104B General

Esso

018903

1982 EXPLORATION REPORT ON THE SULPHURETS PROPERTY SKEENA MINING DIVISION, B.C.

104B/8E, 8W, 9E, 9W

OWNED BY:

GRANDUC MINES, LIMITED (NPL)

ESSO RESOURCES CANADA LIMITED

SIDNEY F. ROSS

BY

DANE BRIDGE AND WALTER MELNYK

with a section by RON BRITTEN

ESSO MINERALS CANADA
600-1281 WEST GEORGIA STREET
VANCOUVER, B.C.

April, 1983

- Iron Cap
- Brucejack Zones

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(R. M. Britton Mar 1983. Separate report.)

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SUMMARY

Exploration in 1982 concentrated on testing known epithermal Ag-Au veins and locating new veins. Drilling in the Near Shore Zone indicated that it has the best potential for economic grades and tonnage on the Sulphurets property. It appears that only small portions of the vein contain ore-grade mineralization. About 3.7 km of strike would have to be explored to produce the minimum tonnage required by Esso if 15% of the structure was ore grade over a 150 m vertical extent.

The West Zone was discovered and drilled. Extremely high Ag-Au values were encountered in the central portion of the stockwork vein but the indicated tonnage is very small.

Eight other vein zones were trenched and/or drilled with negative or inconclusive results.

Recommended work includes mapping and sampling two large alteration zones along the main north-south structure on the property and drilling one possible strike extension of the Near Shore Zone. The objective in the unexplored altered areas is to locate wide mineralized vein zones or possible disseminated zones associated with the Snowfield Gold Zone. Widely spaced drilling in the Near Shore Zone would explore a portion of the structure about twice the length and vertical extent of the vein already explored.

PART I .

INTRODUCTION

Porphyry and epithermal vein type mineralization occur on the Sulphurets property. Potential has been indicated for very large tonnages of porphyry Cu and Cu-Mo mineralization. However, the grades indicated by surface sampling and by one drill hole are around 0.15-0.20% Cu with up to 0.02% Mo. Large areas with very low grade Mo mineralization without Cu also occur.

Two areas of low grade disseminated Au mineralization occur each with indicated potential for in excess of 20,000,000 tonnes of 0.04 to 0.09 oz/tonne Au. One of these areas also has associated zones of Cu-Mo-Au mineralization.

Numerous epithermal Ag-Au-base metal veins occur mainly in the southern part of the property. Exploration in 1982 concentrated on locating and exploring vein structures which had potentially economic sizes and grades. Sampling and/or drilling was done in twelve areas. Two vein zones have small drill indicated tonnages of potentially economic Ag-Au values and the necessary strike length required to develop additional tonnage.

OBJECTIVES

The objectives of the 1982 exploration seasons were to:

1) evaluate known epithermal Ag-Au veins by drilling and trenching.

2) locate new mineralized veins by mapping, prospecting and sampling.

3) conduct detailed mapping in the vein areas to determine the geological controls of the veins.

No obvious potential is seen for bulk mineable vein zones on the property. Consequently, the necessary features of economic, individual veins or vein zones are:

1) a strong and persistent structure, preferably kilometers long.

2) areas in the vein with at least 1 oz/t Au-equivalent to produce 0.7 to 0.8 oz/t Au ore when diluted.

3) a mining width of at least 3 m.

4) a vertical extent of 100 to 200 m.

RESULTS

Based on the preceding criteria, the areas with the best economic potential are, in order of priority:

1) Near Shore Zone
2) West Zone
3) the unexplored Red River Lakes alteration zone.
4) Galena-Stockwork Zone.

The Near Shore Zone has indications of a long strike, good grades, adequate width and vertical extent. The 110 to 170 W section of the Near Shore Zone has 35,000 tonnes of 1.08 oz/tonne Au and 2.88 oz/tonne Ag, uncut and diluted to 3 m widths, through a vertical extent of 50 m. The 263-318 W section of the vein has an indicated grade of 0.31 oz/tonne Au and 0.54 oz/tonne Ag.

The West Zone has indications of necessary grade on two drill sections, only 310 m of exposed strike length, adequate width and untested vertical extent. The central portion of the vein zone has 25,000 tonnes indicated of 0.46 oz/tonne Au and 38.9 oz/tonne Ag, uncut and undiluted, through a vertical extent of 17 to 41 m.

The Red River Lakes alteration zone, ranked as the third priority exploration target, has been mapped but is essentially unexplored. It is a 1 km wide quartz-sericite-pyrite alteration zone, geochemically anomalous in Au and roughly centered on the Brucejack Fault.

The Galena-Stockwork Zone, assuming the two showings are one continuous structure, has a strike length of at least 200 m and numerous, encouraging Au values, 0.73 to 2.35 oz/tonne Au over 0.61 to 1.14 m core lengths. However, the continuity and thickness of Au mineralization in the drilled portions of the zone are not economic.

Additional sampling in the westerly of the three Iron Cap veins has confirmed the low frequency of occurrence of higher grade Au values. The vein has a possible grade of about 0.1 oz/tonne Au and 1.1 oz/tonne Ag.

RECOMMENDATIONS

Recommendations are made based on the following assumptions:

1) underground mineable epithermal Ag-Au veins are a viable target.

2) the critical criteria for exploring a vein are:

   - adequate grade
   - long strike length
   - mining width
   - vertical extent

3) the pace of exploration will be slower than in 1980 to 1982 because:

   - the drill indicated zones in two vein zones are only a small proportion of the necessary tonnage required for development.

   - the difficult logistics of the Sulphurets area are adverse to the short term potential for mine development.

Recommendations are made for six areas plus unspecified mapping and sampling of some miscellaneous veins. The specific areas and recommendations are:

Near Shore Zone: VLF-EM surveying along the Peninsula Fault and drilling on 50 m centres to a vertical depth of 100 m to double the strike length of the Near Shore and associated zones.

One hole would be drilled to 90 m at -40° and the second hole to 150 m at -60°. Two holes at 205° would be drilled on sections 50 m apart. Intersections in the Near Shore Zone would be about 50 and 100 m vertically below surface in each pair of holes. The first section would be about 70 m northwest of the northerly drill section, section 318 W with DDH 71 and 72. The total estimated drilling would be 960 m in 8 holes from 4 locations.

West Zone: Drilling a fan of four holes from one location to extend the high-grade mineralization in DDH 55, 58 and 59 to the southeast and vertically.

Hole lengths and positions can not be determined at this time because of the steep topography in the West Zone. The general plan would be to drill four holes, two at -30° for about 75 m and two at -50° for about 90 m, for an estimated total of 330 m. The holes would be collared near the horizontal projection of the bottom of DDH 57.

Red River Lakes: The Red River Lakes alteration zone requires wide-spaced sampling throughout the area and detailed sampling on quartz veins.

Galena-Stockwork Zone: VLF-EM surveying is recommended in an attempt to define a structure associated with the main quartz vein drilled in the Galena Zone.

Electrum: VLF-EM surveying is recommended to try to locate a fault or structure in the till and ice cover area along the north edge of the Electrum Zone outcrop area. One drill hole of 100 m is recommended to search for the source of electrum-bearing float irregardless of negative VLF-EM results.

Mitchell-Sulphurets Ridge: Mapping and trenching is recommended to evaluate an area where a weathered Ag-Au vein was discovered in 1982.

VLF-EM surveying is recommended as a very inexpensive method of detecting structures such as faults or veins. It may be worth trying Turam surveying on the West Zone and westerly Iron Cap vein to determine if Turam will detect the veins with moderate sulphide contents.

PART II

LOCATION AND ACCESS

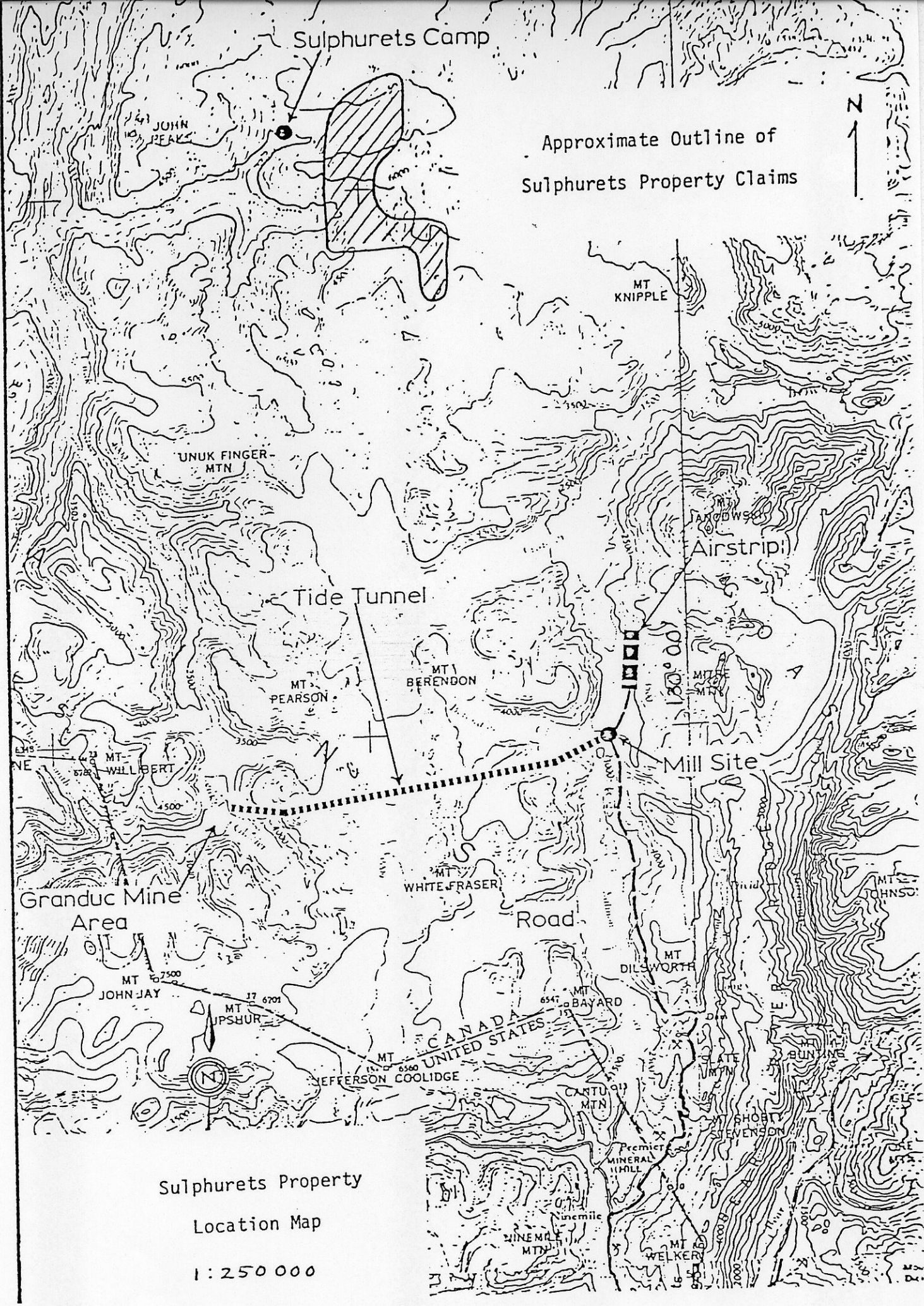
The property is located approximately 32 km north-northwest of the Granduc mill. The claim area is centered approximately at 130° 15', 56° 30' on N.T.S. sheets 104B/8E, 8W, 9E and 9W.

