Geology of the Southern Part of the Rusty Lake Greenstone Belt

Legend

10 Intrusive Rocks
- a) granite, quartz monzonite
- b) granodiorite
- c) diorite, gabbro
- d) quartz-feldspar porphyry
- e) diabase

9 Iron Formation

8 Conglomerate, sandstone,siltstone; volcanic derived
- a) mafic to intermediate
- b) arkosic

7 Siltstone
- a) intermediate
- b) felsic

6 Sandstone
- a) greywacke
- b) arkose

5 Conglomerate
- a) polymictic; volcanic clasts
- b) polymictic; volcanic and plutonic clasts

4 Heterolithic Volcanic Breccia
- a) tuff breccia
- b) lapilli tuff

3 Rhyolite and Dacite Pyroclastic Rocks
- a) tuff-breccia
- b) lapillistone
- c) lapilli-tuff
- d) tuff

2 Rhyolite and Dacite Flows

1 Basalt Flows
- a) aphyric, plagioclase-phyric, plagioclase-and-hornblende-phyric; massive, pillowed, flow breccia
- b) hornblende-phyric; massive, flow breccia
- c) hornblende-phyric; differentiated

SYMBOLS

Zone of intrusion breccia

Flooded areas

Contacts:

Defined

Approximate

Assumed

Extrapolated

Faults

Limit of Flooding

Area of Overburden

Limit of geological mapping

★ Mineral occurrence description

Geology by D.A. Baldwin (1980, 1979, 1978), including data collected by H.P. Gilbert (1974)

Map adapted from Manitoba Energy and Mines, Geological Report GR86-1; Map GR 86-1-1, 1:50 000

1000 0 1000 2000 3000 4000 5000 Meters

5000 0 5000 10000 Feet

NTS: 64B05 **MDS_No.: M64B05-001**

LOCATION: 1

NAME: Ruttan

EASTING: 460763 **NORTHING: 6259107**

AREA: NTS 64B/5; Ruttan Lake.

AIR PHOTO: A25474-115

ACCESS: Gravel all-weather road from the town of Leaf Rapids.

EXPLORATION SUMMARY

The exploration history of the Ruttan deposit is summarized from Mineral Inventory Card 64B/5 Cu1 and from "The Ruttan Mine Story" (SGM, 1984). SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). SGM conducted follow-up ground EM and magnetic surveys in 1968, and drilled numerous holes totalling 21 030 m in 1969. Ore reserves of 46 300 000 t grading 1.47% Cu and 1.61% Zn to the 600 m level were calculated in 1969. Exploration and development continued, including a total of 61 570 m of drilling, bulk sampling and test milling, and construction of the town of Leaf Rapids 24 km to the west. Production from an open pit commenced in 1973 at a rate of 9000 t per day and ceased in 1980; production from underground operations at rates up to 5500 t per day began in 1979 and is ongoing. In 1987, Hudson Bay Mining & Smelting Co., Limited purchased 100% interest in the Ruttan Mine. A 50% net profit interest was purchased by the Government of Manitoba for a price equivalent to an outstanding loan repayment (Hudson Bay Mining and Smelting Co., Limited, 1987 Annual Report). Production commenced from the Ruttan West Anomaly in 1991. As of June 30, 1992, proven and probable reserves for the combined Ruttan and Ruttan West Anomaly deposits were 8 276 000 t averaging 1.37% Cu and 1.75% Zn (Minorco, 1992 Annual Report).

GEOLOGICAL SETTING

The area is underlain by Ruttan Group (Ruttan Block) greywacke and felsic siltstone. The sedimentary succession also includes heterolithic volcanic breccia, polymictic conglomerate and basalt flows, and is surrounded by mafic intrusive rocks and intrusion breccia (Baldwin, 1988). Strata are truncated to the west by post-Sickle granodiorite (Steeves and Lamb, 1972), and partly truncated to the northeast by the Vol Fault (Baldwin, 1988; Ames and Scoates, 1992). Various aspects of the geology of the Ruttan area have been investigated in detail by Haverslew (1976), Baldwin (1978), Jackson (1979), Jackson and Turnock (1979), Baldwin (1982), Speakman et al. (1982), and by Ames and Scoates (1992), which includes work reported earlier by Ames et al. (1990, 1991) and Ames (1991). Various field trip summaries are given by Gale et al. (1982) and Gilbert et al. (1982). Forthcoming papers will describe the results of detailed mapping near the Ruttan deposit (Ames, in prep.), the geology of the West Anomaly (Ames and Taylor, in prep.), and the geology and geochemistry of rhyolite flows from the Karsakuwigamak Block compared to those of the Ruttan area (Ames and Baldwin, in prep.). The detailed geology described here is summarized primarily from Ames and Scoates (1992). A sequence of basalt flows (800 m thick) with subordinate breccia and sulphidic interflow tuff ('Mine Basalt') constitutes the lowermost part of the exposed stratigraphy. A 250 m thick unit of pyroxene phyric basalt overlies the Mine Basalt to the east of the minesite. The pyroxene phyric basalt is overlain variously by intermediate volcaniclastic rocks; microcline-rich rhyolite; plagioclase phyric andesite tuff, lapilli tuff and tuff-breccia. Microcline rhyolite (<10 to 100 m thick) is overlain by aphyric andesite (up to 120 m thick) or the plagioclase phyric andesite. The 'Mine Sequence' consists of solid sulphide, rhyolite tuff and quartzofeldspathic rocks. It overlies, variously, feldspar porphyry, microcline rhyolite, aphyric andesite and plagioclase phyric andesite. The solid sulphides occur within the rhyolite tuff and/or quartzofeldspathic rocks, collectively 'Mine Rhyolite', a name given by Speakman et al. (1982)(Speakman et al. (1982) postulated that the Mine Rhyolite was composed of silicified volcaniclastic rocks) and retained in Ames and Scoates's (1992) nomenclature. A thick (1000 m) sequence of greywacke turbidites and debris flows ('Powder Magazine' or 'P.M.' Unit; nomenclature by Speakman et al., 1982 and retained by Ames and Scoates, 1992) constitutes the hanging wall stratigraphy. The P.M. Unit has been traced 10 km to the northeast of the deposit and 2 km southwest of the deposit (Baldwin, 1982). The sedimentary sequence youngs to the south; sediments were transported from the northeast (Baldwin, 1978; Speakman et al., 1982; Ames and Scoates, 1992). Minor felsic and mafic rocks of unknown origin occur near the southern limits of the tailings pond (Ames and Scoates, 1992). Ames and Scoates (1992) interpret footwall rocks at the deposit as a unit of variably silicified basalt. Aphyric, quartz amygdaloidal, pillowed basalt with chlorite-quartz-sulphide interpillow material and epidote alteration are transected by northeast-trending silicification domains. Alteration intensity ranges from fracture-controlled to pervasive silicification zones. Ames et al. (1990) identified "relict amygdaloidal basalt flows, black 'clast-like' pods and amphibole-chlorite-garnet fractures" within the zones of silicification. Further to the northeast, Ames and Scoates (1992) note pillowed basalt overlain by hornblende phyric, matrix supported heterolithic basalt breccia, tuff breccia and aphyric massive flows. Mafic feldspar- and feldspar-hornblende phyric fragments are most common; other mafic and felsic clasts are present. In contrast, Baldwin (1982) and Speakman et al. (1982) describe felsic and intermediate volcaniclastic rocks near the minesite as fine- to medium-grained, massive, and equigranular with a uniform appearance and composition. Primary structures are obliterated, but Baldwin (1982) recognizes felsic to intermediate fragments, and Speakman et al. (1982) note "indistinct banding and vague curved lamellae". Away from the deposit, elliptical, subangular to subrounded, <1 mm to 40 cm, equidistributed, felsic and intermediate fragments are supported in a greywacke matrix. Rarely, fragments are graded. The matrix is more biotitic and more coarsely crystalline than the fragments. A few heterolithic members, some of which are clast supported, were noted within this unit. Thinly bedded intermediate to felsic sedimentary rocks, 1 to 2 m thick, are interbedded with the volcaniclastic rocks. According to the interpretation of Speakman et al. (1982), the upper 100 m (near the deposit) to 400 m (northeast of the deposit) of this unit are altered, and they designate a dome-shaped unit of 'Altered Footwall Volcaniclastic

Rocks'. The rhyolite tuff that is part of the Mine Sequence and hosts the solid sulphide lenses at the Ruttan deposit was traced 2200 to 3500 m along strike to the northeast of the open pit, where it comprises three members: (1) quartz phyric rhyolite tuff, 3 to 4 m wide, with 10 to 15% quartz phenocrysts and 5 to 10% garnet, interlayered with minor laminated mafic sedimentary rocks; (2) massive, rusty white weathering, quartz phyric and aphryric rhyolite tuff, 3 to 4 m wide, with 5% combined magnetite, pyrite, pyrrhotite, barite, sphalerite and chalcopyrite; and (3) 1.6 m of normally graded quartz- and feldspar-phyric rhyolite. The quartzofeldspathic rocks in the Mine Sequence are quartz-feldspar-biotite schists with 30% sericite and 20% amphibole in patches (Ames and Scoates, 1992). Speakman et al. (1982) and Baldwin (1982) also identify a 50 to 100 m thick 'Exhalite Horizon' separate from the Mine Rhyolite composed of mixed chemical and detrital sediments with 10 to 15% pyrite overlying and flanking the Mine Rhyolite at the base of the P.M. Unit. Ames et al. (1990) apparently describe these rocks as <30 m of mixed chert and felsic tuff more than 2200 m northeast of the deposit, the extension of the Ruttan horizon, part of the Mine Sequence, and place the location of the extension approximately 400 m northwest of the position shown by Jackson (1979), Baldwin (1982) and Speakman et al. (1982). Pre-Sickle mafic stocks intrude the P.M. Unit, and other pre-Sickle sills and dykes of various compositions intrude throughout the stratigraphic succession (Steeves and Lamb, 1972; Ames and Scoates, 1992). A 500 m thick plagioclase porphyry occurs in the immediate footwall to the deposit and further to the northeast (Ames et al. (1990) suggests, instead, that Speakman et al.'s (1982) Footwall Volcaniclastic Rocks are equivalent to feldspar porphyry dykes/sills), and is notable for its visible lack of alteration. A quartz-plagioclase porphyry intrudes the base of the P.M. Unit near the deposit (Ames and Scoates, 1992). A penetrative foliation (S1) subparallel to bedding is oriented 060°/85°S (Ames and Scoates, 1992). The stratigraphic sequence including the deposit sits upright and tops to the south (Speakman et al., 1982; Baldwin, 1982; Ames and Scoates, 1992). Minor F1 folds are Z-shaped and trend and plunge parallel to the ore lenses underground (130°/60°SE). A secondary penetrative foliation (S2) with an average orientation of 053°/77°SE is visible in Mine Basalt in the northeastern part of the area. F1 folds are gently folded into an asymmetric map-scale pattern by F3 folds that plunge 60° to 80°SE (Ames and Scoates, 1992). A shear zone ('North Wall Shear') up to 30 m wide, oriented slightly discordant to the ore lenses (Speakman et al., 1982) at 070°/80°S, is a post-F1 high-angle reverse fault with south side up (Ames and Scoates, 1992); it has been identified along the north side of the open pit and underground, and bifurcates into three main and many minor splays (Speakman et al., 1982). A series of northeasterly trending shear zones crosscut the Ruttan Group. South of the tailings pond, schistosity and shear zones in supracrustal rocks are parallel (030°/75°SE) (Ames and Scoates, 1992).

MINERALIZATION

Mineralization

Multiple en echelon lenses of solid pyrite, pyrrhotite, chalcopyrite and sphalerite occur in a quartz-feldspar-chlorite-biotite-sericite-staurolite-garnet gangue with minor gypsum, anhydrite and calcite (Speakman et al., 1982; Staff, SGM, 1984). Veinlets or vug fillings of galena are rare (Haverslew, 1976). The lenses collectively have a strike length of 825 m and an average width of 35 m, strike approximately 070°, dip 67°SE and plunge 45°E (Staff, SGM, 1984). The lenses are recrystallized and display medium- to coarse-grained granoblastic to augen gneissic textures; most pre-existing textures are obliterated (Speakman et al., 1982). The lenses are hosted by the Mine Sequence, and mineralization is zoned with the more Zn-rich lenses being stratigraphically higher (toward the south) than the stratigraphically lower Cu-rich lenses to the north. Mineralization is also hosted by crosscutting chlorite-biotite schist with cordierite, quartz, and locally, garnet or talc and tremolite (Speakman et al., 1982). A solid sulphide vein of arsenopyrite, scorodite and visible gold cuts a microcline-quartz alteration vein system northeast of the minesite (Ames, 1991). However, Ames and Scoates (1992) specifically note that the microcline-quartz alteration itself is not auriferous.

Alteration

Alteration in the area of the Ruttan deposit has been noted by previous workers, including Gale and Koo (1977), Jackson (1979), Speakman et al. (1982), Ames et al. (1990, 1991), Ames (1991) and Ames and Scoates (1992). This summary is derived from Ames and Scoates (1992). A semi-conformable zone of epidotization, silicification, amphibole blastesis and quartz-microcline alteration affects the Mine Basalt unit and plagioclase phyric andesite and diorite sills, 1500 m below the mine horizon in the footwall. It is also associated with silicification zones in the hanging wall. A discordant zone of ferromagnesian alteration, sericitization and microcline-quartz alteration occurs in the immediate footwall to the Ruttan deposit (Ames and Scoates, 1992). Epidotization is patchy in Mine Basalts, most common as amoeboid domains in pyroxene phyric basalt, and also as pods in diorite sills. Silicification zones occur at various levels throughout the stratigraphy, and range from fracture controlled to patchy to pervasively altered domains. Amphibole blastesis occurs in parallel ribbons, along fractures oblique to bedding, as rims on epidosite pods and as irregular clots in the P.M. Unit adjacent to diorite sills. Ferromagnesian alteration assemblages are extensive, spectacular and diverse, and have been subdivided into six types: talc-chlorite-biotite; anthophyllite-garnet-chlorite ± cordierite, magnetite, pyrite and pyrrhotite; cordierite-chlorite ± andalusite, biotite, garnet, staurolite, magnetite; garnet-chlorite ± biotite and amphibole; staurolite-biotite-andalusite ± chlorite and plagioclase; and magnetite blastesis. In general, the cordierite-anthophyllite rocks dominate in the West Anomaly, and in the lenses to the east, cordierite-chlorite-biotite rocks dominate. The fringes of the ferromagnesian-altered rocks are sericitized; cordierite is associated with sericitized zones in the footwall to the deposit. Microcline-quartz alteration occurs as microcline veins and as a quartz stockwork with amoeboid microcline patches (Ames and Scoates, 1992).

