8.05
887		MWRB	NE	3	12	2	E1	49.984060	97.234470	626573	5538133	undefined	37	43				8.59
888		MWRB	SE	14	11	2	E1	49.917860	97.211572	628390	5530813	undefined						7.30
889		MWRB	NW	17	12	5	E1	50.013534	96.879353	651937	5542071	undefined	40	44				7.75
890		MWRB	SW	34	12	2	E1	50.050526	97.245775	625589	5545504	undefined						8.20
891		MWRB	SW	26	12	1	E1	50.035783	97.360246	617430	5543678	undefined						7.90
892		MWRB	SE	35	7	4	E1	49.608310	96.940646	648783	5496900	undefined						8.10
893		MWRB	SE	36	7	5	E1	49.608300	96.781590	660274	5497226	undefined						8.20
894		MWRB	NE	11	8	5	E1	49.645026	96.804294	658514	5501261	undefined						8.30

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
865		637	42.0	35.0	107.0	6	81	133	233	8			0.1		0			0.58
866	5.6	1266	84.8	50.7	330.0		115	485	200	0					0			2.8
867		523	38.0	34.0	59.0	5	75	17	295	13			0.1		0			0.75
868		873	54.4	41.0	170.0		115	240	253	0			0		0			0.08
869		785	52.8	41.9	130.0		77	190	292	0		1.0			0			0.02
870		607	54.0	41.0	68.5	7.6	54	80	302	0								2.1
871		3141	196.0	149.0	761.0		113	1803	119	0			0.02					0.15
872		3406	218.0	163.0	816.0		119	1956	134	0			0.02					0.18
873		1194	110.0	31.0	270.0		110	486	187	14			0.01					0.56
874		2857	179.0	130.0	697.0		103	1624	124	0			0.09					0.3
875	2.8	1642	102.0	92.2	360.0	19	100	790	179	0			0		0			4
876		1637	110.0	84.9	355.0	18.5	60	860	149	0			0		0			0.2
877		706	35.4	28.1	138.0	11.9	85	147	261	0			0		0			3
878		798	82.0	59.0	48.0	2	25	63	519	0			0.11		0			1
879		455	52.0	38.0	7.0	2	23	6	327	0			0.7		0			1.5
880		621	82.0	47.0	7.0	2	12	1	470	0			0.07		0			
881		520	53.0	26.0	25.0	4	32	7	373	0					0			3.1
882		592	50.4	40.4	68.8		48	81	303	0			0					0.5
883		1011	104.0	63.1	98.0	7.8	38	236	464	0			0		0			0.14
884		4841	184.0	107.0	1385.0	45.5	225	2400	494	0			0		0			0.18
885		3472	11.0	5.0	1190.0	29	529	872	836	28			0.65					0.55
886		2014	47.5	39.0	530.0		630	257	510	0			0.02		0.04			1.69
887		0											0.01					
888		1511	120.0	87.0	260.0	20	225	370	429	0			0.05					0.16
889		404	45.0	34.0	8.0		22	9	286	0			0		0			1.6
890		989	70.1	68.7	119.0		104	147	480	0			0		0			0.8
891		837	65.9	89.0	29.0		156	9	488	0			1.2		0			0.2
892		736	31.4	23.3	162.0		34	158	327	0		0.2	5					0.3
893		590	33.7	22.3	109.0		18	89	318	0		0.2	5					1.3
894		667	27.4	21.4	139.0		14	92	373	0		0.2	5					1

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
865											0.28					
866											0.35					
867											0.4					
868											0.44					
869											0.4					
870											0.55					
871																
872																
873																
874																
875																
876																
877																
878											0.09					
879											0.15					
880											0.09					
881											0.19					
882																
883																
884																
885																
886											0.5					
887																
888											0.56					
889											0.39					
890															7	
891															8	
892															58	
893															43	
894															48	

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
865										3
866										8
867										4
868										1
869										0
870										5
871										0
872										0
873										2
874										0
875										3
876										1
877										1
878										1
879										1
880										2
881										-8
882										3
883										-1
884										-1
885										4
886										0
887					-14.0	-108.0				6
888										0
889										1
890					-15.0	7.0				2
891					-17.0	2.0				0
892					0.3					1
893					0.6					1
894					0.1					1

Water well data
Located by river lots in Parishes

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date	Sampled	Source	Lot	Parrish	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Casing Cond. $\mu\text{S/cm}$	pH
								Easting	Northing	Formation						
895		MWRB	22	HEADINGLY	49.853432	100.577341	613388	5523309	undefined		20					7.43
896		MWRB	37	HEADINGLY	49.874294	100.565801	612510	5525611	undefined		24	35				7.20
897		MWRB	56	HEADINGLY	49.871151	100.608103	615557	5525326	undefined							7.50
898		MWRB	4	KILDONAN	49.940308	100.846326	632485	5533409	undefined							7.10
899		MWRB	22	KILDONAN	49.959828	100.861434	633515	5535606	undefined							7.78
900		MWRB	25	KILDONAN	49.963336	100.863689	633667	5536000	undefined							7.45
901		MWRB	45	KILDONAN	49.947341	100.941632	639303	5534364	undefined		22	34				7.60
902		MWRB	74	KILDONAN	49.927471	100.923305	638045	5532121	undefined							7.40
903		MWRB	88	KILDONAN	49.919528	100.918991	637758	5531230	undefined							7.50
904		MWRB	94	KILDONAN	49.912714	100.917661	637682	5530470	undefined							7.78
905		MWRB	57	LORETTE	49.747341	101.143208	654400	5512525	undefined		27	43				7.50
906		MWRB	58	LORETTE	49.746616	101.145952	654600	5512450	undefined		21	37				7.90
907		MWRB	68	R.C. MISSION	49.836796	100.998517	643712	5522182	undefined		21	32				7.40
908		MWRB	293	R.C. MISSION	49.880581	100.923766	638212	5526909	undefined							7.55
909		MWRB	310	R.C. MISSION	49.880866	100.906488	636970	5526909	undefined		17	50				7.55
910		MWRB	315	R.C. MISSION	49.877145	100.900858	636576	5526485	undefined							7.65
911		MWRB	321	R.C. MISSION	49.854917	100.909682	637273	5524030	undefined							7.55
912		MWRB	450	STE. AGATHE	49.460940	100.751585	626930	5479954	undefined		69	81				7.20
913		MWRB	461	STE. AGATHE	49.471805	100.736775	625829	5481137	undefined		27	67				8.70
914		MWRB	473	STE. AGATHE	49.483055	100.736993	625816	5482388	undefined		28	94				7.40
915		MWRB	488	STE. AGATHE	49.495746	100.793097	629846	5483894	undefined		30	60				7.50
916		MWRB	505	STE. AGATHE	49.511252	100.753312	626925	5485550	undefined							7.55
917		MWRB	576	STE. AGATHE	49.570723	100.859743	634466	5492346	undefined							7.93
918		MWRB	582	STE. AGATHE	49.577940	100.870185	635201	5493167	undefined							7.62
919		MWRB	628	STE. AGATHE	49.623054	100.907552	637775	5498250	undefined							7.75
920		MWRB	631	STE. AGATHE	49.626843	100.862697	634525	5498590	undefined							7.70
921		MWRB	9	ST. ANDREWS	50.048260	100.953677	639874	5545606	undefined		31	75				7.80
922		MWRB	15	ST. ANDREWS	50.052095	100.958834	640232	5546042	undefined		16	27				7.10
923		MWRB	30	ST. ANDREWS	50.061298	100.970988	641075	5547088	undefined		37	84				7.90
924		MWRB	142	ST. ANDREWS	50.095605	101.084211	649072	5551122	undefined		14	65				7.60
925		MWRB	145	ST. ANDREWS	50.093712	101.083416	649021	5550910	undefined		16	69				7.00
926		MWRB	160	ST. ANDREWS	50.084034	101.077894	648656	5549823	undefined							6.98
927		MWRB	204	ST. ANDREWS	50.062541	101.057417	647257	5547393	undefined		13	20				7.90