A camp has been established above the north bank of Mitchell Creek a few hundred metres east of the junction of McTagg Creek. The camp consists of one 18' X 24' insularch kitchen-mess hall, one 12' X 16' portahut wash house, six 14' X 16' frame tents and three 12' X 15' weatherports.

Access is by helicopter from Stewart, B.C. Equipment is mobilized to the camp by helicopter from the Tide airstrip at the Granduc mill site.

PROPERTY HISTORY

Placer Operations: The Unik River and Sulphurets Creek have been known as a source of gold since the 1880's. A Keystone drill was probably flown into Sulphurets Creek below its junction with Mitchell Creek around 1933 to test gravels for



Sulphurets Property

Location Map

1:250 000

placer gold. Gold has been panned in Mitchell Creek 1000 feet above its junction with Sulphurets Creek. There are no production figures for placer operations in the Mitchell-Sulphurets Creek area.

1935: Prospectors located copper mineralization in the location now called the Main Copper Zone.

1955: Prospecting was done in the Sulphurets Creek area.

1959: Au, Ag values found in Brucejack Lake area by prospectors.

1960: Staking of main claim area by Granduc Mines Ltd. and independent prospectors from Ketchikan, Alaska. Airborne magnetometer surveying, a few ground reconnaissance magnetic lines and reconnaissance geology.

Copper mineralization found in Mitchell-Sulphurets Ridge and Au, Ag at the base of the Iron Cap area.

1961: Drilling of 736 feet of packsack core in 32 holes in four locations to test copper mineralization. Au, Ag values found in Hanging Glacier area and molybdenite observed on the south side of Mitchell Glacier.

1962: Two holes drilled on molybdenite mineralization in the Stockwork Zone.

1961-1963: Masters thesis done by R.V. Kirkham based on mapping in Mitchell-Sulphurets area.

1968: Six holes drilled in the Main Copper Zone area. The area below the Hanging Glacier was mapped.

1970: Plane table mapping from Hanging Glacier to south edge of Mitchell Glacier.

1974: Bedrock geochemical sampling started and geological reconnaissance.

1975: Prospecting in the Brucejack Lake area.

1980: Esso optioned Sulphurets with a committment to explore a porphyry Mo and a Au vein area. The original objective was to find bulk mineable Cu-Mo +- Au deposits. Porphyry Mo, Cu and Cu-Mo areas were explored. Large tonnage but low grade Cu and Cu-Mo areas were indicated. Ag-Au veins in the porphyry areas were explored, a new Au and Cu-Mo-Au area was found near an old Cu area and a very high-grade Ag-Au vein was found in the Brucejack area.

1981: In Esso's second year on the property the emphasis was on bulk mineable Au zones and high-grade Ag-Au veins. Two areas with potential for at least 20,000,000 tonnes each of ≥ 0.05 oz/tonne Au were indicated. Numerous veins with potentially economic (≥ 0.50 oz/tonne Au or Au equivalent) Au contents were located in the southern part of the property.

1982: 1982 work was restricted to exploring and locating new veins and vein zones with high-grade Ag and Au. A vein or structure with potential for 250,000 tonnes of 1.0 oz/tonne Au or Au equivalent was considered to be the minimum target.

GENERAL GEOLOGY

The Mitchell-Sulphurets property is underlain by Lower to Middle Jurassic volcanic and sedimentary rocks. These rocks are cut by two, elongate, sub-parallel, northerly-trending zones of intrusive rocks of probable Middle Jurassic age. The intrusive rocks range from diorite to granite in composition and appear to be sub-alkaline. The intrusive rocks roughly enclose a northerly-trending, 10 km linear zone of intense alteration. Sericite is the most ubiquitous alteration mineral. Other assemblages are dominated by K-feldspar, chlorite and propylitic-type minerals. Advanced argillic assemblages, containing alunite and native sulphur, occur at Treaty Creek in an area north of the property.

Porphyry and epithermal vein type mineralization is present. Porphyry Cu-Mo and Cu mineralization occurs in the north and northwest portions of the property and is associated respectively with K-feldspar assemblages that are locally overprinted by sericitic alteration, and with hornfels plus weakly altered granite and syenite. Other porphyry Cu, Mo, Cu-Mo-Au and Au mineralization is generally accompanied by sericite-dominant alteration. Au is found in a shell of 15 to 40% pyrite around a small core of Cu-Mo-Au mineralization in the west-central area of the property. A disseminated Au zone in the eastern part of the prospect is entirely in intermediate tuff-breccia with 5 to 10% pyrite.

Structurally controlled, epithermal Ag-Au-base metal veins occur mainly in massive intermediate volcanic or intrusive rocks within 1 km wide areas of intense, sericite-dominant alteration. The veins consist of quartz, minor calcite and trace to 20% sulphide minerals. They range from simple veins to complex vein zones and stockworks. Pyrite, sphalerite, galena, tetrahedrite, electrum and chalcopyrite-bearing veins have average Ag:Au ratios of 3 to 10:1; those that also contain argentite and pyrargyrite have ratios of 20 to 85:1.

The geology of the area from Treaty Creek, north of Sulphurets, through to the Brucejack Lake area in the southern part of the Sulphurets property reflects three different levels of erosion. The Treaty Creek area appears to be a structural depression and has been shallowly eroded. Advanced argillic alteration occurs at Treaty Creek and only minor pyrite mineralization is known. The southern part of the Sulphurets property has fine-grained, syenodiorites, patches of structurally controlled alteration and epithermal, vein-type, Ag-Au-Pb-Zn mineralization. These features indicate moderate erosion levels. The northern part of the property has coarse-grained intrusive rocks, large areas of pervasive and overprinted alteration and predominantly porphyry-type Cu and Mo mineralization. These features are indicative of relatively deep erosion as compared to the Brucejack and Treaty areas.

CLAIMS

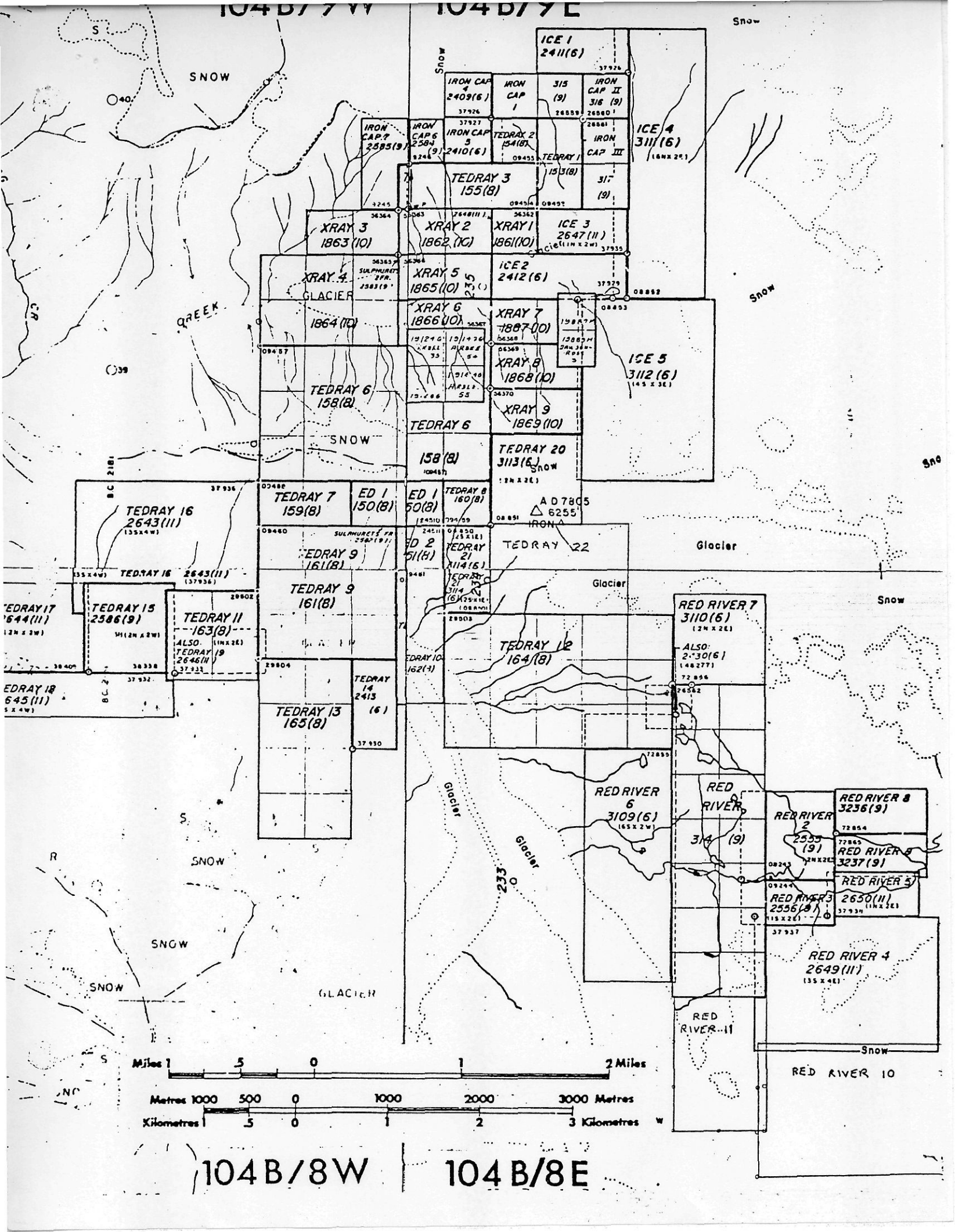
The Sulphurets property currently consists of 258 units. Granduc owns 106 units and Esso owns 152 units. The six Arbee and Dawson-Ross two-post claims were returned to S. Ross in 1982. Three new claims totalling 38 units, Red River 10 and 11 and Tedray 22, were staked in 1982. The only claim requiring assessment filing in 1983 is Tedray 22 recorded Oct. 18, 1982.

Ed Kurchkowski staked a one unit claim, record number 2430 in July, 1981 to cover an apparent fraction between Tedray 12 and Red River. The fraction may be 20-30 m wide E-W and 700 m long N-S. The LCP for Tedray 12 can not be located so the presence of the fraction can not be proven.

