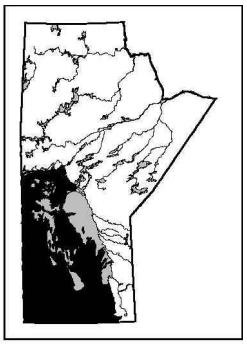
GS-25 STRATIGRAPHIC INVESTIGATIONS AND COREHOLE DRILLING PROGRAM, 2001

by R.K. Bezys and J.D. Bamburak



Bezys, R.K. and Bamburak, J.D. 2001: Stratigraphic investigations and corehole drilling program, 2001; *in* Report of Activities 2001, Manitoba Industry, Trade and Mines, Manitoba Geological Survey, p. 159-163.

SUMMARY

Stratigraphic investigations and drilling programs were carried out for various projects. The Capital Region Project has been completed and the report is in the editing stage. One corehole was drilled at Denbeigh Point (Lake Winnipegosis) to intersect the Precambrian; three coreholes were drilled in the Wekusko Lake–Iskwasum Lake area to test metallic veining in the Red River Formation; and one corehole was drilled at Steeprock River bridge to intersect mineralization within Mesozoic infill. A total of 326.6 m of drilling was conducted this year.

STRATIGRAPHIC INVESTIGATIONS

Capital Region Project

A mineral-resource and land-use assessment of Manitoba's Capital Region (Winnipeg and portions of the surrounding municipalities) was undertaken by the Manitoba Mines Branch and the Manitoba Geological Survey. The study is being conducted in response to the Capital Region Strategy, under development by the Manitoba Round Table. The purpose of this assessment is to provide mineral-resource data for use in municipal development plans for the Capital Region that will legally protect high-quality quarry minerals, such as crushed stone (Bamburak and Bezys, 1995, 1996).

In 1999, eight preliminary maps were released that depict overburden thickness, bedrock topography and mineral resource potential in NTS map sheets 62I/2, /3, /6 and /7. Final versions of these maps, as well as eight maps covering NTS map sheets 62H/10, /11, /14 and /15 are in the final stages of preparation; the accompanying economic report will be released for January 2002 (*see* Conley, GS-22, this report).

STRATIGRAPHIC COREHOLE DRILLING

Denbeigh Point

Denbeigh Point, located at the northeast end of Lake Winnipegosis, is situated above Archean terrane near the eastern edge of the Superior Boundary Zone (SBZ). Tyrrell (1892) noted marcasite concretions between boulders on Ami, Cormorant and Pemmican islands and large nodules of grey chert within dolomite beds on the shoreline and islands near Denbeigh Point. Cominco Ltd., attempting to locate Mississippi Valley-type deposits, conducted drill programs 8 km south of Easterville in 1971 (Assessment File 91785, Manitoba Industry, Trade and Mines, Winnipeg) and in the late 1990s (Assessment files 72623, 72892, 73009 and 73024, Manitoba Industry, Trade and Mines, Winnipeg). None were found but the Denby Structure, an anomalous Precambrian basement high (McCabe, 1978), and accretionary lapilli within Cretaceous channel fill (Bezys et al., 1996) were identified.

In 1978, corehole M-4-78 was drilled on the west shore of Denbeigh Point, midway along its length, to a depth of 93.5 m and terminated in the Williams Member of the Stonewall Formation. The corehole was deep enough to complement the nearby Cominco Denby No. 1 drillhole and provide a complete stratigraphic section from Precambrian to uppermost Silurian (McCabe, 1978). During the summer of 2001, corehole M-1-01 was drilled near the 1978 corehole site (located within Chemawawin Indian Reservation 3) with the permission of Chief Clarence Easter of Chemawawin Cree Nation (Fig. GS-25-1). The corehole was drilled to provide a continuous stratigraphic corehole for detailed geochemical sampling over this interval, to check for possible fracturing of the lower Ordovician beds, and to determine the nature of the Precambrian (Table GS-25-1). Unfortunately, drilling problems were encountered in the Winnipeg Formation sand and the corehole had to be terminated at 203.3 m.

