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Exploration Overview 1995

Northwest Territories

MINING, EXPLORATION AND GEOLOGICAL INVESTIGATIONS

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PART 1
EXPLORATION AND MINING OVERVIEW

INTRODUCTION

J.A. Brophy, W.A. Padgham, NWT Geological Mapping Division. DIAND

The NWT Geological Mapping Division of DIAND provides geological services, mainly in the form of information to the mineral industry and to others who require geological data. This is done from the expertise of staff members and from archives of geological data, drill core, rock and mineral collections representative of the NWT. Staff geologists monitor mining and mineral exploration, collect data to add to the geological database. and conduct grassroots mapping programs. Overviews describing mineral exploration and geological developments in the NWT have been produced by the Division for many years, but work is now in progress to replace these with a computer-based mineral inventory file. This, the first draft of the 1995 **OVERVIEW, will be revised for the Cordilleran Roundup in** early February and a final version will be produced for distribution at the PDAC annual convention in March. All statistical figures given here are preliminary.

MINING

Gold production in the NWT was augmented by the first year of full production from Colomac and increased productivity from Con and Giant, resulting in a 30% increase in gold output in 1995 (18.67 tonnes) relative to 1994(14.23 tonnes). Royal Oak resurrected the SuperCrest Mine near Giant, which is expected to add 8 years to Giant's operating life. At Lupirt, ore grades are diminishing while production costs are increasing because of deeper mining. With only enough reserves to feed the mill for about 3 more years, Echo Bay Mines in November announced acquisition of the Ulu Deposit from BHP Minerals for US$ 10 million and royalty considerations. Ulu is in the southern part of the High Lake Volcanic Belt 130 km north of Lupin. It has drill-indicated reserves of about 1 million tonnes grading 11-12 g/t gold. Echo Bay plans to truck Ulu ore to the Lupin mill using winter roads. Announcements by GMD Resource Corporation suggest that another ex-producing gold mine, Discovery, could be revived with the help of satellite ore bodies.

In other advanced development, BHP Diamond's proposal to establish Canada's first diamond mine at Lac de Gras is currently undergoing environmental review, BHP Minerals has moved supplies to the Boston claims in the Hope Bay Belt in preparation for a programme of underground testing, and San Andreas Resource Corporation continues to expand reserves towards a viable zinc-lead-silver mine at Prairie Creek.

EXPLORATION HIGHLIGHTS

The NWT continued to set the pace for exploration in Canada, although the Voisey Bay rush in Labrador is providing welcome competition. Fewer NWT mineral prospects were evaluated in 1995 (306 compared to 737 in 1994, Table 1), but more prospects appear to have been drilled (202 compared to 100 in 1994, Table 2). Drilling statistics (Table 2) underscore the prominence of the Slave Structural Province, where about 75% of the more than 220,1300 meters of surface drilling and about 90?? of the 65,000 meters of subsurface drilling was completed. Surface drilling for gold outpaced surface drilling for diamonds by 30,000 meters, emphasizing that despite publicity attending the diamond play, the yellow metal continues to figure prominently in NWT exploration. Major surface drill programs for gold continue in the Damoti region (*14,000 meters), at Meadowbank and Meliadine in the Keewatin (± 17,000 meters), in the vicinity of the Yellowknife mines (±35,000 meters) arid on BHP Mineral's properties in the Hope Bay belt, where statistics are incomplete because drilling done on Inuit land was not reported. Three companies were responsible for about 80% of the total drilling for diamonds; BHP Diamonds, Kennecott Canada and Canamera. Kennecott's Diavik project at Lac de Gras, in joint venture with Aber Resources, continues to report results suggesting potential on par with that of BHP Diamonds.

In the Bear Province, GMD Resource Corporation announced the discovery of numerous polymetallic showings (Cu-Bi-Co-Zn-W-Au) with possible affinities to Olympic Dam-style mineralization.

In the Arctic Islands, base-metal exploration appears to be on the upswing with 14 prospects evaluated, mainly by BHP Minerals and Cominco.

Up to the end of September, 3531 mineral claims covering 2.930,000 ha were staked in the NWT, "about the same as was staked in 1994. Distribution of claim staking and permitting will be analyzed in a future version of the overview when all the calendar-year data are available.

Canada-NWT Mineral Initiatives

Martin Irving, Canada-NWT Mineral Initiatives Office (MIO)

The Canada-NWT Economic Development Agreement (EDA) was signed in February, 1991, Under the 50 million dollar agreement, DIAND and the GNWT are cooperating in the development and delivery of a number of Economic Development Initiatives. Four of these Initiatives fall under the title of the Mineral Initatives, with a total budget of 8.2 million over the five-year term. The Geoscience Initiative receives the bulk of the funding (7.5 million). The other three Mineral Initiatives are Mining Productivity (Technology), Mining Sector Information and Prospectors support. This past summer 4 field projects were supported. All of the remaining Mineral Initiative projects are ending this year. Final reports and maps will be released over the coming months. DIAND Geological Mapping and the Department of Energy, **Mines and Petroleum Resources** (EMPR) are working together to complete the NT Minfile database, with the release of Version 1 anticipated in spring, 19%. Due to cuts to the EDA, incurred under the federal budget of February, 1994, only the Geoscience initiative received funding this past year to complete ongoing projects. Project ROCKS, lessons and activities for Grades 4-9 and reference material for teachers, under the Mining Sector Information Initiative, was completed with funding from EMPR.

EMPR continued programs initiated under the Prospectors Initiative by providing support to prospectors in the form of grants and training courses through the Department's Community Mineral Advisor.

The Mineral Initiatives have proven to be successful, however. continuation of an EDA-type program appears very unlikely. The GNWT is committed in their support of the types of projects delivered under the Mineral Initiatives. Through EMPR, sUppOrt for prospector pm-sad for educational and information programs, previously delivered under the MIO, will continue, although at a reduced level. In addition, EMPR anticipates maintaining Mike Stubley, Carolyn Relf and Doug Irwin on staff and delivering a minimum of 3 geological field mapping projects in the coming year.

TABLE 1: NUMBER OF PROSPECTS EVALUATED IN VARIOUS REGIONS, NWT, 1995

AREA	*Au*	***DIAMONDS***	***Cu-Pb-Zn***	*u*	***Ni-PGE***	*OTHER*	***TOTALS***
Slave	54	185	4				243
Churchill	15	1	3	2	3		24
Cordillera			2			2	4
Bear	2	1	5		1	8	17
Arctic Is	1	3	14				18
TOTALS	72	190	28	2	4	10	306

TABLE 2: PROSPECTS EVALUATED BY SURFACE AND UNDERGROUND **DRILLING IN VARIOUS** REGIONS, **NWT,** 1995

SURFACE	Au		Diamonds		Cu-Pb-Zn		U		Ni-PGE		Totals	
DRILLING	Ppts	M	Ppts	M	Ppts	M	Ppts	M	Ppts	M	Ppts	M
Slave	28	87250	156	73912	3	64s I					187	167613
Church[il	3	16630			2	4367	2	7200	I	2438	8	30635
Cordillera					1	11675					1	11675
Bear					1	1537					1	I 537
Arctic Is					5	12366					5	12366
Totals	31	103880	156	73912	12	36396	2	7200	1	2438	202	223826

U'GROUND	Au		Diamonds		Cu-Pb-Zn						Totals	
DRILLING	Ppts	M	Ppts	M	Ppts	M					Ppts	M
Slave	4	57857	I	727							5	58584
Arctic [s					1	6237					1	6237
Totals	4	57857	1	727	1	6237					6	64821

• prospects -Ppts
meterage - M

DIAND-SPONSORED GEOLOGY

Valerie Jackson mapped in the Napatulik are (86 1) and in the Kikerk uplift (86P) to complete 1:50,000 coverage of these area. These areas are on the northwestern edge of the Slave Structural Province. Once completed the whole of the northwest part of the Slave will have been mapped at 1:50,000.

Jennifer Pell and John Brophy completed mapping of the Labrish Lake map area (85 N/9) at 1:30000.

University contractors and other researched were assisted by the NWT GMD as follows. Wulf Mueller and Patricia Cocoran of the University of Quebec at Chicoutimi mapped in tdhe Beaulieu Rapids Formation (85 P/l), the Raquette Lake Formation and adjacent units (85 I/11), the southernmost exposures of the Jackson Lake Formation (in the Sub Islands 85 J/8), and in the Keskarrah Bay Formation on Cyclops Peninsula in Point Lake (86 H/3). These rocks are all believed to represent the last phases of Archean sedimentation in the Slave Structural Province. W. K. Fyson, University of Ottawa studied structures in turbiditic sediments of the Burwash Formation in the Yellowknife Domain. He also continued work on i: 1,000,000 and 1:500,000 compilations of the lithology and structure of the Slave Province. Samuel A. Bowring and associates from MIT continued work on the Acasta Gneisses in the area around the Acasta Research Station@ (86 G/5). These are the oldest rocks in the world. The most recent ages from these rock are circa 4.01 Ga. Dr. Lee Groat of the University of British Columbia continued research on the Little Nahanni lithium-bearing pegmatites in the Mackenzie Mountains north of Tungsten (95 E/NW)..

Professor Stephen Moorbath of Oxford Univeristy, Professor Simon Wilde of Curtin University (Perth Australia) and Dr. John Myers of the Geological Survey of Western Australia were assisted in studies of the Acasta Gneisses.

An expediting service was again operated jointly by GMD-DIAND, the Canada-NWT MIO and the GSC. This provided service to govenment and university sponsored geological operations in the area tributary to Yellowknife.

PART 2
EXPLORATION AND MINING PREVIEW

OPERATING MINES

Pamela Strand, NWT Geological Mapping Division, DIAND

Six gold mines and two lead-zinc mines operated in Northwest Territories during 1995 (Fig. 1). Production estimates for the mines are given in Table 3.

Production at the **Miramar Con Mine (85 J/8) continued** to increase with a record 4,242 kg gold produced in 1995 from the 2900- to 5900-foot levels. Ore definition drilling totalled 42,670 m from the 2300-to 4900-foot levels. Mining methods comprise 40% conventional cut-and-fill, 35% longhole stoping, 15% shrinkage stoping and 10°/0 mechanized cut-and-fill. The cost of production was US$ 10.17/g (US$3 15/02). The mill circuit for refractory ores was commissioned in 1995, This included the addition of a second scavenger and a knelson concentrator for the free milling ores. Gold recovery rates are 92% for free milling ore and 80°A for refractory ore. The autoclave has been operational since March and processes the refractory ore. In 1995 Miramar's Bluefish Hydro-Electric Plant, was expanded from 2.5MW to 7.5 MW per year in 1994. But, due to historically low water levels the plant has not been operating at full capacity. The mine employs 370 workers.

Operations at **Royal Oak's Colomac** Mine (86 B/6) reached full production in 1995 with 4,659 kg of gold produced. Zone 2.0 (main pit) and the Zone 2.5 pit extension were active. Ore definition drilling totalling 9,888 meters was completed on Zone 3.5 (south of main pit). The mine employs310 workers. The mill capacity is 8400 tonnes/day and the recovery rate is 93%. Cost of production is US$9.65/g (US$300/oz).

Production at **Royal Oak's** Giant Mine (85 J/9) was from the 1st and 2nd levels, 575, 750, 950, 1100, 1250 and 1500 foot levels. Underground ore definition totalled 21,335 meters in the ASD and GB zones. Exploration drilling totalled 9,145 meters in the UBC, ASD and GB zones. In 1995 production started from the Supercrest Mine, adjacent to the Giant Mine. Supercrest increases the minable reserves at Giant by 25%, adds 7-8 years to the mine life, and will raise the average grade of the ore being milled. Mill capacity is 1225 tonnes per day with 87% recovery. The mine employs 305 workers.

Production from Echo **Bay's** Lupin Mine (76 E/14) was from the East, West and Centre Zones. Over the past 5 years the East Zone has not been a major source of ore, but processing has begun there on the remaining ore, including the high-grade "crown pillar". Large mined-out areas of the East Zone have been backfilled with waste, providing underground stability to remove the near- surface ore. Cost of production is US$ 10.59/g (US$330/oz). As lower levels are being mined (1260 meter level just completed development), more rock support is required, ore grades are lower and more erratic, stopes are narrower, and it costs more to hoist ore to surface. Lupin has introduced a new mining method at depth sublevel retreat under consolidated fill with cement paste backfill. This avoids dilution, but also produces fewer tonnes per day to feed the mill. Mill throughput averaged 1642 tonnes/day, down from 1832 tonnes/day a year ago. Gold recovery is 92%. Exploration drilling comprised 3500 meters from surface on 4 satellite deposits and 5500 meters from underground below the current workings. Ore definition drilling of 11,000" meters tested actively mined areas from surface down to 1240 meters. The company is currently completing an evaluation of feeding the Lupin mill with ore from four satellite deposits within trucking distance to Lupin. These deposits contain **between** 310-1550 kg Au with average grades of 8.57 g/t and include Dune, Ski. Occurrence Eight and Pan. Mining of Ski and Dune is now considered unfeasible, Pan is currently under evaluation and Occurrence Eight is being open pitted for dual use as ore feed and q-rock for tailing dam materials: The mine employs 437 staff.

operations at **Treminco Resources** Ptarmigan Mine (85 J/9) were constrained due to lack of minable ore. To date, the mine has been in operation for 216 days. Operating costs for 1994 rose from $68 per tonne to $77 per tonne. The actively mined areas include the 750-foot and 900-foot levels of the Ptarmigan mine, the 230-foot level of the Tom mine and the 400-foot level of the "C" Vein. Shrinkage stoping is the mining method. The mine employed 12 workers.

At **Nanisivik Mines Ltd's Nanisivik Mine (48 C/l) an** estimated 10,000 m of ore definition drilling was completed on the West Zone, Central Lower Lens, 06-08 and 04-06 Shale Zones. Production came from all zones and mining at Oceanview was suspended during the year. Mining is 80% room-and-pillar and 20% cut-and-fill. A total of 97,000 t Zn concentrate was shipped in 4 voyages of the HMV Arctic.

At **Cominco's** Polaris Mine (68 H/8) production was from the 900. 880, 850, 820, 790 and 760 levels. An estimated 85°A was from pillar recovery (up from 70°A in 1994) causing more difficult ground conditions, with only 15%from primary mining. Longhole open-stope mining method accounted for 97°/0 of the ore recovered with the remaining 3%from open pitting of the North Pit, a satellite deposit. No ore definition or exploration drilling was done. Currently a cemented-rockfill plant is being installed. This will be the first of its kind where cemented rockfill is to be placed in permafrost. A total of 225,681 t of Zn and 45,254 t of Pb concentrate were shipped in 8 voyages of the HMV Arctic. The mill circuit uses Pb/Zn differential flotation methods and a tower mill is currently being added to regrind rougher concentrates to recover zinc.

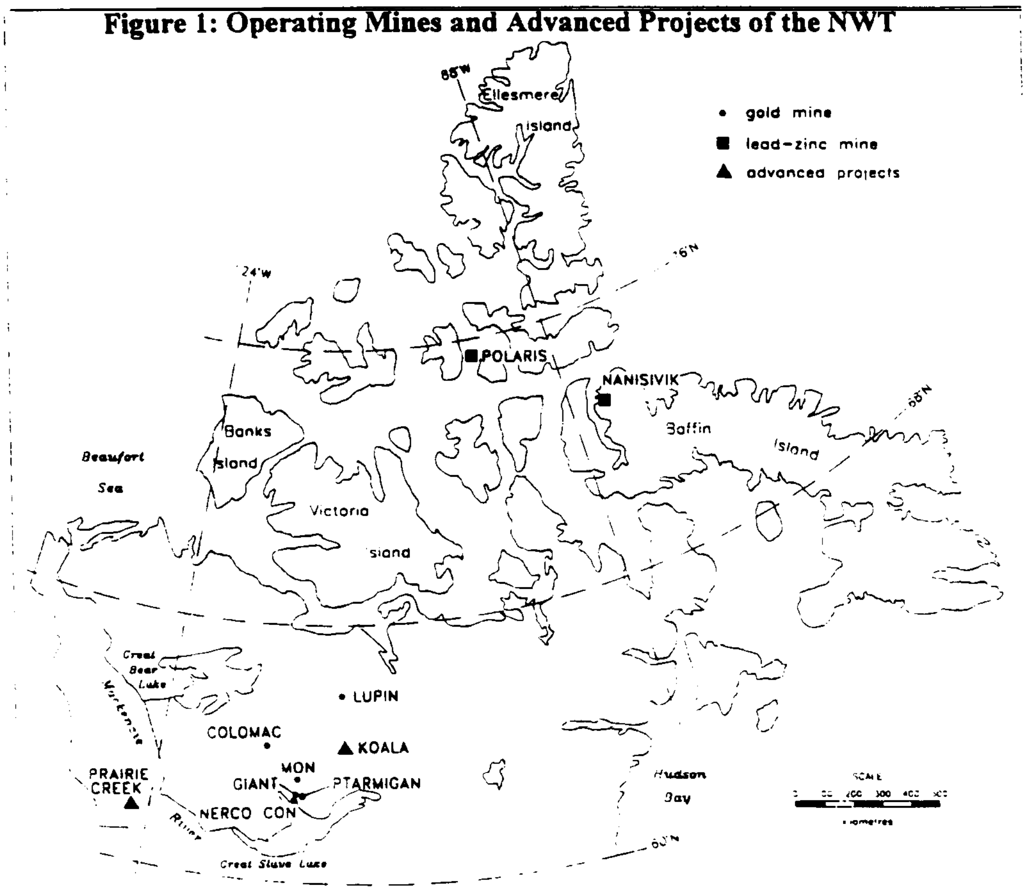
On the smaller scale, the Mon Mine (85 J/16) which is operated by **Ger-Mac Contracting Ltd** produced from mid-June until November in 1995.475 tonnes of ore were milled from which 6.2 kg Au may be recovered. To date 2.8 kg Au have been sold. The staff of 4-6 people developed 50 meters of decline in the North

TABLE 3: OPERATING MINES IN THE NORTHWEST TERRITORIES: PRODUCTION AND RESERVES

	1994[1]				1995 estimates	
MINE	**COMMODITY**	ORE MILLED	**PRODUCTION**	RESERVES @ GRADE[2]	ORE MILLED	PRODUCTION
Colomac	Au, Ag	893,675	1,262 kg Au 93 kg Ag	9,145 kt @ 1.78g/t Au	2,664,208	4,659 kg Au
Con	Au, Ag	316,127	4,007 kg Au 801 kg Ag	3,626 kt @ 10.63 g/t Au	399,168	4,242 kg Au
Giant	Au, Ag	390,312	3,147 kg Au 474 kg Ag	2,172 kt @ 10.9 g/t Au	423,210	3,845 kg Au
Lupin	Au, Ag	740,275	5,602 kg Au 992 kg Ag	2,268kt @ 9.91 g/t Au	660,442	5,797 kg Au
Ptarmigan	Au	26,309	208 kg Au	68,950 t @ 8.33 g/t Au Sept, 1995	18,700	132 kg Au
Nanisivik	Zn, Pb, Ag	756,443	51,789 t Zn 1,646 t Pb 8,501 kg Ag	2,644,000 t @ 7.5% Zn, 0.25 % Pb, 3 g/t Ag	750,000	46,500 t Zn 150 t Pb 21,000 kg Ag
Polaris	Zn, Pb	932,340	135,213 t Zn 32,111 tPb	7,608,000 t @ 13.6% Zn, 3.6%Pb	1,012,560	127.580 t Zn 34,830 t Pb

[1] based on company 1994 annual reports; Ag production statistics from 1994 Annual Mill Survey
[2] total reserves include proven and probable amounts, as of Jan’95 unless stated.

Figure 1: Operating Mines and Advanced Projects of the NWT



Portal down to the 650-foot level. Underground exploration drilling totalled 155 me-in 9 holes with assays Up to 274.2 g/t Au (8.0 oz/ton). The mineralized vein (width 1.2 meters) was extended 24 meters along strike and 15 meters downdip. Current work is subdrifting Up to the old stopes. The mill operated 24 hours a day at 65 tonnes per day.

SLAVE STRUCTURAL PROVINCE: BASE METALS AND GOLD

John Brophy and Karen Gochnauer, NWT Geological Mapping Division, DIAND

YELLOWKNIFE BASIN; YELLOWKNIFE, BEAULIEAU AND CAMERON BELTS

Royal Oak Mines Inc., in joint venture with Golden Marlin Resources Ltd, drilled 37 holes totalling 5523.6 m to evaluate potential gold-bearing shears on the Marlin, Mirage and Slave claims, Yellowknife Bay (85 J/l ,2,7,8) (1 in Fig. 2). Downhole EM was conducted on 7 holes for a total of 3114 m. A total of 1500 samples were collected for geochemical test work.

Miramar Mining Corp. drilled 5 deep holes (6820 m) to test the Campbell Shear Zone at depths between 450 to 1200 m, intersecting 2.7 m (true width) of 8.3 g/t Au in one of the holes spotted close to existing mine workings. Nineteen holes totalling 3800 m were drilled to evaluate the Con Shear and other linears between Keg and Octopus Lake. A thick segment of geochemically anomalous gold was identified in the Con Shear at the south end of Keg Lake. Eleven holes totalling 7576 m were drilled to test the Con Shear near Pud Lake. An intersection of 0.82 m (true width) grading 71.9 g/t Au was obtained in one hole. All work was done in 85 J/8 (2 in Fig.2).

Royal Oak Mines Inc. completed a gold exploration program consisting of 48 diamond drill holes totalling 1649 meters, 1 :2500-scale mapping of the Giant 6, 8, 10, and 12 claims; and 18 km of ground magnetometer surveying at the Giant Minesite (85 J/9) (3 in Fig.2).

Barrick Gold, in joint venture with **Nebex Resources Ltd,.** discovered three new gold zones on their Walsh Lake Property (85 J/9) (3 in Fig.2), defining a gold-bearing possible extension of the Giant Shear structure. Thirty-five holes totalling 8,886 meters were completed on the Walsh Lake property, and Barrick Gold has since dropped the option.

Nebex, in joint venture with **Royal Oak,** completed a winter drill program on the Northbelt property (85J/9) (3 in Fig.2), north of Giant Mine. Fourteen drill holes tested shear zones including: Shear 20; Barney Lake shear (parallel to and east of shear 20); the NGX extension, B and Jed breaks. A mineralized shear zone, not previously drill tested, was intersected in the Brock Formation at the south end of Vee Lake.

Nebex Resources Ltd. drilled three holes at Oro Lake (85 J/9) (3 in Fig.2).

Wait Humphries, a local prospector, prospected his Quyta Lake claims (85 J/16) (4 in Fig. 2), Ace claims (85 J/8)(2 in Fig. 2) in the South Bay, and Eagle claims at the north end of Banting Lake (85 J/9) (3 in Fig. 2).

Dave Nickerson of Yellowknife completed beepmat and EM- 16 surveys on the LOST AND FOUND claim near Long Lake (85 J/9) (3 in Fig.2). Drilling of one discrete geophysical anomaly is planned.

Mark Senkiw prospected the Al and San claims in the Trout Lake area (85 I/6)(5 in Fig.2).

Dave Nickerson of Yellowknife prospected the Ross Lake area and staked the BROW claim (85 I/11) (6 in Fig.2) to cover outcropping of sulphide-rich gossan from which one sample containing 150 ppb gold was collected.

Ray Essery of Yellowknife prospected property in the Allan Lake area (85 I/14, 15) (7 in Fig.2) and identified vein zones containing ore-grade gold ss well as disseminated native copper.

Solid Resources Ltd. drilled gold prospects in the Amacher Lake/Sunset Lake area (85 I/16) (8 in Fig.2)

Miramar completed a program of **lithogeochemical surveying** on the NGL claims at Gordon Lake (85 P/2)(9 in Fig. 2).

GMD **Resource Corp.** started an undergrown exploration programme on the Ormsby Zone south of the Discovery Mine portal (85 P/4) (10 in Fig. 2). To date, 82 m of a planned 150 m of advance have been completed along a 3.3x4.O m decline, and three new mineralized veins have been cut. Assays from samples of the first vein averaged 34 g/t Au across 0.3 m. A review of archival drill and underground information from the old Discovery Mine suggest that there is considerable potential for gold ore at depth, and that together with the Ormsby Zone there may be 2,300,000 tomes of ore grading 20 g/t Au.

Royal Oak Mines Inc purchased the Nicholas Lake gold prospect (85 P/4) (10 in Fig. 2) for $3.5 million.

INDIN LAKE BELT

Gitennes Exploration Inc. continued to explore for gold in amphibolitic banded iron formation (BIF) on the Fishhook property (86 B/3) (11 in Fig. 2) south of Damoti Lake and on the adjacent TQY option (50°/0 Gitennes, 50% Tanqueray Resources Ltd.). **On the** TQY property, drilling focused on the Red Badger Zone, where five of seven holes drilled in late 1994 intersected 8 mineralized BIF segments ranging in width between 1.0-6.0 m and grading 3.4 to 11.5 g/t Au. In 1995, twenty-seven holes totalling 2275.8 m were completed on the TQY option, sixteen of which tested the Red Badger Zone. Five of the Red Badger holes intersected mineralized BIF ranging in width between 0.7-4.5 m and grading 4.08 to 7.71 g/t Au. Other zones tested include the TQY portion of the Bivisible North Zone (2 holes), the Irresistible East Zone (5 holes), and the Parma Belle Zone (2 holes). An additional 3 holes totalling 200

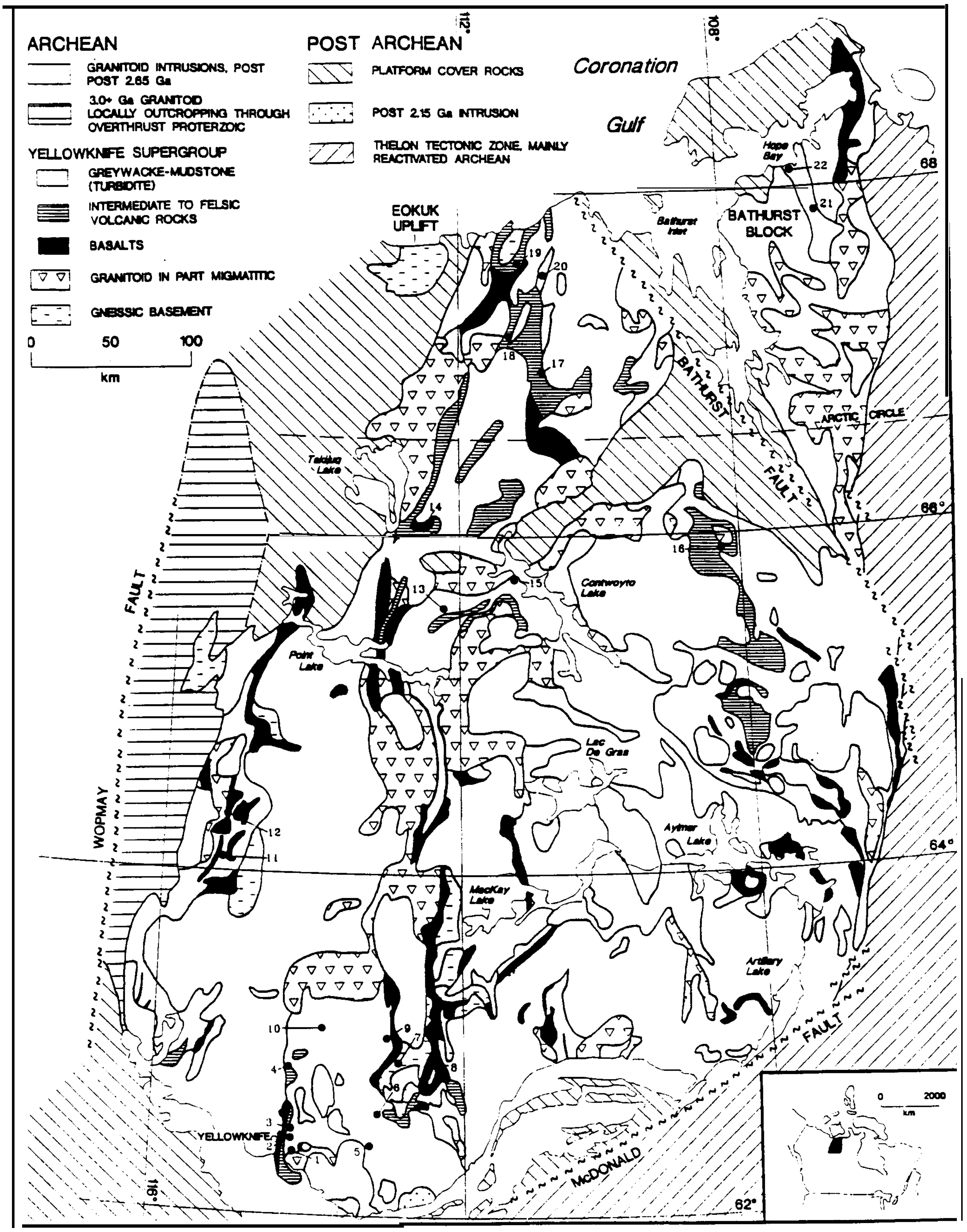


Figure 2: Base Metals and Gold Exploration in the Slave Structural Province, 1995

m is planned. On the Fishhook property, 15 holes totalling 1097.5 m were completed in 1995 to test the Bivisible North & South zones, the Irresistible West Zone and the Royal Champion Zone. Best results were obtained from the Bivisible North Zone where 2 holes intersected 3 mineralized BIF segments ranging in width between 0.7-4.2 m and grading 10.8 to 19.3 g/t Au. On the Irresistible West Zone, 4 holes intersected 5 mineralized BIF segments ranging in width between 1.9-3.3 m and grading 3.4 to 11.4 g/t Au. Exploration on the Fishhook property identified four new zones of mineralized BIF that warrant future testing; the Woolly Bugger (up to 33 m wide, 236 m long, grabs> 10 g/t Au), Humpy (1.2 m wide, 182 m long, well altered), Firefly (2 m wide, 424 m long, grabs commonly >7 g/t Au) and Black Ghost (up to 36 m wide, 455 m long, anomalous gold obtained from grabs). Drilling is currently in progress on the Woolly Bugger and Firefly zones, with a total of 9 holes totalling 700 m planned.

Consolidated Ramrod Gold Corporation (51%), Gitennes Exploration Inc. (25%) and Athabaska Gold Resources Ltd. (24%) continued to explore for gold in amphibolitic banded iron formation (BIF) on the Damoti property (86 B/3) (11 in Fig. 2). In September, Consolidated Ramrod purchased Gitennes' 25% interest for $1 million and 375000 shares, and Athabaska's 24°/0 interest for 630,000 shares, thereby gaining full control of the Damoti properties. Drilling this year focused on the Bif/North Islands Zone (28 holes), the Horseshoe/Pyrite Zone (11 holes), the Causeway Zone (4 holes), the Larder Zone (2 holes) and the Quartz Zone (1 hole). In addition, six "scout" holes were completed for a total of 53 holes so far in 1995. At the Bif/North Islands Zone, 19 of the 28 holes intersected 42 mineralized BIF segments ranging in width between 0.4-8.8 m and grading 4.5 to 17.1 g/t Au (average, 9.8 g/t Au across 2.38 m). At the Horseshoe/Pyrite Zone, 6 of the 11 holes intersected 26 mineralized BIF segments ranging in width between 0.4-10.9 m and grading 2.06 to 25.9 g/t Au. At the Causeway Zone, 3 of the 4 holes intersected mineralized BIF segments ranging in width between 0.5-2.2 m and grading 4.8 to 12.1 g/t Au. Two holes into the Larder Zone intersected 8 mineralized BIF segments ranging in width between 0.7-4.7 m and grading 4.7 to 8.2 g/t Au. A hole into the Quartz Zone returned 1.6 m grading 9.2 g/t Au.

Royal Oak Mines Inc. drilled 34 holestotailing4418 m On the Kim and Cass deposits (86 B/3)(11 in Fig. 2) at Indin Lake to outline reserves. The deposits have an indicated geologic resource of 3,700,000 tonnes grading 2.67 g/t Au containing 8900 kg of gold. If feasible, it is planned to mine the ore and mill it at Colomac, nine miles to the northeast.

Royal Oak Mines Inc. mapped the AGEZ, FREZ, SPAN 1, CARJON 3, and CARJON 5 claims at a scale of 1:4800 in the Colomac Mine area (86 B/6)(12 in Fig. 2). A total of 925 rock and soil samples were taken for geochemical analyses. Approximately 3000 m of drilling was completed south of the pit

Royal Oak Mines Inc. mapped and prospected their RO9-11 and RO13-18 claims of their Chalco Lake gold and base metal property (86 B/6) (12 in Fig. 2). They mapped the reestablished BAT2 grid at 1:5000 and collected 94 rock and 137 channel samples.

BHP Minerals conducted property-scale mapping and geochemical sampling on the HELA and TAIGA 1-4 claims (86 B/6) (12 in Fig. 2). A magnetometer and VLF survey was conducted over a nine kilometre grid on the TAIGA 3 claim.

ITCHEN-CONTWOYTO-NAPAKTULIK LAKE AREA

Echo Bay Mines Ltd. drilled 19 holes totalling 2477 m to test for gold in iron formation on the Ski lease (s6 H/9, 10)(13 in Fig. 2).

