DISTRIBUTION OF GOLD, PLATINUM, PALLADIUM, AND SILVER IN SELECTED PORTIONS OF THE BOHEMIA BASIN DEPOSITS, SOUTHEAST ALASKA (WITH AN APPENDIX SECTION ON MIRROR HARBOR)

by Jan C. Still, Alaska Field Operations Center, Juneau, Alaska

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UNITED STATES DEPARTMENT OF THE INTERIOR

Donald Paul Hodel, Secretary

BUREAU OF MINES

David S. Brown, Acting Director

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	-	foot
in.	-	inch
lb	-	pound
oz/ton	-	ounces per ton
%	-	percent
mi	-	mile
o	-	degree Fahrenheit
L	-	less than
G	-	greater than
wt.	-	weight

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*** ABSTRACT

The Bohemia Basin nickel-copper-cobalt deposits located on the southeastern portion of Yakobi Island were examined by the Bureau of Mines in 1982 to determine the potential for platinum-group metals, gold, and silver. The deposits are thought to be magmatic segregations in a zoned composite stock. Demonstrated resources, accessible by open-pit mining, are 15.1 million tons averaging 0.37% nickel, 0.22% copper, and 0.02% cobalt. Bureau examination consisted of sampling surface outcrops, adits, and pits; and analysis of selected diamond drill hole samples for platinum-group-metals, gold, and silver. Sixty samples were collected from surface outcrops and analyzed, and 185 samples from 5 diamond drill holes were analyzed. The highest gold, platinum, palladium and silver values from the analysis of 245 surface and drill hole samples were 0.01 oz/ton gold, 0.006 oz/ton platinum, 0.004 oz/ton palladium and 0.157 oz/ton silver; 94 of the 185 drill hole samples were analyzed for iridium, osmium, rhodium and ruthenium and none was detected. In general, most of the precious metal values were confined to the nickel-copper ore zones, with the highest values often coinciding with the highest nickel-copper values. Precious metals, except silver, are concentrated with copper and are potential low grade metallurgical byproducts.

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INTRODUCTION

Acknowledgments

Vance Thornsberry of Inspiration Copper Co. was most helpful in obtaining maps and drill core pulps for this study. Bill Salisbury of Salisbury and Dietz Inc., was most cooperative in supplying detailed geology maps (1 to 7)[2] of the deposit. Robert M. Friedland of Galactica Resources, Ltd., current owners of the Bohemia Basin property, supplied current data on the property.

Physiography and Climate

Bohemia Basin is located on the eastern part of Yakobi Island, a few miles west of Lisianski Strait; figure 1 shows the area location. The deposits are exposed at elevations between 400 and 1800 ft at the head of Bohemia Creek, which flows east to Lisianski Strait. The hills on which the deposits are located have generally rounded, somewhat subdued glaciated, topography and rise to elevations of 2500 ft.

The climate of the Bohemia Basin area is typically maritime, with periods of rain and fog that may last for weeks, particularly in the late summer and fall. Weather records kept at Pelican, located 8 mi east of Bohemia Basin show annual precipitation ranging from 88 to 180 in for the years 1964-1979. Temperature variations are moderate with extremes ranging from the high 70's to about 0°F. The average annual temperature is 43°F. Snowfall is heavy during winter months and the snowpack at some localities lasts until late summer.

Access

Bohemia Basin is accessible by a 2-mi-long, 4-wheel-drive road that climbs 1,000 vertical ft from the mine camp and dock at Lisianski Inlet. This camp is accessible by boat or amphibious aircraft. The nearest major supply center is Juneau, population 25,000 and located 100 air mi to the east. The small fishing village of Pelican, population 400, is located 8 mi to the east.

Land Status

The Basin and Takanis deposits are covered by 9 patented lode claims and 264 unpatented lode claims. The property is entirely within Tongass National Forest, and the Basin-Takanis areas and camp site have been designated LUD IV, intensive use area, by the Tongass Land Use Plan. The Mirror Harbor area covered in Appendix B contains 101 unpatented lode claims. They are located on Tongass National Forest land designated as LUD I, wilderness; however, the claims predate the wilderness designation.

Previous Investigations and History

Exploration activity in the Bohemia Basin area has been extensive and has taken place over a period of 60 years. The first claims were located and a 156 ft adit was driven on the southeast side of the Basin deposit in 1920. By 1940, there were 15 prospect trenches 15 to 30 ft long (8). The first testing was by the U.S. Bureau of Mines (Bureau) in 1942 who with the help of the

[2]Underlined numbers in parenthesis refer to reference list on page 9

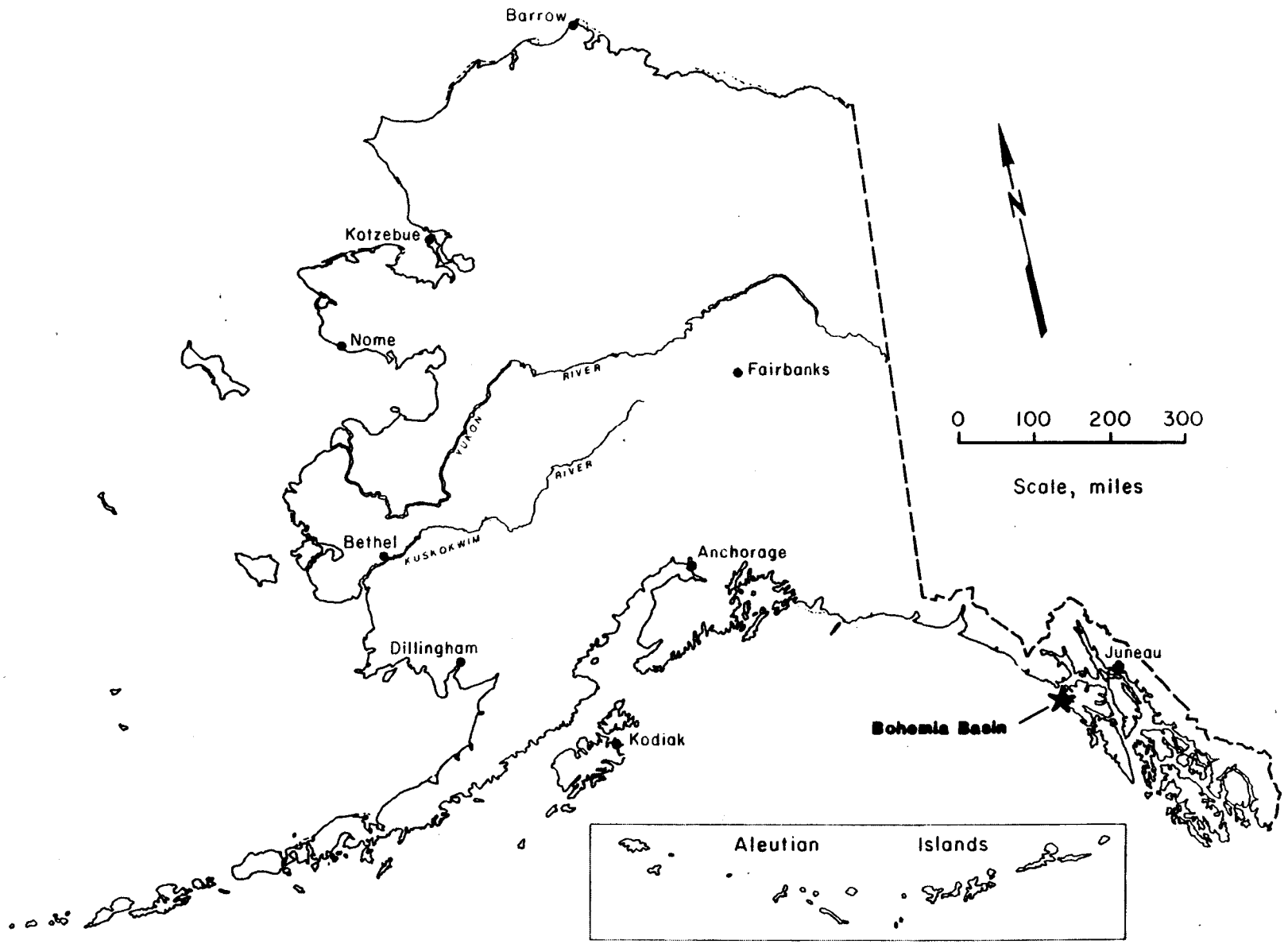

Figure 1. Alaska, showing the location of the Bohemia Basin deposits and Mirror Harbor.

U.S. Geological Survey (USGS) under the War Minerals Act, completed 15 diamond drill holes, mapped the area and trenched and sampled the outcrops. Additional work was completed by the Bureau and the USGS in 1943. The combined work of both agencies resulted in the Bureau of Mines War Minerals Report 174 (1944), the results of which were summarized in USGS Bulletin 947-C (9). In the 1940's the property came under the control of S.H.P. Vevelstead who optioned the claims to International Nickel Company (INCO) in the mid 1950's. INCO held the property for three years and completed 28 diamond drill holes on the Basin and Takanis deposits. INCO lost control of the property after a lawsuit with Vevelstead. Alenco, Inc. acquired the property from Vevelstead in 1971 and optioned it to Inspiration Consolidated Copper Mining (Inspiration) in 1972. Inspiration completed 94 drill holes, conducted extensive geological mapping, geochemical and geophysical surveys; conducted preliminary feasibility studies, pit designs, metallurgical testing and acquired patents for Alenco on nine lode claims covering the Basin and Takanis deposits (10). In 1979-81, the Bureau briefly examined the property as part of a study mandated by the Wilderness Act (Public Law 88-579). These results are published in Bureau of Mines MLA report 97-82 (11). A bulk sample (approximately 200 pounds) from the adit was supplied to the Bureau's Albany Research Center in 1980 for metallurgical testing for platinum-group metals. The results of this testing were published in Bureau of Mines RI 8553 (12). In 1982 Inspiration released the property back to Alenco because of crucial economic considerations within the company. The property was purchased by Galactic Resources, Ltd. and Cornucopia Resources, Ltd. of Portland, Oregon in 1983. In 1984 5,000 ft of diamond drilling were completed on the property.

REGIONAL GEOLOGIC SETTING

A northwest trending belt of Tertiary gabbroic plutons extends from the Fairweather Stock located 75 mi northwest of Bohemia Basin in Glacier Bay National Park, to the northwestern portion of Chichagoff Island. These plutons intrude older metamorphosed alkalic rocks, amphibolites, hornfels, and metagraywackes. Two of these plutons, the Fairweather and the Crillon Stocks exhibit well defined layering varying in composition from diorite to pyroxenite or dunite. The Crillon Stock contains the Brady Glacier nickel-copper deposit at its southern end. That deposit has 180 million tons of indicated and inferred reserves averaging 0.53% nickel, 0.33% copper, 0.03% cobalt, and byproduct PGE (13).