Wekusko Lake–Iskwasum Lake Area

In 2000, corehole M-4-00 was drilled on a mineralized fracture within Ordovician Red River Formation dolomite in a Manitoba Highways quarry (UTM 14, E445016, N6054470), located south of Wekusko Lake and PTH 39 (Bezys, 2000); however, only thin clots and veinlets were found near the top of the hole. Analytical results of the mineralized surface and core samples are shown in Table GS-25-2.

M. Fedikow of the Manitoba Geological Survey (pers. comm., 1999) reported similar mineralization south of Iskwasum Lake. To determine the extent and nature of the mineralization near this locality, three shallow coreholes (M-2-01, M-3-01 and M-4-01) were drilled (Fig. GS-25-1; Table GS-25-1) along PTH 39, south of Iskwasum Lake. Core from these holes will be sent for analyses.

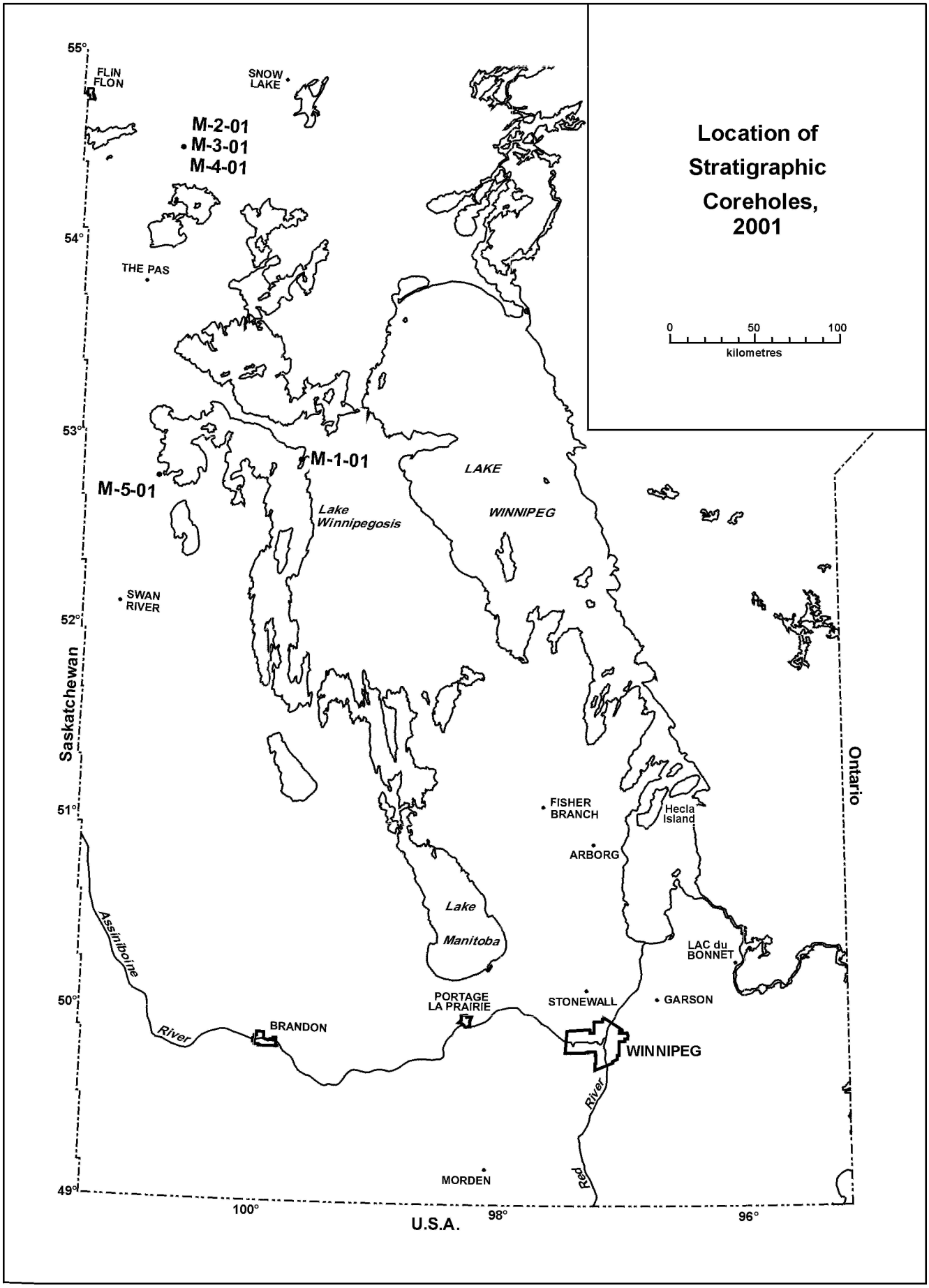


Figure GS-25-1: Location of stratigraphic coreholes, 2001.

Table GS-25-1: Summary of stratigraphic corehole data, 2001.

Hole no.	Location and elevation (m)	SYSTEM/Formation/ (Member)	Interval (m)	Lithology summary
M-1-01 Denbeigh Pt.	12-19-45-16W 5860573N 447396E 254.5	SILURIAN/Interlake Group/ Cedar Lake	0.0-2.0	Tan wackestone, dolomitic, very broken core
		(V-Marker)	2.0-6.6	Dark grey mudstone
		Cedar Lake	6.6-22.3	Buff packstone, marker beds at 12.0-13.8 and 21.3-22.3 m
		East Arm	22.3-40.8	Light brown-tan mudstone to wackestone, very hard to distinguish between East Arm and Cedar Lake formations
		(U_2-Marker)	40.8-45.6	Green-grey, laminated mudstone
		Atikameg	45.6-50.9	Light brown packstone, lost core
		Moose Lake	50.9-59.9	Light brown-tan wackestone, marker bed at top
		(U_1-Marker)	59.9-61.0	Dark brown-grey mudstone, laminated
		Fisher Branch	61.0-75.3	Light brown wackestone, broken and porous core, minor shaly fragments at the base, some corals
		SILURIAN/Stonewall	75.3-82.5	Light brown mudstone to wackestone, laminated, gradational upper contact 75.3-76.8: Stonewall Marker; grey, laminated mudstone 78.8-82.5: T-Zone; dark grey, laminated mudstone, burrowed, some rip-up clasts
		ORDOVICIAN/Stonewall	82.5-91.0	Light brown wackestone, some bituminous partings
		(Williams)	91.0-101.5	Brown mudstone, laminated, 0.5 m marker bed at top
		Stony Mountain	101.5-131.9	101.5-112.3: upper Stony Mountain; very similar to Lower Red River, light brown, mottled wackestone 112.3-131.9: lower Stony Mountain; very nodular and mottled with bituminous partings
