Ontario

Ontario Geological Survey
Open File Report 5972

Report of Activities, 1997 Resident Geologist Program

Timmins Regional Resident Geologist's Report: Timmins–Sault Ste. Marie Districts

1998

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Timmins–Sault Ste. Marie Districts

by

B.T. Atkinson, M.H. Hailstone, A.C. Wilson, D.M. Draper, P. Hope, P.M. Morra and D.C. Egerland

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ONTARIO GEOLOGICAL SURVEY

RESIDENT GEOLOGIST PROGRAM – 1997

TIMMINS REGIONAL RESIDENT GEOLOGIST'S DISTRICT

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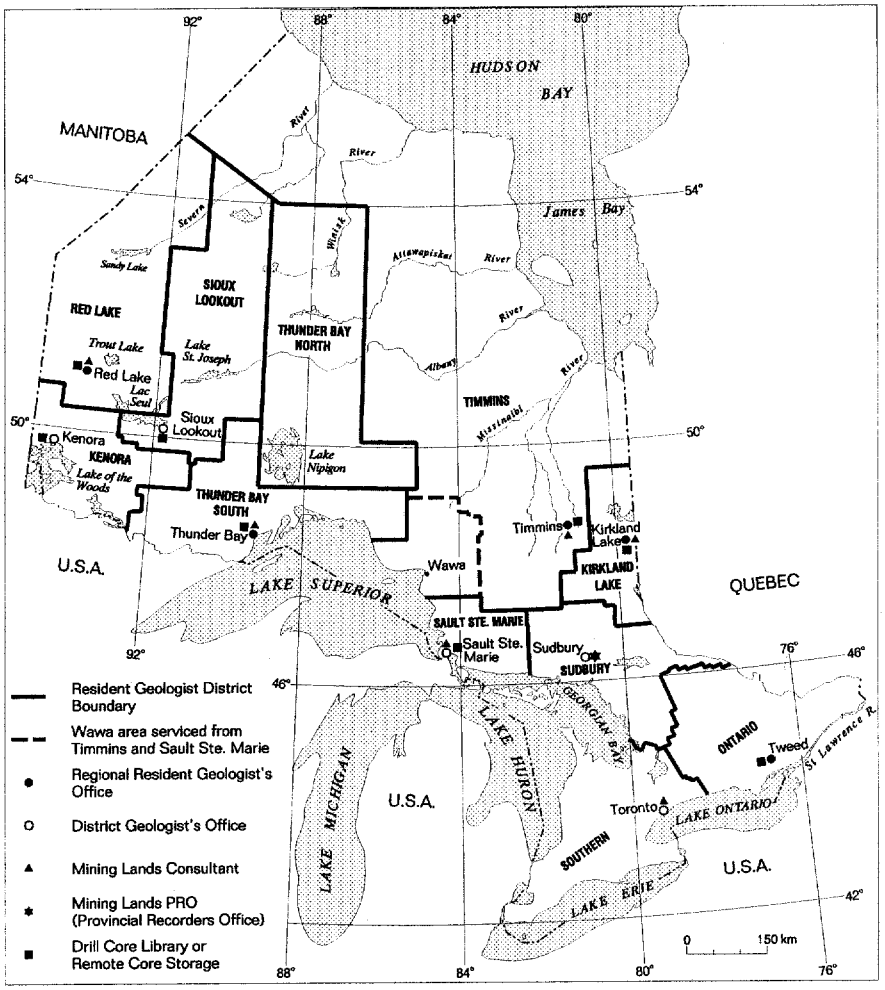

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Ontario Geological Survey
Resident Geologist Program – 1997

Timmins Regional Resident Geologist's District

Timmins Area

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Timmins Area, Timmins Regional Resident Geologist's District –1997

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Introduction

The long tradition of mining continued in the Timmins District with 5 producing gold mines, 1 base metal mine and a talc mine. One local mill did custom gold recovery of ore trucked from the Kirkland Lake District. We were reminded of the vital importance of mining to the Timmins community when the Kidd Creek mine and metallurgical sites as well as the Dome Mine underground operations were simultaneously suspended in October as a result of mining problems. At the Kidd Creek Mine, pit wall failure of the east side of the mined-out open pit resulted in closure of the underground operations as a safety precaution. Suspension of the mining operations resulted in a slow-down of operations at the metallurgical site. At the same time, hoist problems at the No. 8 shaft at the Dome Mine interrupted underground operations. The combined effect of the week long interruptions resulted in the temporary suspension of over 2000 jobs in the community of 49 000 people.

Through most of the year, exploration was very active, but by year end, languishing gold prices affected both gold mining and exploration activities, resulting in workforce downsizing and cost-cutting measures at the area mines, as well as reductions in exploration expenditures. Plans for closure of the Detour Lake Mine in mid 1999 were announced.

The mining industry continued to demonstrate technological innovation by the creative use of frozen ground technology. In the first-ever, mining-scale project, Echo Bay Mines Ltd. began construction of a 3.5 km long freeze wall pit perimeter to control ground water flow at the Aquarius Project east of Timmins.

Agrium Inc. announced their decision to bring the Cargill Township phosphate deposit into production by July, 1999. The site is located approximately 20 km southwest of Kapuskasing.

The discovery of significant concentrations of volcanogenic massive sulphide mineralization by Cross Lake Minerals Ltd. in Sheraton Township, east of Timmins, prompted a staking rush in the district.

A summary of claim staking and assessment work is listed in Table 1. Claim recordings reached a level not seen since 1965 and the Texasgulf (Kidd Creek Mine) discovery. Assessment files received in the Timmins District are presented in Table 3.

The Ontario Prospectors Assistance Program (OPAP) provided funding of $269 936 for 27 designated projects in the Timmins District.

Table 1. Summary of claims recorded and assessment work credit in the Timmins District in 1997

Year	Claims Units Recorded	Claim Units Cancelled	Claims Units Active	Diamond Drilling ($)	Physical Work ($)	Geotechnical Work ($)	Total ($)
1997	45 173	16 908	79 004	N/A*	N/A*	N/A*	N/A*
1996	13 859	15 876	50 739	4 788 424	216 812	3 288 156	8 418 072
1995	14 376	7 769	60 705	2 003 632	202 191	2 742 497	5 052 359
1994	19 738	6 689	47 497	1 577 945	310 392	1 251 400	3 186 244
1993	7 852	3 191	34 779	2 016 974	909 810	1 439 217	4 437 645

** District specific statistics unavailable at time of writing*

Mining Activity

Gold continued to be produced at 5 mines and one custom milling operation. As a result of a decline in gold prices that continued throughout the year, all operations enacted cost-saving measures. Several operations reduced their workforce as part of their cost-saving measures. Placer Dome North America Limited operated both the Dome Mine in Tisdale Township and the Detour Lake Mine, located approximately 200 km northeast of Timmins. Kinross Gold Corporation operated the Hoyle Pond Mine in Whitney Township and Royal Oak Mines Inc. operated the Pamour Mine in Whitney Township and the Nighthawk Lake Mine in Cody Township. St. Andrew Goldfields Ltd. custom milled gold ore trucked from the Glimmer Mine in Hislop and Beatty townships near Matheson at the Stock Mine.

Falconbridge Limited operated the Kidd Creek base metal mine in Kidd Township and their metallurgical complex in Hoyle Township. Ore refined at the Kidd Creek smelter included Kidd Creek ore as well as custom ore from the Flambeau Mine in Wisconsin, USA.

Locations of the active mining operations are presented in Figure 5f. Table 2 lists mine production and reserves for the year. Historical gold production is listed in Table 2a and base metal production is listed in Table 2b. A list of select mineral deposits not being mined in the Timmins District is presented in Table 7.

Gold Mining

KINROSS GOLD CORPORATION - HOYLE POND MINE

The Kinross Gold Corporation, Hoyle Pond Mine produced approximately 174 000 ounces of gold in 1997. Ore is milled at the Bell Creek Mill which was recently expanded to 1500 tons per day capacity. Reserves at the mine (January, 1997) are 4 603 000 tonnes with a grade of 11.07 g/t gold. This includes 807 000 tonnes of proven ore, 734 000 tons of probable ore and 3 062 000 tons of possible ore. The underground mining operations were active on 40 headings on 8 levels. A total of 2666 m of raising, 1273 m of ramp development and 9401 m of lateral development were completed. Mining methods included shrink, panel, cut-and-fill and long hole. Underground drilling totalled 130 000 m in 884 holes for both ore definition and exploration. Development work is being advanced from the newly completed 820 m shaft from the 440-metre and 720-metre levels. Ramping progressed from the 255-metre level to the 440-metre level.

Exploration drilling continued to test the 1060 Zone to depth, the Hoyle Pond Veins, the B-3 Footwall Veins and the Sediment Zone.

The mine employees 200 people. Tony Makuch is the Mine Manager and Keith Green is the Chief Geologist.

PLACER DOME NORTH AMERICA LIMITED - DETOUR LAKE MINE

The Detour Lake Mine produced 125 556 ounces of gold from 1 202 594 tonnes of ore for a recovered grade of 3.46 g/t gold. The daily mining rate was 3 295 tonnes and mill recovery was 93.89%. Mining operations included 6 860 m of drifting and 1203 m of raising. There were 33 active levels and mining methods included long hole, sublevel retreat and modified shrinkage. Underground drilling included 18 171 m of ore definition and 13 504 m of exploration drilling. Surface exploration diamond drilling amounted to 1 092 metres. On the "OK Zone", drifting, diamond drilling and bulk sampling was completed, but the zone was deemed uneconomic. A life of mine study indicated ore reserves will be exhausted by mid-1999.

The mine has a workforce of 359 employees. Peter Neilans is the Mine Manager and Tom Stubens is the Chief Geologist.

PLACER DOME NORTH AMERICA LIMITED - DOME MINE

Gold was mined at the Dome Mine in both underground and open pit operations. Operating capacity for the year was 11 587 tons per day and gold production amounted to 328 729 ounces from 4 229 269 tons of ore milled. The mill achieved a gold recovery rate of 93.2%. Underground mine operations included longhole and cut-and-fill methods. Through the year, mining, development and exploration occurred on 29 levels with 50 active headings. Mining development included a total of 14 329 feet of drifting and 1182 feet of raising. Underground diamond drilling amounted to 92 643 feet of ore definition drilling and 171 443 feet of exploration drilling. Surface diamond drilling exploration totalled 9317 feet.

Development was started on a new intake airway as part of an upgrade of the underground ventilation system from 150 000 ft^3/minute to 250 000 ft^3/minute. Contouring and revegetation of 40 acres of waste dumps were completed as part of the mine's progressive rehabilitation plan.

By way of an option agreement, Placer Dome explored and test-mined the neighbouring Preston Mine property in Tisdale and Deloro townships. Evaluation work included 152 km of line cutting,

148 km of magnetometer surveys, power stripping, channel sampling of 8 trenches, and geological compilation and mapping. Exploration drilling totalled 25 412 feet and 30 039 feet of ore definition drilling was completed. Gold ore obtained from open pit mining of two 30-foot benches was milled at the Dome Mine.

At year end, the Dome Mine had a work force of 484 employees. Peter Martin is the Mine Manager and Morton Shannon is the Chief Geologist.

ROYAL OAK MINES INC., TIMMINS DIVISION – PAMOUR MINE

The Pamour Mine, located in Whitney Township, operates as both an open pit and underground gold operation. Preliminary gold production figures for the year from the combined Timmins operations were 101 344 ounces of gold from 1 365 851 tons of ore milled. The mill head grade was 0.086 ounce per ton gold and the mill achieved a recovery rate of 86.7%. Mill operations produced 18 439 ounces of silver. The daily mining rate was 3 800 tons.

In an effort to reduce costs, the mine reduced the workforce of 340 employees by 34 in November. Mike Lalonde serves as the Mine Manager and Kim Tyler is the Chief Geologist.

ROYAL OAK MINES INC., TIMMINS DIVISION – NIGHTHAWK LAKE MINE

Royal Oak Mines Inc. operates the Nighthawk Mine in Cody Township as a feeder to the Pamour operations. Ore mined at the Nighthawk Mine is trucked to the Pamour Mill for processing.

Royal Oak completed surface drilling (27 holes for a total of 17 285 feet) and underground drilling (98 holes for a total of 23 875 feet) on the R-2 (Ramp Zone) at the Nighthawk Lake Mine. Metallurgical test work was completed with the objective of reclassifying mineralization into the proven and probable reserve category. As a result of the underground drilling, a new zone, south of the Ramp Zone, has been identified. (Paul Coad, Royal Oak Mines Inc., personal communication, January 1998).

Base Metals

FALCONBRIDGE LIMITED – KIDD CREEK MINE AND METALLURGICAL COMPLEX

The Kidd Creek Mine produced 2 940 000 tonnes of ore grading 2.62% Cu, 3.68% Zn, 0.15% Pb and 48 g Ag. The mine operated at a daily capacity of 9500 tons. Ore from the mine in Kidd Township is transported by rail car to the Kidd Metallurgical Site in Hoyle Township, a distance of approximately 45 km. Reserves at the mine are 35 102 000 tonnes grading 2.57% Cu, 5.53% Zn, 0.19% Pb and 62 g/t Ag. Ore reserves include 20 674 000 tonnes of proven ore, 11 710 000 tonnes possible ore and 2 718 000 tons of possible ore. Mill operations include 4 independent circuits, each with a 2500 ton per day capacity. At current mining rates, 3 circuits are sufficient to process ore from the Kidd Creek Mine and the fourth circuit is used as a custom milling facility. Underground mining operations involved 7 236 m of drifting and 2 910 m of raising. Mining was done by sub–level blasthole open stoping. Underground drilling included 44 842 m for ore definition and 38 973 m of exploration drilling. Ore reserves were extended to the 8200–foot level.

Combined, the mine and metallurgical complex employ 1800 people. Falconbridge Ltd. announced a downsizing of the metallurgical operations over the next three years of 200 employees to reduce operating costs. Allen Hayward is the General Manager of the Mining Division and Brent Chertow is the General Manager of the Metallurgical Division. Al Coutts is the Chief Geologist.

Industrial Minerals

LUZENAC INC. - PENHORWOOD MINE

Luzenac Inc. operated an open pit mine in Penhorwood Township in the Swayze greenstone belt. The mine site is situated 75 km west of Timmins and is accessible via Highway 101. High purity, talc-magnesite altered, ultramafic rocks are mined and the talc is pre-concentrated on site, then transported to Luzenac's processing and microgrinding facilities at the former Hollinger Mine site in Timmins. Industrial and cosmetic grade talc products are made at the processing plant.

Talc production for the year was 37 500 short tons from 107 000 tons of ore. The daily production rate is 450 tons and the recovery is 68%. The talc grade varies between 45 to 50%. Proven and possible ore reserves are 7 million tons grading 47.5% talc. An additional 7 million tons of rock are categorized as possible ore.

Luzenac installed new grinding equipment for experimental product research and did exploration drilling on a new North Zone. Surface diamond drilling included 2000 feet of exploration drilling and 600 feet for ore definition.

The Luzenac operations employ 47 people. Terry DiPoce is the General Manager at the mine site.

Advanced Exploration

Advanced exploration projects in the Timmins District are described below with locations are keyed to Figure5f.

AGRIUM INC. – CARGILL PROJECT

Agrium Inc. acquired the Cargill Township phosphate deposit in December, 1996 when it merged with Viridian Inc. The deposit is located 40 km southwest of Kapuskasing and is accessed by a secondary logging road.

To date, over 350 diamond drill holes have been drilled on the deposit since the original discovery in 1954 by Continental Copper. Initially, the deposit was explored for its base metal content but the recognition of phosphate-bearing carbonatite resulted in a shift of exploration emphasis to the phosphate potential. As a result of subsequent exploration, a deposit of 18 million tonnes, grading 29% P_2O_5, has been delineated. Agrium Inc. plans to mine the deposit as an open pit operation and ship the ore by train to their fertilizer plant in Red Water, Alberta for processing. In preparation for the mining operation, feasibility and environmental studies have been completed. The mining operation is scheduled to produce 1.1 million tons of concentrate per year beginning in July, 1999 with a minimum mine life of 13 years. (Agrium Inc., *public information session*, Kapuskasing, November 20, 1997).

Geology:

Phosphate mineralization occurs as apatite-bearing sovite within the Cargill carbonatite. A Proterozoic age of 1907 ± 4 Ma has been determined for the carbonatite by U/Pb dating techniques (Sage 1988). Phosphate enrichment is interpreted to be the result of Cretaceous weathering of the carbonatite, which removed much of the soluble carbonate minerals, leaving a phosphate-enriched residuum (Sage 1988).

BAND-ORE RESOURCES LTD. - THORNE PROPERTY

Band-Ore Resources Ltd.'s Thorne property consists of 229 claims located in Thornloe and Bristol townships centred approximately 25 km southwest of Timmins city centre. Exploration of the property since 1994 has defined several zones of gold mineralization over a distance of 5.2 km. The Kapika Gold Zone consists of altered and deformed, sericite-quartz schists adjacent to, and contained by, a porphyry complex. A near surface gold resource of 290 000 tons grading 0.074 ounce per ton gold has been outlined in the zone.

Recent drilling has outlined the Golden River East Zone, and the Golden River West Zone. A gold resource of 479 180 ounces has been outlined on the property *(The Daily Press,* October 27, 1997). In 1997, an extensive amount of diamond drilling was completed with the object being the delineation of a bulk tonnage, near surface gold resource.

Band-Ore acquired 405 claim units in Carman, Shaw and Michie townships as a follow up to the Cross Lake Minerals base metal discovery in Sheraton Township.

Table 2. Mine production and reserves in the Timmins District.

Mine	Production to end of 1996		Production in 1997		Reserves at end of 1997	
	Tonnage @ Grade	**Total Commodity**	**Tonnage @ Grade**	**Total Commodity**	**Tonnage**	**Grade**
Falconbridge Limited, Kidd Creek Mine	3 384 000 tonnes @: 2.70% Cu, 3.80% Zn, 0.12% Pb 56 g/t Ag	N/A	2 940 000 tonnes @: 2.62% Cu, 3.68% Zn, 0.15% Pb, 48 g/t Ag[1]	As concentrate: 94 000 tonnes Zn 77 000 tonnes Cu[2] (estimated)	35 102 000 tonnes**[1]	2.57% Cu, 5.53% Zn, 0.19 % Pb, 62 g/t Ag[1]
Kinross Gold Corporation, Hoyle Pond Mine	377 746 tonnes @ 14.9 g/t Au[3]	161 669 oz Au[3]	N/A	174 000 oz Au[4]	(as of Jan.1/97) 4 603 000 tonnes**[5]	11.07 g/t Au[5]
Luzenac Incorporated, Penhorwood Mine	80 000 tonnes	36 000 tonnes talc	107 000 tons @ 45-50% talc[6]	37 500 tons talc[6]	7 million tons*[6]	45-50% talc[6]
Placer Dome Inc. Detour Lake Mine	986 928 tonnes @ 4.13 g/t Au	120 288 oz Au	1 202 594 tonnes @ 3.46 g/t Au[7]	3 905 228 g Au[7]	(as of Dec/96) 1 921 000 tonnes*[8]	4.70 g/t Au[8]
Placer Dome North America Dome Mine	4 224 056 tons @ 0.076 opt Au[8]	305 183 oz Au	4 229 269 tons @ 0.084 opt Au[7]	328 729 oz Au[7]	36 244 000 tons*[7]	0.05 opt Au[7]
Royal Oak Mines Inc.— Combined operations	1 381 665 tons @ 0.086 opt Au[10]	104 577 oz Au[10]	1 365 851 tons @ 0.086 opt Au[9]	101 344 oz Au[9]	(1996 year-end) Mineable, all operations: 3 993 000 oz [10]	
Royal Oak Mines Inc. Nighthawk Lake Mine	238 283 tons @ 0.143 opt Au	30 285 oz Au	—	—	1 246 000 tons[10]	0.048 opt Au[10]
Royal Oak Mines Inc. Pamour Mine	1 112 963 tons @ 0.075 opt Au	83 172 oz Au	—	—	2 628 000 oz (drill indicated, open pittable)[10]	

Abbreviations: N/A – Data not available; g/t – grams per tonne; opt – ounces per ton.
** Proven and probable reserves*
*** Total of proven, probable and possible reserves*

[1] Communication, Falconbridge Limited, Kidd Creek Division personnel.
[2] Falconbridge Limited newsrelease Dec. 12, 1997.
[3] Kinross Gold Corporation Annual Report 1996
[4] Kinross Gold Corporation newsrelease Jan. 19, 1998.
[5] Communication, Kinross Gold Corporation personnel.
[6] Communication, Luzenac Incorporated personnel
[7] Communication, Placer Dome North America personnel.
[8] Placer Dome Inc, Annual Report 1996
[9] Communication, Royal Oak Mines Inc. personnel.
[10] Royal Oak Mines Inc. Annual Report 1996

Table 2a. Gold Production from the Timmins Resident Geologist's District to the end of 1997

Mine Name	Township	In Production	Tons Milled	Oz. Au	Grade
Ankerite	Deloro	1926-53, -78	4 993 929	957 292	0.19
Ankerite/March	Deloro	1926-1935	317 769	61 039	0.19
Aquarius	Macklem	1984, 1988-89	139 634	27 117	0.19
Aunor Pamour(#3)	Deloro	1940-1984	8 482 174	2 502 214	0.30
Banner	Whitney	1927-28,-33,-35	315	670	0.13
Bell Creek	Hoyle	1987-91 1992-94	622 227 38 600	111 988 7 625	0.18 0.22
Bonetal	Whitney	1941-51	352 254	51 510	0.15
Bonwhit	Whitney	1951-54	200 555	67 940	0.34
Broulan	Whitney	1939-1953	1 146 059	243 757	0.21
Cincinnati	Deloro	1914, 1922-24	3 200	736	0.23
Concordia	Deloro	1935	230	16	0.07
Coniarum/Carium	Tisdale	1913-18, 1928-61	4 464 006	1 109 574	0.25
Crown	Tisdale	1913-21	226 180	138 330	0.61
Davidson	Tisdale	1918-20 1988	9 371 43 850	2 438 7 301	0.26
Delnite (open pit)	Deloro	1937-64 1987-88	3 847 364 56 067	920 404 3 602	0.20 0.77
DeSantis	Ogden	1933, 39-42, 61-64	196 928	35 842	0.18
DeSantis	Turnbull	1926	NA		NA
Detour Lake	Sunday Lake	1983-	12 583 033	1 430 938	0.11
Dome	Tisdale	1910-	64 155 278	13 261 377	0.21
Fuller	Tisdale	1940-44	44 028	6 566	0.15
Gillies Lake	Tisdale	1921-31, 35-37	54 502	15 278	0.28
Goldhawk (open pit)	Cody	1947 1980	636 40 000	53 3 967	0.08 0.10
Halcrow-Swayze	Halcrow	1935	211	40	0.19
Hallnor (Pamour #2)	Whitney	1938-68,81	4 226 419	1 645 892	0.39
Hollinger- Schumacher	Tisdale	1915-1918	112 124	27 182	0.24
Hollinger Pamour Timmins Property	Tisdale	1910-68 1976-88	65 778 234 2 615 866	19 327 691 182 058	0.29 0.07
Hoyle	Whitney	1941-44,46-49	725 494	71 843	0.10
Hoyle Pond	Hoyle	1985- *1997*	1 255 369 N/A	601 666 *174 000*	0.48 *N/A*
Hugh-Pam	Whitney	1926, 48-65	636 751	119 604	0.19
Jerome	Osway	1941-43, 56	335 060	56 893	0.17
Joburke	Keith	1973-75, 79-81	440 117	43 571	0.10
Kingbridge/Gomak	Chester	1935-36	1 387	98	0.07
McIntyre Pamour Schumacher (ERG Tailings recovery)	Tisdale	1912-88 1988-89	37 634 691 2 549 189	10 751 941 18 260	0.29
McLaren	Deloro	1933-37	876	201	0.23
Moneta	Tisdale	1938-43	314 829	149 250	0.47
Nighthawk Lake	Macklem	1995- *1996* *1997*	14 000 *238 283* *	NA *30 285* *	0.13 *0.14*
Owl Creek	Hoyle	1981-89	1 789 247		0.14

Table 2a. cont'd. Gold Production from the Timmins Resident Geologist's District to the end of 1997

Mine Name	Township	In Production	Tons Milled	Oz. Au	Grade
Pamour #1 (Incl. pits 3, 4 & 7)	Whitney	1936- *1997*	51 347 681 *	4 654 260 *	0.09
Porcupine Peninsular	Cody	1924-27,-40,-47	99 688	27 354	0.27
Preston	Tisdale	1938-68	6 284 405	1 539 355	0.24
Preston NY	Tisdale	1933	2 800	153	0.05
Preston/Porcupine Pet	Deloro	1914-15	NA	314	
Preston/Porphyry Hill	Deloro	1913-15	46	312	6.78
Reef Mine	Whitney	1915-65	2 144 507	498 932	0.23
St. Andrew Goldfields	Stock	1989-94	591 736	95 032	0.16
Tionaga/Smith Thorne	Horwood	1938-39	6 653	2 299	0.35
Tisdale Ankerite	Tisdale	1952	14 655	2 236	0.15
Tommy Burns/ Arcadia	Shaw	1917	21	14	0.28
Vipond	Tisdale	1911-41	1 565 218	414 367	0.26

** Only total figure for production from all Royal Oak sites available; see Table 2.*
Notes: Preliminary production figures for 1997 are shown in Italics
Grade = oz per ton Au

Table 2b. Base Metal Production from the Timmins Resident Geologist's District to the end of 1997

Mine Name	Township	In Production	Ore Milled	Grades
Alexo	Dundonald	1912-19 1943-44	51 857 tons 4 923 tons	4.5% Ni, 0.55% Cu
Canadian Jamieson	Godfrey	1966-71	816 173 tons	2.44% Cu, 4.22% Zn
Jameland	Jamieson	1969-72	509 356 tons	0.99% Cu, 0.88% Zn
Kam Kotia	Robb	1943-44 1961-72	6.6 Mtons	1.1% Cu, 1.17% Zn, 0.10 oz/T Ag
Kidd Creek	Kidd	1966-	124.8 Mtons	2.38% Cu, 6.66% Zn, 0.27% Pb, 83 g/t Ag
Langmuir #1	Langmuir	1990-91	111 502 tons	1.74% Ni
Langmuir #2	Langmuir	1972-78	1.1 Mtons	1.43% Ni
McIntyre	Tisdale	1963-82	10 Mtons	0.67% Cu
Redstone	Eldorado	1989-92 1995-96	294 895 tons 10 228 tons	2.4% Ni 1.7% Ni
United Obalski	Godfrey	1966	Produced 240 tons Cu concentrate	

ECHO BAY MINES LTD. - AQUARIUS PROJECT

The Aquarius project is located in Macklem Township, 36 km east of Timmins. Access is by way of a secondary road leading south from Hwy 101 for 2 km to the mine site. The Aquarius is a former underground gold mine that produced 27 117 ounces of gold in 1984 and 1988 to 1989. At that time, the mine was owned and operated by Asarco Exploration Company of Canada. Asarco began exploring the near surface, open pit potential of the property and then sold the property to Echo Bay Ontario Ltd. in 1995. A 1996 feasibility study of the property by Echo Bay determined a gold resource of 1 277 000 ounces contained in 19.7 million tons of ore could be recovered by open pit mining.

Because the deposit is situated under thick overburden, with a significant ground water flow that impacts on nearby Kettle Lakes Provincial Park, Echo Bay elected to use freeze wall technology instead of conventional pumping to mitigate the effects of ground water flow into the open pit. In 1997, a perimeter freeze wall, consisting of a continuous ring of over 2400 vertical drill holes was established around the planned pit perimeter, a distance of 3.5 km. The freeze wall drill holes are spaced approximately 1.6 m apart and penetrate the overburden to bedrock. Two ammonium refrigeration plants with a combined capacity of 5000 tons have been constructed on opposite sides of the planned pit site to establish the freeze wall. The refrigeration plants will circulate brine cooled to –20°C through the wells to completely freeze the ground in a continuous curtain around the pit perimeter. By year end, the freeze wall was almost completed, but due to the low price of gold, mining plans were deferred. Although ground freeze techniques for earth excavations have been in use for many years, the Aquarius project is the first attempt to employ the technology on a full scale mining operation.