The following is a list of claims with current expiry dates:

	Claim	Record No.	Units	Date of Record	Expiry Date
Sulphurets - 2153	Arbee 035	19124		June 016/60	1991/06/16
Sulphurets - 2153	Arbee 039	19128		June 016/60	1991/06/16
Sulphurets - 2153	Arbee 054	19143		June 014/60	1991/06/14
Sulphurets - 2153	Arbee 055	19144		June 16/60	1991/06/16
Sulphurets - 2153	Dawson-Ross 001	19887		July 24/61	1992/07/24
Sulphurets - 2153	Dawson-Ross 003	19889		July 24/61	1992/07/24
Sulphurets - 2153	Ed 1	150	02	Aug 26/75	1992/08/26
Sulphurets - 2153	Ed 2	151	01	Aug 26/75	1992/08/26
Sulphurets - 2153	Ice 1	2411	02	June 30/80	1991/06/30
Sulphurets - 2153	Ice 2	2412	03	June 30/80	1992/06/30
Sulphurets - 2153	Ice 3	2647	02	Nov 3/80	1985/11/03
Sulphurets - 2153	Ice 4	3111	12	June 30/81	1992/06/30
Sulphurets - 2153	Ice 5	3112	12	June 30/81	1992/06/30
Sulphurets - 2153	Iron Cap 001	315	02	Sept 7/76	1991/09/07
Sulphurets - 2153	Iron Cap 002	316	01	Sept 7/76	1991/09/07
Sulphurets - 2153	Iron Cap 003	317	02	Sept 7/76	1991/09/07
Sulphurets - 2153	Iron Cap 004	2409	01	June 30/80	1991/06/30
Sulphurets - 2153	Iron Cap 005	2410	01	June 30/80	1991/06/30
Sulphurets - 2153	Iron Cap 006	2584	02	Sept 23/80	1991/09/23
Sulphurets - 2153	Iron Cap 007	2585	02	Sept 23/80	1991/09/23
Sulphurets - 2153	Red River	314	14	Sept 15/76	1991/09/15
Sulphurets - 2153	Red River 002	2555	04	Sept 2/80	1991/09/02
Sulphurets - 2153	Red River 003	2556	02	Sept 2/80	1991/09/02
Sulphurets - 2153	Red River 004	2649	12	Nov 3/80	1991/11/03
Sulphurets - 2153	Red River 005	2650	02	Nov 3/80	1991/11/03
Sulphurets - 2153	Red River 006	3109	12	June 30/81	1991/06/30
Sulphurets - 2153	Red River 007	3110	04	June 30/81	1991/06/30
Sulphurets - 2153	Red River 008	3236	02	Sept 29/81	1992/09/29
Sulphurets - 2153	Red River 009	3237	02	Sept 29/81	1992/09/29
Sulphurets - 2153	Red River 010	3516	12	July 12/82	1992/07/12
Sulphurets - 2153	Red River 011	3517	06	July 12/82	1992/07/12
Sulphurets - 2153	Sulphurets 1 Fr.	2582	01	Sept 23/80	1991/09/23
Sulphurets - 2153	Sulphurets 2 Fr.	2583	01	Sept 23/80	1991/09/23

Claim		Record No.	Units	Date of Record	Expiry Date
Sulphurets - 2153	Sulphurets 3 Fr.	2648	01	Nov 3/80	1991/11/03
Sulphurets - 2153	Tedray 001	153	02	Aug 26/75	1991/08/26
Sulphurets - 2153	Tedray 002	154	01	Aug 26/75	1991/08/26
Sulphurets - 2153	Tedray 003	155	03	Aug 26/75	1991/08/26
Sulphurets - 2153	Tedray 006	158	15	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 007	159	02	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 008	160	01	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 009	161	09	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 010	162	03	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 011	163	04	Aug 26/75	1991/08/26
Sulphurets - 2153	Tedray 012	164	15	Aug 26/75	1991/08/26
Sulphurets - 2153	Tedray 013	165	08	Aug 26/75	1992/08/26
Sulphurets - 2153	Tedray 014	2413	02	June 30/80	1985/06/30
Sulphurets - 2153	Tedray 015	2586	04	Sept 23/80	1991/09/23
Sulphurets - 2153	Tedray 016	2643	12	Nov 3/80	1991/11/03
Sulphurets - 2153	Tedray 017	2644	04	Nov 3/80	1991/11/03
Sulphurets - 2153	Tedray 018	2645	04	Nov 3/80	1991/11/03
Sulphurets - 2153	Tedray 019	2646	02	Nov 3/80	1991/11/03
Sulphurets - 2153	Tedray 020	3113	04	June 30/81	1992/06/30
Sulphurets - 2153	Tedray 021	3114	02	June 30/81	1992/06/30
Sulphurets - 2153	Tedray 022	3574	18	Oct 06/82	1983/10/06
Sulphurets - 2153	Xray 001	1861	01	Oct 12/79	1991/10/12
Sulphurets - 2153	Xray 002	1862	02	Oct 12/79	1991/10/12
Sulphurets - 2153	Xray 003	1863	02	Oct 12/79	1990/10/12
Sulphurets - 2153	Xray 004	1864	06	Oct 12/79	1990/10/12
Sulphurets - 2153	Xray 005	1865	02	Oct 12/79	1991/10/12
Sulphurets - 2153	Xray 006	1866	02	Oct 12/79	1990/10/12
Sulphurets - 2153	Xray 007	1867	02	Oct 12/79	1992/10/12
Sulphurets - 2153	Xray 008	1868	02	Oct 12/79	1992/10/12
Sulphurets - 2153	Xray 009	1869	02	Oct 12/79	1992/10/12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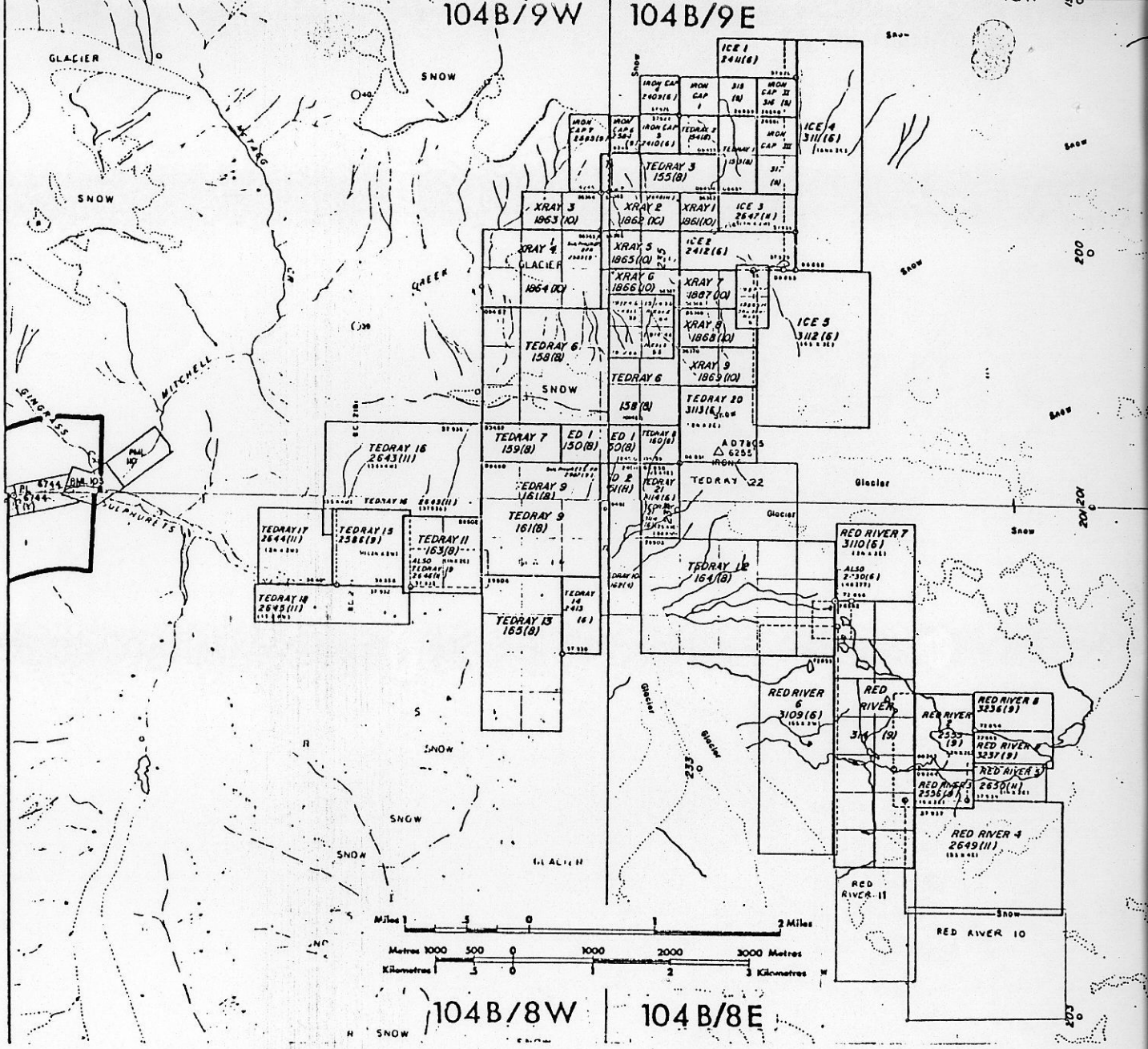
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RED RIVER 7 3110(6)
RED RIVER 6 3109(6)
RED RIVER 8 3236(9)
RED RIVER 3 2650(11)
RED RIVER 4 2649(11)
RED RIVER 10
RED RIVER 11
AD 7805
6255
Miles 1 .5 0 1 2 Miles
Metres 1000 500 0 1000 2000 3000 Metres
Kilometres .5 0 1 2 3 Kilometres

EXPENDITURES

The total expenditures on the Sulphurets property for the period 1960 to 1977 were $336,000. The expenditures are summarized in the Granduc Summary Reports, Sulphurets Creek Project, 1960-1974 and 1976.

Esso's expenditures on the property from Edmonton accounting are:

1980 -	$ 555,800	
1981 -	814,800	
1982 -	670,500	plus a $30,000 cash payment due in 1983 which was paid in 1982.
1983 -	21,970	from 1982 invoices that were not paid until 1983.

WORK DONE

DIAMOND DRILLING

A total of 15,201.6 feet (4366.4 m) of diamond drilling was done in 53 holes, DDH 40 to 76 and 80 to 95. The following is a list of the holes by area:

Brucejack Peninsula Area:

DDH	40	450 feet
	41	370
	42	450
	43	300
	44	367.5
	63	750
	64	650
	65	624
	66	680
	67	410
	68	490
	69	520
	70	390
	71	610
	72	270
	73	280
	74	280
	75	250
	76	270

Four areas south of Brucejack Creek:

5.9 Vein:

DDH	45	100 feet
	46	140
	47	140
	48	170

0.5 Vein:

DDH	59	99.5 feet
	50	150
	51	198.5

Galena Showing:

DDH	52	200 feet
	53	260
	92	203
	93	250
	94	201
	95	221

West Zone:

DDH	54	221.6 feet
	55	180
	56	159
	57	240
	58	89
	59	150
	60	220
	61	160
	62	180
	80	220
	81	186
	82	406
	83	191
	84	141
	85	119
	86	221
	87	230
	88	251
	89	300.5
	90	200
	91	391

GEOLOGY

Mapping and prospecting were concentrated in the area around Brucejack Lake and east of the Brucejack Fault. The object of the mapping was to determine the relationship of epithermal veins to structure and alteration. Ron Britten did widespread traversing over the whole property to tie together the geology and alteration which had been partly mapped on a piecemeal basis.