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
895		3993	512.0	67.9	640.0	66	1880	525	302	0			0					12.2
896		1602	97.0	72.0	258.0	26	322	328	499	0			1.3		0			0.13
897		1809	125.0	74.0	339.0	25	318	462	466	0			0.03		0			2.6
898		2914	169.0	111.0	700.0	30	592	985	327	0					0.02			0.46
899		1146	54.0	91.0	170.0		240	245	346	0			40		0			0
900		1153	84.0	65.0	170.0	13.7	171	220	429	0			0.35		0.03	0.005	0.04	0.14
901		624	61.6	53.6	20.0	4	74	21	390	0			0					0.28
902		811	60.0	65.0	77.0	6.7	135	130	337	0					0.03			0.06
903	6.9	812	70.4	62.8	63.0	5.9	167	95	337	0		11.0	0					0.02
904	6.5	749	64.0	54.6	65.0	4.9	115	91	354	0			0					0.28
905		975	65.0	58.0	114.0	6	313	68	351	0			0.03		0			0.34
906		999	43.0	26.0	223.0	10	225	132	340	0			0.13		0			0.53
907		1169	89.8	79.5	125.0	6.5	400	100	368	0			0.01		0.02			0.35
908		1155	90.4	73.7	160.0	9	305	182	335	0								0.2
909		1004	75.3	68.4	130.0	7.6	255	170	298	0			0.15		0			0.03
910	7.0	1399	94.4	73.2	232.0	10	300	375	305	0		9.7	0					0.08
911		794	81.0	50.6	77.2	0	146	105	334	0			0.15		0.59			0.71
912	6.2	6493	210.0	86.0	2100.0	57	750	3000	290	0			0.01					
913		4598	39.5	63.0	1570.0	33.5	370	2400	122	0			0		0.25			2.75
914		8319	293.0	106.0	2620.0	82	900	4050	268	0			0		0.02			0.94
915		4979	150.0	68.0	1600.0	49	550	2250	312	0			0.03					
916	6.3	14314	475.0	195.0	4820.0		1200	7400	224	0			0.01					
917		3388	84.8	34.7	1095.0	36	320	1500	317	0			0.1		0.05			0.36
918		2428	78.4	39.9	706.0	24	270	1030	280	0			1.3		0.05			0.14
919		1534	40.0	24.7	458.0	20	124	580	287	0			0.1		0.05			6.6
920		1726	45.0	22.0	540.0	31	145	640	303	0			0.01		0.02			0.66
921		898	59.0	39.0	160.0	14	124	251	251	0					0			0.66
922		1879	167.0	128.0	213.0	9	524	326	512	0					0.7			1.5
923		1779	144.0	136.0	193.0	10	517	286	493	0			0.1		0			0.2
924		2366	109.0	100.0	550.0	18.2	200	1040	349	0			0.12		0.03			0.04
925		1316	98.0	145.0	38.0	6.6	322	52	654	0			8.43		0.02			0.05
926		681	52.8	65.2	15.5		54	12	481	0			0					0.02
927		1694	125.0	150.0	140.0	10	529	150	590	0			0.56					0.17

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
895																
896											0.45					
897																
898											0.36					
899											0.49					
900											0.27					
901																
902											0.29					
903																
904																
905											0.57					
906											1.13					
907											0.32					
908																
909											0.22					
910																
911											0.14					
912																
913																
914											1.27					
915																
916																
917																
918																
919																
920																
921											0.61					
922																
923											0.24					
924											0.38					
925											0.26					
926																
927											0.26					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
895										2
896										-3
897										1
898										4
899										0
900										1
901										0
902										-1
903										0
904						-15.2				-1
905										-4
906										1
907										-2
908						-18.0				2
909						-17.2				1
910										-2
911										0
912						-16.0				3
913						-121.0				-1
914										1
915						-15.6				2
916										3
917										1
918										-1
919										2
920										4
921										-1
922										0
923										0
924										-1
925										-1
926										-4
927										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Lot	Parrish	Latitude	Longitude	Easting	Northing	UTM Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
928		MWRB	214 ST. ANDREWS		50.058149	101.045829	646441	5546882	undefined	15	18				8.10
929		MWRB	239 ST. ANDREWS		50.044328	101.027167	645147	5545309	undefined	25	26				7.75
930		MWRB	242 ST. ANDREWS		50.042475	101.026614	645113	5545102	undefined	19	72				7.60
931		MWRB	268 ST. ANDREWS		50.030436	101.009784	643944	5543731	undefined	20	93				7.20
932		MWRB	271 ST. ANDREWS		50.028833	101.005207	643621	5543544	undefined	17	23				7.85
933		MWRB	27 STE. ANNE		49.658372	101.313890	667000	5503000	undefined		26				
934		MWRB	38 STE. ANNE		49.691709	101.306765	666372	5506690	undefined	23	37				7.60
935		MWRB	54 STE. ANNE		49.668901	101.344563	669177	5504239	undefined	21	56				8.00
936		MWRB	55 STE. ANNE		49.667371	101.347691	669408	5504076	undefined	22	37				8.00
937		MWRB	59 STE. ANNE		49.666447	101.361256	670390	5504004	undefined	24	54				8.00
938		MWRB	7 ST. BONIFACE		49.840817	100.837680	632136	5522333	undefined	18	47				7.50
939		MWRB	9 ST. BONIFACE		49.845621	100.844399	632606	5522879	undefined	18	27				7.40
940		MWRB	16 R.C. MISSION		49.876859	101.014730	644758	5526667	undefined	18	24				7.45
941		MWRB	25 ST. BONIFACE		49.852214	100.823992	631121	5523576	undefined	27	34				7.40
942		MWRB	27 ST. BONIFACE		49.854369	100.825339	631212	5523818	undefined						7.35
943		MWRB	31 ST. BONIFACE		49.870548	100.853894	633220	5525667	undefined	16	76				7.49
944		MWRB	35 ST. BONIFACE		49.874059	100.846958	632712	5526045	undefined	16	147				7.93
945		MWRB	37 ST. BONIFACE		49.883417	100.866929	634121	5527121	undefined	14	16				6.90
946		MWRB	57 R.C. MISSION		49.876996	100.998493	643591	5526651	undefined						7.30
947		MWRB	76 ST. BONIFACE		49.896603	100.877561	634848	5528606	undefined						7.45
948		MWRB	80 ST. BONIFACE		49.882495	100.890516	635818	5527061	undefined						7.70
949		MWRB	99 ST. BONIFACE		49.873364	100.881726	635212	5526030	undefined	34	125				7.60
950		MWRB	31 ST. CHARLES		49.845809	100.745773	625515	5522730	undefined						7.50
951		MWRB	35 ST. CHARLES		49.845886	100.738821	625015	5522727	undefined						7.30
952		MWRB	71 ST. CHARLES		49.855773	100.675819	620461	5523723	undefined	36	38				7.55
953		MWRB	72 ST. CHARLES		49.854606	100.673191	620275	5523589	undefined	11	17				7.15
954		MWRB	73 ST. CHARLES		49.854328	100.671901	620183	5523556	undefined	38	43				7.80
955		MWRB	86 ST. CHARLES		49.875058	100.650766	618613	5525827	undefined	10	13				7.10
956		MWRB	94 ST. CHARLES		49.876086	100.674434	620311	5525979	undefined	6	13				7.60
957		MWRB	95 ST. CHARLES		49.897720	100.680558	620697	5528394	undefined	9	11				7.60
958		MWRB	99 ST. CHARLES		49.896715	100.693389	621621	5528303	undefined						7.35
959		MWRB	101 ST. CHARLES		49.896380	100.697805	621939	5528273	undefined	31	88				7.80
960		MWRB	101 ST. CHARLES		49.896380	100.697805	621939	5528273	undefined	32	107				7.20