Exploration at the site included diamond drilling of 78 holes for a combined length of 18 420 m, geochemical analysis of 9000 rock and core specimens, 120 km of line cutting, 50.1 km of induced polarization surveys, and 32.5 km of magnetometer surveys.

Geology:

The Porcupine-Destor Fault underlies the north part of the Aquarius property. A northeast-trending splay fault, the Gold Island Aquarius Fault, crosses the northeast part of the Aquarius property. Mafic metavolcanic rocks and komatiitic peridotites underlie much of the claim group and are intruded by feldspar porphyry and diabase dikes. The metavolcanic rocks have been intensely altered to talc, chlorite and carbonate. Ferroan dolomite altered rocks form an anticlinal cap over the original mine workings, and it is these rocks that form the bulk of the open pit ore reserves (*see* Figure 1). Trace element geochemistry by Asarco indicates the carbonate cap is an altered, ultramafic rock. Gold-bearing quartz+carbonate+albite breccia veins comprise up to 10% of the carbonate replacement rock.

OUTOKUMPU MINES LTD. - MONTCALM PROJECT

Outokumpu Mines Ltd. continued a feasibility study on their Montcalm nickel-copper project in Montcalm Township, located 91 km northwest of Timmins. Access to the site is by way of the Malette logging west of Timmins on Hwy 101, then northwest on the Malette road for 80 km to the project site. The property has been undergoing exploration and evaluation since 1976, and this work continued in 1997. The underground exploration ramp was extended to the 240-metre level and 15 500 m of underground drilling was completed. The underground operations are presently inactive and flooded (Jarmo Besanto, Outokumpu Mines Ltd., personal communication, 1998).

Geology:

Nickel-copper mineralization is hosted by mafic to ultramafic intrusive rocks of the Montcalm Gabbroic Complex (2702 ± 2 Ma, Barrie et al. 1990) that underlies the central part of Montcalm Township. The project area is located near the northern limit of the gabbroic intrusive, close to the contact with the Nat River Granitoid Complex. (MacTavish 1996). Several phases of gabbroic rocks, including gabbro, norite, anorthosite and pyroxenite-peridotite are intruded by granite, feldspar porphyry and mafic dikes. Amygdaloidal pillowed lavas (xenoliths?) have been reported in drill core. Sulphides occur as disseminations, massive, net-textured and as inclusion breccias. Three lenses of sulphide-rich mineralization are separated by granitic dikes and have been outlined by diamond drilling. Mineralization includes pyrrhotite, pyrite, pentlandite, chalcopyrite, magnetite and minor violarite (NiS_2) and is considered to be of magmatic origin on the basis of trace element chemistry (Barrie et al. 1990). The sulphide lenses are north-trending with near-vertical attitudes and dimensions of 200 m in length with maximum widths of 25 m. Referred to as the West Zone, the East Zone and the

Deep Zone, the lenses are depicted in Figure 2. Outokumpu has calculated a mineral resource of 7.1 million tonnes grading 1.54% Ni and 0.72% Cu.

ST. ANDREW GOLDFIELDS LTD. - STOCK MINE

St. Andrew Goldfields Ltd. continued exploring the previously mined Stock Mine in Stock Township which is the site of their 1000 ton per day custom milling operation. Underground drilling of the mine workings focussed on developing continuity below existing mine workings to a depth of 500 feet.

The Stock mill operated on a custom basis, treating ore from the Glimmer Mine, located in Hislop and Beatty townships, east of Matheson, in the Kirkland Lake District.

UNITED TEX-SOL MINES INC. - CLAVOS PROPERTY

The Clavos property is located in the northwest part of Stock Township and the northeast part of German Township.

Access to the site is by way of the Finn road, north from Hwy 101, east of Timmins. A 1997 diamond drill project increased the geological resource of the property to 1 750 048 tonnes grading 6.4 grams per tonne. A total of 360 080 ounces of gold have been identified in the DL Zone (*The Ontario Prospector,* 1998).

To date, 28 000 m of diamond drilling have been completed on the property in 340 holes. The drilling has outlined 4 parallel zones of gold mineralization with a strike length of 1680 m. Gold occurs along a geological contact between metasedimentary rocks and metavolcanic rocks. Host rocks are sericite altered over widths varying from 5 to 40 m. From south to north, the mineralized zones are referred to as the Sediment Zone, the Contact Zone, the DL Zone and the Footwall Zone. The bulk of the gold mineralization is contained by the DL and Footwall zones. Gold occurs both as visible gold and associated with pyrite mineralization. Minor arsenopyrite has been observed in the diamond drill core (Ed Ludwig, United Tex-Sol Mines Inc., personal communication, 1998).

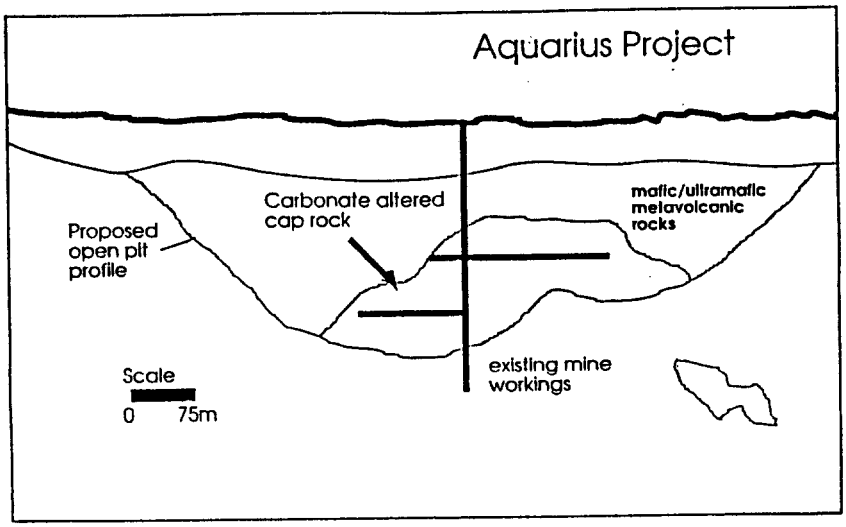

Figure 1. Simplified geology of the Aquarius project, *modified from* Echo Bay Mines Ltd.

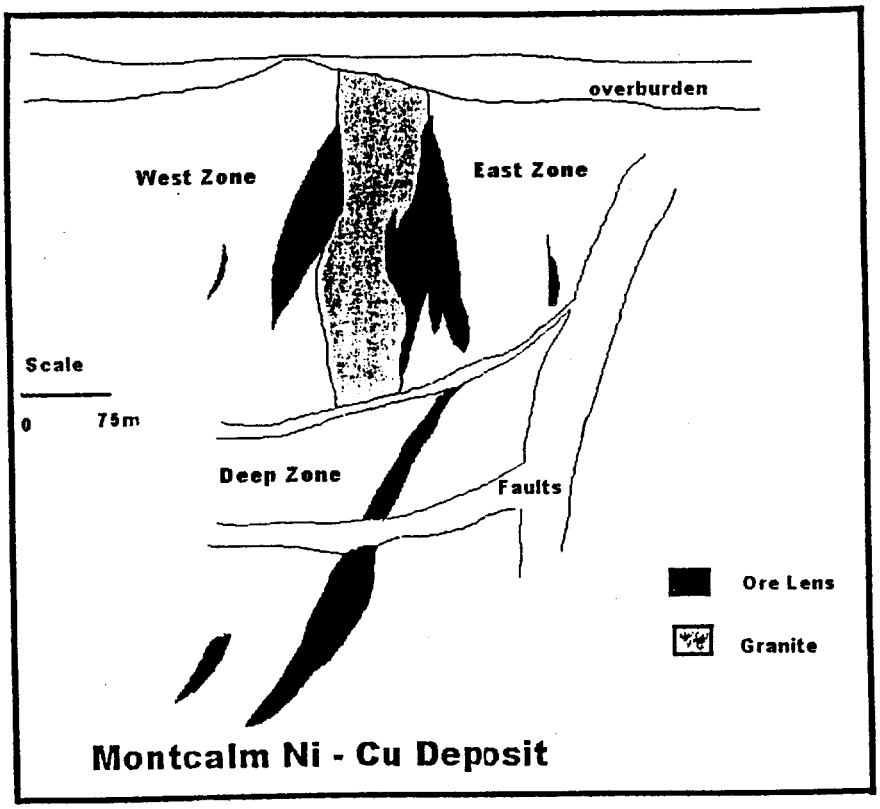

Figure 2. Sketch of mineralized zones, Montcalm project, *modified from* Outokumpu Mines Ltd..

VEDRON GOLD INC. - FULLER ZONE

Vedron Gold Inc. explored their 58 claim, Vedron-Buffalo Ankerite property in Tisdale and Deloro townships. A gold resource of 614 092 ounces of gold grading 0.216 ounce per ton gold has been delineated on the Fuller Zone, where a ramp has been excavated to the 650-foot level. In 1997, diamond drilling included 8 holes totaling 16 993 feet. The drilling was the second phase of an exploration program designed to test the continuation of previously outlined gold mineralization between 1600 feet and 2500 feet below surface. A longitudinal sketch of the property is presented in Figure 3. Vedron Gold completed geophysical surveys over 48 km of grid lines on their Romfield South Zone in Deloro Township.

YOUNG - SHANNON GOLD MINES LIMITED - CHESTER TOWNSHIP

Young – Shannon Gold Mines Limited holds 11 patented claims in Chester Township, in the Swayze greenstone belt. The property is located approximately 95 km southwest of Timmins and is accessed by secondary road from Highway 144. Underground exploration and development on the property has outlined a mineral resource of 695 787 tons with a grade of 0.344 ounces per ton gold (*Canadian Mines Handbook*, 1997-98).

Exploration Activity

Exploration activity, known to have been performed in the district is presented in Table 4 and on Figures 5e, 5f and 6. More detailed information on select exploration projects is described below.

BLACK PEARL MINERALS INC. - NICKEL OFFSETS PROJECT

The Nickel Offsets property in Tully Township includes 16 contiguous patented claims. The property is located approximately 30 km northeast of Timmins city centre. Access is by way of Highway 655, to Buskegou Road for 12 km to the site. The property is blanketed by a mantle of glacial overburden 30 to 50 m thick.

Gold mineralization was discovered by McIntyre Porcupine Mines in 1968. Cromarty Exploration Company Ltd. did follow-up diamond drilling on the property in 1969 for McIntyre Mines. This drilling amounted to 14 675 feet in 25 holes. Limited metallurgical testing of the mineralization was completed but no further work was done over the next ten years until Nickel Offsets Ltd. acquired the ground. By 1982, Nickel Offsets outlined a gold resource of 370 650 tons grading 0.174 ounce per ton gold. In 1987, Noranda Exploration Company Ltd. completed an exploration program on the property consisting of geophysical surveys and 17 265 feet of diamond drilling in 26 holes. In 1988, an additional 18 diamond drill holes, totalling 12 290 feet, were completed by Noranda.

Recent drilling by Black Pearl Minerals Inc. has better defined the mineralization and established the geometry and geology of the deposit. In 1997, Black Pearl completed 46 636 feet of diamond drilling in 61 holes partly as infill drilling on 25 m centres within the Nickel Offsets gold deposit. Ten diamond drill holes tested induced polarization targets on the northern tuff horizon, resulting in the discovery of the Murlin Zone, approximately one mile north of the Nickel Offsets deposit.

Geology:

The geology of the Nickel Offsets property consists of a 50 m wide band of east-trending, altered dacitic to andesitic or mafic “tuffs” bound by peridotite and komatiite flows to the south, and clastic metasediments, including greywacke and graphitic argillite to the north. Ultramafic rocks are altered to talc, chlorite, serpentine and carbonate. An inferred overturned, synclinal fold results in a similar but reversed geological sequence on the north part of the property. The Main Zone is located on the south limb, while the Murlin Zone is located on the north limb of the syncline. In the Main Zone, gold mineralization occurs as crosscutting quartz and quartz + carbonate veins within the tuff unit. Visible gold occurs in the veins and pyrite is common. Minor chalcopyrite, sphalerite, arsenopyrite and galena have been reported in drill core but the presence of these sulphides does not appear to affect the gold tenor. Rare tellurides and tetrahedrite are noted. Diamond drilling indicates the tuff unit thins to the west.

CANABRAVA DIAMOND CORPORATION — KAP DIAMOND PROJECT

Canabrava Diamond Corporation, in conjunction with Paramount Ventures and Finance, completed the acquisition of approximately 120 000 hectares of staked claims south of Kapuskasing. This property, known as the KAP Diamond Project consists of 4 property blocks within the Kapuskasing Structural Zone. The company completed a high-resolution airborne magnetic and electromagnetic-VLF survey over the property in late 1997. Kimberlite targets identified from this survey will be targeted for ground follow up in 1998. Canabrava is also planning a comprehensive geochemical survey for kimberlite indicator minerals in the coming field season (Canabrava Diamond Corporation - Paramount Ventures and Finance, *press release*, December 1, 1997).

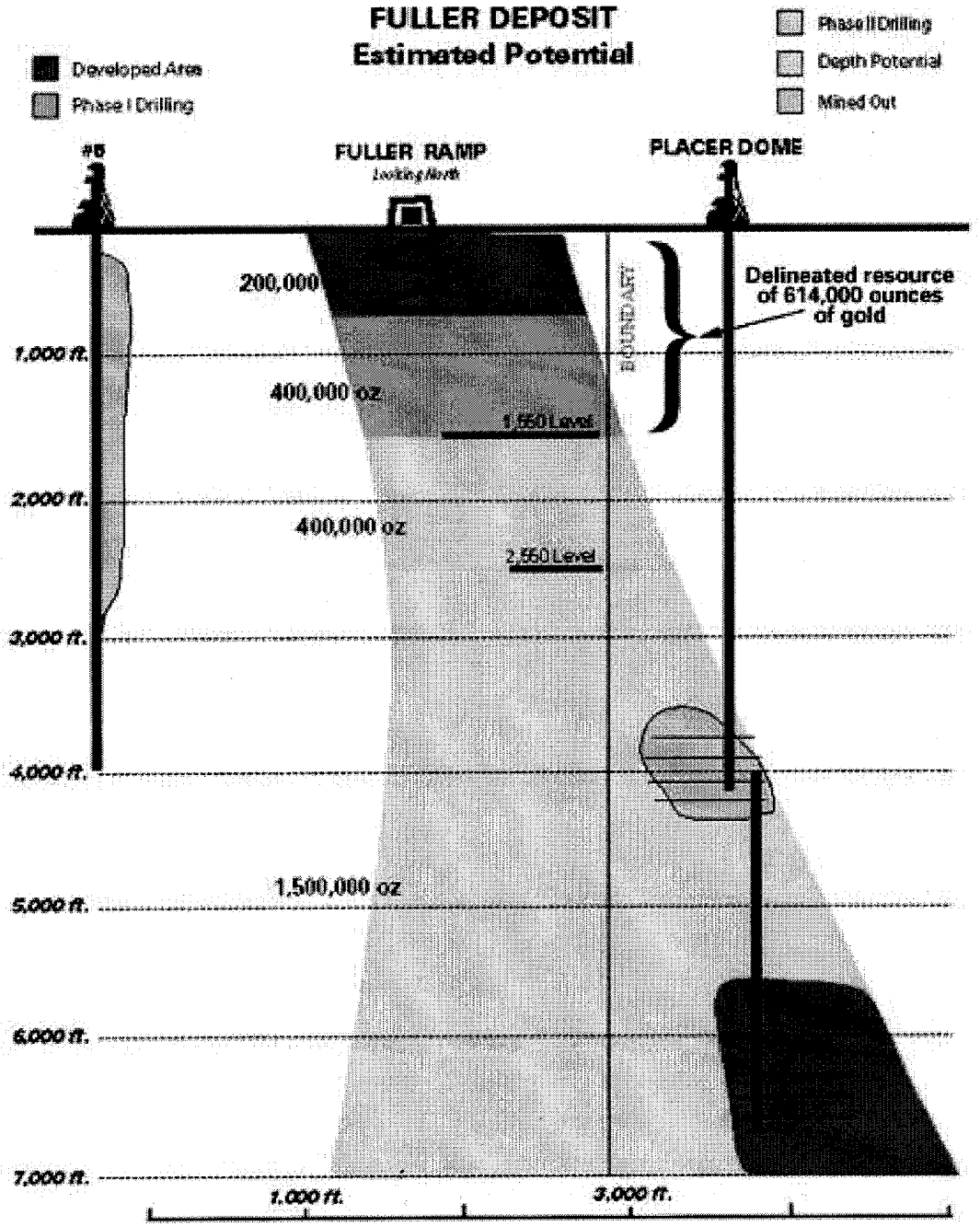

Figure 3. Longitudinal plan of the Fuller Zone, *reproduced with permission* of Vedron Gold Inc.

Table 3. Assessment files received in the Timmins District in 1997.

Abbreviations

Beep	Beep Mat survey	OD	Overburden drilling
DD	Diamond drilling	OM	Ontario Mineral Incentive Program
DGP	Down-hole geophysics	OP	Ontario Prospectors Assistance Program
GC	Geochemical survey	PEM	Pulse electromagnetic survey
GEM	Ground electromagnetic survey	Pr	Prospecting
GL	Geological survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	TEM	Transient electromagnetic in-loop survey
IM	Industrial mineral testing and marketing	Topo	Topographic survey
IP	Induced polarization survey	Tr	Trenching
Lc	Linecutting	VLFEM	Very low frequency electromagnetic survey

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
BMA 524-852	KWG Resources Inc.	95	DD 1 (494 m), Petrology Report	2.16481	T-3659
BMA 527-853	KWG Resources Inc.	95	DD 2 (313 m)	2.17493	T-3659
BMA 528-853	KWG Resources Inc.	96	DD 1 (171 m)	2.17492	T-3659
BMA 528-861	KWG Resources Inc.	96	DD 1 (130 m)	2.17783	T-3894
BMA 531-851 & 531-852	KWG Resources Inc.	96	DD 1 (304 m)	2.17531	T-3865
BMA 531-854	KWG Resources Inc.	95	DD 1 (74 m)	2.17491	T-3861
BMA 532-852	KWG Resources Inc.	95	DD 1 (383 m)	2.17494	T-3864
BMA 532-854	KWG Resources Inc.	95	DD 1 (178 m)	2.17519	T-3862
		95	DD 2 (337 m)	2.17490	T-3862
BMA 533-852	KWG Resources Inc.	95	DD 1 (107 m)	2.17605	T-3863
		95	DD 1 (206 m)	2.17501	T-3863
BMA 534-852	KWG Resources Inc.	95	DD 1 (164 m)	2.17521	T-3866
BMA 535-862	KWG Resources Inc.	95	DD 1 (127 m)	2.17773	T-3895
25 townships	The Hanna Mining Company	72-73	Samp, Assays	Donated	T-3840
Adams, Bartlett, etc (9 townships)	The Hanna Mining Company	75-77	Samp, Assays	Donated	T-3841
Aubin, Beck, etc (11 townships)	McIntyre Porcupine Mines	65	GC	63.4838/2	T-3842
Aurora, Calvert, Duff	Falconbridge Limited	96	GC	2.17658	T-3740
Beemer, English	Driver Resources Inc.	95	IP, GM	2.17532	T-3873
Benton	Cameco Corporation	95-96	GM, VLFEM, IP, Pr, Assays	2.17014	T-3750
Bond	Cross Lake Minerals Ltd.	97	DD 1 (237 m)	2.17424	T-3274
Bond, Sheraton	Cross Lake Minerals Ltd./ Golden Knight Res. Inc.	96-97 97	Lc, IP, GM HLEM	2.17755 2.17718	T-3274 T-3576

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Bristol	Copper Dome Mines Ltd.	97	GM, VLFEM, IP	2.17854	T-3817
Bristol	Copper Dome Mines Ltd. / Poirier Option	97	Lc, VLFEM, GM	2.17356	T-3817
Bristol	R. Poirier Property	90	Reblazing of claim lines	—	T-3468
		95	IP	2.17256	T-3468
Bristol, Carscallen, Denton, Thorneloe	Battle Mountain Canada Ltd.	96	DD 9 (1960 m)	2.17460	T-3246
Brower	P. Haire Property	96-97	GC, Topo	2.17833	T-3801
Carman, Langmuir	Eclipse Mining Corporation	97	Tr, Samp, Assays	2.17801	T-3887
Carroll, Canfield	K. Cool, M. Kean Property	96	IM	2.17045	T-3543
Carscallen	Golden Gate Resources Ltd.	97	GM, IP	2.17911	T-3818
Carscallen	R.A. Plaunt Property	96	GL	2.17771	T-3798
Casselman	P.P. Dirks Property	96	Str, Tr, Assays	2.17528	T-3876
Carscallen, Bristol	Band-Ore Resources Ltd.	97	GM, IP	2.17693	T-3616
Chester	Bryan et al. Property	95	VLFEM	2.17807	T-3469
		95	Str, Tr, GC, VLFEM	OP95-112,113, 114	T-3469
Chester, Yeo	B. Duess & B. Durham Property	95	IP, Pr	2.17536 (OP95-382)	T-3844
Clergue	A. Salo Property	95	Report	OP95-66	T-2759
Clergue	Moneta Porcupine Mines Inc.	97	IP	2.17402, 2.17763	T-3777
Clergue	S.D. Anderson Property	97	Lc, IP	2.17732	T-3885
Cody	Anvil Resources Ltd.	97	IP, HLEM, GM, DD 5 (981 m), Assays	2.17694	T-3882
Cody	Moneta Porcupine Mines Inc.	96 97	IP DD 2 (393 m), Assays	2.17761 2.17741	T-3764 T-3764
Cody	Royal Oak Mines Inc.	97	DD 16 (10,781 ft), Assays	2.17832	T-1573
Crawford, Lucas	Inco Ltd.	97	HLEM, GM, DD 1 (178 m)	2.17682	T-3893
Deloro	Asarco Exploration	97	Assays	2.17691	T-3602
Deloro	Chas. R. Morgan Property	96	Str	—	T-2907
Deloro	Grant-Collin Property	96	VLFEM, GM, GL	2.17266	T-3672
Deloro	Placer Dome Inc.	97	DD 1 (145 ft)	2.17676	T-3832
Deloro	Royal Oak Mines Inc.	97	Lc, GM, VLFEM	2.17865	T-3892
Deloro, Shaw	Grant-Collin Property	95	VLFEM, GM, GL	2.17265	T-3672
Deloro, Shaw	Placer Dome Canada Ltd.	96	GM	2.17042	T-3832
Denton	Band-Ore Resources Ltd.	96	DD 12 (2432 m), Assays	2.17434	T-3784
Denton	Black Pearl Minerals Inc. / Pentland Firth Ventures Ltd.	96	Lc, GM, HLEM	2.17696	T-3880
Denyes	D.F. Patrie Property	96	IP, Lc	2.16964	T-3318

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Dore	Inmet Mining Corporation	96	IP, Lc	2.16945	T-3823
		96	IP, Lc	2.17226	T-3823
		97	DD 8 (2008 m), Assays	2.17466	T-3823
Eldorado, Adams, Deloro	Outokumpu Mines Ltd.	97	OD 51 (814 m)	2.17802	T-3658
English	Cameco Corporation / Tri Origin Exploration Ltd.	96	Str, Tr, Assays	2.17529	T-3464
		96	DD 7 (1354 m), Assays	2.17489	T-3464
English	Tri Origin Exploration Ltd.	95	GL, GC, Assays	OM95-23	T-3464
English, Semple	Cameco Corporation / Tri Origin Exporation Ltd.	96	Lc, GL, Pr, Samp, GC	2.17487	T-3464
		97	IP	2.17689	T-3464
Esther	M.L. Burton Property	96-97	DD 33 (3388 m), Assays	2.17845	T-1920
Evelyn	A. Salo Property	96	DD 1 (647 ft)	—	T-3108
Evelyn	S.D. Anderson Property	96	Lc, HLEM, GM	2.16988	T-3701
		96	GL	2.17523	T-3701
Evelyn	D. & S. Gamble Property	96	DD 1 (300 ft), Assays	2.17455	T-3746
Fortune	Jones - Filo Property	95	DD 1 (350 ft), Str, Assays, Pr	2.17404 (OP95-321, 322)	T-3847
Fox (Stimson)	Anvil Resources Ltd.	95-96	DD 12 (2729 m), Assays	2.17834	T-3889
Fripp	D. Tichinoff Property	97	IP	2.17177	T-3483
Fripp	Moneta Porcupine Mines Inc. / McArthur Minerals	96	DD 2 (525 m), Assays	—	T-3806
		96-97	DD 12 (1074 m), Assays	2.17762	T-3806
Fripp, McKeown, Price	2973090 Canada Inc,/ Anglaumaque/Kalahari Resources Inc.	97	GM, VLFEM	2.17486	T-3855
Garnet	F. Ross Property	96	Str, Tr	2.17527	T-3729
			Str, Tr	2.17526	T-3729
Godfrey	Jones - Bilenki Property	96	VLFEM, Reblazing of claim lines	2.16971	T-3681
Godfrey	Moneta Porcupine Mines Inc.	95-96	DD 3 (751 m), Assays	2.16983	T-3546
		96	GM, HLEM	2.17649	T-3546
		97	IP	2.17601	T-3546
		97	GM	2.17600	T-3546
Gowan	Gowest Amalgamated Resources Ltd.	96	DD 3 (1024 m), Assays	2.17257	T-3803
Greenlaw	2973090 Canada Inc./ T. Obradovich Property	96	Pr, Beep, Samp, Assays	2.17412	T-3859
Halcrow	D.F. Patrie Property	95	IP, GM, VLFEM	2.17433	T-3318
		97	IP	2.17458	T-3318
Halcrow	J.P. Patrie Property	95	IP, Assay	2.17447	T-3648
Halcrow, Tooms	Cameco Corporation	95	IP, GM, VLFEM, Assays	2.17014	T-3749
		96	Tr	—	T-3749
Halliday	Panterra Minerals Inc.	96	VLFEM, GM, GL, Samp, Pr, Assays	2.17533	T-3853

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Halliday	Panterra Minerals Inc. / C. Pegg Property	97	DD 5 (1073m), Assays	2.17518	T-3853
Heenan	Morin – Ross Property	91	Pr, Tr, Samp, Assays	OP91-245, 242	T-3879
Heenan	D. Mullen Property	95	DD 1 (64 m)	OP95-266	T-3564
Horwood	D. Morin Property	95	Str, Tr, Assays	2.17844 (OP95-330)	T-3505
		97	Str, Tr	2.17699	T-3505
Horwood	Haddington Resources Ltd.	95	DD 10 (1795 m)	2.17263	T-3710
Horwood	Morgain Minerals Inc.	95-96	IP, VLFEM, GM	2.17057	T-3830
		96	DD 14 (2355 m)	—	T-3830
Horwood	Ross - Lalonde Property	95	Tr, Samp, Assays	OP95-61,166, 167	T-3851
Hoyle	Black Hawk Mining Inc.	95	DD 16 (2987 m), Assays	OM95-114	T-3852
Hoyle	Pentland Firth Ventures Ltd.	97	DD 2 (749 m), Assays	2.17431	T-3757
Ivanhoe	D. Morin Property	95	Pr, Assays	OP95-330	T-3846
		96	Pr, Mechanical	2.17495	T-3846
Ivanhoe	J.R. Morin Property	95	Pr, Assays	2.17453	T-3870
		96	VLFEM, GM, Pr, Assays	2.17445	T-3870
Jamieson, Godfrey	Falconbridge Limited	96-97	HLEM, GC	2.17820	T-3467
Jessop	Mountjoy Jessop Syndicate	96	DD 4 (1562 m)	2.17398	T-3209
Jessop	The Jessop Syndicate	96	Lc, PEM, GM	2.17357	T-3209
Keefer	Blackwater Gold Corporation	96	Lc, IP, GM	2.17062	T-3825
Keefer, Hillary	W. Sims Property	96	GL, Samp, Assays, Str	2.17485	T-3369
Keith	D. Morin Property	94	Str	—	T-3779
Keith	Marshall Minerals Corp	96	DD 12 (1291 m)	—	T-2776
Keith	Penn-Gold Resources Inc./ Can. Golden Dragon Resources Ltd.	96	GM	2.17058	T-3834
Kenogaming	D. Morin Property	95	Pr, Assays, GM, VLFEM, HLEM	OP95-330	T-2726
Kenogaming	Eastmain Resources Inc.	95	IP, GL	OM95-49	T-3752
Kenogaming	K. Filo Property / Orezone Resources Inc.	96	GL	2.17175	T-3759
Langmuir	Black Pearl Minerals Inc.	97	GL	2.17698	T-3883
Langmuir	D. Meunier Property	97	DD 3 (768 m), Assays	2.17680	T-2951
Langmuir	Kalahari Resources Inc.	92, 96	VLFEM, IP, HLEM	2.17016	T-3829
Langmuir	Outokumpu Mines Ltd.	96	DD 4 (876 m)	2.17422	T-3789
		96	HLEM, GM	2.17520	T-3789
Little	D. & S. Gamble Property	96-97	DD 1 (160 m), Assays	2.17454	T-3745
Loveland	Atna Resources Ltd.	97	GM	2.17401	T-3871
Loveland	D. Meunier Property	96	Lc,VLFEM, GM	2.17172	T-3381
		97	Str	—	T-3381
Loveland	Driver Resources Inc.	95-96	IP, GM, DD 6 (950 m)	2.17171	T-3875