GEOCHEMISTRY

Combined past production and reserves from the Ruttan deposit total 39 985 000 tonnes grading 1.30% Cu and 1.36% Zn (Bamburak, 1990). As of June 30, 1992, proven and probable reserves for the combined Ruttan and Ruttan West Anomaly deposits were 8 276 000 t [9 124 000 short tons] averaging 1.37% Cu and 1.75% Zn (Minorco Annual Report, 1992). Results of 200 whole rock analyses, summarized by Speakman et al. (1982), demonstrated that a pervasive alteration zone extends stratigraphically below and laterally away from the deposit. More specifically, the Footwall Volcaniclastic Rocks are depleted in Na2O, K2O and CaO, and enriched in FeO and, to a lesser extent, MgO toward the deposit; within 200 m of the deposit, there is a sharp increase in MgO and decreases in CaO and Na2O. The Mine Rhyolite contains high SiO2 and low CaO, K2O and Na2O.

The Ruttan deposit and its host rocks have minor enrichments in Pb, Au, Ag, Hg, As, Co, Cd, Ba and Mn. The lenses of the deposit are classified as parts of the west and east zones, based largely on the distribution of Hg and Au, as well as being sheared (west zone) or unsheared (east zone); trace element distributions are generally erratic throughout the west zone, but show more distinguishable patterns in the east zone. Copper/zinc ratios increase stratigraphically downward in both the west and east zones (Haverslew, 1976; Jackson, 1979; Speakman et al., 1982; Ames and Scoates, 1992). Based on whole rock major and trace element analyses, the mafic flow rocks in the footwall are interpreted as subalkaline tholeiitic basalt flows deposited in a island arc regime (Steeves and Lamb, 1972; Haverslew, 1976; Pearce and Gale, 1977 (Analyses from the Ruttan deposit are listed as "Lynn Lake, Manitoba" in this paper (G.H. Gale, pers. comm., 1993)); Jackson, 1979; Speakman et al., 1982; Gale, 1990; Ames and Scoates, 1992). Sulphur isotope analyses, measurements of Fe contents in sphalerite, Pb isotope analyses, and measurements of Fe, Ba and Mn in host and mineralized rocks are given in Haverslew (1976). Sulphur isotope analyses indicated a magmatic source for sulphur. Iron contents in sphalerite indicate that pyrite, pyrrhotite and sphalerite crystallized in equilibrium at pressures of 6 Kb and temperatures between 200° and 250°C. Lead isotope data indicate that mineralization occurred between 1140 and 1900 Ma, and suggest that the lead was derived from a well-mixed, deep-seated Archean source. Fe/Mn ratios and the amounts of Ba and sphalerite increase toward the stratigraphic hanging wall (Haverslew, 1976). Bristol (1979) used ore samples from Ruttan to study variability in sphalerite geobarometry determinations. The Ruttan deposit was subjected to maximum regional metamorphic pressures of 5 to 6 kbars and temperatures of 475° to 650°C, based on the types of coexistent metamorphic mineral assemblages and compositional characteristics of chlorite. These samples were also used to test various assumptions regarding equilibrium conditions for sphalerite, pyrrhotite and pyrite. A till geochemical survey conducted 1 to 2 km northeast of the minesite demonstrated anomalous gold and arsenic concentrations in heavy mineral concentrates and the <2 micron fraction (Nielsen, 1986). Ames (1991) suggests that the gold-arsenopyrite-scorodite vein northeast of the minesite may be the source of these anomalies.

CLASSIFICATION

Stratabound massive sulphide type deposit; volcanic rock associated.

REFERENCES

Ames, D.E. 1991: The Ruttan Cu-Zn deposit and depositional environment: an update; in Manitoba Energy and Mines, Minerals Division, Report of Activities, 1991, p. 106-107. in prep. Geologic setting of the large Proterozoic Ruttan VHMS (Cu-Zn) deposit, Rusty Lake belt, southern Churchill Province; Geological Survey of Canada, Open File.

Ames, D.E. and Baldwin, D.A. in prep. Geology and geochemistry of the rhyolite lava flows in the subaerial Karsakuwigamak Block, Rusty Lake belt, Manitoba; Geological Survey of Canada, Open File.

Ames, D.E. and Scoates, J.S. 1992: Preliminary map of the geological setting of the Ruttan Cu-Zn deposit, Rusty Lake Belt, Manitoba; Geological Survey of Canada, Open File 2571, scale 1:5000.

Ames, D.A. and Taylor, C. in prep. Geology of the West Anomaly, Ruttan VHMS deposit, Proterozoic Rusty Lake belt, Manitoba; Geological Survey of Canada, Open File.

Ames, D.E., Scoates, J.S. and Franklin, J.M. 1990: Preliminary report on the geological setting of the Ruttan base metal deposit and associated hydrothermal alteration, Rusty Lake volcanic belt, Manitoba; in Manitoba Energy and Mines, Minerals Division, Report of Activities 1990, p. 178-186. 1991: Geological setting of the Proterozoic Ruttan Cu-Zn deposit (EXTECH): a revision; Prospector and Developers of Canada, 1991 Convention, Toronto, Abstract W-1.

Assessment Files 91664, 91988; Manitoba Energy and Mines, Mines Branch.

Baldwin, D.A. 1978: Volcanic environments of massive sulphide mineralization in the lower Wasekwan Group in the Rusty Lake greenstone belt; in Manitoba Mines, Resources and Environmental Management, Mineral Resources Division, Report of Field Activities, 1978, p. 109-112. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

Bristol, C.C. 1979: Application of sphalerite geobarometry to ores from the Ruttan Mine; Economic Geology, v. 74, 1496-1503.

Bristol, C.C., Chornoby, P.J., Holmes, G. and Speakman, D.S. 1977: Geology of the Ruttan orebody, Manitoba; Canadian Mining and Metallurgical Bulletin, v. 70, no. 786, p. 46-47.

Gale, G.H. 1990: Major element and REE analyses for selected volcanic and intrusive rocks in the Ruttan Mine area (NTS 64B/5); in Manitoba Energy and Mines, Minerals Division, Report of Field Activities, 1990, p. 4-6.

Gale, G.H. and Koo, J. 1977: Evaluation of massive sulphide environments; in Canada-Manitoba Non-renewable resource evaluation program (NREP), 2nd Annual Report 1976-1977, p. 43-62.

Gale, G.H., Somerville, R.C., Chornoby, P.J., Haystead, B.C.W., Provins, N.M., Braun, D., Mundy, D.C. and Walker, A. 1982: Geological setting of the mineral deposits at Ruttan, Thompson, Snow Lake and Flin Flon; Geological Association of Canada, Mineralogical Association of Canada, 1982 Joint Annual Meeting, Field Trip Guidebook 14, 59p.

Gilbert, H.P., Zwanzig, H.V., Chornoby, P.J. and Olson, P.E. 1982: Stratigraphy of the Lynn Lake greenstone belt and surface geology at Ruttan and Fox mine; Geological Association of Canada, Mineralogical Association of Canada, 1982 Joint Annual Meeting, Field Trip Guidebook 2, 60p.

Haverslew, R.E. 1976: Geology and genesis of the Ruttan Lake Deposit, Manitoba; University of Alberta, M.Sc. Thesis (unpublished), 149p.

Hudson Bay Mining and Smelting Co., Limited; 1987 Annual Report.

Jackson, M.R. 1979: Stratigraphy and geochemistry of the Rusty Lake greenstone belt adjacent to the Ruttan Mine, Manitoba; University of Manitoba, M.Sc. Thesis (unpublished), 125p.

Jackson, M.R. and Turnock, A.C. 1979: Stratigraphy and geochemistry of the Rusty Lake greenstone belt adjacent to the Ruttan Mine, Manitoba; University of Manitoba, Centre for Precambrian Studies, Annual Report, 1978, p. 52-55.

Mineral Inventory Card 64B/5 Cu1; Manitoba Energy and Mines, Geological Services Branch.

Minorco; 1992 Annual Report.
Nielsen, E. 1986: Till geochemistry east of the Ruttan mine; in Manitoba Energy and Mines, Minerals Division, Report of Field Activities, 1976, p. 26-31.
Pearce, J.A. and Gale, G.H. 1977: Identification of ore-deposition environment from trace-element geochemistry of associated igneous host rocks; in Volcanic processes in ore genesis; Geological Society of London, Special Publication No. 7, p. 14-24.
Sherritt Gordon Mines Ltd., Staff 1984: The Ruttan Mine Story; internal report.
Speakman, D.S., Chornoby, P.J., Haystead, B.C.W., and Holmes, G.F. 1982: Geology of the Ruttan deposit; Geological Association of Canada, Special Paper No. 25, p. 525-555.
Steeves, M.A. 1969: The Opachuanau Lake-Ruttan Lake-Issett Lake-Swan Bay area: Southern Indian Lake project; Manitoba Mines and Natural Resources, Mines Branch, Summary of Geological Fieldwork, 1969, Geological Paper 4/69, p. 35-40.

NTS: 64B05 **MDS_No.: M64B05-002**

LOCATION: 2

NAME: (Mineralization intersected by diamond drilling)

EASTING: 460595 **NORTHING: 6255738**

AREA: NTS 64B/5; 1.7 km south of Ruttan minesite.

AIR PHOTO: A25474-116

ACCESS: Traverse from the Ruttan minesite.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Janus Explorations Limited conducted a VLEM and magnetic survey (A.F. 91546), and drilled DDH J-1, J-2 and J-3 totalling 345 m (A.F. 91547) on CB 842 in 1970. A magnetic survey in 1971 (A.F. 91500) and a VLEM survey in 1973 (A.F. 91941), both carried out by R. Kidd, covered the southwestern portion of location 2.

GEOLOGICAL SETTING

The area is underlain by diorite and gabbro (Baldwin, 1988). Near the drill holes, Baldwin (1982) mapped synvolcanic quartz diorite with numerous xenoliths of dioritic amphibolite and schists (probably metamorphosed equivalents of mafic and intermediate volcanic rocks), felsic volcanic rocks, and conglomerate with interbedded sandstone and siltstone. The xenoliths appear brecciated due to penetration by stringers of quartz diorite, and exhibit epidote, amphibole and/or biotite alteration near the stringers. To the northwest, the Ruttan Block volcanic-sedimentary succession includes greywacke and polymictic conglomerate; and to the southeast, basalt flows, felsic siltstone, heterolithic volcanic breccia, rhyolite and dacite flows and lapilli tuff (Baldwin, 1988).

MINERALIZATION

Baldwin (1982, p. 24-26) summarizes the drill log reports of mineralization from DDH J-1, J-2 and J-3 (A.F. 91547) and results of his field work: DDH J-1. "The mineralization comprises disseminated sulphide (py, cp) occurring as specks and sparse blebs in 1 to 2 m thick zones in quartz diorite, amphibolite and dioritic schist...Mineralization was not observed in outcrop." DDH J-2 and J-3. "The mineralization is disseminated sulphide (py, cp) and rarely as stringers in quartz diorite and hybrid rocks."

GEOCHEMISTRY

Copper and Zn assays of drill core samples had ranges of tr. to 0.12% Cu and tr. to 0.01% Zn (A.F. 91547).

CLASSIFICATION

Disseminated mineralization - not classified.

REFERENCES

Assessment Files 91500, 91546, 91547, 91664, 91941, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-003**

LOCATION: 3

NAME: (Mineralization intersected by diamond drilling)

EASTING: 464165 **NORTHING: 6256096**

AREA: NTS 64B/5; Esker Lake.

AIR PHOTO: A24996-115

ACCESS: Float plane.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Obaska Lake Mines Limited conducted a VLEM and magnetic survey (A.F. 90943), and drilled five holes totalling 674 m (A.F. 90944) on the Top claim in 1970. The southeastern part of location 3 was also covered by A VLEM and magnetic survey and a reconnaissance geological survey by Canex Aerial Exploration Ltd. in 1970 (A.F. 90953).

GEOLOGICAL SETTING

The area is underlain by Ruttan Group (Ruttan Block) basalt flows; lesser rhyolite and dacite flows occur to the northeast. Diorite and gabbro, including a zone of intrusion breccia, and granite and quartz monzonite intrusions occur to the north. The fault that separates the Ruttan and Karsakuwigamak blocks is towards the southeasternmost part of location 3 (Baldwin, 1988). Nearby outcrops consist of hornblende phyric, massive, medium- to fine-grained mafic rocks. Drill logs note intermediate to mafic metavolcanic rocks, parts of which are sheared or fault zones with epidote-rich sections, calcite lined vugs and calcite veinlets, biotite-rich zones, and chlorite-rich zones (Baldwin, 1982; A.F. 90944).

MINERALIZATION

Minor magnetite, chalcopyrite, bornite, azurite, malachite and native copper occur in quartz stringers or disseminated in shear zones and fault zones in core from DDH 1, 2 and 3 (Baldwin, 1982, p. 23-24; A.F. 90944). Core from DDH 4 and 5 was not mineralized (A.F. 90944).

GEOCHEMISTRY

Copper assays of drill core samples ranged from 0.02 to 0.08% (A.F. 90944).

CLASSIFICATION

Vein type deposit; multiple veins or lenses.