AREA AND DEPOSIT GEOLOGY

A composite stock of intermediate composition, mostly gabbroic comprises about one-third the land area of Yakobi Island. Rock types are quartz diorite, diorite, gabbro, and norite. These rocks grade into each other and at times can only be identified microscopically. In general, the norite occurs as discrete irregular bodies within or bordering a more sodic rock. This stock, although much smaller in magnitude, is similar in mode of occurrence to the layered complex in the Fairweather province which is associated with the Brady Glacier nickel deposit (10).

Norite hosts the copper-nickel sulfide mineralization and all evidence points to concentration of sulfide mineralization by segregation within a cooling magma. Variations within the norite can be abrupt or gradational with igneous layering a common

feature. Generally, the mineralized units are pyroxenite within norite bodies. At the Basin deposit the mineralized rock occupies the basal zone; however, this is not necessarily the case with the other deposits (10).

Figure 2 shows the location of the Basin, Takanis, and Flapjack areas discussed below while figures 3-6 show the geology of the areas.

The Basin area contains an elliptically-shaped norite plug, 1200-1400 ft in diameter, which is bounded on the east and southwest by barren diorite and pyrrhotite-rich amphibole schist, and bounded on the north and west by the main gabbroic complex. The norite body is layered with composition ranging from anorthosite to pyroxenite. These units are arranged concentrically in a funnel-like shape around the core of the norite plug. The main mineralized zone is a basal pyroxenite unit, 50-150 ft thick, with smaller, usually lower grade zones, 5-20 ft thick, paralleling the main zone.

The Takanis area contains at least three separate gabbro-norite intrusions with many variations in rock types; intruded by a later diorite phase and late siliceous to mafic dikes. The mineralized host rock is a dark gray to brown, medium grained, equigranular norite grading to peridotite and pyroxenite, the latter characteristically containing hypersthene and actinolite , and usually moderately altered. The Takanis ore body, dips steeply and is tabular in shape, striking approximately N50^{o}E and dipping 70^{o}SE; it is approximately 900 ft long by 200 ft wide (10).

The Flapjack area contains a sill-like member within a layered intrusion with tabular shaped mineralized horizons similar to those in the Takanis deposit (10).

Sulfide mineralization in the above three areas includes pyrrhotite, pyrite, pentlandite, and chalcopyrite as disseminated grains, blebs, interstitial networks, and massive aggregates.

RESOURCES

Identified resources for the Bohemia Basin deposits as reported by Thornsberry in 1982 (10) are as follows:

Basin Deposit: (based on 73 diamond drill holes) 16,185,599 tons which average 0.31% Ni, 0.18% Cu, and 0.02% Co.

Takanis Deposit: (based on 47 diamond drill holes) 3,971,500 tons which average 0.29% Ni, 0.18% Cu and 0.02% Co.

Together, the Basin and Takanis deposits have proven resources accessible by open-pit mining of 15.1 million tons grading 0.37% Ni and 0.22% Cu at a 2.5:1 stripping ratio.

Flapjack Deposit: (based on 4 diamond drill holes) 4,000,000 tons inferred which average 0.21% Ni and 0.12% Cu.

BUREAU OF MINES INVESTIGATION

The purpose of this investigation was to determine the potential for platinum-group metals, gold and silver at the Bohemia Basin deposits and to determine their distribution if significant values were found.

A party of two Bureau persons spent 6 days in August of 1982 collecting samples from trenches, pits, and outcrops on the Bohemia Basin deposits and a day collecting samples from trenches and pits on the Mirror Harbor deposit. Sixty surface samples were collected from the Basin deposits and areas and another 17 from the Mirror Harbor deposit. Most of these were chip samples weighing 3 to 5 lbs. Bulk samples weighing 150-200 lbs were collected at the Takanis Ridge area and at the Mirror Harbor deposit for metallurgical testing. Figures 3-5 shows the geology of the Basin deposits and the Takanis and Flapjack areas surface samples while appendix A gives the analytical results. The Mirror Harbor work was not as detailed as the Bohemia Basin work and is described in appendix B. Appendix C describes bulk sample metallurgical tests. The Takanis bulk sample location is shown on figure 3, map number 3, (sample 15005) and the Mirror Harbor bulk sample locations are shown in figure B2, map number 3 (15001), and figure B4, map number 14 (25313).

Inspiration supplied the Bureau with 185 sample pulps from diamond drill core. Holes IDC-B-4, IDC-B-13, and IDC-B-20 are located at the Basin deposit, while holes WDT-13 and WDT-19 are located at the Takanis area. Figure 5 shows the geology and locations of the Basin deposit surface samples, drill holes, and drill hole sections, while figures 6-9 are drill hole sections with sample locations. Figure 2 shows the location of the Takanis area drill hole sections while figures 10 and 11 are drill hole sections showing sample locations. The analytical results are in appendix A.

Most of the samples were analyzed for gold, platinum, and palladium by fire assay-atomic absorption (FA-AA) at Bondar Clegg, Inc., Lakewood, Colorado, while a few were analyzed by inductively-coupled argon plasma spectroscopy (ICP) by the Bureau's Reno, Nevada, laboratory. Detection limits for FA-AA analysis are usually as follows: gold-0.0002 oz/ton, platinum-0.002 oz/ton, and palladium 0.0002-oz/ton. Detection limits for ICP analysis are usually as follows gold-0.0002 oz/ton, platinum-0.0003 oz/ton, and palladium-0.0003 oz/ton. Silver analysis was by atomic absorption (AA) or fire assay. The detection limit for the former is usually 0.01 oz/ton and that for the latter is usually 0.1 oz/ton. Ninety-four of the 185 drill hole samples were analyzed for iridium, osmium, rhodium, and ruthenium by fire assay-spectrography (FA-SPEC.) but none were detected. Surface samples were analyzed for nickel, copper, and cobalt by AA, and Inspiration Copper supplied AA nickel-copper-cobalt values for the drill hole samples. Appendix A contains the analytical results.

Results

Thirty-eight samples were collected from pits and outcrops scattered across the surface exposures of the Basin deposit, while ninety-three samples were obtained from diamond drill holes IDC-B-4, IDC-B-13, and IDC-B-20. Figures 5 to 9 show sample locations and geology, while appendix A gives the analytical results. The platinum and palladium values were all below 0.004 oz/ton and too close to the limit of detection for detailed analysis. Silver values ranged from nil to 0.2 oz/ton. The most significant values were found

where drill hole IDC-B-13 pierces the outer northwest flank or the basal portion of the Basin deposit. Here a twenty-five ft long drill intercept of norite with 10 to 15% sulfide minerals averaged 0.01 oz/ton gold, 0.14 oz/ton silver, 0.65% nickel, and 0.58% copper. The section also averaged 0.0014 oz/ton palladium and 0.0004 oz/ton platinum. Most of the samples were collected in nickel-copper mineralized areas and in general, most of the highest precious metal values were within the nickel-copper mineralized area. Almost all of the samples collected outside the nickel-copper zone had the lowest precious metal values.

In the Takanis area, twenty-nine surface samples were collected from pits and outcrops and ninety-three samples were obtained from the Takanis area diamond drills holes WDT-13 and WDT-19. Figures 3, 10 and 11 show the sample locations and geology while appendix A gives the analytical results. One sample contained 0.01 oz/ton gold while the rest contained from nil to 0.003 oz/ton gold. The highest gold value detected was a 25-ft-long chip sample (2S306) of norite with sulfides collected at a lake located south of pit 13 (figure 3 no. 12). That sample also contained 0.002 oz/ton platinum, 0.001 oz/ton palladium 0.05 oz/ton silver, 0.59% nickel, and 0.20% copper. The sample was collected at the southern end of the surface exposures of the Takanis mineralized zone and likely represents a separate mineralized zone from that exposed in the diamond drill holes; however, geologic data is not sufficient to make a positive determination.

The Takanis Ridge bulk sample (150015) head analysis gave 0.001 oz/ton gold, no detectable platinum, palladium or silver, and 0.52% copper, 0.78% nickel and 0.04% cobalt. Flotation concentrates contained up to 0.006 oz/ton palladium, 0.004 oz/ton gold, 0.16 oz/ton silver, 3.06% copper, 3.26% nickel, and 0.16% cobalt. For details of the metallurgical study see Appendix C

Three samples were collected from outcrops in the Flapjack area. Figure 4 shows their locations while Appendix A gives the analytical results. Two of these samples containing little or no sulfides, and no detectable gold, platinum or palladium. A sample of iron stained norite contained 0.002 oz/ton platinum, 0.002 oz/ton palladium, 0.026 oz/ton silver, 0.22% copper, and 0.30% nickel.

Conclusions

The highest values for the 245 samples analyzed during this study were as follows: gold at 0.01 oz/ton, platinum at 0.006 oz/ton, palladium at 0.004 oz/ton, and silver at 0.157 oz/ton. The average values would be but a small fraction of the above. All of the diamond drill hole samples and most of the surface samples were run by five assay atomic absorption methods. Most of the reported values are too close to the limit of detection for detailed analysis. However, a few general conclusions can be derived from the information obtained from this study:

1. Most of the higher precious metal values are associated with the higher values in nickel and copper within the mineralized zone. Most of the lowest precious metal values were from samples collected outside the nickel-copper zone; however, it must be pointed out that the largest portion of the samples were collected within the zone. According to metallurgical tests conducted by the Bureau's Albany, Oregon, Research Center (12) on a Basin deposit bulk sample, gold, platinum and, palladium, along with copper and nickel, concentrate with a nonmagnetic flotation concentrate and would be recoverable.

2. The most significant precious metal values were found where diamond drill hole IDC-B-13 pierced the northwest flank or basal portion of the Basin nickel-copper zone. Here a 25-ft-long drill intercept averaged 0.01 oz/ton gold, 0.0004 oz/ton platinum, 0.0014 oz/ton palladium, 0.14 oz/ton silver, 0.65% nickel, and 0.58% copper. A surface sample (2S306) with similar gold values was obtained from the Takanis area. These gold values encourage further examination of the deposit, particularly the basal portion, for other higher grade concentrations of precious metals.