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Loveland	International Larder Minerals Inc.	97	IP, GM	2.17730	T-3884
Loveland	Placer Dome (CLA) Limited	96 97	DD 1 (327 m) DD 2 (621 m)	— 2.17461	T-3607 T-3607
Loveland	R.T.J. Barnes Property	97	Tr Str	2.17728	T-3808
Loveland	Reid Syndicate	96	PEM, GM	2.17043	T-3838
Lower Detour Lk, Atkinson Lk	Better Resources Limited	96	DD 10 (1492 m)	—	T-3828
Macdiarmid, Jamieson	Reid Syndicate	96	PEM, GM	2.17020	T-3839
Macdiarmid, Loveland	Falconbridge Limited	96	DD 3 (705 m)	2.17636	T-3152
Macklem	Cross Lake Minerals Ltd.	96-97	Lc, IP, GM	2.17754	T-3886
Macklem	Echo Bay Ontario Ltd.	96	DD 19 (4587 m)	2.17264	T-3807
Macklem	Leader Mining International Inc.	96 96	DD 7 (3521 ft) GM, VLFEM, HLEM	2.17379 2.17882	T-3867 T-3867
Mallard	J.R. Morin Property	95	Reblazing of claim lines	2.17446	T-3562
Mallard	S.D. Anderson Property	96	IP	2.17428	T-3756
		96	DD 5 (943 m)	—	T-3740
Mann	Falconbridge Limited	96	HLEM, GM	2.17819	T-3740
Mann	J. & D. Ward Property	95	IP, DD 1 (152 m), Assays	2.17406 (OP95-120, 121)	T-3461
Mann	L.E. Hill Property	96	DD 1 (804 ft)	2.17731	T-3015
Mann, Aurora, Hanna	Falconbridge Limited	96	DD 3 (831 m)	2.17599	T-3740
Marion	R. Lashbrook Property	95	Lc	OP95-62	T-3849
Massey, Whitesides	Morgain Minerals Inc.	96	DD 1 (176 m), GM, PEM	2.17613	T-3872
Matheson	BHP Minerals Canada Ltd.	96	OD 25 (913 m)	—	T-3772
Matheson	Pentland Firth Ventures Ltd.	96 97	DD 5 (1696 m) DD 1 (200 m), Assays	 2.17522	T-3822 T-3822
		97	DD 1 (117m)	2.17818	T-3822
McCart	D. & S. Gamble Property	95	Lc, HLEM, GM	2.16357	T-3821
		96	DD 1 (568 ft.)	2.17650	T-3821
Michie, Timmins	Royal Oak Mines Inc.	97	VLFEM, HLEM, GM	2.17678	T-3776
Montcalm	Outokumpu Mines Ltd.	95	DD 35 (17,727 m), DGP(PEM), Assays	OM95-70	T-3723
Montcalm, Nova	Teck Exploration Ltd.	96	DD 18 (3966 m)	2.17524	T-3741
Mountjoy	Comaplex Minerals Corp.	97	GC	2.17867	T-2526
Mountjoy	D. Caron Property	95-96	Assays	2.17174	T-3600
Murphy	Murphy Syndicate	97	DD 1 (184 m)	2.17899	T-3891
Murphy	Pentland Firth Ventures Ltd.	97	DD 9 (3246 m), Assays	2.17408	T-3858
Murphy, Tisdale	Moneta Porcupine Mines Inc. / Placer Dome Canada Ltd.	96	DD 7 (1667 m)	—	T-2727

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Murphy, Tisdale	Placer Dome Canada Ltd.	96	HLEM, GM	2.17061	T-3835
Ogden	I.A. Lajeunesse Property	96	Pr, Reblazing of claim lines	2.17614	T-3874
Ogden	S.Anderson / Willow Resources	96-97	Lc, GM	2.17262	T-3697
Osway, Esther, Garnet, Benton, Mallard, Heenan, Dore, Carew, Joffre	M. Charette Property	95	GL, Samp, Assays	OP95-240	T-3845
Penhorwood	B. Durham Property	96	Str	—	T-3774
Penhorwood	Can. Golden Dragon Resources Ltd. /Brownstone Investments	96	IP, GM	2.17060	T-2722
Penhorwood	La Societe de Gestion Maskours Inc.(Roseval)	96	GM	2.16965	T-3237
Penhorwood	Otis J. Exploration	95	IP Sections	OM95-22	T-3774
Penhorwood, Reeves	Can. Golden Dragon Resources Ltd. / Brownstone Investments	96	Lc, HLEM, GM	2.17059	T-2722
Pharand	E. Mord Property	96	DD 2 (461 ft), Assays, Pr, Samp	2.17435	T-3489
Potter, Sangster	Noranda Mining & Exploration	95	GL	2.17772	T-3763
Price	Inmet Mining Corporation	96	DD 8 (2179 m)	2.17500	T-3809
Price, Ogden, Thorneloe	Inmet Mining Corporation	96	IP	2.16987	T-3809
Prosser	Eastmain Resources Inc.	95	IP	2.16980	T-3831
Prosser	Falconbridge Limited	96	GC	2.17013	T-3162
Prosser, Wark	Eastmain Resources Inc.	95	GM, HLEM, TEM, IP, DD 2 (469 m), Assays	OM95-50	T-3831
Reeves	Cross Lake Minerals Ltd.	96	HLEM, IP, GM, DD 3 (725 m)	2.17044	T-3837
		96	DD 2 (350 m), Assays	2.17687	T-3837
Reeves	East West Resource Corporation	96	Lc, HLEM, GM	2.17056	T-3833
Reeves	Elcajun Resources Ltd.	95	Tr	—	T-3628
		95-96	Pr	2.17176	T-3628
		96	Tr	—	T-3628
Reeves + 7 townships	Troup & Otton Property	92	Pr, Samp, Assays, GC	OP92-558,559	T-3878
Reid	McChip Resources Inc.	95	DD 2 (568 m), Assays	OM95-83	T-3519
Reid	Reid Syndicate	96	PEM, GM	2.16966	T-3802
		96	GM	2.16978	T-3802
Reid, Carnegie	Comaplex Minerals Corp. / Comstate Resources	96	DD 3 (722 m), Assays	2.17258	T-3154
Robb	Falconbridge Limited	96	DD 1 (486 m)	2.17499	T-3189
Robb	G. Kerr Property	97	GM	2.17690	T-3881

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Robb, Jamieson, Godfrey	Falconbridge Limited	96	DD 3 (994 m)	2.17648	T-3189
Sewell	Cross Lake Minerals Ltd.	96	IP, GM, Lc	2.16962	T-3824
		96	GL	2.16963	T-3824
Sewell	Driver Resources Inc.	95	DD 6 (950 m)	2.17804	T-3791
Sewell	Sewell Mining Corporation / M. Caron Property	96	Lc, IP, GM	2.17497	T-3868
Shaw	Outokumpu Mines Ltd.	96	DD 2 (229 m)	2.17423	T-3848
		96	GM	2.17578	T-3848
Shaw	R. Collins Property	95	Tr, GL	OP95-97	T-3850
Sheraton	Cross Lake Minerals Ltd.	97	DD 3 (747 m), Assays	2.17719	T-3576
		97	IP, HLEM, GM	2.17720	T-3576
Slack	J.P. Arsenault Property	96	Manual	2.17525	T-2363
Sothman	Abitibi Mining Corp	95-96	DD 14 (1681 m)	—	T-3820
South of Ridge Lake	D. McKinnon Property	97	IM	2.17496	T-3860
Stock	St. Andrew Goldfields Ltd.	96	DD 1 (455 m)	2.17795	T-3088
Sunday Lake	Gowest Amalgamated Resources Ltd.	97	HLEM, GM	2.17808	T-3888
Sunday Lake	Cyprus Canada Inc.	97	Lc, IP, GM, DD 1 (138 m), Assays	2.17530	T-3854
Sunday Lake, West of	Pelangio-Larder Mines Limited	97	DD 4 (629 m), Assays	2.17464	T-3856
Sunday Lk, W. of, Sunday Lk.	Placer Dome Ltd.	96	DD 6 (853 m), Assays	2.17450	T-2349
Swayze	J.P. Patrie et al Property	96	IP, Pr	2.17430	T-3869
Thorburn	Noranda Mining & Exploration	96	DD 1 (783 m)	—	T-3236
Thorneloe	Band-Ore Resources Ltd.	96	DD 15 (4053 m), Assays	2.17757	T-3616
Thorneloe	Band-Ore Resources Ltd. / Abitibi Mining Corp.	96	DD 11 (2758 m), Assays	2.17224	T-3616
Thorneloe	Comaplex Minerals Corp.	96	DD 1 (215 m)	—	T-3826
Thorneloe	Meranto Technology Inc.	96	Lc, IP, GM, VLFEM	2.17888	T-3890
Thorneloe, Bristol	Band-Ore Resources Ltd.	96-97	IP, GM	2.17760	T-3616
Thorneloe, Bristol	Band-Ore Resources Ltd. / Sedex Mining Corp.	96	DD 6 (911 m), Assays	2.17225	T-3616
Timmins	Royal Oak Mines Inc.	96	GC	2.17063	T-3776
		96	DD 4 (1198 m), Assays	—	T-3776
Timmins, Sheraton	Haddington Resources Ltd.	97	GL, Assays	2.17758	T-3805
Tisdale	D. & P. Meunier Property	95	DD 1 (913 ft)	OP95-253,254	T-2956
Tisdale	Pyke - Londry Property	94	GM, VLFEM, HLEM, IP	2.17015	T-2417
Tisdale	D.R. Pyke Property	97	IP	2.17218	T-3569
Tisdale	Pentland Firth Ventures Ltd.	96	DD 2 (601 m)	—	T-3827

Table 3. cont'd. Assessment files received in the Timmins District in 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Tisdale	Pyke, Ristimaki, Londry Property	96	IP	2.17817	T-2417
Tisdale	Timginn Syndicate	95	DD 8 (3134 m), Assays	OM95-82	T-3787
Tooms, Greenlaw, Cunningham	WMC International Limited	94-96	GC, GL, OD 14 (154 m), Assays	2.16857	T-3724
Tully	C.F. Desson Property	95	DD 1 (219 m)	2.17429	T-3521
Tully	D. & S. Gamble Property	97	DD 1 (624 ft), Assays	2.17465	T-3744
Turnbull	Columbia Metals Corporation Ltd.	96-97	Lc, VLFEM, IP, GM	2.17517	T-3500
Turnbull, Carscallen	Cambior Inc.	96	Lc, HLEM, GM	2.16979	T-3475
		96	DD 1 (449 m)	—	T-3475
Wark	Falconbridge Limited	93	GC, Assays	2.17227	T-3288
Wark, Murphy	Falconbridge Limited	96	DD 1 (210 m)	—	T-3288
Watson, Belford	Stratabound Minerals Corporation	96	DD 4 (4144 ft)	—	T-3815
West of Sunday Lake	D. Lough Property	96	GM, Pr, Beep, Assays	2.17647	T-3877
Whitesides, Carscallen	Falconbridge Limited / Prospectors Alliance Corporation	96 96	GC GL, GC	2.17457 2.17688	T-3644 T-3644
Whitney	S.D. Anderson Property	96	GM	2.17064	T-3836
Zavitz, Hutt	Inmet Mining Corporation	97	GM, Lc	2.17456	T-3857

CROSS LAKE MINERALS LTD. - SHERATON-TIMMINS PROPERTY

Cross Lake Minerals Ltd.'s Sheraton -Timmins property is located 43 km east of Timmins in Sheraton and Timmins townships. Access to the property is by way of Hwy 101 east of Timmins to the Gibson Lake Road. The property consists of 312 claim units. Cross Lake Minerals acquired the property and began exploration in 1991. In 1993, ground magnetometer and electromagnetic surveys were completed and 4 diamond drill holes tested south-trending conductors. Drilling encountered a 5 m thick, massive pyrite zone in graphitic argillite and siliceous, felsic breccia. Sphalerite mineralization was noted in the core. Additional geophysical surveys on claim 1193711, were followed by diamond drilling of 3 holes (746 m in total) early in 1997. The first hole, CLS 97-1 tested an induced polarization target and encountered a thick sequence of felsic pyroclastic rocks with widespread, anomalous zinc assays accompanied by sericite and chlorite alteration. These results were considered sufficient to warrant additional follow-up drilling. Drill hole CLS 97-16 intersected massive sulphide mineralization that assayed 6.71% Zn, 1.86% Pb, 3.12 ounces silver per ton, 0.16% Cu and 55 ppb gold over 33 m (Cross Lake Minerals Ltd., *press release,* October 9, 1997). The area of the massive sulphide mineralization is referred to as the Cross Lake Zone. As a result of the discovery, Cross Lake has commenced a major diamond drilling program on the property and, to the end of 1997, 32 holes have been drilled. Most of this drilling has concentrated on the Cross Lake Zone.

Geology:

The property is covered by a thick layer of glacial overburden that attains a thickness of more than 30 m over the Cross Lake Zone. Previous geological maps indicated the area was entirely underlain by mafic metavolcanic rocks. On the basis of the limited diamond drilling by Cross Lake, a north-

trending sequence of felsic pyroclastic rocks has been identified. Geochemical analyses by the company indicate the felsic rocks are sodium depleted and base metal enriched. Minor purple fluorite occurs associated with quartz veins and disseminated in the volcanic rocks and on slips and fractures. The felsic volcanic rocks include tuffs, lapilli tuffs and breccias with occasional narrow white chert bands. The rocks exhibit moderate to intense sericite and chlorite alteration with a pronounced foliation. A discordant feldspar–quartz porphyry body of undetermined thickness intrudes the felsic sequence.

Diamond drill intercepts (*see* Figure 4) indicate the Cross Lake Zone trends northeast, dips steeply southeast and plunges to the southwest. Graded bedding within fragmental pyroclastic breccias indicate stratigraphic tops are south–facing. Chalcopyrite and sphalerite zonation is recognized in the deposit (Bob Middleton, Cross Lake Minerals Ltd., personal communication, 1997).

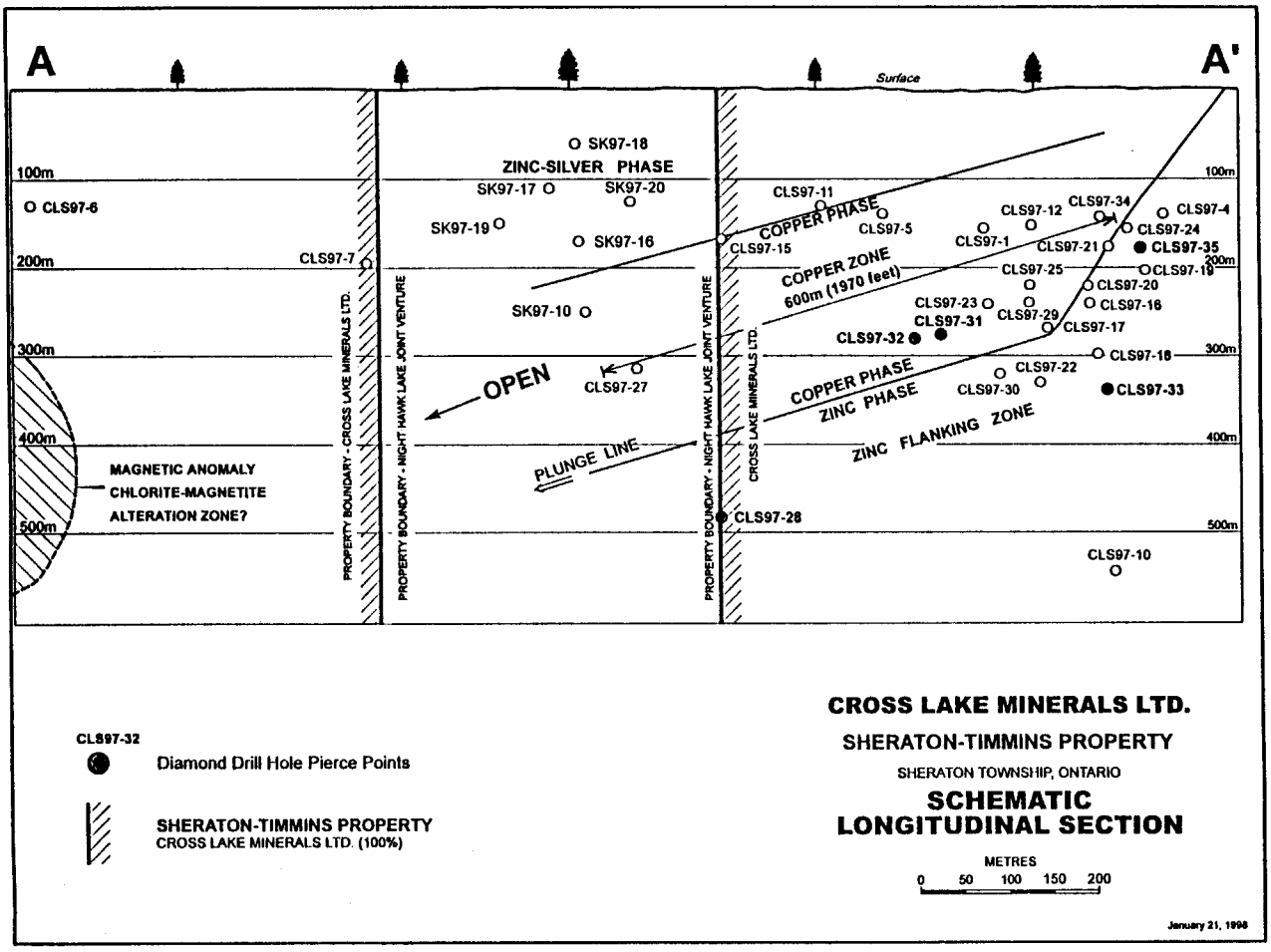

Figure 4. Longitudinal diamond drill section, Sheraton–Timmins property, *reproduced with permission* of Cross Lake Minerals Ltd.

GOLDEN KNIGHT RESOURCES INC. - NIGHTHAWK LAKE PROPERTY

Golden Knight Resources Inc. completed diamond drilling and geophysical surveys on their 645 claim property in Macklem, Bond, Currie and Sheraton townships. The exploration is a joint venture program with Cross Lake Minerals Ltd., East West Resource Corporation and Canadian Golden Dragon Resources Ltd. Much of the exploration focus has been directed towards the on–strike extension of the Cross Lake Minerals base metal discovery and on other parallel zones identified by induced polarization surveys. Diamond drilling on the Sheraton Lake Zone has encountered gold and base metal mineralization in felsic volcanic rocks.

HADDINGTON RESOURCES LTD., SILVERSTONE RESOURCES LTD. - KALTWASSER PROPERTY

The Kaltwasser property is situated at the intersection of Sheraton, Timmins and Egan townships, approximately 50 km east of Timmins city centre. Access to the property is by way of the Gibson Lake Road, south from Hwy 101. Haddington Resources Ltd. and Silverstone Resources Ltd. carried out a joint venture exploration of the property consisting of induced polarization surveys and diamond drilling. Five diamond drill holes tested IP conductors over a strike length of 1 km, approximately 5 km southeast of the recent base metal discovery in Sheraton Township by Cross Lake Minerals Ltd. Felsic volcaniclastic rocks and pyrite-bearing, rhyolite breccia, up to 55.5 m thick, with elevated levels of zinc, copper and gold were encountered in the drill program (Haddington Resources Ltd., Silverstone Resources Ltd*., press release,* October 29, 1997).

PENTLAND FIRTH VENTURES LTD. - MARLHILL MINE PROJECT

The Marlhill Mine Project is located in Hoyle Township, 800 m north of the Bell Creek Mine. Previous exploration on the site has defined and extended a number of gold-bearing zones. The M1 Vein was mined between 1989 and 1991 to a depth of 120 m. Pentland Firth has been exploring beneath the mine workings and has identified a gold resource of 199 000 ounces in 1.3 million tons of mineralization grading 4.78 g/t gold (*The Ontario Prospector,* 1998). The property is presently inactive.

On the Schumacher III project, in Hoyle Township, Pentland Firth has outlined a gold resource of 62 000 ounces in 670 000 tons of mineralization grading 2.89 g/t gold (*The Ontario Prospector*, 1998).

Pentland Firth Ventures Ltd. completed geochemical surveys over their properties in Hoyle and Murphy townships.

PLACER DOME NORTH AMERICA LIMITED - DETOUR LAKE AREA

Placer Dome North America Limited explored four properties in the Detour Lake greenstone belt outside the Detour Lake Mine property. These included a joint venture project with Pelangio Larder Mines Limited west of the Detour Lake Mine where 3 diamond drill holes, totalling 3739 m, were completed.

On the McAlpine Lake property, Placer Dome completed 3 new diamond drill holes and a diamond drill hole collared in 1996 was extended. The diamond drill program amounted to 1851 m.

The South Detour and Sunday Lake properties, situated south and east of the Detour Lake Mine, were optioned from Westmin Resources Limited. Diamond drilling of 16 holes totalling 4314 m explored the South Detour property, and 50 km of line cutting and 45 km of induced polarization were completed on the Sunday Lake property.

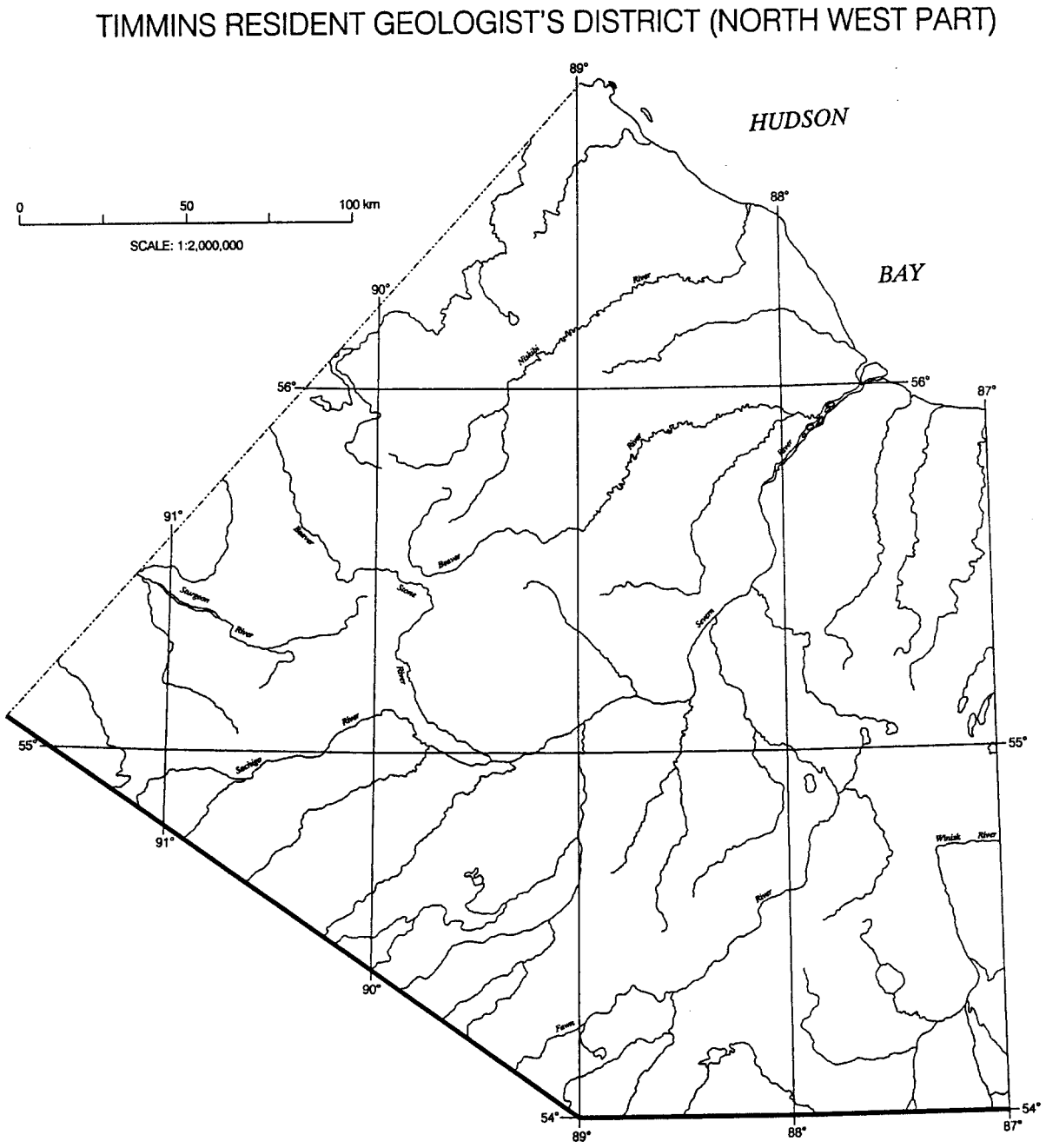

Figure 5a. No exploration activity.

TIMMINS RESIDENT GEOLOGIST'S DISTRICT (NORTH EAST PART)

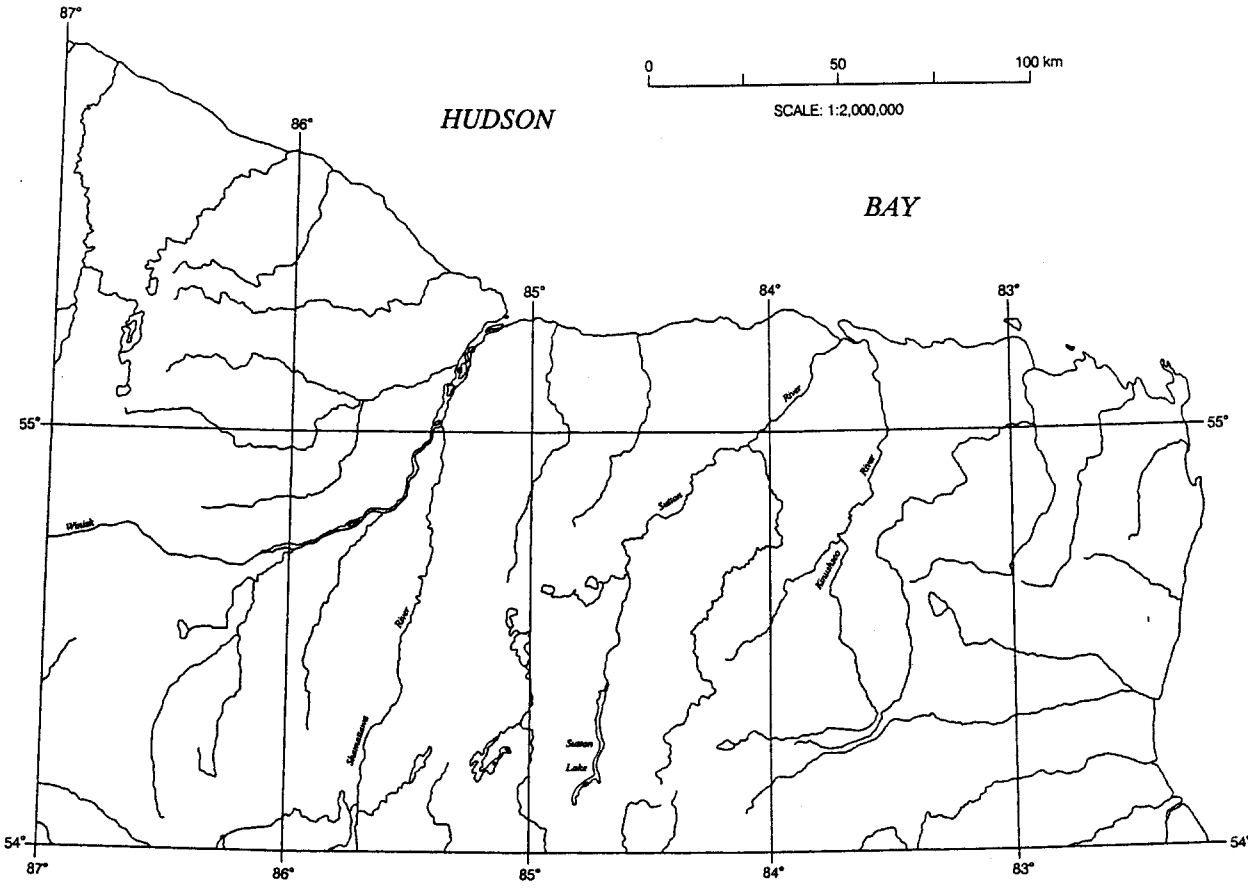

Figure 5b. No exploration activity.