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
928		691	51.0	64.0	55.0	3	184	38	296	10					0			0.7
929		384	54.0	27.0	10.0	3	16	9	265	0								
930		3615	108.0	66.0	1125.0	42	98	2000	176	0			0.02		0.03			2.15
931		1476	124.0	130.0	110.0	5.9	660	26	420	0			0.02		0.05			2.45
932		646	57.6	74.8	35.0		226	17	236	0			0					0.12
933		504	40.0	29.0	54.0		19	31	331	0			0.21					0.15
934		509	46.0	26.0	40.0	7	18	10	362	0					0			0.52
935		575	41.0	22.0	59.0	8	16	22	407	0			1.14		0			2.4
936		575	32.0	30.0	58.0	9	15	26	405	0			1.05		0			0.83
937		536	44.0	28.0	40.0	10	10	8	396	0			0.98		0			1.5
938		2450	163.0	109.0	500.0	26	620	710	322	0			0.71		0.02			0.6
939		4150	215.0	114.0	970.0	32.8	850	1700	268	0			0		0.02			0.59
940		5636	170.0	110.0	1620.0	34	460	2900	342	0			0.06		0.04			0.76
941	7.1	3500	200.0	118.0	880.0	37	730	1240	295	0			0.02					
942	7.2	2868	162.0	144.0	610.0	26	636	955	335	0								0.32
943		1449	94.0	53.8	353.0		266	520	156	0			0					
944		7735	260.0	122.0	2300.0		722	4050	281	0			0		0			2.56
945		1627	227.0	110.0	65.0	18	430	130	647	0								2.1
946		2535	168.0	112.0	515.0		682	720	338	0			0.22					1.47
947	7.7	3497	140.0	95.0	960.0	29	280	1700	293	0			0.01					0.82
948	8.3	1915	106.0	76.4	440.0	13	256	750	274	0			0.57		0.02			0.12
949	5.8	2585	128.0	92.0	650.0		471	1000	244	0			0		0			0.04
950	9.7	5118	337.0	209.0	1133.0		1443	1731	265	0			0.03				5	
951		4945	318.0	169.0	923.0	30	1600	1600	305	0			0.01		0.04			2.66
952	5.0	2199	124.0	77.6	499.0	27	388	705	378	0								0.12
953	3.9	5664	512.0	403.0	740.0		2294	1278	437	0			0					0.21
954		3474	188.0	78.0	896.0	51	671	1313	277	0			0.05		0			0.75
955		1978	142.0	74.0	389.0	27	386	492	468	0			0.08					0.13
956	6.0	1539	139.0	59.0	270.0	17.5	245	360	439	0		9.5	0					0
957	6.3	2629	195.0	170.0	430.0	23	740	600	471	0								
958		2100	116.0	63.0	474.0	23	410	650	364	0			0		0			0.58
959	6.1	2428	134.0	79.0	600.0		417	910	288	0			0					0
960	5.3	2636	146.0	77.0	651.0		471	932	359	0			0.01					0.58

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
928											0.34					
929																
930											0.7					
931											0.3					
932											0.28					
933																
934											0.39					
935											0.72					
936											0.62					
937											0.6					
938											0.39					
939																
940											0.29					
941																
942																
943																
944											0.85					
945																
946																
947											0.3					
948																
949																
950																
951											0.46					
952																
953																
954																
955																
956																
957																
958											0.7					
959															0.9	
960																

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample	Br	Ag	Mo	Sr	$\delta^{18}\text{O}$ ‰	δD ‰	Tritium	Total	Fecal	Charge
No.	mg/l	mg/l	mg/l	mg/l	SMOW	SMOW	T.U.	coliform	coliform	Balance ‰
928										3
929										5
930										0
931										1
932										8
933										0
934										-2
935										-7
936										-6
937										-3
938										2
939										-5
940										-4
941										3
942					-17.0	-129.0				2
943										3
944										-4
945					-13.3					1
946					-19.5					0
947										-1
948					-19.7					0
949										0
950					-18.6					0
951										-8
952					-16.7					1
953					-15.3					0
954										1
955										2
956					-14.4					3
957					-15.0	-119.0				4
958										-1
959										0
960										0

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Lot	Parrish	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S}/\text{cm}$	pH
							Easting	Northing	Formation						
961		MWRB	111 ST. CHARLES		49.880132	100.709052	622788	5526485	undefined			129			7.72
962		MWRB	1 ST. CLEMENTS		50.125217	101.062006	647393	5554370	undefined	57	104				7.70
963		MWRB	2 ST. CLEMENTS		50.128736	101.065949	647664	5554769	undefined	20	57				7.40
964		MWRB	3 ST. CLEMENTS		50.129136	101.067212	647753	5554816	undefined	16	32				7.45
965		MWRB	21 ST. CLEMENTS		50.137203	101.082884	648848	5555744	undefined	57	85				7.25
966		MWRB	27 ST. CLEMENTS		50.139449	101.087530	649173	5556003	undefined		90				7.25
967		MWRB	41 ST. CLEMENTS		50.147270	101.098774	649952	5556895	undefined	21	29				7.35
968		MWRB	43 ST. CLEMENTS		50.148293	101.100387	650064	5557012	undefined	30	38				7.15
969		MWRB	44 ST. CLEMENTS		50.148898	101.101253	650124	5557081	undefined	14	25				8.00
970		MWRB	48 ST. CLEMENTS		50.151135	101.104865	650375	5557337	undefined	15	23				7.50
971		MWRB	51 ST. CLEMENTS		50.152351	101.106780	650508	5557476	undefined	21	91				7.35
972		MWRB	52 ST. CLEMENTS		50.152696	101.107607	650566	5557516	undefined	34	84				7.60
973		MWRB	53 ST. CLEMENTS		50.153077	101.108380	650620	5557560	undefined	31	33				7.20
974		MWRB	69 ST. CLEMENTS		50.155368	101.133638	652417	5557866	undefined	27	47				7.45
975		MWRB	73 ST. CLEMENTS		50.137083	101.166593	654830	5555901	undefined	35	62				7.30
976		MWRB	77 ST. CLEMENTS		50.129585	101.163484	654632	5555061	undefined		84				7.35
977		MWRB	10 ST. JAMES		49.907351	100.720557	623545	5529530	undefined		130				7.20
978		MWRB	12 ST. JAMES		49.901554	100.734708	624576	5528909	undefined	31	83				7.45
979		MWRB	13 ST. JAMES		49.888754	100.743145	625215	5527500	undefined	27	80				7.90
980		MWRB	15 ST. JAMES		49.888682	100.747960	625561	5527500	undefined		128				7.35
981		MWRB	17 ST. JAMES		49.888618	100.752176	625864	5527500	undefined	18	121				7.50
982		MWRB	27 ST. JAMES		49.890726	100.775029	627500	5527773	undefined	8	101				7.35
983		MWRB	31 ST. JAMES		49.892393	100.781843	627985	5527970	undefined		85				7.40
984		MWRB	33 ST. JAMES		49.895033	100.787427	628379	5528273	undefined	9	160				8.05
985		MWRB	34 ST. JAMES		49.895013	100.788693	628470	5528273	undefined						7.35
986		MWRB	37 ST. JAMES		49.895353	100.792924	628773	5528318	undefined	16	61				7.30
987		MWRB	41 ST. JAMES		49.895541	100.798195	629151	5528348	undefined	22	64				7.60
988		MWRB	42 ST. JAMES		49.895482	100.801994	629424	5528348	undefined						7.45
989		MWRB	45 ST. JAMES		49.895390	100.807894	629848	5528348	undefined		122				7.35
990		MWRB	49 ST. JAMES		49.895321	100.812333	630167	5528348	undefined		107				8.12
991		MWRB	53 ST. JAMES		49.895261	100.816118	630439	5528348	undefined		107				7.64
992		MWRB	59 ST. JAMES		49.894196	100.823249	630954	5528242	undefined						7.50
993		MWRB	73 ST. JAMES		49.890902	100.842115	632318	5527909	undefined						7.40