REFERENCES

Assessment Files 90943, 90944, 90953, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-004**

LOCATION: 4

NAME: (Mineralization intersected by diamond drilling)

EASTING: 464656 **NORTHING: 6251138**

AREA: NTS 64B/5; 2.5 km south of Esker Lake.

AIR PHOTO: A24996-114

ACCESS: Float plane to Esker Lake and traverse.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Hudson Bay Exploration & Development Co. Ltd. drilled DDH Jit 20 (110 m) and Jit 21 (95 m) on CB 727 in 1970 (A.F. 90942). Ruttan Lake Explorations Limited conducted an HLEM and magnetic survey over CB 771, which covered the southern part of the area in 1971 (A.F. 90947).

GEOLOGICAL SETTING

The area near the drill holes is covered by surficial deposits and swamp. A granite and quartz monzonite intrusion with small enclaves of Ruttan Group (Ruttan Block) basalt flows occurs nearby. The fault that separates the Ruttan and Karsakuwigamak blocks trends northerly through the area near the drill holes (Baldwin, 1988). DDH Jit 20 and Jit 21 intersected quartz-hornblende-feldspar gneiss, hornblende-biotite gneiss, quartz-hornblende gneiss, chlorite-biotite schist, granite and quartz-feldspar gneiss (A.F. 90942).

MINERALIZATION

Three zones from DDH Jit 20, 2.6 m, 1.0 m and 1.3 m thick separated by 15 to 33 m of barren rock, contained mostly minor pyrrhotite, pyrite and trace chalcopyrite. The 2.6 m thick zone was hosted by fine- to medium-grained quartz-hornblende-feldspar gneiss. The upper 2.3 m contained 1 to 4% pyrrhotite and pyrite with trace chalcopyrite in contact with a 30 cm section with 40% pyrrhotite, 10% pyrite and trace chalcopyrite. The 1.0 m thick zone was hosted by fine grained hornblende-biotite gneiss and consists of 1 to 10% pyrite and pyrrhotite, in which there is a 30 cm section that contained trace to 1% chalcopyrite. The 1.3 m thick zone occurred in quartz-hornblende-biotite gneiss with 2% pyrrhotite and pyrite. Negligible sulphide was reported from DDH Jit 21 (Baldwin, 1982, p. 22-23; A.F. 90942).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90942, 90947, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-005**

LOCATION: 5

NAME: (Mineralization intersected by diamond drilling)

EASTING: 468324 **NORTHING: 6250544**

AREA: NTS 64B/5; northwest shore of Karsakuwigamak Lake, approximately 5 km southeast of Esker Lake.

AIR PHOTO: A24996-114

ACCESS: Float plane on Karsakuwigamak Lake, or by boat from Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

The history of exploration at this location is detailed in Mineral Inventory Card 64B/5 Cu2. SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). P. Allan staked the area as CB 1001 and assigned it to W. Bruce Dunlop in 1969. Ryanor Mining Company Limited conducted an HLEM and magnetic survey by Ryanor Mining Company Limited in 1970 (A.F. 91940), and drilled DDH 1 to 8 totalling 998 m in 1972 (A.F. 91938). In addition, parts of the area were covered by a VLEM and magnetic survey and a reconnaissance geological survey by Canex Aerial Exploration Ltd. in 1970 (A.F. 90953); by a ground magnetic survey by Canadian Nickel Co. Ltd. in 1971 (A.F. 91528); and by an HLEM and magnetic survey by Noranda Exploration Co. Ltd. in 1981 (A.F. 92462).

GEOLOGICAL SETTING

The area is underlain by granite and quartz monzonite. A northeasterly trending fault within the Karsakuwigamak Block separates the intrusions from Ruttan Group rhyolite and dacite flows, and arkosic conglomerate, sandstone and siltstone (Baldwin, 1988). An interlayered sequence of bedded and laminated siltstone and volcaniclastic rocks occurs to the northwest. Pink to red, euhedral garnets, <1 mm, are present in the siltstone and in the fine grained laminated fraction of the volcaniclastic rocks. Layering strikes approximately 290° and dips steeply to the southwest. Unit thicknesses range from 30 to 100 m. The facing and stratigraphic tops directions are unknown (Baldwin, 1982, p. 20-21). Drill logs describe meta-argillite with variable amounts of garnet, quartz-mica schist and mica-quartz-garnet schist (A.F. 91938). Rocks intersected in the drill holes are interpreted to be equivalent to these siltstones/volcaniclastic rocks (Baldwin, 1982, p. 20-21).

MINERALIZATION

DDH 3, 4, 5, 6 and 7 intersected an approximately 12 m thick unit of mica-quartz-garnet schist, parts of which contained 7 to 10% pyrrhotite, pyrite, chalcopyrite and sphalerite. In addition, mineralization from DDH 4 included solid sulphide bands, <2.5 cm wide. The mica-quartz-garnet schist was more extensive in core from DDH 6, chloritized in part, and constituted most of the drill core. DDH 1, 2 and 3 intersected minor disseminated and stringer pyrite hosted by partly graphitic argillite and quartz-chlorite-biotite schist (A.F. 91938). Only traces of pyrite in andesite are noted in logs from DDH 8 (A.F. 91938).

GEOCHEMISTRY

Two drill core samples contained notable amounts of Cu and Zn: (1) 0.22% Cu, 1.56% Zn, nil Ni, 0.1 g/t Ag and trace Au over 1.5 m from DDH 2; (2) 2.26% Cu, 1.40% Zn, 4.5 g/t Ag and 0.2 g/t Au over 5 cm from DDH 6. Other drill core samples had ranges of 0.08 to 0.22% Cu, trace to 0.88% Zn, nil Ni, nil to 0.7 g/t Ag, and nil to trace Au (A.F. 91938).

CLASSIFICATION

Stratabound massive sulphide type deposit; alteration zone associated with sedimentary rocks.

REFERENCES

Assessment Files 90953, 91528, 91664, 91938, 91940, 91988, 92462; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Mineral Inventory Card 64B/5 Cu2; Manitoba Energy and Mines, Geological Services Branch.

NTS: 64B05 **MDS_No.: M64B05-006**

LOCATION: 6

NAME: Karsakuwigamak Lake Northwest

EASTING: 468314 **NORTHING: 6249958**

AREA: NTS 64B/5; Karsakuwigamak Lake, approximately 5.5 km southeast of Esker Lake.

AIR PHOTO: A24996-114

ACCESS: Float plane on Karsakuwigamak Lake, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canadian Nickel Co. Ltd. drilled DDH 35346 (43 m) on CB 719 in 1970 (A.F. 90945), DDH 38801 (251 m), 38802 (abandoned at 15 m), 38803 (154 m), 38804 (abandoned at 43 m), 38805 (52 m), and 38806 (124 m) on CB 710 in 1971 and 1972 (A.F. 91939). A ground magnetic survey by Canadian Nickel Co. Ltd. in 1971 (A.F. 91528) covered all but the southwesternmost part of the area. Mineral Inventory Card 64B/5 Fe1 gives an exploration history for a pyrite occurrence ("Karsakuwigamak Lake Northwest") noted by Steeves and Lamb (1972) that is now flooded. Noranda Exploration Company Limited conducted an HLEM and magnetic survey over the northeastern part of the area in 1981 (A.F. 92462).

GEOLOGICAL SETTING

West of location 6, granite, quartz monzonite, diorite and gabbro contain enclaves of Ruttan Group (Karsakuwigamak Block) basalt flows, and conglomerate, sandstone and siltstone (Baldwin, 1988). The drill holes intersected amphibole-plagioclase-biotite-quartz gneisses and schists (A.F. 90945, 91939), interpreted as interlayered sedimentary rocks by Baldwin (1982, p. 19-20). Pearse (1964, p. 6) noted a silicate-oxide facies iron formation that consists of alternating actinolite and magnetite layers with an average thickness of approximately 2 cm on the northwest shore of Karsakuwigamak Lake (now underwater).

MINERALIZATION

Quartz-amphibole-magnetite iron formation with associated quartzite (probably recrystallized chert) was intersected in core from DDH 38801 (3.6 m thick) and DDH 35346 (13 m thick). Pyrrhotite and pyrite occurred as minor disseminations and stringers in the iron formation, including numerous local <0.5 m intersections with 15 to 40% pyrrhotite and pyrite. Similarly, DDH 38802 and 38803 intersected garnet-quartz-magnetite iron formation, sericite-biotite-quartz schist, sericite-quartz schist and amphibole-biotite-chlorite schist, all with up to 12% disseminated and stringer pyrrhotite and pyrite. Pyrrhotite and pyrite, 1 to 2%, were disseminated throughout the remaining lithologies in these four drill holes (Baldwin, 1982, p. 19-20; A.F. 91939, 90945). Core from DDH 38804, 38805, 38806 was not mineralized (A.F. 91939). Steeves and Lamb (1972) mark the location of a pyrite-bearing iron formation that corresponds with a five-channel INPUT conductor on the northwest shore of Karsakuwigamak Lake; however, this area is now underwater.

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; oxide facies iron formation. The existence of short intersections of more voluminous sulphide minerals suggests that portions of the oxide facies iron formation have been sulphidized. Sericite-biotite-quartz schist, sericite-quartz schist and amphibole-chlorite schist, all with minor pyrrhotite and pyrite, were intersected down the hole in DDH 38802 and 38803.

REFERENCES

Assessment Files 90945, 91528, 91664, 91939, 91988, 92462; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Mineral Inventory Card 64B/5 Fe1; Manitoba Energy and Mines, Geological Services Branch.
Pearse, G. 1964: Geology of the Pemichigamau Lake area (east half); Manitoba Mines and Natural Resources, Mines Branch, Publication 61-3, 16p.
Steeves, M.A. and Lamb, C.F. 1972: Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B05 **MDS_No.: M64B05-007**

LOCATION: 7

NAME: (Mineralization intersected by diamond drilling)

EASTING: 467663 **NORTHING: 6248031**

AREA: NTS 64B/5; Karsakuwigamak Lake, approximately 6.3 km southeast of Esker Lake.

AIR PHOTO: A24996-113

ACCESS: Float plane on Karsakuwigamak Lake, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey, and drilled DDH RL-5 (96 m) in 1971 (A.F. 91498). A ground magnetic survey by Canadian Nickel Co. Ltd. in 1971 (A.F. 91528) covered all but the southwesternmost part of the area.

GEOLOGICAL SETTING

Granite, quartz monzonite, diorite and gabbro with enclaves of Ruttan Group (Karsakuwigamak Block) basalt flows, and conglomerate, sandstone and siltstone underlie the west shore of Karsakuwigamak Lake (Baldwin, 1988). DDH RL-5 intersected dark greyish green, talcose, weakly magnetic pyroxenite that contained patches of biotite (Baldwin, 1982, p. 16-17; A.F. 91498).

MINERALIZATION

DDH RL-5 intersected sulphide veins, 1.25 cm wide, filled with talc-carbonate and 1 to 2% pyrite and pyrrhotite. The veins were intersected in three sections, 1.6 m, 1 m and 1.6 m in core length, separated by massive pyroxenite (Baldwin, 1982, p. 16; A.F. 91498).

GEOCHEMISTRY

Two drill core samples contained trace Cu, trace Zn, trace and 0.06% Ni, 0.7 g/t Ag and trace Au (A.F. 91498).

CLASSIFICATION

Vein type deposit, multiple sulphide veins. The talcose biotitic pyroxenite with sulphide mineralization suggests an environment that may have been favourable for the concentration of platinum group elements.

REFERENCES

Assessment Files 91498, 91528, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-008**

LOCATION: 8

NAME: (Mineralization intersected by diamond drilling)

EASTING: 463838 **NORTHING: 6248256**

AREA: NTS 64B/5; 5.5 km west of Karsakuwigamak Lake, 6.5 km south-southwest of Esker Lake.

AIR PHOTO: A24996-113

ACCESS: Traverse from Karsakuwigamak Lake, which is accessed by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey, and drilled DDH RL-6 (76 m) in 1971 (A.F. 91498). SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988).

GEOLOGICAL SETTING

The area near DDH RL-6 is covered by surficial deposits and swamp. Ruttan Group (Ruttan Block) basalt flows, greywacke, felsic and intermediate siltstone, and intermediate to mafic intrusions occur to the west. A northerly trending fault to the east separates the Ruttan and Karsakuwigamak blocks (Baldwin, 1988). DDH RL6 intersected (sequentially) sheared andesite with quartz-carbonate stringers, biotite-quartz gneiss and quartz-biotite-garnet gneiss, banded iron formation in a 25 m thick unit of metagreywacke (quartz-biotite gneiss), and white to dark grey quartz-hornblende gneiss (Baldwin, 1982, p. 15; A.F. 91498).

MINERALIZATION

DDH RL-6 intersected two banded oxide facies iron formations, 0.2 and 5.3 m in core length. The iron formations contained 1 to 10% pyrite, pyrrhotite and sphalerite grains with magnetite, and rare bands with moderate to near solid amounts of sulphide, 5 cm thick (Baldwin, 1982, p. 15; A.F. 91498).

GEOCHEMISTRY

Four drill core samples from DDH RL-6 contained trace to 0.03% Cu, trace to 0.02% Zn, nil to trace Ni, trace Au, and (in one sample) 0.7 g/t Ag (A.F. 91498).

CLASSIFICATION

Chemical sediment type deposit; oxide facies iron formation. Rare narrow bands with moderate to near solid amounts of sulphide suggest sulphidization of part of the oxide facies assemblage.

REFERENCES

Assessment Files 91498, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-009**

LOCATION: 9

NAME: Darrol Lake

EASTING: 458869 **NORTHING: 6247073**

AREA: NTS 64B/5; approximately 12 km south-southwest of Ruttan minesite and 10.5 km north of Pemichigamau Lake.

AIR PHOTO: A25474-118

ACCESS: Float plane to Darrol Lake or by drill road from the Ruttan minesite.