TIMMINS RESIDENT GEOLOGIST'S DISTRICT (WEST CENTRAL PART)

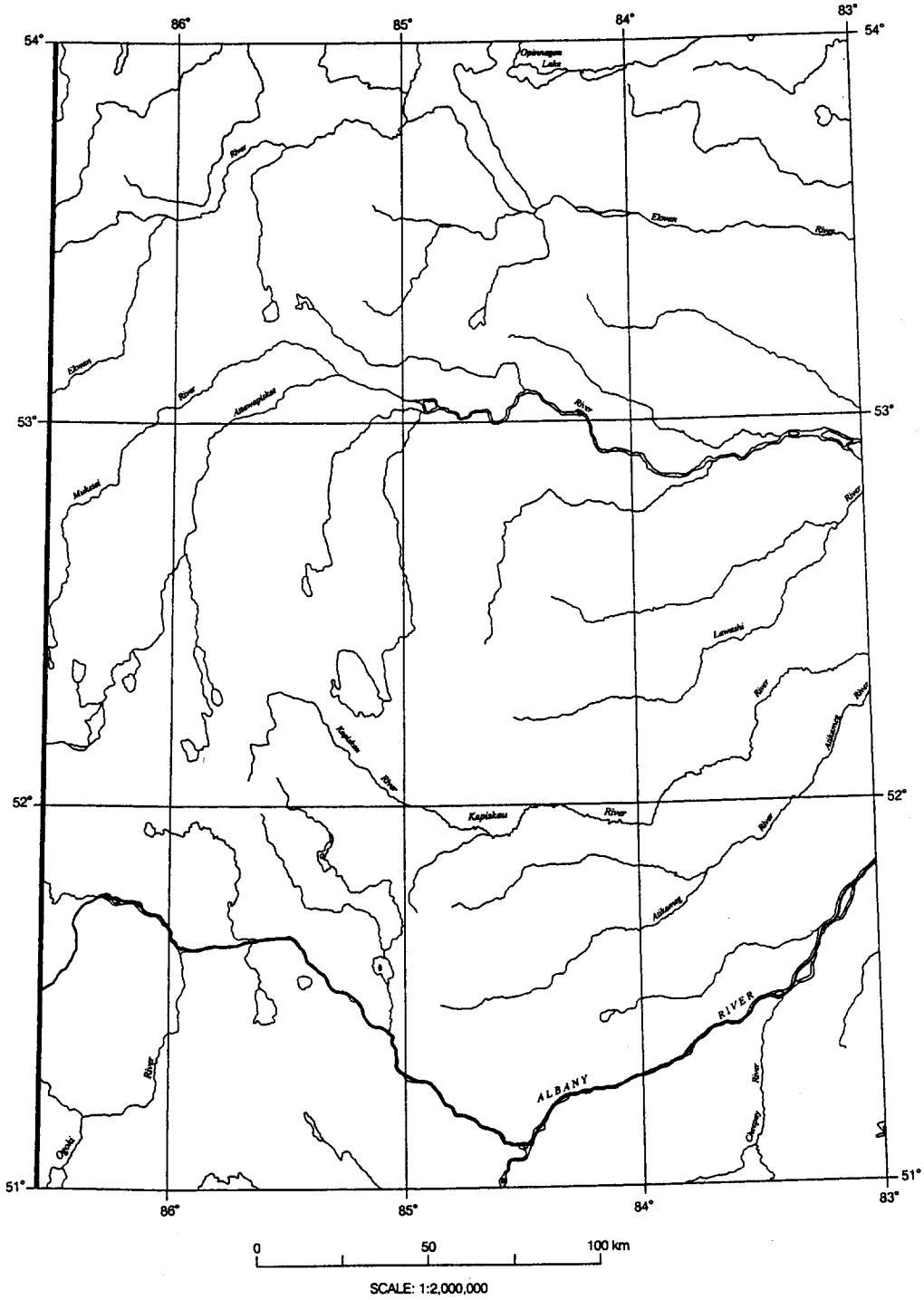

Figure 5c. No exploration activity.

TIMMINS RESIDENT GEOLOGIST'S DISTRICT (EAST CENTRAL PART)

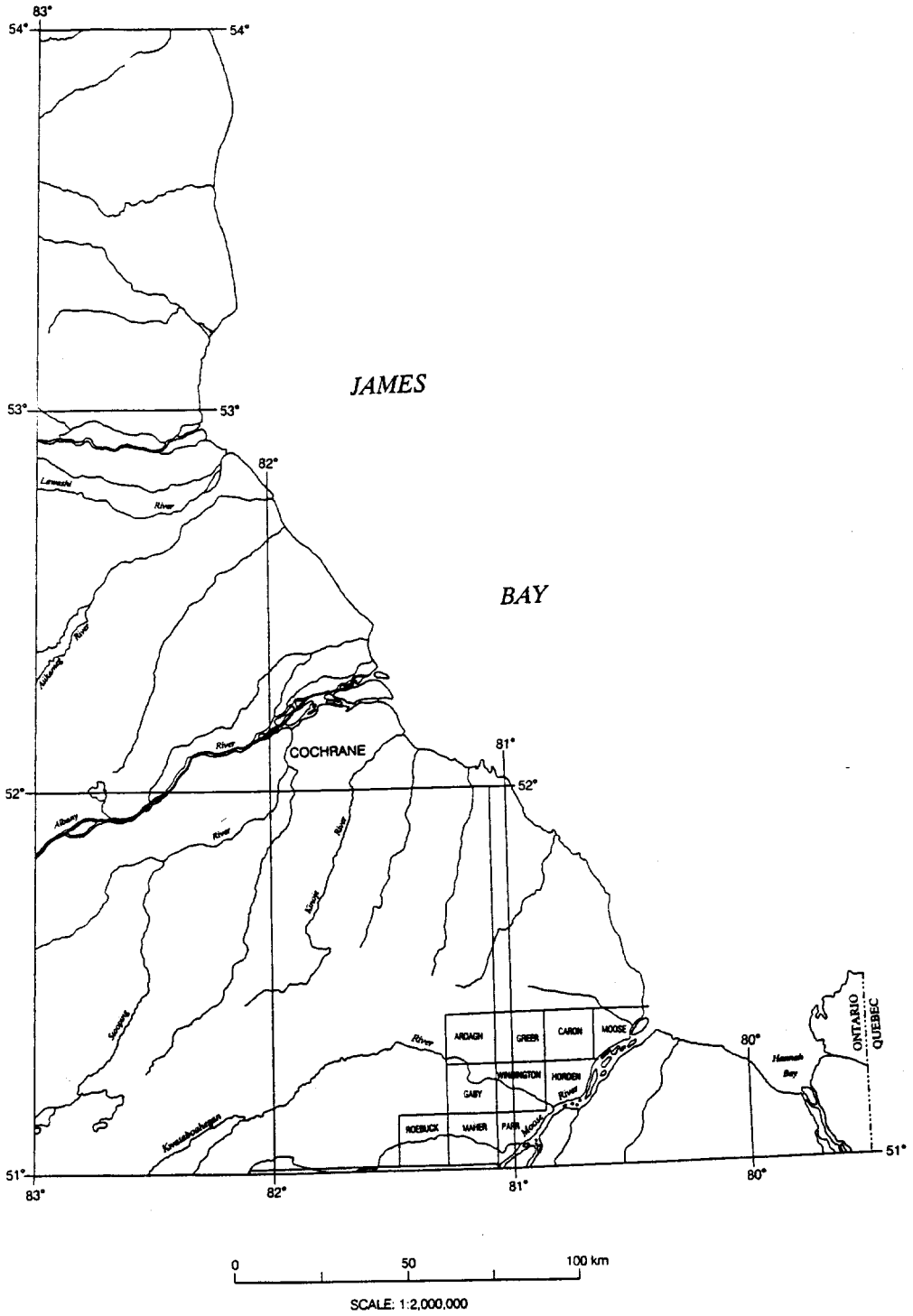

Figure 5d. No exploration activity

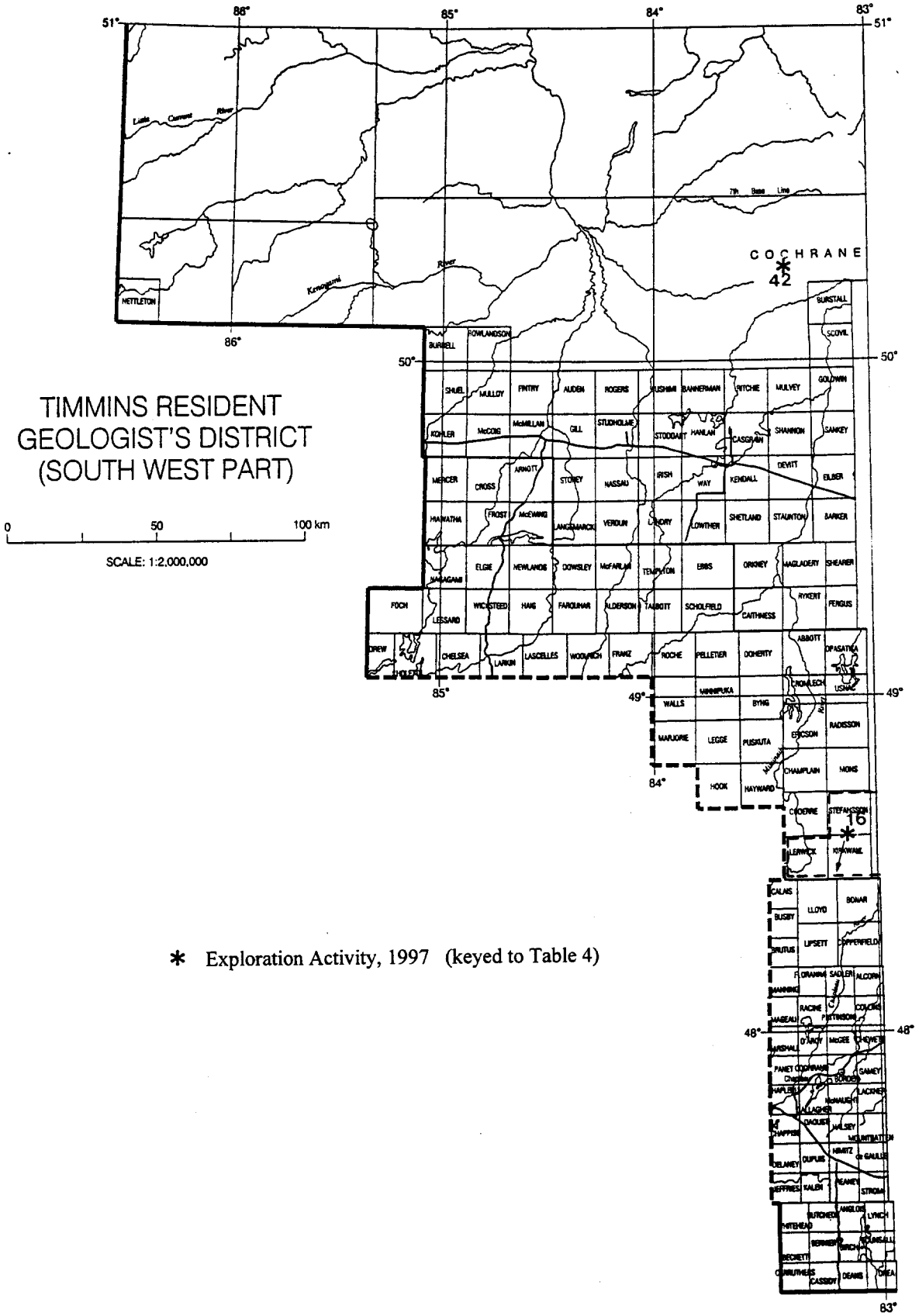

Figure 5e. Exploration activity, 1997.

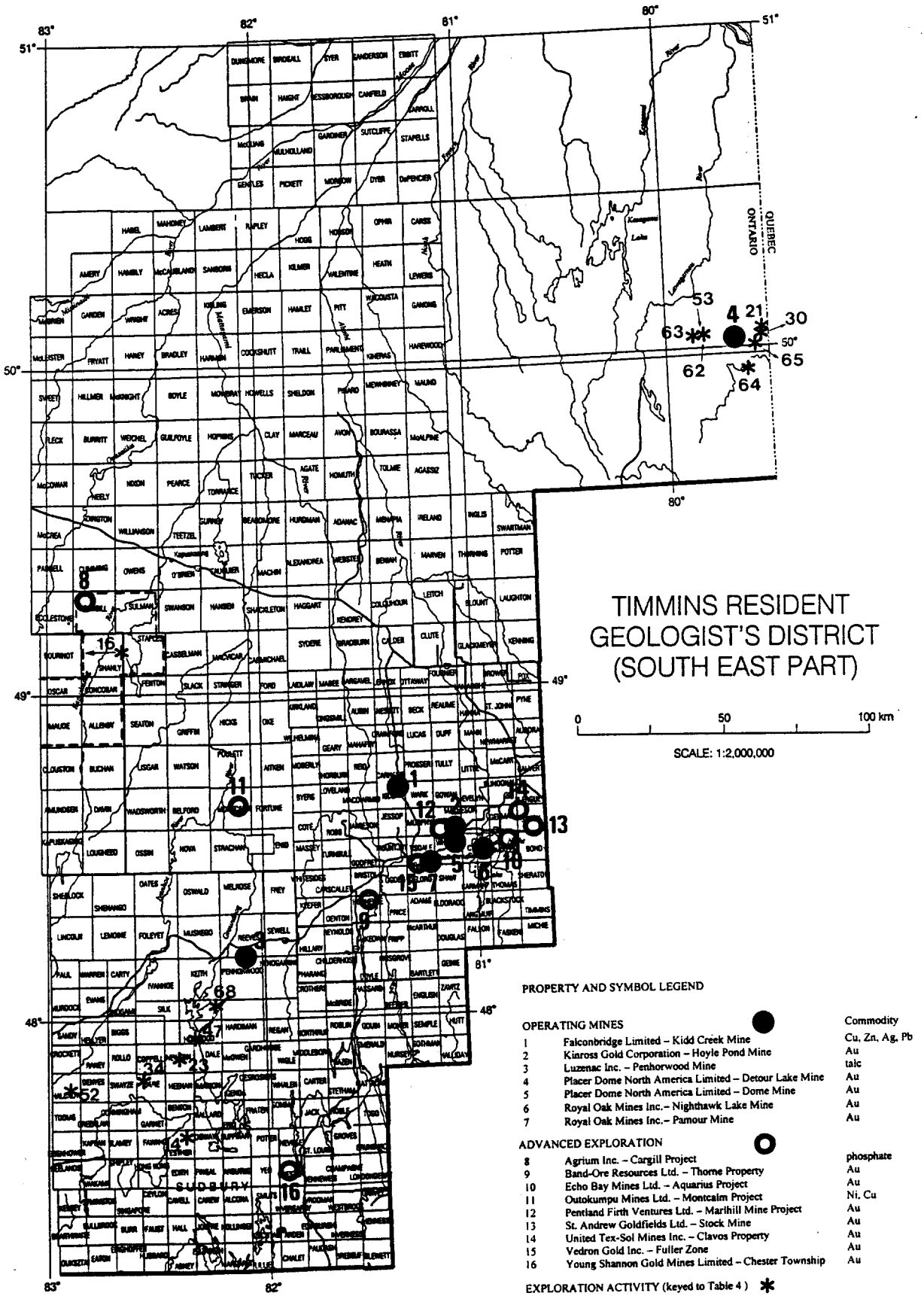

Figure 5f. Mining and exploration activity, 1997.

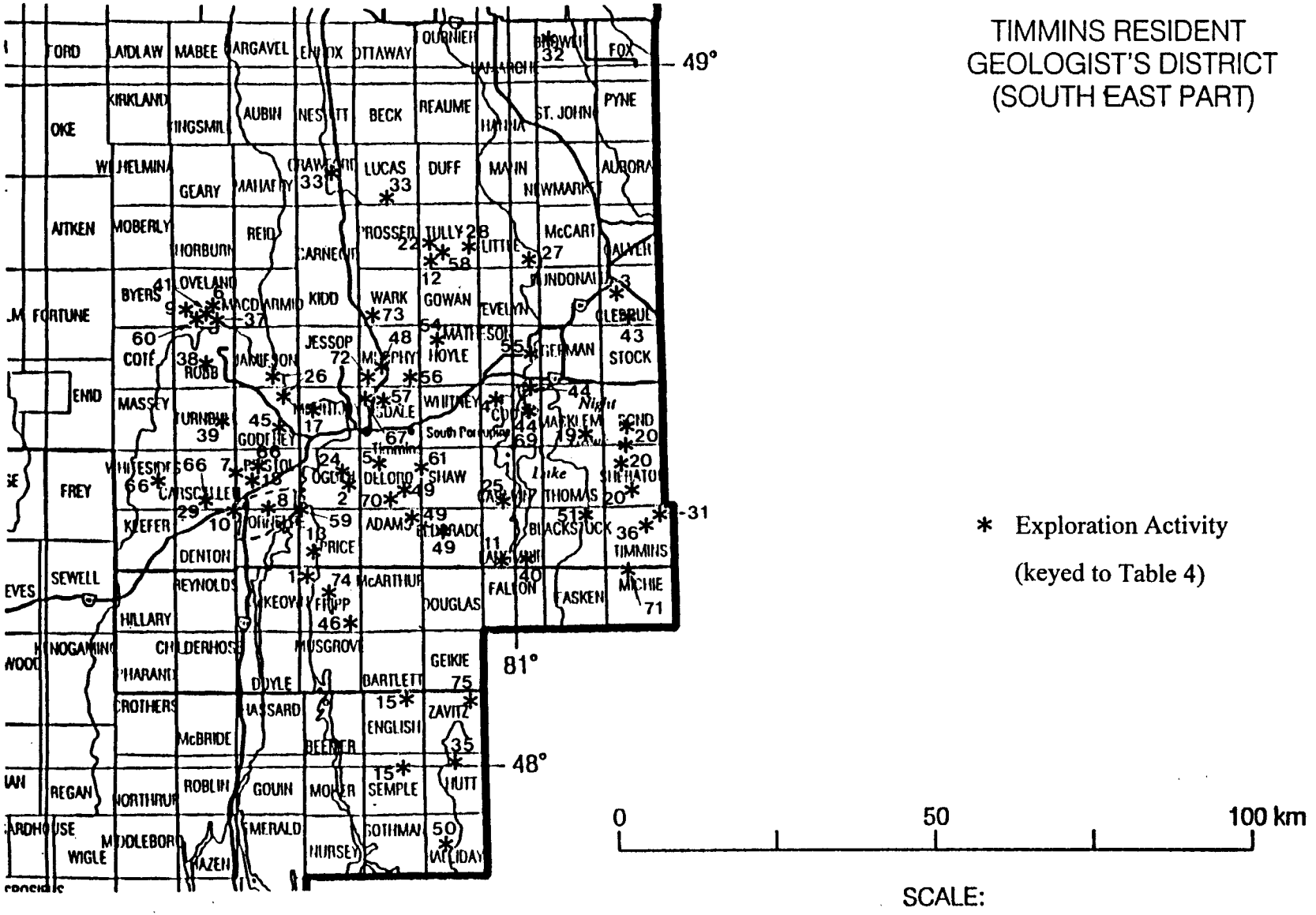

Figure 6. Exploration Activity, 1997

Table 4. Exploration activity in the Timmins District in 1997.

Abbreviations

AEM	Airborne electromagnetic survey	Mo	Molybdenum
AM	Airborne magnetic survey	NA	Data Not Available
Ag	Silver	Ni	Nickel
Au	Gold	ODH	Overburden drill hole(s)
BM	Base metals	Pb	Lead
Cu	Copper	PEM	Pulse electromagnetic survey
DD	Diamond drilling	PGM	Platinum group metals
DGP	Down-hole geophysics	Pr	Prospecting
GC	Geochemical survey	RES	Resistivity survey
GL	Geological Survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Str	Stripping
HLEM	Horizontal loop electromagnetic survey	Topo	Topographical survey
IM	Industrial mineral testing and marketing	Tr	Trenching
IP	Induced polarization survey	VLFEM	Very low frequency electromagnetic survey
Lc	Linecutting	Zn	Zinc

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	2973090 Canada Inc. / Anglaumaque / Kalahari Resources Inc.	Fripp, McKeown, Price (Au)	GM, VLFEM
2	S. D. Anderson / Willow Resources	Ogden (Au)	Lc, GM
3	S. D. Anderson Property	Clergue (Au)	Lc, IP
4	Anvil Resources Ltd.	Cody (Au)	IP, HLEM, GM, DD 5 (981 m), Assays
5	Asarco Exploration	Deloro (Au, Cu, Ag, PGM)	Assays
6	Atna Resources Ltd.	Loveland (NA)	GM
7	Band-Ore Resources Ltd.	Carscallen, Bristol (Au)	GM, IP
8	Band-Ore Resources Ltd.	Thorneloe, Bristol (Au)	IP, GM
9	R.T.J. Barnes Property	Loveland (NA)	Tr, Str
10	Battle Mountain Gold Company	Thorneloe, Bristol, Denton (Au)	Lc, GM, IP, GL, DD 24 (7100 m)
11	Black Pearl Minerals Inc.	Langmuir (Au, BM)	GL
12	Black Pearl Minerals Inc.	Tully (Au)	DD 71 (54,792 ft)
13	Blue Emerald Resources Inc.	Price (Au)	GM, VLFEM
14	M.L. Burton Property	Esther (Au)	DD 33 (3388 m), Assays
15	Cameco Gold Inc./Tri Origin Exploration Ltd.	English, Semple (Au)	Lc, GL, IP
16	Canabrava Diamond Corporation / Paramount Ventures and Finance	Allenby, Cargill, Concobar, Kirkwall, Lerwick, Maude, Oscar, Shanly, Staples, Stephansson, Sulman (diamonds)	AEM, AM
17	Comaplex Minerals Corp.	Mountjoy (Au)	GC
18	Copper Dome Mines Ltd. / Poirier Option	Bristol (Au)	Lc, VLFEM, GM, IP
19	Cross Lake Minerals Ltd.	Macklem (Au)	Lc, GM
20	Cross Lake Minerals Ltd.	Sheraton (Zn, Cu, Au)	DD 34, Assays, Lc, GM, IP
20	Cross Lake Minerals Ltd. / Golden Knight Resources Inc.	Sheraton, Bond (Zn, Cu, Au)	DD 27, IP, GM, HLEM, Assays

Table 4. Cont'd. Exploration activity in the Timmins District in 1997.

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
21	Cyprus Canada Inc.	Sunday Lake (Au, BM)	Lc, IP, GM, DD 1 (138 m), Assays
22	Cyprus Canada Inc.	Tully (Au)	Lc, IP, DD 2 (575 m)
23	Echo Bay Mines Ltd.	Newton (Au)	Tr, GC
24	Echo Bay Mines Ltd.	Ogden (NA)	Lc, GM, IP, GC
25	Eclipse Mining Corporation	Carman, Langmuir (Au)	Tr, Samp, Assays
26	Falconbridge Limited	Jamieson, Godfrey (BM)	HLEM, GC
27	D. & S. Gamble Property	Little (Au, BM)	DD 1 (160 m), Assays
28	D. & S. Gamble Property	Tully (Au,BM)	DD 1 (624 ft.), Assays
29	Golden Gate Resources Ltd.	Carscallen, Denton (Au)	GM, IP
30	Gowest Amalgamated Resources Ltd.	Sunday Lake (Au)	HLEM, GM
31	Haddington Resources Ltd. / Silverstone Resources Ltd.	Timmins (Au, BM)	GL, Assays, IP, DD 5
32	P. Haire Property	Brower (Au)	GC, Topo
33	Inco Ltd.	Crawford, Lucas (BM. Au)	HLEM, GM, DD 1 (178m), Assays
34	Inmet Mining Corporation	Dore (Au)	DD 8 (2008 m), Assays
35	Inmet Mining Corporation	Zavitz, Hutt (Au)	GM, Lc
36	International Canalaska Resources Ltd.	Timmins (NA)	Lc
37	International Larder Minerals Inc.	Loveland (BM)	Lc, IP, GM
38	G. Kerr Property	Robb (Ni, Au)	GM
39	Lapierre, Collin & Collin Property	Turnbull (Au, Cu, Zn)	Lc, VLFEM, IP, GM
40	D. Meunier Property	Langmuir (Au, Ag, Cu, Mo)	DD 3 (768 m), Assays
41	D. Meunier Property	Loveland (Au)	Str
42	D. McKinnon Property	South of Ridge Lake (phosphate)	IM
43	Moneta Porcupine Mines Inc.	Clergue (Au)	Lc, IP
44	Moneta Porcupine Mines Inc.	Cody (Au)	Penninsula: DD 2 (393 m), Assays Collins Zone: DD 19 (4531 m), DGP, GC
45	Moneta Porcupine Mines Inc.	Godfrey (BM)	Lc, GM, IP, DD 1 (350 m), DGP (PEM)
46	Moneta Porcupine Mines Inc./McArthur Minerals	Fripp (Cu, Ni, Ag, Au, Mo, PGM, Pb, Zn)	Lc, DD 12 (1074 m), Assays, RES
47	D.C. Morin Property	Horwood (Au)	Str, Tr
48	Murphy Syndicate	Murphy (Au)	DD 1 (184 m)
49	Outokumpu Mines Ltd.	Eldorado, Adams, Deloro (Ni, Cu)	ODH 51 (814 m)
50	Panterra Minerals Inc. / C. Pegg	Halliday (Au, Cu, Zn)	DD 5 (1073 m), Assays
51	Patrician Gold Mines Ltd.	Blackstock (Au, BM)	HLEM
52	D.F. Patrie Property	Halcrow (Au, BM)	IP
53	Pelangio-Larder Mines Limited	Sunday Lake, West of (Au)	DD 4 (629 m), Assays
54	Pentland Firth Ventures Ltd.	Hoyle (Au)	DD 2 (749 m), Assays
55	Pentland Firth Ventures Ltd.	Matheson (Au)	DD 2 (317 m), Assays
56	Pentland Firth Ventures Ltd.	Murphy (Au)	DD 9 (3246 m), Assays
57	Pentland Firth Ventures Ltd. / Moneta Porcupine Mines Inc.	Tisdale (Au)	Data compilation, GC
58	Pentland Firth Ventures Ltd. / Black Pearl Minerals Inc.	Tully (Au)	GM

Table 4. Cont'd. Exploration activity in the Timmins District in 1997.