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
961		6168	342.0	142.0	1700.0		960	2800	224	0								2.08
962		1150	80.3	57.0	255.0	10	125	440	183	0			0.01					21.4
963		1092	81.3	121.0	46.8	5.8	140	48	649	0			0.01					0.37
964		1077	99.0	113.0	30.0	6.5	134	33	661	0			4.01		0.07			1.81
965		1042	76.4	75.8	101.0	8.5	152	120	508	0			0.01					199
966		903	75.3	90.0	28.0	5.3	105	35	564	0			1.8					0.5
967		894	65.4	97.3	29.9	5.6	66	35	595	0			0.72					1.97
968		1090	78.0	105.0	68.2	7.5	200	53	578	0			0.01					5.19
969		724	56.0	93.0	14.0		30	14	517	0								
970		528	60.0	31.0	32.0	7	95	32	271	0			0.04					5.62
971		1304	76.0	86.0	169.0	12	185	210	566	0			0.04					0.36
972	6.2	1308	63.2	89.8	178.0	20	220	176	561	0								0.06
973		1070	111.0	80.0	82.5	5	220	90	481	0			0.03					125
974		1047	71.0	114.0	52.8	5	150	56	598	0			0.1					0.36
975		965	72.1	81.0	48.0	6	150	64	544	0			0.01					13
976		866	72.5	67.1	60.0	7.5	105	59	495	0			0.32					0.21
977		1482	113.0	76.0	228.0	19.6	283	330	432	0			0.03		0.03			0.32
978		1951	106.0	72.7	429.0	22.4	345	630	346	0			0		0			0.72
979	6.5	4294	225.0	110.0	1210.0	46	825	1600	278	0			0.01		0			0.07
980	7.5	3735	216.0	87.3	960.0	28	740	1375	329	0								0.2
981	10.0	2835	179.0	100.0	645.0		590	990	329	0		2.0						0.97
982		1773	98.0	67.4	356.0	18.4	340	520	373	0					0			0.36
983		1962	130.0	90.0	380.0	30	420	530	382	0			0.01					
984		1607	46.0	106.0	270.0	23	345	425	392	0								
985	11.0	2105	112.0	120.0	360.0	23	460	565	457	0		8.0						0.2
986		1687	116.0	99.0	234.0	17.5	406	360	454	0			0.04		0.04			0.52
987		1838	129.0	98.2	308.0	18.6	400	440	444	0			0.02		0.04			1.68
988		1624	101.0	75.0	304.0	17.7	275	490	361	0					0.03			2.05
989	7.0	1736	120.0	82.5	323.0	22	320	490	378	0								1.1
990		1618	118.0	90.0	270.0	5	345	400	390	0					0			0.57
991	7.0	1538	110.0	82.5	215.0	16.5	345	300	460	0		8.8						0.36
992		1658	125.0	94.7	243.0	21	330	415	429	0			0.01		0.03			0.21
993		1293	84.7	67.7	192.0	6	256	240	447	0			0.35		0.02			0.06

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba	Zn	As	Al	Se	Ni	Cr	Cd	P	DO	F	B	DIC	DOC	TDC	U
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l
961																1.2
962																
963																
964																
965																0.34
966																
967																
968																
969																
970																
971																
972																
973																
974																
975																
976																
977																
978																0.36
979																0.56
980																0.68
981																
982																
983																
984																
985																
986																0.46
987																0.37
988																0.48
989																
990																0.64
991																
992																0.39
993																0.39

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
961										0
962					-19.2					5
963					-13.3					4
964										4
965					-13.3					-1
966					-13.8					0
967					-13.9					2
968					-13.0					2
969										8
970										-1
971					-13.6					-1
972					-13.6					0
973					-12.3					3
974					-13.0					3
975					-12.3					-5
976										0
977					-15.1					0
978										0
979					-18.8	-142.0				5
980					-17.5					1
981					-18.8					0
982										-3
983					-15.6					2
984					-15.2	-114.0				-5
985					-15.4					-2
986										-3
987										1
988										-1
989					-16.1					1
990										1
991										-2
992					-15.7	-117.0				-1
993										-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Lot	Parrish	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
							Easting	Northing	Formation						
994		MWRB	1	ST. JOHN	49.890380	100.857925	633455	5527879	undefined	16	139				7.60
995		MWRB	7	ST. JOHN	49.903225	100.847222	632651	5529288	undefined		148				7.79
996		MWRB	8	ST. JOHN	49.904168	100.847899	632697	5529394	undefined	21	126				8.30
997		MWRB	10	ST. JOHN	49.906310	100.850084	632848	5529636	undefined		114				8.15
998		MWRB	11	ST. JOHN	49.907798	100.850990	632909	5529803	undefined	14	100				7.37
999		MWRB	20	ST. JOHN	49.902149	100.888332	635606	5529242	undefined	31	132				7.55
1000		MWRB	35	ST. JOHN	49.916719	100.838669	632000	5530773	undefined	15	43				7.95
1001		MWRB	37	ST. JOHN	49.923417	100.837141	631872	5531515	undefined		68				7.92
1002		MWRB	41	ST. JOHN	49.927177	100.840544	632106	5531939	undefined						7.55
1003		MWRB	26	ST. NORBERT	49.685350	100.865971	634600	5505100	undefined						7.10
1004		MWRB	35	ST. NORBERT	49.695177	100.870161	634875	5506200	undefined		39				7.60
1005		MWRB	42	ST. NORBERT	49.706990	100.866176	634555	5507506	undefined	24					
1006		MWRB	50	ST. NORBERT	49.716594	100.855155	633734	5508554	undefined						7.72
1007		MWRB	73	ST. NORBERT	49.741776	100.843609	632833	5511333	undefined						7.55
1008		MWRB	75	ST. NORBERT	49.744799	100.842461	632742	5511667	undefined	23	31				7.45
1009		MWRB	95	ST. NORBERT	49.768937	100.815392	630727	5514303	undefined						7.35
1010		MWRB	105	ST. NORBERT	49.779260	100.826515	631500	5515470	undefined						7.60
1011		MWRB	123	ST. NORBERT	49.797106	100.835608	632106	5517470	undefined	19	26				7.38
1012		MWRB	136	ST. NORBERT	49.802890	100.884384	635600	5518200	undefined	19	44				7.90
1013		MWRB	153	ST. NORBERT	49.799641	100.914663	637788	5517894	undefined	21	30				7.38
1014		MWRB	156	ST. NORBERT	49.775961	100.853546	633455	5515151	undefined						7.70
1015		MWRB	161	ST. NORBERT	49.776325	100.886131	635800	5515250	undefined	27	37				8.00
1016		MWRB	164	ST. NORBERT	49.779658	100.902930	637000	5515651	undefined	24	30				7.80
1017		MWRB	170	ST. NORBERT	49.763853	100.878704	635300	5513850	undefined	31	67				7.60
1018		MWRB	172	ST. NORBERT	49.769425	100.903793	637091	5514515	undefined	25	31				7.52
1019		MWRB	173	ST. NORBERT	49.769121	100.905878	637242	5514485	undefined	28	33				7.90
1020		MWRB	195	ST. NORBERT	49.743311	100.905463	637285	5511615	undefined		29				8.05
1021		MWRB	232	ST. NORBERT	49.682525	100.903030	637281	5504853	undefined						8.00
1022		MWRB	252	ST. NORBERT	49.645501	100.906255	637618	5500743	undefined						7.80
1023		MWRB	2	ST. PAUL	49.958526	100.964348	640900	5535650	undefined	18	73				7.80
1024		MWRB	3	ST. PAUL	49.958763	100.963660	640850	5535675	undefined	33	41				7.30
1025		MWRB	6	ST. PAUL	49.960158	100.960928	640650	5535825	undefined		90				7.55
1026		MWRB	7	ST. PAUL	50.013205	100.980283	641882	5541759	undefined		37				7.20