* **Inmet Mining Corp. (formerly Metall Mining Corp.) drilled six holes totalling** 4228m on the Inukshuk satellite zone of the Izok Lake volcanogenic massive sulphide deposit (86 W1O) (13 in Fig. 2). Down-hole EM surveys were completed on all holes. The best results, from Hen 366, returned 1.0% copper, 6.9% zinc and 90 g/t silver over 2.7 m. Select core samples were submitted for whole rock geochemistry to determine the protolith of altered rocks. Inmet Mining Corp. is presently looking at the logistics of developing an open pit mine on their Izok Lake property.

Echo Bay Mines Ltd. mapped and drilled iron formation in search for satellite gold deposits in the Lupin Mine area (76 E/11,12) (15 in Fig. 2). A 1:2500-scale map was completed on the Gossan grid, which is on property under option from Aber Resources and Barrenlands Expiration. A total of 500 samples were collected for geochemical analysis. A 14-hole diamond drill program totalling 877 m was completed on the Aber South lease under option from Aber Resources and Barrenlands Exploration. On the Dune zone of the Butterfly property, optioned from Cominco, Aber Resources and Cogema, eight holes totalling 475 m were drilled. Two holes totalling 150 meters were drilled on the FIN lease, optioned from Aber Resources.

BEECHY LAKE-BACK RIVER-HOOD RIVER AREAS

Covello, Bryan and Associates conducted follow-up geology on base metal targets in the Hackett River region for **Allyn Resources (76 F/16) (16 in Fig. 2).**

HIGH LAKE, ANIALIK AND TAKIJUK BELTS

BHP Minerals completed drill programs and magnetometer/VLF surveys on their BAMAKO 6 (76 M/3)(18 in Fig. 2), and PULSE/KINDLE (76 L/15) (17 in Fig. 2) claims. Six holes totalling 328 m and 13 holes totalling 1254 m, were drilled on the Bamako and Pulse/Kindle properties respectively. A 5-hole drill program totalling 273 m was completed on their CYGNET claim (76 M/10) (20 in Fig. 2).

* **Continental Pacific Resources Inc.** (CPRI) completed a $500,000 drill program (17 holes, 2000 m) to probe the Run Lake massive sulphide deposit in the Anialik Belt (76 M/11) (19 in Fig. 2). Best intersection was 6.29 m grading 10.44°/0 Zn,

0.56% Cu, and 84 g/t Ag and, in the same hole, 1.2 m grading 1.5 l% Pb, 344.2 g/t Ag, and 1.37 g/t Au. A hole drilled beneath this intersection penetrated 4.22 m grading 9.45% Zn, 0.95% Cu, and 70 g/t Ag, and an additions 1.22 m grading 5.93% Zn, 1.9°/0 Cu, and 262.6 g/t silver. CPRI also drilled 4 holes at the nearby Telly gold prospect, none of which intersected significant mineralization.

Continental Pacific Resources Inc drilled 2 holes at the Hood #8 deposit (86 I/2) (14 in Fig. 2), both of which intersected significant base-metal mineralization in strata complicated by faulting.

HOPE BAY BELT

Property-scale mapping and geochemical sampling was conducted by BHP Minerals on several of their claims throughout the belt. Magnetometer/VLF surveys and drill programs were conducted on BHP's BOSTON (76 0/9)(21 in Fig.2), KOIG (76 0/16,77 A/3), and TOK claims (77 A/3) (22 in Fig. 2) of the Windy Lake Project on Nunavut land (drilling details not reported). Reported drilling included: 10 drill holes, 2498 m, on the Boston property and 6 drill holes, 985 m, on Koig property. Drill programs on the MADRID 1 (77 A/3) claim and KAMIK (76 0/15) claims consisted of five holes totalling 562 m and four holes totalling 487 m respectively.

SLAVE DIAMONDS

Jennifer Pen, NWT Geological Mapping Division, DIAND

Adex Mining, Lucero Resources and United Compass Resources drilled 1172 metres in six holes on their MacKay Lake property (76D/1)(1 in Fig. 3).

Advance International and their partner, Major General spent approximately $80,000 to complete an aeromag survey of their GTEN claims, in the Drybones Bay area (851/3,4).

Aquila Energy conducted a ground mag survey on their claims in the Moose Bay area (851/4).

Archon Minerals flew a mag and EM survey of their claims in the Inglis Lake area (850/2,3,7). They also drilled approximately 1800 m in 6 holes (2 in Fig. 3).

Ashton Mining of Canada Inc. spent approximately $2.5 million exploring their numerous joint venture properties in the Slave Structural Province during 1995. Approximately 2200 till samples were collected on properties in 75M, N & O; 76B & G; 850 & P; and 86A, B, G & H. More advanced work was done on three properties, the Cross (85P/6 & 11, 3 in Fig. 3); Noront #1 (75M/7, 4 in Fig. 3); and the Roundrock property (86A/3, 6,11 & 12,5 in Fig. 3).

Ashton and partners Pure Gold and Tenajon did detailed till sampling and detailed helicopter-borne magnetometer and ground magnetometer surveys on their Cross property. During their surface investigations, they discovered one kimberlite that is covered by 1 meter of overburden; this brings the number of kimberlites discovered on the property to 3. Exact surface dimensions of the new kimberlite, the Ursa Pipe, are not known; however, distribution of country rock granite outcrops indicate that the pipe will. in all likelihood, be less than 1 hectare. Approximately 2.5 tonnes of material were extracted by hand trenching and sent for diamond analysis.

Ashton and partners Noront and pure Gold Resources flew a magnetometer and EM survey on their Noront # 1 property, from which they identified 13 high-priority anomalies. Detailed till sampling and ground magnetic surveys were also completed.

On their Roundrock property, Ashton and partners Pure Gold. Lytton and Texas Star completed low-level helicopter-home magnetometer and ground magnetometer surveys.

Athabasca Gold Resource Ltd spent around $200,000 exploring their Warburton Bay property (75 M/13, 76D/4). An airborne magnetometer survey was completed, approximately 300 till samples were collected and ground magnetometer surveys were run on 12 grids (6 in Fig. 3). They also drilled a 116-m hole to test for kimberlite near the Nicholas Lake gold prospect (85P/4, 5)(7 in Fig. 3).

BHP Diamonds& DiaMet collected 200 till samples from their Lac de Gras claims (76D/9-1 1; 14-16) (8 in Fig. 3). They completed 398 line-kilometers of ground magnetometer surveys on 29 grids and 176.5 line-kilometers of HLEM surveys on 24 grids. Approximately 10,000 meters of core were drilled in 46 holes, and 13 kimberlites were discovered. Two large-diameter core holes totaling 410 meters were drilled, from which approximately 15 tonnes of kimberlite were recovered. A total of 14,750 m were drilled in 64 holes with a reverse circulation rig and 2600 tomes of kimberlite were recovered for diamond analysis. Surface bulk samples weighing 900 tonnes were collected. Evaluation of additional parcels of diamonds was completed. An Environmental Impact Statement was submitted. Four other pipes tested in 1995 (Cub, Grizzly, Arnie and Mark) had grade and initial quality assessment indicating that these pipes are of insufficient economic value to warrant additional work at this time; details were not released. See Table 4.

Canamera Geological spent $9,125,000" exploring for diamonds and base metals on the Lytton/New Indigo joint-venture properties in the northern Slave Province (76E, K, L, M, N, 86H, I &P) (9 in Fig. 3). They collected 2509 till samples, completed 350 line-kilometers of ground magnetometer surveys on 16 grids, 110 line-kilometers of resistivity surveys on 12 grids and a 17 line-kilometer horizontal 100p EM survey on 1 grid. They also did detailed (1 :2000 & 1:5000) mapping on two grids and drilled 14,550 m in 104 holes to test 47 targets. Two kimberlite pipes, the Jericho North arid South were discovered and delineated. The Jericho pipe is diamondiferous and is being bulk sampled (Table 5).

Canamera Geological spent $4,450,000 exploring for diamonds on Mountain Province/Glenmore Highlands AK/CJ claims (75N/5,6,8-12, 15)(10 in Fig. 3). They collected 1562 till samples, flew 1466 line-kilometers of magnetometer surveys, did ground mag surveys on 3 grids and a resistivity survey on 1 grid. Detailed mapping (1:2000) was done on one grid and 1:10,000 scale mapping done on the AK claims. Fourty-five holes totalling 7300 m were drilled to test 10 targets. One kimberlite, the 5034 pipe, was discovered, sampled and delineated. It is estimated that there are 1 8,300,000 tomes of kimberlite to a depth of 300 meters (Table 6).

TABLE 4: SUMMARY OF 1995 DIAMOND SAMPLING RESULTS. BHP DIAMONDS PROJECT

PIPE	WEIGHT (tonnes)	CARATS	CARATS/TONNE	$/CARAT	$/TONNE
PANDA*	217	275	1.27		
		317		US$ 113	
MISERY"	905	3,885	4.29		
		3,217		US$ 24	
KOALA*	205	505	2.46		
		501		USS 142	
FOX*	251	65	0.26	US$ 101	US$ 26.26
PIGEON	154	60	0.39	Uss51	US$ 19.89
LESLIE	680	223	0.33		

• Diamond parcels evaluated, in addition to those done in 1! 94.

TABLE 5: DIAMOND SAMPLING RESULTS, JERICHO PIPE

HOLE #	WEIGHT (kg)	MICRO'S	MACRO'S	MACRO'S >1mm	MACRO'S >2mm	CARATS
JD-0 12	108.46	218	128	24	4	
JD-0 14	229.56	580	102	14	.	
JD-O 16	162.70	272	108	35	3	
JD-0 I 7	102.90	112	37	59	2	
JD-026	206.77	387	200	59	2	
JD-028	464.52	318	288	71	7	
JD-029	103.10	45	21	5		
JD-033	381.50	199	250	61	5	
JD-035	547.73	381	558	174	16	
JD-040	108.00	77	72	13	.	

Canamera collected 278 till samples, did 1:2000 scale mapping on one grid and drilled 350 m in one hole on the ITL Capital, Ming Financial, Riley Resources joint venture property in the Lac de Charloit region (75N/16) (11 in Fig. 3). Project expenditures were approximately $500,000.

Canamera spent approximately $500,000 and collected approximately 500 till samples from Lytton Minerals Ice claims (76E/3-7). They also collected 26 till samples for Consolidated Texas Northern on their property in 75N, with project expenditures of around $50,000.

Chapleau Resources spent approximately $400,000 on their Back River property (76B/9 to 16) where they drilled approximately 1800 meters in 12 holes (12 in Fig. 3). They also spent approximately $700,000 to collect over 700 till samples from their Hoarfrost properties, a series on non-contiguous claims in the southeastern Slave Province(751U13- 15; 75L/ 12-14; 75M/3, 4; 75N/3, 4; 85P/1).

Dave Smith of Yellowknife drilled three holes totalling approximately 150 m to test kimberlite targets in the Dry bones Bay area (851/3,4) (13 in Fig. 3).

Gerle Gold Ltd operated three diamond exploration projects in the Slave Province in 1995. Gerle and partner Monopros Ltd spent approximately $800,000 on their Doyle Lake project (75N/1 to 8) where they collected 775 till samples, flew 7500 line-kilometres of fixed-wing mag surveys and completed 883 line-kilometres of detailed helicopter-borne magnetometer surveys (14 in Fig. 3). Ground truthing of airborne magnetic targets and additional claim staking was also completed.

TABLE 6 : DIAMOND SAMPLING RESULTS. 5034 KIMBERLITE

HOLE #	WEIGHT	MICRO'S	MACROS	MACRO'S >1mm	MACRO'S >2mm	CARATS
AK002	183.93	1394	295	51	8	
AK002c	35.42	85	17	3		
AK002e	220.96	234	45	15	2	
AK002f	99,05	224	72	12	2	
AK002h	30.95	14	1			
AK002i	97.85	71	21	4	1	
AK002n	165.75	378	125	32	1	
AK002o	101.45	256	82	26	1	
AK013	78.10	315	57	11	1	
AK016	159.75	759	135	12	1	
AK022	36.75	66	32	3		
AK023	427.08	748	470	122	14	
AK025	65.80	161	52	7		

Gerle, their partners in the Slave Diamond Syndicate (Norcal Resources, Tenajon Silver, Westley Technologies) and Monopros Ltd had joint ventures on two projects, one in the Fishback Lake area (85J/9, 10, 15,16; 850/1,2) and the other in the Dessert Lake area (85F/16; 85G/13-15; 85J/3-6; 85 K/1,2,8). They spent approximately S220,000 exploring at Fishback Lake (15 in Fig. 3) where they flew 750 line-kilometres of detailed helicopter-borne magnetometer surveys, did ground follow-up of airborne magnetic anomalies and drilled 574 metres in 5 holes. In September, an agreement was reached with Archon Minerals allowing them to eam an interest in the project, subsequent to which Archon flew an EM/Mag survey on the claims. On the Dessert Lake project (16 in Fig. 3) they completed 980 line-kilometres of detailed helicopter-borne magnetometer surveys and 86 line-kilometres of ground magnetometer surveys on 7 grids. They also drilled 1580 metres in 12 holes. Total expenditures on this project were approximately $665,000. In August, Monopros terminated its option on this property due to delays in drilling caused by native concerns. Further exploration on this project is on hold pending the outcome of negotiations with the Deh Gah Got'ie Dene Council of Fort Providence.

GMD and Fortune Minerals flew a geophysical survey of their Mud and Dialamart claims in the Lac la Martrc area (85K/13, 14). GMD also collected 320 till samples and flew a 14,805 line-kilometre mag & VLF-EM survey on their Royce property which is made up of the Pan D, Ice and Wheel of Fortune claims (850/5,7, 10-12) (17 in Fig. 3). Indicator minerals with favorable chemistry, including extremely high-Cr, low-Ca G- 10 pyropes, were recovered from a number of samples.

Kennecott Canada Ltd conducted an aggressive diamond exploration program in the Slave province. Their largest project was on the Diavik (Aber) joint venture property (76C/5,6, 10,11 & D/8,9) where they incurred expenditures of approximately $11.7 million (18 in Fig. 3) (Table 7). They collected 897 till samples and flew 5384 line-kilometres of low-level helicopter-bome magnetometer surveys. Ground geophysics included312 line-kilometres of mag surveys on 52 grids, 168 line-kilometres of EM surveys on 56 grids and 23 line-kilometres of gravity surveys on 9 grids. Fourty holes totalling 6031 m were drilled to delineate known pipes and to explore for more kimberlites and test their diamond potential; 6 new pipes were discovered. Ten large-diameter (15-cm) holes were drilled to obtain mini-bulk samples of the A 154 pipes; in total 69.4 tonnes were recovered from 2366 m of kimberlite. Bathymetric surveys were done in the vicinity of the A 154 pipes and a decline was collared in order to obtain a bulk sample from A 154. Kennecott also explored 5 other properties. On their Mackenzie property (76D/8,9, 14), with partner Southern Era, they spent approximately $105,000 and collected 51 till samples, flew 1913 line-kilometres of low-level helicopter-borne magnetometer surveys, completed 18 line-kilometres of ground magnetometer surveys on 3 grids, 15 line-kilometres of EM surveys on 5 grids and 2 line-kilometres of gravity surveys on one grid (19 in Fig. 3). They also drilled 284 m in 2 holes; no kimberlites were discovered.

On their wholly-owned Seahorse property (76D/5,6), Kennecott incurred expenditures of approximately $450,000 to collect 535 till samples, flew 3125 line-kilometres of magnetic and resistivity surveys, completed 24 line-kilometres of ground agnetic surveys on 4 grids and a 2.5 line-kilometre EM survey on 1 grid (20 in Fig. 3).

Kennecott collected 229 till samples and flew 1794 line-kilometres of mag & resistivity surveys on their Pellat Lake property (76C/12). Expenditures were approximately $200,000.

On the ATW property (76 D/1 ,8), with joint venture partners Almaden, Troymin and Williams Creek, Kennecott spent

$ 135,000. They collected 87 till samples, flew 439 line - kilometres of low level helicopter-borne magnetometer surveys, completed 24 line-kilometres of mag surveys on 4 grids and a 3 line-kilometre EM survey on 1 grid. Two holes were drilled, totalling 304 metres; no kimberlites were discovered (21 in Fig.3).

TABLE 7: SUMMARY OF DIAMOND SAMPLING RESULTS FROM CORE DRILLING, DIAVIK PROJECT

HOLE #	WEIGHT (kg)	MICRO'S	MACROS	MACRO'S >1mm	MACRO'S >2mm	CARATS
A21-5	219.7	109	44	12		
A21-6	56.8 kg	25	7	0		
A21-7	70.7 kg	15	6	3		
A21-8	164.3	69	29	5		
A21-9	362.1	272	92	31	2	
A21-11	275.0	180	8	25		
A418-1	397.8	487	235	54	5	
A418-2	707				29	2.56
A4 18-3	310.4	288	143	30		

TABLE 8: SUMMARY OF DIAMOND MINI-BULK SAMPLING RESULTS, DIAVIK PROJECT

HOLE #	WEIGHT (tomes)	CARATS	CARATS/TONNE	$/CARAT	$/TONNE
A154 SOUTH					
LDC-0 1	7.37	35.7	4.8		
LCD-02	5.30	25.7	4.8		
LCD-03	7.91	36.7	4.6		
LCD-05	8.61	38.8	4.5		
LCD-06	6.29	29.0	4.6		
LCD-OS	5.90	22.0	3.7		
LCD-09	7.76	40.5	5.2		
LCD- 10	7.34	27.1	3.7		
TOTAL	56.5	255.6	4,5	US$ 56.70	US$ 255
A 154 NORTH					
LCD-04	8.10	18.1	2.2		
LCD-07	4.80	10.5	2.2		
TOTAL	12.9	28.6	2.2		

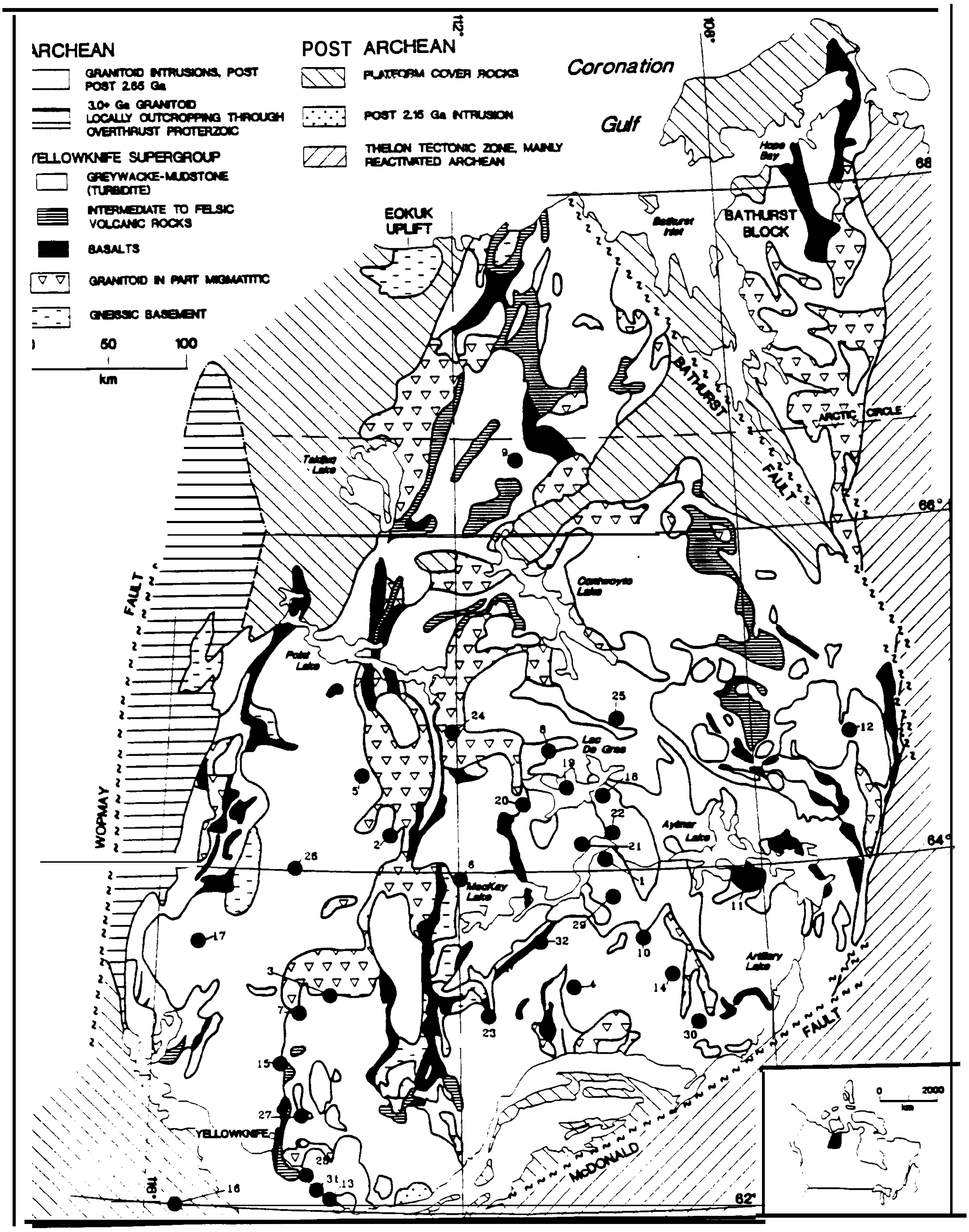


Figure 3: Diamond Exploration in the Slave Structural Province, 1995

Kennecott spent approximately S 125,000 on their DHK properties (WO, DHK & WI claims, 76D/8, 10,11) where they are in joint venture with **Dentonia Resources, Horseshoe Gold and Kettle** River Resources (22 in Fig. 3). They collected 106 till samples, completed 24 line-kilometres of mag surveys on 4 grids, 6 line-kilometres of EM surveys on **2 grids and 15** line-kilometres of gravity surveys on 6 grids. Two holes, totalling 209 metres were drilled, but no kimberlites intersected.

Major General spent approximately S88.000 to fly an 800 line-kilometre magnetometer survey of their Origin Lake claims (86B/5,6,11,12).

Mongolia Gold Resources conducted a preliminary reconnaissance till sampling program on their property located 70 km north-northwest of Yellowknife.

Monopros explored a number of properties in the Slave. They collected 1940 till samples from their Misty Lake property (75N/4,5) (23 in Fig. 3) where they are in joint venture with **SouthernEra, Major General and the International Diamond Syndicate (Agate Bay Resources, Teryl Resources and Calco Resources). Previous work on this property by the joint venture partners in 1995 included till sampling, approximately 1500 line-kilometres** of airborne geophysics (mag) and drill testing of eight magnetic anomalies with 9 holes totalling approximately 1000 m. No kimberlites were intersected in this initial drill program.

Monopros flew 3668 line-kilometres of helicopter-borne magnetometer and EM surveys and did 20 line-kilometres of ground magnetometer surveys on their Lake Providence property (76D/5-7, 11-3; 86A/8-1 1, 14-16) (24 in Figure 3). They also completed 796 m of core drilling in 6 holes and 403 m of reverse-circulation drilling in 35 holes.

On their Hardy Lake property (76C/12, 13; 76D/9, 16), **Monopros collected 280 till samples and flew 3550 line-kilometres** of helicopter-borne magnetometer and EM surveys. They drilled 1016 m of core in 10 holes and did 522 m of reverse circulation drilling in 32 holes (25 in Figure 3).

At Upper Carp Lake (85P/5,6,11-14; 850/7-10,15,16; 86A/3-6; 86B/1 ,2,8) **Monopros** collected 2464 till samples, flew approximately 1000 line-kilometres of helicopter-borne magnetometer surveys and did 120 line-kilometres of ground magnetometer surveys (26 in Figure 3). At Rockinghorse Lake (76E/13, 76L/4, 86H/16, 861/1), Monopros collected 847 till samples and flew 3600 line-kilometres of helicopter-borne magnetometer surveys. They collected 411 till samples from their Wolverine Lake property (75 M/3,6) and 20 till samples from their Kikerk Lake property (861/14; 86P/2,3,6,7,10,1 1).

On the Barnston Lake Joint venture with **Noble Peak & SouthernEra (75 M), Monopros collected 1787 till samples.**

Shane Resources and partners drilled approximately 243 m in one hole to test a geophysical anomaly at Ryan Lake (85J/9) (27 in Figure 3).

SouthernEra and partner Allyn Resources spent approximately S250,000 on their Aylmer Lake South property (76C/1,2) where they collected 317 till samples.

SouthernEra and partner Caledonia collected a few till samples, completed 1200 line-kilometres of helicopter-home magnetometer surveys, did 22 line-kilometres of ground mag and EM on 4 grids **and drilled** 920 metres in 3 holes on their Drybones Bay property (85 I/3-6; 85J/1,8) (28 in Figure 3). No kimberlites were intersected. Cost of the program was around $250,000.

On the MacKay and Back Lake properties (75M/9, 10,15,16; 75N/11- 14) (29 in Figure 3) SouthernEra and partners **Kennecott Canada and Kalahari collected 2500 till samples, completed 300 line-kilometres of airborne mag and** EM surveys **and** 800 line-kilometres of airborne magnetometer surveys. Ten line-kilometres of ground mag and EM surveys were completed on one grid and 9.5 line-kilometres of mag surveys done on two other grids. Further airborne geophysics and till sampling is planned. Total expenditures on the project to date are approximately S800,000.

Storimin drilled 380 metres in one hole on their properties in the southern Slave Province (851).

Tanqueray Resources Limited and partners Mill City, **Almaden** and **Williams** Creek spent approximately $900,000 evaluating their Cook Lake Property (75N/1 ,2; 30 in Figure 3). They flew 4800 line-kilometres of magnetometer and EM surveys and collected 504 till samples. Results from the processing of some of the till samples are pending.

Tradewinds Resources Limited spent approximately S405,800.00 exploring the Drybones Bay kimberlite (851/4;31 in Figure 3). They completed 14.2 line-kilometres of magnetometer surveys and drilled 1416 metres in 8 holes. Microprobe analyses of indicator minerals and caustic fusion analyses to recover diamonds were completed. Ten macrodiamonds and 11 microdiamonds were recovered from 421 kilograms of core.

Winspear Resources Ltd and partners **Aber, Amarado Resources and Consolidated Newgate Resources** spent approximately S 1,600,000 exploring their Camsell Lake property (75M/6 - 11, 14) (32 in Figure 3). They collected approximately 1100 till samples, flew a 2804 line-kilometre high-sensitivity helicopter-borne mini-mag survey, completed 100.3 line-kilometres of **HLEM ground** geophysical surveys on 17 grids and did a 4.2 line-kilometre gravity survey on one grid. They also drilled 3028 metres in 18 holes. The drill program was designed to test 13 geophysical anomalies for the presence of kimberlite and to further delineate and sample the CL-25 pipe. One kimberlite, CL-174 was discovered approximately 150 metres north of their CL-25 pipe. Caustic fusion analyses of 51.1 kg of kimberlite from the CL-174 pipe yielded 44 diamonds.

BEAR STRUCTURAL PROVINCE

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Darnley Bay Resources plan to start their first phase of geophysical exploration on their permits in the Brock Inlier area near Paulatuk (97 A-D) (9 of Fig.4).The exploration target is a large gravity anomaly possibly associated with ultramafic intrusion hosted Ni-Cu-PGE's, similar to the Sudbury Basin.

Fortune Minerals Limited in joint venture with an undisclosed junior mining company **(20% earn in)** completed a 1:10,000-scale magnetometer-resistivity-radiometric airborne survey to evaluate Co-Bi potential of the NICO claim group in the Lou Lake area (85 N/10)(1 of Fig.4). Follow-up exploration consisted of: reconnaissance and 17 km detailed gravity survey; I :5000-claim scale mapping and 1:2000-scale mapping of the NICO and BURKE grids; and trenching /sampling. A total of 292 rock samples were collected on the NICO Claims for assay and whole rock. The new Summit Peak showing, on the NICO claims, was trenched and returned grades up to 9.44% Cu, 0.469% tungsten, and 1.2 g/t gold. The mineralized structure was discontinuously traced for 2.5 km strike length and remains open along strike. A trenched zone of 300 meters continuous mineralization returned a length-weighted average of 0.73% copper over 44 meters with local grades up to 2.53°A copper. The newly discovered Bowl Zone, 800 meters from Summit Peak, returned grades up to 1.4% cobalt, 0.49% bismuth, 8.4 g/t gold and 0.4 1% copper from a 280 by 400 meter defined zone and remains open along strike. The gravity survey identified a 1 mGal bulls-eye gravity anomaly over an area of at least 2000 by 600 m, coincident with the Bowl Zone and the centre of a coincident magnetic and potassium-uranium anomaly. The new Rare Element Zone (15 X 200 m), 200 meters from the Bowl Zone, returned up to 0.74% copper and up to a few percent rare-earth-element enrichment. Additional showings of undefined dimensions includes the Chalco Lake, Derek, and Nico Lake Zones with assays up to 2.10% Cu, 1.0% Co, and 1.6 g/t gold. A 600 by 400 m 1.75-mGal gravity anomaly is coincident with the Burke Lake showing which returned up to 4.69 g/t gold, 0.73% Co, 0.74% Bi, 0.84% Zn, 0.22% Pb, and 0.93% Cu.

Fortune **Minerals Ltd. conducted a 100 m-spaced 299 km airborne magnetometer-resisitivity-radiometric survey** followed by selected gravity survey over their OLYM-PK-DAM claim group (85 N/10, 15)(1 of Fig.4). Limited follow-up sampling was conducted; **assays are pending.**

Fortune Minerals (exploration manager) in joint venture with GMD Resources Corp.(60% earn in) contracted a 100 m-respaced 597 kilometer airborne magnetometer-radiometric-resistivity survey over their JBG claim group (85 N/l O) (1 of Fig.4), 3 km northeast of the NICO claims. A ground gravity survey was conducted with follow-up detailed traverses. Carbonate Mountain and Ron Extension showings were gridded and mapped at a scale of 1:2,000; the JBG 1-6 claims were mapped at 1:5,000-scale. Polymetallic (Co-Bi-Ni-Cu-Ag, Pb-Zn) showings were trenched and a total of 128 rock samples were collected. Significant assays returned include 7.360/. Zn, 3 .80% Pb and 1.39% Cu.

Fortune **Minerals, managers for GMD Resources Corp. (100% earn in), completed a 100 m-spaced 353 km magnetic-resisitivity-radiometric airborne survey over the** TREASURE **and** ISLAND claim groups (85 N/7,10) (1 of Fig.4), near the NICO Discovery, **Reconnaissance gravity survey was followed-up** by detailed gravity over select areas. A significant hydrothermal alteration zone, inferred from the GSC radiometric survey, occurs across the NICO-TREASURE claims boundary and a 29-mGal gravity anomaly from Fortune Mineral's survey is coincident with the ISLAND claims. The Duke showing was grid-mapped at a scale of 1:5,000; TREASURE, ISLAND 1 to 4 were mapped at 1:5000-scale. Twenty-nine samples were collected for geochemistry. Up to 2.00'?!oCuancl3.710/0 Co were returned from old trenches in a nine-meter-wide mineralized fracture zone. New trenches returned values of 0.1570 Co, 0.35% Bi, 0.05% Ni and traces of gold from a 2.8 meter-wide zone.

Westminer Canada evaluated polymetallic targets on the SQU and JAZ claims (85 N/IO, 11)(2 of Fig.4), Mazenod Lake area. The exploration program consisted of rock and soil sampling and **mapping.**

Dave Nickerson of Yellowknife prospected, mapped, trenched. and completed EM 16 and beepmat surveys on the LCL claims at Little Crapeau Lake (85 I/11)(3 of Fig.4). Four gossanous zones discontinuous over a strike length of 1 km have been defined. Rock samples from gossans consistently carry gold in the hundreds of ppb range with the best assay up to 3 g/t gold.

Noranda Exploration (50%), in joint venture with Rhonda Mining (50%), expended 1.2 million dollars on mapping, magnetometer, 1P, HLEM surveys and drilling on the Epworth Project (86 P,I,J,O) (4 of Fig.4) near Kikerk Lake. Their main target was sediment-hosted stratiform copper similar to the African Copperbelt. Ground geophysics consisted of: 32 km of IP over 11 grids; 114.5 kilometers of HLEM over 8 grids: and 75.7 kilometers of Magnetometer surveys over 19 grids. Regional mapping at 1:50,000-scale and 1:20,000-scale was carried out over the property and showings; 1:5000 and 1:2500-scale maps was completed over the WB, Esker, Musket North. Payback North showings, and as follow-up to airborne magnetic **anomalies.** Thirteen holes (1537 meters) were drilled into the WB, CBC, and Payback North copper showings. A total of 500 core and rock samples were collected for geochemical analysis.

Noranda Exploration (50%)-Rhonda Mining (50%) joint venture followed-up airborne and indicator mineral trains from 1994 diamond exploration on their property (86 I, J) (4 of Fig.4). A total of 143 samples were collected.

Canamera prospected their MU claims on the Muskox Intrusion, (86 J/2,6,7,10,1 1,14)(5 of Fig.4).

Norman Hennel prospected and trenched the Scandium claim for rare earth elements (86 K/4) (6 of Fig.4).

Kennecott conducted a reconnaissance gold and base metal exploration program in the Bear Province.