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
59	Pentland Firth Ventures Ltd. / Inmet Mining Corporation (Croxall – Kangas Property)	Thorneloe, Price, Ogden (Au)	GM, IP
60	Placer Dome (CLA) Limited	Loveland (Au)	DD 2 (621 m)
61	Placer Dome (CLA) Limited	Deloro (Au)	DD 1 (145 ft.)
62	Placer Dome North America Limited / Pelangio-Larder Mines Limited	Sunday Lake, West of (Au)	DD 3 (3739 m)
63	Placer Dome North America Limited (Gowest Amalgamated Resources Ltd. Option)	Sunday Lake, West of (Au)	DD 3 (1851 m)
64	Placer Dome North America Limited (Westmin Option)	Lower Detour Lake (Au)	DD 16 (4314 m)
65	Placer Dome North America Limited (Westmin Option)	Sunday Lake (Au)	Lc, IP
66	Prospectors Alliance Corporation	Bristol, Carscallen, Whitesides (Au)	Str, Tr, GL, Samp, DD
67	D.R. Pyke Property	Tisdale (Au)	IP
68	Renaudat – Fournier Property	Horwood (Au, BM)	Str, Assays
69	Royal Oak Mines Inc.	Cody (Au)	DD 16 (10,781 ft), Assays
70	Royal Oak Mines Inc.	Deloro (Au, BM)	Lc, GM, VLFEM
71	Royal Oak Mines Inc.	Michie, Timmins (Au)	Lc, VLFEM, HLEM, GM, DD 1 (689 ft)
72*	Royal Oak Mines Inc.	Murphy (Au)	DD 1 (608 ft)
73	Teck Exploration Ltd.	Wark (BM)	HLEM, DD 1 (110 m)
74	D. Tichinoff Property	Fripp (Au, BM)	IP
75	M. Tremblay	Zavitz (BM)	Pr

* *Property 72 misplotted on Figure 6. Location in NW quarter of township not SW*

PROSPECTORS ALLIANCE CORPORATION - TIMMINS WEST PROPERTIES

Prospectors Alliance Corporation holds a 500 claim block with a 22 km length in Bristol, Carscallen, and Whitesides townships. The company did stripping, trenching, mapping and sampling on the Allerston fault where several historic gold occurrences have been identified. The Jowsey Occurrence (*see* "Property Examinations") was tested with a small drill program.

Prospectors Alliance Corporation and International Larder Minerals Inc. have joint ventured to explore properties in the Kamiskotia area northwest of Timmins for base metal mineralization (*The Ontario Prospector,* 1998).

Land Use Planning Activity

Lands for Life is a new land use planning program initiated by the Ontario government which has the objective of identifying and mitigating varying land use practises throughout much of the province. Staff contributed to the mineral resource assessment of the land base in the Timmins District as part of the Lands for Life process.

Resident Geologist Staff and Activities

As a result of Ministry reorganization, significant personnel changes occurred in the Timmins office. Lorne Luhta vacated the Regional Resident Geologist position in May, and Pam Sangster departed to take up the Tweed based position of Regional Resident Geologist, Southern Ontario in September. Brian Atkinson transferred from the Red Lake Resident Geologist position to serve as the Regional Resident Geologist for the Timmins District in June and also acquired supervisory responsibility for the Sault Ste. Marie District. Ann Wilson was appointed District Geologist and a second position of District Geologist remained vacant through the year. Reno Pressacco has been appointed to fill that position, commencing February 1998. Philip Hope was appointed Geological Assistant. Diane Draper serves as the Regional Support Geologist, responsible for the Earth Resources Land Information System (ERLIS). Dan Lachapelle and John Cribbs provided enthusiastic summer assistance. Reorganization of the Resident Geologist Program re-established Timmins as a regional office. Jim Ireland, former Resident Geologist for the Cobalt District, now serves as Manager, Northeast Region, and is based in the Timmins. Faye Boucher, former staff member in the Kirkland Lake Resident Geologist Office, and Diane Egerland now serve as Regional Administrative Assistants.

In March, the Resident Geologist Office was moved from downtown Timmins to the Ontario Government Complex in South Porcupine.

Staff completed property visits, client service and consultations, participated in the northeastern Ontario Mines and Minerals Symposium and provided several field trips to industry personnel and university students. Statistics for office use are presented in Table 5.

B. Atkinson completed 1:50 000 scale mapping of the Medicine Stone Lake area (NTS 52L/16), Red Lake District.

As a result of cost-saving measures, the closure of the drill core library was initiated. All core presently stored in the library is slated for removal to a fenced, outdoor storage compound that will be operated as a self-serve diamond drill core repository. Core removal is expected to take place early in 1998.

Table 5. Staff Activities, Timmins Resident Geologist office 1996 - 1997.

Activity	1996	1997
Client Visits - Main Office	2620	2406
Client Visits - Drill Core Library	378	238
Property Visits by staff	22	20
ERLIS Client Sessions	151	207
Telephone inquiries	4100	4300
Major surface tours given	3	3
Assessment files processed (including donations)	271	225
OPAP/OMIP files processed	21	23

Property Examinations

HOLMER GOLD LTD. - BRISTOL TOWNSHIP

Holmer Gold Mines Ltd. is currently exploring their property located in southwestern Bristol Township, approximately 20 km west of Timmins. The main showing is south of Highway 101 and is accessible via a short bush road, just west of Thunder Creek.

The property is the former McAuley-Bridge property that was discovered in 1911 by Messrs. McAuley and Bridge. The earliest recorded work on the property consisted of trenching and sinking of two shallow shafts by the two discoverers (Ferguson 1957). Exploration has been conducted sporadically by various companies since the 1920's. Chevron Minerals Ltd. completed the most recent intensive exploration program in the late 1980's under an option agreement with Holmer Gold Mines Ltd. At that time, a mineral resource was calculated at 211 000 tonnes averaging 5 g/t gold (Fumerton 1989).

In 1996, Holmer Gold drilled 10 holes and identified 2 steeply-dipping gold zones in a 330-foot wide shear zone (Luhta et al. 1997). Several new gold zones have been identified as a result of their current 60 000-foot diamond drill program (*The Timmins Times*, August 9, 1997, *The Daily Press,* September 26, 1997*).* Results of the drill program indicate the property hosts 3 westward-plunging, parallel zones (Main, Footwall and Hanging Wall zones) in a shear or deformation zone that is at least 385 feet wide. The gold mineralization has an estimated strike length of 820 feet.

Both the Main and the Hanging Wall zones are characterized by sericite and iron carbonate alteration. Gold mineralization occurs within a system of massive quartz + tourmaline stockwork veins. The stockwork contains disseminated pyrite, arsenopyrite and visible gold. The Main Zone occurs at the nose of a fold and the Hanging Wall lies along the flanks of the fold, at the contact between mafic, metavolcanic rocks and metasediments (*The Northern Miner*, June 23, 1997). The fold structure is exposed in an area that was stripped by Chevron Minerals Ltd. and enlarged by Holmer Gold. Based on the results of Holmer's drilling, the Main Zone has been extended down plunge for at least 1640 feet and the Hanging Wall Zone was extended down plunge for at least 1389 feet. (Holmer Gold Mines Ltd., 1996 Annual Report).

The Footwall Zone exhibits a more complex geology. It is located at the contact between mafic metavolcanic rocks and ultramafic rocks and has been traced down plunge to 2260 feet. A new zone, named the Ultramafic Zone, has also been found within the ultramafic rocks. The shear zone hosting both the Footwall and Ultramafic zones is estimated to be 718 feet wide and averages 0.03 ounce per ton gold (*The Daily Press,* September 26, 1997).

PROSPECTOR'S ALLIANCE CORPORATION - JOWSEY OCCURRENCE

The Jowsey Occurrence is located in Carscallen Township and is held as part of a large claim group by Prospectors Alliance Corporation in the west Timmins area. Access to the site is from Hwy 101, west of Timmins to the Malette Road, then north for a distance of about 4 km to a secondary logging trail that leads directly to the occurrence.

Early records indicate the property was covered by claims P11537 to P11542 as part of the larger Jowsey Denton Gold Mines Ltd. property. (Harding and Berry 1938). An earlier report by Hawley (1926) indicates claim P11538 is the Beanland-Hurst occurrence. The property is now encompassed by claim 1212680. At the time of the property examination, a number of pits and trenches were being

excavated and these permitted a good view of the underlying geology. Glacial overburden in the vicinity of the trenches was 2m or less.

The property is underlain by mafic metavolcanic flows and is situated about 3 km east of the contact of supracrustal rocks with felsic, intrusive batholithic rocks that delineate the margin of the Abitibi greenstone belt. The mafic metavolcanic rocks include pillow forms and associated pillow breccias. The mafic flows are light green in colour and are metamorphosed to upper greenschist facies. Pillow fragments in the breccia units are subrounded to angular and are generally light green to white. Mafic dikes up to 20 cm wide intrude the mafic flows. Chert-magnetite ironstone, up to 3 m in width, interleaves with the mafic flows. The ironstone is thinly banded and contains approximately 80% chert and 20% magnetite. Pyrite occurs as irregular small pods and lenses within the ironstone and is sometimes associated with silicification. The main stripped area exposes a 1 m wide quartz -feldspar porphyry dike within mafic flows that parallels the trend of the ironstone. A 2 m wide, north-trending diabase dike cross cuts the mafic flows, ironstone and a silicified fault breccia on the east side of the outcrop. The ironstone generally trends about 060° but changes abruptly to 350° between 2 closely spaced outcrops. Numerous small faults affect the ironstone and may account for some of the structural complexity observed.

A small trench on the west side of the access road exposed a 3 m wide pod of carbonate + quartz mineralization in mafic volcanic rocks. Euhedral quartz and calcite crystals up to 2 cm long suggest open-space crystallization within a vein system. Minor chalcopyrite and pyrite were observed with the calcite.

LECOURS PROPERTY - BYNG TOWNSHIP

The Lecours property is located in Byng Township, approximately 100 km south of Hearst. Access is by way of municipal road 583, south from Hearst for 5 km to the Bradlo Road, then south on this road for 92 km then east on an unnamed logging road for 8 km to the property. Good road access is available right to the site.

The Lecours property consists of a 16-claim unit numbered 1193827. In 1995, the claim holder completed bedrock trenching and a Beepmat survey. Previous work on the property has included an airborne geophysical survey by Amax Minerals Exploration in 1981. A small diamond drill program, completed 5 km south of the claims in Puskuta Township by a Canamax – Noranda joint venture, encountered mafic metavolcanic rocks, graphitic metasediments and felsic pyroclastic rocks. Narrow intersections of base metal mineralization were reported in drill core.

The property is underlain by amphibolitized, garnet-bearing, pillowed mafic flows that trend 080° and dip northward between 65° to vertical. Several bands of 1 to 2 m thick chert-magnetite ironstone occur within the mafic flows. The ironstone exhibits pronounced sinistral deformation with small S-fold axes and mineral lineations that plunge 40° west. Sulphidized ironstone reportedly carries elevated copper and zinc values up to 1.75% (Rita Lecours and Gerald Lecours, Prospectors, personal communication, 1997). Although no ultramafic rocks were viewed on the property, an angular boulder of ultramafic composition of possible local derivation was noted.

The area is mapped on a regional scale as northwest-trending mafic volcanic rocks that form an elongate greenstone sliver enclosed by felsic intrusive country rocks (Thurston et al. 1977). The greenstone sliver is the eastward extension of the Kabinakagami Lake greenstone belt where numerous gold and base metal occurrences have been identified (Thurston et al. 1977). The Puskuta Lake Shear Zone parallels the length of the greenstone sliver (Leclair 1990).

The location of the Lecours property indicates the underlying greenstone is wider than indicated on regional geological maps. The combination of good road access, limited previous work, favourable geology, structure and mineralization makes the area attractive for reconnaissance exploration.

Recommendations for Exploration

Cu-Ni-Cr-PGEs

Throughout the year, several Timmins-based prospectors have been bringing in various rocks to the Resident Geologist Office for identification. The rocks have been collected from the Watabeag Lake area, McEvay Township, Kirkland Lake District, east of the Cross Lake Minerals Ltd. base metal discovery. Visual inspection indicates the rocks form a complete suite of mafic to ultramafic intrusive rocks, ranging in composition from olivine-bearing peridotite, pyroxenite, gabbro and leucogabbro, with coarse-grained, massive, cumulate and glomeroporphyritic textures. Sulphide mineralization includes pyrrhotite, chalcopyrite and pyrite in leucogabbro host rocks that show a positive nickel response to dimethylgloxine powder. Specimens of cumulate ultramafic rock were heavily mineralized with euhedral, medium-grained black chromite. Assay results from one prospector's chromite-bearing specimen analyzed up to 19% Cr_2O_3. A specimen of gabbro with pyrrhotite mineralization contained anomalous platinum group elements (Garry Windsor, Prospector, personal communication, 1998).

Although chromite is a common, uneconomic accessory mineral in komatiitic flows (MacRae 1965, Naldrett and Mason 1968, Muir 1975, Barrie 1997), the McEvay Township occurrence has a plutonic character and consequently, a high economic potential. The rocks submitted by the prospectors may represent a zoned, chromititic ultramafic intrusive complex, resulting from mantle eduction adjacent to the deep-seated Porcupine-Destor Fault.

With the potential of hosting platinum group elements (PGEs), nickel-copper mineralization and chromite, this new discovery was the result of traditional prospecting that was stimulated by the Cross Lake Minerals base metal discovery, in close proximity to an area traditionally thought to be well explored. The McEvay Township occurrence suggests much remains to be known and discovered within the Abitibi greenstone belt, and underscores the importance of traditional prospecting.

Of particular importance is the presence of documented chromite mineralization associated with platinum group elements for further prospecting interest. Despite obvious differences in scale, exploration models should review and compare the Bushveld intrusion in South Africa, the Stillwater intrusion in Montana, USA, and the Lac des Iles intrusion near Thunder Bay, Ontario, as possible analogues. The reader is referred to *Chromite Deposits in Ontario* (Whittaker 1986) and references within for additional information. Caution is advised in sample selection, as sulphide content may not be a reliable guide to mineral content when searching for PGEs.

PHOSPHATE IN CARBONATITES

Carbonatites may host economic deposits of phosphate mineralization as demonstrated by the production decision for the Cargill Township deposit by Agrium Inc. Numerous other large, weathered and buried carbonatites have been identified with mineral characteristics common to the Cargill carbonatite. Many of these carbonatites appear related to the Kapuskasing structure, and should be more thoroughly evaluated. Examples include the Martison Carbonatite Complex, (Sage 1991), the Lackner Lake Complex, (Sage 1988), the Nemegosenda Lake Complex, (Sage 1987), the Seabrook Lake Carbonatite Complex, (Sage 1988), and the Valentine Township Carbonatite Complex, (Sage 1983). Residual enrichment of phosphate by Cretaceous weathering appears to be an important process for the economic viability of carbonatites. Therefore, carbonatites that don't breach the Paleozoic cover in the James Bay Lowlands would be of less interest for their phosphate potential.

BASE METALS

The Cross Lake Minerals Ltd. base metal discovery in Sheraton Township was the result of persistent exploration in an area of thick overburden and little outcrop. By careful analysis of induced po-

larization surveys followed by diamond drilling, Cross Lake Minerals has outlined a significant new deposit of volcanogenic massive sulphide mineralization. Although the economics of the deposit have yet to be established, the discovery represents a significant find for the Timmins District. The felsic suite of rocks that host the mineralization are prime targets for additional exploration. The felsic volcanic rocks underlying Fasken, Fallon and Douglas townships may be the southwest continuation of the rocks that host the Cross Lake Minerals discovery, but separated by the Blackstock Stock. Similarly, the extensive felsic pile that extends from McArthur Township to Halliday Township may be the southward sweep of the same felsic stratigraphy. Numerous base metal occurrences, combined with favourable geochemical traits suggest these rocks are good prospects for volcanogenic, massive sulphide mineralization.

GOLD

Despite the current downward trend in price, gold remains a rare and precious metal with unique characteristics, historical importance and intrinsic value. The difficulty of discovering economic new sources ensures gold will remain in tight supply over the long term. Exploration should continue to take the long term view and continue the search for the precious metal in the prolific Abitibi greenstone belt.

OGS Activities and Research by Others

Publications received by the Timmins Resident Geologist Office in 1997 are listed in Table 6.

J. A. Ayer, N. F. Trowell, Z. Madon and F. Corfu (OGS) continued to work on a geological compilation of the western Abitibi greenstone belt. The project includes results of a preliminary structural investigation of the Timmins area using Radarsat data.

C. T. Barrie, Geological Survey of Canada (GSC), investigated the geology and completed geochemical, geochronological and isotopic studies of the southern Abitibi subprovince for the Kidd–Munro Extension Project. In 1997, studies concentrated on southwestern Dundonald Township.

R. P. Sage, OGS, Precambrian Geoscience Section, continued a study of Jurassic kimberlites of the James Bay Lowland clustered near the Attawapiskat River, as well as, widely dispersed Precambrian kimberlites.

T. F. Morris of the OGS, Sedimentary Geoscience Section completed a Quaternary geology mapping and overburden sampling program in the Woman Falls – Wakusimi River area, south of Kapuskasing. The project aims to identify occurrences of kimberlite indicator minerals and areas of potential aggregate deposits.

S. M. Hamilton (OGS), M. B. McClenaghan (GSC), A. F. Bajc (OGS) and G. E. M. Hall (GSC) continued a study to evaluate peat and shallow groundwater as suitable geochemical sample media for detecting mineralization in areas of thick overburden. The study is a joint project of the Ontario Geological Survey and the Geological Survey of Canada.

Acknowledgements

Information on past work contained within the body of this report is derived from assessment files unless noted otherwise. Insight and information provided by prospectors, consultants, individuals and mining and exploration company personnel is acknowledged.

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Table 6. Publications received by the Timmins Resident Geologist Office in 1997.

Title	Author	Type and Year of Publication
A Regional Evaluation of Gold Potential along the Western Extension of the Larder Lake – Cadillac Break, Matachewan Area: Results of Regional Till Sampling	Bajc, A.F.	OGS Open File Report 5957, 1997
International Gold Review	Barclays de Zoete Wedd Research	1990
Precambrian Geology, Monteith Area	Berger, B.R.	OGS Preliminary Map P.3367, 1997
Geology and Economic Minerals of Canada, Parts A and B *	Douglas, R.J.W. ed	GSC Economic Geology Report No. 1, 1976
Canadian Minerals and Metals Industry: Trends and Short-Term Outlook	Energy, Mines and Resources Canada Mineral Policy Sector	December 1988
Canadian Minerals and Metals Industry: Trends and Short-Term Outlook	Energy, Mines and Resources Canada Mineral Policy Sector	November 1990
Canadian Mineral Industry Monthly Report	Energy, Mines and Resources Canada	November 1990
Canadian Mineral Industry Monthly Report	Energy, Mines and Resources Canada	December 1990
Canadian Iron Ore Industry Statistics, 1991 and 1990	Energy, Mines and Resources Canada Mineral Policy Sector	1991
Canadian Mineral Industry Monthly Report	Energy, Mines and Resources Canada	January 1991
Mineral Industry Quarterly Report	Energy, Mines and Resources Canada Mineral Policy Sector	June 1992
Mineral Industry Quarterly Report	Energy, Mines and Resources Canada Mineral Policy Sector	September 1992
Canadian Iron Ore Industry Statistics, 1992	Energy, Mines and Resources Canada Mining Sector	1992
Mineral Industry Quarterly Report	Energy, Mines and Resources Canada Mineral Policy Sector	June 1993
Mineral Industry Quarterly Report	Energy, Mines and Resources Canada Mining Sector	Fall 1993
Metallurgical Works in Canada: Primary Iron and Steel 1990	Energy, Mines and Resources Canada	EMR Mineral Bulletin MR 226, 1990
Mining and Mineral Processing Operations in Canada 1990	Energy, Mines and Resources Canada Mineral Policy Sector	EMR Mineral Bulletin MR 227, 1991
Metallurgical Works in Canada: Primary Iron and Steel 1992	Energy, Mines and Resources Canada Mineral Policy Sector	EMR Mineral Bulletin MR 231, 1992
Mining and Mineral Processing Operations in Canada 1992	Energy, Mines and Resources Canada Mineral Policy Sector	EMR Mineral Bulletin MR 232, 1993
Exploration 97: Geophysics and Geochemistry at the Millennium	Gubins, Arnis G. ed.	Proceedings of the Fourth Decennial International Conference on Mineral Exploration, 1997
Preliminary Results from the Murray Lake Project: A Detailed Lake Sediment Geochemical Survey in the Central Michipicoten Greenstone Belt East of Wawa, Ontario	Hamilton, S.M., Fyon, J.A. and Fortescue, J.A.C.	OGS Open File Report 5932, 1995
Flow – Through Share Financing	Kalymon, B.A.	Centre for Resource Studies Working Paper No. 39, 1987
High-Purity Calcite and Dolomite Resources of Ontario	Kelly, R.I.	OGS Open File Report 5954, 1997
Mine Reserves and Currently Promising Deposits: Gold, Silver, Lead, Zinc, Copper, Nickel, Molybdenum	Lemieux, A. and Laughlin, W.H. Energy, Mines and Resources Canada	EMR Mineral Bulletin MR 209, 1985
Canadian Mines: Perspective from 1985	Lemieux, A., Jen, L. and Laughlin, W.H.	EMR Mineral Bulletin MR 211, 1986
Canadian Mines: Perspective from 1986	Lemieux, Jen, Marois and Cranstone	EMR Mineral Bulletin MR 215, 1987
Canadian Mines: Perspective from 1987	Lemieux, Jen, Bouchard and Cranstone	EMR Mineral Bulletin MR 217, 1988

Table 6. cont'd. Publications received by the Timmins Resident Geologist Office in 1997.

Title	Author	Type and Year of Publication
Canadian Mines: Perspective Production, Reserves, Development, Exploration 1991	Lemieux, Jen, Cranstone and Bouchard	NRC MR 233, 1993
Mineral Exploration and Mine Development Potential in Ontario: Economic Guidelines for Government Policy	Mackenzie, B., Bilodeau, M. and Doggett, M.	Centre for Resources Studies, Technical Paper No. 9, 1989
Ice Flow Indicators in the Timmins and Kirkland Lake Area, Northeastern Ontario	McClenaghan, M.B., Veillette, J.J. and Dilabio, R.N.W.	GSC Open File 3014 (map), 1995
Landforms and Surface Materials of Canada: A Stereoscopic Airphoto Atlas and Glossary *	Mollard, J.D.	Circa 1979
Results of Modern Alluvium Sampling for Kimberlite Indicator Minerals, Kinniwabi Lake Area, Northeastern Ontario	Morris, T.F., Crabtree, D. and Pianosi, S.	OGS Open File Report 5956, 1997
Prospector's Guide to Drift Prospecting for Diamonds	Morris, T.F. and Kaszycki, C.A.	OGS Miscellaneous Paper 167, 1997
Metallurgical Works in Canada: Primary Iron and Steel 1993	Natural Resources Canada, Mining Sector	NRC Mineral Bulletin MR 234, 1993
Mining and Mineral Processing Operations in Canada 1993	Natural Resources Canada, Mining Sector	NRC Mineral Bulletin MR 235, 1994
Report of Activities 1996, Resident Geologists	Newsome, J.W. and Laderoute, D.	OGS Open File Report 5958, 1997
Ontario Airborne Magnetic and Electromagnetic Surveys; Processed Data and Derived Products: Black River – Matheson Area	Ontario Geological Survey	OGS ERLIS Data Set 1001
Ontario Airborne Magnetic and Electromagnetic Surveys; Processed Data and Derived Products: Timmins Area	Ontario Geological Survey	OGS ERLIS Data Set 1004
Ontario Airborne Magnetic and Electromagnetic Surveys; Processed Data and Derived Products: North Swayze – Montcalm Area	Ontario Geological Survey	OGS ERLIS Data Set 1005
Precambrian Geology, Greenwater Lake Area, West-Central Shebandowan Greenstone Belt	Osmani, I.A.	OGS Report 296, 1997
Surficial Mapping, Quaternary Stratigraphic Studies, and Drift Prospecting in the western Abitibi Greenstone Belt, Timmins	Paulen, R.C. and McClenaghan, M.B.	GSC/NRC/NODA poster, 1997
Geology of the Aquarius Mine, Night Hawk Lake Area, Timmins, Ontario *	Reddick, J.R.	Queen's University M.Sc. Thesis, 1996
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Potential Use of Granite Curb for Highway Construction in Ontario	Rogers, C.A.	Ontario Min. of Transportation and Communication Materials Information Report No. 86, 1985
Nickel – Copper – Sulphide Mineralization in Labrador: The Voisey Bay Discovery and its Exploration Implications	Ryan, Wardle, Gower and Nunn	Newfoundland Dept. of Natural Resources Report 95-1, Current Research, 1995
The Structure, Stratigraphy and Mineral Deposits of the Wawa Area	Sage, R.P. and Heather, K.B,	GAC/MAC/SEG Field Trip A6: Guidebook, 1991
Industrial Minerals Resources Assessment of Mine Development Rock, Timmins, Ont.	Staff of the Sedimentary Geoscience Section and Golder Associates	OGS Mineral Deposits Circular 34, 1997
Geological Evolution of North America *	Stearn, C.W., Carroll, R.L. and Clark, T.H.	John Wiley & Sons, 1979

Table 6. cont'd. Publications received by the Timmins Resident Geologist Office in 1997.

Title	Author	Type and Year of Publication
Introduction to Geology: Physical and Historical *	Stokes, W.L., Judson, S. and Picard, M.D.	Prentice-Hall, 1978
Five-Year Growth Response in Drained and Fertilized Black Spruce Peatlands	Sundstrom, E. and Jeglum, J.K.	Forestry Canada and MNR NEST Technical Report TR-03, 1992
Applied Geophysics *	Telford, Geldart, Sheriff and Keys	Press Syndicate, 1976
Gold and the Metals Marketplace	The Financial Post Conferences	Toronto, October 1990
Sequence of Glacial Ice Flows in Abitibi – Timiskaming	Veillette, J.J. and McClenaghan, M.B.	GSC Open File 3033 (map), 1996
Geology of the Manitouwadge – Hornepayne Region, Ontario	Williams, H.R. and Breaks, F.W.	OGS Open File Report 5953, 1997

** Donation*

Table 7. Mineral deposits not being mined in the Timmins Resident Geologist District in 1997.

Abbreviations

AF	Assessment Files	MR	Mining Recorder
AR	Company Annual Report	NM	The Northern Miner
CMH	Canadian Mines Handbook	OFR	Open File Report
MDC	Mineral Deposit Circular	PC	Personal Communication
MDIR	Mineral Deposit Inventory Record	RGF	Resident Geologist Files

Deposit Name/ Township	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership	Reserves Reference	Status
Allerston Whitney Township	Talc	36.8 million tonnes (est.)	Cominco Ltd.	Study 28 MDIR C0383	Inactive
Aquarius Macklem Township	Au	1997: reserves 1 277 000 oz. Au in 19.7 Mt In production 1984, 1988-89 produced 27 117 oz. @ .19 opT.	Echo Bay Mines Ltd.	MDIR C0376 PC 1997	Active Production decision deferred. Freeze wall construction underway
Augdome Tisdale Township	Au	140 000 T @ 0.10 opT Accessible from Dome Mine underground workings	Augdome Corporation	MDIR C0276	Inactive
Bell Creek Mine (past producer) Hoyle Township	Au	**6**1 000 tonnes @ 8.3 g/t In production 1987-1994, produced 660 827 oz @ 0.20 opt	Kinross Gold Corporation	AR 1996	Care and maintenance
Broulan Belmoral Whitney Township	Au	336 000 T @ 0.043 opT In production 1939-1953, produced 243 757 oz. @ 0.21 opT.	Royal Oak Mines Ltd.	MDIR C0295	Inactive U/G development in 1988
Canadian Magnesite Deloro Township	Magnesite, Talc	100 MT @ 50% magnesite Bulk Sample 1990	Magnesium Refactories	MDIR C0007	Inactive
Cargill Deposit Cargill Township	Phosphate, Vermiculite	18 MT @ 29% P2O5	Agrium Inc.	MDIR C0056 PC	Active. Expected production to begin mid-1999

Table 7. cont'd. Mineral deposits not being mined in the Timmins Resident Geologist District in 1997.