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APPENDIX A

ASSAY DATA TABLES

See footnotes at the end of Appendix A for list of abbreviations

APPENDIX A ASSAY DATA TABLES

Surface Samples Takanis, see figure 3

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	
1	2S364 J82-1033	random chip	0.003	0.002	0.002	0.055	3500	3000	112	norite
2	2S292 J82-960	chip 6 ft long	0.005	0.002	0.002	0.079	4850	5000	170	pit 13, norite & sulfides
2	2S309 J82-977	float grab	0.001	N	0.001	0.102	G20000	14000	292	pit 13, high grade 40% sulfides
2	2S310 J82-978	float grab	0.003	N	0.003	0.108	G20000	18800	369	pit 13, 1/3 cp, 1/3 po
3	1S005 J81-151	random chip 3 ft long	0.001*	N	0.001	L0.2	4100	19200	1130	pit 13, high grade norite & po & cp
3	2S293 J82-961	1/2 ft chip 3.5 ft long	0.003	N	0.003	0.044	6200	7500	241	pit 13, norite & sulfides
3	2S294 J82-962	chip 4 ft long	0.0025	0.006	0.003	0.055	8700	8500	270	pit 13, norite & abundant sulfides
3	2S295 J82-963	1/2 ft chip 4.5 ft long	0.003	0.002	0.004	0.050	7400	10200	297	pit 13, norite & abundant sulfides
3	2S296 J82-964	1 ft chip 15 ft long	0.002	N	0.001	0.044	3250	1860	59	pit 13, norite & sulfides
3	2S3035 J82-971	chip bulk	0.001	L0.001	L0.001	-	-	-	-	pit 13, f209 norite & sulfides
4	2S297 J82-965	1 ft chip 18 ft long	0.002	0.002	0.001	0.038	2100	2030	77	pit 13, norite & sulfides
4	2S308 J82-976	chip 1/2 ft	0.002	0.002	0.001	0.073	14500	3250	81	pit 13, cp vein
5	2S298 J82-966	chip 2 ft long	0.001	0.001*	0.001*	0.018	710	585	25	pit 13, basic pegmatite
6	20896 J82-1350	1 ft chip 50 ft long	L0.0002	L0.0003	L0.0003	ppm 0.2	287	730	74	pit 13, olivine-norite
6	20897 J82-1351	1 ft chip 35 ft long	0.0003	L0.001	L0.001	ppm 0.5	1360	1310	56	pit 13, fe stained gabbro
7	1S006 J81-152	random chip 5 ft long	0.003	N	0.002	ppm L0.2	4370	4400	210	pit 13, norite & po & cp
7	2S307 J82-975	grab	0.0002	0.002	0.002	0.009	790	G20000	1070	pit 13, high grade po & cp

APPENDIX A ASSAY DATA TABLES

Surface Samples Takanis, see figure 3

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	
7	20895 J82-1349	1 ft chip 55 ft long	L0.0002	L0.0003	L0.0003	ppm 0.2	2440	6670	240	pit 13, mineralized norite
8	1S008 J81-154	random chip 25 ft long	0.001	0.007	0.003	ppm L0.2	2000	2500	105	
8	2S299 J82-967	1 ft chip 55 ft long	0.001	N	0.0004	.050	2800	2650	112	pit 14, norite & sulfides
9	1S007 J81-153	random chip 10 ft long	0.001	0.002	0.001	L0.2	1490	1820	98	
9	2S300 J82-968	1 ft chip 45 ft long	0.002	0.002	0.001	0.29	1800	1480	67	pit 14, norite & sulfides
10	2S301 J82-969	2 ft chip	0.001	0.002	0.001	0.026	2450	3300	140	pit 15, norite & sulfides
10	2S302 J82-970	2 ft chip	0.001	0.002	0.001	0.026	1370	2560	118	pit 15, norite & sulfides
11	20898 J82-1352	1 ft chip 12 ft long	L0.0002	0.001*	0.001*	ppm 0.2	113	108	11	pit 14, gabbro sulfides
11	20899 J82-1353	1 ft chip 25 ft long	L0.0002	L0.0003	L0.0003	ppm 0.2	780	1100	52	pit 14, gabbro
12	2S304 J82-972	grab	0.003	0.002	0.002	0.082	15900	9050	255	above lake, norite, cu rich cp
12	2S305 J82-973	grab	0.002	0.002	0.002	0.023	4000	9000	242	1150 ft el, norite, ni rich po
12	2S306 J82-974	1 ft chip 25 ft long	0.01	0.002	0.001	0.050	5900	2005	62	on knob, norite & sulfides
Surface Samples Flap Jack, see figure 4										FLAP JACK
13	2S322 J82-991	grab	L0.0004	0.002	0.002	0.026	2170	2970	106	fe stained norite
13	2S324 J82-992	grab	L0.0002	L0.0003	L0.0003	0.006	640	860	34	ultramafic pegmatite
13	2S325 J82-993	grab	L0.0002	L0.0003	L0.0003	0.006	81	46	18	norite & po

APPENDIX A ASSAY DATA TABLES

Surface Samples Bohemia Basin, see figure 5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	
14	2S311 J82-979	chip 0.1 ft long	0.001	N	0.001	0.047	11900	6300	156	pit 1, lens of cp & po & bn in gabbro
14	2S312 J82-980	rep. grab	0.002	N	0.0004	0.035	1960	3730	62	pit 1, gabbro
15	1S002 J81-148	random grab 15 ft long	0.001	N	0.0002	L0.2	2550	7700	360	pit 2, norite & po & cp
15	1S003 J81-150	chip 8 ft long	0.001	N	0.0003	L0.2	4000	7600	360	pit 2, norite & po & cp
16	2S291 J82-959	1 ft chip 15 ft long	0.001	N	0.0003	0.026	5550	3750	123	pit 2, norite & sulfides
17	2S290 J82-958	1 ft chip 15 ft long	0.001	N	0.0002	0.035	3600	4750	152	pit 2, norite & sulfides
18	2S275 J82-942	rep. grab	0.034	N	0.001	0.082	5700	3000	73	pit 4, high grade norite & po & cp
19	20771 J82-1356	rep. grab	0.004	N	0.001	0.044	3750	1290	25	pit 4, hornfels & cp
20	20769 J82-1354	random chip	0.0002	N	N	0.006	51	44	11	pit 5, calcicgabbro & po & cp
20	20770 J82-1355	random chip	0.002	N	0.0004	0.055	3390	3060	59	pit 5, calcicgabbro & po & cp
21	2S274 J82-941	rep. grab	0.0003	N	N	0.006	106	166	200	pit 5, andesite dike
22	2S273 J82-940	rep. grab	0.004	L0.0003	L0.0003	0.079	4500	2500	69	pit 5, norite & po & cp
23	20772 J82-1357	random chip 1 ft long	0.0004	N	N	0.006	550	415	13	pit 19, basic pegmatite
24	2S279 J82-946	float grab	0.002	0.002	0.001	0.067	6150	7150	279	60 ft below pit 12, pyroxenite & amphibolite & cp& po
25	2S278 J82-945	grab	0.002	0.002	0.001	0.018	1030	3500	126	pit 12, periodotite & po & cp
26	20773 J82-1358	random chip	0.0002	N	N	0.006	52	62	8	pit 12, andesite & sparce sulfides

APPENDIX A ASSAY DATA TABLES

Surface Samples Bohemia Basin, see figure 5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	
27	2S277 J82-944	rep. grab	0.001	0.002	0.0002	0.018	1320	1760	63	pit 19, norite & sulfides
28	2S276 J82-943	rep. grab	0.001	N	0.001	0.035	5750	G20000	785	pit 19, norite & po & cp
29	2S363 J82-1032	random chip 10 ft long	L0.0002	L0.001	L0.001	0.044	1260	820	12	brecciated norite
30	2S361 J82-1030	grab	L0.0004	L0.0006	L0.0006	0.041	7200	8700	500	sulfide rich norite
30	2S362 J82-1031	random chip 30 ft long	L0.0002	L0.001	L0.001	0.017	1580	525	28	norite
31	1S004 J81-150	grab	0.003	N	0.0004	L0.2	5300	10650	165	pit 13, high grade norite & po & cp
32	2S288 J82-956	dump grab	0.002	0.002	0.0007	0.050	2900	4850	85	norite & po, fresh
32	2S289 J82-957	dump grab	0.003	0.002	0.001	0.067	5150	8000	167	hornblendite & cp & po
33	2S286 J82-954	grab	0.002	0.004	0.0006	0.157	G20000	13000	300	Cu rich norite in place & float
33	2S287 J82-955	1.5 ft chip 45 ft long	0.002	N	0.0007	0.041	3600	4600	124	norite
33	20894 J82-1363	grab	0.003	N	0.0004	0.020	1950	G20000	540	high grade po in norite
34	20776 J82-1361	grab	0.0045	0.002	0.001	0.044	3010	5080	80	mineralized norite
35	20777 J82-1362	chip 5 ft long	0.002	N	0.001	0.041	5500	6350	119	high grade zone
36	2S283A J82-950	1 ft chip 18 ft long	0.0025	N	0.0002	0.038	3250	4500	117	norite & sulfides
37	2S281 J82-948	1 ft chip 5 ft long	0.005	0.002	0.001	0.099	6350	5300	110	80 ft below pit 11, norite & sulfides
37	2S282 J82-948	grab	0.002	N	0.0002	0.061	1400	665	26	80 ft below pit 11, amphibolite&sulfides

APPENDIX A ASSAY DATA TABLES

Surface Samples Bohemia Basin, see figure 5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	
38	2S285 J82-953	chip 0.10 ft long	0.005	N	L0.0002	0.018	880	670	19	pit 11, qz vein
39	2S284 J82-952	grab	0.0015	N	0.0007	0.040	3150	4890	100	pit 11, norite & po & cp
40	2S280 J82-947	1 ft chip 25 ft long	0.004	N	0.0003	0.047	3200	2650	51	80 ft below pit 11, norite, diorite & sulfides
41	20775 J82-1360	chip	0.003	N	0.0004	0.047	2750	2240	43	80 ft below pit 11, across norite/ diorite contact
42	20774 J82-1359	grab	N	N	N	0.006	111	129	11	80 ft below pit 11, diorite

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole IDC-B-13, see figure 7 section A-13