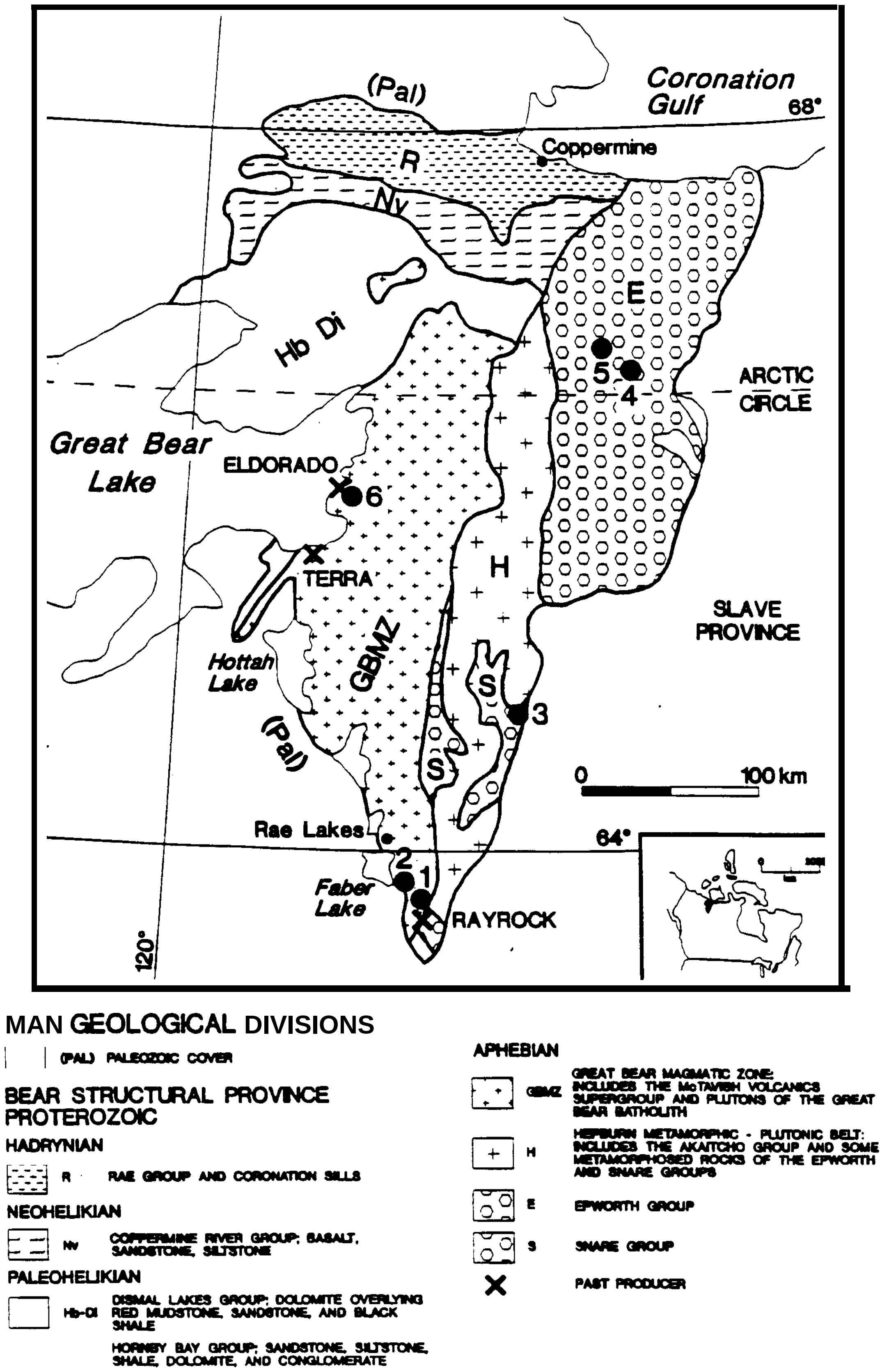

Figure 4: Mineral Exploration in the Bear Structural Province, 1995

S.W. RAE STRUCTURAL PROVINCE of the NWT

S.P. Goff, NWT Geological Mapping Division, DIAND

Covello Bryan & Associates, on behalf of Aber Resources, completed ground HLEM and magnetometer surveys, plus mapping, and drilled 13 holes (2430 m) on the gabbro-pyroxenite-hosted Ni-Cu deposit underlying the ANKI claims at Thye Lake, north of Selwyn Lake (75 A/7)(1 in Fig.5).

ARCTIC ISLANDS

Jennifer Pen, Pamela Strand & Steve Goff, NWT Geological Mapping Division, DIAND

Ascot Resources Ltd and partner Major General flew a magnetometer survey covering 863 line-kilometres at a 50-metre line spacing on their prospecting permits on Victoria Island (NTS 77C/9, 10, 15; D/12; & F/2; 1 in Fig.6). They also collected and processed 65 till samples from the vicinity of indicator mineral anomalies discovered during the 1994 sampling program. Chromites, olivines, eclogitic garnets and G-9 and G- 10 pyrope garnets were recovered from both the 1994 & 1995 samples; distribution of indicator mineral groins and surface textures suggest a nearby kimberlite source.

BHP Minerals Canada Limited explored for lead and zinc on their claims and prospecting permits (PP1493 to 1495& 1774) on Cornwallis Island (58F/14; 58 G/2,3&6; 2 in Fig. 6). They did reconnaissance mapping and soil sampling, flew approximately 2700 line-kilometres of airborne magnetometer and GEOTEM-III EM surveys, completed 27 line-kilometres of pole-dipole 1P surveys on 3 grids and 5 line-kilometres of gradient IP surveys on 2 grids.

BHP Minerals Canada Limited also explored for base metals on their prospecting permits (PP 1496 to 1498) on Devon Island (59B/6, 7, 8; 3 in Fig.6) where they did reconnaissance mapping, and rock, soil and stream-sediment sampling. Detailed (1: 10,000 scale) mapping was done on two grids on Prospecting Permits 1496 & 1498. Twenty-five line-kilometres of pole-dipole 1P surveys were completed on two grids and 7 holes totalling 683 metres were drilled.

Cominco Limited explored four properties for base metals (Pb, Zn). They spent approximately $300,00 on their Eclipse property on Little Cornwallis Island (68H/9; 4 in Fig.6) where they did detailed (1: 1,000 scale) mapping, collected 130 soil and 85 rock samples and drilled 2850 metres in 25 holes to test zones of surface mineralization.

Cominco spent about $485,000 exploring on Cornwallis Island (5 in Fig. 6). They prospected, collected 950 soil samples and drilled 4400 meres in 23 holes to test geochemical and geophysical anomalies on their Caribou property (58G/6). On their Abbott River North property (58G/5), Cominco did detailed (1:5000 scale) mapping and completed 62 line-kilometres of IP surveys and 61 line-kilometres of gravity surveys on one grid.

On the Aston Bay pro-on Somerset Island (58C/6, 1 1-13; 6 in Fig. 6), **Cominco spent** approximately $720,000. They did regional prospecting, collected 1600 soil samples and 50 rock samples, and drilled 2465 metres in 14 holes to establish the stratigraphy of the area.

Cyclone Capital processed 580 kg of kimberlite samples that it had previously collected from the JP pipes on its Nikos claim on Somerset Island (58D/6; 7 in Fig.6). Numerous pyrope garnet, corundum and graphite grains were recovered.

Monoproscollected 3360 till samples and did 70 line-kilometres of ground magnetometer surveys on their Victoria Island Prospecting Permits (77E/5,12,13; F/5-16; G/1-8,10,11; H/4,5) (13 in Fig. 6).

Westminer Canada Limited mapped and collected till and rock samples during a 2 week program on the Duke of York Inlier in southern Victoria Island (Pp 1805.1832, 77B/1 1-14, 77C/4,5, 12,13)(8 in Fig.6) and a couple days on the Coronation Sills on the mainland west of Coppermine (PP 1833-1853, 87A/4,5,9, 16, 87B/1 ,7-10). Land use permits have been approved by the Inuvialuit Corporation for a proposed project in the Minto Inlier, central Victoria Island, **and materials have been** mobilized for a 1996 program.

BHP Minerals Canada Ltd. prospected on permits in the Barrow River area, Melville Peninsula (PP 1466-1473; 46 0/4-6)(12 in Fig.6).

International Capri Resources Ltd. discovered a massive sulphide Zn-Pb prospect on claims on Cumberland Peninsula, Baffin Island. The sulphides form stratiform lenses in Proterozoic paragneisses and occur at the contact between massive quartzites and garnet-sillimanite-biotite gneisses. Grab samples from an outcropping bed of sulphide, 500 m **long, contained** 1.1% Zn (26 N)(1 1 in Fig.6).

Nanisivik Mines Ltd. Completed4514 m of exploration drilling on the RAVEN and DEB claims, and the Oceanview, TGS#2 and K-baseline zones (48 C/1)(10 in Fig.6).

CORDILLERAN STRUCTURAL PROVINCE

Pamela D. Strand,NWT Geological Mapping Division, DIAND

Canamera Geological Ltd explored on claims TUN 1-7 covering the Little Nahanni Pegmatite Group (105 I/2). Reserves have been estimated at 45 million tonnes LiO_2 from a grade of 1.2% LiO_2.

San Andreas Resource Corp drilled 40 holes totaling 11,675 meters on the Prairie Creek zinc-lead-silver-copper deposit (95 F/l O). All holes intersected the main vein structure

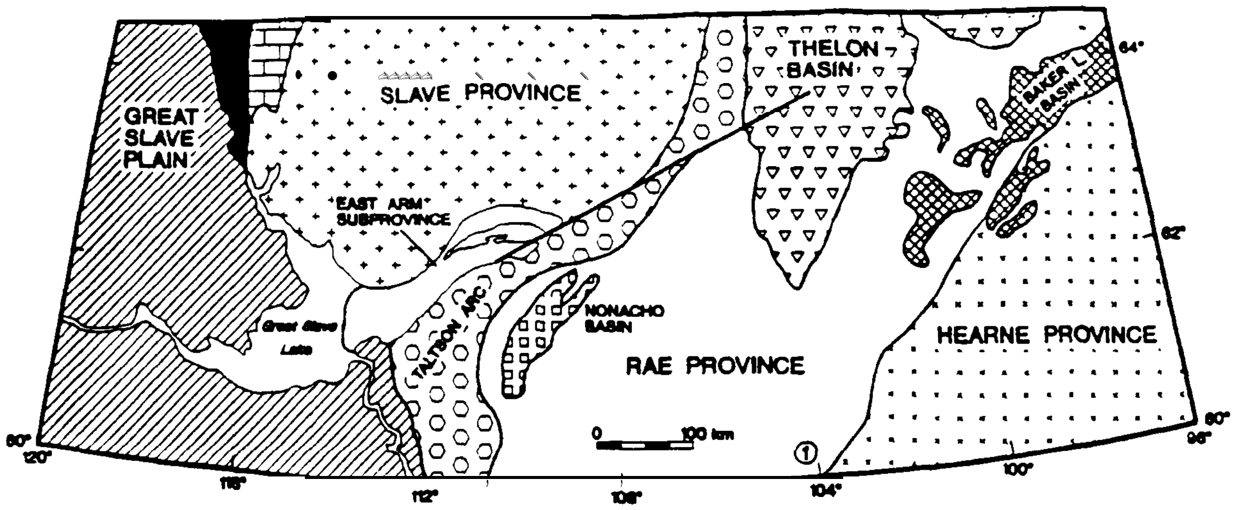

Figure 5: Mineral Exploration in the Southwestern Rae Structural Province of NWT, 1995

extending Zone 3 mineralization 1.25 kilometers beyond the previously known strike length of 0.85 kilometers. Holes were drilled at 200-meter intervals. Results include 5.4m grading 12.5% Zn, 5.6% Pb, 203 g/t Ag, 0.5% Cu (PC-95-122); 3.9m grading 22.9% Zn, 20.4% Pb, 244 g/t Ag, 0.5% Cu (PC-95-109) and 6.4m grading 13.6% Zn, 12.6% Pb, 290 g/t Ag, 0.8% Cu (PC-95-90). Zones 3,4, and 5 were explored for further ver" and stratiform mineralization. Stratiform mineralization, previously found in Zones 3 and 6, was discovered in Zones 4 and 5. Hole PC-95-124 in Zone 5 intersected 1.3m of stratiform pyrite-sphalerite-galena grading 22.7% Zn, 6% Pb, 94 g/t Ag. Zones 1 through 6 were mapped at 1: 2000. program cost totalled $1.2 million. Geological reserves in December 1994 were 5.6 million tonnes, of which 3.6 million tonnes of 120/. Zn, 14.3% Pb, 218 g/t Ag, 0.4% Cu is within the 850-meter strike length of Zone 3. Other work included drill pad construction and access road building. All regulatory processes have been put on hold in order to expand reserves.

Aur Resources has optioned the Cantung deposit (105W16) from Canada Tungsten and are re-evaluating the property.

Firesteel Resources Inc explored their 15700-ha Kap Permit (PP1603) (95M/7) in the Mackenzie Mountains for Zn-Pb-Cd-Ga-Ge mineralization. The Main Showing Grid was mapped at 1:5,000 and 9 samples were taken for assay and specific gravity tests. A gravity survey consisting of 20.9 line kilometers identified several Bouger anomalies in areas of previously discovered Zn mineralization. One anomaly (F) is adjacent to the Main showing where Cominco outlined >50,000 tonnes grading 18.5% Zn by x-ray drilling in 1976. Expenditures total led $80,000.

KEEWATIN REGION

S.P. Goff, NWT Geological Mapping Division. DIAND

Apex Geoscience Ltd., on behalf of Cyprus Canada Ltd. anc Echo Bay Mines Ltd., prospected for gold on permits underlair by metasedimentary rocks of the Prince Albert Group, in th Loughland Lake to Committee Bay area (pp 1330-1334, 1477 1490, 1771-1773; 56 J/10,11,12,14,15, K/3,6 & P/4-7)(1 i Fig.7). (Cyprus Canada Ltd. became the operator in July). Th program included lithogeochemical sampling, a groun magnetometer survey and mapping in selected areas.

Cameco Corp. explored for uranium on permits coverin sedimentary rocks of the Thelon Formation, north of Aberdee Lake (PP 1398-1404, 1455-1458, 1764-1767 & 1782; 6 B/09, 13-16, F/01, G/03,04)(3 in Fig.7). This included outcro and boulder lithogeochemical sampling, drilling and a 70 line km surface gravity survey.

Cogema Resources Inc. explored for uranium by drilling 620 m and performing ground geophysical surveys on a block c leases, claims and permits, covering metasedimentary rocks c the Judge Sissons Lake belt, in the Sissons Lake-Schultz Lak area (66 A/5)(4 in Fig.7).

Comaplex Minerals Corp. prospected and sampled f lithogeochemistry along 18 km of the ENE-trending, high. altered and sheared belt of iron formation at Noomut River, ju east of South Henik Lake (Pp 1793 & 1794; 65 W1OSW I1SE)(14 in Fig.7). The strike of the iron formation is parallel a regional fault which lies just south of the belt. Detail mapping, rock sampling and ground VLF plus total field ar gradient magnetometer surveys were per-formed along a 2 k strike length of the Ironside showing, which is at the southwe end of the belt. This work identified a package of strong

Four grab samples of sheared, silicified volcaniclastic rocks collected 12 km northeast along strike of the Ironside showing yielded gold contents of 3.5 to 70 g/t.

Comaplex Minerals Corp., who are equal partners in a joint venture wrth **Cumberland Resources Ltd., drilled 39 holes** (totalling 6000 m) on the Discovery deposit and nearby targets, which are in the SSE-trending gold-bearing Iron formation of the Meliadine East property, 20 km north of Rankin Inlet (55 J/1 3 &14)(9 in Fig.7).

Drilling revealed the Discovery deposit is controlled by three plunging folds along the same iron- formation unit, with miners.lizauon open to a depth of at least 350 m. The Discovery Main fold is the largest fold and yielded significant gold concentrations in drill intercepts: 9.94 g/t Au over 8 m (hole 95-108), 24.0 g/t Au over 3.5 m (hole 95-114), and S.14 g/t Au over 3.o m (hole 95-111). High gold concentrations were found in the Discovery East fold which gave best intercepts of 1989 g/t Au over 4.7 m (hole 95-106) and 11.31 g/t Au over 43 m (hole 95-118). The pre-1995 drilling mineral inventory for the Discovery deposit, 670000 t of 9.94 g/t Au, is being revised.

Drilling in the three plunging folds of the Capricorn Zone, 400 m west of the Discovery deposit, indicated increasing gold concentration and alteration with depth: the best intercept was 24.69 g/t Au over 3.8 m in drillhole 95-1 16; this in-tbei14323 m vertically below drillhole 95-97 which intersected 13.71 g/t Au over 2.0 m. Drilling on the Pisces West Zone, 400 m east of the Discovery deposit, gave **best intercepts of** 12.34 g/t Au over 2.8 m (hole 95-87) and 14.74 g/t Au over 2.0 m (hole 95-85). One exploratory drillhole (95-112) in the Aquarius grid yielded

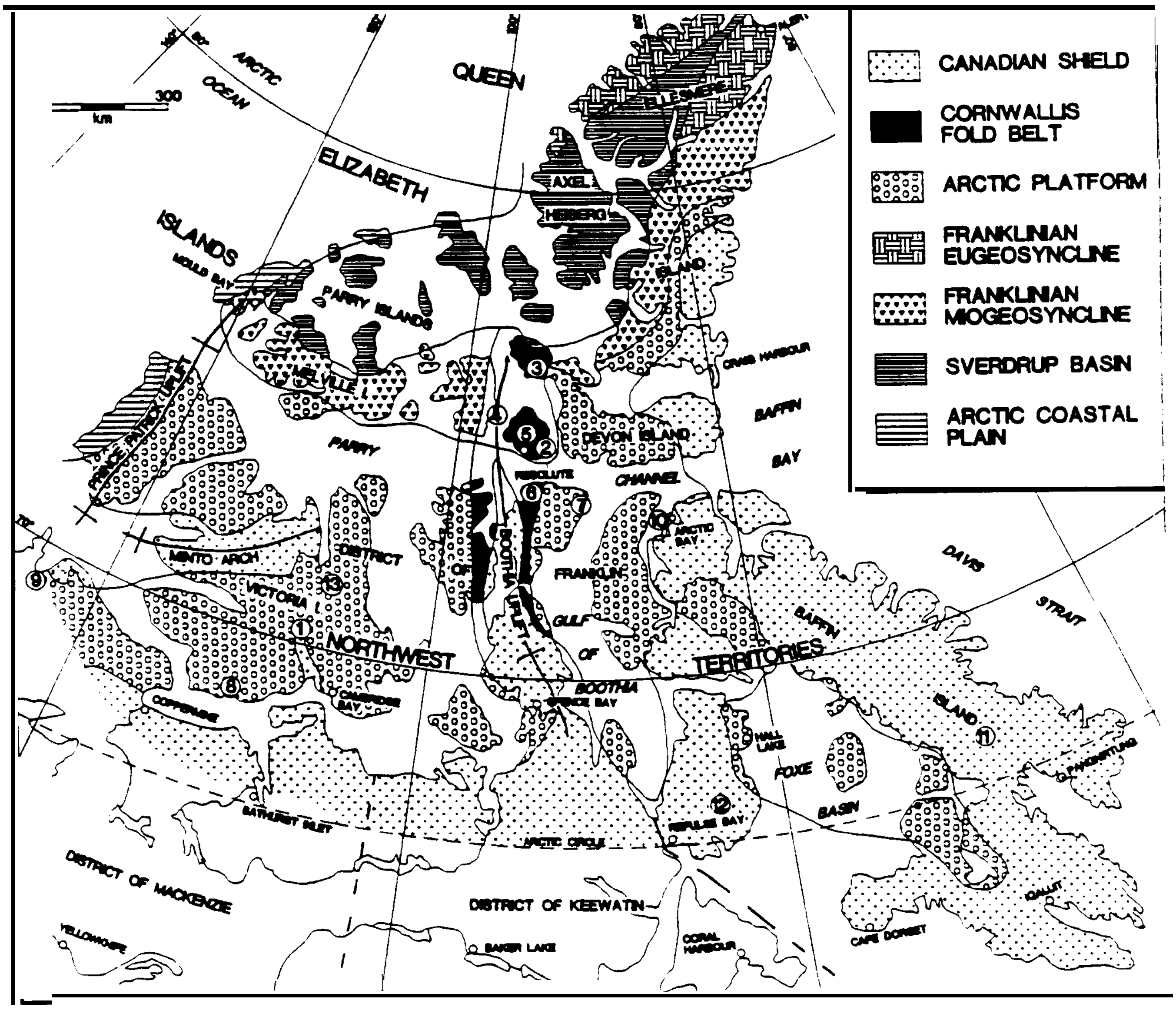

Figure 6: Mineral Exploration in the Arctic Islands. 1995

24.69 g/t Au over 3.8 m m **drillhole** 95- 116; this intercept being 23 m vertically **below drillhole** 95-97 which **intersected** 13.71 g/t Au over 2.0 m. Drilling on the Pisces West Zone, 400 m east of

6.86 g/t over 1 m. Surface gradient and total-field magnetic **surveys** were completed on the **Sinnik**, Capricorn, Aquarius and Pisces E & W grids.

Comaplex Minerals Corp., in joint venture with **Cumberland Resources Ltd.** and **Mattson Creek Resources Ltd., prospected** on permits in the N. **Kaminuriak** Lake area (PP 1783-1786; 55 M/3,4 & 6)(5 in **Fig.7**), and the Banks Lake and **MacQuoid** Lake area (PP 1787-1792; 55 M/8& 9)(6 in **Fig.7**).

*

Cumberland Resources Ltd., in joint venture with **Comaplex Minerals Corp.,** drilled 32 holes (3500 m) on several grids along the northerly trending gold-bearing Third Portage iron formation, on Meadowbank River, 75 **km** north of Baker Lake (66 WI)(2 in **Fig.7**). The Third Portage trend is 5 km long and includes, **from** north to south, the Third Portage deposit (400 m long); South Third Portage zone (300 m long); Goose Island zone (330 m long); SGI **zone** (600 m long); and the Y zone (150 m long).

Seven holes, **totalling** 1100 m, were drilled at Goose Island and **outlined a** gold-bearing **zone** with best intercepts of 9.60 g/t Au over 21.2 m (hole 95-70); 25.37 g/t Au over 6.2 m (**hole** 95-68); and 100.8 g/t Au over 3 m (hole 95-66). The mineralized zone is open in all directions and has been drill tested to a depth of 120 m. Two shallow drill holes (95-65 and 95-67) intersected zones of anomalous gold above the main zone of gold mineralization. The Goose Island zone has an estimated mineral resource of451 000 t of 12.69 g/t Au.

Ten reconnaissance **holes, totalling** 900 m, were drilled on the SGI and Y zones, intersecting zones of strong alteration and yielding intercepts of up to 3.43 g/t Au over 4.88 m.

Fifteen holes, **totalling** 1500 m and spaced 40 m **apart,** were drilled on the **central** portion of the Third Portage **deposit,** expanding **drill-indicated** resources above and below the limits determined by previous drilling. Several **near-surface** gold **zones** were identified: hole 95-86 **intersected** 13.69 m **grading** 17.14 **g/t** Au, and hole 95-88 intersected 13.99 m grading 10.29 g/t Au. Hole 95-87 was drilled on section below 95-86 and **intersected** a gold zone (10 m grading 8.91 g/t Au) below the current limit of the resource. The Third Pottage deposit is within 120 m of the surface and is being examined as an open-pit **minable** resource. The **pre-** 1995-drilling **mineral** inventory is 974,000 t of 6.51 g/t Au.

*

Comaplex Minerals Corp., in joint venture with **Cumberland Resources Ltd.** and **Manson Creek Resources Ltd.,** discovered a NE-striking zone of **Ni-Cu-Co** massive **sulphide mineralization** on claims 80 km east of Parker Lake (55 N/12)(7 in **Fig.7**). This new prospect (the **Suluk** zone) is 3 km southwest of **the Sandhill Zn-Cu** occurrence. The zone of **mineralization** averages 1 m in width at the surface and was sampled for **lithogeochemistry** along a strike length of 550 m. Ten evenly **spaced,** composite grab samples yielded average concentrations of 3.82% Ni, the **Discovery deposit, gave best intercepts** of 12.34 g/t Au over 2.8 m (hole **95-87) and** 14.74 **g/t** Au over 2.0 m (hole 95-85). One exploratory **drillhole** (95-112) **in the Aquarius** grid yielded

2.93% Cu and O. 165% CO. A **ground HLEM survey** indicated a continuous conductive zone over a strike length of 790 m.

The Thirsty Lake **diamondiferous dyke occurs 1 km** southwest of the **Sandhill Zn-Cu** occurrence, on **the same claim** group (55 N/12)(13 **in Fig.7**). **Monopros Ltd.** recovered three **macrodiamonds** and **6677 microdiamonds** from a **7.8** kg **grab sample** taken from **the narrow minette dyke.** (Most of the diamonds recovered were less **than** 0.074 **mm**). A **bulk** sample of 1 **tonne was collected from the same dyke** for **macrodiamond** analysis.

Cyprus Canada Inc. **Prospected** for gold on **claims** in **the** Last Lake **area** (55 W4-6)(1O in **Fig.7**).

Cyprus **Canada Inc., in joint venture with Noble Peak Resources** Ltd., prospected on the eastern extension of the **gold-**bearing Cache zone, **Quartzite Lake** (55 U7)(11 **in Fig.7**).

INCO Ltd., in joint venture with Breakwater Resources Ltd., drilled 8 holes (3760 m) on the Heninga Lake Cu-Zn massive sulphide deposit (65 W16)(13 **in Fig.7**), **relogged** old drill core, prospected around the deposit and completed a ground **deep-pulse** EM survey.

INCO Ltd., in joint venture **with Midasco Gold Corp. (40% Dejour Mines Ltd. & 40% Noble Peak Resources Ltd.),** completed a ground **deep-pulse** EM survey on **the** Mag Lake **Cu-Zn-Pb** massive **sulphide** prospect (65 **H/1** 6)(12 in **Fig.7**).

INCO **Ltd.** prospected for Ni **and** Cu and sampled for **lithogeochemistry,** on the **GRIF 1-6** claims, underlain by the **EW-trending ultramafic** sequence **north** of Griffin Lake (65 **G/6** & 7)(15 in **Fig.7**).

Phelps Dodge Corp. Of Canada Ltd. conducted several limited **reconnaissance programs** for **gold and base** metals which resulted in the staking of **the ENN 1-5 claims** at **Ennadai** Lake (65 C/14)(17 **in Fig.7**) and the DANA **1-4** claims at Griffin Lake (65 G/7)(15 in **Fig.7**).

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WMC International Inc. in joint ventue with Cumberland Resources Ltd., and Comaplex Minerals Corp., drilled 33 holes (over 7100 m) on several grids between the Wes Meg and Musket Bay prospects on the Meliadine West property, 15 km west of the Discovery deposit and 30 km northwest of **Rankin Inlet** (55 N/l & 2)(8 **in Fig.7**). Two **significant auriferous** zones, the Fox and the Wolf, were discovered during the program.

In the Fox **zone,** gold mineralization is associated with an **ENE-**trending alteration and shear zone **that** cuts volcanic and sedentary rocks **in** addition to iron formation. This zone of gold **mineralization** is 1 km northwest of **the** Wes Meg "F-grid" **and has** been intersected by ten holes drilled **along** a strike length of 2700 m. High **grade** gold concentrations occur within a large envelope of **anomalous** gold values: **hole** 95-1 contained high grade intersections including 12.0 g/t Au over 4.97 m within a section that averages 3.77 g/t Au over 38.4 m. Other high grade intersections were 8.91 g/t Au over 5.05 m (hole 95-16), 8.57 g/t Au over 5.7 m (hole 95-25) and 12.34 g/t Au over 2.78 m (hole 95-27). Mineralization is open in all directions. The Fox zone contains the first known significant gold mineralization along the Meliadine trend to be hosted by rocks other than iron formation.

The Wolf zone is on the Musket Bay prospect, 3 km west of the Fox zone, and has a minimum strike length of 670 m. Gold concentrations in the Wolf zone ranged up to 10.97 g/t Au over 3.8 m (hole 95-14) and 9.26 g/t Au over 2.88 m (hole 95-15).

Other widely spaced exploitation holes drilled across the property returned significant goid values.

WMC International Inc. in joint venture with Leeward Capital Corp. explored for Cu, Au and Ag northeast of Angikuni Lake in the Proterozoic Angikuni Lake basin (65 J/6,7, 10- 12)(16 in Fig.7). Surface magnetic, gravity and lithogeochemical surveys were completed and one hole (597 m) was drilled to test a coincident magnetic and residual gravity anomaly. This intersected two zones, 120 m & 10 m thick, of hydrothermal alteration with chalcopyrite-hematite mineralization. Till covering geophysical anomalies, plus drillcore, was sampled for diamond indicator mineral analysis.

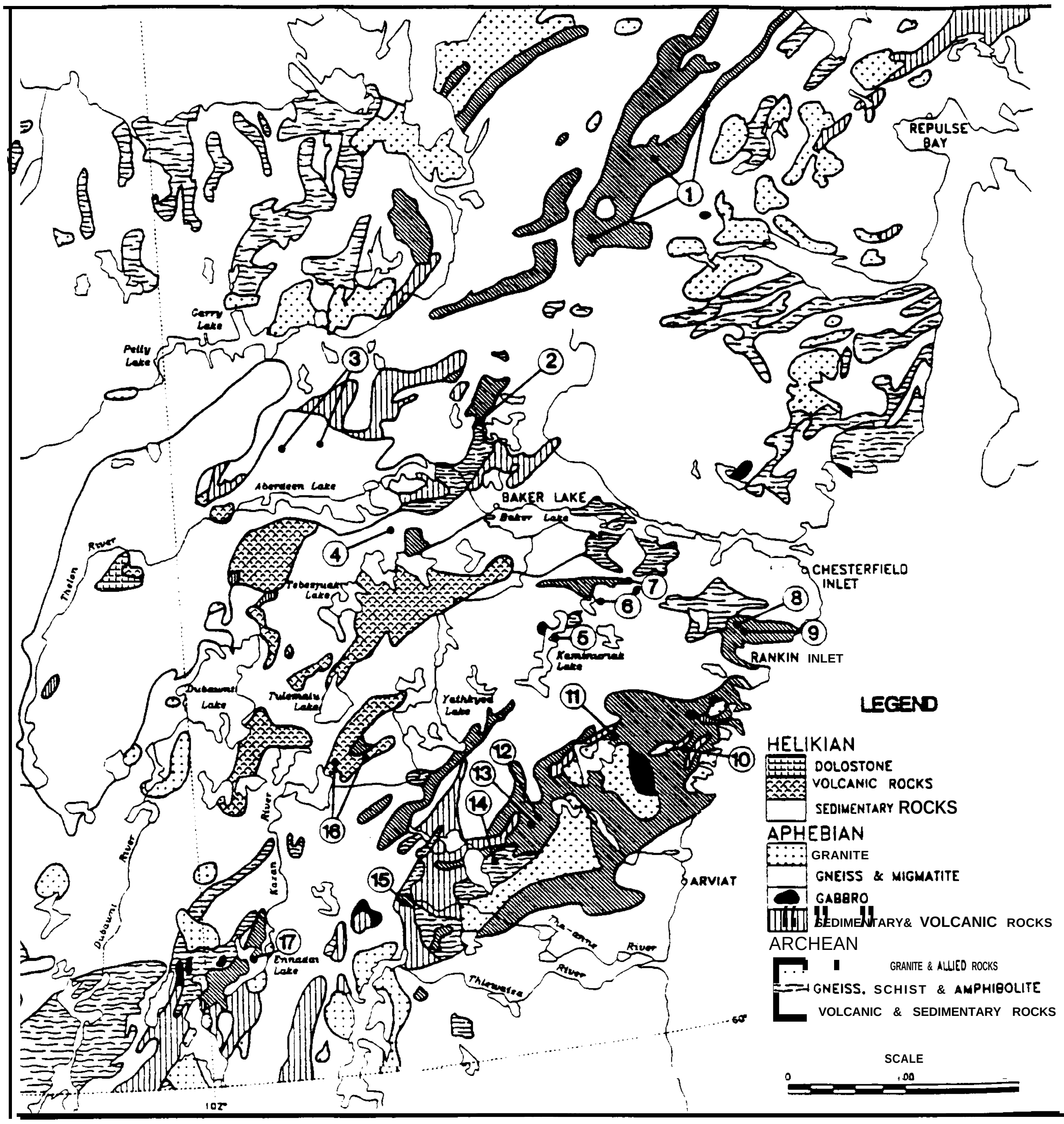

Figure 7: Mineral Exploration in the Keewatin Region. 1995

PART 3

PRELIMINARY REPORTS ON GEOLOGICAL WORK IN THE NWT

ABSTRACTS OF TALKS AND POSTERS AND SUMMARIES OF WORK IN PROGRESS

CRUSTAL BREAKS AND LATE ARCHEAN SHEAR ZONE-HOSTED AU-QUARTZ VEIN MINERALIZATION: STRUCTURAL AND GEOCHRONOLOGICAL EVIDENCE FROM THE NORTHWESTERN SLAVE PROVINCE, CANADA.

Abraham, .1 A.P.G, Davis. [2]D. W., Spooner, [1] E. T. C., [1]Department of Geology, Earth Sciences Centre, University of Toronto, 22 Russell St., Toronto, Ontario, M5S 3B 1. Canada. [2]Jack Satterly, Geochronology Laboratory, Royal Ontario Museum, 100 Queen's Park, Toronto, Ontario M5S 2C6, Canada.