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/l	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
994	9.0	1419	123.0	100.0	170.0		198	360	468	0							0.26
995	9.6	1886	130.0	75.0	388.0	17.3	260	610	406	0							0.17
996	8.0	1317	80.0	103.0	175.0		384	225	350	0			0				0.08
997		1314	92.0	84.0	170.0	17	245	275	431	0			0.06				
998	7.7	1262	92.8	79.6	166.0	16	247	204	457	0							0.18
999	11.1	958	63.2	56.3	150.0	9	123	263	281	0		12.0	0				0.36
1000	7.3	1326	84.8	67.4	228.0	14	254	254	424	0							0.2
1001		1148	70.0	69.0	160.0	14	200	230	405	0			0.31				
1002	7.0	1171	41.6	93.6	150.0	13	200	210	454	0		9.0	0				0.32
1003	7.5	6111	240.0	121.0	1780.0	60	650	3160	100	0			0.49				3.04
1004	6.2	1574	168.0	33.0	274.0	16	446	325	312	0							0.16
1005		6836	280.0	141.0	2000.0	50	820	3360	185	0			0				1.9
1006	7.2	3879	221.0	92.0	1015.0	20	360	2000	156	0		14.6	0				0.57
1007		2014	99.9	66.3	470.0	13.7	370	740	254	0			0.02	0.02			1.03
1008		1295	84.9	60.0	250.0	10	275	320	295	0			0.02	0			0.32
1009	8.6	962	81.2	37.0	182.0	11	190	230	220	0		10.5					0.05
1010	8.9	3643	268.0	80.0	965.0	27	590	1550	158	0		5.3	0				0.4
1011	8.7	1863	136.0	50.0	420.0	20	380	650	200	0		7.0					0.17
1012		1371	78.0	74.0	269.0	11	218	412	309	0			0.31	0			0.31
1013	6.0	1528	101.0	67.5	294.0	13.8	200	530	311	0		11.0	0				0.4
1014	6.7	2211	126.0	67.0	536.0	22	376	818	262	0		4.4	0				0.42
1015		846	62.0	39.0	140.0	7	153	186	259	0			0.06	0			0.39
1016		1008	81.0	58.0	132.0	10.5	251	180	295	0			0.01	0.03			3.15
1017		924	70.0	66.0	129.0	9	249	127	274	0				0			0.48
1018		992	77.0	57.0	150.0	10	250	167	281	0							
1019		780	35.0	49.0	138.0	11.7	225	130	183	0		7.8					0
1020		861	71.0	67.0	81.0		184	109	349	0			0.95				0.85
1021		1579	97.0	29.0	405.0	16	182	629	221	16				0.1			2.26
1022		6525	218.0	93.4	2030.0	58	700	3150	268	0		7.2	0				1.3
1023		1233	90.0	66.0	183.0	9	217	292	376	0			0.11	0			1.18
1024		1898	115.0	135.0	244.0		665	300	439	0			0	0.11			1.25
1025		1261	61.6	83.6	225.0		210	310	371	0			0.01	0.02			0.09
1026		1901	158.0	122.0	235.0		675	330	381	0			0.01	1.03			4.26

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
994																
995																
996																
997																
998																
999											0.62					
1000												0.1				
1001																
1002																
1003																
1004																
1005																
1006																
1007											0.39					
1008											1.1					
1009																
1010																
1011																
1012											0.18					
1013																
1014																
1015																
1016											0.41					
1017											0.28					
1018																
1019																
1020																
1021											0.1					
1022											0.69					
1023																
1024											0.22					
1025											0.24					
1026											0.25					
1027											0.33					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
994										0
995					-15.8					1
996										0
997					-14.8	-112.0				-1
998					-15.1					1
999										0
1000					-15.5					2
1001										-2
1002					-15.3					-3
1003					-18.7					-2
1004					-17.1					0
1005										0
1006										-2
1007										-2
1008										2
1009										4
1010										3
1011										0
1012										2
1013										-1
1014										1
1015										0
1016										-1
1017										5
1018										3
1019										3
1020										0
1021										0
1022										0
1023										-2
1024										-4
1025										1
1026										-3

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Date Sampled	Source	Lot	Parrish	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
							Easting	Northing	Formation						
1027		MWRB	27 ST. PAUL		49.970225	100.937281	638925	5536900	undefined	16	18				7.80
1028		MWRB	28 ST. PAUL		49.972000	100.938747	639025	5537100	undefined	17	23				7.80
1029		MWRB	71 ST. PAUL		50.012670	100.979494	641827	5541698	undefined	17	22				7.55
1030		MWRB	93 ST. PAUL		49.987347	100.976501	641687	5538877	undefined	13	36				7.40
1031		MWRB	95 ST. PAUL		49.985444	100.973075	641447	5538659	undefined	17	46				7.70
1032		MWRB	101 ST. PAUL		49.979843	100.967099	641035	5538025	undefined	13	18				8.10
1033		MWRB	113 ST. PAUL		49.965903	100.954189	640150	5536451	undefined	22	72				7.55
1034		MWRB	7 ST. PETER		50.162478	101.133423	652379	5558656	undefined	30	37				7.40
1035		MWRB	1 ST. VITAL		49.799170	100.834213	632000	5517697	undefined						7.70
1036		MWRB	5 ST. VITAL		49.802418	100.826761	631455	5518045	undefined						7.47
1037		MWRB	20 ST. VITAL		49.818342	100.819771	630909	5519803	undefined						7.30
1038		MWRB	23 ST. VITAL		49.822019	100.819909	630909	5520212	undefined	20	35				7.55
1039		MWRB	47 ST. VITAL		49.832536	100.886676	635682	5521500	undefined		12				7.60

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1027		1245	90.0	74.0	170.0		235	310	366	0			0.27		0.02			0.36
1028		1371	100.0	78.0	200.0	11	270	356	356	0			0.26		0.02			0.2
1029		927	95.5	80.4	41.5	0	305	17	388	0			0.01		0.04			2.87
1030		780	76.0	77.0	14.0		150	7	456	0			0.11					0.11
1031		782	82.0	64.0	39.0		184	22	391	0			0.1					1.4
1032		622	67.0	55.0	23.0	3	113	22	339	11			0.17		0			2.52
1033		812	88.0	58.0	60.0		192	99	315	0					0			0.08
1034		913	56.0	87.3	54.0	6.5	98	50	561	0			0					0.02
1035	6.4	3495	224.0	167.0	757.0		785	1347	215	0			0.13					3.2
1036	6.0	5034	320.0	146.0	1240.0	40	1020	2050	210	0		8.4	0					0.42
1037	7.0	5111	301.0	153.0	1287.0		1184	1958	228	0			0.02					0.9
1038	9.0	3946	224.0	121.0	980.0	39	715	1575	284	0		7.5	0			0.099	0	1.9
1039		3893	195.0	102.0	1000.0	44	725	1600	227	0			0		0.02			0.5

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
1027											0.2					
1028											0.21					
1029											0.24					
1030																
1031																4
1032																
1033																
1034																
1035																
1036																
1037																
1038																
1039											0.68					

Geochemical analyses of the Carbonate Aquifer, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1027										-4
1028										-3
1029										0
1030										0
1031										1
1032										2
1033										-1
1034						-13.2				-1
1035						-19.4				0
1036						-14.4				0
1037						-19.3				0
1038										1
1039										-1

Oilfield data

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Conductivity $\mu\text{S/cm}$	pH
										Easting	Northing	Formation						
1040		DST	1	28	1	2	W1	49.061500	97.664060	597596	5434933	RED RIVER	152.4	163.1				
1041		DST	16	4	1	20	W1	49.013010	100.086130	420577	5429251	NISKU	1083.3	1091.2				6.4
1042		DST	16	23	1	21	W1	49.057150	100.176360	414055	5434256	SOURIS RIVER	1013.8	1032.1				7.2
1043	22/4/53	DST	4	36	1	21	W1	49.075570	100.169980	414552	5436297	BIRDBEAR	1119.5	1123.2				
1044		DST	10	21	1	23	W1	49.053060	100.495390	390738	5434212	NISKU	1235	1247.2				
1045		DST	1	30	1	25	W1	49.060650	100.803880	368219	5435546	BIRDBEAR	1176.5	1187.5				6
1046		DST	9	13	1	26	W1	49.038400	100.826280	366523	5433112	SOURIS RIVER	1396.6	1403.3				7.7
1047		DST	16	11	2	10	W1	49.116290	98.695730	522204	5440209	INTERLAKE	651.4	669				
1048	17/7/79	DST	9	6	2	26	W1	49.097340	100.939230	358436	5439869	INTERLAKE	1596	1602				6.11
1049		DST	2	30	2	26	W1	49.149070	100.944160	358223	5445628	NISKU	1173.8	1179.6				8
1050		DST	9	6	3	18	W1	49.186070	99.879890	435881	5448294	BIRDBEAR	774.2	783.3				7.7
1051		DST	8	14	3	22	W1	49.212490	100.332460	402954	5451713	NISKU	790.7	800.1				
1052		DST	16	25	4	17	W1	49.339810	99.629330	454282	5465203	NISKU	577.6	588.3				6.4
1053		DST	4	13	4	21	W1	49.297880	100.190940	413410	5461034	NISKU	832.1	836.7				
1054		DST	4	4	4	22	W1	49.268390	100.394130	398577	5458008	NISKU	926.6	932.7				*
1055		DST	5	3	4	25	W1	49.272040	100.778480	370626	5459001	INTERLAKE	1446	1446				6.7
1056		DST	8	20	4	25	W1	49.316260	100.807030	368667	5463966	BIRDBEAR	999.7	1016.5				
1057		DST	3	30	5	21	W1	49.415810	100.298470	405818	5474273	NISKU	780.3	794.3				
1058		DST	4	8	5	22	W1	49.371770	100.416880	397138	5469531	NISKU	877.8	902.2				6
1059		DST	5	13	5	22	W1	49.389940	100.326600	403727	5471432	DAWSON BAY	1092.7	1109.2				
1060		DST	15	13	5	23	W1	49.397180	100.451140	394705	5472403	NISKU	851.3	888.2				6
1061		DST	1	19	5	24	W1	49.401090	100.694170	377081	5473206	SOURIS RIVER	1138.7	1144.8				
1062	14/11/52	DST	7	27	5	24	W1	49.419440	100.631960	381639	5475146	SILURIAN	1208.8	1219.5				
1063		DST	16	33	5	24	W1	49.441420	100.649020	380455	5477616	INTERLAKE	1175.9	1181.4				
1064		DST	9	35	5	25	W1	49.437810	100.739450	373890	5477363	SILURIAN	1269.5	1292.4				6.8
1065		DST	9	22	6	6	W1	49.496630	98.185250	559000	5482766	RED RIVER	326.1	335.3				
1066		DST	13	16	6	12	W1	49.485550	99.038270	497228	5481216	SOURIS RIVER	489.2	499.9				6.8
1067		DST	6	4	6	20	W1	49.448900	100.117640	418988	5477741	NISKU	713.2	721.5				
1068		DST	2	13	6	20	W1	49.474750	100.044340	424341	5480539	NISKU	670.6	676.7				
1069		DST	16	3	6	21	W1	49.456140	100.219580	411612	5478661	NISKU	732.7	740.7				
1070		DST	1	31	6	22	W1	49.519000	100.423180	396989	5485907	NISKU	736.4	747.4				
1071		DST	12	28	6	23	W1	49.511480	100.530200	389226	5485223	NISKU	767.9	774.5				