		Red River (Fort Garry) (lower Red River)	131.9-200.3	131.9-149.4: Light grey to brown wackestone, scattered chert, burrowed and fossiliferous 149.4-200.3: Light brown-tan wackestone, mottled, some chert, burrowed, fossiliferous
		Winnipeg	200.3-203.3	Light to dark grey sandstone, well rounded, medium grained, quartzose, burrowed, abundant flecks of ovoid, flattened fragments (rip-ups) of shaly material, some are pyritic (maybe oolites?), some pyrite and marcasite mineralization present, dolomitic sandstone at top
M-2-01 Iskwasum Lake S	11-23-65-23W 6050487N 381619E 311.5	ORDOVICIAN/Red River (lower)	0.00-18.50	Mottled dolomite, buff becoming red below 11.60 m, abundant sand grains near the base
		Winnipeg	18.50-19.67	Silica sand, ferruginous in upper 4.00 cm, becoming soft at the base, lost 0.50 m of core
		PRECAMBRIAN	19.67-25.19	Mafic gneiss with near-vertical fractures (spacing 0.25-0.50 m) cutting foliation, minor pyrite at base
M-3-01 Iskwasum Quarry W	2-23-65-23W 6050581N 382005E 304.8	ORDOVICIAN/Red River (lower)	0.00-11.30	Mottled dolomite, buff becoming reddish below 5.80 m, abundant sand grains at the base
		Winnipeg	11.30-12.04	Ferruginous silica sand with buff rip-ups of kaolin, silica sand and blue clay
		PRECAMBRIAN (weathered) (unweathered)	12.04-20.05	12.04-14.24: Regolith, abundant pyrite, oxidized, becoming darker downward 14.24-20.05: Dark green argillite to 17.25 m, soft mud to 17.77 m (lost core), mafic gneiss at the base
M-4-01 Iskwasum Quarry E	7-23-65-23W 6050624N 382151E 304.8	ORDOVICIAN/Red River (lower)	0.0-9.60	Mottled dolomite, buff with minor chert, becoming reddish below 4.37 m, abundant sand grains near the base
		Winnipeg	9.60-10.85	Silica sand, ferruginous in upper 1.06 m, lost 0.50 m of core
		PRECAMBRIAN (weathered) (unweathered)	10.85-17.25	10.85-10.94:Regolith, black shale 10.94-17.25: Mafic gneiss, some near-vertical fractures
M-5-01 Steeprock River Bridge	5-13-44-25W 5850400N 367300E 260.0 m	OVERBURDEN	0.0-9.0	Brown clay, boulder fragments
		DEVONIAN/Dawson Bay (Middle Beds)	9.0-23.8	Light green-grey limestone, mudstone, crinoidal
		(Lower Beds)	23.8-35.8	Tan limestone, wackestone, stylolitic, fossiliferous
		(Second Red Beds)	35.8-45.5	Buff to red mudstone, dolomitic
		Transitional Beds	45.5-51.6	Limestone breccia, very angular fragments, and tan
		Winnipegosis (Upper)	51.6-60.8	Reefal, porous, beige, packstone, fractured