U-Pb age relationships, proximity and similarity of deformational structures in a craton-scale ductile shear zone, and Au-quartz vein mineralization within the Arcadia Bay shear zone system, suggest contemporaneous development and regional Late Archean structural relationships analogous to those of shear zone hosted Au-quartz vein mineralization seen in the Abitibi Subprovince (Canada) and Yilgarn Craton (Australia).

An anastamosing system of Au-quartz vein-bearing shear zones crosscuts the -2678 to 2689 Ma Anialik River greenstone belt (ARGB) and the-2705 Ma to 2683 Ma syn-volcanically emplaced Anialik River igneous complex (ARIC). Shear zones developed coevally with ductile and brittle-ductile deformation during the late stages of regional compressive defamation.

Hydrothermal titanite in wall rocks to gold-mineralized shear zones crystallized during early shear zone development (2670 ± I Ma) and was subsequently locally altered to rutile, with gold occurring within the rutile-bearing assemblage. Unaltered second generation hydrothermal titanite, overgrowing the rutile assemblage, crystallized during later brittle-ductile movement (2656 2 Ma) and provides a minimum age for gold mineralization. Hydrothermal titanites are chemically distinct from titanite from unsheared ARIC rocks that crystallized during localized metamorphism and deuteric alteration between 2693 Ma and 2683 Ma.

A Late Archean regional-scale ductile shear zone, -10 km to the west of the Arcadia Bay area, separates the >3.0 Ga Kangguyak gneiss belt from the ca. 2.7 Ga greenstone belt. Similarities in structural elements and U-Pb age constraints suggest (i) that the two terrains were accreted prior to ca. 2670 Ma and (ii) that the Kangguyak ductile shear zone and the Arcadia Bay system shear zones developed coevally during crustal accretion. Ductile deformation predates intrusion of the Chin Lake Stock suite (2602+6/-4 Ma), which locally crosscuts and contains xenoliths of ductily deformed gneiss. The shear zones of the Arcadia Bay system are suggested to represent second and third order splays related to ductile deformation in the Kangguyak gneiss belt. Since this shear zone lies at the northern end of a -200 km long NNE/SSW-striking lineament separating >3.0 Ga rocks from 2.7 Ga rocks, it is reasonable to infer that it is of crustal-scale, analogous to a subprovince boundary, and that Late Archean gold-quartz vein mineralization in the northwestern Slave Province was probably associated with the ca. 2.7 Ga global convergent-margin tectonic event.

Relatively high $^{207}Pb/^{204}Pb$ ratios of pb in gold and associated galena suggest that Pb was partly derived from significantly older crustal material, which is consistent with a model for Late Archean crustal accretion in the northwestern Slave Province.

Identification in the Slave province of a "subprovince boundary" in close proximity to shear zone-hosted gold-quartz vein mineralization in the synvolcanic ARIC and encompassing ARGB, indicates similarities with other Archean terrains (cf., Val d'Or camp, Abitibi greenstone belt, Quebec).

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GEOLOGIC SETTING OF THE SANDHILL Zn-Cu-Pb-Ag AND SULUK Ni-Cu-Co PROSPECTS, AND THE AKLUILAK DIAMOND-BEARING DYKE IN THE GIBSON-MACQUOID LAKE AREA, DISTRICT OF KEEWATIN, NWT

Armitage Allan and Neil MacRae, Department of Earth Sciences. University of Western Ontario, London, Allan Miller, Mineral Resources Division. Geological Survey of Canada, Ottawa

Field mapping and sampling, and laboratory research in the Gibson-MacQuoid Lake area has better defined and extended the previously discovered Sandhill base metal prospect and discovered the Akluilak diamond-bearing dyke and the Suluk base metal prospect. The property is currently owned by the Joint Venture Partners (JVP) Cumberland Resources Ltd. (50%), Comaplex Minerals Corp. (25 %), and Manson Creek Resources Ltd. (25 %). The project area is strategically located approximately 120 km northwest of the community of Rankin Inlet and 40 km from tidal water. The proximity to an existing infrastructure and a transportation corridor is viewed as a positive economic criterion that signals this area as a prime exploration target and suitable for renewed geoscience research.

The study area is approximately 120 km northwest of the community of Rankin Inlet, and 40 km SW of the tidal waters of Cross Bay in Chesterfield Inlet. Geological mapping in this area covered 350 Km^2 of parts of the Gibson Lake (55N/12)-MacQuoid Lake (55M/9) maps, This area is underlain by the polydeformed amphibolite grade Archean supracrustal rocks belonging to the Gibson-MacQuoid Lake greenstone belt in the central Churchill Structural Province. This west-trending north-dipping greenstone belt is comprised of a bimodal sequence of tholeiitic basalts and talc-alkaline rhyodacitic tuffs, with associated elastic and chemical sedimentary rocks. Granitic gneiss is interlayered with the volcanic and sedimentary rocks, and forms the northern and southern boundaries of the greenstone belt. Younger gabbro and granodiorite intrusions and lamprophyre and diabase dykes are common throughout the map area.

The Sandhill prospect is approximately 1400 m long and up to 70 m at its widest point. Stratabound Zn-Cu mineralization at the Sandhill prospect occurs within a concordant alteration envelope of white-weathering pyritic quartz-muscovite schist (hydrothermally altered felsic tuffs). Disseminated to massive, fine to medium grained sphalerite occurs as multiple discontinuous bands (4 mm to 8 cm wide) and is associated with paragonitic muscovite, and variable amounts of gahnite, manganiferous garnet and zincian staurolite. This assemblage is the result of metamorphism of an aluminous alteration assemblage. Tourmaline is a common accessory mineral. Zn values range from 0.02-9.3 wt. % (average of 1.6 wt %) in 28 selected samples. Concordant discontinuous chert horizons, 0.5- 1.5 m thick, contain 1-4 cm wide bands and cross-cutting veins of coarse-grained sphalerite F1 galena associated with disseminated free-to medium-grained chalcopyrite. Two samples from a chert horizon averaged 3.9 wt % Zn, 0.9 wt % Cu, 0.2 wt % Pb, and 185 g/t ome Ag. The main Sandhill showing is approximately 1400 m long and up to 70 m at its widest point.

Stratigraphic continuity of the Sandhill zone is indicated by alteration and mineralization assemblages to the east and west. Alteration assemblages, similar to those that host the Sandhill mineralization, persist for up to 12 km eastward along strike. Although sphalerite and/or chalcopyrite were rarely observed, the presence of gahnite as well as zincian staurolite are good indicators of massive sulphide mineralization. Thirteen samples from the eastern horizons averaged 0.1 wt % Zn and 8.2 g/tonne Ag. Several gossans 15 km west of the Sandhill prospect define a thin discontinuous graphitic schist horizon at a mafic volcanic-sedimentary rock contact. Four samples collected from this horizon averaged 0.36 wt. % Zn.

During the 1993 field season, a unique diamond-bearing dyke, the Akluilak dyke was discovered approximately 1.5 km southwest of the Sandhill prospect. A 22 kg bulk sample collected during this study yielded 1765 microdiamonds and 2 macrodiamonds (> 500 (m).Two independent samples returned 1163 diamonds (including 6 macrodiamonds) from a 32.8 kg sample and 6680 diamonds (including 3 macrodiamonds) from a 7.8 kg sample. This is the first confirmed multi-diamond occurrence in the Central Churchill Province and the first recorded occurrence of a significant number of diamonds in a lamprophyre host rock. The north-striking near vertical dyke crosscuts the Archean stratigraphy. It measures 1.5 m wide at the discovery site and is exposed **continuously for 300-400 m.**

It consists of coarse grained oikocrystic orthoclase separated by aggregates of biotite, calcite, lesser apatite and accessory rutile and pyrite. Petrographically and chemically, the dyke is classified as a lamprophyre of ultrapotassic composition. Indicator mineral suite include olivine, chrome spinel, garnet (G9), pyroxe ne (low chrome and Ti diopside), and hornblende. Diamonds are yellow-brown in colour, but a few are pale yellow and pale green. Larger black crystals are the result of a thin graphite coat. Diamond crystal shapes include octahedra, macles, cubes and dodecahedra.

A monazite-bearing apatite separated from the Akluilak 83k dyke yielded a Pb-Pb isochron age of 1832 ±28 Ms. This age is similar to the age for the potassic-ultrapotassic volcanism of the Christopher Island Formation, Dubawnt Supergroup.

During the 1994 summer field season, a Ni-Cu massive sulphide prospect , the Suluk Zone, was discovered approximately 4 km southwest of the Sandhill prospect. Massive sulphides occur in multiple 3-4 m long by 0.5-1 m wide pods over a strike length of 700 m. The pods occur within strongly foliated/sheared mafic volcanic rocks and contain minor rounded to angular fragments of the mafic volcanics. They are perpendicular to the structural trends and in sharp contact with the mafic volcanic rocks. The structural fabric is not continuous through the sulphide pods. Sulphides predominantly consist of pyrrhotite, violarite, chalcopyrite, sparse pentlandite and secondary marcasite. Four samples collected for this study averaged 2.3 wt. % Ni, 1.7 wt. % Cu and 0.14 wt. % Co. An additional 10 samples collected by the JVP averaged 3.82 wt. % Ni, 2.93 wt. % Cu and 0.17 wt. % Co. The features defined by the pods suggest the Ni-Cu sulphides are structurally controlled, unrelated to the Archean mafic volcanic rocks and may be related to a Proterozoic igneous event.

The Ni-Cu sulphides are spatially associated with a gabbro intrusion west of the Suluk zone. This inhomogenious gabbro consists of fine to coarse grained phases that contain hornblende and pyroxene, and hornblende pegmatite. A pronounced aeromagnetic signature is, in part, contributed to by 1-2 % disseminated magnetite and trace disseminated pyrrhotite.

The regionally extensive mineralization and alteration associated with the Sandhill prospect, the newly discovered Suluk Ni-Cu-Co prospect, and diamondiferous lamprophyre dyke indicates the promising resource potential of this region.

The significant portion of the financial support for this project has been provided by the GSC under the Canada-Northwest Territories 'Mineral Initiatives (1991-1996), an initiative under the Canada-Northwest Territories Economic Development Cooperation Agreement. Additional support has been provided by DIAND, NSERC and the Joint Venture Partners.

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AN EXPLORATION OVERVIEW OF THE MELIADINE GOLD PROJECT, N.W.T.

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The Meliadine Gold Project has had ongoing exploration for the last 6 years and while many people have heard of the drilling successes on the property during this time, few are aware of the history of the exploration or of the advances made in understanding the geology and controls on the gold mineralization. This may in part be due to the property's location on the Keewatin side of the Territories, but it is also a function of the sometimes confusing scenario when several different joint ventures, each with differing exploration philosophies, all conduct exploration on a property of this size and potential. The project is centered 20 kilometers north of the hamlet of Rankin Inlet and is 65 kilometers in length. The majority of this ground remains largely unexplored. Numerous other areas are at the 1-3 year drill stage and only one small zone (Discovery) has had sufficient drilling to begin preliminary ore reserve calculations.

The Meliadine Gold Trend is characterized by a regional structural zone located at the southern edge of a pair of parallel oxide iron formations. The structure, called the Pyke Fault Zone, is interpreted to be a kilometers wide zone of extensive ductile to brittle strain with apparent dextral movement that strikes across the property. Proterozoic movement along this structure is interpreted to be the dominant controlling mechanism for extreme shortening, shearing, and tectonic thickening of asymmetric Z folds along the iron formations and the gold mineralization found within them. While gold is present in a wide variety of locales on the property, economic mineralization is largely restricted to fold closures in iron formation or, as recently outlined in 1995, in shear zone splays off of, and within, the Pyke Fault.

Exploration in the area began with North Rankin Nickel Mines discovery of Ni-Cu mineralization on the Rankin peninsula in the 1940s. In 1970, Nufort Resources Inc. headed by an eminent Toronto geologist, J. Harquail, obtained financing from a Calgary syndicate to conduct a nickel exploration program in the Rankin Inlet area (a potion of which covered the east end of the Meliadine property). The program consisted of a helicopter-borne magnetic survey and follow-up diamond drilling of 6 select magnetic anomalies. One of Newfort's drillholes intersected 0.10 oz gold per ton over 6.5 feet, in what was described as a sulphide rich zone in a chloritic, magnetite rich quartzite. Mention of this in the assessment records, combined with follow-up reconnaissance work in the area in 1987, resulted in the Nat claim being staked by the original joint venture partners of Comaplex Minerals Corp. and Asamera Minerals Ltd.

The property then remained dormant until September 1989, when, in response to lapsing notices from the mining recorder, a total of 58 reconnaissance samples were collected in the area. A last minute decision by the prospectors to sample a gossan on the west end of their traverse (future Discovery Zone) proved critical. Gold values from the samples ranged from 1 ppb to 59,800 ppb (1.74 opt). A follow-up sampling program in October of that same year collected 17 chip samples over the Discovery outcrop and returned assays of up to 1.2 opt gold over 13 feet. Numerous additional claims were staked at that time and a suite of prospecting permits were acquired over the trend.

For 3 years, from 1990 to 1992, Asamera operated extensive exploration programs concentrated on the 6.5 kilometer long Discovery Prospect. The vast majority of the drilling was completed on the Discovery Zone itself, a northeasterly plunging fold wrinkle on the northernmost of the two laterally continuous iron formations. A total of 43 holes into the zone (6177 meters) defied continuous gold mineralization down to a vertical depth of 450 meters. Concurrent with this activity, another large auriferous zone (surface grab samples of up to 2.2 opt gold), called the Wesmeg Prospect, was discovered on strike, 13 kilometers to the west of Discovery.

In the winter of 1991, Rio Algom optioned the western half of the property, including the Wesmeg Prospect, from the joint venture. Extensive boulder/felsenmeer grid sampling ova the entire 7.0 kilometer long strike length of the Wesmeg Prospect returned very impressive geochemical numbers. O f 710 grab samples taken, 10% assayed greater than 1 opt gold, 45% assayed greater than 0.2 opt gold, and 8 1% assayed over 1 gpt Au (0.03 opt). The better grades are invariably associated with sheared sulphide rich (arsenopyrite bearing) quartz-carbonate veins and/or silica altered iron formation. Widely spaced (50. 100 meter) magnetics was completed over portions of the western half of the property and a total of 3287 meters in 28 diamond drillholes were completed by Rio on largely electromagnetic targets over 30 kilometers of strike length. Numerous high grade gold intersections were encountered. In February of 1992, Rio terminated the option and the property reverted to the 50-50 joint venture partners, Comaplex and Asamera.

During the winter of 1993, Comaplex Minerals re-interpreted the geology of the Discovery Zone and proposed a new structural control on the mineralization in the zone. At the same time, a combined effort by Comaplex Minerals and A. Miller and S. Tells of the Geological Survey of Canada hammered out a structural history for the Meliadine area that tied-in the gold mineralization. In April of 1993, Cumberland Resources Ltd. acquired Asamera's 50% interest and operatorship in the Meliadine property and Comaplex was contracted to manage the property.

A program of high density magnetics in 1993 over select iron formation targets proved essential to understanding the structural complexity of the area (negligible outcrop exposure). Diamond drill testing over the next two years intersected several zones worthy of detailed follow-up. During this time, Comaplex and the GSC expanded their study of the property and early ideas about certain structural consistencies and Proterozoic gold were confirmed.

In June of 1995, WMC International Ltd. entered into an option 'with the joint venture on the western half of the property and conducted an exploration program on the Wesmeg Prospect. Preliminary results from their 1995 program suggest a previously unrecognized type of shear related mineralization has been discovered in the mafic volcanics and iron formations in the Wesmeg area. Comaplex and Cumberland meanwhile, returned to the Discovery deposit (after a two year absence) to assess the economic viability of the zone. In-fill and step-out drilling was completed and two additional parallel plunging zones of gold mineralization (0.72 opt over 12.5 feet) were encountered immediately west of the zone. Pre 1995 tonnage calculations by H.A. Simons Ltd. for the Discovery Zone are 740,000 tons at 0.28 opt gold. Ore reserves are currently being recalculated for the deposit.

TECTONIC HISTORY OF THE EQE BAY AREA, BAFFIN ISLAND, NWT; PART OF AN ARCHEAN GRANITE GREENSTONE TERRAIN VARIABLY REWORKED DURING THE PALEOPROTEROZOIC.

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The Eqe Bay area is located on north-central Baffin island along the southeastern margin of the Archean Committee orogen just northwest of the Paleoproterozoic Foxe fold belt. The area contains both Archean and Paleoproterozoic tectono-stratigraphic elements occupying a zone of overlap between these two belts. Archean elements include the 'Eqe Bay' and 'Isortoq' greenstone belts, a bounding complex of quartzofeldspathic and mafic gneisses, and a variety of late granitic plutons. The main Paleoproterozoic element is the Piling Group, a platformal sequence of quartzite, carbonate and semi-pelite rocks preserved only in the northwest part of the area where it is highly deformed, metamorphosed to granulite facies and intruded by granite. ‘This tectonism is related to activity along the Isortoq Fault Zone, a prominent southeast-dipping structure which extends from Isortoq Fiord in the map area right across Baffin island. Mapping and precise U-Pb dating of rocks within the map area have elucidated both the Archean history and the nature of the Paleoproterozoic overprint. Two distinct volcano-plutonic cycles are recognized in the greenstone belts: an earlier one between ca. 2785 and 2755 Ma and a later one between ca. 2730 and 2715 Ma. A major period of uplift and erosion, characterized by rapid deposition of siliciclastic rocks, including a thick succession of turbidites in the Eqe Bay Belt, occurred during the second cycle. A crystallization age of 2843+2 Ma from a granitic cobble at the base of the turbidites implies the existence of pre-greenstone sialic crust. Zircon xenocrysts recovered from other rock types areas old as 2950/2850 Ma, providing corroborating evidence. Apart from an indication of a post-depositional thermal event at -2700-2690 Ma, the next major tectonism is recorded by growth of etamorphic zircon, monazite and titanite in high-grade rocks in the footwall of the Isortoq Fault Zone in the period 1830/1820 Ma. Tight east-northeast plunging, syn-metamorphic folds in the Isortoq Belt and strong flattening in subjacent gneisses are related to early northwest-directed (thrust) displacement along this zone, intrusion of syn- to late-kinematic granite occurred at 18 19± 1 Ma.

Thereafter, distributed normal displacement, first in the ductile realm and later in the brittle realm, was responsible for truncation of folds and offset of relatively flat isograds resulting in the present juxtaposition of low over high-grade rocks. In accord with the overall northwest-southeast decrease in metamorphic grade, geochronological data indicate that a markedly higher temperature (>700°C) was attained in the footwall than in the hangingwall (500°-600°C). In the footwall, rare orthopyroxene/plagioclase symplectite around embayed garnet in mafic granulates attests to late decompression. Exhumation of granulites was likely largely accomplished before deposition of the Mesoproterozoic Bylot Supergroup, although some late faults (Neoproterozoic, early Phanerozoic?) perturb the granulite-facies isograd north-northwest of Isortoq Fiord.

THEMATIC STRUCTURAL STUDIES IN THE SLAVE PROVINCE: THE SLEEPY DRAGON COMPLEX.

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The geometry of the Sleepy Dragon Complex, a controversial structure in the Yellowknife Domain of the Archean Slave province, is shown to be a mushroom interference pattern between regional F, and F_2 folds (Bleeker and Beaumont-smith, 1995; Bleeker and Villeneuve, 1995). Critical evidence in favour of a F_1 fold hinge on the western side of the complex is provided by a change in vergence of the S, schistosity and coplanar bulk flattening planes in pillows. The Sleepy Dragon Complex basement uplift was initiated as a high-amplitude F_1 anticline, not as a syn-depositional horst (Bleeker, in press).

A well-preserved quartzite/BIF assemblage underlies the Cameron River basalts at Patterson Lake. This assemblage is cross-cut by the deformed and metamorphosed dykes that likely fed the Cameron River basalts.

It is suggested that the contact between the Cameron River basalt pile and an overlying rhyolite unit represents an intravolcanic, angular unconformity that is laterally equivalent with the unconformity at the base of the Raquette Lake Formation. This ca. 2680 Ma unconformity is probably equivalent to the angular unconformity at the base of the Banting Group in the Yellowknife greenstone belt proper.

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THEMATIC STRUCTURAL STUDIES IN THE SLAVE STRUCTURAL PROVINCE: PRELIMINARY RESULTS AND IMPLICATIONS FOR THE YELLOWKNIFE DOMAIN.

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The Yellowknife Domain and its greenstone belts form the focus of the present study (Bleeker and Beaumont-Smith, 1995; B leeker and Villeneuve, 1995). Building on earlier work by Henderson (1985), Lambert (1988), and others, the geology and in particular the structural geometry of the eastern part of the domain have been investigated. Preliminary results indicate that the structure of the area is dominated by two phases of regional folding that produce mushroom-type interference patterns. The Sleepy Dragon Complex is such a regional-scale interference structure. Its geometry and timing of formation contradict the hypothesis that the complex represents a core complex (James and Mortensen, 1992). They also cast doubt on previous kinematic studies (Kusky, 1990).

D_2 was a response to dextral transgression during which both the Defeat Suite and Prosperous Suite granitoids were emplaced. Regional low-pressure metamorphism is largely late-D_2 and associated with granitoid emplacement. Following F_2 folding, D_2 dextral transgression became localized in discrete dextral shear zones that record retrograde metamorphism.

A third phase of deformation, D], is manifested by a locally developed, northeast-trending, subvertical S_3 crenulation cleavage. Two regional-scale F_3 folds have been defined, one at the south end of Harding Lake, and one to the northwest of Tibbit Lake. The timing of D, deformation relative to the peak of regional metamorphism is under investigation. The orientation of S_3 could be compatible with late-stage sinistral transgression, possibly related to movement on regional faults such as the Yellowknife River lineament.

If one accepts that the Sleepy Dragon Complex is a basement-cored interference structure, it implies that its map pattern, and that of the surrounding volcanic belts, is the product of the interplay between a horizontal cut and complexly folded stratigraphy. This interpretation predicts that the volcanic belts should extend underneath the Burwash Formation. Another implication is that the present extent of the Burwash Formation does not represent a depositional basin, but only a local remnant of an originally much larger basin.

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GIS METHODOLOGY FOR ASSESSING THE INFLUENCE OF PRoTEROZOIC DIABASE DYKE SWARMS ON THE DISTRIBUTION OF KIMBERLITE PIPES, LAC DE GRAS REGION, NWT, CANADA

Bowie, Cameron and Bruce A. Kjarsgaard; Continental Geoscience Division, Geological Survey of Canada

The spatial associations between kimberlite pipes and Proterozoic diabase dyke swat-Ms in the Lac de Gras region of the Slave Structural Province, Northwest Territories. Cartada were investigated using a Geographic Information System (GIS). The region contains over 100 kimberlite pipes and is cross cut by at least four, and likely five, major Proterozoic diabase dyke swarms.

A study area of approximately 900 sq. Km was selected based on the availability of accurate pipe locations (29) and dyke interpretations derived from recent 1:50,000 field mapping arid high resolution aeromagnetic data (LeCheminant, 1994). Analysis was performed using a weights of evidence model, which incorporates probabilities of occurrences in a given area to derive statistical measures of spatial association. Spatial association measurements were derived for several different dyke phenomena, including:

I) proximity to all dykes, regardless of swarm
2) proximity to dykes based on swarm
3) proximity to dyke intersections regardless of swarm.
4) proximity to dyke intersections based on swarm
5) proximity to dyke densities (linear km/sq km) regardless of swarm and based on swarm
6) proximity to dyke intersection densities (intersections/sq km) regardless of swarm and based on swarm.

The methodology of the analysis will be presented along with results. Discussion will focus on interpretation of results in a exploration context.

References:

LeCheminant, A.N., 1994: Proterozoic diabase dyke swarms: Lac de Gras and Aylmer Lake area, District of Mackenzie, Northwest Territories, Geological Survey of Canada, Open File 2975, Scale 1:250,000

SLAVE *NATMAP:* DIGITAL RELEASE OF PRELIMINARY DATA SETS ON CD-ROM MEDIA

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In early 1995, GSC Open File 2974, Selected Geoscience Data for the Slave NATMAP Project, District of Mackenzie, Northwest Territories, was released to the public on CD-ROM media. This was intended as a prototype for digital distribution of data collected under the Slave National Mapping Program (NATMAP). Datasets on the CD-ROM included

5 Bedrock geology maps

1 surficial geology map
1 ice flow map
3 till geochemistry surveys
Slave wide geochronology
1 dyke interpretation map
Slave wide shaded total field magnetics

Efforts were made to organize the data in such a manner and format that accommodates an integrated approach to geoscientific applications using GIS or CAD software. Common data formats such as DXF and ARC/INFO EXPORT were used. All data was projected to a common map projection (UTM Zone 12). In addition, a GSC developed WINDOWS software package, SURVIEW, was included on the CD, to provide all users, regardless of software, the ability to display, query, and print the constituent data sets.

This poster will present this CD-ROM to the conference attendees. Demonstrations will be given on SURVIEW, and the author will be available for consultation on data sets and formats.

ADDITIONAL EVIDENCE FOR SYNGENETIC GOLD ENRICHMENT IN AMPHIBOLITIC BANDED IRON FORMATION, SLAVE PROVINCE

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Within the past decade, numerous gold prospects hosted by amphibolitic banded iron fortnation (BIF) have been identified in metaturbidites of the Damoti Lake, Russell Lake, and Wheeler Lake domains, southwest Slave Structural Province. All are similar to the Lupin deposit, with the notable exceptions that **none of the prospects** have as yet been demonstrated to be ore deposits, and none are associated with appreciable concentrations of arsenopyrite.

There is now a body of geochemical information available from university theses, assessment reports, and government-sponsored research that indicates that amphibolitic BIFs of the aforementioned domains are regionally enriched in gold. Given a lower cut-off for ore-grade gold. are-evaluation of the epigenetic model most often invoked to explain these deposits would surely result.

Consideration of the modal (most often repeated) values of gold concentrations in populations of geochemically analysed BIF are particularly informative because the contribution from low-grade and high-grade samples are eliminated. At Damoti, about 250 assays of drill core from four holes intersecting about 200 metres of amphibolitic BIF were subdivided into a sulphide-free population (11 3 samples containing nil to trace sulphides) and a sulphidic population (123 samples containing> I % sulphides). The sulphide-free population returned a mode of 40 ppb Au and the sulphidic population returned a mode of 300 ppb Au. It is salient to note that in terms of aggregate width, the sulphidic population outsizes the non-sulphidic population. At Wheeler Lake, 41 geochemical determinations were subdivided into a sulphide-free population consisting of21 samples having a mode of 16 ppb goid and a sulphidic population (≥ 1 % sulphides) consisting of 20 samples having a mode of 400 ppb gold. More than 400 samples collected during industry reconnaissance at Wheeler Lake —a programme in which all BIF was sampled and no distinction was made between non-sulphidic and sulphidic BIF---returned a mode of 150 ppb gold, obviously a mixture between sulphidic and non-sulphidic populations. At the Cabin Lake Zone, Russell Lake. 449 BIF samples averaged 1070 ppb gold, although the mode is not known. At Labrish Lake, an area where BIF has only recently been documented (see Pell and Brophy, this volume), 27 samples of sulphidic and non-sulphidic BIF contain a mode of 64 ppb gold.

Evidently, gold is associated with sulfur, but is the sulfur introduced, as is argued by proponents of an epigenetic model? There are compelling arguments to suggest that largely it is not.

Firstly, the distribution of sulphidic BIF (here defined as BIF with ≥ lo/o sulphides, rather than the usual exploration standard of ≥ 5% sulphides) is regional rather than local. At Damoti, sulphidic BIF has been documented along a strike length of 12 km. At Wheeler Lake, sulphidic BIF is a component of most BIF outcrops over the entire 10-km strike length of the domain. At Labrish Lake, sparsely sulphidic BIF is documented along a strike length of 7 km.

Secondly, many zones of mineralization are on the straight limbs of folds and are not controlled by any particular structure. Examples are the Bugow Deposit at Russell Lake(>100,000 tomes grading 10g/t Au) and most of the prospects at Wheeler Lake.

Thirdly, the mesoscopic characteristics of sulphidic BIF in relatively undeformed BIF suggests that the sulphides are syngenetic. At Cabin Lake in the Russell Lake domain, individual stratiform pyrrhotite-rich beds have reportedly been traced more than 100 metres, and grading of pyrrhotite in beds is not uncommon. At Wheeler Lake, perfectly stratiform, relatively unveined sulphidic BIF layers comprising amphibolite carrying 1-5% very fine grained and evenly disseminated pyrrhotite contain 125-500 ppb gold.

And finally, microscopic evidence from the stratiform sulphidic BIF at Wheeler Lake suggests that the sulphides predate porphyroblastesis and fabric, and are probably syngenetic, although there is obviously some remobilization of sulphides in veined portions of the BIF.

The geochemical, geological, and petrographical evidence suggests that sulphides and go ld (in at least ' protore' concentration) are synsedimentary components of sulphidic BIF. Given that sparsely sulphidic, stratiform, relatively unveined BIF at Wheeler can carry up to 500 ppb gold, about two orders of magnitude greater than crustal abundances, it is conceivable that ore-grade tenors can be achieved in a syngenetic environment. However. most of the higher-grade prospects are probably a result of remobilization and reconcentration of gold and sulphides in response to deformation and metamorphism.

The quartz veins and associated arsenopyrite halos so well developed at Lupin are considered to reflect a late event that may have marginally boosted the grade of pre-existing goid, either by introducing a little gold or reconcentrating existing gold, but the paucity of arsenopyrite at Damon, Wheeler and Russell suggests that such veining is not an integral part of the ore-forming process. If a mme from one of these domains eventually comes on stream. the unimportance of the quartz-arsenopyrite vetning will probably be acknowledged.

These conclusions apply only to gold associated with amphibolitic banded iron formation. Gold associated with oxide (chert-magnetite) banded iron formation (George Lake, Meliadine, Meadowbank, etc) appears to be related to late-stage veining and localized sulphidization, and mineralization can generally be attributed to a controlling structure.

MINERALOGY, PETROLOGY, AND POSSIBLE ROCK TYPES OF THE 5034 KIMBERLITE AT KENNEDY LAKE, NWT.

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The 5034 kimberlite pipe is located 275 king northeast of Yellowknife and was discovered in February, 1995 by drilling after tracing an indicator mmeral train up-ice. The pipe has subsequently been delineated by a total of 37 drill holes. Kimberlite mineralogy and textures have been investigated by thin section petrography, scatming electron microscopy with attached energy dispersive spectrometer (SEM-EDS), and X-ray diffraction. Macrocryst mineralogy is dominantly olivine or serpentine pseudomorphs after olivine, and lesser amounts of orthopyroxene. Mantle xenoliths are rare, but some macrocrysts are multilithic, and contain very small olivine neoblasts, suggesting art origin as porphryoclastic peridotitic mantle -Harte, 1976). Some of these olivine neoblasts are unstrained and tablet shaped, suggesting by analogy to South African peridotitic xenoliths that they may have formed during annealing related to entrainment in the kimberlite magma.

Groundmass mineralogy includes perovskite, aluminous chromian spinel, serpentine, Ti-Ba phlogopite, apatite, sphene, Ca-silicates with variable Mg concentrations, strontianite, barite, CUS, native Cu, and calcite. Based on petrographic textural relations, the groundmass minerals crystallized in roughly the order listed above. For example, perovskite mantles on serpentinized olivine macrocrysts began forming prior to Ti-Ba phiogopite (which is in part poikilitic) and serpentine. Ca-silicate phases crystallized in part simultaneously with phlogopite and serpentine. As demonstrated by SEM-EDS analysis of zoned prismatic crystals where a Ca- silicate phase with low Mg preceded (at least in part) a higher Mg phase. Ca-silicates continued to form after serpentine and phiogopite crystallizahon ceased. Barite formed next, along with apatite, strontianite, minor CUS and rare native Cu. Isotropic to very iow birefringence material rich in Mg and Si fills remaining interstitial pore spaces and may be serpentine or partially devitrified glass. Calcite is the final groundmass phase and it typically crystallizes in the center of spherulitic segregations.

Spheroidal to ameoboidal segregations are common in the groundmass. The segregations typically have the same progression of minerals from the early formed (e.g. perovskite and phlogopite) near the edges to later formed (e.g. Ca-silicates. sometimes crystallized as thin radial needles and calcite) near their centers. Similar phlogopite and oxide rich rims occur around many of the more or iess resorbed crustal xenoliths, suggesting that at least some of the segregations originated as crustal xenoliths that have been completely resorbed into the magma.

The whole rock geochemistry of the pipe has similarities to both micaceous (Group 11) kimberlites (Smith, et aisle., 1985) and olivine (madupitic) lamproites (Mitchell and Berman, 1991). Typical of both micaceous kimberlites and olivine lamproites are the major constituents SiO_2 (between 36.3 1% and 44.56%) and MgO (between 26.96% and 34.69%), as well as Al_2O_3 (between 1.93% and 3.83%), total Fe (Fe_2O_3 between 5.50% and 8.52%), and Na_2O (between O. 17% and 0.74). CaO_2 K O, and C are unusually iow for micaceous kimberlites, and actually compare better to olivine madupitic lamproites. Structural water (H_2O^+), in contrast, is unusually high for micaceous kimberlites, and in some analyses even exceeds typical values for olivine lamproites.