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %		Comments
			Au	Pt	Pd	Ag	Cu	Ni	B-13 B.B. 355 ft to 410 ft
1	16153	5	0.002	N	0.001	0.1	0.40	0.49	5-7% sulfides, gabbroic norite
2	16154	5	0.001	N	0.0003	0.02	0.15	0.10	Tr L 1% T.S., gabbroic norite
3	16155	5	N	N	N	N	0.05	0.03	Tr L 1% T.S., gabbroic norite
4	16156	5	N	N	N	N	0.05	0.03	Tr L 1% T.S., gabbroic norite
5	16157	5	N	N	N	N	0.05	0.04	Tr L 1% T.S., gabbroic norite
6	16158	5	0.0002	N	0.0004	0.01	0.10	0.09	Tr L 1% T.S., gabbroic norite
7	16159	5	0.002	N	N	N	0.05	0.02	Tr barren, gabbro
8	16160	5	N	N	N	N	0.05	Tr	Tr barren, gabbro
9	16161	5	N	N	N	0.01	0.05	Tr	Tr barren, gabbro
10	16162	5	0.0004	N	N	0.01	0.08	0.03	L 1% T.S., gabbroic norite
11	16163	5	0.0003	N	N	0.01	0.05	0.02	L 1% T.S., gabbroic norite
									B-13 B.B. 435 ft to 440 ft
12	16169	5	0.002	N	0.001	0.10	0.70	1.44	massive sulfides, 25%-30% T.S., norite?
									B-13 B.B. 450 ft to 515 ft
13	16172	5	0.001	N	0.0002	0.02	0.15	0.10	+ or - 1% T.S., gabbroic norite
14	16173	5	N	N	N	N	0.05	0.01	+ or - 1% T.S., gabbroic norite
15	16174	5	0.002	N	0.001	0.10	0.35	0.28	3%-5% T.S., gabbroic norite
16	16175	5	0.004	N	0.001	0.10	0.48	0.48	3%-5% T.S., gabbroic norite
17	16176	5	0.002	N	0.001	0.10	0.35	0.30	3%-5% T.S., gabbroic norite

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole IDC-B-13, see figure 7 section A-13

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %		Comments
			Au	Pt	Pd	Ag	Cu	Ni	B-13 B.B. 450 ft to 515 ft
18	16177	5	0.002	N	0.001	0.10	0.35	0.38	3%-5% T.S., gabbroic norite
19	16178	5	0.001	N	0.0004	0.04	0.28	0.24	3%-5% T.S., gabbroic norite
20	16179	5	0.001	N	0.0004	0.03	0.20	0.16	L 1% T.S., gabbroic norite
21	16180	5	0.001	N	0.0003	0.03	0.20	0.18	L 1% T.S., gabbroic norite
22	16181	5	0.001	N	0.0002	0.02	0.15	0.12	L 1% T.S., gabbroic norite
23	16182	5	N	N	N	N	0.05	0.02	L 1% T.S., gabbroic norite
24	16183	5	0.0003	N	N	0.01	0.08	0.03	L 1% T.S., gabbroic norite
25	16184	5	0.0004	N	N	0.01	0.08	0.02	L 1% T.S., gabbroic norite
									B-13 B.B. 520 ft to 550 ft
26	16186	5	N	N	N	N	0.03	0.01	no visible sulfides, gabbro
27	16187	5	N	N	N	N	.08	Tr	no visible sulfides, gabbro
28	16188	5	0.0004	N	0.0002	0.01	0.10	0.03	Tr, L 1% T.S., gabbroic norite
29	16189	5	0.001	N	0.0003	0.02	0.13	0.05	7%-10% T.S., gabbroic norite
30	16190	5	0.001	N	0.0003	0.03	0.15	0.13	3%-5% T.S., gabbro to GR. norite
31	16191	5	0.0004	N	N	0.01	0.10	0.05	+ or - 1% T.S., gabbroic norite
									B-13 B.B. 555 ft to 590 ft
32	16193	5	0.003	N	0.001	0.1	0.35	0.31	5%-7% T.S., gabbroic norite
33	16194	5	0.002	N	0.0004	0.02	0.15	0.12	3%-5% T.S., gabbroic norite, grading to norite
34	16195	5	N	N	N	N	0.05	Tr	+ or - 1% T.S., norite

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole IDC-B-13, see figure 7 section A-13

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %		Comments
			Au	Pt	Pd	Ag	Cu	Ni	B-13 B.B. 600 ft to 745 ft
35	16196	5	0.0002	N	N	N	0.05	0.02	L 1% T.S., norite
36	16197	5	0.0003	N	N	N	0.05	0.03	L 1% T.S., norite
37	16198	5	0.0003	N	N	N	0.08	0.02	Tr
38	16199	5	0.0001	N	N	N	0.08	0.01	L 1% sulfides
39	10959	5	0.001	N	0.0002	0.03	0.05	0.15	2%-3% T.S., norite
40	10960	5	0.002	0.002	0.0003	0.04	0.25	0.21	sulfides, gabbro
41	10961	5	0.002	N	0.0003	0.04	0.23	0.22	7%-10% T.S., gabbro
42	10962	5	0.003	N	0.001	0.1	0.28	0.29	2%-3% T.S., gabbroic norite
43	10963	5	0.005	N	0.001	0.04	0.25	0.29	2%-3% T.S., gabbroic norite
44	10964	5	0.003	N	0.001	0.1	0.43	0.47	7%-10% T.S., norite
45	10965	5	0.003	N	0.001	0.1	0.58	1.46	massive sulfides, norite
46	10966	5	0.002	N	0.0004	0.03	0.28	0.66	massive sulfides, norite
47	10967	5	0.005	N	0.0004	0.1	0.48	0.33	massive sulfides, norite
48	10968	5	0.001	N	N	0.01	0.08	0.01	+ or - 3% T.S., gabbro?
49	10969	5	0.001	N	0.0003	0.03	0.20	0.08	sulfides, gabbro?
50	10970	5	0.01	N	0.001	0.2	0.85	0.77	7%-10%, gabbroic norite
51	10971	5	0.005	N	0.001	0.1	0.75	0.70	10%-12%, norite
52	10972	5	0.003	N	0.0004	0.1	0.38	0.27	10%-12%, norite
53	10973	5	0.005	N	0.001	0.1	0.58	0.51	10%-12%, norite
54	10974	5	0.003	N	0.001	0.1	0.48	0.41	10%-12%, norite
55	10975	5	0.003	N	0.001	0.1	0.28	0.22	12%-15% T.S., norite
56	10976	5	0.005	0.002	0.001	0.03	0.18	0.50	12%-15% T.S., norite
57	10977	5	0.01	0.002	0.001	0.2	0.80	0.74	12%-15% T.S., norite
58	10978	5	0.01	N	0.002	0.2	0.73	0.72	10% T.S., norite
59	10979	5	0.01	N	0.001	0.1	0.63	0.52	7%-10%, norite
60	10980	5	0.01	N	0.001	0.1	0.60	0.52	5%-7% T.S., norite
61	10981	5	0.01	N	0.002	0.1	0.48	0.42	L 1% T.S., norite
62	10982	5	0.0003	N	N	N	0.05	0.02	L 1% T.S., norite
63	10983	5	0.0003	N	N	N	0.05	0.02	L 1% T.S., norite
64	10984	5	0.0003	N	N	N	0.05	0.02	L 1% T.S., norite
65	10985	5	0.0003	N	N	N	0.05	0.02	L 1% T.S., norite
66	10986	5	0.0002	N	N	N	0.05	0.02	L 1% T.S., norite

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole IDC-B-4, see figure 8 section B-11

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %		Comments
			Au N L0.0002	Pt N L0.002	Pd N L0.0002	Ag N L0.01	Cu	Ni	Hole B-4 B.B. 365 ft to 455 ft
1	7040	5	0.01	N	0.0003	0.03	0.09	0.40	3%-5% T.S., norite
2	7041	5	0.001	N	0.0004	0.02	0.08	0.33	1 ft zone of 30% sulfide, norite
3	7042	5	0.001	N	N	0.01	0.03	0.07	gabbroic zones
4	7043	5	0.001	N	N	N	0.03	0.02	3% T.S., gabbroic zones
5	7044	4	0.001	N	N	0.01	0.03	0.08	gabbroic zones
6	7045	4	0.0003	N	N	0.01	0.03	0.05	gabbroic zones
7	7046	5	0.004	N	0.0003	0.03	?	0.38	norite
8	7047	5	0.002	N	N	0.02	0.05	0.16	5%-7% T.S., norite
9	7048	5	0.002	N	0.0003	0.03	?	0.36	L 1% T.S., norite to gabbro
10	7049	4.5	0.003	N	0.0002	0.02	0.03	0.15	2% T.S., L 1% T.S., norite to gabbro
11	7050	5	0.001	N	0.0002	0.02	0.04	?	2%-3% T.S., L 1% T.S., norite to gabbro
12	7051	5	0.0004	N	N	N	0.03	0.05	L 1% T.S., norite to gabbro
13	7052	5	0.0003	N	N	0.01	0.01	0.03	L 1% T.S., norite
14	7053	4.8	0.0003	N	0.0002	0.01	0.03	0.05	L 1% T.S., norite
15	7054	5	0.0003	N	N	0.01	0.01	0.02	L 1% sulfides, norite
16	7055	4	0.0003	N	N	0.01	0.03	0.03	1%-2% T.S., gabbro
17	7056	4	0.005	N	0.0003	0.05	?	0.36	1%-2% T.S., gabbro
18	7057	5	0.002	N	0.0002	0.02	?	0.02	1%-2% T.S., gabbro
19	7058	5	0.0003	N	0.0002	N	0.03	0.02	mixed diorite, gabbro, qz pory., no apparent sulfides

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole IDC-B-20, see figure 9 section B-13

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %		Comments
			Au	Pt	Pd	Ag	Cu	Ni	B-20 B.B.
1	16465	5	0.001	N	0.001	0.02	0.58	1.3	15 ft to 20 ft, 5%-20% T.S., norite
2	16468	5	0.001	N	0.001	0.05	0.63	0.44	30 ft to 35 ft, 15%-20% T.S., norite
3	16472	5	0.002	N	0.001	0.05	0.41	0.83	50 ft to 55 ft, 10%-15% T.S., gabbroic norite
4	16475	5	0.002	N	0.0004	0.05	0.50	0.47	65 ft to 70 ft, 5%-10% T.S., norite
5	16480	5	0.0002	N	N	N	0.06	0.02	135 ft to 140 ft, L 1% T.S., amph. schist

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-13, see figure 10 section T-3-3