SAMPLING

A crew of three students did 560 m of trenching using a hand-held drill and explosives. The trenching was done in 8 areas in the Brucejack areas and on the upper portion of the westerly Iron Cap vein. All trenches were channel sampled and assayed for Au and Ag.

CLAIM STAKING

Three claims totalling 38 units were staked in 1982. Red River 10 and 11 were staked in July to provide protection around showings in the Brucejack area. Tedray 22 was staked in September to cover an unexplored area of sericitic alteration where a grab sample of a weathered quartz vein assayed 16.70 oz/ton Ag and 0.017 oz/ton Au.

ASSESSMENT WORK

One hundred claim units were grouped as the Brucejack No. 1 Group on July 19, 1982. A Statement of Exploration and Development was filed for this group on Sept. 24, 1982, Mining Receipt 181529. An additional assessment report will be filed in 1983 for portable assessment credits on drilling done after August 7, 1982.

ORTHOPHOTOS

Six orthophotos were made by Burnett Resource Survey Ltd. from August, 1981 air photography. Four sheets at 1:5000 cover the property and 2 sheets at 1:2000 cover the Brucejack Lake area.

PART III: RESULTS

It is not feasible to summarize the assay results because of the large amount of work and drilling done in individual areas on the property in 1982. Instead, the following is a summary of the deposit types on the property and the possible or indicated sizes and grades for each individual area.

Table 1 for porphyry mineralization and Table 2 for epithermal vein mineralization summarize the possible or drill indicated grades and tonnage for the individual areas on the Sulphurets property. Vein zones which have not been adequately explored to estimate their potential are omitted from Table 2.

Metals	Area	Grade Au in oz/tonne	Tonnes or Comments
Cu	Kirkham	.16% Cu	showing
Cu	Mitchell	.18 % Cu	showing
Cu	Iron Cap	≥ .10%Cu	≥ 100,000,000
Cu-Mo	Iron Cap Moly	.20% Cu .02% Mo	50,000,00; one drill hole
Cu-Mo-Au	Breccia	.62% Cu .02% Mo .03 Au	≥ 1,000,000; one drill hole, core of Breccia Au Zone
Mo	Moly	very low	showing
Au	Breccia	.05-.08 Au	20,000,000; 7 drill holes
Au	Canyon	.03	showing, 6 drill holes
Au	Snowfield	.04-.09	20,000,000; not drilled

TABLE 1: Areas of disseminated or porphyry-type mineralization at Sulphurets. Grades are reported for Au ≥ 0.4 g/tonne and Mo ≥ 0.01%. Tonnages are geologically possible tonnages based on surface sampling or trenching or a few drill holes.

Area and Vein or Zone	Grade oz/tonne	Tonnes, Comments
Iron Cap, West Vein	0.1 Au 1.0 Ag	500,000 possible; 2 drill holes, 17 trenches
Brucejack Peninsula, Near Shore Zone	1.08 Au 2.88 Ag	35,000 indicated in the 100-170 W ore shoot
	0.31 Au 0.54 Ag	~ 35,000 inferred in the 263-318 W ore shoot
	?	105,000 possible in each ore shoot
Brucejack Peninsula, Second Zone	?	small stockwork with up to 1.63 Au, 26.4 Ag
Brucejack Peninsula, Third Zone	?	small stockwork with up to 2.73 Au, 35.4 Ag
Brucejack Peninsula Discovery Vein	?	unexplored vein with up to 33 Au, 732 Ag
South Brucejack, West Zone	0.46 Au 38.90 Ag	25,000 indicated
	?	92,000 possible in one ore shoot
South Brucejack, Galena-Stockwork Zone	0.05-.18 Au	350,000 possible; intersections with up to 2.35 Au

TABLE 2: Areas of epithermal Ag-Au-base metal veins at Sulphurets.

PART IV: GEOLOGY AND RESULTS OF INDIVIDUAL ZONES

GEOLOGY OF THE BRUCEJACK AREA SEDIMENTARY AND VOLCANIC ROCKS

Rocks in the area are mapable as two formations and six types of intrusive bodies. The youngest formation is a sequence of sandstones, wackes and shale which is collectively called the Sandstone Formation. Overlying the Sandstone Formation is a Volcanic Fragmental Formation which is composed mainly of tuff-breccia that lacks bedding. Two types of plug shaped plutonic porphyries occur, a compositionally diverse hornblende - feldspar porphyry syenite and an alkalic feldspar porphyry syenite. In addition, four types of dikes occur. The intrusive rocks have been interpreted to be syenodiorites and the alkalic feldspar porphyry syenite may not be a valid unit. Detailed lithological descriptions are given in Table 3. The distribution of lithologies is shown on Map 75.

The Sandstone Formation is at least 300 m thick and consists of 2 members which are usually not mapable; an arkose member and a lithic arkose member. The arkose member consists of laminated to thin bedded arkoses and arenites usually with moderately sorted, subangular quartz. Interbedded with the above are heterolithic pebble conglomerate beds and shales which are usually not more than 1 m thick. The lithic arkose member consists of interbedded lithic arkose, lithic wackes and shales. Lithics consist of black shale and felsic fragments.

Bedding is generally obscured by cleavage and pervasive alteration. The proportion of shale in the lithic arkose generally decreases toward the arkose member. Quartz-rich arkose is locally intercalated with lithic arkose and shale especially near the contacts of the members. Thus the distinction between the members is often subjective. The arkose member is interpreted to be a beach deposit by its immaturity and poor sorting. Although none of the volcanic or intrusive rocks in the map area contain significant quartz it is probable that the quartz was derived from the volcanic edifice rather than a large granitic terrain. The lithic arkose member is interpreted to be a shallow water shelf deposit adjacent to the beach.

The Volcanic Fragmental Formation is at least 400 m thick and consists of 3 or more members. The members, in apparent chronological sequence are, a high-matrix lapilli-tuff, a low-matrix tuff-breccia sequence that lacks bedding and occurs at more than one stratigraphic position and an undivided member which is commonly low-matrix tuff-breccia and locally is interbedded with conglomerate. Pervasive alteration and cleavage often make it impossible to distinguish the individual volcanic members.

The high matrix lapilli-tuff member is at least 100 metres thick. This unit lacks bedding, contains 10% chloritic lapilli and blocks (Appendix 2) and a high proportion of crystals which includes quartz in the matrix.

The low matrix sequence which may be more than one member contains 30-80% chaotic monolithic to slightly heterolithic lapilli and blocks and is practically devoid of observable bedding planes. These are, therefore, interpreted to be primary pyroclastic units. The low matrix sequence is interbedded with heterolithic conglomerate, reworked lapilli-tuff and tuff. Clasts in the conglomerate include creamy aphyritic felsic clasts and feldspar and hornblende porphyritic clasts which may have been derived from flows and/or intrusions.

The volume of fragmental rocks in the volcanic units implies a subaerial depositional environment. The lack of flows implies relatively gas-rich magmas. The high-matrix tuff-breccia is probably an ash flow and the low-matrix unit a high-energy pyroclastic deposit.

INTRUSIVE ROCKS

Thirteen hornblende-feldspar porphyry syenite (syenodiorites) and two alkaline feldspar porphyry syenites (probably also syenodiorites) occur in the map area. The alkali feldspar is a derived unit from the hornblende feldspar porphyry which includes several units. Although minor compositional and textural variations abound, all units in the map area belong to the same intrusive phase (Appendix 2).

The hornblende feldspar porphyry is compositionally and texturally diverse within the individual intrusions outlined on the detailed maps (Maps 77 and 79). The rock generally contains 10-20% hornblende phenocrysts and a similar proportion of feldspar phenocrysts set in an aphanatic groundmass (Table 3).

The alkali-feldspar porphyry is readily distinguished by the presence of large 0.5-2.0 cm long euhedral alkali feldspar? phenocrysts (Table 3). In addition the rock contains 40-55% smaller feldspar phenocrysts which are mainly alkali feldspar. The large intrusion near Brucejack Creek is unusual because it contains well developed cleavage and pervasive alteration.

Quartz veins and intense pervasive alteration are spatially related to intrusions. In the West Brucejack zone quartz veins are perpendicular and parallel to the intrusive contact and in other areas quartz veins and pervasive alteration partially rim several intrusions (Map 77). This relationship strongly suggests that the absence of free quartz in the intrusions is related to veining and pervasive alteration.

Four varieties of dikes have been noted, two types which strike east-west and two types strike approximately 130^{o} (Maps 75 and 77). Most dikes are unaltered. The equigranular hornblende-feldspar dike postdates alteration whereas the other three varieties seem to be unfavourable hosts compositionally and texturally for alteration. Andesite dikes intruding

intensely silicified and pyritized wall rock lack quartz, sericite and pyrite. Instead the groundmass is chloritized and the margin contains carbonate-quartz and rare sulphide amygdules.

STRUCTURE

At least three major strike-slip faults and two major folds occur in the map area. The known faults are all marked by obvious displacement. The Brucejack Peninsula anticline is known by right angle bedding-cleavage intersections, an abrupt swing of bedding, the distribution of lithologies adjacent to the peninsula and the vertical cliff outcrop northwest of the peninsula where the fold can be observed. The inferred syncline is based on the distribution of formations, bedding attitudes and stereonet plots of poles to bedding.

The major known strike-slip faults, which have displacements of between about 150 and 250 metres, are all right-lateral; strike in different directions and are not necessarily expressed as obvious lineaments. The major known faults are the Brucejack Peninsula fault striking northwest, the Brucejack lineament fault striking north-south and the Kruchkowski fault striking northeast (Map 75). Other major faults can be inferred and several minor faults have been observed.

A stereographic plot of poles to bedding shows considerable data scatter (Figure 3) and reveals folding. The distribution of points indicates that attitudes have been taken on both limbs of one or more folds.

Cleavage attitudes range from mainly northwest striking, west dipping along the eastern and western margins of the map area to east-west striking and relatively gently dipping in the central section. An east-west cross section of cleavage (Map 80) illustrates the apparent change in dip. This change in attitude is not easily explained.