Deposit Name/ Township	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership	Reserves Reference	Status
Carshaw-Malaga Shaw Township	Au	159 368 T @ 0.148 opT	Marshall Minerals Corp.	MDIR C0354	Inactive Underground development in 1988.
Clavos Clergue Township	Au	1 750 048 t @ 6.4 g/t	United Tex-Sol Mines Inc.	AR 1987 MDIR C0158	Active
Consolidated Shunsby Cunningham Township	Cu, Zn	Main Zone (psbl) 681 000 t @ 27% Cu, 1.5% Zn. North Zone (unclass) 45 350 t @3.2% Cu, 3.10% Zn, 0.68 g/t Au. Lwr Chert (psbl) 464 460 t @ 1.14% Cu, 1.56% Zn. Upper Chert (psbl) 201 449 t @ 0.81% Cu, 1.94% Zn. LCUG (psbl) 447 526 t @ 1.10% Cu, 1.49% Zn	Kirkton Resources* *CMH1993-94	MDIR S0378	Inactive
Davidson Tisdale Tisdale Township	Au	600 000 T @ 0.255 opT In production 1918-1920, 1988, produced 9739 oz.	Davidson Tisdale Mines	MDIR C0281	Inactive
Desantis Mine Ogden Township	Au	405 000 T @ 0.17 opt and 162 000 @ 0.5 opt In production 1933, 1939-1942, 1961-1964, produced 35 842 oz. @ 0.18 opT. U/G development	L. Bonhomme	MDIR C0348	Inactive
Dundonald Dundonald Township	Ni	"Low tonnage high grade"	Falconbridge Ltd.	RGF	Inactive
Fuller and Deloro Property Deloro Township	Au	614 092 oz @ 0.216 opt	Vedron Gold Inc	RGF	Active
Extender Minerals Penhorwood Township	Barite	100 000 T U/G development and limited production	Extender Minerals	AF	Inactive
Hart Eldorado Township	Ni	770 000 tonnes @ 0.9%	Timmins Nickel (1990)	IAGOD 1990	Inactive
Holmer Gold Mines Ltd. Bristol Township	Au	1.48 million tonnes @ 7.98 g/t	Holmer Gold Mines Ltd.	RGF	Active
Intex/Frankfield Tully Township	Au	300 000 to 400 000 T @ 0.24 opT	New Texmont	MDIR C0498	Last explored 1988
Jerome Mine Osway Township	Au	524 000 t @ 6.85 gpt to 244 m depth Past producer 1941-1943, 1956 56 893 oz. @ 0.17 opT.	E. B. Eddy Forest Products	MDIR S0415	Inactive U/G development 1987-1989
Kenilworth Deloro Township	Au	1 MT @0.129 opT Past producer.	Victoria Porcupine Mines Ltd.	RGF	U/G development 1987-1988
Kenty Swayze Township	Au	43 300 t @ 4.70 gpt Past producer (1965).	Emerald Isle Resources	MDIR S0388	Inactive. Last explored 1987
Kidd #3 Zone Chester Township	Au	450 000 T @ 0.29 opT	Kidd Resources	AF	Inactive
Kipling Kipling Township	kaolin, silica sand, ball clay	unpublished - defined by approximately 9000 m drilling	Great Lakes Kaolin	PC	Active Company owns test plant in Parry Sound. Bulk sampled 1992

Table 7. cont'd. Mineral deposits not being mined in the Timmins Resident Geologist District in 1997.

Deposit Name/ Township	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership	Reserves Reference	Status
Langmuir #2 Langmuir Township	Ni	N.A.	Timmins Nickel (1990)	IAGOD 1990	Inactive
Lucas Abitibi Price Lucas Township	Au	235 000 T @ 0.01 opT	Abitibi Price	MDIR C0637	Inactive
Marlhill Mine Hoyle Township	Au	1.3 MT @ 4.78 g/t	Pentland Firth Ventures Ltd.	RGF	Inactive
Martison Lake South of Ridge Lake Area	Phosphate	95 MT @ 24% P_2O_5 Last active 1982	D. McKinnon	MDIR C0367	Active
McWatters Langmuir Township	Ni	181.500 tonnes @ 1.92% Ni 525,700 tonnes @ 0.73% Ni	Timmins Nickel	IAGOD 1990	Inactive
Montcalm Nickel Montcalm Township	Ni	7.1 Mtonnes @ 1.54% Ni and 0.72% Cu	Outukompu Mines Ltd.	RGF	Active. Ramp to 180m at end of 1996
Murgold Chester Township	Au	460 000 t @ 8.1 gpt above 150 m	The Van Diemens Company Ltd.	RGF	U/G development 1981. Last active 1988-1989
Nemegosenda Lake Collins Township	Niobium	20 million tons Nb_2O_5	Pat Sheridan	PC 1996	Active
Nickel Offsets Tully Township	Au	650 000 T @ 0.23 opT	Asquith Resources Inc.	RGF	Inactive
Onakawana Lignite Dyer Township	Lignite	172 MT (proven)	Onakawana Development Ltd	MDIR C0320	Inactive
Orofino Mine Silk and Horwood Townships	Au	242 000 T @0.24 opT	Claude Rundle Gold Mines	MDIR S0429	Inactive Past producer. U/G development 1987-89
Owl Creek East Hoyle Township	Au	2 706 163 tonnes @ 6.55 g/t 569 965 oz (est)	Kinross Gold Corporation	AR 1996	Inactive
Owl Creek Mine (past producer) Hoyle Township	Au	1 618 704 t @ 8.41 g/t. Produced 1981-1989, 1 789 247 oz @ 0.14 opt	Kinross Gold Corporation	AR 1996	Inactive
Paymaster Project Tisdale Township	Au	1.8 Mtonnes @ 6.80g/t Au	Placer Dome Inc.	PC 1996	Inactive
Roseval Silica Penhorwood Township	Silica	490 520 t @ 98% Si	Gaetan Lavallee	MDIR S2764	Past producer. Si for silicon metal
Redstone Eldorado Township	Ni	1995 - 170 000 tonnes @3.28%Ni, 0.038% Co Prod. 4996 tonnes @ 1.62%Ni in 1995 Prod.4302 tonnes @ 1.80%Ni in 1996	Black Hawk Mining Inc	PC 1997	Inactive
Rundle Mine Newton Township	Au	624 850 t @8.19 gpt in 8 zones	Claude Rundle Gold Mines	MDIR S0428	U/G development 1987-1988. Last active 1991-1992
Schumacher III Hoyle Township	Au	1 520 000 tonnes @ 6.19 g/t	Pentland Firth Ventures Ltd	AR 1996	Active

Table 7. cont'd. Mineral deposits not being mined in the Timmins Resident Geologist District in 1997.

Deposit Name/ Township	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership	Reserves Reference	Status
Sothman Sothman Township	Ni	231 000 @ 1.3% Ni 440 000 @ 0.9% Ni	Falconbridge Ltd	IAGOD 1990	
Thorne Property - Kapika Gold and Golden River East Zones Bristol Township	Au	479 180 oz	Band-Ore Resources Ltd.	RGF	Active
Wetmore Hoyle Township	Au	290 500 t @ 2.75 gpt in the North Vein Zone	Pentland Firth Ventures Ltd.	MDIR	Active
Young Shannon Chester Township	Au	695 787 tons @ 3.44 opton Au	Young Shannon Gold Mines Ltd.	PC	Active

Erratum 1

Open File Report 5972

Report of Activities 1997,

Timmins Resident Geologist's District—Timmins Area

Please note the addition of the following information for Table 4. p. 35 to 37.

Table 4. Exploration activity in the Timmins District in 1997.

No	Company / Individual (Occurrence Name or Property)	Township / Area (Commodity)	Exploration Activity
8	Band-Ore Resources Ltd.	Thornloe, Bristol (Au)	IP, GM, DD(186)-50738m
20	Cross Lake Minerals Ltd. / Golden	Sheraton, Bond (Zn, Cu, Au)	DD, IP, GM, HLEM,
	Knight Resources Inc. / East West		Assays
	Resource Corp. / Canadian Golden		
	Dragon Resources Ltd.		
	(Nighthawk Joint Venture)		
32a	Holmer Gold Mines Ltd.	Bristol (Au)	DD
37a	International PBX Ventures Ltd.	McArthur (Au)	Lc, IP
72a	St Andrew Goldfields Ltd.	Stock, Bond (Au)	DD, AEM, AM

Table 7, p. 50 and 52 should be modified as follows:

Table 7. Mineral deposits not being mined in the Timmins Resident Geologist District in 1997.

Deposit Name / Township	Commodity	Tonnage-Grade Estimates and/or	Ownership	Reserves References	Status
Consolidated Shunsby	Cu, Zn	Main Zone (psbl) 681 000 t	Kirkton Resources*	MDIR S0378	Inactive
Cunningham Township		@ 2.7% Cu, 1.5%Zn. North Zone (unclass) 45 350t @3.2% Cu, #.10% Zn, 0.68 G/t Au. Lwr Chert (psbl) 464 460 t @ 1.14% Cu 1.56% Zn. Upper Chert (psbl) 201 449 T @ 0.81% Cu, 1.94% Zn. LCUG (psbl) 447 526 t @ 1.1% Cu, 1.49% Zn	*CMH1993-94		
Young Shannon Chester Township	Au	695 787 tons @ 0.344 opt Au	Young Shannon Mines Ltd.	PC	Active

Erratum 2

Open File Report 5972

Report of Activities 1997,

Timmins Resident Geologist's District—Timmins Area

Please note the following changes:

Page 2, last sentence reads:

Claim recordings reached a level not seen since 1965 and the Texasgulf (Kidd Creek Mine) discovery.

should read:

Claim recordings declined by 11% from the previous year.

Table 1, page 2 should be changed as follows:

Table 1. Summary of claims recorded and assessment work credit in the Timmins District in 1997

Year	Claims Units Recorded	Claim Units Cancelled	Claims Units Active	Diamond Drilling $	Physical Work $	Geotechnical Work $	Total $
1997	45 173	16 908	70 004	N/A*	N/A*	N/A*	N/A*

should read:

Table 1. Summary of claims recorded and assessment work credit in the Timmins District in 1997

Year	Claims Units Recorded	Claim Units Cancelled	Claims Units Active	Diamond Drilling $	Physical Work $	Geotechnical Work $	Total $
1997	10 771	16 908	45 173	N/A*	N/A*	N/A*	N/A*

Ontario

Ontario Geological Survey
Resident Geologist Program – 1997

Regional Resident Geologist's District

Wawa Area

by

A. C. Wilson, M. H. Hailstone and P. M. Morra

1998

Wawa Area, Timmins Regional Resident Geologist's District – 1997

A. C. Wilson[1], M. H. Hailstone[2] and P. M. Morra[3]

[1]District Geologist, Timmins District, Resident Geologist Program

[2]District Geologist, Sault Ste. Marie District, Resident Geologist Program

[3]Geological Assistant, Sault Ste. Marie District, Resident Geologist Program

Introduction

Iron mining began its one hundredth year of continuous production from the Helen Iron Range at the G. W. Macleod Mine in 1997. River Gold Mines Ltd. operated both the Eagle River Mine in the Mishibishu Lake area and began trucking and milling ore from the Edwards Project in Finan Township. Gold had last been produced from the Edwards in 1938.

Two advanced exploration projects, both in the Goudreau area, successfully improved the available ore reserves at the Magino Mine and the Island Gold Project (Lochalsh Deposit).

Announcements concerning a new discovery of diamonds in Lalibert and Menzies townships by Spider Resources Inc. — KWG Resources Inc., and the discovery of significant haloes of kimberlite indicator minerals in the Whitefish Lake area by Canabrava Diamond Corporation sparked a staking rush in the Wawa area in mid-summer.

Mid-summer also saw the completion of an agreement between Algoma Central Corporation (ACC) and McDonald Investment Company Inc. of Birmingham, Alabama on the sale of 816 000 acres of ACC's land holdings north of Sault Ste. Marie.

Seventeen active exploration projects were ongoing in the Wawa area during the year. The Ontario Prospectors Assistance Program (OPAP) provided funding of $60 000 for 5 designated projects in the area.

A summary of the claims recorded and assessment work credit filed in the former Sault Ste. Marie Mining Division is presented in Hailstone and Morra (this volume). Hailstone and Morra (this volume) also provide information for the Wawa area on the assessment files received in Sault Ste. Marie and on Wawa specific publications received in Sault Ste. Marie.

Mining Activity

Total production and reserve figures for the 3 mines operating in the Wawa district is summarized in Table 1. Total historical production of gold for the Michipicoten greenstone belt is presented in Table 1b. The locations of each of the producing mines are presented on Figure 1.

ALGOMA ORE DIVISION – G. W. MACLEOD MINE

The G. W. Macleod Mine produced 645 514 tons of natural siderite ore during 1997 (A. L. Stevens, Algoma Ore Division, personal communication, 1998). Production statistics and raw material consumption for the year are presented below:

Total Sinter Production	782 662 tons
Superfluxed Sinter	621 361 tons
Low Flux Sinter	155 422 tons
Total Sinter Shipped	776 783 tons
Sinter on Wawa Stockpile (31/12/97)	137 505 tons

Raw materials used for total sinter production include:

Siderite Natural Ore	645 514 tons
Limestone	162 931 tons
Reverts/Oxides	339 419 tons
Subgrade Fines	23 433 tons

The mine is expected to produce approximately 500 000 tons of superfluxed sinter, in 1998, to be shipped to the Algoma Steel Inc. steelworks in Sault Ste. Marie.

On December 2, 1997, Algoma Steel Inc. announced that the G. W. MacLeod Mine would close in mid-1998. The reason for the closure is reported to be the inability of the mine to effectively compete with other alternate sources of supply. All of the approximately 200 permanent employees at the mine will be provided with positions at the Corporation's facilities in Sault Ste. Marie. Algoma Steel will be working with the community of Wawa, as well as the provincial and federal governments, in order to determine ways in which the community can be assisted with the impact of the closure (Algoma Steel Inc., *press release*, December 2, 1997).

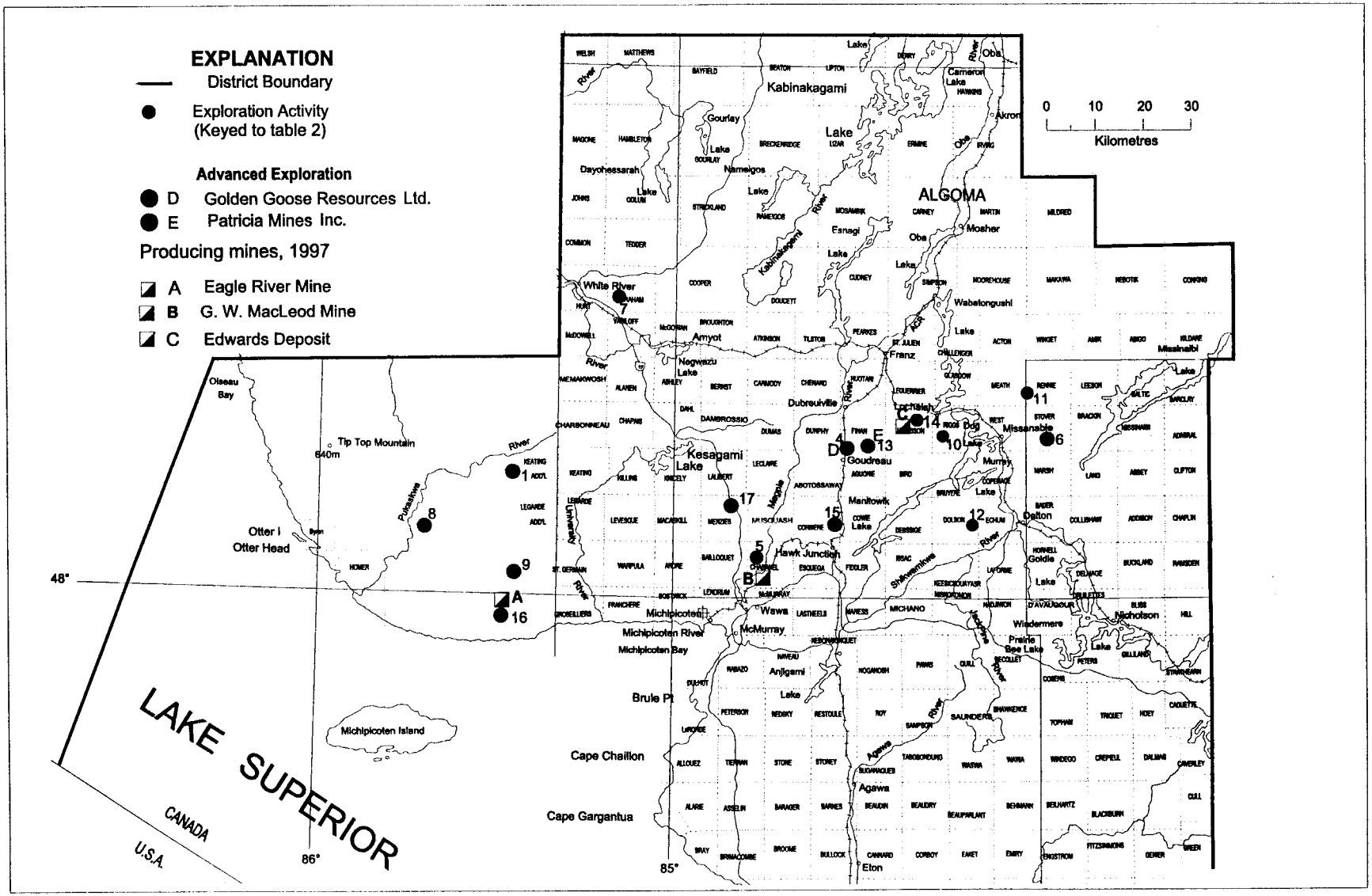

Figure 1. Wawa District, exploration, development and mining activity, 1997.

Table 1. Mine production and reserves in the Wawa Area.

Mine	Production to end of 1996		Production in 1997		Reserves at end of 1997	
	Tonnage @ Grade	Total Commodity	Tonnage @ Grade	Total Commodity	Tonnage	Grade
Algoma Ore Division, G. W. Macleod Mine	739 569 tons @ 31.5% Fe	832 544 tons sinter	645 514 tons @ 34.8% Fe	782 662 tons sinter	17 456 000 tons	31.0% Fe
River Gold Mines Ltd., Eagle River Mine	162 074 tonnes @ 12.76 g/t	64 523 oz Au	156 293 @ 9.2 g/t	46 312 oz Au	1 158 000 tonnes	10.97 g/t
River Gold Mines Ltd., Edwards Project	1573 tons @ 3.0 oz/t*	485 oz Au*	62 963 tonnes @ 15.23 g/t	30 414 oz Au	28 835 tonnes (proven) 127 214 (probable)	12.09 g/t

**Edwards Property last produced ore in 1938*

RIVER GOLD MINES LTD. – EAGLE RIVER MINE

The Eagle River Mine is a classic, shear-hosted, narrow quartz vein, high-grade gold deposit. It is situated within the Eagle River Deformation Zone (ERDZ) of the Mishibishu Lake greenstone belt. Numerous mineralized zones have been identified along the 14-kilometre strike length of the ERDZ on the Eagle River property. Production and development work in 1997 concentrated on the No. 8 and the No. 6 Zones. Both of these zones are hosted by shears, which cut a quartz diorite stock. The ore zones dip vertically, are moderately to steeply dipping to the east and have mineable widths of between 1.5 and 7.5 metres (River Gold Mines Ltd., 1996 Annual Report). Production and reserve figures for the mine are presented in Table 1.

In late 1996, the company began work on a $10 million shaft sinking and exploration program to be completed by 1998. The shaft will eventually reach 700 metres and it will provide access to the depth extensions of the known ore zones. Delineation drilling of the No. 6 Zone was completed during the year and early results show continuity of the mineralization at a vertical depth of 400 metres. Underground exploration of the No. 7 Zone resulted in the extension of this high-grade zone to a depth of 100 metres. The No. 7 zone parallels the current mine workings. A surface diamond-drilling program also investigated the depth extensions of the Papa and HP zones. The company continues to prospect to the east of the minesite (Eagle River Gold Mines Ltd., *press release*, July 31, 1997).

Five kilometres east of the Eagle River property, surface prospecting by the company identified a new structure, the Iron Hat Vein. Grab samples from the vein returned assay values up to 150 g/t gold. Several veins in this vicinity merit future diamond drilling (Eagle River Gold Mines Ltd, *press release*, November 6, 1997).

The mine is accessed by a decline ramp. Shrinkage stope mining of the No. 6 and No. 8 Zones has taken place above a depth of 220 metres. The company operates 550-tpd mill on the site of the former Magnacon Mine.

A combined total of 172 people are employed by the company at the Eagle River Mine and the Edwards Project.

RIVER GOLD MINES LTD. – EDWARDS PROJECT

In early 1996 River Gold Mines Ltd. entered into a ten-year agreement with VenCan Gold Corporation to develop and mine the former Edwards Gold Mine in Jacobson Township. The property lies approximately 100 km northeast of the Eagle River Gold Mine. Development and mining of ore be-

gan early in 1997, with the ore being trucked to the Eagle River mill at a rate of approximately 500 tpd. Milling of the Edwards ore was delayed for two months because of the need to construct an access road to the Magnacon mill. In addition, River Gold decided to concentrate all of the 1997 production from the Edwards into a single mill run of approximately 45 000 – 50 000 tons (*The Northern Miner,* September 1, 1997, p.3).

Bruce (1940) originally described the geology at the Edwards. According to Bruce, the 2.5-foot wide vein reportedly cut a porphyry dike and metavolcanic rocks. The vein strikes 293° and dips 75° to the north. Mineralization is concentrated in two, high-grade, gold-bearing zones: the Porphyry and the Carbonate zones. Two additional untested targets, the Shaynee and the New North horizons, lie to the east and west of the main mineralized zones (Wilson 1992).

Development at the mine consisted of completion of the decline ramp to the 380-vertical-foot level and stope development from the 200-foot level up to near surface for both of the high-grade zones. The original mineral inventory, prepared by VanCan, for the two zones was listed as a drill-indicated reserve (probable) of 43 915 tons grading 0.964 ounces of gold per ton (uncut) within 200 feet of surface (*The Northern Miner*, September 1, 1997, p.1).

Table 1a: Gold Production from the Wawa Area to the end of 1997

Mine Name	Township	In Production	Tons Milled	Oz. Au	Grade
Alden-Goudreau	Cowie	1937, 40, 43, 45	13 479	3220	4.2
Centennial	Naveau	1939-40	8612	610	14.1
Cline	Jacobson	1938-40, 1947-48	331 842	63 328	5.2
Darwin/Grace	McMurray	1902-03, 07-08, 10, 23, 25, 30, 35, 37, 40, 43-44	45 528	15 191	3.0
Deep Lake	McMurray	1936-1938, 1943	2790	1633	1.7
Eagle River	Point Isacor	1995-	318 367	110 835	10.98 g/t
Edwards	Jacobson	1938	1537	485	3.2
		1997	62 963	30 414	15.23 g/t
Holdsworth Prospect	Corbiere	1933	60	10	6
Kremzar	Finan	1989-90	392 858	37 678	4.5g/t
Magino/Algoma Summit	Finan	1930-40, 1988-92	768 679 +	113 228	4.5 g/t
Magnacon	Mishbishu Lake	1989-90	165 000	15 356	10.7
Minto (includes Jubilee and Cooper)	McMurray	1929-1942	184 600	37 678	4.9
Murphy/Algold /Amherst	Abotossaway	1926-32, 36-38, 1940	23 211	2450	9.5
Norwalk/Manxman	Naveau	1904, 1910	820	60	13
Parkhill	McMurray	1902, 29, 30-38, 40-44	125 778	54 301	2.3
Ranson	Rabazo	1939	774	156	4.96
Renabie	Leeson	1947-70, 1981-91	5 583 895	1 100 000	0.2
Smith/Van Sickle	McMurray	1935-36	9228	536	17.2
Surluga	McMurray	1968-69, 1988-89	87460	8898	n.a.
Stanley	McMurray	1936	1963	84	23.3

Table 2. Exploration activity in the Wawa Area in 1997.

Abbreviations

AEM	Airborne electromagnetic survey	GM	Ground magnetic survey
AM	Airborne magnetic survey	HLEM	Horizontal loop electromagnetic survey
Beep	Beep Mat survey	IP	Induced polarization survey
DD	Diamond drilling	Lc	Linecutting
DDH	Diamond drill hole(s)	Pr	Prospecting
GC	Geochemical survey	Samp	Sampling (other than bulk)
GEM	Ground electromagnetic survey	Str	Stripping
GL	Geological Survey	Tr	Trenching

No	**Company/Individual (Occurrence Name) or Property**	**Township/Area(Commodity)**	**Exploration Activity**
1	Atkins, W. M.	Abbie Lake (Au)	Str, Tr, Samp, Pr
2	Canabrava Diamond Corporation (Whitefish Lake Diamond Project)	Maness, Fiddler, Cowie, Issac, Michano and Miskokomon (diamonds)	Samp, AEM, AM, GL, GC,
3	Fraser, M.	Stover (Au)	Str, Tr, Samp, Beep, Pr
4	Golden Goose Resources Ltd. (Magino Mine)	Finan (Au)	DD, Str, Tr, Samp, GL, GC
5	Hutteri, H.	Chabanel (Au)	Str, Samp, GL, GEM, GM
6	Luciuk, G.	Stover (Au)	Str, Tr, Samp, GL, GC
7	Mealey, G. L. and Mealey, W. B.	Abraham (Au)	Str, Tr, Samp, Pr, GEM, GM
8	Mishibishu Gold Corporation (Mishi Gold Project)	Mishibishu Lake and David Lake (Au)	Str, Tr, Samp, Lc, GC, GL
9	Murgor Resources Inc. (Mishibishu Lake Project)	Mishibishu Lake (Au)	Lc, GM, HLEM, Samp Str, Tr, GL, GC
10	Nicholson,T. Gratton, G.	Riggs (Au)	Pr, Samp
11	Noront Resources Ltd.	Meath and Rennie (Au)	GL, GEM, GM
12	O'Reilly, G. and Gerdes, J.	Dolson and Echum (diamonds)	Pr, Samp
13	Patricia Mines Inc. (Island Lake Project)	Finan (Au)	DDH (34), Str, Tr, Samp, GL, GC
14	Pele Mountain Resources Inc. (Markes Gold Prospect)	Jacobson (Au)	DDH (30), Samp, GL
15	Prime Equities International Corporation (Otter Pond Occurrence)	Corbiere Tp (Au)	Str, Tr, Samp, GL, GC
16	River Gold Mines Ltd (Eagle River Gold Mine)	Point Isacor (Au)	Pr, Str, Tr, Samp
17	Spider Resources Inc. and KWG Resources Inc.	Lalibert and Menzies (diamonds)	Str, Samp, AEM, AM, GL, GC

Advanced Exploration

The location of advanced exploration projects is shown on Figure 1.

GOLDEN GOOSE RESOURCES INC. – MAGINO GOLD MINE

Golden Goose Resources Inc. holds a 100% interest in the former Muscocho Explorations Limited — McNellen Resources Inc. owned Magino Gold Mine in Finan Township. Magino operated from 1988-1992 when the mine closed due to low gold prices. At the time of shutdown, Magino had produced 102 185 ounces of gold and contained a resource of 611 000 tonnes grading 5.6 g/t gold (Wilson 1992). The Magino Mine was previously operated as a narrow-vein, underground mining operation, however the company is now examining the potential of operating a large tonnage open pit at the site.