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-13, 0 ft to 270 ft
1	20751	4.6	0.001	N	0.0003	0.02	?	0.19	0.01	Tr L 1% T.S., norite to pyrox.
2	20752	2.7	0.0004	N	0.0003	0.01	0.10	0.17	.01	1% T.S.
3	20753	3.9	N	N	N	0.01	Tr	0.02	-	no visible sulfides
4	20754	2.5	0.0003	N	N	0.01	0.02	0.03	-	no visible sulfides
5	20755	2.3	N	N	N	0.01	Tr	Tr	-	no visible sulfides
6	20756	2.4	0.0003	N	N	0.01	0.02	0.04	-	no visible sulfides
7	20757	3.6	0.0004	N	N	0.01	Tr	0.02	-	no visible sulfides
8	20758	3.9	N	N	N	0.01	Tr	0.02	-	no visible sulfides
9	20759	5	0.0002	N	N	0.01	Tr	0.02	-	no visible sulfides
10	20760	5	N	N	0.0002	0.01	Tr	0.03	-	Tr
11	20761	5	0.0002	N	N	0.01	Tr	Tr	-	no visible sulfides
12	20762	5	0.0002	N	N	0.01	Tr	Tr	-	no visible sulfides
13	20763	4.9	0.0002	N	N	0.01	Tr	Tr	-	Tr T.S.
14	20764	5	N	N	N	0.01	Tr	Tr	-	Tr T.S.
15	20765	5	0.0002	N	N	0.01	Tr	0.03	-	Tr T.S.
16	20766	5	0.0002	N	N	0.01	0.03	0.06	-	Tr T.S.
17	20767	4.9	0.001	N	N	0.01	0.06	0.12	-	3%-5% T.S.
18	20768	5	0.001	N	0.0003	0.02	0.14	0.19	0.01	approx. 5% T.S.
19	20769	5	0.0004	N	0.0002	N	0.05	0.07	-	Tr approx. 3%-4% T.S.
20	20770	5	0.001	N	0.0004	0.02	0.11	0.17	0.04	approx. 3%-4% T.S.
21	20771	4.8	0.002	N	0.001	0.03	0.21	0.28	0.02	approx. 3%-4% T.S.
22	20772	5	0.0004	N	0.0003	0.01	0.09	0.13	0.01	Tr L 1% T.S.
23	20773	5	0.002	N	0.001	0.02	0.12	0.17	0.01	10%-12% T.S.
24	20774	4.8	0.001	N	0.0004	0.02	0.50	0.76	0.04	10%-12% T.S.
25	20775	5	0.001	N	0.0003	0.03	0.27	0.40	0.02	30%-35% T.S.
26	20776	5	0.001	N	0.001	0.05	0.35	0.33	0.02	7%-10% T.S.
27	20777	5	0.001	N	0.0004	0.05	0.24	0.27	0.02	3%-5% T.S.
28	20778	5	0.0003	N	0.0003	0.01	0.04	0.10	0.01	Tr
29	20779	5	0.002	N	0.0004	0.05	0.24	0.28	0.01	3%-5% T.S.
30	20780	5	0.002	N	0.001	0.05	0.25	0.26	0.02	approx. 5% T.S.
31	20781	5	0.002	N	0.0003	0.04	0.19	0.21	0.02	10% T.S.
32	20782	4.8	0.002	N	N	0.01	0.06	0.13	0.01	1%-2% pyrox.

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-13, see figure 10 section T-3-3

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-13, 0 ft to 270 ft
33	20783	5	0.002	N	0.0002	0.03	0.19	0.28	0.02	10%-12% T.S., pyrox.
34	20784	5	0.0004	N	0.002	0.10	0.44	0.63	0.04	10-15%, pyrox.
35	20785	5	0.001	N	0.001	0.02	0.14	0.28	0.01	Tr, pyrox.
36	20786	4.2	0.0002	N	N	0.01	0.02	0.02	-	no visible sulfides, andesitic or mafic dike
37	20787	5	0.001	N	0.0004	0.02	0.16	0.26	0.02	Tr 3%-5%, pyrox./ norite
38	20788	4	0.0004	N	N	0.01	0.04	0.12	0.01	Tr, dike
39	20789	5	0.001	N	0.001	0.02	0.16	0.24	0.01	1%-2%
40	20790	4.1	0.002	0.002	0.001	0.03	0.24	0.30	0.02	1%-2%
41	20791	1.1	0.001	N	0.001	0.02	0.08	0.17	0.02	1%-2% T.S.
42	20792	4.9	0.002	0.002	0.002	0.03	0.21	0.36	0.02	5%-7% T.S.
43	20793	4.3	0.001	N	0.001	0.02	0.15	0.25	0.02	approx 5% T.S.
44	20794	4	0.001	N	0.001	0.02	0.15	0.26	0.02	Tr L 1% T.S.
45	20795	5	0.002	N	0.002	0.03	0.26	0.45	0.02	Tr
46	20796	5	N	N	N	N	Tr	Tr	-	Tr
47	20797	4.8	0.002	N	0.001	0.03	0.24	0.38	0.02	10%-12% T.S.
48	20798	4.4	0.002	N	0.002	0.04	0.30	0.56	0.02	5%-7%
49	20799	4.9	0.002	0.002	0.002	0.05	0.34	0.61	0.03	Tr L 1% T.S.
50	20800	4.8	0.002	0.002	0.002	0.03	0.20	0.35	0.02	8%-10% T.S.
51	20642	4.9	0.002	0.002	0.002	0.04	0.38	0.76	0.03	270 ft to 325 ft, sulfides
52	20643	4.7	0.002	0.002	0.004	0.01	0.22	1.12	0.04	sulfides
53	20644	4.6	0.001	N	0.001	0.01	0.14	0.18	0.01	no visible sulfides
54	20645	5	0.0002	N	0.0002	N	0.03	0.04	-	no visible sulfides or Tr
55	20646	4.8	0.001	N	0.0002	N	0.04	0.03	-	Tr
56	20647	5	0.001	N	0.0003	0.01	0.03	0.03	-	Tr

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-13, see figure 10 section T-3-3

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-13, 0 ft to 270 ft
57	20648	4.8	0.002	0.002	0.002	0.03	0.15	0.09	0.01	Tr
58	20649	4.1	0.001	N	0.0003	0.01	0.02	0.02	-	Tr
59	20650	4.9	0.0004	N	N	N	Tr	Tr	-	Tr
60	20651	5	N	N	N	0.01	Tr	0.02	-	Tr
61	20652	5	N	N	N	N	Tr	0.02	-	L 1% T.S.

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-19, see figure 11 section T-5-5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-19, 200 ft to 225 ft
1	20896	4.8	0.0004	0.002	0.0003	0.01	0.08	0.24	0.02	7%-10% T.S., pyrox. to norite
2	20897	4	0.0002	N	0.0002	0.01	0.05	0.07	0.01	approx. 3% T.S.
3	20898	5	0.001	N	0.0004	0.02	0.20	0.26	0.02	G 10% T.S.
4	20899	5	0.001	N	0.0004	0.02	0.19	0.25	0.02	G 10% T.S.
5	20900	4	0.001	N	0.0004	0.04	0.26	0.35	0.02	G 10% T.S.
										WDT-19, 225 ft to 360 ft
6	19101	5	0.001	N	0.0003	0.03	0.20	0.22	0.02	no visible sulfides, gabbroic norite?
7	19102	5	0.001	N	0.0003	0.02	0.15	0.21	0.02	no visible sulfides, gabbroic norite?
8	19103	4.8	0.001	N	0.001	0.02	0.15	0.21	0.02	no visible sulfides, gabbroic norite?
9	19104	4.8	0.002	0.004	0.001	0.03	0.21	0.26	0.02	no visible sulfides, gabbroic norite?
10	19105	4.9	0.001	0.002	0.001	0.02	0.13	0.18	0.02	approx. 3% T.S. gabroic norite?
11	19106	4.5	0.001	N	0.0003	0.02	0.16	0.19	0.02	approx. 3% T.S. gabroic norite?
12	19201	1.3	0.002	0.003	0.001	0.04	0.20	0.20	0.02	approx. 3% T.S. gabroic norite?
13	19202	4.4	0.002	0.003	0.001	0.03	0.20	0.35	0.02	approx. 5% T.S. gabroic norite?
14	19203	2.7	0.001	N	0.0003	0.02	0.08	0.14	0.01	approx. 5% T.S. gabroic norite?
15	19204	2	0.001	N	0.0003	0.02	0.14	0.20	0.01	approx. 5% T.S. gabroic norite?

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-19, see figure 11 section T-5-5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-19, 225 ft to 225 ft
17	19206	3.7	0.002	-	-	0.05	0.31	0.31	0.02	approx. 5% T.S. gabroic norite?
18	19207	4.9	0.002	N	0.0004	0.04	0.22	0.24	0.02	approx. 5% T.S. gabroic norite?
19	19208	3.7	0.002	N	0.0002	0.01	0.09	0.14	0.02	approx. 5% T.S. gabbroic norite?
20A	19209	3.2	0.001	N	0.0003	0.03	0.17	0.36	0.02	approx. 5% T.S. gabbroic norite?
20B	19223	5	0.002	N	0.0003	0.02	0.14	0.26	0.02	1%-2% T.S., pyroxenite
21A	19224	5	0.004	N	0.0004	0.04	0.31	0.35	0.03	2%-3% T.S., pyroxenite
22A	19225	5	0.001	N	0.0003	0.02	0.10	0.14	0.02	1% po, cp T.S., pyroxenite
23	19226	4.2	0.002			0.02	0.12	0.18	0.02	1% po, cp T.S., pyroxenite
24	19227	5	0.0002	N	0.0003	0.01	0.07	0.09	0.02	1% po, cp T.S., pyroxenite
21B	19228	5	0.002	N	0.0004	0.03	0.22	0.32	0.02	approx. 5% T.S., noritic gabbro
22B	19229	3.1	0.002	N	0.0004	0.02	0.17	0.21	0.02	approx. 5% T.S., noritic gabbro
25	19230	5	0.001	N	0.001	0.03	0.20	0.30	0.02	3%-5% T.S., pyroxenite
26	19231	5	0.004	0.002	0.001	0.02	0.16	0.32	0.02	L 1% T.S., 3%-5% T.S., pyroxenite
27	19232	4.8	0.002	N	0.0002	0.01	0.04	0.04	-	3%-5% T.S., gabbro
28	19233	4.4	N	N	N	N	Tr	0.02	-	Tr, gabbro
29	19234	4.6	0.0002	N	N	N	0.02	0.10	0.01	Tr, gabbro
30	19235	1.8	0.001	N	0.001	0.01	0.16	0.20	0.02	Tr, gabbro

APPENDIX A ASSAY DATA TABLES

Diamond Drill Hole WDT-19, see figure 11 section T-5-5

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft) Core	Analyses[2] (oz/t)				Analyses[3] (units as shown) values in %			Comments
			Au	Pt	Pd	Ag	Cu	Ni	Co	WDT-19, 225 ft to 225 ft
31	19236	5	0.004	N	0.005	0.03	0.34	1.80	0.06	5% po, cp, pyroxenite
32	19237	5	0.004	0.002	0.002	0.10	0.70	0.42	0.02	1% po, cp, T.S., pyroxenite, medium green gabbro

[1]Samples were of several types including chip, spaced chip, representative chip, random chip, grab, random grab, and select. Grab samples are randomly collected outcrop or float materials and select samples are grab samples of specific material. Random chip samples consist of small rock fragments brocken randomly from outcrop while representative chip samples are used to characterize an outcrop. Spaced chip samples are composed of a series of rock fragments taken at a designated interval and continuous chip samples consist of a continuous series of rock fragments taken from the outcrop.