If the poles to bedding are plotted as two separate populations, one population west of gossan hill (a prominent gossan area centred at 6,258,900N - 426,800 E, see Map 77) and one population east of gossan hill, then the degree of scatter is reduced considerably (Fig. 4 and 5). Great circles roughly fit the data if points X_1, X_2, X_3 are ignored west of gossan hill and point X_4 is ignored east of gossan hill. Point X_1 refers to an attitude taken on the cliff face of the Brucejack fault lineament and is, therefore, probably disturbed. Point X_4 was taken on the east limb of the well exposed anticline on the 1:2000 scale map and is approximately the same attitude as cleavage. Points X_3 and X_4 are not obviously related to any observable structure. Because the distribution of poles east and west of gossan hill span the great circles it implies that complete folds exist east and west of gossan hill. From the maps we can confirm that at

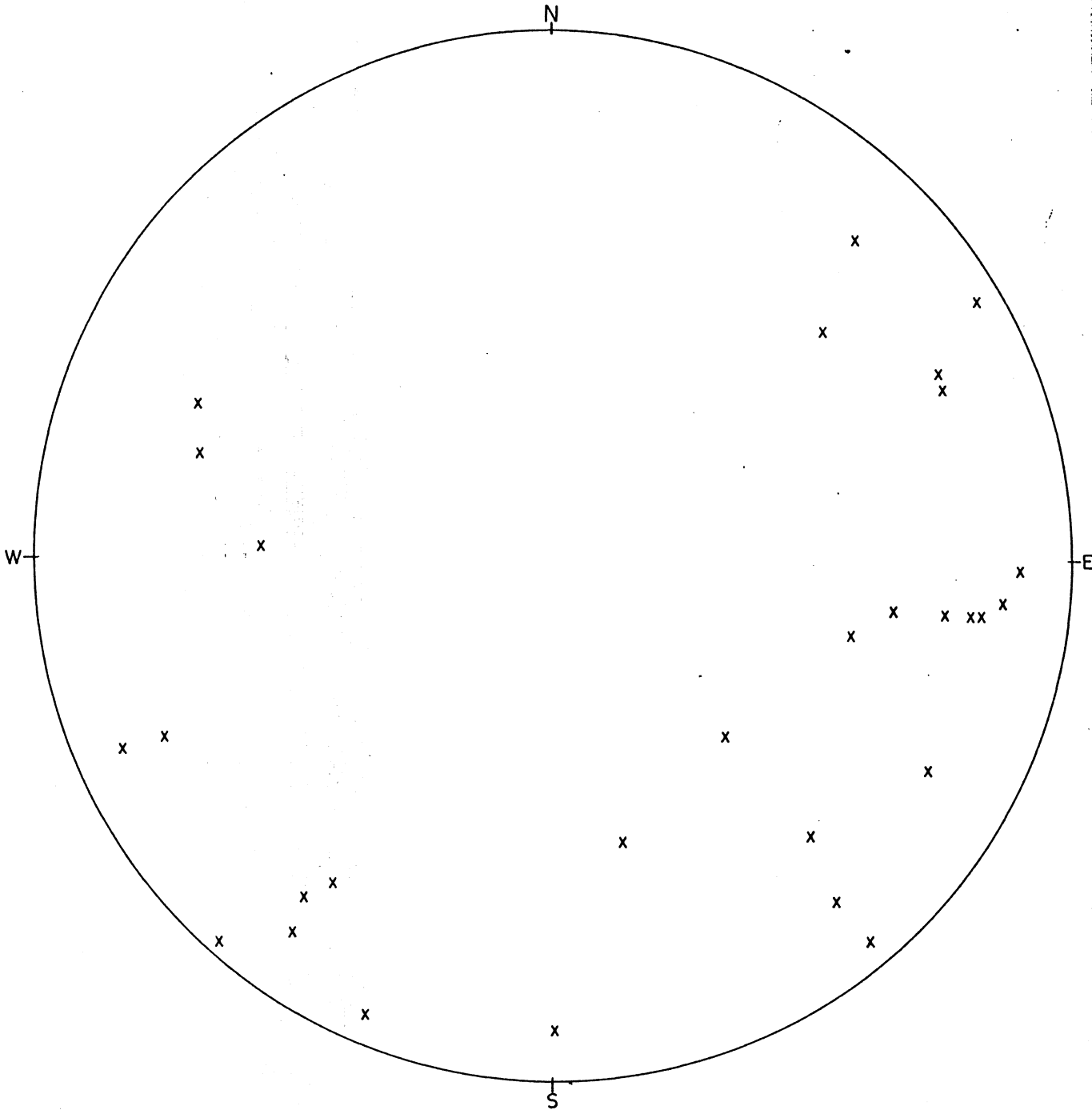

Figure 3: Plot of 29 poles to bedding from North Brucejack area, Map 77

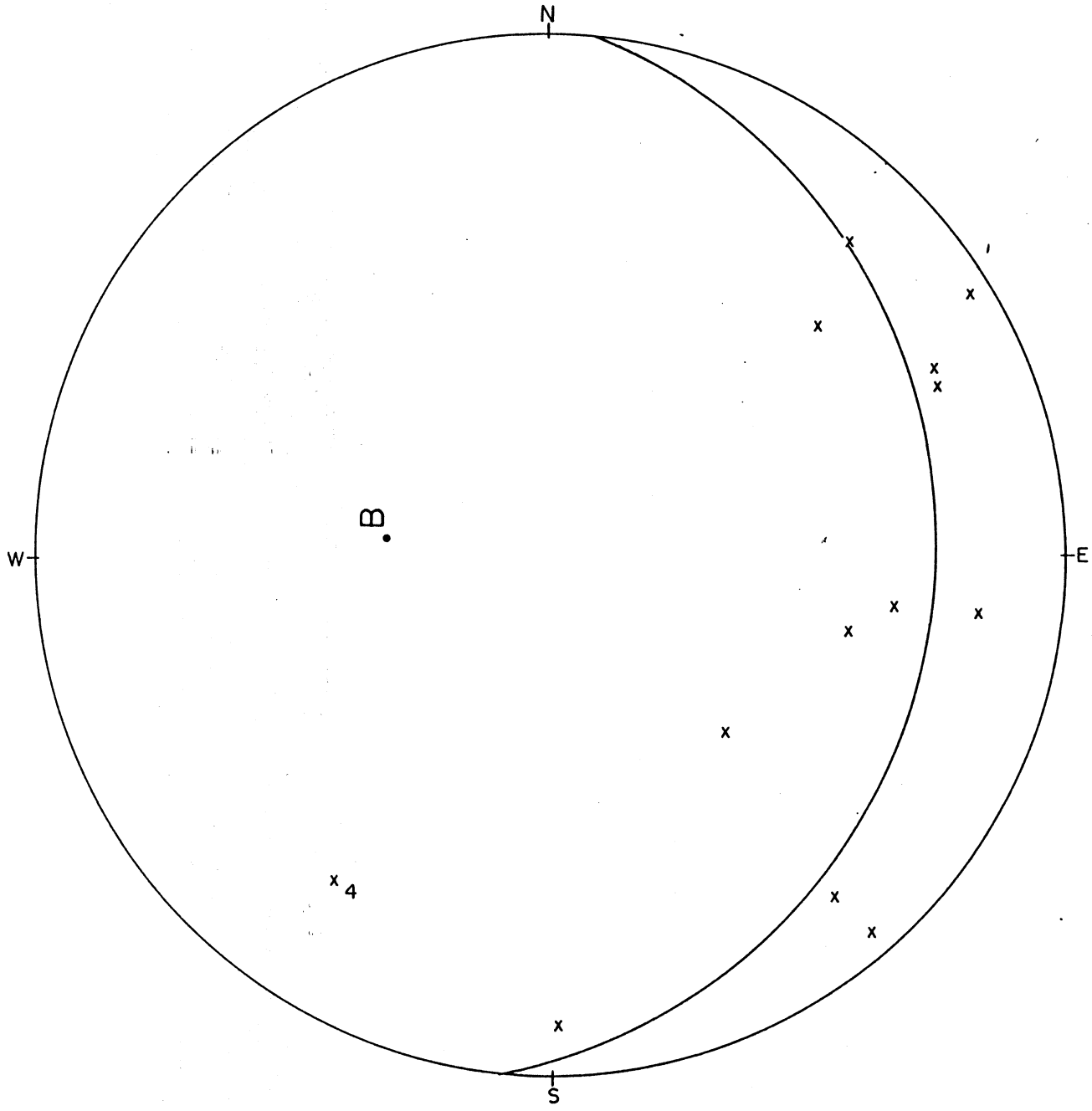

Figure 5: Plot of 13 poles to bedding, North Brucejack area east of Gossan Hill, Map 77

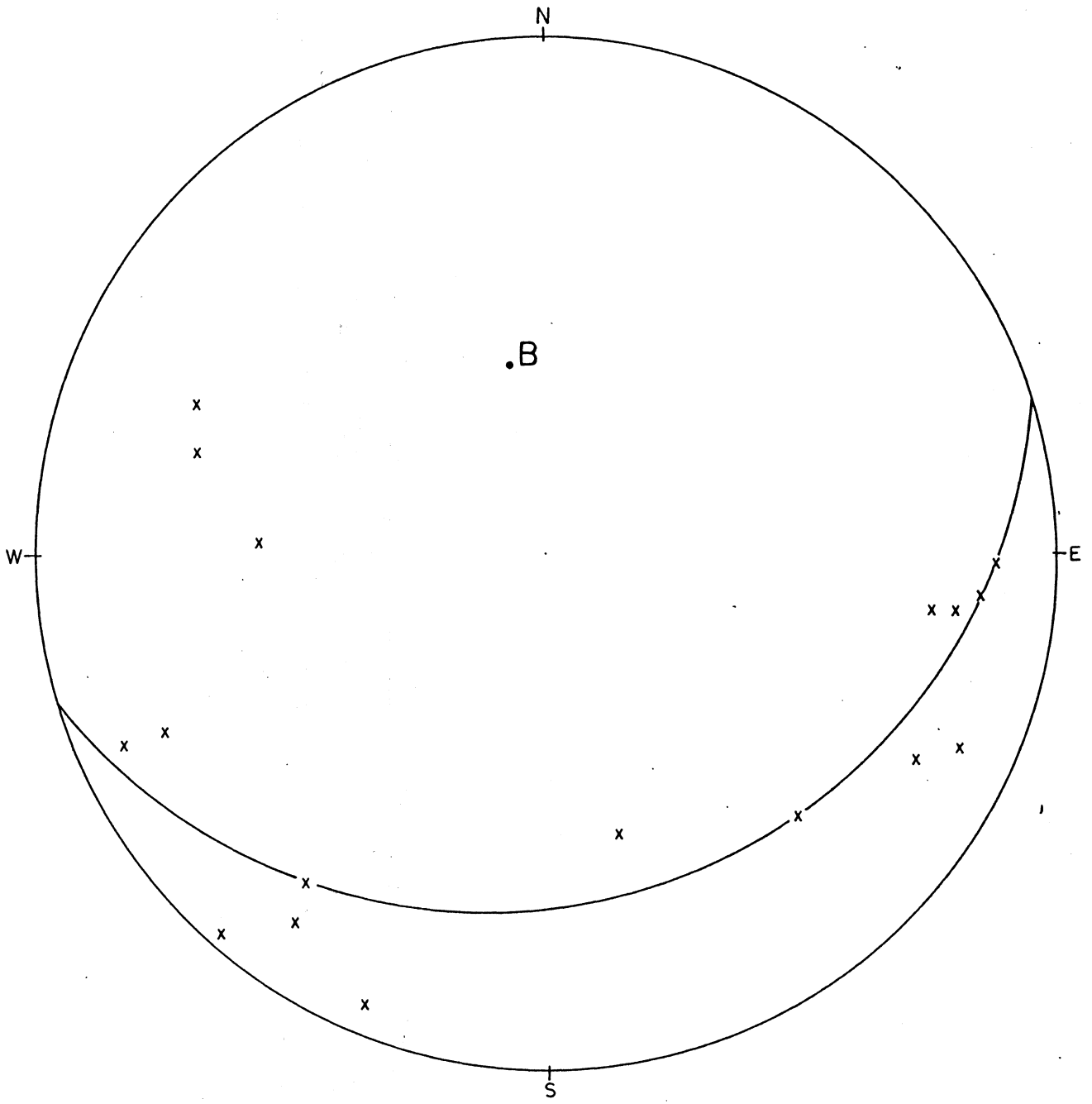

Figure 4: Plot of 17 poles to bedding attitudes, North Brucejack area, west of Gossan Hill, Map 77