EXPLORATION SUMMARY

Two pits pre-dating SGM's initial staking of the area attest to earlier exploration, but details are not known (SGM, unpublished data, 1978). SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). SGM staked the Dar claim group in 1968 to cover airborne geophysical conductors, cut a grid, and conducted HLEM and magnetometer surveys. SGM drilled thirty-two holes totalling 4123 m southeast of Darrol Lake from 1969 to 1973. SGM, in joint venture with the Manitoba Government, conducted another EM and magnetic survey to provide more continuous coverage of the area, mapped the area at 1:4800, and drilled an additional five holes totalling 449 m in 1977 and 1978 further to the east (SGM, unpublished data, 1978). Mineral Inventory Card 64B/5 Zn1 ("Karsakuwigamak Lake West") gives a history of exploration and development western edge of the area and Pearse (1964, p. 15) notes the presence of an old trench in the same area.

GEOLOGICAL SETTING

The area is underlain by iron formation within a sequence of Ruttan Group (Ruttan Block) differentiated basalt flows that are also interlayered with felsic and intermediate siltstone, comparatively minor greywacke, rhyolite and dacite flows, and polymictic conglomerate. The volcanic-sedimentary sequence is surrounded by intrusive rocks that include granite, quartz monzonite, diorite and gabbro (Baldwin, 1988). A more detailed description of the iron formation unit is given in 'Mineralization' below. The degree of deformation in the Darrol Lake area is greater than elsewhere in the southern part of the Rusty Lake greenstone belt (Baldwin, 1980). A northeast- to east-striking, vertically to steeply northwest-dipping foliation is persistent, except for northeast-striking southeast-dipping foliation in the northwest part of the area. Core from DDH Dar-29 in the western part of the area shows tight folds in mafic tuff. Nearby outcrops exhibit diverging foliation orientations that suggest folds plunge to the east. In the western part of the area, northeast-, northwest-, and east-striking faults are indicated by disruption of lithologic units in outcrop. Structural interpretation is limited by the paucity of outcrop (SGM, unpublished data, 1977).

MINERALIZATION

The iron formation is characterized by interlayered solid magnetite, tremolite schist and tremolite-garnet schist locally interlayered with quartzite (possibly recrystallized chert). Less commonly, the iron formation is characterized by interlayered solid pyrite, solid magnetite and tremolite schist (Baldwin, 1982). Magnetite and pyrite layers range in thickness from 0.1 to 1.5 cm and layers of tremolite schist, tremolite-garnet schist and quartzite are 0.1 to 20 cm thick. The thickness of the iron formation ranges from 3 to 16 m (Baldwin, 1987). Drill holes intersected iron formation that varied from banded magnetite to solid pyrrhotite and pyrite with lesser sphalerite, chalcopyrite and galena; graphite was absent (SGM, unpublished data, 1978). "The change from pyrite to magnetite is gradational and generally pyrite veinlets occur in the tremolite schist adjacent to the massive sulphide layers" (Baldwin, 1987). The iron formation is bounded by, and is in sharp contact with, variably altered metasedimentary rocks (Baldwin, 1987); quartz-plagioclase, biotite and garnet with variable amounts of sillimanite + staurolite, or tremolite + anthophyllite, or staurolite + muscovite, or anthophyllite or chlorite make up the mineral assemblage. Differentiated mafic flows underlie and overlie the metagrewacke; alteration was not observed in the mafic flows (Baldwin, 1982). Meta-argillite commonly contains 1 to 2 m thick zones with 2 to 3% finely disseminated pyrite, pyrrhotite and sphalerite (Baldwin, 1982, 1987). The western edge of the area consists of solid pyrrhotite associated with a sugary quartz vein hosted by a tuffaceous layer within a sequence of flows. Minor marcasite and chalcopyrite were identified; sphalerite, although not noted in field descriptions, is probably present (see 'Geochemical Data'). Mineralization is exposed in a zone 0.6 to 1.5 m wide and 30 m long, flanked by an additional 15 m width of rusty weathered rocks (Pearse, 1964). Baldwin (1982, p. 27) interpreted rocks in this area (presumably the host rocks) as felsic to intermediate, interlayered, laminated fine grained rocks, which include a few beds that consist of heterolithic clastic deposits.

GEOCHEMISTRY

A sample of brown staurolite contained highly anomalous Zn concentrations (Table 8; E. Nielsen and G. Trembath, unpublished data). Twenty-three littoral sand and till samples were collected for heavy mineral analysis, gold grain counts, and trace element geochemistry in the <2 micron fraction (Nielsen, 1987). Pearse (1964) lists a grab sample assay of 2.5% Zn, nil Cu and nil Pb from the western edge of the area.

Analysis of brown staurolite from Darrol Lake. The sample (90-DL-1) represents a quartz "sweat" in metasedimentary rocks, and contained minor biotite and quartz inclusions

SiO_2	35.4%
Al_2O_3	49.1
FeO	2.30
Fe_2O_3	8.18
CaO	0.11

MgO	1.55
Na_2O	0.12
K_2O	0.15
TiO_2	0.25
P_2O_5	0.02
MnO	0.18
H_2O	1.32
Other	2.53
Total	101.21%
Ni, ppm	6
Cr, ppm	<8
Cu, ppm	13
Zn, ppm	20000
Co, ppm	215
Li, ppm	41

CLASSIFICATION

Chemical sediment type deposit; sulphidized oxide facies iron formation. The western edge of the area represents a vein type deposit; single vein.

REFERENCES

Assessment Files 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1980: Ruttan Lake, Karsakuwigamak Lake, Eagle Lake project; in Manitoba Energy and Mines, Mineral Resources Division, Report of Field Activities, p. 14-18. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1987: Mineral deposit investigations in the Ruttan Lake area; Manitoba Energy and Mines, Minerals Division, Report of Field Activities 1987, p. 25-26. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Mineral Inventory Card 64B/5 Zn1; Manitoba Energy and Mines, Geological Services Branch.
Nielsen, E. 1987: Till geochemistry in selected areas of northern Manitoba; Manitoba Energy and Mines, Minerals Division, Report of Field Activities 1987, p. 27-29.
Pearse, G. 1964: Geology of the Pemichigamau Lake area (east half); Manitoba Mines and Natural Resources, Mines Branch, Publication 61-3, 16p.

NTS: 64B05 **MDS_No.: M64B05-010**

LOCATION: 10

NAME: (Mineralization intersected by diamond drilling)

EASTING: 466954 **NORTHING: 6243509**

AREA: NTS 64B/5; Karsakuwigamak Lake, near the Twenty-second Base Line (see MDS Map 64B/SW).

AIR PHOTO: MB88021-2; A24996-112, -113

ACCESS: Float plane, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey, and drilled DDH RL-4 (122 m) in 1971 (A.F. 91498).

GEOLOGICAL SETTING

The area is underlain by Ruttan Group basalt flows and intrusive rocks, including granodiorite, diorite and gabbro (Baldwin, 1988) DDH RL-4 intersected metaquartzite, hornblende-biotite gneiss, quartz-hornblende gneiss, chlorite-biotite-sericite schist with narrow layers of hornblende gneiss and medium- to fine-grained massive andesite (A.F. 91498). These gneisses and schists probably represent a metamorphosed sedimentary succession that is intruded by mafic to intermediate sills (Baldwin, 1982, p. 17).

MINERALIZATION

DDH RL-4 intersected four banded oxide facies iron formations, 0.3 m, 0.3 m, 1.3 m and 2.3 m thick, that are hosted by a 20 m thick unit of quartz-hornblende gneiss. Most of the the iron formations contained 20 to 40% magnetite; however, the 1.3 m thick iron formation consisted mostly of garnet and a few magnetite layers with traces of pyrrhotite and pyrite. A 2 cm thick, near solid pyrite band occurred in a 13 m thick unit of hornblende-biotite gneiss, up the hole from the iron formations (A.F. 91498; Baldwin, 1982, p. 17).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; oxide facies iron formation.

REFERENCES

Assessment Files 91498, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B05 **MDS_No.: M64B05-011**

LOCATION: 11

NAME: Parres-Baker

EASTING: 467275 **NORTHING: 6242930**

AREA: NTS 64B/5; southeast shore of Karsakuwigamak Lake, near the Twenty-second Base Line.

AIR PHOTO: MB88021-2; A24996-112, -113

ACCESS: Float plane, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

The exploration history of this occurrence is detailed in Mineral Inventory Card 64B/5 Au1. Hudson Bay Exploration and Development Co. Ltd. trenched the gold showing in 1947-48. A. McVeigh prospected for SGM in the Karsakuwigamak Lake area in 1948 (Quinn, 1956). SGM carried out an airborne EM and magnetic survey in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Western Nuclear Mines Ltd. drilled DDH Kar 1, Kar 2 and Kar 3 totalling 76 m in 1968 (A.F. 90948). Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey in 1971 (A.F. 91498).

GEOLOGICAL SETTING

The area is underlain by granodiorite (Fig. 54; Baldwin, 1988). An earlier map of the area (Steeves and Lamb, 1972) shows a unit of felsic and intermediate pyroclastic rocks, volcaniclastic rocks, argillite and amphibolite along the southeast shore of Karsakuwigamak Lake; the contact of this unit with the granodiorite coincides approximately with the current shoreline. Drill logs indicate that DDH Kar 1, Kar 2 and Kar 3 intersected tuff, rhyolite, and chloritic schist; quartz veins and conformable "seams" were abundant (A.F. 90948). Baldwin (1982, p. 18-19) reinterprets these rocks as metagreywacke, meta-argillite and quartz-sericite schist.

MINERALIZATION

"A quartz vein exposed on the shore of the lake can be traced southeasterly along its strike for 110 ft. [34 m]. The vein dips steeply, is 1 to 3<$E1/2> ft. [0.3 to 1.1 m] wide, occurs in hybrid gneiss and carries erratic gold values" (Quinn, 1956, p. 8). This outcrop is probably now underwater. DDH Kar 1 to Kar 3 intersected minor disseminated pyrite and chalcopyrite in a quartz vein; rare solid pyrite filled narrow fractures (Baldwin, 1982, p. 18-19).

GEOCHEMISTRY

Quinn (1956, p. 8, 9) lists results of channel samples taken by Hudson Bay Exploration and Development Co. Ltd. in 1947. Twelve samples were collected, of which three contained gold:

Analysis of brown staurolite from Darrol Lake. The sample (90-DL-1) represents a quartz "sweat" in metasedimentary rocks, and contained minor biotite and quartz inclusions

No.	Width (cm)	Au (g/t)	Ag (g/t)
1	51	71.3	8.9
2	30	36.3	tr.
3	86	8.9	tr.

CLASSIFICATION

Vein type deposit; single vein.

REFERENCES

Assessment Files 90948, 91498, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Mineral Inventory Card 64B/5 Au1; Manitoba Energy and Mines, Geological Services Branch.
Quinn, H.A. 1956: Mineral occurrences between Chipewyan and Herb Lakes, Manitoba; Precambrian; v.29(10), Part 1, p. 6-14.; v. 29(11), Part 2, p. 6-12.
Steeves, M.A. and Lamb, C.F. 1972: Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B06 **MDS_No.: M64B06-001**

LOCATION: 1

NAME: (Mineralization intersected by diamond drilling)

EASTING: 470611 **NORTHING: 6251166**

AREA: Karsakuwigamak Lake, near western limit of NTS 64B/6.

AIR PHOTO: A24996-114

ACCESS: Float plane on Karsakuwigamak Lake, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Parts of the area were covered by an HLEM and magnetic survey by Ryanor Mining Company Limited in 1970 (A.F. 91940), and a VLEM and magnetic survey and a reconnaissance geological survey by Canex Aerial Exploration Ltd. in 1970 (A.F. 90953). Canadian Nickel Co. Ltd. carried out a magnetic survey over part of the area in 1971 (A.F. 91528), and drilled DDH 38807 (abandoned at 72 m), 38808 (abandoned at 63 m), 38809 (171 m), 35399 (abandoned at 24 m), and 35400 (134 m) on CB 710 in 1971-72 (A.F. 91939), and DDH 38810 (166 m) on CB 710 in 1972 (A.F. 91529). Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey over part of the area in 1971 (A.F. 91498), and carried out an HLEM and magnetic survey and drilled DDH RL-3 (also named DDH RU-3 in some of the sections and part of A.F. 90956) (109 m) on CB 772 in 1972 (A.F. 90956). Noranda Exploration Company Limited conducted an HLEM and magnetic survey in 1981 (A.F. 92462).

GEOLOGICAL SETTING

Most of the area is covered by Karsakuwigamak Lake and its flood plain; post-Sickle granodiorite constitutes the nearby exposures (Baldwin, 1988). Pre-flooding maps show basalt and andesite with lesser felsic volcanic rocks exposed north and west of Karsakuwigamak Lake (Steeves and Lamb, 1972). DDH RL-3 intersected andesite, quartz-hornblende gneiss, sheared dacite and andesite, and a 5.2 m section of hornblende-garnet-biotite-sericite schist (A.F. 90956). DDH 38809 intersected biotite-amphibole-garnet schist, biotite schist, iron formation, micaceous quartz-feldspar-biotite gneiss, minor aplite and pegmatite. DDH 35400 intersected altered, sheared, fine- to medium-grained, biotite-chlorite-bearing amphibolite with local mylonitic zones, amphibole-biotite-chlorite schist, biotite schist, biotite gneiss, quartzite and a minor pegmatite dyke (A.F. 91939).

MINERALIZATION

DDH RL-3 intersected:
(1) several 1.5 m thick sections of disseminated or thinly banded pyrrhotite and pyrite;
(2) 1.5 m of near solid pyrrhotite, pyrite and chalcopyrite;
(3) 1.2 cm of solid pyrrhotite;
(4) an unspecified width of 10 to 15% banded magnetite, 6 to 8% pyrrhotite, 1% pyrite; and
(5) 30 cm of 20% banded magnetite, all in massive to sheared andesite (Baldwin, 1982; A.F. 90956).
DDH 38809 intersected three sections, 6, 4 and 3.2 m in core length, of banded iron formation with minor pyrrhotite and pyrite in layered biotite-amphibole-garnet schists (Baldwin, 1982; A.F. 91939). DDH 35400 intersected <5% pyrite in blebs and streaks in a 1.5 m section of biotite schist and in a pegmatite (A.F. 91939).