[2]Au, Pt, and Pd analyses were by Fire Assay - Atomic Absorption, (FA-AA), Inductively Coupled Argon Plasma Spetroscopy, (ICP) or Fire Assay, (FA). Ag analyses was by Atomic Absorption - Fire Assay (see p.6)

[3]Cu, Ni, and Co analyses were by Atomic Absorption (see P. 6).

Sample analyses were by a laboratory in Colorado or by the Bureau of Mines Research Center in Reno, Nevada.

Units of measure abbreviation used

N means not detected
ppm means parts per million
L0.0003 means not detected above the lower limit of detection, that is, 0.0003 oz/ton
G10.00 means greater than 10.00%
------ means not analyzed

Mineral abbreviations used:

az	- azurite	mag	- magnetite
bn	- bornite	ml	- malachite
calc	- calcite	mo	- molybdenite
chl	- chlorite	plag	- plagioclase
cp	- chalcopyrite	po	- pyrrhotite
ep	- epidote	py	- pyrite
hem	- hematite	qz	- quartz
hnbd	- hornblende	t.s.	- total sulfides

APPENDIX B

MIRROR HARBOR SAMPLE LOCATION MAPS AND RESULTS

At a location about 14 miles southerly from Bohemia Basin on northwestern Chichagof Island, nickel-copper-cobalt occurrences were discovered near Mirror Harbor in 1911. These occurrences have been explored by surface trenching, diamond drilling, and a 175 ft-deep shaft and are magmatic segregations in a norite body. A disseminated zone of mineralization located between Davidson and Little Bay reportedly contains about 1,000,000 tons averaging 0.32% nickel and 0.12% copper (10), while a high grade zone at Mirror Harbor reportedly contains 7,300 tons averaging 1.60% nickel and 0.90% copper (11).

Locations of Bureau samples are shown in the appendix B figures while the sample results are given in the appendix B tables. Samples contained up to 0.002 oz/ton gold, 0.003 oz/ton platinum, 0.003 oz/ton palladium and 0.093 oz/ton silver. Metallurgical test results for a large sample collected at the Mirror Harbor high grade zone (15001) and another collected at the disseminated zone between Davidson and Little Bay (25313) are described in Appendix C.

Appendix B Mirror Harbor, see figure B1 - B4

Map Number	Lab & Field Sample Number	Sample Type[1] & Length (ft)	Analyses[2] (oz/t)				Analyses[3] (units as shown)			Comments
			Au	Pt	Pd	Ag	Cu ppm	Ni ppm	Co ppm	Mirror
1	2S354 J82-1023	grab	L0.0004	0.002	0.003	0.035	9700	7050	287	norite + cp
2	2S355 J82-1024	grab	L0.0004	0.003	0.003	0.026	4500	G20000	985	norite + po
2	2S356 J82-1025	grab	0.001	0.001*	L0.0006	0.093	G20000	13600	590	norite + cp
3	1S001S J81-147	random chip 23 ft long	0.002	0.002	0.002	L0.2	22000	9000	430	norite + po + cp
4	2S353 J82-1022	grab	L0.002	L0.001	L0.001	0.006	121	189	20	banded norite
5	1S158 J81-158	chip	L0.001*	L0.002	L0.002	L0.2ppm	7350	11500	346	chips of high grade po + cp
5	1S159	random grab	0.000*	L0.001	L0.001	L0.2ppm	340	545	21	disseminated sulfides in norite
6	25320 J82-988	rep. grab	L0.0002	L0.0003	L0.0003	0.006	455	610	39	norite + sparse olivine sulfides
7	2S321 J82-989	rep. grab	L0.0002	L0.0003	L0.0003	0.006	239	415	28	norite + very sparse sulfides
8	2S319 J82-987	rep. grab	L0.0002	L0.0003	L0.0003	0.006	285	415	30	norite + sulfides
9	2S318 J82-986	high grade grab	L0.0004	0.002*	0.001*	0.020	4000	5100	201	norite + sulfides
10	2S317 J82-985	rep. grab	L0.0004	0.001*	0.002	0.006	1200	2700	83	norite + sulfides
11	2S316 J82-984	rep. grab	L0.0002	L0.0003	L0.0003	0.006	850	2500	100	norite + sulfides higher grade
12	2S322 J82-990	rep. grab	L0.0002	L0.0003	0.001*	0.012	335	119	16	pyroxenite + olivine very sparse sulfides
13	2S315 J82-983	rep. grab	L0.0002	L0.0003	L0.0003	0.006	1330	4480	131	norite + sulfides
14	2S313S J82-981	bulk, float + in place	L0.0002	L0.001	L0.001	0.009	3100	8100	329	196*f*, norite + po + cp
14	2S314 J82-982	high grade grab	L0.0002	L0.001	L0.001	-	-	-	-	similar to 2S313S

[1]Samples were of several types including chip, random chip, grab, random grab, and representative grab. Grab samples are randomly collected outcrop or float materials and representative grab samples are grab samples used to characterize an outcrop. Random chip samples consist of small rock fragments brocken randomly from outcrop.

[2]Au, Pt, and Pd analyses were by Fire Assay - Atomic Absorption, (FA-AA), Inductively Coupled Argon Plasma Spetroscopy, (ICP) or Fire Assay, (FA). Ag analyses was by Atomic Absorption or Fire Assay (see p.6)

[3]Cu, Ni, and Co analyses were by Atomic Absorption (see P. 6).

Sample analyses were by a laboratory in Colorado or by the Bureau of Mines Research Center in Reno, Nevada.

Units of measure abbreviation used

N means not detected
ppm means parts per million
L0.0003 means not detected above the lower limit of detection, that is, 0.0003 oz/ton
G10.00 means greater than 10.00%
------ means not analyzed

Mineral abbreviations used:

cp - chalcopyrite po - pyrrhotite py - pyrite

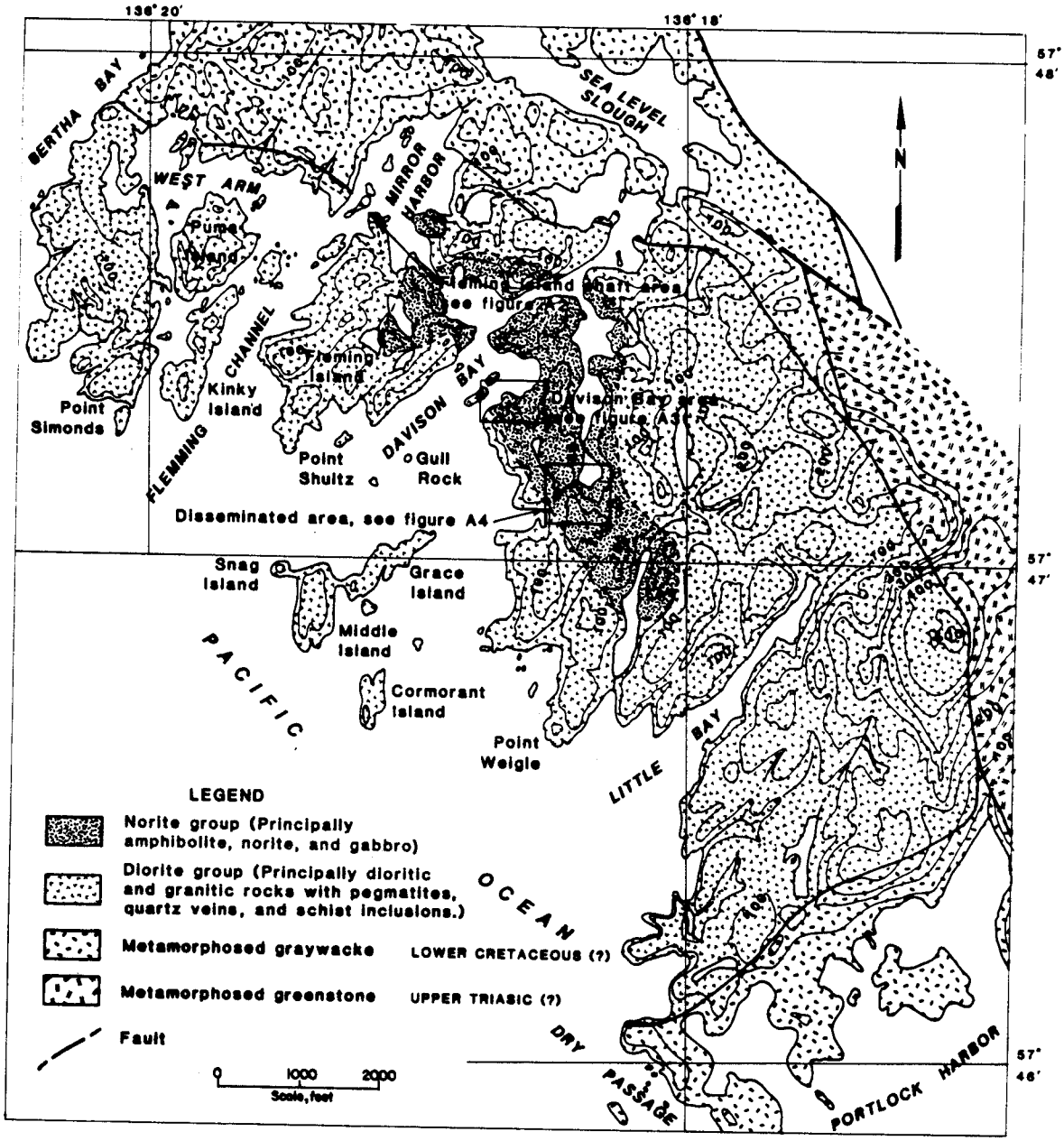


FIGURE B1. – Mirror Harbor–Davison Bay area, showing geology and figure locations