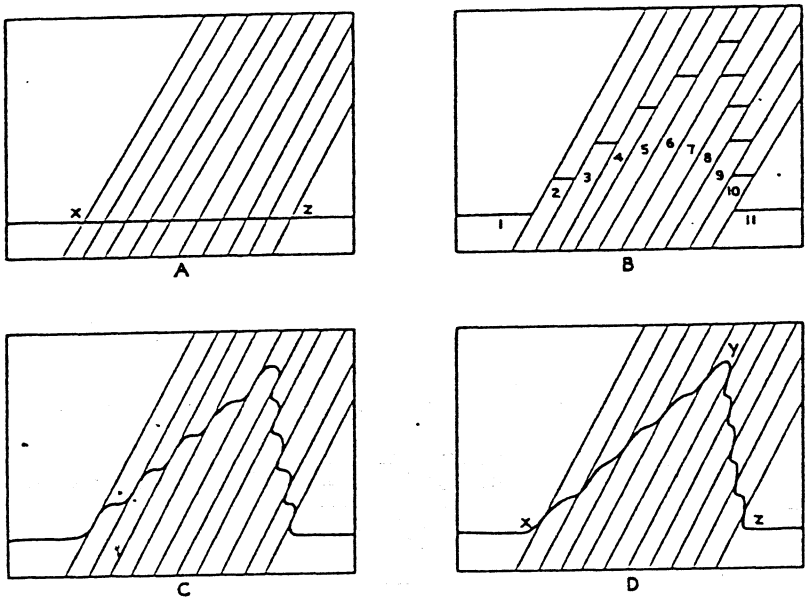

FIGURE 6: Cross sections illustrating shear folding. Heavy black line, xz, is a bedding plane. Inclined light lines are fractures. (A) Before displacement on fractures. (B) After displacement. (C) Because of friction, beds tend to parallel the fractures. (D) Fold results if bed maintains continuity. After Billings (1970).

least two folds occur east of gossan hill and at least one occurs west of gossan hill. These folds, however, can not account for the gross map patterns. Consequently, they are interpreted as subsidiary folds. The poor fit of the great circle to poles of bedding and the inaccountability of three points (X_2, X_3, and X_4) which are apparently related to folding suggests that these folds do not maintain a constant plunge and are therefore not concentric folds.

The best interpretation is that the major structure is an overturned shear fold (Fig. 6). With this type of folding we do not expect that bedding attitudes will clearly define the shape of folds. Thus there is a poor fit of poles to bedding with a great circle. The "pooling of the map pattern" where the Brucejack Peninsula anticline is inferred in Map 77 could be explained by changing the plunge.

77

ALTERATION

The main megascopically identifiable alteration assemblages are:

1) quartz, sericite, pyrite, minor carbonates

2) quartz, sericite – muscovite, chlorite, carbonates, pyrite

3) chlorite, carbonate, epidote

The original textures and lithologies of the intensely altered rocks have been obliterated. Alteration contacts are commonly transgressive over a few meters but locally sharp contacts which cross cut cleavage can be observed on cliff faces.

There are two main areas of alteration in the southern part of the Sulphurets property. They are dominated by the assemblage sericite-quartz-pyrite. The northerly altered area is roughly 1 km in diameter. It occurs along the Brucejack Fault but the fault lineament can not be observed in the altered area. The only identifiable rocks in the altered area are hornfelsed sedimentary rocks, syenodiorite (unit 4) and quartz veins (Map 75). The area has not been sampled by Esso but is known to be anomalous in Au. Seven samples in the area from Granduc's bedrock sampling contained 310 to 850 ppm Au.

The southerly of the two main areas of alteration occurs between the Brucejack Fault and the Peninsula Fault. The zone is widest around Brucejack Creek and occurs erratically to the north west along a synclinal axis (Maps 77 and 79). The erratic areas of quartz-sericite-pyrite alteration are surrounded by weaker alteration which includes chlorite and carbonates.

The only significant known mineralization occurs within the approximately 1 km in diameter area of alteration centered on Brucejack Creek. Mineralized quartz veins are commonly parts of complex vein stockworks. The larger silicified masses and simple veins are commonly not mineralized.

Mineralized vein zones have two preferred orientations, 090° and 140°, and are sub-vertical. Individual veins within the stockworks have extremely variable orientations. The Near Shore and associated zones and the West Zone strike 140°. The Near Shore Zone is within the 140° striking Peninsula Fault which parallels the crest of a northwest plunging anticline. A black, possibly pyrobitumen-bearing quartz vein parallels the Near Shore Zone about 150 m to the southwest.

The West Zone also is oriented at 140° but it has no known relation to a major, through going, structure. It is likely that it is also along a 140° splay fault to the Brucejack Fault. Preserved foliation northwest of the zone are at 125-138°. Any through going structure has been obliterated by late quartz veins and quartz-carbonate masses.

The Galena-Stockwork Zone strikes about 090° and dips vertically to steeply south. This is a common quartz vein orientation in the southerly alteration zone for both thin and very thick quartz veins. A good example of the generally 090 veins is around 6,258,600N - 426,400E on Map 77 where the veins cut syenodiorite and merge into a zone which follows the contact between intensely altered syenodiorite? and syenodiorite.

Two showings of some significance, the Discovery Zone and Kruchkowski's Trench, do not correlate with main mineralized orientations. The Discovery Zone at the south end of the

Brucejack Peninsula (Map 77) can not be followed by trenching and is interpreted to be orientated at 050/70 NW. The 050 trend is one of three common orientations for quartz veins in the immediate area.

Kruchkowski's Trench is a small quartz-electrum vein. It occurs along an undulating fault striking about 045° at the point where a northwesterly syncline axis is offset by the fault.

MINERALIZATION

Mineralization and associated vein characteristics are quite variable in the epithermal veins in the Brucejack area. Some characteristics are discussed for individual vein zones and are summarized in Table 4. Table 4 also includes the Iron Cap vein located in the northerly part of the property.

Area	Vein Type	Vein Mineralogy		Structure
		Non-Sulphide	Sulphide	
Iron Cap	simple qz vein, sharp walls	qz	C-py M-tet, mg T-sph, gn, Mo, cp, specularite	350° to 020°, vertically dipping to steep to the W
Near Shore Zone	complex vein and stockwork, minor vuggy qz w. calcite infilling	qz, calcite, late? barite veins	C-py M-sph, tet, gn, electrum T-cp, argentite	140°, vertical to steep to the SE
Second Zone	stockwork of qz-sulphide veins	qz, calcite	C-py, tet, sph, gn T-cp, argentite, electrum	140°, subvertical
Third Zone	as for Second Zone			
Discovery Vein	pods of qz vein in stockwork	qz, late? barite veins	C-argentite M-electrum, py, tet, sph, gn, pyrargyrite	050°/70 NE
367 Zone	dilatant zone between faults with matrix supported breccia	vuggy quartz matrix and later qz-calcite veins	M-aspy T-gn, sph	050

West Zone	qz-sulphide stockwork, local high-sulphide vein in stockwork	qz	C-py, tet M-sph, gn, pyrargyrite, argentite, electrum	140/90
Stockwork Zone	qz-sulphide sheeted stockwork	qz, minor calcite	C-py, sph M-tet, gn T-electrum, cp, pyrargyrite?	090/-90
Galena	qz vein with halo of qz and qz-electrum stockwork	qz, minor calcite	C-py M-sph, tet T-gn, electrum, cp	090/-70S for main qz vein
Electrum	zone of weak, irregular qz veining	qz	M-py T-tet, electrum	no preferred orientation

TABLE 4: Characteristics of epithermal vein zones. C = common, M = minor, T = trace. Compare with Table 2 for grade and tonnage comments.

BRUCEJACK PENINSULA AREA

NEAR SHORE AND ASSOCIATED VEIN ZONES

Introduction

The Near Shore Zone is one of four, parallel vein zones along the north east edge of the Brucejack Peninsula (Map 77). A 20 to 50 m wide vein zone occurs along the peninsula shore (Map 55, 1981) and three vein zones occur offshore and are unexposed. The poorly mineralized vein zone on shore is described in the 1981 report, pages 59-63. The Near Shore Zone is the shoreward of the three offshore vein zones.

Geological Setting

The Near Shore and associated vein zones occur along the east edge of the main area of intense alteration between the Brucejack Fault and Brucejack Lake (Maps 75 and 77). The veins appear to cut syenodiorite which is called unit 4, hornblende-feldspar porphyry syenite on Map 77. Intense sericitization and patchy silicification has obliterated most textures and made host and rock identification difficult.

The vein zones appear to lie in or adjacent to a fault in an anticlinal axis. The fault at 140^{o} is not exposed but

forms a prominent lineament and accounts for different rock units along each side of the linear. The anticline is defined by partial wrapping around of sedimentary rocks in the northwest part of the peninsula, bedding-cleavage relationships in one outcrop and fold closure about 550 m north west of the north west corner of Brucejack Lake. A black, possibly pyrobitumen-bearing quartz vein, also may swing into the anticlinal axis.

Geology and Structure

Many of the geological fetures of the Near Shore Zone are described in the appendix in MV-7763 Revised and MV-7853. Some additional information is discussed in this section.

Drill logs for the 22 holes from 1981 and 1982 in the Near Shore Zone describe the host rock as arkose, hornblende syenite or tuff and tuff-breccia. The host rock appears to be trachyandesite with numerous fine-grained and fragment sections representing sheared or crushed areas or xenoliths of tuff-breccia.

The host rocks are pervasively altered throughout all four vein zones. No alteration envelopes have been recognized. Sericite and quartz are pervasive and calcite occurs in most quartz veins and as a minor component of the wall rocks. The sericitization has not produced a schistosity or penetrative

foliation. Sixteen samples of wallrock through DDH 63 were analyzed by XRD. No feldspars were present except for the presence of albite in one sample.

No evidence of vertical zonation with the Near Shore Zone has been observed. However, the Ag:Au ratios and the presence of barite and calcite may indicate that the explored part of the vein zone is relatively high and in the Au-rich zone if the vein zone has the classical zoning of Ag-Au-base metal epithermal vein systems.