The prolific diamond content, whole rock geochemistry, groundmass mineralogy, and the paucity of indicator minerals and mantle xenoliths within the 5034 pipe suggest similarities to both olivine lamproite, and Group II micaceous kimberlite. Possible analogous are the contemporaneous group of Swartsruggens dikes at the northern edge of the Kaapvaal craton, which apparently include both olivine lamproites and Group 11 kimberlites (Mitchell and Bergman, 1991), and the olivine lamproite at Argyle, which is extremeiy diamondiferous, contains a paucity of indicator minerals, and has calcite restricted to iate stage spherules.

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DISCOVERY AND PRELIMINARY EVALUATION OF THE 5034 KIMBERLITE AT KENNEDY LAKE, NWT.

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The 5034 kimberlite at Kennedy Lake, 275 krn northeast of Yellowknife, is among the most prolific diamond pipes in the world. Discovery of the pipe began with recovery of chrome pyropes and chromites from till samples as part of a regional sampling program. Drilling of a magnetic anomaly at the up-ice end of the indicator mineral train first intersected kimberlite in February, 1995. Further drilling foilowed the magnetic iow to the north, and intersected more than 200 m of kimberlite under a 45 to 65 m thick granite cap. As of October 1995, a total of 37 delineation holes have been drilled, defining an elongate northeast trending pipe geometry that comprises an estimated 18.3 million metric tomes. Further drilling after freeze up is required to define the southern boundaries of the pipe.

The core is assigned to 1 of 4 facies when logged, based on aspects of the core recognizable in hand sample, such as macrocryst and groundmass color, xenolith content, and competence. These 4 observational facies (AK Facies 1, AK Facies 2, AK Facies 3, and AK Facies 4) permit correlation between drill holes, and define a sill-like internal stratigraphy for the kimberlite. Examination by thin section petrography, SEM-EDS, and XRD support hand sample observations that suggest all 4 facies are dominantly macro crystal olivine micaceous kimberlite of apparently hypabyssal orgy although locally AK Facies 4 has a more fragmental appearance.

Caustic fusion tests demonstrate that 5034 is prolifically diamondiferous, with an overall grade for macro diamonds (defied as 0.5 mm in their longest dimension) of 7.498 carats per tonne, as estimated from the first 1702.88 kg tested. The 287 macro diamonds > 1.0 mm in their longest dimension comprise most of the carats at an estimated grade of 5.190 carats per tonne. The 30 macro diamonds> 2.0 mm in longest dimension have an estimated grade of 1.947 carats per tonne.

ALLUVIAL - FAN AND FLUVIAL - DOMINATED DEPOSITS IN AN ANCIENT STRIKE-SLIP BASIN: ARCHEAN BEAULIEU RAPIDS FORMATION, NWT.

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The Beaulieu Rapids Formation (BRF) contains sedimentary facies associations and structural features that are consistent with basin formation during sinistral strike-slip movement. The north-trending, 9.5 km-long sequence displays a lazy-S shape and is bound on the north, east, and south by faults. The western margin of the basin is an unconformity that is intermittently identifiable for at least 5 km along strike between the mafic- to intermediate-volcanic rocks of the Beaulieu River volcanic belt (BRVB) and the overlying BRF. Fault margins are also bound by the BRVB, save for the northeastern limit of the basin where porphry stocks and/or dykes exist as thin discontinuous packages for 3.5 km. An U-Pb age determination for the porphyry stocks constrains the timing of basin evolution and the later but associated deformation.

Four facies associations; 1) a basal conglomerate, 2) a siltstone-sandstone, 3) a clast-supported conglomerate, and 4) a quartz-rich sandstone, comprise the sedimentary basin. The basal conglomerate facies association, represented by a maximum thickness of 450m, constitutes 32% of the sedimentary succession. It is subdivided into a massive conglomerate unit and a sandstone-interbedded conglomerate unit, interpreted respectively as debris-flow deposits on proximal portions of alluvial fans and traction-current deposits on medial portions. Clast counts indicate the dominant components to be mafic and plutonic. Significantly, porphyry clasts occur in the conglomerate along the eastern shore of the river, just 400 m west of the porphyry stocks which lie just outside the basin. The siltstone-sandstone facies association, has a maximum thickness of 305 m and makes up 18% of the BRF. Stratigraphically, it is in conformable contact with the underlying basal conglomerate, however, in rare instances, it is found interfingering with the latter and is in unconformable contact with the underlying BRVB at the southwestern margin. The siltstone-sandstone facies association is subdivided into a sandstone-dominated unit and a very minor siltstone-dominated unit, interpreted respectively as deposits formed in ponds in a braided stream setting and as lacustrine deposits. The clast-supported conglomerate facies association has a maximum thickness of 120m, is of limited lateral extent, and constitutes only 4% of the BRF. It overlies the siltstone-sandstone facies association and is in turn overlain by the quartz-rich sandstone facies association before it laterally pinches out towards the north. It is typified by trough cross-stratified sandstone interbeds and imbrication and, as in the basal conglomerate, mafic and plutonic clasts dominate. No porphyry cobbles were found in this facies association. The conglomerate was deposited by traction currents and may represent channel fills in a braided stream environment. Approximately 46% of the sequence is composed of the quartz-rich sandstone facies association which has a maximum thickness of 750 m. It is by far the most extensive facies association found within the basin. Coarse-grained sandstone is the dominant grain size, but both granular and pebbly sandstone occur. The abundance of truncating sets of high-angle trough crossbeds (large- and small-scale) is consistent with megaripple progradation along the bottoms of braided-stream channels.

The lateral distribution of the different facies associations in conjunction with the basin assymetry, the unconformity and the bounding faults are all characteristic of strike-slip basins. The hypothesis that the BRF was deposited in a strike slip basin is reinforced by the presence of a pervasive north-northeast trending foliation and several *en echelon* folds that are parallel to each other and to the foliation, but oblique to the basin strike; these are prominent features of strike-slip deformation.

THE ARCHEAN KESKARRAH FORMATION, CYCLOPS PENINSULA, POINT LAKE: A DISTINCT LATE - OROGENIC, VOLCANO - SEDIMENTARY BASIN.

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The Slave Province is a complex of volcanic belts, extensive sedimentary assemblages and gneisso-plutonic suites and that formed between 4.0-2.6 Ga. The 2,600 Ma volcano-sedimentary Keskarrah Formation, and the time-equivalent Jackson Lake and Beaulieu Rapids Formations represent the youngest basin-forming event in the Slave Province. Detailed mapping (1:2,000 and 1:50) of the 1.5x2 km-large Cyclops peninsula (65° 15' 30"N. 113°8'30"W) in conjunction with preliminary facies analyses, show that mafic volcanism and clastic sedimentation were contemporaneous in the Keskarrah Formation. Late-stage volcanism, common to Iate-erogenic, successor basins in the Wabigoon and Abitibi Subprovinces, has recently been documented in the Hood River belt (2600 Ma) and has now been established in the Point Lake belt. Mafic volcanic rocks dominate the eastern part of Cyclops peninsula, but are progressively interstratified with sedimentary rocks towards the west.

Five mappable lithological units were identified in the field: (I) a primary volcanic flow unit, (2) a conglomerate unit, (3) a sandstone-siltstone unit, (4) a sandstone unit, and (5) a quartz-arenite unit. The primary volcanic flow unit is composed of thick massive to pillowed basalt with local pillow breccias. The interstratified sedimentary deposits are suggestive of.a shallow-water subaqueous or littoral setting. The conglomerate unit, characterized by amalgamated clast-supported conglomerate beds containing cobble- to bulder-size material, has local trough crossbedded and planar-bedded sandstone interbeds. The conglomerates in erosional contact with the primary volcanic flow unit exhibit a dominance of local debris derived from intrabasinal mafic flows. Conglomerates removed from the influence of the mafic flows display an abundance of extraformational detritus in the form of plutonic clasts. The adjacent Augustus granite was a major source of detritus during this basin-forming event as many of the granitoid cobbles in the conglomerate give a U/Pb age of 3.2 Ga (Baadsgaard unpublished data). The conglomerate unit has the characteristics of alluvial fan, proximal baided stream and fan-delta deposits. The sandstone-siltstone unit is composed of cosets of trough crossbeds, minor planar crossbeds and planar-beds with minor argillite laminae between bedforms. This unit may either represent a sandy braidplain or a shallow water shoreface setting. Interstratification with the quartz-arenite lenses favour the latter. Large-to medium-scale, quartz-rich (30-60%), trough crossbeds and planar-beds that locally have argillite laminae on and between bedforms, comprise the sandstone unit. Small-scale trough crossbeds are superposed on large-scale structures. The argillite laminae on bedforms, composite bedforms and lateral accretion surfaces suggest a wave-influenced shoreface to lower shoreface environment. The massive to planar bedded quartz-arenite unit is exposed as a series of small lenses and is interpreted to be the result of shallow-water shoreface deposition.

Although isoclinal folds were ubiquitous, rapid lateral and vertical volcanological and sedimentary facies changes were readily observed. Excellent preservation of erosional surfaces and trough crossbeds in the sedimentary units and pillows in the lava flows of the volcanic unit facilitated the identification of younging direction. The N-striking strata are generally steeply dipping, and locally overturned. Doubly plunging, N-trending folds are common and appear to have an en-echelon array. A penetrative NNE-NE striking schistosity cross-cuts the folds, locally creating secondary folds. Such structural features are observed in modem strike-slip basins. The Keskarrah Formation at Cyclops peninsula is one of a number of recently recognized late-erogenic, successor (strike-slip ?) basins that formed along major north-trending lineaments in the Slave Province.

MEADOWBANK PROJECT

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Cumberland Resources Ltd. owns a 60% interest in the Meadowbank Project located in the Meadowbank River area north of Baker Lake, NWT. The remaining 40% interest is held by Comaplex Minerals Ltd. The property covers a portion of the of the Sissons-Tehek greenstone belt and is underlain by intermediate to mafic volcanic rocks, greywacke and pelites, komatiitic volcanic rocks. felsic volcanic rocks and quartzites of the Archean Woodbum Group. The area is structurally complex, with the stratified rocks being deformed into a series of tight, southerly plunging folds. Numerous oxide facies iron formations are present in the sequence; some of which host significant gold occurrences associated with pyrite, pyrrhotite and arsenopyrite mineralization.

The Third Portage gold deposit was discovered in 1988. Drilling between 1 989 and 1991 revealed that gold mineralization was hosted in iron formation where it is deformed into a recumbent fold. An independent mineral inventory was subsequently calculated on the basis of 5,111 metres of diamond drilling, resulting in a total of 522,223 tonnes of probable reserves grading 7.93 #tAUad451,73 1 tonnes of possible reserves grading 5.2 g/t Au. It was believed that considerable fill-in drilling could result in an additional 600,000 tonnes of possible reserves grading 6 g/t Au. Fifteen additional diamond drill holes totalling 1,462 metres were completed in the Third Portage Zone in 1995, mainly to fill in gaps in the previous drill pattern. All holes intersected gold mineralization and ten contained one or more intervals whose grade and width are at potentially economic levels. One of the better intersections included 13.7 metres at 17.1 g/t Au. All gold assays have been cut to 30 g/t. A revised resource estimate of the Third Portage Zone is currently in progress.

In 1991, significant gold mineralization was discovered along the southward extension of the Third Portage iron formation in the Goose Island area Four drill holes were completed, returning a number of high grade intersections including 17.6 metres grading 13.16 g/t Au. Seven additional holes totalling 968 metres were drilled in 1995. All intersected significant gold mineralization, with five holes containing potentially economic Au concentrations in one or more intervals. The Goose island Zone has now been traced over a strike length of 275 metres and to a depth of approximately 100 metres with holes spaced at approximately 50 metre intervals. A mineral inventory estimate resulted in an undiluted resource of 451,909 t grading 12.69 g/t Au with assays cut to 29.5 g. The zone is open to depth and to the north; and although a lesser intersection was returned for a 1991 hole a further 175 metres south along strike, it may still be open to the south. There is excellent potential to expand this resource and an aggressive program of drilling for 1996 is planned. Core samples on display at the Forum are from the 1995 drilling program at Goose island,

Cumberland Resources has a 50% interest in the Meliadine Project located immediately north of Rankin Inlet which is actively being explored for iron formation hosted and shear zone hosted gold deposits with partner Comaplex Minerals Ltd. Western Mining Corporation is presently earning a 60% interest in a portion of this project.

Cumberland also holds a 50% interest and operates the Parker Lake Project situated midway between Rankin Inlet and Baker Lake. An extensive high grade Ni-Cu-Co horizon has recently been discovered, and evaluation is continuing on Cu-Zn VMS targets and diamondiferous dykes.

U-Pb GEOCHRONOLOGY OF LOWER CRUSTAL XENOLITHS: IMPLICATIONS FOR THE FORMATION AND EVOLUTION OF THE SLAVE AND HEARNE PROVINCES.

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Lower crustal xenoliths entrained in alkaline magmatic rocks provide a unique opportunity to study the age and history of the lower continental crest of the Canadian Shield. Xenolith ages provide essential constraints to evaluate hypotheses concerning the formation and evolution of Precambrian cratons and the relationship of lower crustal metamorphism to mineralization in the upper crust. U-Pb analyses of zircon and other accessory minerals (rutile, titanite, apatite, monazite) can yield both protolith and metamorphic ages, and along with pressure and temperature estimates help constrain the cooling history of the xenoliths. Work is currently in progress on lower crustal xenoliths from three areas of western Canada; the central Slave Province in the N. W.T., Saskatchewan and southern Alberta Preliminary data are reported here for samples from the Slave and southern Alberta areas.

Xenoliths recovered from kimberlites in the central Slave Province are dominantly mafic granulates and consist predominantly of clinopyroxene, plagioclase, garnet, ilmenite, + orthopyroxene, + quartz, + rutile, + zircon. Alteration of the primary mineralogy during transport in the kimberlite is often extensive, although primary minerals are preserved in a number of xenoliths. The xenoliths range in composition from 44 to 50 wt% Si02. preliminary U-Pb data for zircon indicate that granulite metamorphism occurred at ca. 2.55 Ga, slightly younger than the age of metamorphism and granitic magmatism (2.60-2.58 Ga) observed in lower pressure rocks exposed at surface. Younger metamorphic ages in the lower relative to the upper crust also characterizes lower crust of the Superior Province exposed in the Kapuskasing structure (Krogh, 1993). The Slave xenolith samples are all Archean in age and show no evidence for underpiated Proterozoic material associated with the diabase dyke swarms intruded between 2.2 and 2.0 Ga, and at 1.27 Ga.

In contrast, mafic and felsic xenoliths from Eocene minettes from the Archean Medicine Hat Block of the Hearne craton in southern Alberta and northern Montana indicate extensive reworking of the lower crust during the Paleoproterozoic. U-Pb zircon ages indicate a protracted period of granulite metamorphism (950°C, 11-13 kbar) between 1.8 and 1.7 Ga, much younger than the Archean age of the upper crust. This metamorphic event is also observed in upper crustal rocks in reset K-Ar ages (Burwash et al. 1962) and in partial Pb loss in titanite. The lower crustal metamorphism is similar in age to a mantle metasomatic event documented in the area (Davis et al., 1995, Carlson and Irving, 1994; Rudnick et al., 1992), suggesting a linkage between upper mantle metasomatism and crustal metamorphism. Thermal reworking of the lower crust may be related to Paleoproterozoic erogenic events on the margins of the Hearne and Wyoming provinces during assembly of Laurentia.

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NWT MARINE INITIATIVES OF INTEREST TO MINING

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Efficient and effective marine support is key to the success of several remote mining operations in the Northwest Territories. The marine sector continues to develop innovations which improve abilities to operate over an extended shipping season in the ice infested waters. Current initiatives will ensure that the marine sector is prepared to provide essential transportation services for future mine operators in the Northwest Territories.

This presentation will outline current arctic marine initiatives which should be of interest to the mining sector. Initiatives to be discussed include: hydrographic programs (charting); sea ice studies; vessel and ship system R&D, and the status of essential public marine programs.

INTEGRATED KIMBERLITE EXPLORATION PROGRAM IN THE NWT': THE DISCOVERY OF THE RANCH LAKE, JERICHO, AND 5034 (KENNEDY LAKE) DIAMONDIFEROUS KIMBERLITES.

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An integrated and ambitious program of kimberlite exploration in the NWT was begun by Canamera Geological Ltd. after the discovery of kimberlite at Lac De Gras in 1991. The initial step in the exploration program was staking claims, first near the Lac De Gras discovery and then across a large portion of the Slave craton. The total arcs staked by Canamera reached 3.4 million acres by the end of 1992, and peaked at 14.5 million acres in 1995. Till sampling for indicator minerals began in the summer of 1992, and a pilot piant for heavy mineral processing was set up simultaneously in North Vancouver, British Columbia.

The first kimberiitic indicator minerals found were pyropes and chrome diopsides recovered from concentrate at the North Vancouver lab in the fall of 1992. Follow up sampling traced an indicator mineral train up-ice to Ranch Lake, where drilling intersected kimberlite in the spring of 1993. Delineation drilling determined that the pipe covers 12 hectares. A semi-bulk sample of 29 tonnes proved Ranch Lake diamondiferous at a published grade of roughly 19 carats per 100 tonnes. Diamond and indicator mineral compositions suggest that both peridotitic and eclogitic mantle may have contributed to the diamond sample.

Further processing of regional till samples at the expanded laboratory in North Vancouver has identified numerous additional indicator mineral trains. Follow-up till samples and detailed geophysical surveys for 2 of these indicator mineral trains led to kimberlite discoveries 300 km apart on the same night in February, 199S. The first discovery was the Jericho south pipe, located 26 km northwest of Lupin at the northwest end of Contwoyto Lake. Caustic fusion of the discovery and delineation holes revealed that the pipe is diamondiferous at a macro diamond (defied as 0.5 mm in longest dimension) grade of 5.620 carats per tome from the first 2,415.24 kgs tested. The second discovery was the 5034 pipe at Kennedy Lake, located 275 km northeast of Yellowknife (see Cookenboo and Foulkes, this volume). Caustic fusion tests demonstrate that 5034 is diamondiferous, with an overall grade for macro diamonds (0.5 mm in longest dimension) of 7.498 carats per tome from the first 1702.88 kg tested.

The Jericho and 5034 pipes are undergoing further evaluation. Included in this evaluation are delineation drilling, collection of initial small (roughly 100 tome) bulk samples, as well as environmental baseline and mine feasibility studies. Detailed geochemical studies, including analyses of indicator mineral assemblages, mantle xenoliths, and diamonds, are also underway to better constrain kimberlite emplacement and the mantle source.

Canamera Geological Ltd. is currently also pursuing indicator minerals trains in other parts of the Slave, which hold promise of further kimberlite discoveries.

THE AFFECT OF OLYMPIC DAM, KIRUNA, AND COPPER-PORPHYRY ORE MODELS ON RESEARCH AND DEVELOPMENT OF SUE-DIANNE Cu-U-Au DEPOSIT, RAE LAKES NW'T, FROM DISCOVERY TO UNDERSTANDING THE TALE OF THREE THEORIES.

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Sue-Dianne CU-U-AU deposit was discovered by G.S.C. radiometric survey in 1974 near Rae Lakes settlement. Located on the western shore of Dianne Lake 198 km from Yellowknife, this uranium anomaly was staked by Dave Smith and expiored by Noranda Exploration. Driven by high uranium commodity prices Noranda proved 8 million tons of 0.8% chalcopyrite-bornite ore through drilling. Uranium and gold were in limited concentrations with copper as the significant commodity. The quantity of copper was not sufficient to satisfy economic feasibility of minable reserves. Exploration of other local uranium anomalies was expanded during Sue-Dianne development leading to discoveries of smaller occurrences of magnetite in breccia and insitu breccias with magnetite-apatite-actinolite cement. Exploration ceased in 1978 on all occurrences leaving Sue-Dianne waler-researched until 1989 when N. W.T. Mineral Development Agreements were approved. New mines, research and theories were discovered and brought forth to public attention, during Sue-Dianne's eleven year quiet period. were Kiruna-type magnetite-apatite-actinolite Great Bear lake silver deposits, regional metallogeny of northern Great Bear Magmatic Zone, and speculative evidence on the formation of Olympic Dam of south Australia. The combination of these theories with Olympic Dam featured prominently gave renewed interest in the southern Great Bear region. Coincidence of physical nature and chemistry of Sue-Dianne Breccia pipe to Olympic Dam ores became the driving force of renewed research into Sue-Dianne and its possible connection to Olympic Dam. Recent petrographic studies of Sue-Dianne breccia and mineral textures defined a new understanding supporting neither theory but a third well studied and often overbooked hydrothermal effects of intruding plutons.

Sue-Dianne can briefly be described as a magnetite-rich breccia pipe hosting quartz-epidote-chlorite +/- chalcopyrite -bornite -specular hematite stringers and veinlets, the result of two events generated by two invading plutons.

APPLICATION OF FLUID INCLUSION AND STABLE ISOTOPE RESEARCH IN CHARACTERIZING MINERALIZATION AT THE PRAIRIE CREEK Zn, Pb, Ag DEPOSIT, NW'T.

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The Prairie Creek dolomite-hosted Zn, pb, Ag deposits located in theMacKenzie Mountains, Northwest Territories, consist of three distinct styles of mineralization. The three mineralization styles listed below,described in order of their paragenesis, occur within pervasively dolomitized, shelf carbonates (Morrow and Cook, 1987). They include; 1) Type I stratiform mineralization which is characterized by vaguely banded, fine grained (zoned) sphalerite, pyrite and lesser galena, within a mottled, chert-rich/siliceous dolostone unit of the late Ordovician, Whittaker Formation. Based on drill core observations, this mineralization appears zoned with pyrite increasing toward the margins of this unit. Hydrothermal (ferroan) dolomite forms as veinlets within the sulfide mineralization. 2) Type II mineralization as seen at the Zebra showing, includes both colloform sphalerite and reddish-black, massive sphalerite, pyrite and minor galena within the Silurian. Root River Formation. 3) A final phase of mineralization consists of cross-cutting quartz-sulfide veins characterized by a more complex mineralogy consisting of pyrite, sphalerite, galena ± tennantite and tetrahedrite. Late calcite veins appear to cut the three mineralization types.

Based on fluid inclusion studies and analyses of stable (C, O, H and S) isotopes as well as radiogenic (Pb and Sr) isotope analyses, distinct geochemical features have been observed. Within Type I, stratiform mineralization, gangue dolomite possess Sr isotopic values up to 0.726, and $\delta^{18}O$ values at 23.0 ± 0.8%0 indicating low temperature fluids. $\delta^{34}S$ isotopes for Type I pyrite mineralization (3 samples) are +22.5+ 1.2%o, with sphalerite at +22.2 and galena at +20.0‰ suggesting a seawater source. $^{206}Pb/^{204}Pb$ isotope values from galena range from 18.664 to 18.773 and $^{207}Pb/^{204}Pb$ isotopes range from 15.640 to 15.662 which compare closely to the values from Howards Pass and Jason deposits. Fluid inclusion observations from sphalerite indicate high salinity fluids (21.4 eq.

wt.% NaCl) and relatively low temperatures of homogenization (Th) averaging 131 'C, from four samples of zoned sphalerite. Limited fluid inclusion results from gangue dolomite suggest higher Th ranging from 165 to 221 °C averaging 199+19'C and salinities at -19.5 eq.wt % NaCl. Based on the geochemical results, Type I mineralization is interpreted as syndiagenetic, with Zn-Pb mineralization channeled along faults in a subsiding basin, the Prairie Creek Embayment.

Type II (MVT style) mineralization, is intimately associated with saddle dolomitic cement, within a siliceous dolostone host. Sr isotopic ratios from saddle dolomite cement record values to 0.710, and microprobe analyses of cement record Mn values to 0.02 wt %. $\delta^{13}C$ and $\delta^{18}O$ values for dolomitic cement average -4.4 ±2.2 and 15.1 ± 2.1%0 while host dolomites have $\delta^{13}C$ and $\delta^{18}O$ values of 0.4 ± 1.2 and 24.7 ± 0.5?60 , indicating distinctly different fluids (and different temperatures). $^{206}Pb/^{204}Pb$ values for sphalerite range from 18.581 to 18.739 and $^{207}Pb/^{204}Pb$ values range from 15.641 to 15.656. Fluid inclusion results from Type II sphalerite mineralization from outcrop, indicate homogenization temperatures ranging from 155 to 220 °C (ave 191 'C) with a salinity averaging 22.1 eq.wt % NaCl. Dolomitic cement from drill hole PC-94-78 at 242m depth recorded Th ranging from 153 to 203 'C (ave. 166 ± 17 "C) and salinity of 20.2 eq wt % NaCl. Based on the high salinity fluids (>20 eq. wt % NaCl) and enrichment of Sr isotopic values in saddle dolomite versus host dolomites (0.710 vs 0.709), sphalerite mineralization is interpreted as MVT.

Type 111 mineralization consisting of quartz-sulfide veins show distinct deformation features (cleavage developed in sphalerite and crack-seal deformation within quartz veining). $\delta^{18}O$ values in quartz range from 9.1 to 19.7%0 and average 16.7 ± 3.5%o , indicating a progressive dilution of formation fluids with younger (meteoric) fluids. Pb isotopic values from 28 analyses of galenas show extreme homogeneity with $^{206}Pb/^{204}Pb$ values ranging from 19.003 to 19.132 and $^{207}Pb/^{204}Pb$ values ranging from 15.656 to 15.681. Fluid inclusion results from inclusions in quartz show a broad range in temperatures (up to 265 "C) and salinities(2to21 eq. wt% NaCl) while data from inclusions in sphalerite indicate lower temperatures ranging from 120 to 144 'C and salinities at -8 eq.wt %. The quartz veins are interpreted as products of Laramide deformation, formed at right angles to the axial plane of Laramide folding, and host silver mineralization (associated with tetrahedrite) similar to other quartz vein, silver-bearing deposits such as Rusty Springs, Yukon (Kirker, 1982) in the northern Cordillera.

While compressional features presently dominate structural effects in the Prairie Creek area, rifting as documented in the Root River area by Cecile (1982) would account for a heat source for early Zn-Pb mineralization. Kusznir et al. (1987) suggest that early extensional features may be replaced by compressional features through structural inversion such as are presently observed in the southern MacKenzie Mountains including high angle reverse and thrust faults.

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ORIGIN OF FOLD PATTERN IN ARCHEAN META SEDIMENTS, YELLOWKNIFE DOMAIN, SLAVE PROVINCE.

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Axial-surface traces of tight folds in metagreywacke-mudstones of the Yellowknife domain outline large open to closed curves that have long been interpreted as representing secondary folds (Henderson 1943, Fortier 1946, Bleeker and Beaumont-Smith 1995). It is assumed that there were two phases of regional deformation, that the early tight folds were initially aligned in a straight array across the domain, that bisectors of the large curves are secondary axial surfaces, and that a parallel cleavage is a secondary foliation. Detailed mapping of the metasediments reveals, however, that the geometry and reformational history are more complex (see summary in Padgham and Fyson 1992, more recent data from Stubley and Bégin 1993, and field work by author 1993, 1994, 1995). For example, folds are typically disharmonic, die out abruptly, and none extends around the large curves defied by generalized fold trends. The curved arrangement is therefore not directly analogous to a fold interference pattern. Moreover. marked local variations in trend of discontinuous folds prevent extrapolation of structures of a particular generation beyond where identified from small-scale interference patterns.

The simplest reformational scheme that explains both the small-scale and larger features recognises three main generations of structures, locally defined subgenerations, and a general decrease in size of successive structures. Major F_1 folds in the metasediments and homoclines in marginal maficvolcanic belts are succeeded by smaller F_2 map-scale folds, and finally mesoscopic F_3 folds and S3 cleavages, which are the structures apparent in outcrop.

The small size of most structures post-dating the F, folds is not in accord with the large curves in trend if these are interpreted as secondary folds, nor are several map relationships. A syncline terminates obliquely against an anticline as part of an arrangement whereby fold axial traces converge to form an "F_2" curve; small F_2 folds that lie oblique to a flank of the curve in an opposite sense to the bisector are incongruous to the curve if it is seen as an F_2 fold; remnants of early cleavages, axial planar to minor folds, strike across curves at high angles to the bisectors in agreement withimposition across a pre-existing curved pattern. The later S, cleavage that parallels curve bisectors thus also post-dates the curved pattern of fold trends, as evident where the cleavage effects granite plutons truncating the folds.

The fold pattern reflects the strong influence of rock and crustal anisotropy on local strain during heterogeneous deformation. Deflections in trend around granite plutons and anold gneissic complex are therefore analogous to the curvature of foliation around augen structures. As previously suggested (Fyson 1984), the alignment of cleavage parallel to bisectors of earlier curves in fold trend could be attributed to the repeated influence of underlying crustal fractures on the orientation of structures formed at different times.

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METALLOGENIC EVOLUTION OF THE SOUTHERN GREAT BEAR MAGMATIC ZONE

Gandhi, S. S., N. Prasad and B.W. Charbonneau, Geological Survey of Canada,

Metallogenic studies carried out under the Canada-Northwest Territories Minerals Initiative Program (199 1-'96) in the southern part of Great Bear magmatic zone (GBmz) have provided new insights into the resource potential for the whole of the magmatic zone (Fig. 1). In addition, an airborne multiparameter geophysical survey on a selected part of it, released recently by the Geological Survey of Canada, has generated incentives for further exploration.

The GBmz is a continental volcano-plutonic zone on the west margin of the Wopmay Orogen, which culminated ca 1900 Ma. The magmatic activity occurred during the period 1870 to 1840 Ma. Older rocks in the GBmz include early Proterozoic metasediments and granitic plutons of the Hottah terrane in the north and Snare Group metasediments and granitic gneisses of the Hepburn suite in the south.