GEOCHEMISTRY

Drill core samples from DDH RL-3 assayed 0.01 to 0.25% Cu, nil Ni, trace to 0.7 g/t Ag, and trace Au (A.F. 90956).

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90953, 90956, 91498, 91528, 91529, 91664, 91939, 91940, 91988, 92462; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Steeves, M.A. and Lamb, C.F. 1972: Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B06 **MDS_No.: M64B06-002**

LOCATION: 2

NAME: Karsakuwigamak Lake

EASTING: 472871 **NORTHING: 6250145**

AREA: NTS 64B/6; south shore of Karsakuwigamak Lake, southwest of Einarsson Island.

AIR PHOTO: A24996-114

ACCESS: Float plane on Karsakuwigamak Lake, or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

The exploration history of this occurrence is detailed in Mineral Inventory Card 64B/6 Cu1. SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Hudson Bay Exploration and Development Co. Ltd. carried out an airborne radiometric and EM survey, an HLEM survey, and drilled DDH Jit 22, -23, -24, -25 (abandoned), -25A, and -26 totalling 393 m on CB 727 in 1970 (A.F. 90942). Parts of the area were covered by various surveys: a VLEM and magnetic survey and a reconnaissance geological survey by Canex Aerial Exploration Ltd. in 1970 (A.F. 90953); an HLEM and magnetic survey and reconnaissance geological survey by Semiahmoo Petro-Mines Ltd. in 1970 (A.F. 91507); a magnetic survey by Canadian Nickel Co. Ltd. in 1971 (A.F. 91528); an airborne EM and magnetic survey by Argem Exploration Ltd. in 1972 (A.F. 91377); and a ground EM survey by Phelps Dodge Corporation in 1972 (A.F. 90946). Ruttan Lake Explorations Limited carried out an HLEM and magnetic survey and drilled DDH RL-1 and RL-2 (also called DDH RU-1 and RU-2 in some of parts of A.F. 90956) (total 300 m) on CB 772 in 1972 (A.F. 90956). Canadian Nickel Co. Ltd. drilled DDH 35347, 35348, 35349, 35350, 35377, 35378 and 35379 totalling 514 m on CB 780 in 1972; only DDH 35378 and 35379 intersected bedrock (A.F. 91530).

GEOLOGICAL SETTING

Post-Sickle granodiorite is exposed to the south of the area of this occurrence (Baldwin, 1988). Pre-flooding maps show Ruttan Group basalt, andesite and picrite with lesser felsic volcanic rocks exposed north and slightly south of the Rat River; most of the area south of the Rat River is underlain by a granodiorite batholith (Steeves and Lamb, 1972). Lithologies intersected in DDH Jit-22 through Jit-26 probably represent a metasedimentary succession, and include various biotite-hornblende-quartz gneisses and schists, hornblende-biotite gneiss and hornblende-biotite-chlorite gneiss. In addition, (1) DDH Jit-23 intersected quartz-hornblende-sericite gneiss, (2) DDH Jit-22 intersected quartzite and biotite granite, (3) DDH Jit-24 intersected chlorite-biotite schist and quartz-biotite gneiss, and (4) DDH Jit-25A intersected granite gneiss, quartz-biotite-hornblende gneiss with local garnets and chlorite, and quartz-hornblende gneiss (A.F. 90942). DDH RL-1 intersected andesite, quartz-hornblende gneiss, hornblende-biotite gneiss and schist, chlorite-epidote-biotite schist, minor granitic and aplitic dykes. DDH RL-2 intersected quartz-hornblende gneiss and hornblende gneiss including a 2.0 m silicified (cherty) zone; 1.5 m of chloritized, magnetite (10%)-bearing iron formation; and gabbro (A.F. 90956). DDH 35378 and 35379 intersected volcanic-derived amphibolite, amphibole-biotite-garnet schist, biotite-garnet schist, amphibole gneiss, biotite gneiss, muscovite-biotite-feldspar schist and gneiss, and granite and pegmatite dykes (A.F. 91530).

MINERALIZATION

DDH Jit-22 intersected solid pyrrhotite, pyrite and chalcopyrite in a 2.0 m thick zone hosted by biotite-hornblende-quartz gneiss and a 15 cm thick zone hosted by biotite-quartz-hornblende-quartz gneiss. The 2.0 m thick zone consisted of 80 to 95% pyrrhotite and pyrite and up to 2% chalcopyrite; the biotite-hornblende-quartz gneiss host rock was 15.5 m thick. A 30 cm zone with 40% pyrrhotite and pyrite occurred 1.3 m from the 2.0 m solid sulphide zone. The 15 cm zone in biotite-quartz-hornblende-quartz gneiss contained 60% pyrrhotite (Baldwin, 1982; A.F. 90942). DDH Jit-23 intersected 3.2 m of near solid- to solid sulphide with 5 to 10% sphalerite and 1 to 10% chalcopyrite in four sections that were <35 cm thick. This mineralization is hosted by quartz-hornblende-sericite gneiss. DDH Jit-24 intersected 1 m of solid sulphide with 60% sphalerite, 10% pyrrhotite, trace chalcopyrite, trace to 1% sphalerite, and 1 to 2% magnetite in biotite-quartz-hornblende gneiss. DDH Jit-25A intersected three zones with <10% pyrrhotite and pyrite and 3% magnetite in quartz-biotite-hornblende gneiss with minor garnet and chlorite. A fourth zone, 2.1 m thick and containing 5 to 20% pyrite and 5 to 35% pyrrhotite, is hosted by similar rocks (Baldwin, 1982; A.F. 90942). DDH Jit-26 intersected a 1.9 m section with trace to 15% pyrrhotite and 1% pyrite and a 0.9 m section with 10% magnetite and 3% pyrite, both hosted by quartz-biotite-hornblende gneiss (A.F. 90942). DDH RL-1 intersected 1.2 m of 80 to 90% pyrrhotite and trace chalcopyrite in hornblende-epidote gneiss and 60 cm of quartz-hornblende gneiss with disseminated pyrrhotite and pyrite. These two mineralized zones are separated by 10 m of chlorite-epidote schist that contained magnetite bands up to 2 or 3 cm thick. Minor pyrrhotite and pyrite occur with magnetite, and drill logs report one band with 1% arsenopyrite. Directly up the hole from the 60 cm section with disseminated pyrrhotite and pyrite, a 2 m thick section, reported as very strongly altered, contains garnets, magnetite and trace pyrrhotite in chlorite-epidote schist. Magnetite bands with 1 to 2% pyrrhotite constitute a 1.5 m thick section of chloritized epidote-bearing banded iron formation in hornblende gneiss. Pyrrhotite (1 to 2%) is present in the magnetite bands intersected in core from DDH RL-2 (Baldwin, 1982; A.F. 90956). Core from DDH 35378 and 35379 was not mineralized (A.F. 91530).

GEOCHEMISTRY

Drill core samples from DDH RL-1 contained 0.02 to 0.05% Cu, nil Ni, 3.4 to 8.6 g/t Ag, and nil to trace Au. Samples from DDH RL-2 were not assayed (A.F. 90956).

CLASSIFICATION

Stratabound massive sulphide type deposit; volcanic rock associated.

REFERENCES

Assessment Files 90942, 90946, 90953, 90956, 91377, 91507, 91528, 91530, 91664, 91988; Manitoba Energy and Mines, Mines Branch.

Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

Mineral Inventory Card 64B/6 Cu1; Manitoba Energy and Mines, Geological Services Branch.

Steeves, M.A. and Lamb, C.F. 1972: Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B06 **MDS_No.: M64B06-003**

LOCATION: 3

NAME: (Mineralization intersected by diamond drilling)

EASTING: 482049 **NORTHING: 6261370**

AREA: 3.5 km west of the Rat River, near the northern limit of NTS 64B/6.

AIR PHOTO: A25474-149

ACCESS: Traverse from the Rat River, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

Hudson Bay Exploration and Development Co. Ltd. conducted a helicopter EM and radiometric survey in 1960 (A.F. 90958), and an HLEM survey in 1961 (A.F. 90950) on the Tam claims. DDH Tam 11 and Tam 12 (total 257 m) were drilled in 1963 to test EM conductors from the latter survey (A.F. 90957). SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Most of the area was covered by an HLEM and magnetic survey and reconnaissance geological survey by Semiahmoo Petro-Mines Ltd. in 1970 (A.F. 91507), and by an airborne EM and magnetic survey by Argem Exploration Limited in 1972 (A.F. 91377). Falconbridge Nickel Mines Ltd. conducted a ground EM and magnetic survey (A.F. 92496), mapped the area at 1:4800 and collected rock geochemical samples at 61 m (200 ft.) grid stations (A.F. 92497) over the western part of area in 1980.

GEOLOGICAL SETTING

The area is mostly covered by surficial deposits and swamp, but some Ruttan Group (Northern Block) polymictic conglomerate with interbedded arkosic sandstone and siltstone is exposed (Baldwin, 1988, 1982). Drill logs in A.F. 90957 note that DDH Tam 11 intersected sheared basalt with some sections of altered sediments and minor conglomerate, and DDH Tam 12 intersected granite, a "green breccia", and 0.2 m of basalt. Baldwin (1982) re-interpreted sheared graphitic basalt at this location as sheared, mafic to intermediate graphitic siltstone with minor disseminated pyrite, and the breccia as conglomerate with abundant mafic clasts.

MINERALIZATION

Logs for DDH Tam 11 note four sections of "sheared basalts" with minor pyrrhotite, two of which also contained graphite. A 0.2 m "basalt" intersection contained minor pyrite and graphite (A.F. 90957) (see 'Geological Setting' above). Baldwin (1982) notes that outcrops with local interbedded siltstones west of the drill holes contain "variable amounts of graphite and very minor disseminated sulphide". Falconbridge Nickel Mines Ltd. did not identify any alteration or mineralization in its mapping and rock geochemical survey over the western part of the area (A.F. 92497).

GEOCHEMISTRY

None.

CLASSIFICATION

Disseminated mineralization - not classified.

REFERENCES

Assessment Files 90950, 90957, 90958, 91377, 91507, 91664, 91988, 92496, 92497; Manitoba Energy and Mines, Mines Branch. Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B06 **MDS_No.: M64B06-004**

LOCATION: 4

NAME: (Mineralization intersected by diamond drilling)

EASTING: 469867 **NORTHING: 6253630**

AREA: 1.5 km north of Karsakuwigamak Lake, near western limit of NTS 64B/6.

AIR PHOTO: A24996-114

ACCESS: Traverse from Karsakuwigamak Lake, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). The area was covered by an HLEM and magnetic survey by Ryanor Mining Company Limited in 1970 (A.F. 91940). Canex Aerial Exploration Ltd. conducted a VLEM and magnetic survey, a reconnaissance geological survey, and drilled DDH 124-1 and 124-2 (total 243 m) in 1970 (A.F. 90953).

GEOLOGICAL SETTING

The area is underlain by post-Sickle diorite and gabbro intrusions. Rhyolite and dacite flows, lapilli tuff and tuff occur to the northwest. A northeast-trending fault offsets lithologic units in the area (Baldwin, 1988). DDH 124-1 intersected intermediate to mafic volcanic rocks and a siliceous biotitic sedimentary rock; DDH 124-2 intersected mafic, intermediate and felsic volcanic rocks and minor gabbro (A.F. 90953).

MINERALIZATION

Traces of pyrite occurred locally in intermediate to mafic volcanic rocks from DDH 124-1 (A.F. 90953). DDH 124-2 intersected traces of pyrrhotite, pyrite and chalcopyrite in mafic, intermediate and felsic volcanic rocks (Baldwin, 1982; A.F. 90953).

GEOCHEMISTRY

None.

CLASSIFICATION

Disseminated mineralization - not classified.

REFERENCES

Assessment Files 90953, 91664, 91940, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B06 **MDS_No.: M64B06-005**

LOCATION: 5

NAME: (Mineralization intersected by diamond drilling)

EASTING: 471507 **NORTHING: 6255936**

AREA: NTS 64B/6; 3.75 km west of Phillips Bay (Karsakuwigamak Lake).

AIR PHOTO: A24996-115

ACCESS: Traverse from Karsakuwigamak Lake, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canex Aerial Exploration Ltd. conducted a VLEM and magnetic survey, a reconnaissance geological survey, and drilled DDH 124-3 (198 m) in 1970 (A.F. 90953).

GEOLOGICAL SETTING

The area is underlain by post-Sickle diorite and gabbro intrusions and a layered assemblage of Ruttan Group (Karsakuwigamak Block) rhyolite and dacite flows, lapilli tuff and tuff, heterolithic volcanic breccia and polymictic conglomerate (Baldwin, 1988). DDH 124-3 intersected intermediate to mafic volcanic rocks, and sedimentary rocks including greywacke, quartzite, conglomerate, phyllite, arkose, and interlayered felsic volcanic rocks (A.F. 90953).

MINERALIZATION

Pyrite, 5%, occurred over a 36 m section of quartzite and greywacke, conglomerate, quartzite, and phyllite from DDH 124-3. Mineralization included numerous 15 cm thick sections that contain up to 30% pyrite parallel to bedding (A.F. 90953).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90953, 91664, 91988; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B06 **MDS_No.: M64B06-006**

LOCATION: 6

NAME: (Mineralization intersected by diamond drilling)

EASTING: 477382 **NORTHING: 6261181**

AREA: NTS 64B/6; 5 km north-northeast of Phillips Bay (Karsakuwigamak Lake).