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1040		48884	1632	457	16282		4307	26084	122									
1041		36523	1756	286	11602		3731	19000	148									
1042		143491	2926	1031	51180		4700	83508	146									
1043		190280	4580	1520	67070		4000	112930	180									
1044		121936	5153	1197	40061		2582	71882	1061									
1045		169324	6630	1201	57224		2521	101500	248									
1046		103566	5145	847	33525		2337	61352	360									
1047		19218	1078	228	5599		3643	8310	360									
1048		229237	6250	1150	83100	2925	839	134900	73.2									
1049		21510	936	99	6709		5566	8151	49									
1050		116318	2930	990	40606		3997	67636	159									
1051		145376	2737	836	52380		4210	84621	592									
1052		18824	1159	281	5264		3490	8120	510									
1053		165349	5342	1659	56317		2869	98876	286									
1054		170933	5746	1547	58318		2296	102819	207									
1055		110400	2924	631	38909		2346	64900	690									
1056		101328	2510	608	35627		4504	57506	573									
1057		147963	3991	1249	51501		3457	87350	415									
1058		158053	4434	1144	55229		3121	94000	125									
1059		209422	4725	1585	74470		2839	125687	116									
1060		120098	3314	838	41903		3805	70000	238									
1061		107590	3326	682	37180		3762	62176	464									
1062		135170	3640	800	47560		3460	79420	290									
1063		111628	2475	669	39750		4240	64200	294									
1064		192092	4100	1380	68638		2729	115000	245									
1065		37578	1324	139	12581		4788	18441	305									
1066		36993	1448	592	11569		4409	18750	225									
1067		149255	3949	1371	51896		3675	88260	104									
1068		131864	3751	1120	45656		3735	77523	79									
1069		106611	2965	1117	36518		4331	61570	110									
1070		61018	2047	578	20393		4198	33515	287									
1071		67512	1933	654	22875		5101	36699	250									

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample	Ba	Zn	As	Al	Se	Ni	Cr	Cd	P	DO	F	B	DIC	DOC	TDC	U
No.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l
1040																
1041																
1042																
1043																
1044																
1045																
1046																
1047																
1048																
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1050																
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Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1040										0
1041										0
1042										0
1043										0
1044										0
1045										0
1046										0
1047										0
1048										3
1049										0
1050										0
1051										0
1052										0
1053										0
1054,										0
1055										0
1056										0
1057										0
1058										0
1059										0
1060										0
1061										0
1062										0
1063										0
1064										0
1065										0
1066										0
1067										0
1068										0
1069										0
1070										0
1071										0

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing Top	Casing Bottom	Well Depth (m)	Casing Length (m)	Conductivity (µS/cm)	pH
										Easting	Northing	Formation						
1072		DST	1	35	6	23	W1	49.519010	100.468250	393727	5485971	NISKU	751.3	755.6				
1073		DST	12	24	6	26	W1	49.496780	100.869140	364651	5484143	NISKU	908.6	916.5				
1074	12/10/81	DST	4	25	6	26	W1	49.504290	100.869140	364671	5484978	DUPEROW	945	956				7.4
1075		DST	6	36	6	27	W1	49.522660	100.999220	355308	5487262	NISKU	958	962.6				
1076		DST	5	26	7	18	W1	49.597170	99.821560	440629	5493949	NISKU	482.5	502.3				7.4
1077	14/3/56	DST	16	34	7	24	W1	49.619160	100.646580	381064	5497372	NISKU	737.6	745.8				
1078		DST	7	32	8	5	W1	49.700350	98.104180	564601	5505481	ORDOVICIAN	467.6	475.5				5.5
1079		DST	6	11	8	7	W1	49.641390	98.314520	549492	5498767	WINNIPEG SS	511.1	518.8				6
1080		DST	8	36	8	14	W1	49.700360	99.236190	482967	5505124	RED RIVER	659	678.5				
1081		DST	4	33	8	15	W1	49.696740	99.457810	466983	5504795	DEVONIAN	405.7	434.6				6
1082		DST	10	17	8	17	W1	49.659760	99.742090	446441	5500848	STONY MT.	902.2	911.4				6.4
1083		DST	3	1	8	18	W1	49.623040	99.793330	442700	5496803	RED RIVER	1015.3	1019.6				6
1084		DST	12	22	8	20	W1	49.674500	100.117340	419382	5502822	NISKU	562.7	576.1				7.58
1085		DST	11	28	8	24	W1	49.689730	100.680510	378788	5505271	NISKU	705.6	714.8				6
1086		DST	13	27	8	26	W1	49.692860	100.936390	360342	5506064	NISKU	810.8	841.2				
1087		DST	13	11	9	16	W1	49.737070	99.548690	460462	5509323	COOKING LAKE	414.5	429.8				
1088		DST	3	5	9	19	W1	49.711490	100.020770	426406	5506835	WINNIPEGOSIS	824.5	828.8				5.5
1089		DST	16	27	9	19	W1	49.781300	99.964230	430582	5514542	SOURIS RIVER	670.9	673.9				
1090		DST	1	13	9	24	W1	49.740970	100.601210	384629	5510843	NISKU	668.4	682.8				
1091		DST	4	24	9	25	W1	49.755710	100.754460	373626	5512728	BIRDBEAR	741	747.1				8
1092		DST	16	12	9	26	W1	49.737530	100.873720	364986	5510915	JEFFERSON GP	648	652				
1093		DST	1	22	9	26	W1	49.755710	100.919720	361723	5513020	NISKU	764.4	779.1				7.65
1094		DST	16	10	10	18	W1	49.825520	99.827780	440459	5519341	WINNIPEGOSIS	664.5	701				
1095		DST	14	16	10	19	W1	49.840260	99.998250	428220	5521129	WINNIPEGOSIS	749.8	771.1				
1096		DST	13	4	10	22	W1	49.810780	100.413320	398313	5518332	DUPEROW	668.1	720.2				7
1097		DST	2	8	10	26	W1	49.814680	100.970950	358206	5519671	NISKU	773	800.4				5.5
1098		DST	3	11	10	26	W1	49.814690	100.908190	362720	5519555	DEVONIAN	838.2	846.1				5.5
1099		DST	1	12	10	26	W1	49.814680	100.874220	365164	5519493	NISKU	730.9	733				
1100		DST	7	27	10	26	W1	49.862510	100.925420	361618	5524903	NISKU	730	740.7				5
1101		DST	16	20	12	25	W1	50.032580	100.853840	367230	5543681	NISKU	628.5	636.1				
1102		DST	1	10	12	26	W1	49.991950	100.945350	360559	5539330	BIRDBEAR	690.7	694.3				
1103		DST	7	11	14	5	W1	50.172530	98.040670	568508	5558035	YEOMAN	243.8	253				