Early stages of the Great Bear magmatic activity are represented by abundant volcanic rocks and associated volcaniclastic rocks,

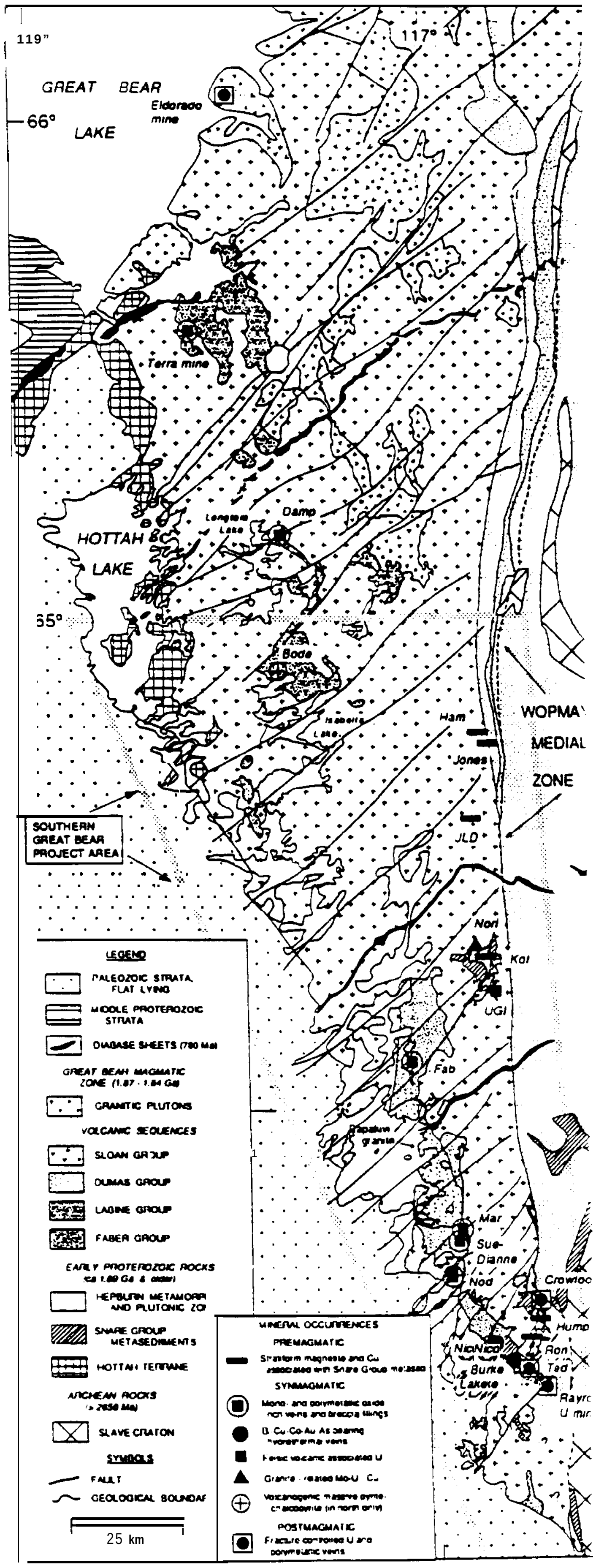

Fig. 1: Generalized geology and types of mineralization in Great Bear magmatic z

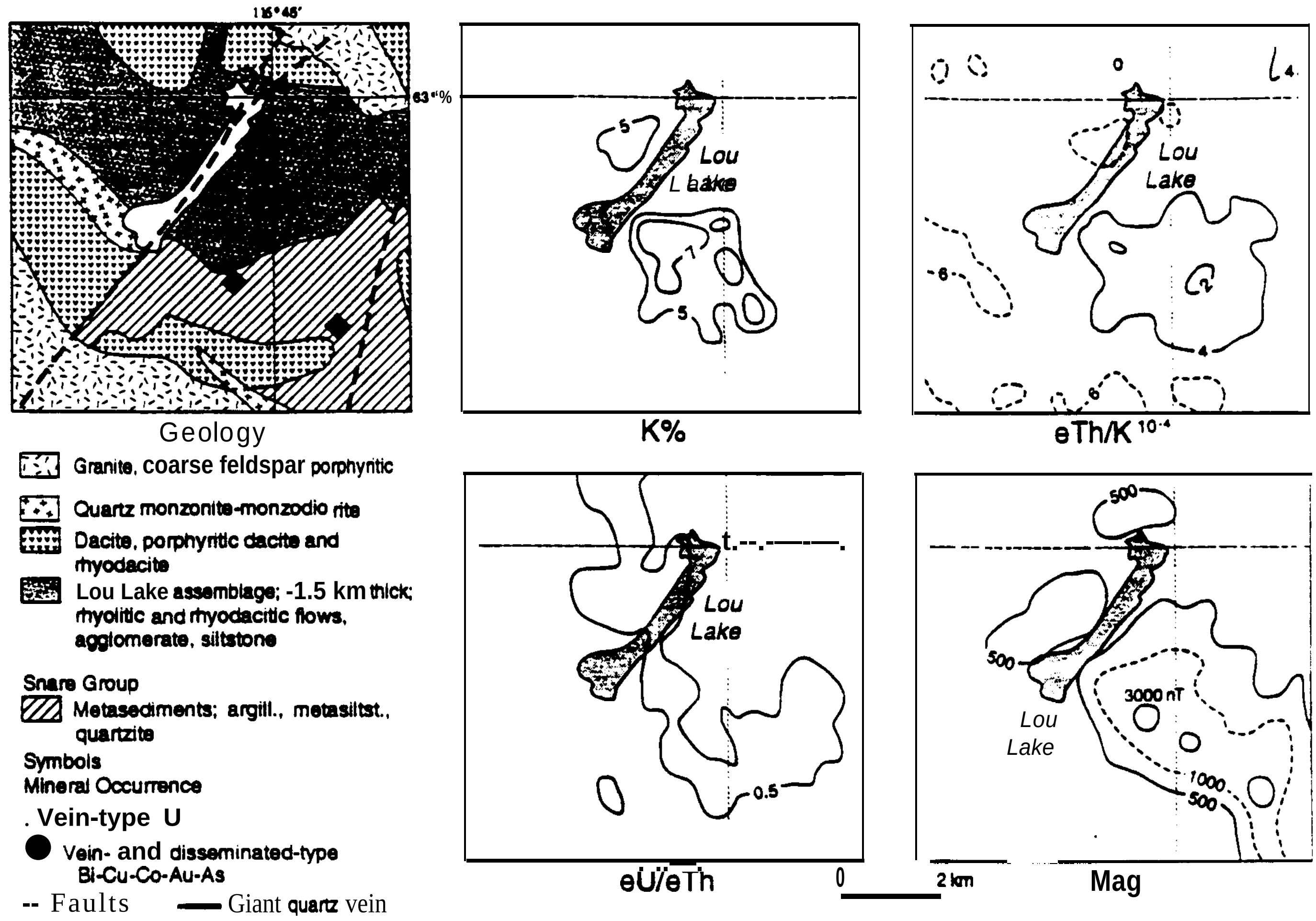

Fig. 2. Geology, **mineral occurrences, geophysics** of the Lou **Lake area (Nico claims)**

which have an aggregate thickness of approximately 10 km in the north and 5 km in the south. Those in the north range from basalt to rhyolite in composition, but dacites, rhyodacites and rhyolites predominate over andesite and basalt. In the south, the volcanic rocks are in the dacite-rhyodacite-rhyolite range. Overall. the volcanic rocks of the magmatic zone display talc-aikaline trends, but in many places alkali metasomatism is intense. The older volcanics (Ca 1865 Ma) include Labine and Dumas Groups in the north and Faber Lake Group in the south. These volcanic and associated volcaniclastic rocks are gently folded and intruded byabundant subvolcanic porphyritic dacites and quartz monzonite plutons, which predate the younger Sloan Group in the north. Large granitic batholiths were emplaced during later stages of volcanic activity, including the rapakivi granite suite at Faber Lake, which is characterized by high radioelement concentration.

Metallogenic evolution of the GBmz is reflected in distinctive mineral deposits and occurrences formed at different stages in its geological history. These are broadly treated here under the pre-, syn- and postmagmatic stages (Fig. 1).

The main premagmatic metallic concentrations are in the Snare Group metasedimentary sequence, which is at least 1.5 km thick, and includes siltstone, sandstone, carbonate and argillaceous beds deposited in a regressive cycle. It is characterized by stratiform magnetite beds and lenses in siltstone and, to a lesser extent, in carbonate rocks. Magnetite occurs as disseminations and massive beds and lenses, as much as 20 m tick and a few hundred metres long. These are interpreted as synsedimentary chemical precipitates, modified by diagenesis, folding, metamorphism and intrusions. Minor stratabound iron and copper sulphide concentrations also occur locally.

The synmagmatic occurrences are of five types:

1) monometallic and polymetallic iron oxide-rich veins and breccia-fillings exemplified by the magnetite-apatite-actinolite veins (Kiruna-type) and the Cu-U-Au-Ag bearing breccia zones (Olympic Dam-type);
2) Bi-Cu-Co-Au bearing hydrothermal arsenopyrite-pyrite veins and disseminations with associated large potash enrichment haloes;
3) felsic volcanic-associated uranium occurrences;
4) granite-related Mo-U+Cu occurrences; and
5) volcanogenic massive pyrite-chalcopyrite occurrences in the north.

The polymetallic deposit types 1) and 2) are most promising from the expiration standpoint.

Examples of the Olympic Dam-type deposits are the Sue-Dianne, Mar, Fab and Damp prospects (Fig. 1). These are small compared to the 2 billion tonne Olympic Dam deposit in South Australia. This deposit is hosted by a 1600 Ma old felsic-dominated continental volcano-plutonic zone and was discovered by drilling of coincident magnetic and gravity anomalies, through 300 m of Paleozoic cover strata. The genetic model involves concentration of volatiles, phosphorus, iron and other metals in the roof zone of a magma chamber, and piercement of roof by volatiles causing brecciation and eventually leading to precipitation of iron oxide as magnetite in subsurface environments and as hematite in near surface environments, where mixing of magmatic fluids with meteoric water may occur.

The polymetallic arsenopyrite veins and disseminations near Lou Lake are at the unconformity between metasedimentary rocks in the basement and the rhyolites at the base of the Faber Group. The numerous occurrences are concentrated in a 3x4 km area of very high K anomaly detected by the recent airborne multiparameter survey (Fig. 2). The potassium enrichment to a level of 8 to 10 percent is substantiated by ground spectrometry and chemical analyses of altered rhyolites in the vicinity of mineralized zones. The K anomaly coincides with a strong magnetic anomaly. It is postulated that hydrothermal{ solutions, related to a deep seated granitic pluton, moved upwards through the metasedimentary rocks (which include argillaceous beds enriched in metals), scavenged the metals and deposited them at the unconformity. Whether this hydrothermal system is a variant of the Olympic Dam-type or porphyry copper-type system or some other type remains to be determined from the intensive exploration activity currently underway

occurrences that postdate the Great Bear magmatic activity include the ~-controlled uranium and polymetallic vein-type deposits. Among these are the classic U-Ag-Cu-Co-Ni-As veins at Great Bear Lake which have been mined. These are restricted to a small area, whereas mineralogically simpler pitchblende ± chalcopyrite veins and_ fillings are widespread throughout the GBmz. Those of the Rayrock mine in the south occur in one of the giant quartz veins that are common along the northeast trending brittle faults.

The Great Bear magmatic zone has been explored in the past mainly for vein-type uranium and silver deposits. Recent metallogenic studies and airborne geophysical surveys have, however, brought to light the potential for large polymetallic deposits. The magmatic zone provides, as far as is known, the best area in the Canadian Shield for these types of deposits.

MINERAL SHOWINGS IN THE THE BEAR STRUCTURAL PROVINCE, NORTHWEST TERRITORIES: A PRELIMINARY COMPILATION.

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[1] Geological Mapping Division; [2] Image

Renewed interest in Proterozoic poiymetailic (Ag, Co, Ni, Bi, Cu, Pb, Zn, Au, W, U, REE...) showings and deposits of the Bear Structural Province has prompted a compilation of a GIS-compatible 1: i ,000,000-scale mineral-showings map and database. Between 1933 and 1979, five mines produced Ag, Bi, U, Cu, Co, and Ra from polymetallic veins and uranium from veins in quartz stockworks and altered granitoids. Other deposit types include polymetallic vein and skarn showings similar to the Olympic Dam and Kiruna-type deposits; stratiform sediment- and volcanic-hosted Cu ± Zn ± Pb; Bushveld-type ultramafic/mafic inuusion-hosted Cu-Ni-PGE's; unconformity and fault-related uranium: and plutonic-related REE. Additional exploration targets can be modelled on attributes similar to porphyry Cu-Au-Mo, skarn Cu-Fe ± Zn ± Pb±W, Noril'sk type Ni-Cu-PGE, and volcanic/granite/iron formation-hosted gold.

The preliminary compilation will include classification of mineral showings into the deposit types used by NT Minfile. Future work will include digitizing existing geochemical, geophysical and geological data to produce a map defining metallogenic zones.

RECENT ADVANCES IN GEOLOGY AND ASSESSMENT OF MINERAL EXPLORATION POTENTIAL OF THE PHANEROZOIC ROCKS OF THE CANADIAN ARCTIC ISLANDS.

Harrison, J. C., de Freitas, T. and Beauchamp, B.; Geological Survey of Canada

The following notes provide an overview of various exploration targets within the Cambrian and younger rocks for each of the major Canadian Arctic Islands and island groups along with the key GSC reports and standard (mostly 1:250,000) scale bedrock geology maps.

The best general reference is Geological Survey of Canada. Geology of Canada, no. 3 (Geology of the Innuitian Orogen and Arctic Platform of Canada and Greenland, H.P. Trettin, cd., 1991).

Banks Island: GSC Memoir 387 (with GSC Maps 1454A-1456A), GSC Bulletin 258. Mineral exploration potential is probably small. Part of northern Banks Island is protected by a national park.

Victoria Island: GSC Memoir 330 (with GSC Map 1135A; both out of print). Potential exists for kimberlites east of Hadley Bay.

King William Island GSC Paper 63-19 (with preliminary Map 36-1963 ; both out of print).

Boothia Peninsula: GSC Paper 63-19 (with preliminary Map 36-1963; both out of print), GSC Paper 83-26 (with Maps 1597A, 1598A).

Prince of Wales Island: GSC Paper 63-19 (with preliminary map 37- 1963; both out of print), GSC Open File 66. Some potential may exist for Mississippi Valley-type (MVT) lead-zinc in lower Paleozoic carbonates of eastern Prince of Wales Island and possibly also on King William and Boothia. Potential exists for kimberlites.

Somerset Island: GSC Paper 83-26 (with Maps 1595A, 1596A). Kimberlites are known on northeastern Somerset Island. Potential also exists for MVT lead-zinc.

Northern Baffin Island, Foxe Basin: GSC Maps 1235A-1242A, GSC Bulletin251 (with GSC Maps 1406A, 1407A; out of print). Some potential exists for kimberlites and perhaps MVT lead-zinc. All of Bylot Island and parts of northern Baffin Island are protected from exploration by either bird sanctuary or national park.

Prince Patrick and Eglinton islands: GSC Open File 2654 (with preliminary maps), GSC Memoir 332 (with GSC Map 1 142A; both out of print). Extensive sedimentary manganese **carbonate** deposits occur in Upper Cretaceus strata on Eglinton Island. Remaining mineral exploration potential is small.

Melville Island: GSC Bulletin 472 (with Map 1488A); GSC Bulletin 450. Potential exists across northern Melville Island for MVT lead-zinc in lower Paleozoic carbonates. sedimentary-exhalative ("SEDEX") lead-zinc in Lower Ordovician to Middle Devonian graptolitic shales and sedimentary copper in association with Carboniferous redbeds. Coal deposits are known in Lower Cretaceus and Upper Devonian strata on eastern Melville Island. Tar sand deposits occur in Lower Triassic strata on northwestern Melville Island. Large gas reserves occur on Sabine Peninsula.

Bathurst Island: GSC Memoir 378 (GSC Map 1350A), GSC Bulletin 306: Potential exists for MVT lead-zinc in lower Paleozoic carbonates, SEDEX lead-zinc in Ordovician to Lower Devonian graptolitic shales and sedimentary copper in Carboniferous redbeds. Some potential exists for kimberlites in the Freemans Cove area. Petrogenetic affinity of intrusive breccias remains to be studied. Central Bathurst Island is protected from exploration by a national wildlife refuge. Assessment work is also currently underway for a new national park covering most of northern Bathurst island.

Results of a 1 995 reconnaissance bedrock mapping project covering the entire island group are not yet available.

Cornwallis and adjacent small islands: GSC Bulletins 276, 292, GSC Map 1626A. Potential exists for MVT lead-zinc in lower Paleozoic carbonates although this region has been more intensively explored than adjacent areas.

Grinnell Peninsula, western Devon Island: GSC Open File 1431 (with preliminary map). Potential exists for MVT lead-zinc in lower Paleozoic carbonates.

Eastern Devon Island GSC Memoir 411 (with GSC Maps 1612A- 1616A). **Some** potential for MVT lead-zinc and kimberlites.

Southern Ellesmere Island (below 77°N): GSC Bulletin 470 (with GSC Maps 1840A, 1841A). Potential exists for MVT lead-zinc in lower Paleozoic carbonates and for kimberlites.

Central Ellesmere Island (77-80°N): GSC Bulletins 302 and 224 (with GSC Maps 1300A, 1307A-1308A, 1312A), GSC Maps 1357A, 1358A. Potential exists for MVT lead-zinc in Cambrian to Lower Devonian shelf and shelf-edge carbonates especially within the Vendom and Strathcona Fiord map areas adjacent to Bathe Uplift (preliminary maps in GSC Open Files 2880, 2881). MVT deposits may also exist in association with fault-related hydrothermal dolomite within Carboniferous and Permian shelf and shelf-edge carbonates of Eureka Sound South map area (GSC Map 1300A). There is also some potential for SEDEX lead-zinc in Ordovician to Lower Devonian graptolitic shales and for redbed-related copper in or above the Carboniferous Canyon Fiord Formation. Large Eocene coal deposits are known near Stenkul and Strathcona fiords.

Northern Ellesmere island (beyond 80°N): GSC Bulletin 224 (with GSC Maps 1305A, 1306A, 1309A, 13 11A, 1348A), GSC Bulletin 430. GSC Paper 91-08, GSC Open Files 757, 836, 2135-2138 (preliminary maps), GSC Maps 1881A-1888A (in press). Large areas of extreme northern Ellesmere Island lie within a national park. Outside the park there are a variety of copper showings and potential for redbed-related copper, SEDEX lead-zinc, MVT lead-zinc, volcanogenic massive sulphide deposits and various magmatic deposits including those with nickel, platinum group elements, copper, silver and gold.

Axel Heiberg Island: GSC Bulletin 224 (with GSC Maps 1298A- 1299A, 1302A- 1305A; 13 lOA). Some exploration potential for redbed-related copper on northern Axel Heiberg Island.

Lougheed Island: GSC Memoir 395 (with GSC Map 1490A) King Christian Island: GSC Memoir 386 (with GSC Map 1445A) Ellef Ringnes Island, Around Ringnes, Cornwall and Haig Thomas islands: GSC Memoir 390 (with GSC Map 1471A) Extensive Cretaceus gabbro sills on Ellef Ringnes Island may have potential for nickel, cobalt. silver and platinum group elements. This region contains extensive undeveloped gas and oil reserves in Mesozoic elastic rocks.

NEW SHOWINGS AND NEW GEOLOGICAL SETTINGS FOR MINERAL EXPLORATION IN THE CANADIAN ARCTIC ISLANDS.

Harrison, J.C., de Freitas, T. and Beauchamp, B.; Geological Survey of Canada.

Promising developments in mineral exploration in coastal North Greenland and northern Labrador underscore the remaining potential for new discoveries in coastal areas of northern Canada. Two producing zinc-lead mines in Canada's Arctic Islands both benefit from feasible access to maritime export of mine concentrate in spite of limitations imposed by a short shipping season. Access to tidewater and the increasing use of Polar class icebreakers capable of reaching far into the Arctic Ocean will provide strong incentives for an expanded interest in the resource potential of the Arctic Islands.

Potential for Mississippi Valley-type (MVT) lead-zinc deposits, similar to the Polaris deposit on Little Cornwallis Island, remains significant. Exploration philosophy should be guided by the same principles as those used to locate hydrocarbon accumulations including recognition of trap (with pre-brine migration structural development), seal. source beds. a suitable reservoir, and adequate porosity. Potential stratigraphic plays for carbonate-hosted lead-zinc in the Arctic Islands include shelf and shelf-edge carbonates ranging from Cambrian to Middle Devonian in age. Structural plays are deemed most favorable in the vicinity of the Boothia Uplift of Cornwallis, Bathurst and western Devon islands and near the coeval Bathe Uplift on southeastern Ellesmere Island. Both uplifts have experienced Early Devonian phases of deformation prior to the likely main phase(s) of Middle and Late Devonian metallogenic brine migration. Additional potential for MVT deposits occurs in the Carboniferous and Permian carbonate-rich succession of the Sverdrup Basin on west central Ellesmere Island. High temperature saddle dolomite of probable hydrothermal origin in this area is also associated with abundant migrated bitumen and proximity to rift-related normal faults.

Potential in the Arctic Islands for sedimentary-exhalative ("SEDEX") lead-zinc deposits exists in strata similar in age and depositional setting to those of the Selwyn Basin of the central Yukon. Metal prone horizons occur in Ordovician to Devonian graptolitic strata of the Hazen, Cape Phillips, Devon Island and Ibbett Bay formations of Ellesmere, Devon, Bathurst and Melville islands. The Ibbett Bay Formation in the Canrobert Hills area of northwestern Melville Island contains underexplored occurrences of exhalative sulphide, bedded phosphorite and epigenetic galena-sphalerite-fluorite vein mineralization.

Potential also exists for redbed-related copper deposits in upper Paleozoic strata as indicated by replacement chalcopyrite and supergene copper sulphide-oxide showings in the Canyon Fiord Formation (Carboniferous) on Melville Island and in age-equivalent carbonate formations of northern Ellesmere Island. The Canyon Fiord Formation and the similar but slightly older Borup Fiord Formation were deposited in rift-related alluvial fan and shallow marine settings on the periphery of the Sverdrup Basin and are widely exposed on Melville, Bathurst, western Devon, Ellesmere and northern Axel Heiberg islands.

Kimberlite suite igneous rocks are known on northeastern Somerset Island. Potential exists in other areas where the Archeanshield may exist beneath thin Paleozoic cover as on Victoria Island east of Hadley Bay, and on Prince of Wales, Baffin, eastern Devon and southeastern Ellesmere islands. Intrusive breccias with olivine and phlogopite megacrysts also occur in the Tertiary Freemans Cove volcanic-plutonic province of southeastern Bathurst Island but arenot well understood petrogenetically.

SLAVE PROVINCE HYDRO DEVELOPMENT

Helwig, Phil; NWT Power Corporation

Sustained exploration activity and the promise of long-range development of mines is a clear opportunity for the NWT Power Corporation (NWTPC). To this end, NWTPC has been consulting with BHP Minerals and Kennecott on their anticipated requirements and welcomes other developers to discuss their plans.

The Corporation is also working with managers at the Con and Giant mines to streamline billing, consumption data and work on energy reduction programs.

In the longer term, the Corporation is pleased with the progress at the Snare Cascades Dogrib Hydro Corporation joint venture and has begun preliminary feasibility studies at the two potential new hydro sites on the Snare River. These also have the potential of involving aboriginal investment. These new developments could be critical to diamond development as well as emerging gold properties in the Slave province and the chronic hydro shortage for the City of Yellowknife. NWTPC is also keenly interested in alternative wind generation projects. particularly in Cambridge Bay.

GEOLOGICAL EVOLUTION OF THE WINTER LAKE BELT, SLAVE PROVINCE, NWT.

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The Winter Lake belt is an Archean supracrusta1 belt located in the central Slave Province (MS 86A) south of Point Lake. Although a relatively narrow belt, it is made up of a diverse rock assemblage and records a geological history of at least 700 million years. The belt has a broadly synformal geometry but metavolcanic units can not be correlated across the belt. Although ages >3 Ga from gneissic complexes and detrital zircons >3 Ga are well known in the Slave, the oldest rocks in the Winter Lake belt are coherent units of felsic to intermediate metavolcanic rocks and orthoquartzite occurring at the structural base of the belt. These felsic units have yielded U-Pb zircon dates of 3.3 Ga on the west side of the belt and 3.1 Ga on the east side of belt. A unit of pillowed, talc-alkalic to tholeiitic mafic metavolcanic rocks lies stratigraphically above, and faces away from, the 3.3 Ga felsic metavolcanic *rocks* on the west side of the belt. Pillowed komatiitic basalts, rare in the Slave Province, form part of a heterogeneous sequence that overlies these mafic rocks. On the east side of the belt, a thin unit of komatiitic basalt separates the 3.1 Ga felsic rocks and an orthoquartzite with detrital zircons between 3.13-3.14 Ga from a dominantly tholeiitic metavolcanic unit. Turbiditic metasedimentary rocks occupy the centre of the belt and contain a thin felsic metavolcanic unit younger than 2.63 Ga. Polymictic conglomerates and associated sandstones with a depositional age bracketed between 2689-2548 Ma unconformably overlie the mafic metavolcanic and turbiditic metasedimentary rocks and constrain the timing of important structural and metamorphic events.

Although they are preserved together in a relatively narrow belt, it is unlikely that the metavolcanic rocks all formed in the same tectonic environment. The structural and stratigraphic relationships of the metavolcanic rocks and their chemical compositions suggest a long-lived tectonic history involving elements of both the rifting and accretionary models proposed for the evolution of Slave Province. On the west side of the belt the contact between the older felsic metavolcanic rocks and the overlying mafic rocks is only weakly deformed. The mafic rocks directly above the contact have LREE-enriched profiles and negative Nb-positive Th anomalies suggesting they were contaminated by pre-existing felsic crust. Basaltic komatiites from the belt have chemical characteristics suggesting that they were also contaminated by felsic crust. This evidence is consistent with the extrusion of the mafic metavolcanic rocks through pre-existing crust during rifting of the older felsic volcanic package, although no syn-rift sedentary deposits are present.

In con-on *the* east side of the belt, the tholeiitic metavolcanic unit has chemical characteristics analogous to modem MORB with no evidence of crustal contamination. suggesting that these rocks must have been erupted in a relatively wide basin. The tholeiitic mafic rocks, komatiitic basalts and 3.1 Ga felsic metavolcanic rocks are presently juxtaposed along a zone of high strain. Structural relationships suggest that the collapse of this basin and the structural juxtaposition of these rocks was accomplished relatively early in the tectonic evolution of the belt, before the deposition of the unconformable conglomerate unit and the later folding events that are responsible for the present structural geometry of the belt.

GEOLOGY AND MINERAL OCCURRENCES OF THE SOUTHERN LAKE MAP AREA, (55 L/1) DISTRICT OF KEEWATIN

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During the 1995 field season, a 1:50,000 mapping project within *the* Hearne (Churchill) Structural Province continued at Southern Lake (55 L/l), approximately 110 km southwest of Rankin Inlet. The oldest rocks in the area are the Archean volcanic and sedimentary rocks (commonly referred to ss the “Kaminak Group”) of the Rankin-Ennadai greenstone belt (ea. 2.70 Ga; Mortensen and Thorpe, 1987; GSC Paper 87-2). Exploration in adjacent areas has centred on massive sulphide deposits (Spi Lake), disseminated sulphides in zones of carbonate, chlorite and sericite alteration (Mac, Cache), and shear-related auriferous quartz veins (Fat Lake) in Archean rocks. Gold exploration within the map area has focused on stratiform sulphide zones and shear-hosted gold showings.

The Archean volcanic rocks define a continuous northwest-trending belt and are dominated by intermediate to mafic volcanic flows, massive or pillowed, with discontinuous volcaniclastic beds and felsic flows. Biotite-garnet schists (± magnetite) and supracrustal gneisses are found in the southwestern part of the map area Cherts and pelites occupy a few outcrops in the southeastern part of the map sheet.

Syn- and postvolcanic gabbroic intrusions are common within the Archean supracrustal rocks. A migmatitic gabbro complex consists of medium -to coarse-grained gabbro and diorite (locally plagioclase porphyritic) paleosomes and quartz diorite to tonalite neosomes. Fine-grained mafic and felsic volcanic screens are locally preserved within the complex. Immediately south of this complex is a similar plutonic complex which is composed of fine- to coarse-grained gabbro, locally plagioclase or hornblende porphyritic, intruded by tonalite and granite stringers. Rocks of volcanic affinity are rare. Gabbro breccia, characterized by subangular clasts, is quite common. Postvolcanic intrusions of diorite, quartz diorite and tonalite dominate the map area southwest of the supracrustal belt and a massive microcline-porphyritic biotite monzogranite dominates the northeastern side. A composite dioritic pluton occurs within the southwestern plutonic masses and adjacent to supracrustal rocks. It consists dominantly of variably foliated diorite to amphibolite with varying amounts of hornblende, and numerous partly assimilated supracrustal rocks.

At least four mafic dyke sets intrude the Archean rocks in the map area. The Kaminak mafic dyke swarm (ea. 2.45 Ga.; L.M. Heaman, pers. comm., 1993), north-northeast trending and locally porphyritic, is the most predominant within the map area. The youngest dyke in the map area is a 20 m wide magnetite-bearing diabase. Several smaller discontinuous (<5 m) magnetite-bearing diabase dykes with weathering similar to the young diabase dyke were observed and are thought to be related to it. Biotite porphyritic lamprophyre dykes are common as well. Previous mapping has shown that these two dyke sets cross-cut the Kaminak dykes and intrude Early Proterozoic supracrustal rocks of the Hurwitz Group. One foliated biotite-porphyritic mafic dyke (lamprophyre?) intrudes pillowed volcanic rocks. Several similar dykes were mapped in the adjacent Snug Lake area (see Relf, this volume).

Bedding, SO, in the volcanic rocks generally dips southwest and youngs northeast. A bedding parallel foliation defied by cleavage and aligned metamorphic minerals is the dominant fabric in the map area. This early foliation, S,, was found to be axial planar to an isoclinal fold (F_1) in one outcrop, and it is deformed into open to tight F_2 folds with a southeast striking axial surface in the northwest part of the map area. A northwest dipping crenelation cleavage, S_3, cuts the F_2 folds, and therefore postdates them. The variation in the regional orientation of F_2 fold axes and mineral lineations may be related to the folds associated with S,. Regionally, the pattern defmed by F2 fold axes and S_3 cremation clevages suggests a complex fold interference pattern. In addition to folding, a major shear zone trends northwest along Southern Lake and the Copperneedle River. A second fault set is northeast-trending. The majority of kinematic indicators of the northwest-trending fault zones record sinistral strike-slip displacement. Kinematic indicators for northeast-trending faults commonly record dextral strike-slip movement. Amphibole and garnet porphyroblasts in the mafic volcanic rocks indicate amphibolite metamorphic grade. A maximum metamorphic grade of upper amphibolite may have been reached in the southwestern part of the map sheet.

During the course of mapping, 99 samples were collected for assay. These range from stratabound-type gossans, both shear-related and dilation-feature quartz (± carbonate) veins, and disseminated sulphides within mafic and felsic intrusions. Numerous stratiform gossans containing disseminated to massive sulphides (pyrite, ± pyrrhotite, ± chalcopyrite, ± sphalerite) occur in Archean supracrustal rocks and supracrustal enclaves within plutonic masses. Three grab samples from these gossans yielded anomalous Au (> 100 ppb), Cu (>500 ppm) and Zn (>500 ppm). Eight other similar samples yielded anomalous Cu and/or Zn values. Maximum concentrations detected were 6,720 ppb Au, 11,100 ppm Cu, and 2,440 ppm Zn; none contained significant arsenic or lead. One quartz vein yielded anomalous Cu and two others yielded Mo > 100 ppm.

SUMMARY OF 1995 MAPPING

Jackson, V.A. NWT Geological Mapping Division

July and August of 1995 were devoted to mapping "holes" problem solving and tine-tuning geological relationships in 86 and 86P. Four areas were reviewed: Eokuk Uplift, Tree River volcanic belt (TRVB), southern Napaktulik Lake volcanic be (NLVB) and the Hood River area of NLVB. About 2 weeks wer spent in each area. Work in TRVB, Hood River area of NLV and the main part of Eokuk Uplift was aimed at solving specifi problems, which are outlined below. The only new mapping, a 1:30,000 scale, was in eastern Eokuk Uplift and southern NLVI and the geology of these two areas is summarized below.

TRVB

The geology of this area is given in Jackson (1993). In 1995 won was concentrated in the central part of TRVB (Hinge lake area) Contacts between some of the major lithologies were re-examined mainly to determine which were structural and which were stratigraphic. Within pelitic-psammitic sediments, metamorphic grade and porphyroblast growth relative to fabric formation, were further constrained Parts of the bounding granitoids and gneisses were mapped, in part as a "hole-filling" procedure, but also to identify any supracrustal remnants.

Hood River area of NLVB

The geology of this area is given in Jackson (1991). In 1995. felsic volcanics exposed along the Hood River and in the Long Gossan lake area were re-examined in an attempt to find criteria that may distinguish the circa 3.1 Ga from the 2.7 Ga rhyolites (Villeneuve et al., 1993 and pers. comm.). Some of the supracrustal rocks were studied to clarify complex structural relationships. Mapping of some of the medium to high grade migmatitic rocks was aimed at further delineation of supracrustal rocks. Although supracrustals were discovered, mapping of these rocks requires greater detail than can be allowed in a 1:30,000 scale project.

Main Eokuk Uplift

Most of the Uplift was mapped in 1994; the geology of the area was given in Jackson (1994b) and in a 1:100,000 scale compilation map (Jackson, 1995a). In 1995, some of the amphibolitic marker units within the granitoid and gneiss terrane were traced to further constrain map scale fold patterns. The granitoid cobble-rich conglomerate unit was re-examined in hopes of further defining its contact relations and aerial extent.

Eastern Eokuk Uplift

Eastern Eokuk Uplift is underlain by Archean granitoids, granitic gneisses and disrupted amphibolite facies supracrustal rocks. Supracrustals include interlayered hornblende gneiss, garnetiferous quartz-rich metasediments, and possible quartz-pebble metaconglomerate. Locally, hornblende gneiss contains zones rich in disseminated sulfides and metasedimentary rocks contain magnetite-bearing layers (remnant iron formation?). The main fabric is a northerly trending migmatitic to gneissic compositional layering. This is locally folded about either northerly trending axial traces or west-southwest plunging axes. Where not disrupted by faults, the Archean-Proterozoic contact is an unconformity. Generally, Proterozoic strata face away from the Uplift and are gently to steeply inclined. Locally, the strata are overturned and overlain by Archean rocks.

Southern NLVB

A small segment of Archean rocks in the Napaktulik Lake area covering the northern third of 86I/1 and 2, was mapped to join the maps of Jackson (1991) and Gebert (1995). The geology of this area is given in Jackson (1995b). Here, NLVB ranges from less than 200 m to almost 2 km in thickness and is dominated by finely laminated volcanic and volcaniclastic rocks which lack reliable top indicators. The belt is bound on the west by granitic rocks, including the highly deformed Tak granite and other younger grattites. To the east of the belt lies a diorite complex which is characterized by intrusive breccias and contains local concentrations of volcanics. To the east, dioritic rocks are intruded by granites that are part of a regional batholith. A belt of amphibolite grade supracrustals was found to the west of NLVB. Sedimentary and volcanic rocks in this belt contain banded magnetite iron formation (BIF), whereas those of NLVB lack BIF. These western supracrustals are likely continuous with those near the south end of Napaktulik Lake (Gebert, 1995) and they continue to the north where they form disrupted medium to high grade migmatitic to gneissic rocks (Jackson, 1994a).

Foliation trends are northeast in both NLVB and rocks to the west of the belt, whereas they are northwest throughout most of the diorite complex. Within the eastern granitic rocks these trends vary from northwest or northeast adjacent to the diorite, but are predominantly east-west. Locally, feldspar augen and quartz lenses within the Tak granite define a penetrative northeast-plunging lineation. Within NLVB linear fabrics plunge between east-southeast and northeast.

Of the five assay samples collected, the best result came from a BIF unit in the western supracrustals and yielded 434 ppb Au and elevated As.

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SURFICIAL SEDIMENTS, PEWFROST AND GEOMORPHIC PROCESSES, KIKERK LAKE AND COPPERMINE MAP AREAS (NTS 86P, 860 EAST HALF), WEST KITIKMEOT, NUNAVUT.

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Ongoing mineral exploration and development in the central and north Slave Geological Province have resulted in the need for a wide range of baseline information. In response, Terrain Sciences Division initiated regional surficial mapping through the Slave Province National Mapping ('NATMAP) Program to provide fundamental regional data of surficial materials and till geochemistry. During the 1995 field season, the Coppermine (860, east half) and Kikerk Lake (86P) map areas were mapped at a scale of 1:125 000. A permafrost and terrain information component was incorporated into the 1995 investigation because of increasing prospects for development, including proposed winter roads and marine port facility along the Coronation Gulf coast.