AIR PHOTO: A24996-99

ACCESS: Traverse from Karsakuwigamak Lake, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

Hudson Bay Exploration and Development Co. Ltd. conducted a helicopter EM and radiometric survey in 1960 (A.F. 90958), and an HLEM survey on the Tam claims in 1961 (A.F. 90950). DDH Tam 8 and Tam 10 (total 180 m) were drilled in 1963 to test EM conductors from the latter survey (A.F. 90957). SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canex Aerial Exploration Ltd. conducted a VLEM and magnetic survey and a reconnaissance geological survey over part of the area in 1970 (A.F. 90953). The area was covered by an HLEM and magnetic survey and reconnaissance geological survey by Semiahmoo Petro-Mines Ltd. in 1970 (A.F. 91507), an airborne EM and magnetic survey by Argem Exploration Limited in 1972 (A.F. 91377), and part of the area was covered by a ground EM survey by Phelps Dodge Corporation in 1972 (A.F. 90946). Canadian Nickel Co. Ltd. carried out a magnetic survey over the western part of the area in 1972 (A.F. 92213).

GEOLOGICAL SETTING

Ruttan Group (Northern Block) polymictic conglomerate and arkose is exposed to the east of the occurrence (Baldwin, 1988). Drill logs for DDH Tam 8 and Tam 10 note "greenstone with biotite and quartz stringers", sheared basalt with quartz stringers, some of which was interbedded with tuff and breccia, and minor biotite quartzite (A.F. 90957). Baldwin (1982) re-interpreted the sheared basalt as sheared, mafic to intermediate siltstone, and the breccia as conglomerate with abundant mafic clasts.

MINERALIZATION

DDH Tam 8 and Tam 10 intersected two mineralized zones, 5.5 m and 12.4 m true thickness, in sheared basalt. The 5.5 m thick zone consisted of three graphitic intervals up to 2 m thick with minor pyrite separated by 1 m thick graphitic nonsulphidic intervals. The 12.4 m thick zone consisted of nongraphitic intervals with minor pyrrhotite up to 3.3 m thick separated by nonmineralized intervals (Baldwin, 1982; A.F. 90957).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; other chemical sediments.

REFERENCES

Assessment Files 90946, 90950, 90953, 90957, 90958, 91377, 91507, 91664, 91988, 92213; Manitoba Energy and Mines, Mines Branch.

Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B06 **MDS_No.: M64B06-007**

LOCATION: 7

NAME: Karsakuwigamak Lake North

EASTING: 473351 **NORTHING: 6258911**

AREA: NTS 64B/6; 3.5 km northwest of Phillips Bay (Karsakuwigamak Lake).

AIR PHOTO: A24996-99

ACCESS: Traverse from Karsakuwigamak Lake, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

The exploration history of this occurrence is detailed in Mineral Inventory Card 64B/6 Cu2. SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canex Aerial Exploration Ltd. conducted a VLEM and magnetic survey, a reconnaissance geological survey, and drilled DDH 124-5 (119 m) in 1970 (A.F. 90953). Phelps Dodge Corporation conducted an ground EM survey on CB 255 (A.F. 90946) and CB 257 (A.F. 90955) in 1972, and drilled DDH 128-1 and 128-2 totalling 242 m in 1973 on CB 257 (A.F. 90955). Falconbridge Nickel Mines Ltd. conducted a magnetic survey (A.F. 92557), mapped the area at 1:4800 and conducted a rock geochemical survey at 61 m (200 ft.) grid stations on CB 8592 in 1980 (A.F. 92559). Falconbridge carried out an IP survey in 1981 (A.F. 92561), and an HLEM survey in 1983 (A.F. 92572).

GEOLOGICAL SETTING

Ruttan Group rhyolite and dacite flows and tuff, heterolithic tuff breccia, polymictic conglomerate, arkose, felsic siltstone, and post-Sickle diorite and gabbro are exposed in the area. Strata are disrupted by block-bounding faults; parts of the Ruttan, Northern and Karsakuwigamak blocks are represented in the area (Baldwin, 1988). DDH 124-4, 128-1 and 128-2 intersected an interbedded sequence of conglomerate, greywacke, quartzite, siliceous greywacke and hard black argillaceous greywacke (A.F. 90953, 90955). In outcrop, the rocks are volcanic-derived sandstone, massive chert, conglomerate (debris flow) and black siltstones (Baldwin, 1982). The north-younging succession overlies a thick sequence of volcanic-derived epiclastic rocks with subordinate felsic flow rocks (Baldwin, 1982).

MINERALIZATION

DDH 124-5, 128-1 and 128-2 intersected disseminated pyrrhotite and pyrite in quartzite and argillaceous greywacke. Based on drill log and outcrop data, the impure quartzite is 18 m in true thickness and contains 3% pyrrhotite and traces of pyrite. The argillaceous greywacke is 3 to 3.5 m in true thickness, generally graphitic and contains up to 10% pyrrhotite and 3% pyrite (Baldwin, 1982; A.F. 90953, 90955). Falconbridge Nickel Mines Ltd. identified a unit of "pyritic cherty tuff" in its mapping program of the area (A.F. 92559).

GEOCHEMISTRY

Drill core samples from DDH 124-5 contained trace to 0.01% Cu, trace to 0.01% Zn, and nil Ag and Au (A.F. 90953). Drill core samples from DDH 128-1 and 128-2 contained 0.02 to 0.04% Cu, 0.01 to 0.02% Zn, 0.01 to 0.02% Ni, 1.4 to 9.6 g/t Ag and 0.3 to 0.7 g/t Au (A.F. 90955).

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation. Baldwin (1982) notes: "Similarities of rock descriptions and stratigraphic succession in outcrop at one (drill hole location) and to the west...suggest that the mineralization is stratiform.

REFERENCES

Assessment Files 90946, 90953, 90955, 91664, 91988, 92557, 92559, 92561, 92572; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Mineral Inventory Card 64B/6 Cu2; Manitoba Energy and Mines, Geological Services Branch.

NTS: 64B06 **MDS_No.: M64B06-008**

LOCATION: 8

NAME: (Mineralization intersected by diamond drilling)

EASTING: 473605 **NORTHING: 6260542**

AREA: NTS 64B/6; 4 km north of Phillips Bay (Karsakuwigamak Lake)

AIR PHOTO: A24996-99

ACCESS: Traverse from Karsakuwigamak Lake, which is accessible by float plane or by boat from the Suwannee River landing near Provincial Road 391.

EXPLORATION SUMMARY

Hudson Bay Exploration and Development Co. Ltd. conducted an EM survey on the Tam claims in 1961 (A.F. 90950). SGM conducted an airborne EM and magnetometer survey over the area in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canex Aerial Exploration Ltd. conducted a VLEM and magnetic survey and a reconnaissance geological survey over part of the area in 1970 (A.F. 90953). Canadian Nickel Co. Ltd. drilled DDH 35316 and 35314 totalling 334 m on CB 964 in 1970 (A.F. 90967), and carried out a magnetic survey on the Tar claims in 1972 (A.F. 92213). Phelps Dodge Corporation carried out an HLEM survey over CB 257 (A.F. 90955) and CB 255 (A.F. 90946) in 1972. SGM carried out an HLEM and magnetic survey over CB 8969 in 1980 (A.F. 92542).

GEOLOGICAL SETTING

The area is covered by overburden (Baldwin, 1988; Steeves and Lamb, 1972). DDH 35314 intersected quartzite, biotite gneiss, amphibole gneiss, metasedimentary rocks, sericite schist, and minor quartz veins. DDH 35316 intersected quartzite, including some sections that are cherty, micaceous, impure, or sheared; biotite-quartz schist; quartz-muscovite schist; sheared graphitic biotite-quartz schist; and tremolite schist (A.F. 90967). The micaceous quartzite is at least 30 m thick. Graphite schist, quartz-graphitic schist, muscovite-quartz schist and biotite-quartz schist constitute an interbedded succession; individual rock types range from 0.3 to 6.5 m in thickness (Baldwin, 1982; A.F. 90967).

MINERALIZATION

Baldwin (1982) summarizes the drill log reports of mineralization from DDH 35314 and 35316 (A.F. 90967): DDH 35314 intersected: (1) <15% disseminated pyrrhotite and pyrite in impure quartzite, (2) up to 8% disseminated pyrrhotite and pyrite and trace chalcopyrite in metasedimentary rocks, and (3) 60% pyrrhotite and pyrite in a 6 cm quartz vein hosted by impure quartzite. The impure quartzite was at least 100 m thick, banded, locally sheared and locally graphitic. The metasedimentary rocks comprised an approximately 25 m thick banded (bedded) unit that includes argillite beds. DDH 35316 intersected 3 to 20% pyrrhotite and pyrite, disseminated and streaks, in 15 to 76 m thick sections hosted by micaceous quartzite, graphite schist, quartz-graphite schist, muscovite-quartz schist and biotite-quartz schist.

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment File 90946, 90950, 90953, 90955, 90967, 91664, 91988, 92213, 92542; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982: Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p. 1988: Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Steeves, M.A. and Lamb, C.F. 1972: Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B11 **MDS_No.: M64B11-004**

LOCATION: 4

NAME: (A.F. - Mineralization intersected by diamond drilling)

EASTING: 474147 **NORTHING: 6268553**

AREA: NTS 64B/11; Nisku Bay (Issett Lake).

AIR PHOTO: A24996-97

ACCESS: Boat on Issett Lake, which is accessible by the road from Leaf Rapids to Southern Indian Lake.

EXPLORATION SUMMARY

Hudson Bay Exploration & Development Co. Ltd. conducted an HLEM survey over the Cat claims in 1960-61 (A.F. 90963), and drilled DDH Cat 23 (133.8 m) on claim Cat 22 in 1961 (A.F. 90964). Sherritt Gordon Mines Limited conducted an airborne EM and magnetic survey over Airborne Permit 71 in 1968 (A.F. 91664). Canadian Nickel Co. Ltd. drilled seven holes (DDH 35301, 35302, 35303, 35304, 35307, 35308, 35309) totalling 788 m on CB 963 and CB 964 in 1969-70 (A.F. 90966). Canadian Nickel Co. Ltd drilled five holes (DDH 35305, 35306, 35310, 35311, 35312) totalling 693 m on CB 964 and CB 968 in 1970 (A.F. 90967). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canadian Nickel Co. Ltd. carried out a magnetic survey over the area in 1972 (A.F. 92213).

GEOLOGICAL SETTING

The area is mostly covered by overburden or flooded; the eastern part of the area is underlain by tonalite and diorite (Lamb et al., 1972). Drillholes intersected mostly biotite schist, in parts graphitic or siliceous or pegmatitic, and lesser grey micaceous quartzite. Minor mylonitic ± graphitic sections, amphibole gneiss or schist were logged in core from several holes. DDH 35309, 35310, 35311 and 35312 additionally intersected stringers and zones of skarn (A.F. 90966, 90967). DDH 35310 also intersected minor granite gneiss (A.F. 90967).

MINERALIZATION

DDH 35301. Separate 0.6 and 0.7 m sections of brecciated biotite schist contained 35% and 60%, respectively, pyrrhotite and pyrite. In addition, from 17.1 to 47.9 m, the drill core contained trace to 20% pyrrhotite and pyrite, generally approximately 10% sulphides (A.F. 90966).
DDH 35302. Notable mineralized intersections included (a) 1.7 m with 45% pyrrhotite and pyrite bands, (b) 1.3 m with 50% pyrrhotite and pyrite, brecciated in places, (c) 0.2 m of sulphide breccia with 80% pyrrhotite and pyrite, (d) 1.3 m of sulphide breccia with 75% pyrrhotite and pyrite, (e) 1.4 m of sulphide breccia with 75% pyrrhotite and pyrite, and (f) 0.2 m of sulphide breccia with 60% pyrrhotite and pyrite. All of these intersections were hosted by biotite schist. In addition, most of the remainder of the drill core contained trace to 20% pyrrhotite and pyrite (A.F. 90966).
DDH 35303. Separate 6 and 50 cm sections of sulphide-quartz-schist breccia contained 60% pyrrhotite. In addition, from 27.7 to 53.1 m, biotite schist contained trace to 22% pyrrhotite and pyrite (A.F. 90966).
DDH 35304. A 0.3 m section of quartzite-sulphide-schist breccia contained 35% pyrrhotite surrounding quartzite fragments; a 0.1 m section of schist-sulphide-quartzite breccia contained 40% pyrrhotite and pyrite. In addition, core from 23.4 to 46.6 m contained trace to 15% pyrrhotite and pyrite (A.F. 90966).
DDH 35305. A 0.3 m section of biotite schist contained 30% pyrrhotite stringers and disseminations, a 0.4 m section of schist-sulphide breccia contained 40% pyrrhotite and pyrite, and a 0.3 m section of biotite schist contained 30% pyrrhotite stringers. In addition, core from 13.1 to 46.1 m contained trace to 12% pyrite (A.F. 90967).
DDH 35306. Two sections, 0.5 and 0.3 m, of biotite schist contained 30% pyrrhotite and pyrite. In addition, core from 28.2 to 56.4 m and from 76.4 to 83.6 m contained trace to 20% pyrrhotite and pyrite (A.F. 90967).
DDH 35307. Trace to 15% pyrrhotite and pyrite occurred in biotite schist throughout most of the drill core (A.F. 90966).
DDH 35308. A 0.7 m section of brecciated graphitic biotite schist with local bands of quartzite contained 30% pyrrhotite and pyrite; a 0.8 m section of brecciated schist and quartzite contained 30% pyrrhotite. Most of the remainder of the core contained trace to 15% pyrrhotite and pyrite (A.F. 90966).
DDH 35309. A 0.2 m section of brecciated biotite-chlorite-quartz schist contained 45% pyrrhotite and pyrite. Trace to minor pyrrhotite and pyrite were present throughout most of the rest of the drill core (A.F. 90966).
DDH 35310. Trace to minor pyrite and pyrrhotite were disseminated from 13.7 to 26.3 m, from 77.0 to 81.0 m, and from 102.0 to 111.2 m (A.F. 90967).
DDH 35311. A 0.2 m section of sulphide breccia consisted of 80% fine grained pyrrhotite with fragments of schist and quartz. Most of the rest of the core contained trace to moderate pyrrhotite and pyrite (A.F. 90967).
DDH 35312. Nine intersections, 0.15 to 2.7 m, contained 30 to 50% pyrrhotite and pyrite stringers, veins and blebs, and were hosted by biotite schist, some of which is siliceous or graphitic, "micaceous schist", and quartzite, some of which is micaceous and graphitic. A 9 cm solid pyrrhotite-pyrite vein was hosted by biotite schist. Eleven intersections of sulphide breccia, 0.1 to 1.9 m, consisted of 60 to 95% pyrrhotite and pyrite (and in one intersection, possible pentlandite) with schist and/or quartz fragments. In addition, the remainder of the drill core contained trace to moderate amounts of pyrrhotite and pyrite (A.F. 90967).
DDH Cat 23. A 59.1 m zone of mineralization contained minor to moderate amounts of pyrrhotite, graphite, and pyrite, and narrow zones of near solid to solid pyrrhotite. Mineralization occurred within a larger unit of quartz-mica gneiss and schist. Included in this zone were a 1.3 m section with moderate amounts to solid pyrite and a separate 1.2 m section with traces of sphalerite (A.F. 90964).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90963, 90964, 90966, 90967, 91664, 91988, 92213; Manitoba Energy and Mines, Mines Branch.
Lamb, C.F., Steeves, M.A., Hinds, R.W. and Frohlinger, T.G. Figure 8:Drillhole locations at occurrences 4 and 5 (NTS 64B/11). 1972:Issett Lake, Map 71-2-9; in Frohlinger, T.G., 1972, Geology of the Southern Indian Lake area, central portion; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2I, 91p.