The Ag:Au ratios in the Near Shore Zone are extremely variable and range from 1.1 to 216.7:1 with an average of 23.6:1. The two indicate ore shoots, where about half of the intersections have in excess of 0.5 oz/t Au, have Ag:Au ratios of 1.7 and 2.7:1 in the 263-318 W and 110-170 W ore shoots respectively.

Large masses of calcite occur in the vein system on shore and up to the southwest contact of the Near Shore Zone. Barite veins are minor and appear to be late in the paragenetic sequence. The combination of calcite and barite commonly occurs within or above the precious metal level in epithermal vein systems.

There is a coincidence of:

1) high-grade intersections in the Near Shore Zone
2) flexures in the strike of the zone
3) the occurrence of the two parallel (Second and Third Zones) stockworks
4) high-grade intersections in the two parallel stockworks

These features indicate that Au mineralization is related to zones of dilatency and intense fracturing accompanying minor strike changes in the main vein structure.

High-grade Au intersections (0.60-2.62 oz/t Au) occur in half the drill intersections where there are flexures in the strike of the zone concave to the southwest and where the two parallel (Second and Third Zones) stockwork zones are identifiable or widest. The high-grade intersections in the Second Zone (1.38-1.48 oz/t Au) and in the Third Zone (0.56-2.48 oz/t Au) all occur adjacent to the 110-270 W ore shoot (Map 81). These high-grade intersections are all vertically lower than the high-grade intersections in the Near Shore Zone because of the drilling pattern. They indicate continuity of high-grade Au down to at least 128 m below the lake level. The two holes (DDH 72 and 74) which intersect the Second and Third Zones below the 263-318 W ore shoot did not have any high-grade intersections.

The problems with individual vein orientations is discussed in MV-7763 Revised. Flat quartz veins are present and may, in part, control or influence the Au distribution in the Near Shore Zone. Flat veins can only be observed on one rock face between sections 70 and 110 W. The Near Shore Zone appears to be sub-horizontal rather than sub-vertical on section 190 W (Map 88).

Potential

The Near Shoe Zone has indications of a long strike, good grades, adequate width and vertical extent. The 110 to 170 W section of the Near Shore Zone has 35,000 tonnes of 1.08 oz/tonne Au and 2.88 oz/tonne Ag, uncut and diluted to 3 m widths, through a vertical extent of 50 m. The 263-318 W section of the vein has an indicated grade of 0.31 oz/tonne Au and 0.54 oz/tonne Ag.

The potential for economic tonnage in the Near Shore Zone is dependent on its strike length. Economic grades have been indicated so tonnage through strike extent must now be determined.

Second and Third Vein Zones

The Second and Third vein zones are two parallel quartz-sulphide stockworks which occur about 20 m apart and parallel to the Near Shore Zone. They are weak stockworks but they consistently occur parallel to the Near Shore Zone and contain relatively high-grade Au and Ag sections adjacent to the 110 to 270 W ore shoot in the Near Shore Zone. High-grade intersections in the Third Zone occur to a depth of 120 m below the surface of Brucejack Lake and all 5 intersections with in excess of 0.5 oz/t Au in both zones are below the depth of the

four high-grade intersections in the 110 to 270 W ore shoot of the Near Shore Zone. The presence of these scattered high-grade values in the two stockwork zones parallel to the Near Shore Zone indicates that high grades could be present at similar depth in the Near Shore Zone.

Table 5 summarizes some features of the Second and Third Zones. The low frequency of occurrence of intersections in excess of 0.5 oz/t Au and the variable and generally narrow apparent true widths indicate that the zones have a low economic potential. The Ag contents are higher than in the Near Shore Zone with 19.04 oz/t Ag over 1.7 m of true width being the best in the Second Zone. However, the Ag contents and Ag:Au ratios are extremely variable.

The zones can be distinguished from other veins intersected in the drill holes in the area by the presence of minor sphalerite, tetrahedrite and galena and rare chalcopyrite, argentite and electrum. Pervasive sericitic alteration occurs in the wallrocks around all the vein zones in the Brucejack Peninsula area. Very fine-grained 'sooty' pyrite imparts a dark gray color in patches and along fractures in the lower parts of the holes north east of the Third Zone. Similar pyrite occurs near the Near Shore Zone and does not appear to have any direct correlation with the Third Zone.

No significant evidence exists for vertical zoning in the four parallel vein zones in the Peninsula area. Drill hole intersections in the vein zones are at successively deeper

levels in the Near Shore Zone through to the Third Zone. Ag:Au ratios are highest in the Second Zone and lowest in the Near Shore Zone. Ag:Au ratios are extremely variable within the zones and do not appear to indicate any consistent patterns. Large masses of calcite occur at surface in the wide vein stockwork on shore and are commonly intersected in the tops of the holes drilled in the Peninsula area. However, the calcite is likely characteristic of the on shore zone rather than indicative of the top of an epithermal vein.

Apparent true thicknesses and grades of the intersections in the Second and Third Zones are tabulated in Tables 6 and 7.

	Second Zone	Third Zone
No. of holes long enough to intersect zones	15	10
No. of holes that intersect zones	12	8
No. of holes with intersections of:		
≥ 0.1 oz/t Au	7	4
≥ 0.5 oz/t Au (includes ≥ 0.1)	2	3
≥ 1.0 oz/t Au (includes ≥ 0.5)	2	1
Range of apparent true thickness	0.2-3.8 m	0.2-5.2 m
Ag:Au ratios	1.3 to 530.0:1	1.0 to 150.2:1
Mineralogy	sph, tet, py, gn, cp, argentite, electrum for both 1-10% total sulphides in qz veins	2-6% total sulphides in qz veins, locally 15-20% py
Qz veining	extremely variable for both zones 10-85%	10-50%

TABLE 5: Features of the Second and Third Zones.

Second Zone

Section	DDH	Thickness in metres Drilled	Apparent	True	Grade oz/t Au	oz/t Ag
70.8W		75	0.67	0.5	0.04	1.02
110.2W		43	1.38	1.0	1.48	1.90
110.2W		44	2.93	1.7	0.21	19.04
130W		41	0.70	0.5	0.05	2.51
130W		42	0.56	0.3	0.14	3.38
150W		40	Andesite dike			
150W		63	5.45	3.8	0.26	6.51
150W		64	2.78	1.7	0.37	16.60
			0.41	0.2	0.22	24.00
150W		65	6.05	3.2	.07	1.75
			2.88	1.5	.04	2.40
			4.03	2.2	.08	3.05
170W		28	0.20	No significant assay in 3.0 section		
190W		32	0.55	0.5	0.22	23.60
190W		66	1.00	0.5	1.38	14.40
230W		69	no identifiable zone			
263.6W		73	3.00	2.2	0.01	5.30
318W		71	2.54	1.6	0.07	1.22

TABLE 6: Thickness and grades of intersections in the Second Zone.

Third Zone

Section	DDH	Thickness in metres Drilled	Apparent	True	Grade oz/t Au	oz/t Ag
150W		40	0.65	0.40	0.063	5.24
			5.24	3.40	0.157	4.70
			0.60	0.40	2.483	2.55
			7.38	4.70	0.089	5.09
150W		63	5.54	4.00	0.048	7.21
150W		64	0.33*	0.20	0.130	2.24
			1.22	0.70	1.220	4.25
150W		65	0.75	0.40	0.042	2.92
			0.82	0.50	0.738	32.10
170W		28	6.00	5.20	0.560	3.53
190W		32	No identifiable zone			
190W		66	2.00	1.10	0.050	0.78
230W		69	No identifiable zone			
263.6W		73	3.34	2.50	0.030	2.27
318W		71	Samples destroyed at lab.			

*may be an erratic vein and not part of the Third Zone.

TABLE 7: Thickness and grades of intersections in the Third Zone.

Discovery Zone

The Discovery Zone is a vein of shattered quartz with argentite and electrum which assays 34.0 oz/t Au and 664 oz/t Ag over 1.0 m in trench 1. Additional trenching in 1981 and 1982 has not been able to follow the vein but has indicated a small patch of argentite which apparently caused a 3.0 m section in trench 2 to assay 0.25 oz/t Au and 23.75 oz/t Ag (Maps 54T-R2 and 92).

The Discovery Zone appears to be a pod of quartz-argentite-electrum within a structure which can not be traced on surface. However, DDH 30, as discussed in the 1981 report, intersected a weakly mineralized structure which may correlate with the Discovery Zone and which indicates a vein orientation of 050/70- 75^{o}N. This possible vein orientation has not been confirmed by 1982 trenching but is still considered to be the likely orientation of the Discovery Zone.

SOUTH BRUCEJACK AREA

Introduction

The South Brucejack area is the region south of Brucejack Creek and Lake. The geology is shown on map 79 and partly on map 77. The geological description at the start of Part IV in this report applies to the South Brucejack area.

The mineralized areas in the South Brucejack area include the West, Galena-Stockwork, Electrum and North Spine zones and the 0.5 and 5.9 veins.

WEST ZONE

Introduction

The West Zone was discovered in 1982 by Walter Melnyk. It is in an area of intense quartz veining which required very careful observation of every vein and silicified mass in order to locate the mineralized vein zone. Small amounts of purple stain or rind were observed on some quartz veins. Esso observed in 1981 that quartz veins with a purple rind invariably contained argentite and very high Ag values. The purple stain has been identified by XRD as cerargyrite, AgCl. A small grain of native silver was found in one quartz vein and some black, massive sulphides were located. The massive

sulphide patch consisted of tetrahedrite, pyrite, argentite, pyrargyrite and probably other silver minerals. A grab sample of the black sulphides from trench 84 by the B.C.D.M. contained about 65,000 g/t (1900 oz/t) Ag.

Geology

The West Zone is a linear stockwork zone in intensely sericitized tuff-breccia at or adjacent to a volcanic-sedimentary contact (map 93). It is almost surrounded by syenodiorite. The syenodiorite is cut by numerous quartz veins and is partly rimmed by quartz veins or has quartz veins radiating from it. The West Zone is cut off at the northwest by an irregular mass of quartz-carbonate veining and is open but unexposed to the southeast.

The vein zone consists of extremely irregular and randomly oriented quartz veins and quartz-minor sulphide veins from 3 m to up to 24 m wide. Locally the stockwork zone contains massive quartz veins and rarely quartz veins with a high sulphide content and very high Au and Ag values. A set of sulphide-bearing splay veins occur in the central part of the West Zone along the east side of the zone. They produced some good assays at surface but were not intersected in DDH 54 or 57.

The vein zone is linear, strikes 138^{o} and dips steeply southwest. It is parallel to the Near Shore and associated zones but is 800 m southwest of them. The vein is probably

controlled by a splay fault to the major north-south faults like the Brucejack Fault. However, no trace of a linear structure occurs beyond the known strike limits of the West Zone.

Cross sections of drill holes in the West Zone are on maps 94 to 100. Significant assay sections, grade and tonnage indications and potential are discussed in Appendix 3 and 4.