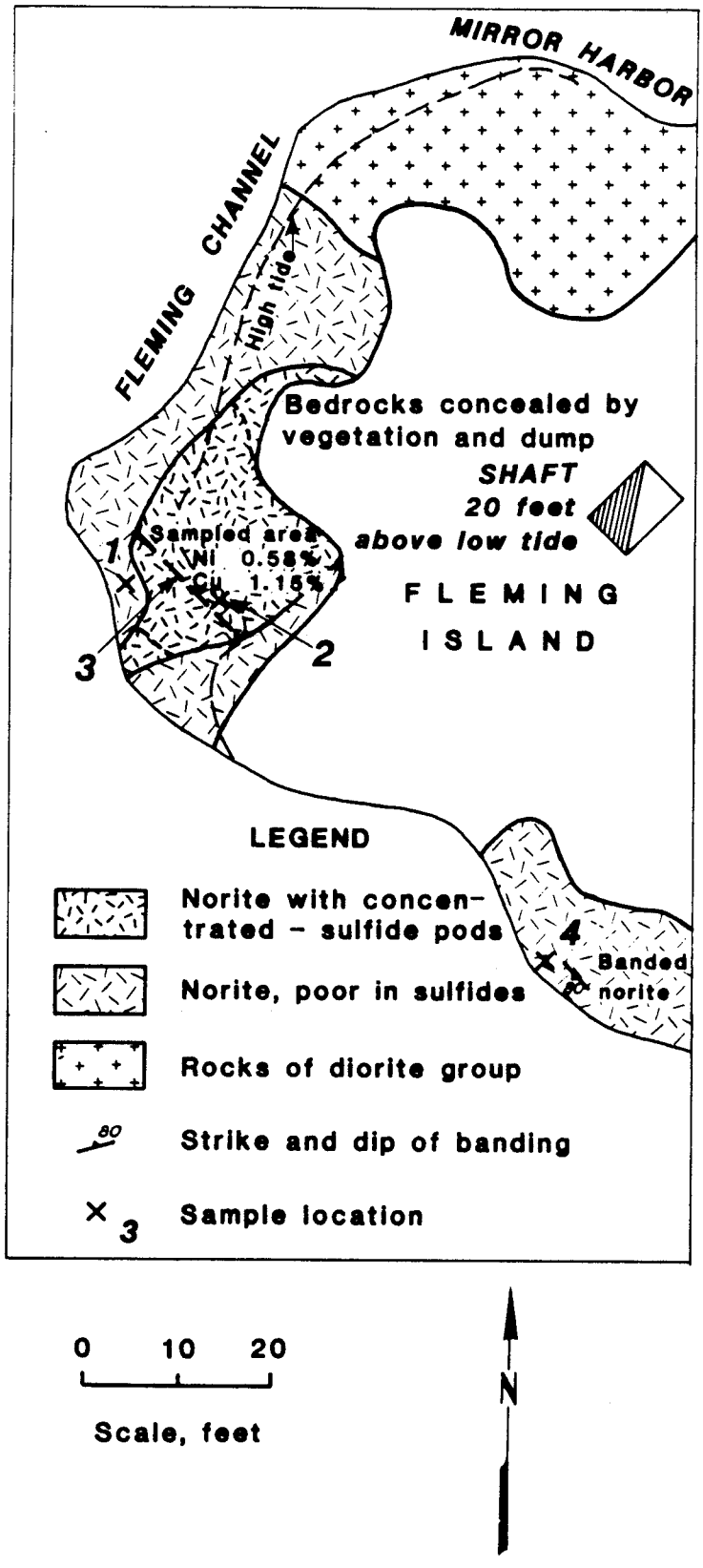
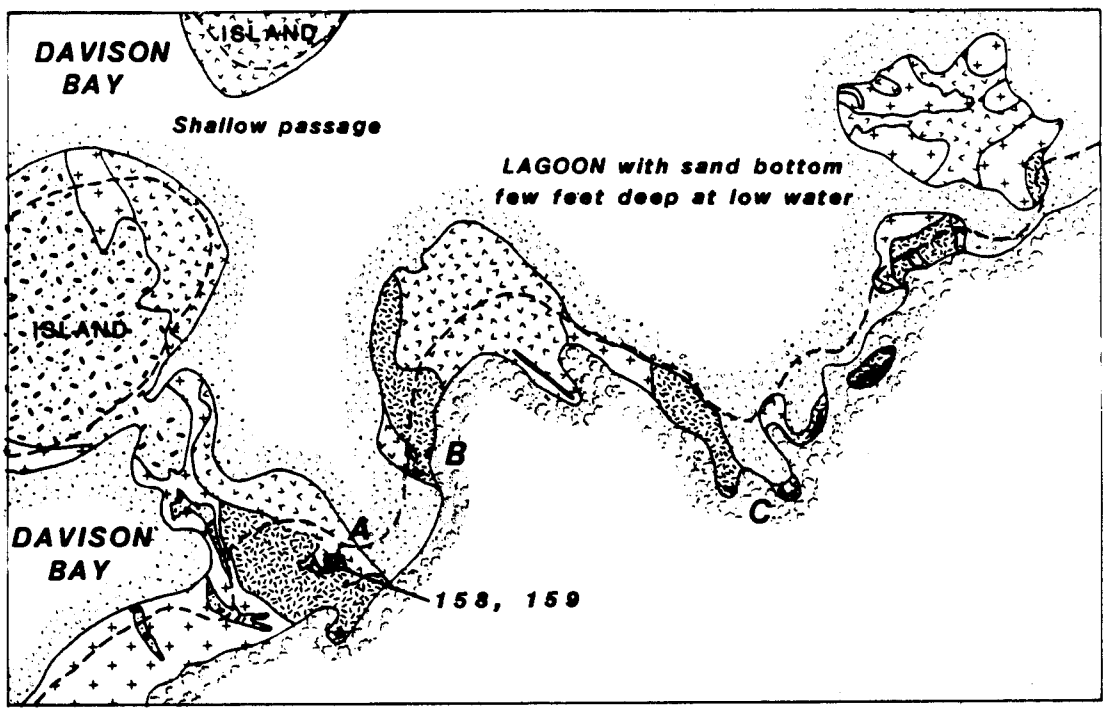


FIGURE B2. - Fleming Island shaft area, showing geology and sample locations



LEGEND

- Amphibolitic norite
- Norite
- Gabbro – diorite
- Pegmatite
- Concentrated – sulfide outcrops
- Sand and rubble
- A — Locality referred to in text
- Vegetation
- High – water shore line
- Shaft
- Trench
- 158 — Sample location

N

0 50 150

Scale, feet

FIGURE B3. – Davison Bay area, showing geology and sample locations

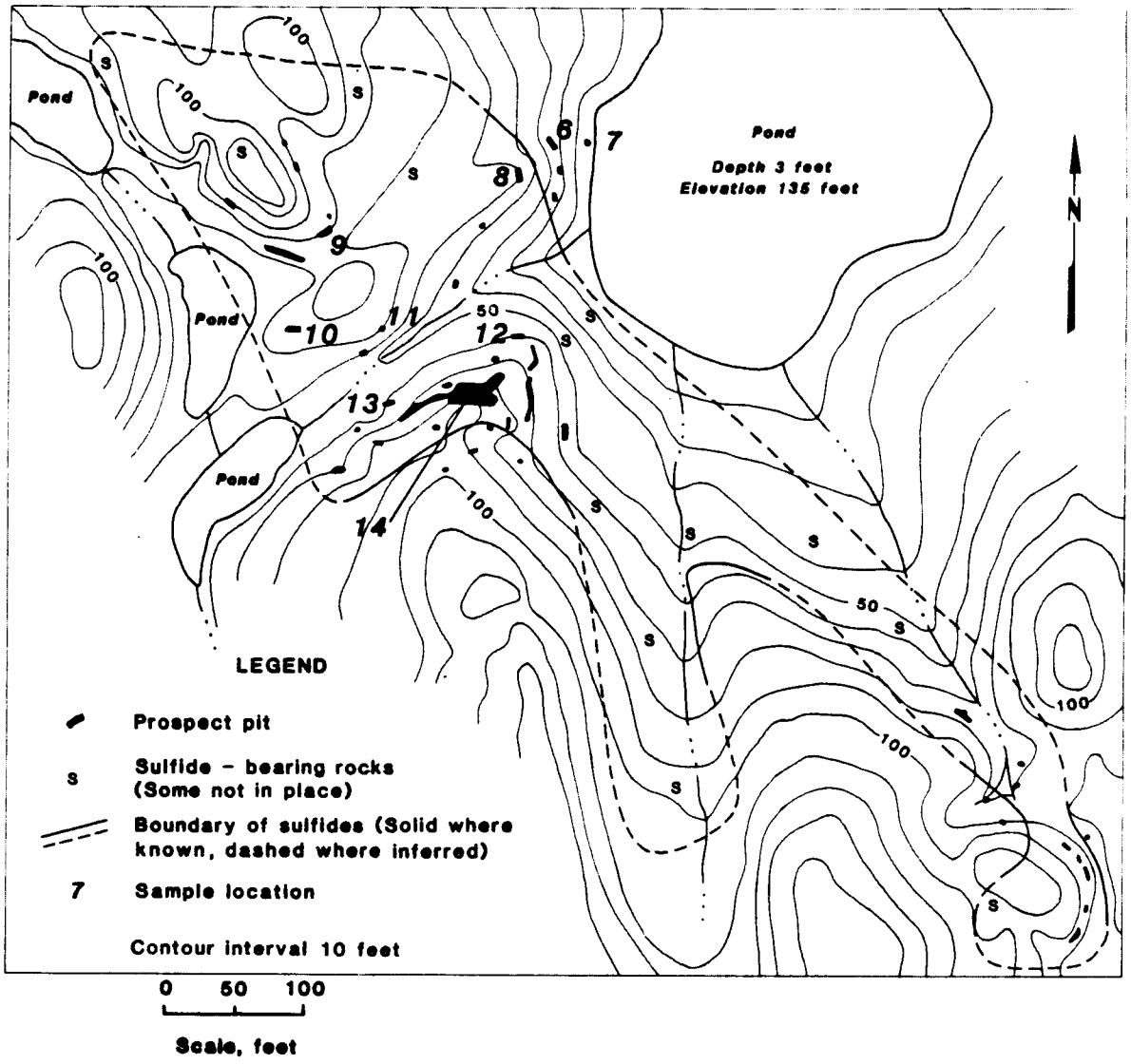


FIGURE B4. - Disseminated area, showing prospect pits and approximate outline of disseminated sulfide area

APPENDIX C

RESULTS OF TAKANIS RIDGE AND MIRROR HARBOR METALLURGICAL TESTING

MINERALOGICAL AND BENEFICIATION CHARACTERIZATION OF THE TAKANIS RIDGE DEPOSIT

Mineralogical Characterization

The hand specimen petrographic samples show that the material is an iron stained sulfide enriched rock consisting essentially of ferromagnesian silicate minerals (hypersthene with some enstatite) with less feldspar and some (about 20%) sulfide minerals, mostly pyrrhotite with minor chalcopyrite. Abundant limonite-geothite is present on all fracture surfaces.