NTS: 64B11 **MDS_No.: M64B11-005**

LOCATION: 5

NAME: (A.F. - Mineralization intersected by diamond drilling)

EASTING: 469649 **NORTHING: 6266926**

AREA: NTS 64B/11; Nisku Bay (Issett Lake).

AIR PHOTO: A24996-116

ACCESS: Boat on Issett Lake, which is accessible by the road from Leaf Rapids to Southern Indian Lake.

EXPLORATION SUMMARY

Hudson Bay Exploration & Development Co. Ltd. conducted an HLEM survey on the Cat claims in 1960-61 (A.F. 90963). Sherritt Gordon Mines Limited conducted an airborne EM and magnetic survey over Airborne Permit 71 in 1968 (A.F. 91664). Canadian Nickel Co. Ltd. drilled DDH 35313 (113 m) on CB 1293 in 1970 (A.F. 90967). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canadian Nickel Co. Ltd. carried out a magnetic survey over the area in 1972 (A.F. 92213). Sherritt Gordon Mines Limited drilled DDH Rus-81-7 (128 m) to test an EM conductor on CB 8962 in 1981 (A.F. 92562).

GEOLOGICAL SETTING

The area is covered by overburden and water; Lamb et al. (1972) mapped tonalite and diorite to the east of the area. Baldwin (1988) mapped volcanic and sedimentary rocks to the west of this occurrence. DDH 35313 intersected granite gneiss, hornblende gneiss, biotite gneiss and biotite schist (A.F. 90967). DDH Rus-81-7 intersected fine grained gneissic to laminated metasedimentary rocks with abundant felsic to intermediate dykes and sills; a highly chloritized, pale to dark green, fine grained, friable schist with variable amounts of biotite, carbonate, and minor quartz veinlets; cherty rocks; and massive, pale green, chloritic andesite (A.F. 92562).

MINERALIZATION

DDH 35313 intersected trace to minor amounts of pyrite and lesser pyrrhotite stringers and disseminations throughout virtually all of the drill core (A.F. 90967).
DDH Rus-81-7 intersected 5 cm of near solid pyrite crystals in laminated metasedimentary rocks that contains pyrrhotite and pyrite disseminations and laminae. A description of a 21 m (core length) section of cherty sedimentary rocks mentions traces of graphite, disseminated pyrrhotite and pyrite, and locally, near solid pyrrhotite and pyrite. Trace to minor pyrite and pyrrhotite occur as disseminations, blebs, and vug- and fracture-fillings throughout most of the core (A.F. 92562).

GEOCHEMISTRY

Analyses of 53 drill core samples ranged from nil to 0.05% Cu, nil to 0.07% Zn, 1.6 to 14.0% Fe, nil to 0.02% Pb, trace to 0.3 g/t Au and 0.3 to 4.8 g/t Ag (A.F. 92562).

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90963, 90967, 91664, 91988, 92213, 92562; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1988:Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Lamb, C.F., Steeves, M.A., Hinds, R.W. and Frohlinger, T.G. 1972:Issett Lake, Map 71-2-9; in Frohlinger, T.G., 1972, Geology of the Southern Indian Lake area, central portion; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2I, 91p.

NTS: 64B11 **MDS_No.: M64B11-006**

LOCATION: 6

NAME: (A.F. - Mineralization intersected by diamond drilling)

EASTING: 469581 **NORTHING: 6263010**

AREA: NTS 64B/11; south shore of Nisku Bay (Issett Lake).

AIR PHOTO: A24996-117

ACCESS: Road from Leaf Rapids to Southern Indian Lake.

EXPLORATION SUMMARY

Hudson Bay Exploration and Development Co. Ltd. conducted an airborne EM and radiometric survey in 1959 (A.F. 90968). HBED carried out a follow-up ground EM survey, and drilled six holes totalling 402 m in 1960 on the Roc claims (A.F. 90968). Sherritt Gordon Mines Limited conducted an airborne EM and magnetic survey over Airborne Permit 71 in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canadian Nickel Co. Ltd. carried out a magnetic survey over the area in 1972 (A.F. 92213). Sherritt Gordon Mines Limited carried out a ground HLEM and magnetic survey on CB 8969 in 1980 (A.F. 92542).

GEOLOGICAL SETTING

The area is covered by overburden and water. Drillholes intersected quartz ± plagioclase ± biotite gneiss and schist, locally with minor garnets; "altered" (unspecified) mafic to intermediate metavolcanic rocks, some of which are banded or contain siliceous and tuffaceous sections; and minor banded metasedimentary rocks (A.F. 90968). Baldwin (1982) interprets the host rocks as high grade metamorphic equivalents of Ruttan Group polymictic conglomerate with volcanic- and plutonic-derived clasts. In addition, minor rhyolite was intersected by DDH Roc 2 and Roc 6. DDH Roc 2 also intersected amphibolite with quartz stringers and minor quartz diorite porphyry (A.F. 90968).

MINERALIZATION

DDH Roc 1. Three mineralized zones were intersected:(a) 0.6 m with moderate pyrrhotite and traces of disseminated chalcopyrite in "altered" mafic to intermediate volcanic rocks, (b) 0.8 m with minor to near solid pyrrhotite and trace to minor chalcopyrite, between "altered" mafic to intermediate volcanic rocks with siliceous and tuffaceous sections and banded sedimentary rocks, and (c) 1.0 m with graphite and minor to moderate pyrrhotite, between "altered" mafic to intermediate volcanic rocks and quartz-plagioclase-mica gneiss with local minor garnets (A.F. 90968).
DDH Roc 2. Two zones, 1.6 and 16.3 m, of graphite and minor to moderate pyrrhotite ± pyrite are separated by 2.6 m of rhyolite. "Highly altered" quartz-feldspar gneiss occurs up the hole from the first zone, and quartz-plagioclase-biotite gneiss occurs down the hole from the second zone (A.F. 90968).
DDH Roc 3. A 3.3 m zone with graphite and minor to moderate pyrrhotite is hosted by banded mafic to intermediate volcanic rocks (A.F. 90968).
DDH Roc 5. A 19.3 m zone with graphite and minor to moderate pyrrhotite and local traces of disseminated chalcopyrite occurs between quartz-plagioclase-biotite gneiss and "altered" andesite (A.F. 90968).
DDH Roc 6. A 1.0 m zone with minor graphite and moderate pyrrhotite occurs down the hole from "altered" rhyolite with minor disseminated pyrrhotite and pyrite, and up the hole from quartz-plagioclase-biotite gneiss with local garnets and minor local pyrrhotite stringers. A second zone, 13.3 m in core length, with graphite, minor to moderate pyrrhotite, and traces of disseminated chalcopyrite is hosted by quartz-plagioclase-biotite gneiss (A.F. 90968).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation. References to altered mafic and felsic volcanic rocks in drill logs may be indicative of the type of alteration generally associated with massive sulphide type deposits.

REFERENCES

Assessment Files 90968, 91664, 91988, 92213, 92542; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982:Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p.

NTS: 64B11 **MDS_No.: M64B11-007**

LOCATION: 7

NAME: (A.F. - Mineralization intersected by diamond drilling)

EASTING: 476679 **NORTHING: 6261731**

AREA: NTS 64B/11; approximately 3 km southwest of Muskayk Lake.

AIR PHOTO: A24996-99

ACCESS: Float plane and traverse from Muskayk Lake or the Rat River north of Karsakuwigamak Lake.

EXPLORATION SUMMARY

Hudson Bay Exploration & Development Co. Ltd. carried out a helicopter-borne EM and radiometric survey on the Tam claims in 1960 (A.F. 90958), and a follow-up HLEM survey in 1961 (A.F. 90950). Part of the area was covered by an airborne EM and Turam survey conducted by Argem Exploration Limited in 1962 (A.F. 91377). Sherritt Gordon Mines Limited conducted an airborne EM and magnetic survey over Airborne Permit 71 in 1968 (A.F. 91664). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Canadian Nickel Co. Ltd. drilled DDH 35315 (137 m) on CB 1060 in 1970 (A.F. 90967). Canadian Nickel Co. Ltd. carried out a magnetic survey over the area in 1972 (A.F. 92213). Sherritt Gordon Mines Limited carried out an HLEM survey over CB 8969 in 1980 (A.F. 92542).

GEOLOGICAL SETTING

The area is underlain by Ruttan Group greywacke, polymictic conglomerate and arkose (Baldwin, 1988). DDH 35315 intersected impure and feldspathic quartzites; sericite, biotite and graphite schists; and minor amphibole gneiss (A.F. 90967).

MINERALIZATION

DDH 35315 intersected two sections of sulphide breccia, 40 and 6 cm, with 50 to 60% pyrrhotite and pyrite and fragments and bands of schist. The sections are separated by 0.4 m of graphite schist with 3 to 4% disseminated pyrite. Up to 25%, usually <10%, pyrite and pyrrhotite are disseminated from 56.4 to 89.4 m (A.F. 90967).

GEOCHEMISTRY

None.

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation.

REFERENCES

Assessment Files 90950, 90958, 90967, 91377, 91664, 91988, 92213, 92542; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1988:Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.

NTS: 64B12 **MDS_No.: M64B12-009**

LOCATION: 9

NAME: RUSTY LAKE

EASTING: 461622 **NORTHING: 6268260**

AREA: NTS 64B/12; south shore of Rusty Lake.

AIR PHOTO: A25474-113; A21124-70

ACCESS: Float plane. Winter access by snowmobile from the road between Ruttan Mine and Southern Indian Lake or by ski-equipped airplane.

EXPLORATION SUMMARY

The exploration history of this location is given in Mineral Inventory Card 64B/12 Cu1. R.G. Crosby conducted an HLEM survey on the Max claims in 1958 (A.F. 91359). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Hudson Bay Exploration and Development Company Limited carried out an airborne EM and radiometric survey over part of the area in 1969 (A.F. 91673). Chemalloy Minerals conducted a magnetic and EM survey and drilled DDH 1, 2, 3, 4 totalling 410.3 m on CB 849 in 1970 (A.F. 90975). Falconbridge Nickel Mines Limited conducted an HLEM and magnetic survey on CB 8011 in 1978-79 (A.F. 92676), mapped CB 8011 and CB 8012 at 1:4800, and completed a whole rock lithogeochemical survey over their grid in 1980 (A.F. 92677). Falconbridge drilled DDH RL-1 (96.6 m), RL-2 (abandoned at 72.5 m; hole drilled downdip), and RL-3 (74.4 m) on CB 8012 in 1983 (A.F. 92679).

GEOLOGICAL SETTING

The area is underlain by greywacke, lithic arenite, and minor conglomerate with volcanic and plutonic clasts; aphyric pillowed basalt; volcanic- and plutonic-derived sandstone and interbedded conglomerate; and volcanic-derived conglomerate with intermediate to mafic sandstone and siltstone. This sequence is folded into an overturned syncline (Bailes and Syme, 1982). DDH 1, 2, 3 and 4 intersected biotite schist (altered amphibolite), some of which is siliceous, chloritic, garnetiferous and/or banded; fine grained amphibolite; minor talc or serpentine schist; and hornblende gabbro and granodiorite (A.F. 90975). DDH RL-1 intersected metasedimentary rocks and intermediate to felsic tuff (possibly sheared), separated by a 1.5 m fault zone. DDH RL-2 intersected intermediate to mafic conglomerate. DDH RL-3 intersected volcaniclastic fragmental rocks, rhyolitic tuff and siliceous metapelite (A.F. 92679).

MINERALIZATION

Parts of a 7.6 m section of amphibolite and biotite schist from DDH 4 contained solid pyrrhotite and pyrite, including a 0.3 m section. A 3.9 m section of amphibolite with 5-10% pyrrhotite with some graphite. The remainder of the drill core contained trace to minor pyrrhotite, pyrite, and rare chalcopyrite (A.F. 90975). DDH 1 and 3 intersected only minor pyrrhotite and traces of chalcopyrite throughout the core, except for one 5 cm section of solid pyrrhotite with traces of chalcopyrite from each hole. From DDH 2, a 0.8 m section of fine grained siliceous rock contained 30-40% pyrrhotite. Amphibolite contained graphitic siliceous bands with minor pyrrhotite. Traces of malachite stain were associated with pyrrhotite at one place in core from DDH 3, and traces of native copper were noted at one place in core from DDH 4 (A.F. 90975). Mineralization was not intersected by DDH RL-1, RL-2 and RL-3; EM conductors were attributed to a fault/shear zone in DDH RL-1 and to conductive overburden in DDH RL-3 (A.F. 92679). Minor pyrite and pyrrhotite are common in outcrops in the area (Steeves and Lamb, 1972; A.F. 92677).