Table GS-25-2: Analytical results of the mineralized surface and core samples of Red River Formation dolomite from Wekusko South Quarry ((instrumental neutron activation analysis [INAA], inductively coupled plasma optical emission spectroscopy [ICP-OES] and inductively coupled plasma cold vapour [ICP-CV] geochemistry).

Element	Au	As	Ba	Br	Co	Cr	Cs	Fe	Hf	Ir
Units	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppb
Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
Detection limit	2	0.5	50	0.5	1	5	1	0.01	1	5
Sample no.										
99-99-SL-002B (surface)	<2	90.4	<50	17.7	44	<5	<1	5.06	<1	<5
99-99-SL-002B (D) (surface)	<2	90.9	<50	17.6	43	<5	<1	4.98	<1	<5
99-99-SL-002A (surface)	<2	73.3	<50	18.8	34	5	<1	3.66	<1	<5
M-4-00-0 (corehole)	<2	19.3	<50	9.9	10	5	<1	1.78	<1	<5

Element	Na	Rb	Sb	Sc	Se	Sn	Ta	Th	U	W
Units	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm
Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
Detection limit	0.01	15	0.1	0.1	3	0.01	0.5	0.2	0.5	1
Sample no.										
99-99-SL-002B (surface)	0.03	<15	8.3	0.3	<3	<0.01	<0.5	0.2	3.0	<1
99-99-SL-002B (D) (surface)	0.03	<15	8.5	0.4	<3	<0.01	<0.5	0.3	3.0	<1
99-99-SL-002A (surface)	0.04	<15	6.1	0.4	<3	<0.01	<0.5	0.3	2.9	<1
M-4-00-0 (corehole)	0.02	<15	1.5	0.5	<3	<0.01	<0.5	<0.2	2.0	<1