A 10-hole (2088 m) surface diamond drilling program tested three profiles through the deposit. These profiles were drilled to depths of 100 to 250 metres in the west, main and northeast areas of the mine property. The mineralized profiles were 9.5 to 48 metres long, with gold grades ranging from 1 to 4 g/t gold (*The Northern Miner*, August 4, 1997, p.4). A new resource estimate was calculated using the results from the 1997 drilling program. One calculation, the inverse-distance-squared method, using a cutoff grade of 0.86 g/t gold resulted in a resource of 24 million tonnes grading 1.68 g/t gold or 1.3 million ounces. The second calculation, using the Kriging method, returned a resource of 35.7 million tonnes @ 1.16 g/t gold or 1.3 million ounces (*The Northern Miner*, August 11, 1997, p.15).

PATRICIA MINES INC. – ISLAND GOLD PROJECT

An extensive program of infill diamond drilling and bedrock stripping/trenching was conducted by Patricia Mines Inc. to assess the mineral resource of the Lochalsh Deposit (Island Gold Project) in Finan Township. As a result of the diamond drill program, the company was able to extend the known depth of mineralization in the Lochalsh Deposit by 100-300 metres along its 1 km strike length (*The Northern Miner*, October 27, 1997, p.18). In 1990, a 1 km long decline ramp was driven into the Island Zone by Canamax Resources Inc. and a bulk sample was extracted from the 125- and 140-metre levels. The 4172-tonne sample had a head grade of 6.6 g/t gold (Tortosa et al. 1990).

An independent resource evaluation of the deposit by Roscoe Postle and Associates Inc. was released in early 1998. Roscoe Postle estimates the Island/Lochalsh Deposit contains a total resource of 883 000 tonnes grading 6.50 g/t gold, for a total of 184 608 ounces of gold in all categories (Patricia Mines Ltd., *press release*, January, 15, 1998). This reserve calculation is based upon 96 surface and 50 underground diamond drill holes (37 019 m total) spaced at approximately 25 m over the 1 km strike length of the deposit, to a maximum depth of 320 metres.

Surface trenching was also conducted on a number of other high-grade gold occurrences on the property. Notable assays include: average values of 20.94 g/t gold across a width of 1.7 m from the No. 2 Zone; average values of 2.82 g/t gold over a combined width of 15 m from the Morrison Zone; 40.60 g/t gold over a width of 2.6 m from the No. 9 Zone; and a grab sample of 58.80 g/t gold from a vein at the Tent Zone (Patricia Mines Inc., *press release*, October 8, 1997).

Company land holdings also include the former Kremzar Mine and mill, operated by Canamax in the late 1980's. During its two years of operation, the Kremzar produced 46 000 ounces of gold at a head grade of 4.7 g/t Au. The deposit was mined to a depth of 240 metres and still contains an estimated reserve of 350 000 tonnes grading 6.3 g/t Au (*The Northern Miner*, July 28, 1997).

Exploration Activity

Locations of exploration activity are shown on Figure 1 and Table 2.

CANABRAVA DIAMOND CORPORATION

Approximately 75 000 hectares of ground was acquired by Canabrave Diamond Corporation from Algoma Central Corporation following the release of a stream sediment survey for kimberlite indicator minerals by the Ontario Geological Survey (OGS). The results of the OGS survey indicated the presence of G-10 garnets and high-chromium chromites and the report suggested that the source for these indicator minerals was local. This property, known as the Whitefish Lake property, is located 30 km northeast of Wawa.

Following the completion of a high-resolution aeromagnetic survey and an intensive till, stream and lake bottom sediment survey, the company announced the discovery of a kimberlite pipe cluster, as well as, 3 new kimberlite indicator mineral haloes on their Whitefish Lake property (Canabrava Diamond Corporation, *press releases,* September 17, 1997 and December 9, 1997). Fresh olivine, pyrope garnet and picroilmenite were discovered within the indicator haloes. The presence of fresh olivine suggests a local kimberlitic source for the minerals. Microprobe analysis of the grains will be completed in early 1998. A ground follow-up survey of the kimberlite pipes is expected in the coming year.

MISHIBISHU GOLD CORPORATION

Mishibishu Gold Corporation purchased a 100% interest in the Mishi Gold project from MacMillan Gold Corp. The Mishi Gold project is located within the Mishibishu Lake Deformation Zone (MLDZ) in the Mishibishu Lake area. The Mishi Main Zone has been estimated to contain a mineral resource of 1 424 300 tonnes grading 4.24 g/t gold. This resource includes an open pittable reserve of 772 000 tonnes grading 3.3 g/t gold (Mishibishu Gold Corporation, *press release*, September 9, 1997).

The company completed geological mapping, channel sampling, soil sampling and mechanical trenching on the property. Several anomalous gold zones were discovered along strike to the west of the Mishi Main Zone. Selected channel sample values include: 13.25 g/t gold across 3 metres, 10.59 g/t gold across 1.2 metres, 9.69 g/t gold across 1.8 m and 5.03 g/t gold across 2.5 meters (Mishibishu Gold Corporation, *press release*, November 24, 1997).

MURGOR RESOURCES INC.

Murgor Resources Inc. completed an extensive surface exploration program on their Mishibishu Lake area property during 1998. Work consisted of a ground geophysical (IP) survey as well as bedrock stripping and channel sampling. Of note was a discovery on the Dorset Zone. Channel samples yielded assays of 2.67 g/t Au across 12.5 m, including 4.82 g/t Au across 4.2 m and 3.66 g/t Au over 10.6 m, including 6.19 g/t Au across 2.1 m. This zone varies from 2-12 m in width over its 4-km long strike length and is hosted by pillowed metavolcanic and clastic metasedimentary rocks (Murgor Resources Inc., *pre*ss *release*, December 17, 1997).

The property is situated in the Mishibishu Lake area, west of the Mishi Deposit and the past-producing Magnacon Mine, and north of the Eagle River Mine.

PELE MOUNTAIN RESOURCES INC.

A 30-hole (3000 m) surface diamond drilling program was completed by Pele Mountain Resources Inc. on the Markes and Vega gold occurrences in Jacobson Township. Both properties are lo-

cated to the east of the past-producing Cline Gold Mine and are hosted by mafic metavolcanic rocks and quartz-phyric or quartz-feldspar porphyry dikes of the eastern Goudreau Lake Deformation Zone. The boundaries of the main mineralized shear zone are defined by narrow, 1-2 cm wide, crack and seal, quartz-tourmaline-bearing shears (Sage and Heather 1991).

PRIME EQUITIES INTERNATIONAL CORPORATION

Prime Equities International Corporation has entered into a Mineral Exploration License Agreement with Algoma Central Corporation. The agreement covers 41.5 km^2 and includes the Otter Pond Occurrence in Corbiere Township. Prime Equities has optioned the Otter Pond Occurrence from Sault Ste. Marie prospectors, George Lucuik and Cliff Hicks (Prime Equities International Corporation, *press release*, February 10 1997). Messrs. Lucuik and Hicks, partially financed with an Ontario Prospector's Assistance Program (OPAP) grant explored the Otter Pond Occurrence in 1996.

Channel sampling was conducted on the property by the company during 1997. Seven samples cut along the exposed dip surfaces of the veins assayed between 6.4 g/t and 74.1 g/t gold. An additional 10 grab samples assayed between 1.2 g/t and 5.5 g/t gold. Prime Equities also completed a soil sample survey and a ground geophysical survey (Prime Equities International Corporation, *press release*, June 5, 1997).

SPIDER RESOURCES INC. — KWG RESOURCES INC.

A spring and early summer program conducted by Spider Resources Inc. included the collection and sampling of 367 till samples and 103 rock samples, geological mapping and ground geophysical surveys on their property located in Lalibert and Menzies townships. A total of 95 diamonds, including 15 macrodiamonds, were recovered from a 167.4 kg sample taken from a roadcut on Highway 17. The largest diamond recovered was a white, transparent fragment measuring 0.82 mm by 0.76 mm by 0.65 mm (Spider Resources Inc. – KWG Resources Inc., *press release*, August 19 1997). In a later press release, the company announced that a total of 231 diamonds were recovered from 8 separate outcrop areas during the 1997 sample analysis. Two of these outcrops represent new discoveries (Spider Resources Inc. – KWG Resources Inc., *press release*, November 5, 1997).

The company plans to focus its 1998 exploration program on these 8 outcrop areas. They will conduct a program consisting of bedrock trenching, geological and geophysical surveying and diamond drilling.

Staff and Activities

As a result of the restucturing of the Resident Geologist's Program in early 1997, responsibility for the Wawa area was shifted to the Timmins Regional Resident Geologist's Office. Prior to mid-1997, Wawa area clients were served by staff based in Sault Ste. Marie. Service to Wawa area clients is now provided from both Sault Ste. Marie (M. H. Hailstone) and Timmins (A. C. Wilson). Assessment files and a complete library for the Wawa area are currently available for viewing at the Sault Ste. Marie office. In Timmins, assessment files for the Wawa area are available for viewing on the regional ERLIS system. A complete reference library of OGS material for the Michipicoten greenstone belt will also be available in Timmins in 1998.

A Wawa-specific library of Ontario Geological Survey publications was compiled in Timmins by the District Geologist and is available for viewing or borrowing from the Wawa Northern Development Officer's office. This library consists of all Geological Reports, Open File Reports, airborne geophysical surveys, preliminary geological maps and final geological maps. A small selection of general interest Miscellaneous Papers and Mineral Resource Circulars is also available for consultation.

Property Examinations

SPIDER RESOURCES INC. – KWG RESOURCES INC.

In early October, a field visit was made to the Spider Resources Inc. – KWG Resources Inc. property by R. P. Sage (OGS, Sudbury) and A. C. Wilson, District Geologist. The property is located on the Trans-Canada Highway about 25 km west of Wawa. The purpose of the visit was to examine and sample outcrop exposures where recent diamond discoveries have been made.

Spider Resources Inc. currently holds a five-year exploration licence agreement with Algoma Central Properties Inc., which has recently been acquired by New Hampshire based McDonald Forestry Products (KWG Resources Inc.– Spider Resources Inc., *press release,* November 5, 1997). Even though the agreement covers an area of 222 km^2, exploration is focussed on a 45 km^2 area where 8 separate outcrops have yielded diamonds. This area includes the site of the 1995 diamond discovery made by Sandor Surmacz and Marcelle Hauseaux (Bennett, Hailstone and Fremlin 1997).

The property is underlain by the supracrustal rocks of the 2700 Ma cycle of the Michipicoten greenstone belt. These rocks are dominantly intermediate to felsic tuffs and poorly-bedded to massive quartz-feldspar crystal tuffs. Oligomictic and polymictic breccias stratigraphically overlie the tuffs and are sporadically found on the property. Most breccias are oligomictic and consist of either breccia fragments in a matrix of similar composition or fragments within a chlorite-rich matrix. Fragments are up to 0.3 m in size (Sage 1993).

Diamonds are hosted within narrow (1-10 m wide), xenolith-rich ultramafic dikes which crosscut the stratigraphy. These dikes are typically characterized by round to elliptical, actinolite or actinolite plus talc inclusions which may reach up to 0.5 m in size. The actinolite inclusions frequently consist of large (up to 8 cm), prismatic crystals which may be arranged randomly or radiate inwards toward the inclusion centre. Actinolite-talc inclusions consist of talc cores surrounded by radiating prismatic or acicular actinolite crystals (Sage 1993). Black, biotite-rich reaction rims are frequently observed enclosing the xenoliths. Sage (1993) suggests that the xenoliths may represent at least two original mafic compositions. They are likely to be of lower crust, or deeper, origin. Other diamond-bearing dikes in the vicinity are characterized by carbonate-altered ultramafic xenoliths. These dikes are less commonly observed.

The matrix of the dikes is variable in appearance. In some cases, the matrix is biotite- and actinolite-rich and is dark green in colour. These dikes resemble more conventional ultramafic dikes. In other instances, the matrix is light grey in colour and it is difficult to distinguish dikes with this matrix from the surrounding felsic lapilli tuffs.

Two ages of xenolith-bearing dikes have been observed on the property. The oldest are xenolith-rich dikes containing approximately 50-60% rounded inclusions. Younger, relatively xenolith-free dikes appear to crosscut this series of dikes. These younger dikes contain approximately 20-30% subangular to subrounded xenoliths. Both sets of dikes are diamond-bearing. When both phases of the dikes crosscut each other and are hosted by one of the supracrustal breccias, it is simple to distinguish among the three rock types. Identification is far more difficult when the xenolith-poor dikes appear on their own in outcrop.

The older set of dikes trends northwest to west-northwest and the younger set of dikes trends roughly west. Because a weakly developed regional schistosity crosses these dikes, it is implied that they are Archean in age.

Chemically, it is suggested that these rocks have lamprophyric affinities (KWG Resources Inc.– Spider Resources Inc., *press release,* November 6, 1997; Sage 1993).

Eight separate outcrops on the property have yielded 231 diamonds. Of this number, 37 of the diamonds are greater than 0.5 mm in one dimension and this includes 5 that are greater than 0.8 mm in one dimension (KWG Resources Inc.—Spider Resources Inc., *press release*, November 5, 1997).

A complete suite of the xenoliths and the host rocks is available for viewing at the Timmins Resident Geologist's Office in South Porcupine.

Recommendations for Exploration

DIAMONDS IN ARCHEAN LAMPROPHYRE DIKES

Known commercial diamond deposits occur only in kimberlite and lamproite, although diamonds have been discovered in a variety of other host rocks. Lamprophyres, specifically monchiquites and aillikites, have been reported as hosting diamonds. Occurrences of diamond-bearing lamprophyres have been reported in Canada. Sage (1996) has compiled a comprehensive listing of these various rock types and the reader is referred to his publication and bibliography for further details.

Within the Michipicoten greenstone belt, lamprophyre dikes have been mapped in two broad geographic regions. One area lies between the former Magpie Mine in Leclaire Township and the Dickenson Lake Stock in Knicely Township and the second lies to the south of the Wawa-Hawk-Manitowik Lakes Fault system. Lamprophyre dikes in the first area are Archean in age and occur as one of three types. They are biotite-rich lamprophyres, lamprophyres with a biotite-actinolite rich matrix and containing rounded xenoliths, and heterolithic breccias similar to diatreme breccias. Lamprophyre dikes in the second area are Proterozoic in age and are interpreted as being related to the Kapuskasing Structural Zone (Sage 1994). No lamprophyre dikes have been mapped in the Goudreau area, west of the Dickenson Lake Stock or east of the Magpie Mine.

The 1995 and 1997 discoveries of macrodiamonds in Archean lamprophyric dikes in the Wawa area suggest that there is potential for similar discoveries not only in the Wawa area, but in other greenstone belts in the province.

The xenolith-rich dikes in the vicinity of the KWG Resources Inc.-Spider Resources Inc. property were recognized and reported in 1926 by Collins, Quirke and Thomson. They described the dikes as “spherulitic greenstone” and suggested that the rock could readily pass as a conglomerate. Their description accurately describes both the location and the rock type, although they did not attach any economic significance to their presence. Numerous other older geological publications also make reference to “cobble dikes” or pebble lamprophyres. These could be descriptions of dikes similar to the xenolith-bearing lamprophyre dikes. It is recommended that particular attention be paid to any descriptions that might appear in any vintage geological publications of cobble or rubble dikes, pebble lamprophyre, spherulitic greenstones or unusual conglomerates. Every attempt should be made to locate, examine and sample rocks matching these descriptions.

Acknowledgements

M. H. Hailstone provided information for Table 2. Figure 1 was prepared by P. M. Morra.

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Table 3. Mineral deposits not being mined in the Wawa Area in 1997.

Abbreviations

AF	Assessment Files	MLS	Mining Lands, Sudbury
CMH	Canadian Mines Handbook	MR	Mining Recorder
GR	Geological Report	NM	The Northern Miner
MDC	Mineral Deposit Circular	OFR	Open File Report
MDIR	Mineral Deposit Inventory record	PC	Personal Communication

Deposit Name/NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Braminco Prospect Brackin Township	Au	100 000 T @0.15 opT (#21 Vein); 23 000 T @ 0.31 opT (#7 Vein); 5000 T @ 0.26 opT (B Vein)	Conquest Yellowknife Resources Ltd.	RGF	Inactive
Conboy Lake Prospect Rennie Township	Zn	100 000 tons @ 8.3% Zn, 5.5 opt Ag; strike length 125 m, extends to 140 m, maximum width 1.8 m	N. A.	RGF	Active exploration 1997
Goudreau Zone Finan Township	Au	198 000 tonnes @ 8.4 g/t	Patricia Mines Ltd.	Jan. 15, 1998 company press release	Active exploration 1997
Kremzar Mine (past producer) Finan Township	Au	298 000 tonnes @ 6.3 g/t Past producer 1988-1990, 46 000 oz @ 4.7 g/t	Patricia Mines Ltd.	Jan. 15, 1998 company press release	Care and maintenance
Lochalsh Deposit (Island Gold Project) Finan Township	Au	883 000 tonnes @ 6.5 g/t includes 148 000 tonnes @ 5.34 g/t (measured); 260 000 tonnes @ 6.95 g/t (indicated); 475 000 tonnes @ 6.61 g/t (inferred)	Patricia Mines Ltd.	Jan.15, 1998 company press release	Active. Underground ramp to 140 m
Magino Mine (past producer) Finan Township	Au	24 million tonnes @ 1.68 g/t. Past producer 1988-92, 101 948 oz	Golden Goose Resources Inc.	NM, Aug. 11 1997	Active
Magnacon Mine (past producer) Mishibishu Lake Area	Au	1.47 million tons aver. 0.19 oz/t (drill indicated). Past producer 1990, 19 397 oz from 163 366 tons	Golden Goose Resources Inc	CMH, 1997-98, p. 204	Inactive
Mishi Main Zone Mishibishu Lake Area	Au	1 424 3000 tonnes @ 4.24 g/t; open pittable reserve 772 000 tonnes @ 3.3 g/t	Mishibishu Gold Corporation	CMH, 1997-98, p.318-319	Active exploration 1997
Nudulama Prospect Leeson Township	Au	579 325 T @ 0.194 opT	Conquest Yellowknife Resources Ltd.	RGF	Inactive
No. 8 Zone Finan Township	Au	90 700 tonnes @ 6.9 g/t	Patricia Mines Ltd.	Jan. 15, 1998 company press release	Exploration 1997
Pine Zone Finan Township	Au	70 000 tonnes @ 6.4 g/t	Patricia Mines Ltd.	Jan. 15, 1998 company press release	Inactive
Surluga Mine (past producer) McMurray Township	Au	385 000 tons @ 0.21 opt. Past producer 1989, 4921 oz Au & 383 oz Ag	Citadel Gold Mines Inc.	NM, March 5, 1990	Care and maintenance

Ontario

Ontario Geological Survey
Resident Geologist Program – 1997

Sault Ste. Marie Resident Geologist's District

by

M. Hailstone and P. Morra

1998

Sault Ste. Marie Resident Geologist District – 1997

M. Hailstone[1] and P.Morra[2]

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Introduction

The primary mineral production in the Sault Ste. Marie district is bedrock aggregate from four quarries. A total of 5 mineral exploration projects were conducted in the district during the year including 2 diamond drill programs for Keweenawan mineralization, 2 prospecting projects for gold and 1 prospecting project for copper zinc. Total explortation expenditures amounted to approximately $1.2 million. This year 3 OPAP programs were conducted in the Sault Ste. Marie district. Details on exploration activity for the Sault Ste. Marie district can be found in the text and by reference to Table 3. and Figure 1. This report contains details of the Wawa district in Table 2. However details on exploration development and mining activity as well as property visits and recommendations for exploration in the Wawa District, are published under a separate chapter for the Wawa district.

Mining Activity

ONTARIO TRAP ROCK (A DIVISION OF R.W. TOMLINSON LIMITED)

A crushed bedrock aggregate is quarried from Nipissing diabase at the Ontario Trap Rock site near the Town of Bruce Mines. Ontario Trap Rock produces armour stone, railway ballast, products for road surfacing and material for rock wool insulation.

During 1996 the State of Michigan added 4 cents a gallon to the price of gasoline to finance a major highway reconstruction and maintenance program. The company is aggressively pursuing the sale of their products to Michigan.

The company has increased the number of employees from 18 salaried workers to 40. Expenditures on wages, fuel and materials amount to about $1 million per year.

The operating season begins in March and normally ends in November . Aggregate is shipped by truck, rail and water. During 1997 there were 22 vessels loaded with a total of 318 000 tons of product at the company's ship loading facilities near Bruce Mines. Production figures are shown in Table 2.

Table 1. Mine production and reserves in the Sault Ste Marie District.

Mine	Production to end of 1996		Production in 1997		Reserves at end of 1997	
	Tonnage @ Grade	Total Commodity	Tonnage @ Grade	Total Commodity	Tonnage	Grade
Gilbertson Enterprises	Not available	Not available	20 000 tonnes	20 000 tonnes	Not available	
Ontario Traprock (A Division of R.W. Tomlinson Ltd.	354 377 tonnes	354 377 tonne	416 000 tonnes	416 000 tonnes	Undefined but considerable	Undefined but considerable
Nestorville Trap Rock Quarry (Smelter Bay Aggregates Ltd).	6000 tonnes	6000 tonnes	40 000 tonnes	40 000 tonnes	Undefined but considerable	Undefined but considerable
Root River Quarry (E. Kosiba)	40 – 50 tons	40 – 50 tons	300 tons	300 tons	Undefined but considerable	Undefined but considerable

NESTORVILLE QUARRY (SMELTER BAY AGGREGATES LIMITED)

This quarry is located near the Village of Nestorville a short distance west of Thessalon. Production of crushed Nipissing diabase increased substantially during 1997, (see Table 2). Products are used primarily for construction aggregate and roofing granules. The products are shipped from the port of Maple Ridge Aggregates at Thessalon.

GILBERTSON ENTERPRISES QUARRY

Gilbertson Enterprises of St. Joseph Island operates a quarry east of Highway 548, just south of the junction with Highway 17.

The product is a reddish-pink granophyre, crushed primarily for landscaping purposes. Several sizes of products are screened for various landscaping effects. There are minor amounts of pyrite, chalcopyrite and specular hematite, healing fractures in the granophyre. This is typical of the Bruce Mines type diabase of which the granophyre is a differentiate. Production figures are shown in Table 2.

ROOT RIVER SANDSTONE QUARRY

E. Kosiba operates a small quarry within the city limits of Sault Ste Marie. The Jacobsville Sandstone has long been used in local building construction, and some of the oldest and finest buildings in Sault Ste Marie were built of this product. Presently the flagstone is used mostly for facing stone and landscaping. Production from the quarry this year by Brandes Aggregates Limited consisted of 300 tons. Brandes Aggregates removed the material for use as landsacaping flagstone. For a marketing sample Brandes Aggregates Limited crushed approximately 25 tons of material. The resulting aggregate is an attractive tan, reddish brown colour. See Table 2 for production.

Table 2. Assessment files receive in Sault Ste Marie District, 1997.

Abbreviations

AEM	Airborne electromagnetic survey	IP	Induced polarization survey
AM	Airborne magnetic survey	Lc	Linecutting
DD	Diamond drilling	OD	Overburden drilling
DDH	Diamond drill hole(s)	OPAP	Ontario Prospectors Assistance Program
GC	Geochemical survey	Pr	Prospecting
GEM	Ground electromagnetic survey	RES	Resistivity survey
GL	Geological Survey	Samp	Sampling (other than bulk)
GM	Ground magnetic survey	Tr	Trenching
HLEM	Horizontal loop electromagnetic survey	VLEM	Vertical loop electromagnetic survey
HM	Heavy mineral sampling	VLFEM	Very low frequency electromagnetic survey

Township or Area	Company Name	Year	Type of Work	AFRO Number	District Geologist Office File Designation
Abotossaway	Hemlo Gold Mines Inc.	1991	GC GL		WP Abotossaway 25
Abotossaway Aguonie Corbiere	Manwa Exploration Services	1985	GEM GM VLFEM GC		WP Corbiere 16
Abotossaway Aguonie Corbiere	Mascot Gold Mines Ltd	1985	DD Samp GM HEM		WP Abotossaway 23
Abotossaway Aguonie Corbiere	Orequest Cons. Ltd	1987	DD IP GL Samp		WP Abotossaway 24
Abotossawa Aguonie Corbiere	International Corona Res. Hemlo Gold Mines Inc	1993	DD Samp GM		WP Abotossaway 26
Abraham	Mealy, Geo.	1997	GM VLF	2.17329	WP Abraham 03
Abraham	Mealy, Geo.	1995	GC		
Brackin	Fraser, Malcom	1995	Pr Samp Tr Beep		
Camp Lake	Mishibishu Gold Corp	1996	DD		WP Camp Lake 3
Casson	Mayer, Y.L.	1996	Tr Str	2.17418	SSMP Casson 09
Chabanel	International Legacy Inc.	1996	Samp	2.16960	WP Chabanel 28
Chabanel McMurray	Melnick, Lawrence	1996	GL VLFEM GM	2.16959	WP McMurray 71
David Lakes	Murgor Resources Ltd.	1997	IP Tr	2.17441	WP DavidLakes 43
David Lakes	Mishibishu Gold Corp	1996	DD		WP David Lakes 42
Finan	Golden Goose Resources Ltd	1997	IP	2.17847	WP Finan 59
Finan	Golden Goose Resources Ltd	1997	Samp	2.17118	WP Finan 56
Finan	Golden Goose Resources Ltd	1997	Samp	2.17173	WP Finan 58
Finan	Golden Goose Resources Ltd	1997	IP	2.17847	WP Finan 59

Table 2. Cont'd. Assessment files receive in Sault Ste Marie District, 1997.

Township or Area	Company Name	Year	Type of Work	AFRO Number	District Geologist Office File Designation
Finan	Golden Goose Resources Ltd	1996	Samp	2.16993	WP Finan 55
Finan	Canada Tungsten Inc	1997	DDH Samp	2.17141	WP Finan 57
Hughes	Fleming, Dennis	1995	Pr Samp		SSMP Hughes 4
Jacobson	Champion Gold Res. Ltd	1996	GL VLFEM GM	2.07671	WP Jacobson 65
Keating	Manwa Exploration Services	1983	VLFEM GC		WP Keating 1
Lastheels McMurray	Feder. Elliot	1996	DDH		WP Lastheels 5
Lastheels McMurray	Feder. Elliot	1996	Samp GC VLFEM GL	2.16985	WP Lastheels 6
Lendrum	Currie Rose Resources Inc.	1996	DDH	2.17184	WP Lendrum 26
Lendrum, McMurray,Rabazo	Currie Rose Resources Inc.	1995	Samp	2.17362	WP Lendrum 27
Lendrum, McMurray,Rabazo	Currie Rose Resources Inc.	1996	DDH	2.17184	WP Lendrum 26
Michano	McMillan, Doug	1995	GM		
Mishibishu Lake	Murgor Resources Ltd.	1997	GM	2.17365	WP Mishibishu 47
Mishibishu Lake David Lk Pt.Isacor	Dominion Explorers Inc	1996	GM	2.16986	WP Mishibishu Lk 46
Moggy Moen	Starcore Resources Ltd	1996	GL GC	2.17155	SSMP Moggy 7
Moggy Moen	Avalon Ventures Ltd	1996	GM HLEM GC	2.17156	SSMP Moggy 6
Nahwegezhic	Algoma Ore Properties		Met		
Neill	Frankow, Phillip	1997	GL VLFEM Pr	2.17378	SSMP Neill 15
Palmer	Aurogin Resources Ltd.	1996	IP RES	2.17271	SSMP Palmer 17
Palmer	Aurogin Resources Ltd.	1996	Pr Samp	2.17341	SSMP Palmer 18
Palmer	Hepditch, L.	1997	Pr Samp	2.17161	SSMP Palmer 19
Plummer	Ontario Traprock Ltd.	1996	Str		SSMP Plummer 6
Point Isacor Pilot Harbour Mishibishu	River Gold Mines Ltd.	1996	DDH Samp	2.17709	WP Point Isacor 16
Rennie	Reukl, Robert	1997	GM	2.17508	WP Rennie 11
Riggs	Lloydex Resources Inc.	1996	Samp	2.17114	WP Riggs 97
Stover	Kerr, William	1996	Tr Samp	2.17069	WP Stover 6
Vankoughnet	Lucuick, Geo.	1997	DD	2.17513	SSMP Vankoughnet 3

Exploration Activity

AUROGIN RESOURCES LTD.