Approximately 240 till samples of 3 kg were taken for grain size and trace element geochemical analyses. At each site, 50 pebbles (2 to 6 cm in diameter) were collected for provenance investigations. Sediment samples were also taken for analysis of moisture content and basic engineering properties. In addition, permafrost features, observations on bedrock weathering and other geomorphic processes were identified at each sample location. A CRREL corer was used to obtain samples to a depth of 2 m. Six air temperature and near-surface ground temperature stations were installed within the map area to monitor climatic controls on the active layer and permafrost during the period 1995-2000.

Till as a blanket or veneer is the most common surficial sediment in the area; exceptionally large drumlinoid features up to 35 km in length are found west of Kikerk Lake. Till is attributed to the Late Wisconsin Laurentide Ice Sheet. Sand and gravel glaciofluvial deposits, consisting predominantly of esker and outwash complexes. occur throughout the area and are potential aggregate sources. Marine deposits, consisting primarily of clayey silt cover much of the coastal plain below the limit of postglacial marine submergence at 170-200 m a.s.l. Raised sand and grovel beaches are relatively common near the present coastline, whereas gravelly glaciomarine and marine deltas are found farther inland.

Preliminary surveys of permafrost aspects revealed variations among different surficial units. Active layers are shallowest over fine-grained marine and till deposits where peat accumulations exceed 0.35 m. In these areas, the active layer is commonly restricted to a depth of 0.3 to 0.4 m. On unvegetated marine silts and clays, the active layer thicknesses are typically only 0.6 m or less. In comparison active layer thicknesses on mudboils in sandy ills are on the order of 1.0 m. Littoral and outwash sands with 0.1 m to 0.15 m of organic cover have active layers on the order of 0.7 m thick while those on unvegetated gravels are in excess of 1.3 m thick. The fine grained marine sediments are probably the most sensitive to permafrost degradation. These silty sediments are typically ice-rich in the upper 1.5 m, and lenses of ice up to 1.0 m thick are present, resulting in high thaw-sensitivity. Removal or disturbance of the overlying littoral sediments would likely induce melting and slumping of the ice-rich sediments. Ice-wedge troughs on many marine deltas, outwash terraces and kames can be exceedingly large, >2 m deep and up to 6 m wide. These features may be the product of thermokarst development in the form of partial or complete meltout of underlying wedge ice, or could signify the presence of massive ground ice at depth resulting in a widening of ice-wedge troughs through creep deformation of the underlying ice. Granular deposits associated with these features should be investigated for potential ground ice prior to removal of the aggregate materials.

HIGHLIGHTS OF SOME RECENT METALLOGENIC INVESTIGATIONS IN SLAVE PROVINCE[1]

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'Contribution to Canada-Northwest Territories Mineral Initiatives (1991-1996), an initiative under the Canada-Notthwest Territories Economic Development Agreement, *Geological Survey of Canada, Ottawa, Ontario K1A 0E8; 'Department of Indian Affairs and Northern Development Yellowknife, NWT X1A 2R3; 'United States Geological Survey, Denver, Colorado 80225

Field and laboratory studies related to iron-formation-hosted gold deposits continue to be consistent with classification of most deposits into two distinct types (Kerswill, 1993): a largely synsedirnentary stratiform type (Lupin, Bugow and SP prospects in the Russell Lake area, prospects in the wheeler Lake area) and an entirely epigenetic non-stratiform type (George Lake, Goose Lake). However, some occurrences are more difficult to classify. These are enigmatic because they appear to contain significant stratiform as well as non-stratiform mineralization. Examples include several prospects in the Damoti Lake and Fishhook Lake areas of western Slave Province. The presence of unequivocal stratiform mineralization would significantly enhance the exploration potential of these latter prospects.

Evaluation of data on gold concentration and the abundance of quartz veins in the Centre Zone at Lupin indicates no correlation between quartz veins and gold mineralization. Areas of low quartz vein density (widely spaced quartz veins) are commonly high in gold content (equal to or greater than 15 g/tome Au). Areas of high quartz vein density (closely spaced quartz veins) are commonly lower in gold content (less than 15 g/tonne Au). The average spacing between quartz veins in gold-rich portions of the Centre Zone is about 4 metres but varies from less than 1 metre to greater than 10 metres.

Comparison of field and lithogeochemical data between Lupin (Kerswill) and Homestake (DeWitt), evaluation of published information, including Caddey et al. (1991), as well as recent field work at Lupin by DeWitt, Kerswill and Brophy indicate a remarkable similarity between Lupin and Homestake. Most notably, much of the ore in both deposits is stratiform, well-laminated, pyrrhotite-rich, but arsenic-poor, and uncorrelated with the distribution of late quartz veins. Furthermore, much of the ore in both deposits occurs away from fold noses.

Much of the gold in stratiform deposits and prospects appears to have been deposited with Fe-sulphide minerals prior to deformation and metamorphism. Structural and textural evidence in support of this includes the presence of fish-head boudins in sulphide-BIF, the occurrence of intrafolial folds in sulphide-BIF, overgrowths of Fe-sulphide minerals by syn-peak metamorphic silicate porphyroblasts, and increases in the grain size of Fe-sulphide minerals and the abundance of Fe-sulphide-filled fractures at higher metamorphic grades.

Recent (1995) bedrock mapping in western Slave Province by John Brophy and others, Sally Pehrsson and several exploration companies has significantly increased the areal extent of turbidite-dominated terranes that contain iron formation. Thus the exploration potential for BIF -hosted gold deposits in Slave Province has increased.

Comparison between the High Lake and Courageous Lake greenstone belts reveals that both belts contain older volcanic-dominated domains in the west characterized by synvolcanic massive sulphide mineralization and younger sedirnentdominated domains to the east characterized by epigenetic gold-arsenic mineralization. Other similarities include the presence of iron formation in the zone at the contact between the volcanic-dominated and sediment-dominated domains.

A recent U/Pb zircon age from an altered felsic volcanic rock from the High Lake deposit has significant metallogenic implications. The circa 2705 Ma age is consistent with the High Lake deposit being part of the metal-rich Western Domain as defined by Henderson et al. (1995) and is identical to that of the Rush Lake area further to the west. The Rush Lake area is characterized by widespread synvolcanic hydrothermal alteration (dalmatianite) but has few known mineral occurrences.

Comparison of lithogeochemical analyses between samples of altered felsic volcanic rocks (dalmatianite) from the High Lake deposit and samples of apparently altered volcanic rocks collected by Sally Pehrsson from the Indin Lake area indicates a remarkable similarity. This suggests potential for synvolcanic massive sulphide mineralization in the Indin Lake belt.

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DISTINCT EMPLACEMENT PERIODS OF PHANEROZOIC KIMBERLITES IN NORTH AMERICA, AND IMPLICATIONS FOR THE SLAVE PROVINCE

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An intensive staking rush for diamonds in North America has resulted in the discovery of a number of new kimberlite clusters and fields. In addition, new kimberlite pipes have also been found within known clusters or fields. Despite all these recent discoveries, however, there is a surprising paucity of data on the emplacement ages of Phanerozoic kimberlites in North America as compared to relatively comprehensive databases which exist for Yakutia and South Africa. Data from more than fifty new, precise U-Pb analyses (primarily perovskite) from various North American kimberlites, coupled with existing data allows the first comprehensive documentation of the temporal and spatial distribution of Phanerozoic kimberlites in North America.

Compilation of all the age determinations indicate that Phanerozoic kimberlites in North America fall into distinctive age clusters, which correlate with known periods of global kimberlite volcanism. Furthermore, kimberlite of similar ages in North America appear to define north - south trending belts. The eastern North America belt consists of Jurassic kimberlites in the Kirkland Lake and Lake Ellen fields and at Glenwood Creek (New York). The central North America belt consists of Cretaceus kimberlites in the Somerset Island, NWT and Fort a la Come, Saskatchewan fields, plus the Riley Co., Kansas and Elliot Co., Kentucky kimberlites. The western North America belt, in contrast, consists of a number of distinct magmatic periods. These include: Eocene kimberlites at Lac de Gras, NWT and Missouri Breaks, Montana; Cretaceus kimberlites at Lac de Gras, NWT; Permian kimberlite at Cross, B.C. and Devonian kimberlites in the State Line field, Colorado - Wyoming.

Kimberlite fields for which a number of the individual pipes have been dated by the U-Pb perovskite method (e.g. Somerset Island, 99 Ma; Kirkland Lake, 155 Ma) indicate that magmatism occured as a discrete episode (i.e. + 3 Ma). All of the kimberlite provinces in North America (with the exception of Lac de Gras) are interpreted to consist of single or multiple fields of the same age, that is they are Type I or II kimberlite provinces as defined by Mitchell (1986). however, in Lac de Gras, there has been multiple periods of kimberlite emplacement (Cretaceus and Tertiary), thus it is a Type III province (as is South Africa and Yakutia). Considering that there are a number of pipes in the Slave Province for which the emplacement ages are unknown, it can be suggested that future studies should reveal emplacement ages older than Cretaceus. This observation has important implications for kimberlite exploration in the portions of the Archean Slave craton which are covered by platform sediments.

AN OVERVIEW OF THE BOSTON GOLD PROJECT.

le Nobel, D.N.; Exploration Manager, Western Canada BHP Minerals Canada Ltd.

The BOSTON claims are IXON~mqsheet760/9 along the southeast shore of Spyder lake within the Hope Bay volcanic belt (HBVB). The property is centered approximately 700 km northeast Of Yellowknife. The nearest settlements are Umingmaktok and Cambridge Bay, 65 km to the west and 170 km to the northeast respectively.

The southern portion of the HBVB, encompasses a north to northwesterly trending, 3-7 km wide package of supracrustals that are bounded by Archean granitoid intrusives to the east and a heterogeneous gneiss terrane to the southwest. The property is centered on a carbonated shear zone that sub-parallels the regional schistosity. Greenschist facies tholeiitic basalts and turbidites/greywackes underlie the majority of the claims. Subordinate amounts of felsic flows, pyroclastics, and intrusive are also present.

Favorable geology, structure and gold anomalies of 2.8 g/t and 3.4 g/t gold reported on MDA - DIAND funded map sheets (Gebert. EGS 1990-15) near the discussed shear zone prompted BHP's staking of the BOSTON 1 to 4 claims in May of 1991. The property has since been expanded.

During the initial field season, soil and rock samples along a five km long corridor of the BOSTON Shear Zone produced peak assay values ranging from 1 to 191 g/t gold. An orientation style soil grid on the BOSTON 1 claim delineated a number of linear, auriferous trends centered over a 150m by 1000m portion of the shear.

The first drill program, completed in 1992, intersected gold bearing, pyritiferous quartz veins over a strike length of 850m and to a vertical depth of 260m below surface. Since then three field seasons of drilling have expanded the deposit and helped to determine gold grade continuity. The property received an intense preparatory stage that included 80 line km of ground geophysics (IP,VLF, and total field magnetics) and 23 line km of soil sampling. Preliminary bench scale metallurgical work has been completed and baseline environmental surveys have been carried out since program inception. An inferred resource has been calculated and the company is working towards a decision, pending completion of engineering studies, management and regulatory approvals, to proceed with an underground bulk sampling program in 1996.

Occurrences of gold mineralization are restricted to quartz and quartz-carbonate veins that themselves are mostly confined to the Boston Shear Zone. The structure that hosts the BOSTON deposit contains aspects of alteration and mineralization that are comparable to the shear hosted mesothermal deposits in the Porcupine, Red Lake, and Kalgoorlie mining districts. The most strongly carbonatized portions of the shear are comprised of rusty-brown weathering, fine-grained masses of dolomite (ankerite) and sericite schists. Typically, the schistose rock is manifested on surface as frost-heaved, friable rubble that can occur across widths of up to 100m.

THE LITTLE NAHANNI PEGMATITE GROUP AND NEIGHBORING PLUTONS. NWT'. CANADA

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Little Nahanni Pegmatite Group is located in the Logan Mountains in the NW'T, about 47 kilometres NW of Tungsten. The group is hosted by deformed, upper greenschist to lower amphibolite facies metasedimentary rocks of the Upper Proterozoic Hyland Group. Mineralogical and geochemical data show the group to belong to the LCT family as classified by Cerny (1991). The 100+ dikes that make up the group are characteristic of the albite-spodumene type of rare-element class of granitic pegmatite. Of all pegmatite types, this type represents the richest in lithium (Cerny 1989). The dikes are up to only several metres wide (most are less than i m), yet can extend up to several kilometres along strike.

The primary ore mineral (of lithium) is spodumene. Dikes contain up to 25-30°A spodumene. Lepidolite, the only other significant lithium-bearing mineral, is not as plentiful. Quartz, albite, K-feldspar and muscovite make up the remainder of the bulk of the pegmatites. Accessory minerals include beryl, columbite-tantalite, cassiterite, apatite, lithiophilite and other minor phases.

Given an increasing demand for lithium for use in electrically -driven transportation, in the medical field and others, this pegmatite group represents a potentially economic deposit of this element. Potential by-products include the elements niobium, tantalum, tin, beryllium. The deposit also has some gemstone potential.

Lithium-bearing minerals were aiso discovered within pegmatites associated with the O'Grady pluton. Except for uncommon allanite, no other rare-element-bearing minerals were found to occur in this pluton. While this occurrence does not have the economic potential that the Little Nahanni Pegmatite Group does, it does show that the plutons of the Selwyn suite and anomolies in metamorphic grade in the proximity of these plutons warrant further investigation in terms of rare-element potential.

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STRATABOUND AND STRATIFORM SEDIMENT-HOSTED URANIUM-COPPER PROSPECTS IN THE PALEOPROTEROZOIC AMER GROUP, CHURCHILL PROVINCE NORTHWEST TERRITORIES, WITH COMPARISONS TO OTHER SEDIMENT-HOSTED MINERAL DEPOSIT TERRANES WITHIN AND OUTSIDE THE CHURCHILL PROVINCE.[1]

Miller, A.R. and S. Tella; Geological Survey of Canada.

[1]Contribution to Canada-Northwest Territories Mineral Initiatives (1991-1996), an initiative under the Canada-Northwest Territories Economic Development Cooperative Agreement

Scattered remnants of Paleoproterozoic supracrustal sequences are preserved across the western Churchill province. They display contrasting sedimentology, deformation style and metamorphism and are divisible into three time-stratigraphic sequences, 1) Amer. Hurwitz and Kiyuk groups, and Chantery belt (ca 2.45 to 2.1 Ga), 2) Baker Lake and Wharton groups, Baker Lake Basin (ca 1.84 to 1.76 Ga) and 3) Barrensland Group, Thelon Basin (ca 1.72 Ga). The first is preserved as infolded keels within Archean gneisses and greenstone belts, the second as weakly deformed to undeformed graben fill, and the third as flat-lying undeformed sheets. Although the sequences record three different stages of thermotectonic evolution that span approximately 0.73 billion years, they are united by a common metallogenetic signature - uranium mineralization. Several uranium deposit types are recognized in the central Churchill Province, each linked to particular sedimentary, volcanic or thermotectonic processes during the Paleoproterozoic and Mesoproterozoic. The oldest uranium mineralization is Paleoproterozoic and occurs in the polydeformed Amer Group.

The Amer Group was intruded by 1849+/- 18 Ma granite/syenite and ultrapotassic dykes and overlies a heterogeneous polydeformed Archean granitoid basement complex with metavolcanic rocks, the latter correlative with the ca 2.79 Ga Woodburn Lake Group.

The supracrustal rocks of the Amer Group, exposed along a 140 km southwest-mending belt, are comprised of two elastic sequences. The lower c lastic sequence is comprised of massive orthoquartzite with subordinate quartz-pebble conglomerate, and an upper sequence of, in ascending order, siltstone-sandstone-pyritiferous shale, feldspathic quartzite, dolomitic limestone, feldspathic sandstone-siltstone-mudstone-carbonate and feldspathic sandstone. The upper clastic sequence hosts subeconomic stratabound and stratiform sediment-hosted uranium-copper prospects. The mineralized zones are restricted to the lower portion of an interbedded calcareous sandstone-siltstone-mudstone-carbonate unit which was deposited in an intertidal lagoonal to sabkha environment. This unit is enriched in Cu, Pb and Zn over a 75 km strike length. Anomalous concentrations of euhedral magnetite in sandstone-siltstone are commonly associated with disseminated pitchblende and coffinite, pyrite, chalcopyrite, +/- bomite, covellite and chalcocite. Textures and opaque mineral assemblages suggest that the redox reaction of magnetite to hematite and replacement of magnetite by iron and copper sulphides controlled metal deposition. The primary mineralization is interpreted to be diagenetic, being weakly recrystallized and remobilized during lower greenschist facies Paleoproterozoic thermotectonism. Stratigraphic and metallogenic correlations are made between the Amer Group and the Hurwitz and Wollaston Groups in the southwestern Churchill Province, and comparisons are made to the Paleoproterozoic sediment-hosted uranium+copper deposits in India and to the copperbelts in Zaire and Namibia.

Cu-Co-Bi-Au-Pb-Zn-Ni-As-W AND Fe-OXIDE MINERALIZATION IN THE SOUTHERN GREAT BEAR MAGMATIC ZONE, NWT.

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Significant concentrations of Cu-W, Co-Bi-Cu-Au-As, Cu-Ni-Co-As and Pb-Zn-Cu were discovered by Fortune Minerals Limited and GMD Resource Corp. near Lou, Burke, Hump, Treasure and Crowfoot lakes, in the southern Great Bear Magmatic Zone, N.W.T. Mineralization occurs in Early Proterozoic felsic to mafic volcanic flows, tuffs and breccias of the Faber Lake volcanic sequence, intercalated with banded siltstones, quartzites and carbonates of the Snare Group.

Regional skarn and hydrothermal type alteration has extensively modified the original nature of the rocks to Fe-oxide, potassium feldspar, amphibole, epidote, biotite, chlorite and talc-siiicate mineral assemblages. Much of the polymetallic sulphide mineralization is associated with the transition from hematite- to magnetite-rich alteration. Peripheral monzonite, syenite and granitoid intrusions appear to have been syntectonic and synvolcanic sources for much of the alteration and mineralization.

Intersecting regional and local structures played an important role in focusing deposition of significant mineralization in tectonic and hydrothermal breccias. Ore minerals include cobaltian arsenopyrite, cobaltite, bismuthinite, chalcopyrite, bornite, galena, sphalerite, pyrite and a number of presently unidentified phases.

The hvo most significant areas of mineralization are the Summit Peak and Bowl zones. The Summit Peak Zone is predominantly chalcopyrite, pyrite and bornite in fractured and brecciated potassium metasomatised felsic volcanic rocks. The discovery trench graded 0.73°A Cu over a 44 meter width.

The Bowl Zone occurs in mafic rocks in a tectonic and hydrothermal breccia at the confluence of structural lineaments. Mineralization is predominantly cobaltian arsenopyrite, chalcopyrite, bismuthinite and cobaltite in a chlorite-magnetite-amphibole schist. The discovery trench sampled 130 meters of a 300 meter wide arsenopyrite-rich zone and averaged 0.11 4°A cobalt and 0.095% bismuth, with sporadic gold and copper. Disseminated copper mineralization is exposed over an additional 150 meter wide interval in apparently higher-temperature altered footwall rocks immediately south of the arsenopyrite-rich zone. Host-rocks for the footwall mineralization consist of quartz-feldspar porphyry intrusions (unmineralized) in hornfelsed siltstones and altered rhyolites.

The recent discoveries were made by systematic regional and detailed geological mapping, supported by airborne and ground radiometric, magnetic and gravity surveys. Extensive diamond drilling will commence this winter in order to delineate the new zones and test additional targets.

RECENTLY DISCOVERED GOLD OCCURRENCES IN SNARE GROUP ROCKS LITTLE CRAPEAU LAKE, NWT (86-C-16).

NickerSon, [1]D, K. Rasmussen[1], G.A. Wilson[2], [1]Independent Yellowknife prospectors, [2]Geological consultants. Calgary.

Conspicuous gossans spaced along the northeast shore of a small lake near Little Crapeau Lake some 90 kilometres north northeast of the community of Rae Lakes, NWT attracted the attention of the authors in 1994. Preliminary sampling of the weathered gossan material gave gold values of Up to 700 ppb and petrographic examination revealed the presence of gold.

Further exploration work consisting of geological mapping, reconnaissance-style geophysics, trenching and sampling was conducted during the 1995 field season. Six gold-bearing gossan zones over a strike length of about 2 kilometres were located. Widths are of the order of 1 to 12 meters and the zones can be traced continuously up to 50 meters or so and discontinuously for greater distances. The originally observed gossans exposed in a cliff face are highly weathered with the development of thick yellow and brown limonite but it was much easier to collect relatively unoxidized material from some of the later discoveries. Pyrrhotite and pyrite are the most abundant sulphide minerals and in places display a banded texture. Gold values within the sulphide-rich bands range from 150 to 3000 ppb. Most of the mineralized zones could be traced using E.M. geophysics.

A NNW-SSE trending belt of preserved Snare Group rocks about 500 meters in width traverses the property. This is generally recessive and is flanked by granite gneiss ridges. The Snare Group strata has been highly metamorphosed. Most of it is thought to be of sedimentary origin although some appears to be volcanic. In the field, it was mapped mostly as amphibolite schist. Within this sequence, some granitic rocks are found and in some cases the result is a banded injection gneiss. There appears to be at least two amphibole-sulphide horizons contained within the Snare Group assemblage. It is within these stratigraphically controlled horizons that the auriferous gossan zones are found. If, as preliminary mapping would seem to indicate, the assemblage has been folded into an anticline, then both the eastern and western amphibole-sulphide horizons might occupy the same stratigraphic position.

At the time of preparation of this abstract, the petrographic work being undertaken by Mr. G.A. Wilson has not been completed. It is expected that Wilson's examinations will shed further light on the nature of the gold mineralization, its genesis and the nature of the host rocks in which it is found. The examination of a single specimen from the No. 1 gossan zone in 1994 showed the rock to have originally contained 40-60% orthoclase, most of which has been altered to masses of sericite and clay minerals, 5- 10"A plagioclase which has been left relatively unaltered, both muscovite and biotite micas together with sulphide minerals and derived limonite. Two modes of pyrite occurrence were observed. Gold was observed both as composite pyrite/gold grains and as very small blebs in the feldspar independent from replacement pyrite.

It is thought that large tonnages of lower grade gold ore could exist within the sulphide horizons or alternatively higher grade sections might be found within these stratigraphic units. The authors believe that the No. i gossan zone, where the highest gold values to date have been discovered and where geophysics indicate a strong and persistent conductor, should be the target of continued exploration effort.

LABRISH GOLD PROJECT

Northern Geophysics Ltd., Yellowknife

DIAND mapping was initiated in the Labrish Lake area of the Northwest Territories in 1993. This mapping has discovered silicate iron formation which is anomalous in goid in a previously unexplored area. The sediments preserve at least four phases of folding.

A program of airborne geophysics, ground geophysics and diamond drilling is planned for the winter of 1995-96.

INTERIM REPORT ON THE STRATIGRAPHY AND STRUCTURE OF THE INDIN LAKE GREENSTONE BELT

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This report summarizes work completed to date and presents the results of i month of mapping during the 1995 field season at i :5000 scale on selected structural problems within the Indin Lake greenstone beit (NTS 86B 3,6,7).

The Indin Lake greenstone beit is a *stack* of four distinct, structurally repeated, tectonostratigraphic units. In ascending structural order these units are:

1) The ca. 2.7 Ga Lets Arm formation; comprised of talc-alkaiine, submarine to subaerial, laterally discontinuous units of mafic through felsic volcanic rock. Pillowed and massive flows comprise 40-500/o of the formation and are dominantly andesite/dacite to basaltic andesite. Volcaniclastic and pyroclastic rocks, which comprise up to 300/0 of the formation, are also dominantly andesite to dacite in composition. Gabbro to diorite synvolcanic intrusive sills and dykes comprise the remaining 25%.

2) A lower turbidite sequence with local volcanic-clast conglomerates at its contact with unit 1. Silicate-facies iron fortnation and felsic volcanic flows and breccias are interbedded with these turbidites.The maximum age of this tectonostratigraphic unit is 2.67 +/-10 Ma, the age of an interbedded felsic volcanic breccia from near its lower contact.

3) The Hewitt Lake formation of unknown age, a *homogeneous* succession of laterally continuous, submarine, tholeiitic basalt and basaltic andesite flows and associated synvolcanic sills.

4) An upper 2.63 Ga turbidite sequence interbedded with silicate-facies iron formation.

The Indin Lake greenstone belt has undergone complex, polyphase deformation. Three Archean and two Proterozoic sets of structural fabric elements have been identified. D1 pre-dates the metamorphic thermal peak and is characterized by rare bedding-parallel slatey cleavage and moderately (25-60 degreee doubly-plunging, isoclinal folds of bedding in the turbidites. In the volcanic rocks, D 1 is characterized by a regional foliation and clast elongation lineation. Penetrative D 1 fabrics, locally strongly modified by D2, and increased strain characterize the contacts of the homoclinal Hewitt Lake formation. Large-scale D1 isoclinal folds of the Leta Arm formation are interpreted based on changes in facing direction about regional-scale D2 interference fold patterns. The past summer's mapping has determined that these interference patterns are characterized by kilometric-scale. overturned (50-70 degree), southern hinges and upright, more steeply-plunging, northern hinges.

D2 deformation is broadly coeval with the metamorphic thermal peak, which ranges from middle greenschist in centre of the greenstone belt to low pressure sillimanite + partial melt (3.5-4.5 kbar) along its west and southeast margins. A regional S2 crenulation cleavage is axial planar to upright, tight to isoclinal F2 folds of bedding and S1. F2 folds occur at all scales and define the regional structural geometry of the greenstone belt. They plunge steeply, predominantly to the north and northeast. Interference with F 1 folds produced regional-scale fold patterns intermediate between mushroom and dome-basin styles. Structural repetition of the tectonostraphic sequence is interpreted to be due to a combination of the D2/D 1 interference folding and syn to post D 1 imbrication.

D3 deformation is characterized by locally developed, north-striking crenulation cleavage and by open, kilometric -scale, steeply south-southwest plunging folds of bedding, S 1 and S2. D4 structural features include northwest-trending, outcrop-scale chevron folds, kink-bands and open meso-scale, northwest-trending cross-folds. D4 deformation is interpreted to be Proterozoic in age, based on the observation that kink-bands deform an unmetamorphosed diabase dyke.

Two sets of Proterozoic faults imbricate the Archean structural stack. The first set consists of north/south striking, brittle-ductile, moderately to steeply west-dipping, east vergent thrust faults. The second set comprises northwest striking, sinistral oblique-slip faults with strike separations of Up to 3 km. The northwest oblique-slip faults have locally reactivated the earlier thrust faults.

Mineral occurrences and alteration styles within the Indin Lake greenstone belt are distinct between the major tectonostratigraphic units. The Leta Arm formation contains silicificied, propylitically alterated, and extremely Na-depleted intermediate to felsic volcanic rocks. It hosts the porphyry-related Colomac goid mine and numerous polymetallic and base-metal showings (Cranston

Lake, Bow Lake. Rainbow zone, Tamarack zone. Bum Inlet). The Hewitt Lake formation hosts the Cass and Main zone epigenetic gold deposits and numerous gold and gold-silver occurrences (Snowden, Oti, Treasure Island, Raspberry zone). The turbidite sequences contain significant iron-formation hosted gold occurrences (Damoti, Horseshoe zone, Fishhook) and two formerly-producing gold mines (North Inca, Diversified) spatially associated with the Proterozoic reactivated thrust faults, Detailed mapping has shown that geochemically favorable, altered felsic volcanic rocks and synvolcanic felsic intrusions occur in the Leta Arm formation. These units contain stringer pyrite/chalcopyrite mineralization and anomalous Zn and Cu occurrences, highlighting the potential for significant base-metal deposits in the Leta Arm formation. These observations show that tectonostratigraphic subdivision is useful to directing gold and base-metal exploration.

GEOLOGY AND ECONOMIC POTENTIAL OF THE LABRISH LAKE AREA (85N/9)

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The Labrish Lake map area is at the western margin of the Slave Structural Province between the Russell Lake and Indin Lake domains. Proterozoic supracrustals and granitiods of the Bear Province are exposed on the west and Archean rocks dominate the eastern 4/5ths of the map area The Proterozoic succession consists of granitic to silica-undersaturated intrusive rocks and Snare Group platformal carbonate and elastic sediments which unconformably overlie or, locally, are in fault contact with Archean rocks. A giant quartz vein and quartz stockwork system with minor copper mineralization occurs within Proterozoic intrusive rocks at the western edge of the map area

A north to northeasterly trending belt of Archean supracrustals, up to nearly 10 kilometres in width, is exposed on either side of the Labrish Lake/Emile River system and lies between the Proterozoic rocks to the west and a large Archean granitoid body, to the east. Archean turbidites, mainly argillaceous and arenaceous metasediments which range in metamorphic grade from greenschist to upper amphibolite-facies and preserve at least three phases of deformation, dominate the supracrustal sequence. Amphibolitic banded iron formation is abundant in a 7-km-long belt parallel to the long axis of southern Labrish Lake. Thicknesses vary from several centimetres to two metres, but layers three or four metres wide have been found on islands, suggesting that iron formation is more abundant under water. Amphibole, garnet, quartz, chlorite and variable amounts of sulphides (pyrite and pyrrhotite) ranging from trace to 5% comprise most of the iron formation. Magnetite in more than-e concentrations was noted at only one locale, in a 20-cm-wide layer. Hematite bands, commonly less than 3 or 4 cm thick, were observed in a few of the thicker iron formations near the southern end of the belt. Tweny-seven samples of amphibolitic banded iron formation were collected and analyzed for gold. With the exception of two ore-tenor anomalies of 1.98 and 1.19 ppm Au, gold contents ranged between 14 and 183 ppb (mode 62 ppb). This anomalous gold signature, coupled with the presence of ore-tenor gold conceptions in two samples, suggests that the Labrish map area is a favourable exploration target for gold in iron formations. Elsewhere within the turbidites of the Labrish area, anomalous gold concentrations (164 to 506 ppb) are associated with limonite quartz-chlorite-pyrite shears that are generally less than 1 metre wide.

Archean metavolcanic rocks occur along the southeastern margin of the supracrustal belt. They are more extensive than previously mapped, comprising a homoclinal sequence, as much as 3 kilometres wide and more than 9 kilometres in strike length. Mixed intermediate to mafic rocks are dominant in the eastern part of the belt and intermediate to felsic flows, tuffs and coarse fragmentals dominate to the west. A hypabyssal quartz-eye to quartz-feldspar porphyry intrudes the metasediments immediately west of the volcanic belt. Top determinations are virtually impossible within the volcanic succession as pillowed flows and other clear indicators are absent. Turbidites immediately west of the volcanics suggest that the sequence is west facing; however the evidence is equivocal.

South of the south end of Labrish Lake, extensive gossans are developed in felsic volcanic rocks near the main sediment -volcanic contact. These gossans, collectively referred to as the "Last Trav Zone", are believed to be near or at the top of the volcanic pile and are spatially associated with a large magnetic anomaly evident on the government aeromag map. The Main Gossan is at least 80 metres long and 26 metres wide, with discontinuous gossan lenses up section (?) for an additional 20 to 30 metres. Fresh samples are difficult to obtain, but appear to be felsic or silicified volcanics carrying trace to several percent pyrite and appreciable coarse secondary sericite. Despite compass deflections of up to 60° on surface, no magnetic minerals were identified in the rocks, and the magnetic source is presumed to lie at depth. Traces of pyrrhotite were noted in the lenses overlying the Main Gossan, but could not explain the anomaly. The North Gossan is exposed on a steep hillside to the north of and along strike from the Main Gossan. It can be traced for 140 meres, is at least 5 metres wide, and is open to the west where it is covered by overburden. There is no physical evidence in the field or historical evidence in government publications, assessment reports or property files for previous sampling of these gossans. No analytical data are presently available from the Last Trav Zone. but alteration, geological setting (at the top of a differentiated volcanic pile spatially associated with a quartz-eye porphyry) and geophysical signature suggest that it maybe the surface expression of unexposed volcanogenic-massive-sulphide-style mineralization and thus it warrants further work.

GEOLOGY OF THE SNUG LAKE MAP AREA, DISTRICT OF KEEWATIN

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Regional (1:50,000) mapping in the Rankin-Ennadai volcanic belt has been ongoing since 1993 under the Canada-NWT Mineral Initiatives Agreement, Mapping continued this past summer in the Southern Lake (55 L/l; Irwin, this volume) and Snug Lake map areas (55 L/8; this study), about 100 km southwest of Rankin inlet.

The 1:250,000 geological map *of* Davidson (1970) has focussed mapping in the Kaminak Lake region (55 L), and the Snug Lake area in particular was selected because Davidson (ibid.) reported a high conception of mineral showings here. Much of this summer's work concentrated on sampling gossans from the mineralized part of the belt, and remapping the area to determine whether the host rocks differ lithologically or structurally from rocks elsewhere in the belt.