Polished surface and SEM examinations confirm the hand specimen mineralogy. The material is highly fractured and the sulfide materials are scattered throughout as crystal clots, as small to very small stringers apparently developed along fractures, and as extremely small individual grains. The major sulfide mineral present is pyrrhotite, most of which shows alteration rims of iron oxide minerals. Considerably less abundant is chalcopyrite, much of which is intimately associated with and in some cases coats the pyrrhotite grains. A large number of the chalcopyrite grains are themselves rimmed with chalcocite. Nickel is contained in two different sulfide minerals one a FeNi sulfide containing about 33% Fe, 25% Ni, and 42% S. This mineral does not fit any reported composition but may be an intermediate in the bravoite-pyrite series and therefore would be a nickelian pyrite. The other nickel bearing mineral is a FeNiCu sulfide (containing about 30% Fe, 23% Ni, 7% Cu, and 40% S) that may best fit the pyrite group mineral villamaninite (Cu, Ni, Co, Fe) (S, Se). Pentlandite was not observed. A few one micrometer gold grains were observed intimately associated on a chalcopyrite surface in a magnesium silicate seam in an iron oxide grain. No platinum group minerals nor any other gold grains were observed. SEM micrographs showing mineral occurrences and associations will be retained with the original of this report.

Liberation of the components of the samples from one another would not be complete even at the very fine sizes. The smallest practical grinding size should be used.

Beneficiation Characterization

After petrographic specimens were selected, the remainder of the sample was crushed to minus 1/4 inch and split for head analysis and beneficiation tests. Base metals and sulfur analyses were done at the Albany Research Center, and precious metals analyses were done at the Reno Research Center. Tests were done on 1-kg samples to establish appropriate grinding and reagent additions for bulk sulfide flotation. A 9.4-kg sample was then beneficiated; the procedures and results are described in the attached tables. No Pt was detected in the sample, but very small amounts of Pd, Au, and Ag were concentrated. Cu, Ni, and Co were concentrated in two low grade products with recoveries of 74%, 71%, and 68% respectively. The rougher concentrate contained 52% of the Cu. The scavenger concentrate contained 55% of the Ni and 54% of the Co. The analysis and distribution of elements in the flotation tailings indicate that additional metals recovery to the concentrates is possible, although the sample was 42% minus 400 mesh. Selective flotation of the concentrates could eliminate pyrrhotite at the expense of recovery. Optimum conditions and procedures were not investigated.

MINERALIZATION AND BENEFICIATION OF MIRROR HARBOR DISSEMINATED DEPOSIT

Sample 1S001

The sample is a gabbroic rock containing disseminated sulfides, primarily chalcopyrite and pyrrhotite. Some of the individual specimens consist mostly of sulfide minerals, appearing as massive sulfide samples while other specimens contain only a few scattered grains and small veins of sulfide minerals. On the average, the total sulfides present in the sample probably is 10% to 20%. All fracture surfaces contain limonite-goethite as alteration products.

Polished surface and SEM examinations indicate that the sulfide minerals present are chalcopyrite and pyrrhotite with some pentlandite. They are all highly fractured and occur as small to large randomly scattered grains and very large grain clots, mostly interstitial to the host rock minerals. Small amounts of sulfides occur intergranular in the pyroxene as small-sized disseminations. Larger sulfide accumulations exhibit limonite-goethite alteration along fractures. Silicate minerals present as inclusions in a massive sulfide portion were identified as hypersthene and enstatite. It was also noted in this sample that pyrrhotite zones had formed as rims between the silicate inclusions and the enclosing chalcopyrite. Pentlandite is associated with the pyrrhotite which also contains small amounts of Ni and Co. No precious metals were observed.

Sample 2S313

The sample is mineralogically similar to the above sample but contains considerably fewer sulfide minerals occurring as scattered interstitial grains in a matrix of hypersthene and laboradorite. The sulfide minerals are mainly pyrrhotite with less chalcopyrite and pentlandite and minor pyrite. The pyrrhotite contains a small amount of Ni and Co. Micro grains of galena and a Te-bearing mineral were also detected. No precious element minerals were observed.

SEM micrographs of minerals and associations observed accompany the original of this report and are available for reference.

Reasonable liberation of the sulfide minerals in both samples would be accomplished at about 100 mesh with complete liberation at considerably finer sizes. The highly fractured nature of the sulfides should aid crushing and liberation.

Beneficiation Characterization

After petrographic specimens were selected, the remainder of the sample was crushed to minus 1/4 in. and split for head analysis and beneficiation tests. Base metals and sulfur analyses were done at the Albany Research Center, and precious metals analyses were done at the Reno Research Center. Tests were done on 1-kg samples to establish appropriate grinding and reagent additions for bulk sulfide flotation. Ten kg samples were then beneficiated; the procedures and results are described in the attached tables.

Sample 1S001 (ME1417) was the higher grade sample, and it produced the higher grade concentrates. Nearly 98% of the Cu, 89% of the Ni, and essentially 100% of the Co were recovered in the two flotation concentrations. Copper was concentrated in the rougher concentrate product with a grade of 6.74% Cu and recovery 89%. Nickel and Co were concentrated in the scavenger concentrate with grades of 3.60% Ni and 0.21% Co and recoveries of 55% and 66%, respectively.

Sample 2S313 (ME1461) was lower grade sample, and nearly all of the floated material reported to the rougher concentrate. That product contained 95% of the Cu, 84% of the Ni, and 96% of the Co at grades of 1.24%, 2.18%, and 0.12%, respectively.

Platinum and Pd values were below detectable limits in the head samples of these two samples. Small amounts of each were detected in the rougher concentrate of 1S001 and in the scavenger concentrate of 2S313.

Sample No.: ME 1460.2 AFOC No.: Location: Takanis Ridge

Grind: Initial: -1/4 in. Final: +100 mesh 0% Time: 28 minutes
Addition: none -400 mesh 42% % solids: 50

METALLURGICAL RESULTS

Product	Wt.	Analysis, %					Analysis, oz/ton				Distribution, %				
	%	Cu	Fe	Ni	Co	S	Pt	Pd	Au	Ag	Cu	Fe	Ni	Co	S
Rougher Concentrate	5.1	3.06	31.0	2.98	0.12	21.4	L0.0006	0.006	0.004	0.16	52.5	11.3	16.2	13.2	28.6
Scavenger Concentrate	15.8	0.41	20.4	3.26	0.16	11.7	L0.0006	0.006	0.002	0.06	21.9	22.9	55.0	54.4	48.4
Flotation Tailings	79.1	0.096	11.7	0.34	0.019	1.11	L0.0006	L0.0006	L0.0004	L0.02	25.6	65.8	28.8	32.4	23.0
Composite or Total	100.0	0.30	14.1	0.94	0.05	3.82					100.0	100.0	100.0	100.0	100.0
Head		0.52	15.7	0.78	0.04	5.0	L0.002	L0.002	0.001	L0.02					

TEST PROCECURE

Reagents	Condition	Rougher Flotation	Condition	Scavenger Flotation
Potassium Amyl Xanthate	0.1 lb/ton		0.05 lb/ton	
Frother	0.05 lb/ton			
pH (natural = 6.2	63	63	64	64
Time (minutes)	15	10.25	15	35

Sample No.: ME 1417.2 AFOC No.: 1S001 Location: Mirror Harbor

Grind: Initial: -1/4 in. Final: +100 mesh 0% Time: 25 minutes
Addition: none -400 mesh 49% % solids: 50

METALLURGICAL RESULTS

Product	Wt. %	Analysis, %					Analysis, oz/ton				Distribution, %				
		Cu	Fe	Ni	Co	S	Pt	Pd	Au	Ag	Cu	Fe	Ni	Co	S
Rougher Concentrate	17.1	6.74	35.9	1.81	0.09	26.5	0.003	0.004	0.010	0.11	88.8	37.7	34.4	34.1	61.8
Scavenger Concentrate	13.7	0.85	26.2	3.60	0.21	17.1	L0.001	L0.001	0.007	0.05	8.9	22.0	54.8	65.9	31.9
Flotation Tailings	69.2	0.04	9.51	0.14	L0.01	0.67	L0.0006	0.002	0.005	L0.02	2.3	40.3	10.8	0.0	6.3
Composite or Total	100.0	1.30	16.3	0.90	0.04	7.34					100.0	100.0	100.0	100.0	100.0
Head		1.26	17.0	0.88	0.05	7.48	L0.004	L0.004	0.006	L0.04					

TEST PROCECURE

Reagents	Condition	Rougher Flotation	Condition	Scavenger Flotation
Potassium Amyl Xanthate	0.1 lb/ton		0.05 lb/ton	
Frother	0.05 lb/ton		0.025 l./ton	
pH (natural = 45)	44		41	
Time (minutes)				

Sample No.: ME 1461.2 AFOC No.: Location: Mirror Harbor

Grind: Initial: -1/4 in. Final: +100 mesh 1% Time: 30 minutes
Addition: none -400 mesh 40% % solids: 50

METALLURGICAL RESULTS

Product	Wt.	Analysis, %					Analysis, oz/ton				Distribution, %				
	%	Cu	Fe	Ni	Co	S	Pt	Pd	Au	Ag	Cu	Fe	Ni	Co	S
Rougher Concentrate	21.2	1.24	28.9	2.18	0.12	18.2	L0.0006	L0.0006	0.001	0.02	95.3	93.2	83.7	96.2	90.4
Scavenger Concentrate	1.4	0.14	17.4	0.39	0.05	7.15	0.011	0.023	0.001	L0.02	0.7	3.7	0.9	3.8	2.3
Flotation Tailings	77.4	0.01	8.68	0.11	L0.01	0.40	0.004	0.015	L0.0004	L0.02	4.0	3.1	15.4	0.0	7.3
Composite or Total	100.0	0.28	13.1	0.55	0.03	4.27					100.0	100.0	100.0	100.0	100.0
Head		0.24	13.6	0.57	0.04	4.76	L0.002	L0.002	L0.001	L0.01					

TEST PROCECURE

Reagents	Condition	Rougher Flotation	Condition	Scavenger Flotation
Potassium Amyl Xanthate	0.1 lb/ton		0.05 lb/ton	
Frother	0.1 lb/ton		0.025 l./ton	
pH (natural = 4.6)	4.6		4.6	
Time (minutes)				