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1072		109724	2765	817	38371		4544	62904	323									
1073		84950	1996	830	29336		5294	47012	482									
1074		39622	1802	632	12550	265	1671	20750	1952									
1075		167998	6092	1073	57492		2280	100695	366									
1076		119486	2643	1118	41946		4181	69500	98									
1077		55523	1692	455	18816		4204	30027	329									
1078		123899	4386	969	42213		2216	74000	115									
1079		117739	2706	819	41587		4742	67750	135									
1080		131552	3893	1004	45524		3947	77038	146									
1081		18513	1118	254	5317		3128	8500	196									
1082		51921	2366	1283	15384		4213	28375	300									
1083		183241	4702	1223	64878		2701	109557	180									
1084		181559	3560	1555	67859		3767	104725	93									
1085		185881	3788	1610	66124		3504	110750	105									
1086		28479	1301	369	8688		4130	13369	622									
1087		37598	2131	701	10989		3417	19945	415									
1088		145552	3126	1242	51480		3959	85500	245									
1089		115579	2524	655	41193		4528	66423	256									
1090		110254	3212	1050	37761		3886	63814	531									
1091		122210	2411	796	43645		4887	70062	409									
1092		43393	1001	389	14170	68	2679	23280	1806									
1093		62030	1797	554	21122		4566	33363	628									
1094		197220	4324	227	72203		2967	117377	122									
1095		158175	4010	1020	55990		2974	94023	158									
1096		149341	5022	2508	49118		2558	90000	135									
1097		156189	3409	1086	55615		3939	92000	140									
1098		191804	5640	2276	65464		2534	115500	390									
1099		170853	4978	1202	59523		3750	101302	98									
1100		158352	2879	1262	56734		4389	93000	88									
1101		58364	1867	433	19762		4381	31665	256									
1102		127045	2638	872	45502		5003	72792	238									
1103		11433	540	201	3287		1893	4731	781									

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample	Ba	Zn	As	Al	Se	Ni	Cr	Cd	P	DO	F	B	DIC	DOC	TDC	U
No.	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µg/l
1072																
1073																
1074																
1075																
1076																
1077																
1078																
1079																
1080																
1081																
1082																
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1097																
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1099																
1100																
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1102																
1103																

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1072										0
1073										0
1074										3
1075										0
1076										0
1077										0
1078										0
1079										0
1080										0
1081										0
1082										0
1083										0
1084										4
1085										0
1086										0
1087										0
1088										0
1089										0
1090										0
1091										0
1092										-3
1093										0
1094										0
1095										0
1096										0
1097										0
1098										0
1099										0
1100										0
1101										0
1102										0
1103										0

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM			Casing		Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing	Formation	Top	Bottom				
1104		DST	16	26	14	18	W1	50.223930	99.822290	441342	5563633	DAWSON BAY	647.4	656.5				6.5
1105	5/3/58	DST	1	29	14	26	W1	50.213040	100.991710	357892	5563998	NISKU	602.3	609.6				7.01
1106		DST	4	6	15	2	W1	50.242610	97.733240	590329	5566155	RED RIVER	230.1	243.8				7
1107		DST	4	17	16	24	W1	50.360460	100.757360	374999	5579967	NISKU	537.4	551.1				7.65
1108		DST	2	7	18	25	W1	50.522540	100.908020	364746	5598252	DUPEROW	588.3	608.7				7.3
1109		DST	14	17	20	5	W1	50.726590	98.127550	561580	5619566	STONY MT.	156.7	169.5				8.1
1110		DST	13	34	23	12	W1	51.035730	99.075150	494731	5653582	RED RIVER	384	446.8				8.71
1111	8/10/55	DST	16	18	30	25	W1	51.576050	100.958250	364300	5715486	WINNIPEGOSIS	694	709.3				
1112		MWRB	13	31	9	27	W1	49.796091	101.141404	345884.6	5517941	Lodgepole	713	742				7.30
1113		MWRB	11	7	11	25	W1	49.910621	100.887508	364476.9	5530182	Lodgepole	587	594				7.33
1114		MWRB	6	17	6	22	W1	49.478617	100.411495	397750.8	5481402	Lodgepole	650	661				7.30
1115		MWRB	16	17	6	22	W1	49.485855	100.400385	398570.5	5482192	Lodgepole	642	649				7.30
1116		MWRB	10	8	9	25	W1	49.733526	100.834239	367819.7	5510399	Lodgepole	640	649				7.65
1117		MWRB	5	18	12	29	W1	50.010180	101.443688	324908.5	5542405	Lodgepole	743	750				7.51
1118		MWRB	16	31	8	27	W1	49.707656	101.124409	346829.3	5508075	Lodgepole	772	762				7.70
1119		MWRB	6	7	4	21	W1	49.286969	100.298021	405604.3	5459949	Lodgepole	761	765				7.20
1120		MWRB	11	10	12	29	W1	49.999076	101.369301	330198.7	5540999	Lodgepole	730	734				7.10
1121		MWRB	14	8	11	26	W1	49.914248	101.002227	356251.5	5530800	Lodgepole	640	642				7.20
1122		MWRB	14	17	11	26	W1	49.928988	101.002259	356293	5532438	Lodgepole	648	656				7.20

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/l	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1104		137867	2960	1495	48232		4290	80750	140									
1105		42448	1314	576	13699		5797	20545	517									
1106		2775	89	108	755		368	1125	330									
1107		23738	538	231	7974		2772	11389	834									
1108		76455	1701	832	25725		5908	40642	1647									
1109		1241	36	29	325		437	207	207									
1110		44715	1125	215	15856		1683	25801	35									
1111		13627	351	149	4591		1389	6976	171									
1112		162153	2426.0	685.0	58970.0	359	4617	94600	483			12.9			0.160	<.05	0.04	3.39
1113		159008	2245.0	785.0	56500.0	470	4845	93750	410			3.1						0.02
1114		143017	2585.0	825.0	49500.0	540	4070	85000	494			3.0						0.18
1115		144186	2923.0	1215.0	50920.0	486	4954	83250	429			8.9			0.190	<.05	0.05	0.24
1116		52505	1290.0	510.0	16200.0	360	4280	29050	810			5.3						
1117		49774	1235.0	490.0	14500.0	335	4725	27830	653			5.6						
1118		41871	780.0	690.0	14350.0	265	2810	22220	750			6.1						
1119		132254	2282.0	923.0	46500.0	462	4263	77100	715			9.4			0.030	<.05	0.04	0.11
1120		51213	1017.0	442.0	18010.0	32	3695	26950	1054			12.8			0.020	<.05	0.04	0.33
1121		52583	1381.0	505.0	18030.0	362	4675	26550	1069			10.8			0.040	<.05	0.04	0.46
1122		51134	1353.0	520.0	17440.0	364	4708	25850	888			11.4			0.030	<.05	0.04	0.56

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
1104																
1105																
1106																
1107																
1108																
1109																
1110																
1111																
1112	0.02	0.03	0.014	0.09		<.01					2.4	7.27				
1113											179.5	25.95				
1114											171	42				
1115	0.01	<.02	0.001	0.06		<.01					2.6	26				
1116											66	10.6				
1117											60.5	10.4				
1118											43	7.3				
1119	0.02	<.02	0.003	0.05		<.01					3	30.3				
1120	0.05	<.02	0.01	0.08		<.01					5.7	10.5				
1121	0.04	0.03	0.011	0.13		0.03					4.7	9.58				
1122	0.03	<.02	0.013	0.09		<.01					6	9.18				

Geochemical analyses of oilfield waters, southwestern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}$ ‰ SMOW	δD ‰ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1104										0
1105										0
1106										1
1107										0
1108										-1
1109										0
1110										0
1111										0
1112	110			23.3	-3.2	-62.2				
1113	120			48.5	-2.3	-63.4				
1114	108.5			53.5	-2.8	-69.6				
1115	116			26.9	-2.7	-64.9				
1116	18.5			34.4	-15.8	-129.5				
1117	15.6			29.25	-16.8	-135.3				
1118	12.8			24.1	-15.6	-126.1				
1119	107			29.7	-3.7	-70.1				
1120	25.3			22.4	-15.6	-130.0				
1121	18			22.1	-15.2	-125.6				
1122	18.3			20.9	-15.6	-127.6				