Aurogin Resources Ltd. carried out an exploration program for Keweenawan Cu-Ag-Au mineralization associated with breccia zones and veins on their 12,000 hectare, Batchawana property (100% owned) located in Ryan and Palmer Townships, north of Sault Ste. Marie. An airborne survey, geological mapping and sampling, soil geochemistry and an Induced Polarization survey located 16 anomalies indicative of breccia pipes. The width of these anomalies varies from 200 m to 1500m (Aurogin Resources Ltd., press release, Dec 2,1998). A 35 hole 5300m diamond drilling program tested these and other tagets during the year.

In October the company announced the discovery of two significant breccia zones, Mountain Breccia and Richards Breccia. The Mountain Breccia is an exceptionally strong resistivity anomaly 250 metres in diameter. The mountain Breccia is located 3.5 km southwest of the former Tribag copper mine. Initial shallow diamond drilling of 9 holes intersected numerous veinlets containing zinc, copper, arsenic, lead and molybdenum mineralization. Partial assays available from the first of these holes (97-26) indicate values up to 4 g/t gold and 81 g/t silver. The last hole of the program (97-35) was positioned to drill into the target at deeper levels and it intersected 203 metres of continuously mineralized sulphide bearing autoclastic breccia. (Aurogin Resources Ltd.,press release, Oct. 6,1997)

Diamond drilling of the Richards Breccia Discovery produced the following results. Hole No. 1 (97-24) drilled into the surface outcrop of low grade breccia mineralized with pyrite and copper sulphides encountered 44 metres of similar low grade breccia. In contrast the following 14 metres encountered a breccia phase mineralized with significant chalcopyrite. Hole No. 2 (97-25) drilled beneath the first encountered a 42 metre section of breccia mineralized with chalcopyrite. The 14m and 42m sections average over one percent copper and contain gold and silver values.

The company has spent $1.19 million this year on exploration on the property(Rogers, D. , personal communication, 1997). The 16 breccia pipe targets will be tested with a major drill program in early 1998. (Aurogin Resources Ltd., press release, Dec. 2 1997)

HICKS, C. AND LUCIUK, G.

Prospectors Cliff Hicks and George Luciuk conducted a soil geochemistry survey, stripping, trenching, sampling and a diamond drill program on their Prace Mine property in Vankoughnet Township this year. Five diamond drill holes using a Boyles Winkie drill were attempted but due to excessive overburden only 2 holes were competed. The two diamond drill holes which were completed yeilded disappointing results although both holes intersected mineralization.

A total of 83 soil samples, were collected and analyitcal results indicated 2 anomalous areas. Additional drilling, stripping, trenching and sampling is planned to follow up on the soil geochemical anomalies and mineralization exposed in trench #2.

Three other prospectors are known to have conducted prospecting programs for gold in the Batchawana Greenstone Belt in the Sault Ste Marie Geologist's district. Details of these propsecting programs include: Trevor Fleming for gold at his Olsen Township property, Dennis Flemming for copper zinc mineralization in Lunkie Township and Phil Frankow for gold on this Neill Township claim block.

Table 3. Exploration activity in the Sault Ste Marie Discrict, 1997

Abbreviations

AEM	Airborne electromagnetic survey	Lc	Linecutting
AM	Airborne magnetic survey	OPAP	Ontario Prospectors Assistance Program
DD	Diamond drilling	Pr	Prospecting
GC	Geochemical survey	RES	Resistivity survey
GEM	Ground electromagnetic survey	Samp	Sampling (other than bulk)
GL	Geological Survey	Str	Stripping
GM	Ground magnetic survey	Tr	Trenching
IP	Induced polarization survey		

No	Company/Individual (Occurance Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Aurogin Resources Ltd.	Palmer , Ryan (Cu, Au, Ag, Zn)	IP, RES, Str, Samp, Pr, DDH, AEM, AM, GL, GC, Lc, GEM, GM
2	Fleming, D. (OPAP)	Lunkie, (BM)	Str, Samp, Tr, Pr.
3	Fleming, T. (OPAP)	Olsen, (Au)	Str, Samp, Tr, Pr.
4	Frankow, P.	Neill, (Au.)	Str, Samp, Tr.
5	Hicks, C. (OPAP)	Vankoughnet (Pb, Ag)	GC, Samp. DD

Land Use Planning Activity

Geological and mineral production background information were provided for the North Shore Official Plan and the Elliot Lake official Plan during the year. A review of the Elliot Lake official plan was ongoing at the time of writing this report.

Resident Geologist Staff and Activities

Following restructuring of the Ontario Geological Survey Resident Geologist's Program in April of this year the Sault District office is now staffed by Mike Hailstone, District Geologist and Paul Morra, Geological Assistant. Gerald Bennett retired in June after 35 years service with the Ontario Geological Survey.

A Field Trip entitled; "The Huronian between Sault Ste Marie and Elliot Lake – Evidence for the Early Proterozoic atmosphere, climate and tectonics" and a talk were presented by Gerald Bennett at the 43rd annual meeting of the Lake Superior Institute on Lake Superior Geology in Sudbury May 6-11, 1997.

The District Geologist was also assigned to the Ministry of Northern Development and Mines Economic Development Initiative Team for the Algoma Area. The area teams have been charged with co-ordinating the delivery of the government's economic development programs and services and promoting economic development opportunities throughout the north.

During the year staff of the District Geologist Office were assissted by Experience student Jeremy Smith during July and August and by White Pines High School Co-Op student Tara Roussel from October to January 1998.

The office responded to 1023 telephone calls and 787 visitors during the calendar year. The Drill Core Library received 15 visitors during the year.

Table 4. Property visits conducted in the Sault Ste Marie District, 1997

Numbered (keyed to Figure 1)	**Property/Occurrence**
1	Green Quartzite Quarry, Kehoe Township
2	Foul Bight, Thompson Township
3	Hicks Claims (Former Prace Mine) Vankoughnet Township
4	Coppercorp Mine, Montreal Mining Location (Ryan Township)
5	Gilbertson Granophyre Quarry, Tarbutt Additional Township
6	East Bull Lake Intrusion, Massey Tote Road, Boon and Mandamin townships
7	Pecors Road – Livingston Creek Formation, Joubin Township
8	Lorrain Formation in Poulin and Sagard Township
9	Moon Lake area, Bolger Township
10	Rydal Bank area Lorrain Formation, Plummer Topwnship

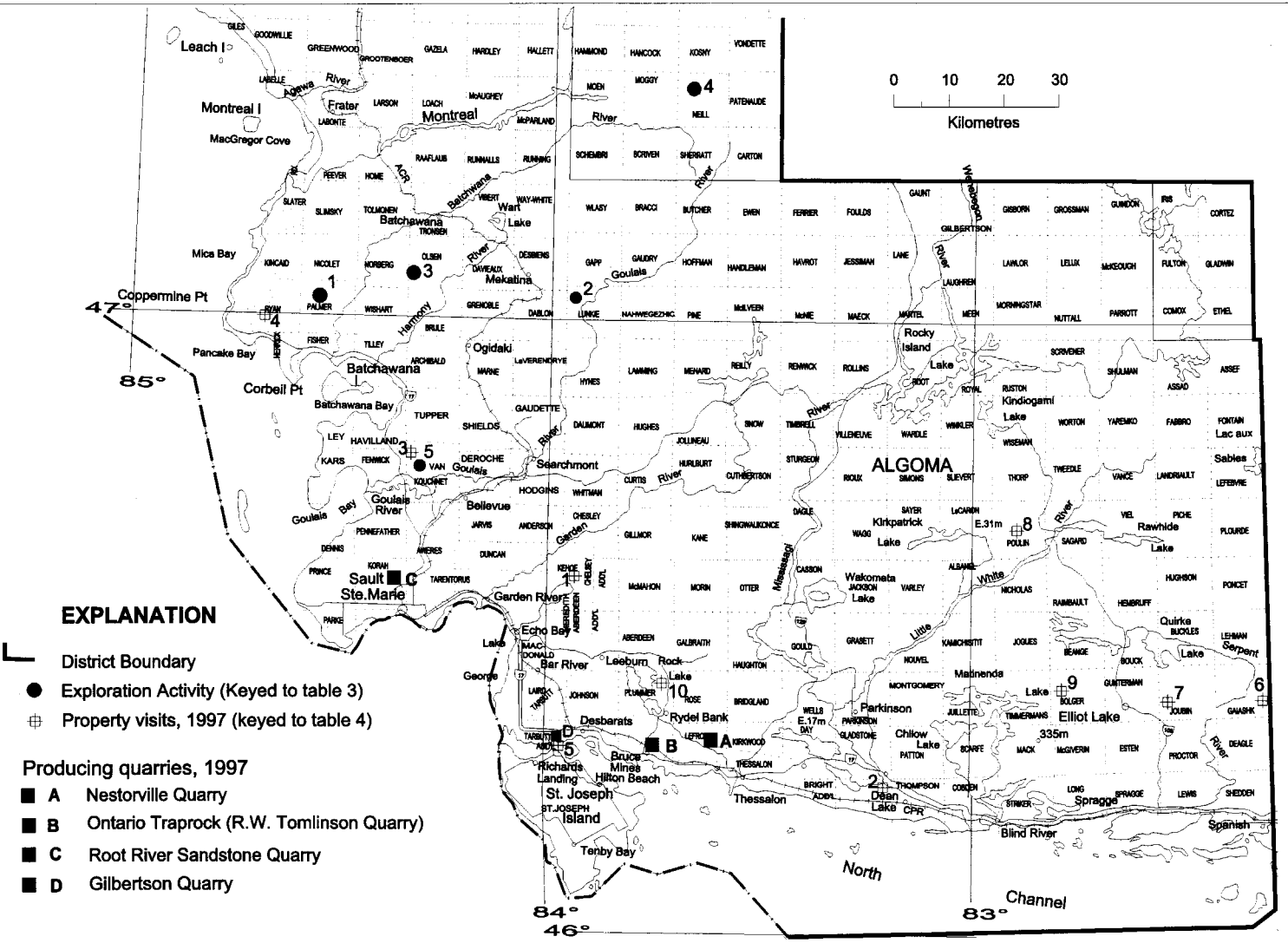

Figure 1. Sault Ste. Marie District, exploration and mining activity, 1997.

Property Examinations

GREEN QUARTZITE QUARRY (ALGOMA JADE).

This quarry is located in the Township of Kehoe, in the northeastern part of Section 26, several miles north of the north end of Echo Lake. There is a road to the property, accessible from Echo Bay on Hwy 17. Hwy 638 leads north 2.5 km from Echo Bay to the Echo Lake Road. The Echo Lake Road proceeds 12.5 km north to a skidder trail in Kehoe Township. The property can be accessed on foot along this skidder trail leading 550 meters off the Echo Lake Road.

Mr. R. Barnett from the Barnet Geological Consulting wished to visit the site to collect samples for tests at the University of Western Ontario. This was done in July 1997.

The earliest workings of the quarry took place about 1961 or 1962, the exact date is not known. There were some diamond drill holes put down on the property , but the core is not available. A company under the name of Special Aggregates Limited marketed the product in Michigan State.

A description of the quartzite is given by R. Rupert, former Resident Geologist in Sault Ste Marie, as follows:

"The quarry exploits a lens of green quartzite in a sequence of whitish to pale green , 10 foot thick beds of cross-bedded indurated quartzite. Dips are 40 to 55 degrees southwest.

Petrographically, the quartzite is rather pure, being composed of 85% rounded and moderately sorted fine to medium packed grains of quartz and 5% rounded, fine to medium grained chert and jasper clasts. A few (less than 2%) decomposed potash feldspar grains are present. The above sand grains are in a matrix of very fine sericite flakes whose ends penetrate the quartz grains in a saw-tooth pattern when viewed microscopically..... "

The Lorrain quartz arenite member dips towards a 200 meter thick, northwest striking diabase dyke (Frarey, 1977). The dike is located in outcrop aproximately 100 meters SW of the quarry site. Chromium-bearing micas are thought to give the green colour to the rock and it is suggested that fluid migration from the diabase, along bedding planes, has added chromium to the rock.

Nicki Ahrencia, a BSc student from Western University is currently studying this occurrence with N. Duke as his thesis supervisor .

Results of the samples taken for testing by Mr. Barnett have not yet been received.

The quarry has had about 1400 tons of material removed over the years, and is now inactive.

LIVINGSTON CREEK OUTCROPS – PECORS ROAD/JOUBIN TOWNSHIP

The Livingston Creek Formation is the oldest known sedimentary unit in the Huronian Supergroup. The Livingston Creek formation is unconformably overlain by Huronian volcanic stratigraphy of the Thessalon Formation. Outcrops of Livingston creek conglomerate unconformably overlying and proximal to archean felsic volcanic pyroclastic rocks, and iron formation, were observed this summer in Joubin Township, along the Pecors road.

The Pecors road is accessible from Hwy 108, approximately 7 km south of Elliot Lake. Here, the Nordic mine road leads north 1 km to the Pecors road. The distance to exposures of Livingston Creek on the

north side of the Pecors road is 11.5 km from the start of the road. These outcrops are located 75 m east of the powerline.

At the powerline site, "B" on Figure 2, sheared archean pyroclastic rocks are unconformably overlain by a pyritic conglomerate unit containing fist sized cobbles of subrounded felsic volcanic rock and cherty material with cobbles of grey granite and milky quartz pebbles. The matrix for the is subarkosic and contains smokey glassy quartz up to 0.5 cm with irregular patches of disseminated pyrite. The matrix/clast ratio is approximately 2/3. This unit is observed in thicknesses of 1 to 2 metres in each of the Pecors road sites.

At Site "C", 1.5 m of the pyritic conglomerate is overlain by 0.5 to 1 m of hetrolithic, clast supported granite boulder conglomerate with no pyrite in the matrix and well rounded clasts up to 10 cm in diameter. Clasts of gniesic material are found in this conglomerate. The contact between the boulder conglomerate and the lower pyritic unit is gradational. The beds dip approximately 10-15 degrees to the north with a 80-85 degree strike. Here the pyritic conglomerate unit can clearly be seen to underlie the Boulder conglomerate and unconformably overling the sheared Archean intermediate to felsic pyroclastic rocks.

At site "A", the unconformable relationship between the pyritic conglomerate unit and the sheared Archean mafic volcanics is quite distinct, however the overlying boulder conglomerate is missing in this area.

The geology of this area has been described by Robertson (1961) as located on the south side of the Quirke syncline, with Huronian sediments unconformably overlapping archean mafic volcanics and metasedimentary rocks. More recent mapping by Jensen and Rodgers (OGS, 1994 and 1992) defined est striking felsic vocanic rocks and a felsic centre in the Kings Lake area, striking east approximately 1-2 kilometers south of the unconformity.

The Livingstone Creek Formation has been regionaly described by Bennett (1997) as a clast supported. polymictic conglomerate base essentially composed of well rounded boulder and cobble sized clasts overlain by a fine to meduim-grained, subarkose to subwacke. This type section of the Livingston Creek formation is exposed along the shoreline of Lake Huron , approximately 7 km east of Thessalon.

Comments by Bennett on the base of the Huronian bear similarity to the base of the Livingston creek in the Pecors road outcrops. " The diffuse edges and embayment of some clasts suggests that they have undergone little transportation and may be corestones of weathered granitic blocks. The basal portion of this short section may be, at least in part, paleosol material which is either in place, or undergone little transportation " (Bennett, 1997).

West of Pecors Lake Byron (1994) obtained anomalous concentrations of arsenic, gold and zinc from samples collected from Archean sulphide rich-iron formations mineralized with pyrite, pyrrhotite and minor chalcopyrite, sphalerite and galena. The Archean iron formations occurr within a diverse sequence of magnesium-rich basalt, mafic tuff, rhyolite/dacite, felsic tuff and metasedimentary rocks. Sampling of iron formation from a pit located on the west side of Hwy 108 returned an assay of 0.893 ounces gold per ton, although subsequent assays of grab samples could not reproduce this value. (Bennett et al. 1992). The highest gold value (256 ppb) was obtained from sampling of a discontiuous zone of highly silicified and carbonatized mafic volcanic rocks west of Pecors Lake by Mr. Byron. The pyritic lower units, possibly locally derived paleosol of the Livingston creek Formation, are also located in this area.

Additional evaluation of basal pyritic units of Livingston Creek Formation will be carried out during the summer of 1998.

GOLD ASSOCIATED WITH LORRAIN FORMATION

Outcrops of Lorrain Formation quartz-pebble conglomerate (locally ferruginous) were examined along new logging roads in the vicinity of Hat Lake on the west side of Poulin Township. Heavy mineral

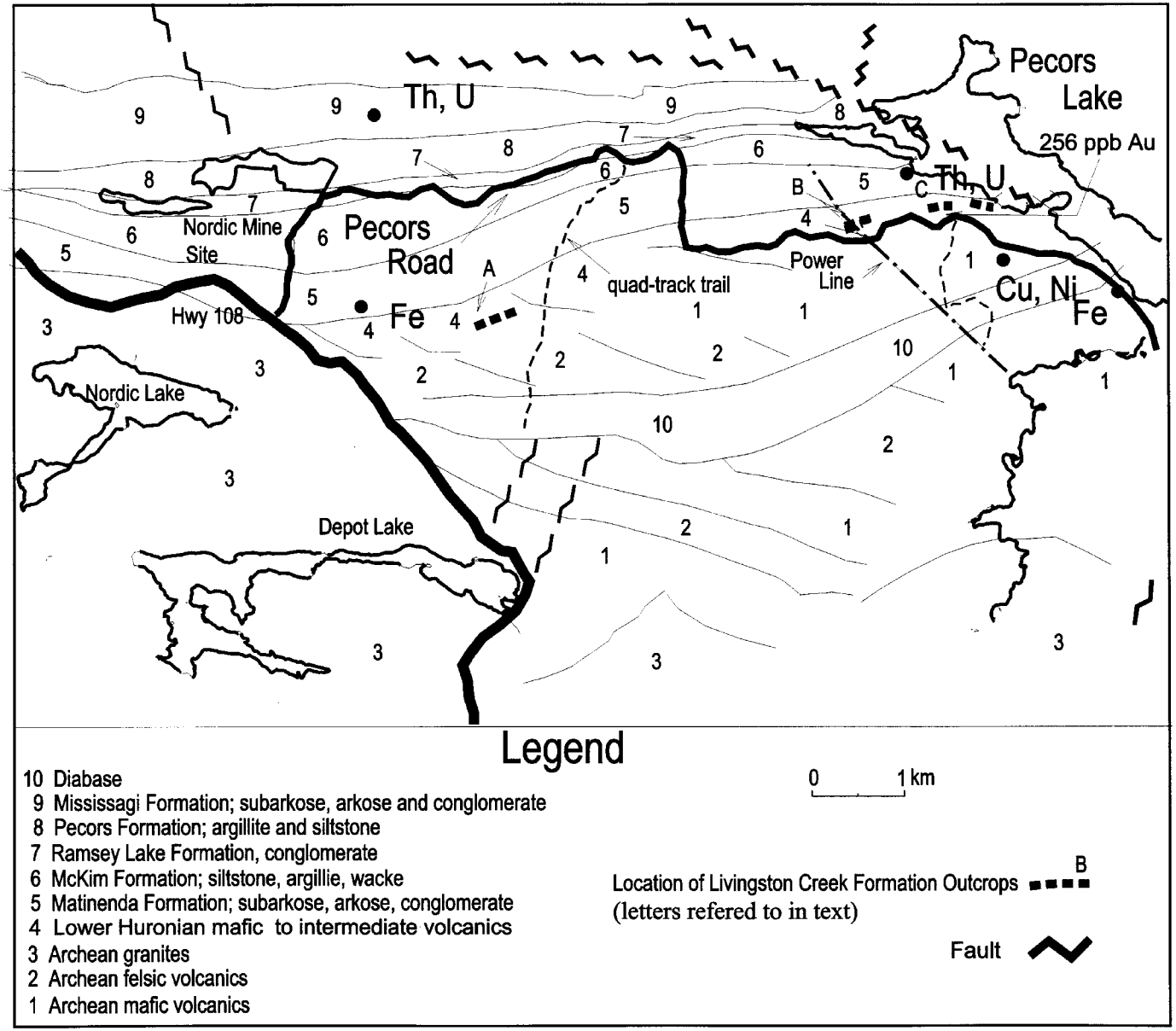

Figure 2. Location of Livingston Creek outcrops on Pecors Road.

concentrations up to 4 cm thick are found in the fore sets of local cross bedded grit beds within the quartz pebble conglomerate member.

The geology of the area has been described by Robertson (1976). Bedding regionally dips to the south at at 10 degrees. Locally, ferruginous heavy mineral beds are radioactive (attributable to 190 counts uranium and 10 counts thorium on a McPhar TV-1A). Hematite may have originally been deposited as magnetite-illmentite and altered to Hematite through diagenesis. Two grab samples of the heavy mineral material were collected to determine other heavy metals that may have been deposited. Assay results are as follows:

Additional sampling of ferruginous quartz-pebble conglomerate in this area is planned for the 1998 field season to compare with those of Totosa, from his sampling of the Lorrain Formation in the Bruce mines and Whitefish Falls areas (Tortosa, 1984).

In Plummer Township, north of Otter Lake, Tortosa has suggested that in the Lorrain Formation, heavy mineral beds located at the base of the red quartzite member, overlying the quartz-pebble conglomerate member, host elevated gold values to 197 ppb Au. This was determined from a sampling program carried out in 1984 where 972 samples were collected form Lorrain Formation in the Bruce Mines area and 1217 samples from Lorrain in the Whitefish Falls area(Tortosa, 1984). From a review of previously published surveys on paleo-placer gold in the Huronian, Tortosa concluded that heavy mineral beds , pebble conglomerate facies and red beds were the most likely candidates for concentration of Gold in the Huronian (Tortosa, 1984).

In previous studies of Gold in the Lorrain Formation in the Cobalt Embayment , Colvine (1981) found values of up to 1200 ppb gold in hematitic middle members of the Lorrain Formation. In a sampled stratigraphic section through the Lorrain formation north of Elliot Lake , Colvine (1983) found only low concentrations of gold. Suggesting geologic provenance for gold being present north of the Cobalt embayment but not present in the Elliot Lake area.

Recommendations for Exploration

Gold associated with basal pyritic units of the Livingston Creek Formation is suggested as a target for reconnaissance grass roots sampling exploration program in the Huronian. Evaluation should include the pyritic quartz pebble-conglomerate horizon, possibly a paleosol, at the base of the Huronian volcanic rocks. Samples of this unit in the Thessalon area collected by Bennett G. in 1982 gave assays of 200 and 600 ppb Au. Samples of similar material from the same stratigraphic horizon at Cullis Lake in Day Township returned assays as high as 43000 ppb Au (Bennett et al. 1992). Also for paleoplacer gold in the Huronian, Totosa (1984) has indicated that heavy mineral beds in the ferruginous quartzite member overlying the jasper quartz pebble conglomerate member of the Lorrain Formation contains elevated values of gold to 197 ppb north of Bruce Mines.

Fragmental lamprophyres have been reported from an area east of Ranger Lake by several local prospectors including Ted Leahy (Leahy, T. personal communication, 1994). The Keweenawan Sea Brooke Lake Carbonatite intrusion is located 10 km northeast of this area. fragmental lamprophyres have also been observed by the author underground in the Stanleigh mine in the Elliot Lake area. Lamprophyre was encountered during the sinking of the No. 2 shaft at the Stanleigh Mine and fragments of this material can be seen along the east side of the mine road leading to the Stanleigh Mine. Fragmental lamprophyres should be examined carefully for diamonds. The district geologist can advise prospectors on how to proceed with samples of more promising looking fragmental lamprophyre.

Table 5. Publications received by the Sault Ste. Marie District Geologist Office, 1997.

Title	Author	Type and Year of Publication
Report of Activities 1996, Resident Geologists	Newsome, J.W. and Laderoute, D. editors	Ontario Geological Survey Open File Report 5958,1997
The "Nicholson" Ultramafic Dike, Wawa, Ontario: A Preliminary Investigation	Sage R.P and Crabtree, D.	Ontario Geological Survey Open File Report 5955, 1997
Results of Modern Alluvium Sampling for Kimberlite Indicator Minerals, Kinniwabi Lake Area, Northeastern Ontario	Morris, T. F.	Ontartio Geological Survey Open File Report 5956, 1997
Roadside Geology of Ontario, North Shore of Lake Superior	Pye, E. edited by Debecki, R.	Ontartio Geological Survey ROCK ON Series No. 2, 1997
Prospector's Guide to Drift Prospecting for Diamonds, Northern Ontario	Morris, T.F. and Kaszycki, C.A.	Ontartio Geological Survey Miscellaneous Paper 167
The Huronian Supergroup between Sault Ste. Marie and Elliot Lake	Bennett, G, Card, K.D and Tomlinson, K.Y.	ILSG Fieldtrip Guidebook 43rd annual meeting, 1997
Structual Evoloution of The Central Michipicoten Greenstone Belt, Superior Province, Wawa, Ontario, Canada	Arias, Z.G.	MSc Thesis, Queens University, 1996

OGS Activities and Research by Others

Nicki Abrencia, University of Western Ontario, commenced a BSc thesison the Lorrain Formation at the Algoma Jade occurrence this year. Norman Duke is the thesis supervisor.

John Walmsley continues a digital compilation of abandoned mine data at the Canada Centre for Mineral and Energy Technology (CANMET) in Elliot Lake. This program has produced three dimensional images of abandoned mine workings not only in the Elliot Lake area but for other mining Camps in Ontario.

The Elliot Lake Research Filed Station, of Laurentian University continues to focus studies in the area of mine rehabilitation and related environmental remediation. The main aspect of mining related research carried out at the lab today involve Surface Environment, Radiation, Mine Site Database and Tailings Database as well as a study into the stability of sludges.

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Bennett, Card and Tomlinson, 1997: The Huronian Supergroup between Sault Ste. Marie and Elliot Lake; Institute On Lake Superior Geology, 43rd annual meeting; Field Trip Guidebook, Volume 43, prt 2, 76p.

Bennett, G., Leahy, T., Walmsley, J. and Hailstone, M., 1992: Sault Ste. Marie Resident Geologist's District – 1992; in Report of Activities of the Resident Geologist-1992; Ontario Geological Survey, Miscellaneous Paper 161, pp207-231.

Byron, M.,1993: Lithogeochemical Study of the Archean Volcanic Rocks of the Whiskey Lake Greenstone Belt, Algoma Dsitict Ontarioo; Ontario Geological Survey, Open File Report 5587, 51p.

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Colvine, A.C., 1981: Reconnaissance of the Lorrain Formation, Northern Cobalt Embayment; Ontario Geological Survey, Miscellaneous Paper 100, p.187-190.

Frarey, M.J., 1977: Geology of the Huronian Belt between Sault Ste, Marie and Blind River, Ontario; Geological Survey of Canada, Memoir 383, p.87 accompanied by maps 1412A, 1413A, 1414A and 1415A, scale 1:50,000.

Jensen, L., 1994: Geology of the Whiskey Lake Greenstone Belt (West Half), Districts of Sault Ste. Marie and Sudbury; Ontario Geological Survey, Open File Report 5883, 101p.

Richards J.P. 1985: A Fluid Inclusion and Stable Isotope Study of Keweenawan Fissure-Vein Hosted Copper Sulphide Mineralization, Mamainse Point, Ontario; University of Toronto; MSc thesis; p.290.

Robertson, J.A. 1961: Geology of Townships 143 and 144 District of Algoma; Ontario Department of Mines; Geological Report 4, 65p. accompanied by maps 2001 and 2002 , scale 1:15,840.

Robertson, J.A., 1976: Map 2346 Poulin and Sagard Townships; Ontario Geological Survey; scale1:31680.

Rogers, M.C., 1992: Geology of the Whiskey Lake area, east half, Ontario Geological Survey, Open File Report 5834, 109p.

Tortosa, D., (1984): Lithogeochemistry of Huronian Supergroup, Bruce Mines and Whitefish Falls Areas, Northern Ontario; Geological Survey of Canada; Open File Report 1089, p77.

Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

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