GEOCHEMISTRY

Thirteen drill core assays from DDH 1 to 4 assayed 0.007-0.08% Cu, 0.007-0.02% Ni, and nil to 0.01% Zn (A.F. 90975). A whole rock lithogeochemical survey of the area by Falconbridge Nickel Mines Limited in 1980 did not detect depletion of Na, Ca and Sr or enrichment of Mg, K, Cu (range = 11-180 ppm) or Zn (range = 7-94 ppm) in 28 samples. The report cautioned that sample coverage was sparse because of lack of bedrock in the area (A.F. 92677).

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation. The EM trends that these drillholes tested extend throughout the Opachuanau - Rusty lakes area (see also locations 3, 4, 5, 6, 11), and are interpreted as folded sulphide facies iron formation (Steeves and Lamb, 1972).

REFERENCES

Assessment Files 90975, 91359, 91673, 91988, 92676, 92677, 92679; Manitoba Energy and Mines, Mines Branch.
Bailes, A.H. and Syme, E.C. 1982:Rusty Lake area; in Manitoba Energy and Mines, Report of Field Activities, 1982, p. 15; 1:125 000.
Mineral Inventory Card 64B/12 Cu1; Manitoba Energy and Mines, Geological Services Branch.
Steeves, M.A. and Lamb, C.F. 1972:Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B12 **MDS_No.: M64B12-012**

LOCATION: 12

NAME: (A.F. - Mineralization intersected by diamond drilling)

EASTING: 462710 **NORTHING: 6266649**

AREA: NTS 64B/12; between Rusty Lake and Nisku Bay (Issett Lake).

AIR PHOTO: A25474-114; A21124-71

ACCESS: Float plane to Rusty Lake. Access by snowmobile or ATV on trails from the road between the Ruttan Mine and Southern Indian Lake.

EXPLORATION SUMMARY

Hudson Bay Exploration and Development Co. Ltd. drilled DDH Gab 1 and Gab 3 to Gab 7 (total 655.2 m) to test EM conductors on the Gab claims in 1959. Locations for DDH Gab 2 and Gab 8 to Gab 14 are also shown, but logs are not included (A.F. 90974). Hudson Bay Exploration and Development Co. Ltd. conducted an EM survey in 1960-61 (A.F. 90963) and drilled DDH Cat 4 (147.7 m) to test a conductor in 1961 (A.F. 90964). Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Chemalloy Minerals conducted a magnetic and EM survey on CB 849 in 1970 (A.F. 90975). Canadian Nickel Co. Ltd. conducted a magnetic survey on the Tar claims in 1971 (A.F. 92213). Sherritt Gordon Mines Limited drilled DDH Rus-81-6 (149.4 m) on CB 8962 in 1981. The report also cites an unpublished report of grid mapping by M.R. Jackson for Sherritt in 1979 (A.F. 92562). Homestake Mineral Development Company conducted a minor prospecting and lithogeochemical sampling program southeast of Rusty Lake on the Rust claims in 1989 (A.F. 93008). Richard D. Joy blasted and sampled four trenches and drilled two holes (DDH J1, J2; total 86.6 m) on the John claims further to the west in 1991 (A.F. 93304).

GEOLOGICAL SETTING

The area is underlain by various conglomerates, sandstone, siltstone, and minor iron formation and basalt flows (Baldwin, 1982, 1988). Sulphide facies iron formation interbedded with greywacke occurs in two units 15 to 20 m thick that can be traced intermittently for 1.5 km along strike. Massive to foliated siliceous rock with variable amounts of plagioclase and biotite contains 15 to 20% fine grained disseminated pyrrhotite, pyrite, and traces of chalcopyrite. The sulphidic beds are 1 to 2 m thick, are interbedded with 0.01-0.5 m thick greywacke sandstone and siltstone beds, and locally, with 0.02-5 m thick chert beds (Baldwin, 1982, p. 58). The 'Gab' drillholes intersected silicified andesite, dacite and rhyolite; fragmental rocks (details not specified); quartz-hornblende gneiss, quartz-biotite gneiss, biotite-plagioclase ± hornblende gneiss, quartz-feldspar gneiss, hornblende ± biotite gneiss (chloritic in places), and locally, minor pegmatite and granite dykes (A.F. 90974). Drill logs of DDH Cat 4 report metavolcanic mica schist and quartz-feldspar-biotite gneiss, partly schistose and garnetiferous (A.F. 90964). DDH Rus-81-6 intersected intermediate laminated sedimentary rocks (A.F. 92562).

MINERALIZATION

Mineralization intersected by drillholes is summarized in Table 8. In general, the 'Gab' drillholes intersected disseminated to near solid pyrrhotite and pyrite and local traces of chalcopyrite in quartz-plagioclase-biotite ± hornblende gneisses that are up to 14 m thick. Baldwin (1982, p. 57) notes that these gneisses are probably metasedimentary rocks, correlative with those to the south and east, and that the sulphides were deposited contemporaneously with the sediment. DDH Cat 4 intersected several short intersections of disseminated to solid pyrrhotite, traces of chalcopyrite, and locally, graphite in places. The host rocks are interpreted by Baldwin (1982, p. 57) as volcanic and plutonic derived polymictic conglomerate. DDH Rus-81-6 intersected only minor pyrite locally disseminated in intermediate metasedimentary rocks (A.F. 92562). Drillholes J1 and J2 intersected only traces of chalcopyrite or galena in narrow quartz veins hosted by sericitic siliceous siltstone. Rock in the trenches was not mineralized (A.F. 93304).

Description of mineralization summarized from drill logs for occurrence 12 (A.F. 90972) (NTS 64B/12).

DDH	Intersection Length(m)	Mineralization	Host Rock	Comments(Reference)	DDH Length(m)
Rus-81-6		Only trace to minor py locally	Intermediate laminated metasedimentary rocks	(A.F. 92562)	149.4
Cat 4	1.5	Minor to mod. po, tr. cp	(Metavolcanic) mica schist(1)	Minor po ± gf in places throughout core (A.F. 90964;Baldwin, 1982 , p. 57)	147.7
	2.1	Minor to NS po, tr. Cp	(Metavolcanic) mica schist(1)		
	1.5	Minor to mod. po	Quartz-feldspar-biotite gneiss	schistose, garnetiferous in parts	
	1.0	Minor to NS po; gf; tr. cp	Quartz-feldspar-biotite gneiss	schistose, garnetiferous in parts	
	6.1	Minor to NS po, gf; tr. cp	(Metavolcanic) mica schist1		
	1.2	Minor to NS po	(Metavolcanic) mica schist1	partly quartzose	
	1.2	Minor to mod. po; gf	(Metavolcanic) mica schist1		

	0.5	Minor to NS po; gf	(Metavolcanic) mica schist1		
	0.7	Mod. to SS po; tr. cp	(Metavolcanic) mica schist1		
Gab 1	13.7	NS po with sections of SS po	Fragmental rock(2)	Contains chlorite and quartz blebs; Minor po, py elsewhere in core. (A.F. 90974)	125.0
Gab 3	11.9	Scattered narrow zones & stringers minor to mod. po, tr. Py, tr. cp	Quartz-plagioclase-biotite gneiss(2), parts rhyolite	(A.F. 90974)	79.9
Gab 4	0.8	Minor to mod. po	Quartz-feldspar gneiss(2)	Minor local po elsewhere in core (A.F. 90974)	150.6
Gab 5	5.4	Scattered stringers and narrow zones with minor to mod. po	Quartz-plagioclase-biotite gneiss(2), parts fragmental	(A.F. 90974 Baldwin, 1982, p. 57)	81.1
	0.9	Same	Same		
	1.8	Same	Same		
Gab 6	0.2	Minor to mod. po, tr. cp	Quartz-feldspar ± biotite gneiss(2) with narrow zones of hornblende	Minor po ± gf locally elsewhere in core (A.F. 90974)	100.6
	0.8	Minor to mod. po, tr. cp			
	0.1	NS po	Biotite-plagioclase gneiss	Volcanic-derived	
	2.7	Parts have mod. po	"Altered zone"	Volcanic or gabbroic intrusive origin	
Gab 7	1.2	Py, po stringers	Quartz-biotite gneiss(2)	(A.F. 90974 Baldwin, 1982, p. 57)	118.0
1 Baldwin (1982), based on outcrops mapped near the drilled area, interprets the metavolcanic mica schist with gneissic, granitic, amphibolitic, quartzose and pegmatitic sections from drill core as volcanic and plutonic derived polymictic conglomerate.					
2 Baldwin (1982), based on outcrops mapped near the drilled area, interprets these gneisses as metasedimentary rocks.					

GEOCHEMISTRY

Five rock samples collected by Homestake Mineral Development Co. contained 16-84 ppm Cu, 5-98 ppm Zn, 5-50 ppb Au; results for 28 other elements also given in this report are generally not significant (A.F. 93008). Samples from drill core from DDH J1 and J2 and nearby trenches contained only nil to trace Au and Cu (A.F. 93304).

CLASSIFICATION

Chemical sediment type deposit; sulphide facies iron formation. The EM trends that these drillholes tested extend through the Rusty Lake area eastward to Nisku Bay (Issett Lake) (see also NTS 64B/11 locations 4 and 5). Steeves and Lamb (1972) note that these trends are parallel to layering and foliation.

REFERENCES

Assessment Files 90963, 90964, 90974, 90975, 91988, 92213, 92562, 93008, 93304; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1982:Mineral deposits in the Ruttan Lake, Karsakuwigamak Lake, Muskayk Lake areas, Manitoba; Manitoba Energy and Mines, Mineral Resources Division, Open File Report OF81-4, 59p.
Steeves, M.A. and Lamb, C.F. 1972:Geology of the Issett - Opachuanau - Pemichigamau - Earp lakes area; Manitoba Mines, Resources and Environmental Management, Mines Branch, Publication 71-2F, 56p.

NTS: 64B12 **MDS_No.: M64B12-013**

LOCATION: 13

NAME: VOL

EASTING: 462317 **NORTHING: 6262322**

AREA: NTS 64B/12; approximately 1.5 km east of Brehaut Lake.

AIR PHOTO: A25474-115; A21124-72

ACCESS: Road from Ruttan Mine to Southern Indian Lake.

EXPLORATION SUMMARY

Questor Surveys Ltd. carried out an airborne INPUT EM and magnetic survey for Manitoba Mines and Natural Resources in 1968 (A.F. 91988). Ruttan Lake Explorations conducted a magnetic and EM survey on CB 823 in 1971 (A.F. 90973). In addition, Sherritt Gordon Mines Limited drilled DDH R-395, R-396, R-397 to the east on CB 809 in 1977 (A.F. 92458).

GEOLOGICAL SETTING

The area occurs near the margin of a granodiorite pluton within a sequence of intermediate to mafic volcanic-derived conglomerate, sandstone and siltstone and plagioclase phyric basalt (Baldwin, 1988).

MINERALIZATION

Baldwin (1987, p. 26) describes the Vol Deposit:"The Vol deposit consists of three en echelon disseminated sulphide zones in an intrusion breccia that consists of angular to subangular blocks of mafic to felsic, phyric and aphyric volcanic rocks, metasedimentary rocks and mafic plutonic rocks in a granodiorite matrix. The sulphide zones are 1-2 m thick and are exposed for 10-20 m along strike. They consist of sulphide in quartz-sericite schist, silicified fault gouge and boudinaged quartz veins. The sulphide minerals are pyrite, pyrrhotite, sphalerite, galena and chalcopyrite. "The sulphide zones are spatially associated with, and occur a few tens of metres south of, a major east-trending fault that transects the Rusty Lake metavolcanic belt. The absence of outcrop in critical areas precludes the establishment of the relationships between the sulphide zones and the major fault. However, it is possible that the sulphide zones are in fault splays associated with the major east-trending fault." This fault with the associated sulphide zones is locally known as the Vol fault. Mineralization was not reported in drill core from DDH R-395, R-396 and R-397 (A.F. 92458).

GEOCHEMISTRY

"Geochemical analyses of drill core indicate that gold values are generally less than 100 ppb. However, values of 500 to 9000 ppb over sample intervals of 0.3 to 0.75 m have been reported" (Baldwin, 1987, p. 26). Till geochemical surveys (Nielsen, 1985, 1986, 1987) identified anomalous arsenic concentrations in the <2ppm fraction and gold in the heavy mineral fraction in samples from this area. Three east-southeast-trending bands of arsenic anomalies are perpendicular to ice flow; the northernmost anomaly coincides approximately with the Vol fault. Visible gold grain samples contain up to 540 ppb, and include delicate grains adjacent to the fault and irregular and abraded grains down ice from the fault. The Vol fault is interpreted as the major source of these anomalies (Nielsen, 1986).

CLASSIFICATION

Vein type deposit; multiple veins.

REFERENCES

Assessment Files 90973, 91988, 92458; Manitoba Energy and Mines, Mines Branch.
Baldwin, D.A. 1987:Mineral deposits in the Ruttan Lake; Manitoba Energy and Mines, Minerals Division, Report of Field Activities, 1987, p. 25-26. 1988:Geology of the southern part of the Rusty Lake volcanic belt; Manitoba Energy and Mines, Geological Services, Geological Report GR86-1, 90p.
Nielsen, E. 1985:Till geochemical investigations in northwestern Manitoba; in Manitoba Energy and Mines, Report of Field Activities 1985, p. 14-19. 1986:Till geochemistry east of the Ruttan mine; in Manitoba Energy and Mines, Report of Field Activities 1986, p. 26-31. 1987:Till geochemistry in selected areas of northern Manitoba; in Manitoba Energy and Mines, Report of Field Activities 1987, p. 27-29.