The geology of the Snug Lake area is dominated by mafic pillowed flows and pillow breccias, with minor felsic to intermediate flows and volcaniclastic rocks. Although younging is preserved in many pillows, numerous reversals in younging direction preclude the determination of the regional "way up" for this part of the volcanic belt. Sedimentary rocks comprise two distinct packages in the Snug Lake area. An early, synvolcanic package characterized by coarse-grained, carbonate-rick trough cross-bedded sandstones occurs in the west part of the map area. These rocks are interbedded with felsic volcanic rocks and cut by mafic dykes. Younging in the sandstones indicates the mafic flows overlie the felsic rocks. A second sedimentary package, exposed in the north part of the map area, is dominated by thinly bedded turbidites interlayered with minor polymictic conglomerates. This package overlaps and youngs away from a unit of felsic volcanic rocks. Where the base of the turbidites is exposed, it truncates mafic dykes cutting the felsic rocks, suggesting an unconformity.

Archean plutonic rocks in the area have been subdivided into four units based on composition, strain state and cross-cutting relations. The first unit is a medium- to coarse-grained hornblende gabbro that defuses dykes, sills and irregular plutons within the mafic volcanic rocks, and is interpreted to be synvolcanic. Locally this unit is plagioclase-porphyritic, and in a few places it grades into a leucogabbro with plagioclase megacrysts up to 20 cm in diameter. The second unit is a variably foliated, leucocratic hornblende diorite to quartz diorite, characterized locally by abundant mafic enclaves. In the northeastern and southwestern parts of the map area, this unit defines plutons which parallel both the regional foliation and isograds. The third plutonic phase is a weakly to moderately foliated biotite ± hornblende leuco-tonalite which appears to truncate isograds at low angles and is therefore interpreted to be younger than the diorite. Finally, the youngest plutonic unit is a massive, pink, K-feldspar megacrystic biotite monzogranite that is distinguished by a strong aeromagnetic signature. Veins and lenses of this unit are common in rocks above the hornblende isograd, where they cross-cut metamorphic layering.

In addition to plutonic rocks, four sets of dykes cut the map area. North-northeast-striking, plagioclase-porphyritic Kaminak diabase dykes (ea. 2.45 Ga; Heaman, unpublished data) are the most abundant set. They range in width from about 5m to 50m, and are characterized by their relatively fresh appearance and ophitic texture. Kaminak dykes are cut by a set of fine-grained, grey-weathering biotite-porphyritic lamprophyre dykes that are typically less than 2m wide. A second, eider set of lamprophyre dykes was recognized this summer in the area north of Snug Lake: these dykes are coarsely recrystallized have a moderate to strong foliation, and commonly are associated with carbonate veins and lenses. Limited geochemical data show the older lamprophyres are slightly more enriched in rare earth elements and have lower tote] alkalies than the Proterozoic dykes. Based on their strain state, the eider lamprophyres are interpreted to be Archean. and they may be related to the ca. 2.66 Ga Kaminak Lake alkaline complex (Cavell et al., 1991). The youngest dyke in the area is a 50m wide, northwest-striking diabase dyke that traverses the entire map area. This dyke may be part of the Makenzie dyke swarm.

Regionally, the Snug Lake map area straddles a T-shaped junction where a southeast-trending arm splits off the northeast-trending volcanic belt. At the intersection of these two volcanic "arms", an early, subhorizontal, synmetamorphic foliation is deformed into upright, gently plunging northeast- and northwest- trending cross folds, defining a modified dome and basin fold interference pattern. Amphibolite facies mineral assemblages in the centre of the "T" include hornblende-garnet-plagioclase-quartz-epidote and hornblende-garnet-plagioclase, suggesting pressures corresponding to mid-crustal depths (-15 km). Thermobarometric studies are underway to determine whether the Snug Lake area represents deeper crustal levels than elsewhere in the belt.

A large number of sulphide-rich mineral showings cluster between Quartzite and Snug Lakes, in the area where the belt curves through the "T-junction". Although some appear to be stratabound, many mineralized zones follow the axial trace of late cross folds. As a result, the concentration and distribution of gossans in this area is thought to be controlled largely by regional folding. Despite the large number of showings, very few contain any sulphides besides pyrite, and only 3 samples from this area yielded anomalous Cu and/or Zn values (> 1000 ppm). Expiration in the area by Noble Peak Resources resulted in the discovery of numerous mineralized quark ± carbonate veins northwest of Snug Lake, and sampling during the present study found further evidence for vein- and shear zone-hosted mineralization here, including a quartz vein bearing> 1 g/t Au. and Cu values up to 0.47%.

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KRAMANITUAR COMPLEX: A PRESERVED PORTION OF LOWER CRUST FROM THE CENTRAL CHURCHILL PROVINCE, NWT.

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The Kramanituar complex comprises high-pressure granulite-facies plutonic rocks with a minor supracrustal component, exposed over 850 km² in the central part of the Churchill Province. These rocks preserve microstructures, metamorphic mineral assemblages and reaction textures that reflect high-pressure granulite-facies conditions, and allow the opportunity to study the manner in which mafic tectonites behave under lower crustal conditions. They represent one of several similar complexes that are discontinously exposed throughout a 2800 km corridor which transects the central part of the Churchill Province, whose juxtaposition with mid-crustal rocks represents a fundamental problem in reconstructing the Precambrian history of this part of the North American craton.

The highest-grade rocks presently identified in the Kramanituar complex are mafic granulates from its NE margin, These comprise garnet- clinopyroxene-plagioclase-quartz+-pargasitic amphibole assemblages which exhibit petrographic textures and uniform mineral compositions suggestive of close approach to equilibrium. P-T conditions of ca. 12-15 kb and 800-850°C are consistently deduced from these rocks. In contrast, central parts of the complex comprise mafic to anorthositic rocks which preserve delicate disequilibrium reaction textures of two types; coronitic and symplectitic. Complex, micron-scale compositional zonation across these reaction textures pertnit an additional part of the P-T path for the complex to be constrained, yielding a virtually isothermal (850-750°C) decompression history from ca. 13 to 8-9 kb.

Preservation of cinematically significant ductile microstructure in many of these rocks presents a rare opportunity to link their decompression path to the deformation which appears responsible for the preservation of these structural and metamorphic features. Deformation coeval with high-T decompression of some 4 kb is revealed by 1) localization of decompression products to pressure shadow regions in mylonitic rocks; 2) the preferred shape of garnets grown and/or modified during decompression; and 3) c-axis patterns revealing prism and rhombohedral slip as the dominant slip mechanisms during non-coaxial deformation of quartz-bearing diatexites. Deformation related to this kinematic framework is localized in a belt of ultramylonites that appears to transect the northern margin of the complex. Tectonic fabrics and shear sense indicators within this belt are consistent with it being a locus for exhuming the complex through approximately 4 kb, however, its present-day steep attitude does not constrain whether the structure was contractional or extensional during exhumation. Exhumation via tectonic denudation in an extensional setting would account for the preservation of tectonic microstructure, equilibrated metamorphic mineral assemblages, and reaction textures in these rocks: features which suggest that exhumation of this portion of lower crust from depths of 55 km to 40 km was exceedingly efficient in bringing these rocks to conditions at which they were not affected by subsequent retrograde modifications. However, fabric elements and metamorphic gradients across the complex appear to impose constraints which are better accommodated by contractional deformation. This implies that to exhume these rocks, tectonic denudation was taking place synchronously at higher levels.

The timing of high-grade metamorphism and exhumation for this section of lower crust is currently under investigation. Regional isotopic constraints suggest these events may have taken place at ca. 2.6 Ga, possibly during a regional intracontinental magmatic event; or at ca. 1.93 Ga, possibly as part of the magmatism, metamorphism and uplift related to subduction of the Archean Slave Province along the western margin of the Churchill craton. Arrival of these rocks at shallow crustal conditions by 1.85 Ga is constrained by presently-exposed. shallow-dipping metasedimentary rocks that unconforinably overlie the high-pressure granulite-grade complex. Not recognized within the study area are structures to which exhumation from ca. 40 km to within a few km of the earth's surface can be attributed, and these are therefore presumed to be more regional in scale.

GEOLOGY AND U/Pb GEOCHRONOLOGY OF ROCKS ALONG THE BOUNDARY BETWEEN THE ARCHEAN COMMITTEE OROGEN AND PALEOPROTEROZOIC FOXE FOLD BELT, EQE BAY AREA, BAFFIN ISLAND, NORTHWEST TERRITORIES.

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Precambrian bedrock mapping completed in the northeast quarter of NTS 37C is a contribution to the Canada/NWT Mineral Initiative 199 1/1996. The area is underlain mainly by quartzofeldspathic gneisses which bound two greenstone belts, the 'Eqe Bay' and 'Isortoq' belts, as well as thin units of supracrustal rocks correlated with the Piling Group of the Foxe fold belt, and a variety of granitic plutons. The Isortoq Fault Zone is a major southeast-dipping structure which strikes northeast across Baffin island from Isortoq fiord in the map area and coincides with a marked change in aeromagnetic patterns and a southeast/northwest transition to granulite facies. Latest displacements along this fault were normal with a left-lateral oblique component. Precise U/Pb dating of zircon, monazite and titanite constrain ages of Archean volcanism and plutonism, and the timing and nature of later, Paleoproterozoic activity:

Archean supracrustal rocks: Zircons have been analysed in three samples from a felsic volcanic horizon in the Eqe Bay Belt. In two samples, the most concordant zircons have 207/206Pb ages of -2759 Ma and -2755 Ma, respectively. Both rocks also contain somewhat older zircons, ranging in age from -2790 Ma to -2760 Ma, suggesting protracted igneous activity. The third sample contains appreciably younger zircons; the two most concordant fractions bracket its age between -2728 and -2723 Ma. A similar age of -2720 Ma has been obtained from a quartz-feldspar porphyry in the Isortoq Belt. Felsic volcanic rocks at Eqe Bay contain a number of older zircons, interpreted as inherited, with the following 207/206Pb ages: -2802 Ma, -2805 Ma, -291 I Ma and -2962 Ma.

Archean gneiss complex: Fractions of zircon from a granitic cobble in the basal conglomerate of the turbidite unit in the Eqe Bay Belt define a tight upper-intercept age of 2843+2 Ma, interpreted as the time of igneous crystallization (before deposition). Younger zircon (-2690 Ma) in the same cobble is interpreted in terms of a thermal event either before or after deposition. Two samples of tonalitic- to granodioritic gneiss bordering the Isortoq Belt contain concordant zircons with 207/206Pb ages of -2779 Ma and -2764 Ma, respectively, interpreted as the time of crystallization of igneous protoliths. One of the rocks contains 2850|2840 Ma-old inherited grains.

Archean plutonic rocks: Supracrustal rocks of both greenstone belts are cut by later granitic intrusions. At two localities along the margin of the Isortoq Belt, a distinctive unit of Kfs-megacrystic granite has yielded ages of igneous crystallization of 2721 ● 3 Ma and 2725 ±2 Ma, respectively. An age of 2714+2 Ma has been obtained from a texturally identical granite in the Eqe Bay Belt. Intrusions of quartz-diorite/monzodiorite in each belt have identical ages within uncertainty, of-2725 Ma.

Paleoproterozoic tectonism: Zircon, monazite and titanite from migmatitic pelites and high-grade gneisses in the footwall of the the Isortoq Fault Zone indicate that high-grade metamorphism occurred in the period 1830-1820 Ma and was followed by emplacement of syn- to late-kinematic granite at 1819+1 Ma. In contrast to near-concordant titanite in rocks in the footwall, titanite in Kfs-megacrystic in the immediate hangingwall is discordant with an upper-intercept age of-2690 Ma and lower-intercept age of 190011800 Ma. An almost identical pattern of discordance is defined by titanite in K-feldspar megacrystic granite in the Eqe Bay Belt to the southeast.

Conclusions: 1) The 2840 Ma-old granite cobble in the Eqe Bay Belt implies erosion of pre-existing sialic crust. Zircons xenocrysts the same age or older provide additional evidence for 'basement' to the greenstone belts and suggest possible age heterogeneity within it; 2) Ages of tonalitic to granodioritic orthogneisses of the Archean gneiss complex fall within the age-range of older volcanic rocks in the Eqe Bay Belt, suggesting that they may represent intrusive equivalents. The same relationship is suggested by near-identical ages of younger granitic and volcanic rocks. The greenstone belts thus appear to have formed during two volcano-plutonic cycles, the first between ca. 2785 Ma and 2755 Ma, and the second between ca. 2730 and 2715 Ma. Turbidites were deposited in a short interval (<5 Ma) during the second cycle; 3) There is some isotopic evidence pointing to a post-depositional (Archean) metamorphism at -2700-2690 Ma; 4) Upper-amphibolite to granulite-facies metamorphism associated with early thrusting along the Isortoq Fault Zone peaked at -1825 Ma, and was followed by granitic plutonism at -1820 Ma; 5) Strong isotopic resetting in rocks in the footwall of the Isortoq Fault contrasts with a milder disturbance in the hangingwall reflecting late-stage displacement of lower-grade rocks (in the hangingwall) from higher crustal levels.

GEOLOGY OF THE META INCOGNITA PENINSULA, SOUTHERN BAFFIN ISLAND: TECTONOSTRATIGRAPHIC UNITS, STRUCTURAL EVOLUTION AND THE POTENTIAL FOR RAGLAN-TYPE FE-NI-CU DEPOSITS.

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Field work in 1995 on Meta Incognita Peninsula (southern Baffin Island) marks the first phase of a proposed three-year multidisciplinary project to investigate the geology of the Lake Harbour (NTS 25K), Big Island (NTS 25 L), Markham Bay (NTS 25 M), and Armshow River (NTS 25N) map areas. Field aspects of the project in 1995 included bedrock geological mapping of 15,000 km² at 1:100,000 scale between Lake Harbour and Iqaluit, mapping of surficial deposits at 1:250,000 scale, and rock/mineral identification for local residents and Inuit carvers.

Several tectonostratigraphic units in the southern Baffin Island region (Baffin Orogen) can be correlated with similar units in northern Quebec (Cape Smith Belt - Ungava Orogen) or south-central Baffin Island. A grey tonalite gneiss on Big Island is identified as possible reworked Superior Province basement. Siliciclastic-mafic-ultramafic sequences are correlated with the Paleoproterozoic lower Povungnituk Group of Ungava Orogen. Carbonate and siliciclastic units of the Lake Harbour Group may be equivalent to the Paleoproterozoic Sugluk Group (Ungava Orogen). Large felsic plutonic units represent the southern extension of the Paleoproterozoic Cumberland Batholith (south-central Baffin Island) and structural panels of tonalite and monzogranite are correlated with the Paleoproterozoic Narsajuaq arc of Ungava Orogen. The paucity of ortho- and paragneisses of potential Archean age does not support suggestions that a southeastern arm of the Archean Rae craton is present on Meta Incognita Peninsula.

The principal structural components of the Meta Incognita Peninsula include a widespread penetrative foliation, southwest-verging kinematically linked thrusts, and a set of southwest-vergent folds Up to tens of kilometres in wavelength. These structures collectively comprise the southwest-vergent Meta Incognita thrust belt. South of Frobisher Bay, the thrusts are cross-cut by, and imbricate, the southwestern margin of the Cumberland batholith. The generalized structural sequence for the Lake Harbour - Iqaluit area starts with formation of a low-angle foliation, followed by regional thrusting, folding, and localized strike-slip shearing. All preserved deformation structures were formed at granulite facies. The Mets Incognita thrust belt is interpreted as the high-temperature continuation of the Cape Smith Belt, Ungava Orogen, northern Quebec.

The correlation of tectonostratigraphic units on Meta incognita Peninsula with the lower Povungnituk Group in northern Quebec is of potential significance for mineral exploration work. Within the Cape Smith Belt, Fe-Ni-Cu mineralization (Raglan-type) is associated with the emplacement of ultramafic and differentiated mafic-ultramafic units in siliciclastic rocks of the lower Povungnituk Group. The occurrence of siliciclastic sedimentary rocks, mafic/ultramafic assemblages and gossan zones in the Meta Incognita Peninsula, within thrust-bound panels similar to those of the Cape Smith Belt, substantially extends the ground prospective for Raglan-type deposits and highlights the economic potential of the south Baffin region. Interested parties are referred to GSC colour Open File Maps # 3191-3193 which are due for release on January 22.1996 and which document the detailed distribution of the tectonostratigraphic and structural elements in the Lake Harbour - Iqaluit area.

NT MINFILE - A COMPUTERIZED MINERAL OCCURRENCE DATABASE.

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The NT MINFILE Computerized Mineral Showings Database is being developed through the collaborative efforts of Canada-NWT Mineral Initiatives Office, DIAND NWT. Geology Division, and G.N.W.T. Systems& Communications Division.

NT MINFILE runs in FOXPRO 2.5, utilizing VISUAL BASIC 3.0 to allow operation in DOS or WINDOWS environments. Database design is modelled after BC MINFILE with data screens devoted to Identification/Location, Mineralization, Host Rock, Geological Setting, Reserves, Production and References. The database may be searched and reports are generated from query results. Database development and data capture of mineral occurrences from the Slave, Cordillera, Hearne and Arctic Platform Provinces is ongoing. Conversion of other digital databases to NWT MINFILE format, has begun. Based on progress to date, a beta version of the database, containing approximately 1000 occurrences may be available by 1996.

Delegates are invited to visit the NT MINFILE display.

CRUSTAL-SCALE BREAKS: PRECAMBRIAN EXAMPLES FROM THE SOUTH-CENTRAL SLAVE PROVINCE

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The complex and protracted history of faulting in the south-central Slave Province has been partly solved by recent 1:50,000 mapping in the Carp Lakes area (NTS 85 P). It is concluded that the length or width of deformation zones and the intensity of alteration or fault fabrics are unreliable indicators of the magnitude of displacement. Many of the numerous lineaments in the area cannot be attributed to faults with discernible displacements.

Faults within the Carp Lakes area preserve a variety of orientations, displacement directions and textures. Faults with dominantly vertical displacement are most evident where they displace shallowly dipping surfaces (e.g. isograds, some contacts) and are commonly curved. Transcurrent faults are generally steep and quasi-planar and are most evident where they displace steeply dipping surfaces (e.g. most contacts, other faults, dykes). Textures within the fault zones range from brittle (breccia) to ductile (ultramylonite) with variably developed kinematic indicators. In addition, many of the most significant faults or tectonic breaks are intruded by thin granitic sheets or pegmatites that generally lack any penetrative fabric. Individual faults can display all three of these features along their length. It is proposed that this spectrum of fault characteristics is largely dependent on strain rate and on irregularities in the fault surface.

Reactivation of existing fault zones adds further complexity to the deformation history, although it may not be as prevalent as commonly assumed. This is because early fault zones are commonly folded or are segmented by subsequent oblique faults and are therefore not suitably positioned for regional-scale reactivation. Where parts of existing faults are reactivated, the extent of apparent influence is the sum of the length of the early fault segment and the magnitude of secondary displacement. The most reliable indicator of fault reactivation is contrasting metamorphic grade along the fault zone. Conflicting kinematic indicators do not necessarily imply multiple movements, as they can be the product of single displacements (e.g. oblique slip associated with flower structures in bulk strike-slip zones).

Archean fault zones are widespread and the most difficult to characterize. Fault zones which are folded or are truncated by granitic plutons, or which contain amphibolite facies metamorphic assemblages, are presumed to have an Archean history. Discrete fault zones include a major thrust which replicates the northern Cameron River volcanic belt (James & Mortensen, 1992), and which is interpreted to have been active during the regional cleavage-forming deformation (D_2). Moderately inclined granitic sheets and tourmaline-bearing pegmatite, locally with a well-developed downdip lineation, surround a domal migmatite terrane north of Nicholas Lake and are interpreted to have intruded along normal faults during late Archean extensional denudation of the mid-crustal rocks.

Three systems of Proterozoic faults postdate emplacement of northwest and east-northeast striking diabase dykes, the latter attributed to either 2.19 or 2.235 Ga magmatism (A.N. LeCheminant, pers. comm., 1995). Specular hematite is common in all Proterozoic faults. No faults can be demonstrated to displace the 1.27 Ga north-northwest striking Mackenzie diabase swarm.

The oldest of the Proterozoic fault systems consists of conjugate northwest- and northeast-striking sets which record, respectively, sinistral and dextral strike-slip displacement. The ca. 2.18 Ga Squalus Lake alkaline intrusion (Villeneuve & van Breemen, 1994) straddles the 80 km long dextral phoenix fault and displays no appreciable offset. As it seems improbable that the dextral fault would intersect the small pluton by chance, the preferred interpretation is that the alkaline magmatism exploited a pre-existing or developing fault. Hence, the age of the conjugate fault system is tentatively constrained between 2180 and 2235 Ma.

The second Proterozoic fault system comprises northerly striking sinistral strike-slip faults with variable but consistent components of east-side-up displacement. Of these, the ca. 300 km long Beniah fault zone is the most spectacular and best studied. It exhibits many features typical of major transcurrent fault zones including brittle to ductile features, duplexes and flower structures, conflicting kinematic indicators, variable magnitudes of final displacement (8 to 14 km horizontal component) possibly related to parallel relay faults, and local reactivation of earlier (Archean) fault zones. Pegmatites intruded along the Beniah fault zone lack tourmaline and have a distinctive salmon colour. Other faults of this system include one along the western margin of the northern Cameron River volcanic belt which farther north curves eastward into a thrust ramp, and another which delimits much of the northwestern margin of the Yellowknife supracrustal domain.

Tie final fault system is poorly constrained with respect to age and displacements. [t includes variously oriented lineaments which lack common kinematic indicators, but which delineate offset marker units. The most common set strikes east-west and exhibits near-vertical displacements.

Archean tectonic breaks tend to be masked by the extensive Proterozoic displacements. Recognition of major Archean breaks first requires reversing the effects of younger deformation. Integrated studies (e.g isotopic and kinematic analyses) can then be used to evaluate the significance of the older faults.

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OPEN FILE GEOLOGICAL MAP OF THE SCARAB (NTS 55J/14) AND BAIRD BAY (NTS 55J/15) REGION, DISTRICT OF KEEWATIN, NORTHWEST TERRITORIES.

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The 1:50,000 scale coloured digital map showing the bedrock geology of the Scarab-Baird Bay region is scheduled for open file release in December 1995. The data for this map was compiled digitally using FIELDLOG and AutoCAD with final output generated through direct collaboration with the Cartagrophy Unit, GICD using GIS software.

The geological map presents results of bedrock mapping undertaken in the region during 1985, 1994, and 1995 field seasons, The objectives of the mapping were to upgrade reconnaissance database in order to provide a better framework for regional correlation and tectonic synthesis of rock units of this part of the Churchill Structural Province. Detailed accounts of bedrock geology and structure covering the adjoining regions to the west and north were published in numerous GSC publications. The reader is referred to the marginal notes and references therein for an overview of the geology and structure of this region.

REGIONAL RADIOGENIC HEAT PRODUCTION AND LITHOSPHERIC TEMPERATURES BENEATH THE SLAVE PROVINCE - IS THE THICKNESS OF POTENTIALLY DIAMONDIFEROUS LITHOSPHERE VARIABLE?

Thompson, P. H., A.S. Judge, B.W. Charbonneau, J.M. Carson
Geological Survey of Canada

A preliminary thermal parameter study led to the suggestion that wherever the most radiogenic *rock units are* present in sufficient volumes, the underlying lithosphere could be thinner than average for the Slave Province (Thompson et al., 1995). According to simple one-dimensional models that assume the base of the lithosphere corresponds to 1300 "C, an increase in average heat production in the upper crust from 1.7 uW/m3 (surface heat flow = 40 mW/m2) to 2.3 uW/m3 (surface heat flow = 50 mW/m2) reduced lithospheric thickness from 23o to 175 km and the thickness of the potentially diamondiferous zone in the lowermost lithosphere from 110 to 30 km. To the extent that the modelling is a reasonable approximation of reality, the potential for diamond discoveries may vary across the Province in a manner partly dependent on crustal heat production.

Knowledge of the distribution and volume of radiogenic heat sources within the crust is limited. A compilation of apparent heat production has been derived from Geological Survey of Canada airborne radiometric surveys (Darnley et al., 1986) for an area of 125,000 km2 (62-66° N, 110-116° W) in the south central Slave Province. The values shown on the map range from <0.5 to >4.0 u W/m3. Taking into account the reduction in airborne anomaly levels by glacial overburden, surface wetness, and vegetation these values represent outcrop values approximately twice as high (Richardson and Killeen, 1980). The significance of the airborne data is substantiated by heat production calculated from 725 in situ gamma spectrometric analyses (15 localities) measured in the course of follow-up to the airborne surveys and from laboratory measurements of 85 samples (10 rock units, Thompson et al., 1995) from the Winter Lake - Lac de Gras area (64°-650 N, 1110-113° W). The outcrop and laboratory measurements ranged from <1 uW/m3 for mafic volcanic rocks and tonalitic gneiss to 16 u W/m3 for pink K-feldspar megacrystic granite. The latter rock unit is the cause of a large airborne anomaly more than 100 km long and 3040 km wide northeast of Cross Lake (Carp Lakes *map* area - NTS 86P).

Reasonable values of average heat production within other components of the crust combined with a range of estimates of the volume of megacrystic K-feldspar granite beneath the Carp Lakes anomaly indicate diamond potential should be lower than in the Lac de Gras region. According to an admittedly limited data set (Pell, 1995) kimberlite pipes close to or within large masses of this granite (e.g., Cross Lake, Yamba Lake) are significantly less diamondiferous than those near Lac de Grin. While many other parameters may be involved, for example, spatial variations in composition of lithospheric mantle, the significance of crustal heat production with respect to diamond potential merits careful consideration. One test of the models indicating thin lithosphere (100-150 km) beneath radiogenic upper crust would be to determine if any mantle xenoliths in kimberlites near the anomalous zone are derived from thick lithosphere (>200 km).

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THERMAL PARAMETERS IN ROCK UNITS OF THE WINTER LAKE - LAC DE GRAS AREA, CENTRAL SLAVE PROVINCE, N.W.T. - IMPLICATIONS FOR DIAMOND GENESIS .

Thompson, P. H., A.S. Judge[1], T.J. Lewis[2], [1]Continental Geoscience Division, ‘Terrain Sciences Division GSC, ‘Pacific Geoscience Centre GSC

Radiogenic heat production varies with rock type from 0.1-0.8 uW/m3 in amphibolite and tonalitic gneiss to 8.0-15.8 u W/m3 in late granites. Metasedimentary rocks and other granitoid units fall between these extremes. Thermal conductivity ranges from 2.3 to 4.9 W/mK. Conductivity parallel to planar foliation or layering is up to 1.6 times higher than that perpendicular to these features.

A simple conductive thermal model and the assumption that the lithosphere/asthenosphere boundary is a thermal feature (1300 “C) suggests that decreasing heat production in the crust can account for the transition from barren lithosphere less than 100 km *thick* at the end of the Archean to a diamond-bearing lithosphere 200-225 km thick today. Lateral variations in this parameter may cause the thickness of diamond-bearing lithosphere beneath the Slave Province to change.

Consistency between the model results, surface geology, and the results of other modelling approaches suggests that crustal thermal parameters and their evolution with time should be part of any comprehensive hypothesis for formation and evolution of lithosphere beneath Archean cratons.

GSC AEROMAGNETIC AND GRAVITY COVERAGE FOR THE NORTHWEST TERRITORIES

Tod, J; Continental Geoscience Division, GSC

Existing aeromagnetic and gravity data in the National Data Bases (NMDB, NGDB), is regional in nature and covers much of the NWT. Typically, the aeromagnetic data were recorded in pre-digital days and later digitized from contour maps, which had a basic interval of 10 nT. The wide line spacing (800 m or often greater) combined with the 10 nT accuracy, means these data are too coarse to meet today's exploration requirements. The gravity data has characteristically been acquired at 15 km intervals, a spacing which is suitable for interpretation of broad, regional features.

This year, the GSC has two aeromagnetic acquisition projects in the NWT. In the NE, the central portion of Victoria island (61,300 line km) was surveyed in partnership with 2 industry companies. These data will support detailed geological mapping, base metal and kimberlite exploration programs. The second project, entailing 108,153 line km, is located at the juxtaposition of B. C., Yukon and NW'T. Three oil companies formed a consortium with the GSC, to further their exploration efforts over the Liard Plateau.

Recent gravity acquisition includes an on-ice survey in Queen Maud Gulf early in 1995; 6 km station readings were taken as part of the systematic gravity mapping of the Arctic Channels. Further north, a major initiative was undertaken as part of the North American Defence Plan. On-ice measurements m Nares Strait and 12 km station readings on Ellesmere Island were taken in the spring of 1995.

Future data acquisition will similarly be undertaken on a cost-shared basis with industry and/or the territories. The sizeable investment required to cany out these surveys will then be spread over several players and the target areas will be those of greatest mutual interest.

CONTINENTAL PACIFIC RESOURCES INC., ANIALIK RIVER PROJECT, NWT RUN LAKE PROPERTY.

Vivian Gary, Covello, Bryan and Associates, Yellowknife.

The Run Lake property hosts a potential high grade, large tonnage Archean-aged polymetallic Zn-Ag-Cu-Pb-Au massive sulphide deposit.

The Run Lake property lies within 19km of Grays Bay on the Arctic Coast. The property is some 6 15km north of Yellowknife and lies some 150km east of the Hamlet of Coppermine. Fuel and eqipment can be barged to the Grays Bay area providing a significant cost savings.

Contitnental Pacific Resources Inc.'s land holdings in the Anialik River-High Lake area comprise a total of over 116,000 acres.

The property was discovered, and first worked, by Cominco Ltd. in 1975 who drill delineated a prominent large copper stringer zone.

Continental Pacific Resources inc. has wholly-owned the Run Lake Property since 1988.

,Recognizing at least two conductive trends stratigraphically overlying the copper stringer zone provided the impetus to search for a large polymetallic massive sulphide deposit.

A short two drill program was completed in 1990 on the untested Wolverine Zone. R-2-90 intersected 1.45m of 0.48% Cu, 15.28% Zn and 93 g/t Ag which lies within a 10. 1m section of semi-massive sulphide. This intersection represents the only high-grade massive sulphide intersection to date.

The 1995 drill program has confirmed the Wolverine Horizon has the potential to host a high-grade and large tonnage polymetallic massive sulphide deposit.

Geophysics has delineated the Wolverine Zone over an approximate strike length of1500m.

The volcanic host rocks to the Wolverine Zone are subaqueous and finfered volcanic rocks of mafic to felsic composition and occur as flows, tuffs and sub-volcanic intrusive units. They dip moderately east to southeast and trend north-northwest. A minor elastic component represents the erosion of the volcanics.

The massive sulphide portion of this horizon contains high-grade

:inc-silver and minor amounts of copper-lead-and gold. This massive sulphide zone has been delineated over a strike of some 240m. Thicknesses of 6.29m grading 0.56% Cu, 10.44% Zn and 83.5 g/t Ag have been intersected. A stratigraphically lower zone has alos been intersected with widths of 1.13m grading 1.51% Pb, 21.23% Zn, 343 g/t Ag and 1.4 g/t Au. The Wolverine Horizon has been drill tested to a depth of 120m. Drilling indicates the zone is thickening at depth.

Moderately altered felsic volcanics (sericite and weak chlorite) containing prominent massive sulphides, such as the Wolverine Zone, suggests drilling to this point is higher up in the stratigraphic sequence and excellent potential lies at depth and along strike.

THE DISCOVERY MINE, THE FIRST FIFTY YEARS

Webb, D.R., New Discovery Mines Ltd.

The Discovery Mine is located 100 km north-northeast of Yellowknife, NWT, near the northern extent of the Yellowknife Greenstone Belt. Gold was initially discovered on the west side of Giauque Lake by Fred Giauque and his son in 1944. That discovery consisted of numerous enechelon auriferous quartz veins near the northern extent of, and within gossanous mafic volcanic rocks. Fred sold this for a significant sum of cash. Initial prospecting disclosed a zone of mineralized mafic volcanics containing narrow quartz veins, generally less than 1 m. In width, and less than 30 m in strike length. Subsequent prospecting in 1945, led by Bert Wagenitz discovered a more extensive folded quartz vein within metasedimentary rocks in a low-lying area 50 m to the north of the volcanic-hosted mineralization. The quartz vein could be traced for 75 m in a hook-shape, and averaged 1.1 m in width grading 2.90 ounces of gold per ton. This discovery, made in September, 1945 was the foundation of what would become the million ounce producer.

Subsequent development of this resource led to a 4,060' shaft, 27 levels and the production of 1 million tons of ore. All production was from this zone, referred to as the Main Zone, and the original discovery, referred to as the West Zone. Additional mineralized zones, such as the Ormsby Zone, 6,000' southwest of the Main Zone, were discovered, but none were to become economically viable at the time. Recent work by GMD Resource Corp. And New Discovery Mines Ltd has focused on reserves that were known to exist and were not economic under the existing gold price and technology, as well as areas of prospective ground that can be identified using the more than 50 years of history from the giant shear zone-hosted gold deposits to the south.

The Yellowknife Greenstone Belt extends from Great Slave Lake to north of Discovery Mine in a near continuos domain of metavolcanic and associated metasedimentary rocks and related intrusions. It is a sequence of Archean rocks ranging to 2,920 ma., intruded by Archean and Proterozoic rocks and transected by cogenetic to late Proterozoic faults.

Economic concentrations of gold mineralization is structurally-hosted, associated with igneous and sedimentary rocks, although by far the dominant production has come from volcanic-hosted mineralization. The Discovery Mine occupies a portion of a large northeast-striking shear zone that contains numerous gold showings and occurrences. Recent work has revealed that the main deposits of the Discovery Mine are hosted within a structural setting similar to the multi-million ounce deposits at Yellowknife, and that additional targets exist on the property from rocks in a similar setting.