Element	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Mo	Cu
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Method	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	ICP-OES	ICP-OES
Detection limit	0.5	3	5	0.1	0.2	0.5	0.2	0.05	2	1
Sample no.										
99-99-SL-002B (surface)	2.6	4	<5	0.5	<0.2	<0.5	<0.2	<0.05	<2	200
99-99-SL-002B (D) (surface)	2.6	3	<5	0.5	0.2	<0.5	0.2	<0.05	<2	196
99-99-SL-002A (surface)	2.5	5	<5	0.6	<0.2	<0.5	<0.2	<0.05	2	75
M-4-00-0 (corehole)	2.6	5	<5	1.1	0.5	<0.5	0.4	0.06	<2	69

Element	Pb	Zn	Ag	Ni	Mn	Sr	Cd	Bi	V	Ca
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
Method	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES
Detection limit	5	1	0.5	1	1	1	0.5	5	2	0.01
Sample no.										
99-99-SL-002B (surface)	248	28	1.1	52	1841	46	<0.5	<5	6	17.14
99-99-SL-002B (D) (surface)	226	28	1.1	54	1823	44	<0.5	<5	4	16.70
99-99-SL-002A (surface)	133	21	<0.4	34	1565	44	<0.5	<5	2	16.26
M-4-00-0 (corehole)	24	<1	0.6	13	1037	38	<0.5	<5	2	18.53

Element	P	Mg	Ti	Al	K	Y	Be	S	Hg
Units	%	%	%	%	%	ppm	ppm	%	ppb
Method	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-OES	ICP-CV
Detection limit	0.001	0.01	0.01	0.10	0.01	2	2	0.01	5
Sample no.									
99-99-SL-002B (surface)	0.008	9.30	<0.01	0.11	0.07	4	<2	2.92	362
99-99-SL-002B (D) (surface)	0.008	9.17	<0.01	0.10	0.07	4	<2	2.73	333
99-99-SL-002A (surface)	0.004	9.36	0.01	0.11	0.06	3	<2	2.13	233
M-4-00-0 (corehole)	0.005	14.71	<0.01	0.10	0.07	6	<2	0.43	-

(D) duplicate sample

Steeprock River

Also in 2001, corehole M-5-01 was drilled at the Steeprock River bridge to intersect possible mineralization within the Mesozoic (Fig. GS-25-1). In 1975, corehole S-4-75 encountered 36.0 m of probable Mesozoic infill with some pyritic mineralization and the Devonian strata were severely disrupted (H.R. McCabe, unpub. rept., 1975). McCabe suggested that the feature might represent a post-Devonian, pre-Cretaceous sedimentary breccia and channel fill. It may also be related to salt collapse or tectonics. Corehole M-5-01 encountered 9.0 m of overburden and had no indication of Mesozoic infill or severely disrupted Devonian strata (Table GS-25-1).

REFERENCES

Bamburak, J.D. and Bezys, R.K. 1995: Capital Region resource evaluation project (NTS 62I/3); *in* Report of Activities 1996, Manitoba Energy and Mines, Geological Services, p. 151–154.

Bamburak, J.D. and Bezys, R.K. 1996: Capital Region study: update 1996 (NTS 62H and 62I); *in* Report of Activities 1996, Manitoba Energy and Mines, Geological Services, p. 103–107.

Bezys, R.K. 2000: Stratigraphic investigations and corehole drilling program, 2000; *in* Report of Activities 2000, Manitoba Industry, Trade and Mines, Manitoba Geological Survey, p. 196–201.

Bezys, R.K., Fedikow, M.A.F. and Kjarsgaard, B.A. 1996: Evidence of Cretaceous(?) volcanism along the Churchill–Superior boundary zone, Manitoba (NTS 63G/4); *in* Report of Activities 1996, Manitoba Energy and Mines, Geological Services, p.122–126.

McCabe, H.R. 1978: Stratigraphic core hole and mapping programme; *in* Report of Field Activities 1978, Manitoba Department of Mines, Resources and Environmental Management, Mineral Resources Division, p. 64–67.

Tyrrell, J.B. 1892: Report on North-Western Manitoba; *in* Annual Report of the Geological Survey of Canada (1890–91), v. 5, pt. 1, p. 153E, 170E.