Saline spring data

Geochemical analyses of saline spring waters, southern Manitoba

Sample No.	Date Sampled	Source	Qtr	Sec	Twp	Rge	Mer	Latitude	Longitude	UTM		Formation	Casing Top	Casing Bottom	Well Depth (m)	Casing Length	Cond. $\mu\text{S/cm}$	pH
										Easting	Northing							
1123		MWRB	NE	8	45	25	W1	52.868462	101.042716	362499	5859375							6.7
1124		MWRB	SW	34	31	19	W1	51.696978	100.073253	425823	5727663							7.08
1125		MWRB	NE	21	32	18	W1	51.762428	99.943505	434884	5734818							7.21
1126		MWRB	SW	23	33	18	W1	51.842519	99.907934	437450	5743695							7
1127		MWRB	SW	7	31	17	W1	51.638741	99.860700	440437	5720992							6.8
1128		MWRB	NE	29	30	17	W1	51.602413	99.807313	444086	5716909							6.92
1129		MWRB	SE	18	45	25	W1	52.875865	101.066897	360896	5860245							7.7
1131		MWRB	SW	21	45	25	W1	52.890337	101.030476	363392	5861785							7.7
1133		MWRB						51.563889	99.686111	452440	5712539							7.95
1134		MWRB						51.676944	99.950000	434312	5725317							8
1135		MWRB						51.841667	99.915278	436943	5743606							8.4
1136		MWRB						51.722222	100.083333	425168	5730481							6.95
1137		MWRB						51.722222	100.083333	425168	5730481							7.9
1138		MWRB						51.795278	100.100000	424139	5738623							8
1139		MWRB						51.835833	100.119444	422867	5743154							7.4
1140		MWRB						51.669444	99.947222	434493	5724480							7.55
1141		MWRB						52.869444	101.057778	361489	5859514							7.65
1142		MWRB						52.868889	101.057222	361525	5859451							7.75
1143		MWRB						52.886111	101.041667	362626	5861336							8.15
1144		MWRB						52.753889	100.884722	372799	5846342							7.15
1145		MWRB						52.754444	100.885556	372745	5846405							7.8
1146		MWRB						52.745833	100.748611	381963	5845214							8
1147		MWRB						52.753611	100.885000	372780	5846311							7.8
1148		MWRB						52.902778	101.020833	364080	5863150							7
1149		MWRB						52.752778	100.880556	373077	5846211							6.9
1150		MWRB						52.752778	100.883333	372890	5846215							8.1
1151		MWRB						52.753611	100.881944	372986	5846306							8.15
1152		MWRB						52.755000	100.882778	372934	5846462							7.8
1153		MWRB						52.802778	100.955556	368167	5851907							6.8
1154		MWRB						52.801944	100.913889	370973	5851738							8.1
1155		MWRB						52.799167	100.913056	371021	5851428							6.8
1156		MWRB						52.799167	100.913611	370984	5851429							7.55

Geochemical analyses of saline spring waters, southern Manitoba

Sample No.	Temp °C	TDS mg/l	Ca mg/L	Mg mg/L	Na mg/l	K mg/l	SO ₄ mg/l	Cl mg/l	HCO ₃ mg/l	CO ₃ mg/l	Alk-OH mg/l	SiO ₂ mg/l	NO ₃ +NO ₂ -N mg/l	NH ₃ -N mg/l	Mn mg/l	Pb mg/l	Cu mg/l	Fe mg/l
1123	-	54900	914	259	16400	477	2900	33000	349			7.9	<0.01		<0.02	<0.005	0.04	1.56
1124	6	35790	1041	290	11700	310	2461	18650	259			6.79	3.05		0.032	0.078	<0.01	0.19
1125	6.5	29560	929	276	9240	259	2301	15160	271			8	2.05		0.068	<0.05	0.043	1.92
1126	5	27090	811	229	8770	241	1967	14320	283			7.58	2.55		0.059	<0.05	0.086	1.51
1127	7.5	1.013	739	215	6080	184	930	10800	254			9.14	1.7		0.032	<0.05	<0.01	0.07
1128	6	6060	272	121	2070	92	971	2970	278			9.1	0.65		0.036	<0.05	0.049	0.55
1129	-	55950	1120	320	19000	520	2880	31850	260			3.6	4					
1131	-	56815	1140	395	19000	520	2670	32800	290			2.22	4					
1133		14980	718	270	4160	150	2265	7175	242				0.01		0.1			1.39
1134		18120	668	206	5568	117	1693	9650	218				0.13		0.15			1.3
1135		6503	220	112	1975	32	500	3400	264				0.01		0.02			0.1
1136		32519	1068	216	10650	320	2510	17500	255				2.19		0.08			3.41
1137		47613	1400	406	16100	407	3600	25700							0.04			0.79
1138		8941	280	140	2750	85	665	4560	461				0.01		0.04			0.15
1139		18924	495	136	6000	190	1940	10000	163				0.24		0.05			0.34
1140		43256	1347	423	14233	370	3493	23100	290				0.1		0.14			1.84
1141		49083	1113	328	16200	350	2478	28400	214				0.58		0.12			13.4
1142		4201	146	47	1450	28	165	2180	185				0.03		0.02			1.75
1143		53274	1030	180	18800	475	2650	30000	139				1.4		0.07			1.63
1144		10717	308	127	3550	58	460	5850	364				0.01		0.32			0.5
1145		28398	745	216	9700	N/A	1700	15800	237				0.03		0.1			0.51
1146		5767	130	66	1184	21	78	3850	438				0.73		0.03			0.13
1147		6780	241	75	2162	5	606	3530	161				0.15		0.1			0.56
1148		31640	868	283	10850	258	1625	17550	206				0.05		0.07			3.97
1149		60253	1188	250	21350	550	3050	33500	365				0.23		0.06			2.84
1150		29542	587	132	10115	25	1500	17040	143				0.19		0.05			0.64
1151		58288	1210	240	20000	N/A	3050	33600	188				0.37		0.03			0.16
1152		1761	59	19	587	15	100	861	120				0.02		0.05			0.24
1153		60302	1203	259	21313	460	2940	33750	377				0.01		0.05			5.15
1154		49033	1000	249	16600	315	2360	28300	209				0.37		0.06			2.55
1155		59298	1373	297	20100	535	3073	33533	387				0.01		0.07			2.34
1156		59281	1360	303	20000	555	3157	33533	373				0.34		0.3			6.19

Geochemical analyses of saline spring waters, southern Manitoba

Sample No.	Ba mg/l	Zn mg/l	As mg/l	Al mg/l	Se mg/l	Ni mg/l	Cr mg/l	Cd mg/l	P mg/l	DO mg/l	F mg/l	B mg/l	DIC mg/l	DOC mg/l	TDC mg/l	U µg/l
1123	0.003	<0.01	0.002			0.038					1	3.8				
1124	0.018	0.041	0.0267	0.61		0.084					2.15	2.62				
1125	0.019	0.04	0.023	0.719		0.105					1.7	2.79				
1126	0.019	0.051	0.0295	0.653		0.089					1.5	2.62				
1127	0.016	0.054	0.0031	0.613		0.093					1.5	2.7				
1128	0.014	0.054	0.0188	0.27		<0.05					0.93	2.49				
1129	17.9					1.77					35	3.03				
1131	19.9					0					35.4	3.22				
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Geochemical analyses of saline spring waters, southern Manitoba

Sample No.	Br mg/l	Ag mg/l	Mo mg/l	Sr mg/l	$\delta^{18}\text{O}\text{‰}$ SMOW	$\delta\text{D}\text{‰}$ SMOW	Tritium T.U.	Total coliform	Fecal coliform	Charge Balance %
1123	20.11			1706	-10.0	-70.0				
1124	9.9			14.9	-20.0	-150.0				
1125	2.93			13.3						
1126	10.35			11.98						
1127	7.85			10.4						
1128	3.1			3.98						
1129	25.4									
1131	25.4									
1133										
1134										
1135										
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