Potential

The West Zone has indications of necessary grade on two drill sections, only 310 m of exposed strike length, adequate width and untested vertical extent. The central portion of the vein zone has 25,000 tonnes indicated of 0.46 oz/tonne Au and 38.9 oz/tonne Ag, uncut and undiluted, through a vertical extent of 17 to 41 m.

Potential for more tonnage exists at depth in this central area but the potential for economic tonnage is obviously limited.

GALENA-STOCKWORK ZONE

Introduction

The Galena-Stockwork Zone is one of two mineralized areas in the South Brucejack area with potential for significant strike length. Drilling began in the Stockwork Zone in 1981 with four holes being drilled on a sheeted quartz-sulphide stockwork vein zone. Only a few individual veins had interesting values (0.48 oz/t Au over 2.1 m in DDH 33) but DDH 33 indicated a 35 m wide sheeted stockwork with 0.07 oz/t Au.

Drilling in 1982 on the Galena Showing indicated a thick quartz vein surrounded by a weak stockwork of quartz veins and some quartz-electrum veins. Assays up to 21.13 oz/t Au over 0.7 m occur but there is no consistency to the mineralization. Wallrocks to the thick quartz vein and weak stockwork are only weakly sericitic.

Geology

The Galena and Stockwork Zones are interpreted to be the same structure containing interesting Au values along 220 m and open to the west. The structure is a wide quartz-minor sulphide sheeted stockwork at the east end and a thick quartz vein with a weak quartz-electrum halo at the west end. The structure is east-west and subvertical to about 70°S in the Galena area. The Stockwork Zone is partly exposed (Map 2153-56., 1981). The 100 m gap between the Stockwork and Galena areas is till covered and only a few minor outcrops occur in the Galena area.

The Stockwork Zone is in a wide zone of moderately intense sericite-pyrite alteration in intermediate tuff-breccia. In the Galena area sericitic alteration is very weak. No alteration halos exist around individual veins in either area.

Grades

Trenching in 1982 (Map 102) revealed two trends of sub-parallel veins in the Stockwork area. The trend of veins through trenches 132, 133, 136-139 has erratic Au values. the short (10-15 m?) quartz-sulphide vein in trenches 134 and 135 assays 0.41 - 0.78 oz/t Au and 17.7 - 42.2 oz/t Ag over 1.5 - 2.5 m. No single continuous vein with length, width and good grades, nor a wide zone with greater than 0.07 oz/t Au has been indicated by trenching or drilling.

The following list of Au assay intervals for the Stockwork Zone (DDH 33-36) and Galena Zone, arranged from east to west indicates the presence of a zone of continuous high-background Au values. However, the apparent true thickness of the intervals, assuming the mineralized zones are vertical, is extremely variable. The intervals have a bounding cut-off of 0.035 oz/t, but include very low-grade sections between scattered higher grade sections.

DDH	Interval	Apparent True Thickness	oz/t Au
33	24.00-72.00 = 48.0 m	35.0	.068
34	52.30-70.60 = 18.3 m	7.7	.108
35	15.00-70.50 = 55.5 m	40.6	.026
36	45.00-81.00 = 36.0 m	13.2	.049
92	18.97-32.00 = 13.03 m	8.6	.156
93	51.40-55.16 = 3.76 m	1.3	.075
52	19.87-55.77 = 35.90 m	26.0	.095
53	45.22-58.65 = 13.43 m	4.6	.050
94	16.30-26.65 = 10.35 m	7.3	.072
95	31.58-53.34 = 21.76 m	6.2	.114

Potential

The Galena-Stockwork structure has potential for a strike length in excess of 200 m. However, exploration in two parts of the zone along 40 to 90 m strike lengths has not indicated continuity of potentially economic grades. The unexplored section between DDH 35-36 and 92-93 and the open west end beyond DDH 94-95 should be considered if economic zones are developed on other vein zones on the property.

0.5 VEIN

A poorly exposed quartz-tetrahedrite vein occurs at 0+90W to 1+20W and 3+15 to 20S on Map 56, 1981 in an area of extensive moraine cover near the edge of an ice sheet. It contains .5 Au and 8.0 Ag over 1.0 m and .18 Au and 13.9 Ag over 2.0 m in two trenches 17 m apart. The vein was not intersected in the lower part of DDH 35 and 36 about 37 m east of the vein outcrop. The area west of the vein is covered for at least 200 m.

Three short holes were drilled on the 0.5 Vein from one setup as shown on Map 101. DDH 49 and 50, drilled to the southwest under the trench with 0.50 oz/t Au over 1.0 m did not intersect any significant veins or assay intervals. DDH 51 drilled to the southeast intersected four quartz-sulphide veins with 0.41 to 0.51 oz/t Au over 0.5 to 3.3 m core lengths.

However, there are no indications of continuity between individual veins or any indications of significant structures.

Weak pervasive sericitic alteration occurs in the 0.5 vein area. However, the alteration is weaker than in the Stockwork Zone (DDH 33-36, Map 101) and much weaker than in the Near Shore Zone area.

5.9 VEIN

A quartz vein with some gray Ag-bearing minerals occurs at 0+20 to 60E and 0+85S on Map 56, 1981. It is exposed for 27 of 40 m along its strike. A grab sample on the east end of the vein assayed 5.9 Au and 543.0 Ag. Possible strike extensions of the vein are covered to the east and in mainly unmineralized rock to the west. The vein is probably about 20 to 100 cm thick.

Four short holes, DDH 45 to 48 were drilled in the 5.9 vein area (Map 79). The holes intersected very weakly sericitic tuff-breccia and only minor quartz veining with no significant Au or Ag contents. There are no indications of any significant veins or structures.

ELECTRUM ZONE

Introduction

The Electrum Zone is located at about 6257500N and 426700E on map 79. Electrum-bearing quartz vein float was discovered in 1981. Numerous quartz veins were located in 1982 (map 107) which were similar to the float veins but lacked visible electrum. Electrum was only found in place after trenching (map 106). Interesting Au values were found in only two of the 28 trenches blasted in the area.

Geology

The Electrum Zone is underlain by moderately to intensely quartz-sericite-pyrite altered syenodiorite. Numerous thin and very discontinuous quartz veins occur in the area. The veins contain trace to 1-2% pyrite, loally have thin halos of silicification with 1-15% pyrite and occur in uniformly altered wallrocks with 1-5% pyrite.

The orientation of veins in the Electrum Zone is shown on map 107. There is a northwesterly trend for many of the veins but no strong or persistent structure has been found.

Potential

The potential in the Electrum Zone is limited to small patches of electrum in thin quartz veins or silicified patches. The electrum-bearing float which lead to the discovery of electrum in situ comes from a northwesterly trending, moraine covered depression along the north east side of the trenched area. EM-16 surveying has been recommended to determine if a structural break which could be mineralized exists in the linear depression.

NORTH SPINE ZONE

The North Spine Zone is located north of the Electrum Zone at about 6,257,600N and 426,600E on Map 79. Map 108 shows the location of trenches in the area and partly overlaps with the Electrum Zone trench map 106.

The area is underlain by arkose to lithic arkose. Weak pervasive quartz-sericite-pyrite alteration renders only minor lithic fragments and rare pebbly sections identifiable.

A few long quartz veins with minor patches of tetrahedrite occur in the area as shown on map 79. Trenching did not indicate any significant Ag-Au values.

NORTHERN PART OF THE SULPHURETS PROPERTY

IRON CAP WEST VEIN

Summary

The westerly of three quartz-sulphide veins in the Iron Cap area is exposed for 330 m by 140 m vertically. It is fairly continuous and relatively uniform with a typical width of 3 to 5 m. Nineteen samples across the vein indicate a grade of roughly 0.1 oz/t Au and 1.0 oz/t Ag. Only one in 19 sampled sections exceeded 0.18 oz/t Au excluding an atypical tetrahedrite-pyrite lens with 2.7 oz/t Au over 0.5 m.

Size

The west vein is exposed for 330 m horizontally and 140 m vertically. The lower half of the vein has widths of 4.6 to 11.5 m with about 5 m being a realistic average width. The upper half of the vein has numerous minor fault offsets and an average width of 3 m.

The list of assays indicates that the vein has a rough average grade of 0.1 oz/t Au and 1.0 oz/t Ag, excluding sample 2060. Sixteen of the 19 samples across the vein have in excess of 0.05 oz/t Au, with 8 assaying 0.10 to 0.18 oz/t Au and 2 assaying greater than 0.18 oz/t Au. The section with 2.7 oz/t

Au over 0.5 m is a massive tetrahedrite-pyrite lens which is greater than 0.1 m wide for less than 2.0 m. It is not typical of the mineralization in the west vein or any of the veins in the Iron Cap area.

Grade

The following is a list of the grade in the west vein in trenches and 2 drill holes arranged from top (north) to bottom (south):

Sample	Thickness	oz/t Au	oz/t Ag
T 117	1.5 m	.088	1.46 G
T 118	3.0	.085 G	.47 G
2060	0.5	2.700	17.00
T 119	3.6	.062 G	1.08 G
T 120	3.0	.162	2.88 G
T 121	3.0	.056	.29 G
T 122	3.0	.083 G	.29 G
T 123	6.0	.085	1.78 G
T 124	3.5	.643	.12 G
T 125	3.0	.081 G	2.26 G
T 126	6.0	.178	.60 G
T 127	6.8	.134	.70 G
chip	3.0	.148	1.73
T 19	4.6	.009	.16
T 18	11.5	.117	1.70
DDH 14	15.0*	.068	1.81
DDH 15	15.9*	.036	.82
T 17	5.3	.107	.78
T 16	8.7	.015	.74

G indicates assays from Canada Wide Mines at Granduc. * indicates an exaggerated width in drill core. The thicknesses are essentailly true widths of the vein or vein plus some mineralized wallrock.

Geology

The Iron Cap West Vein strikes from 010 to 025° and dips vertically to very steeply east. It is emplaced in area of pervasively quartz-sericite-pyrite altered volcanic and volcaniclastic rocks and is controlled by a prominent fault set. The vein is fairly uniform and continuous. The south end terminates abruptly. The north end may split into two or three veins and is offset by numerous cross faults.

The vein consists of massive quartz with commonly 5 to 10% pyrite. Tetrahedrite is a minor component and molybdenite, chalcopyrite, sphalerite, galena, hematite and magnetite are rare components. Visible gold has not been observed.

EXPLORATION GUIDES FOR PORPHYRY OR DISSEMINATED AU ZONES

Summary

The most significant features that characterize the disseminated Au areas at Sulphurets and which can be used on a mapping and sampling basis are:

1) Areas of pervasive sericite-quartz-pyrite alteration with only very minor to absent quartz veining.
2) High pyrite contents, commonly 15 to 40% pyrite, mainly disseminated and also as thin to 1 m thick pyrite veins.
3) Au contents of at least 0.03 oz/t (1 g/tonne).
4) Low Ag:Au ratios, commonly from 1:1 to 10:1 in areas with $\geq$ 0.15% Cu and 0.4 to 2.4:1 in areas with very low Cu contents. Porphyry Cu-Mo areas on the property have Ag:Au ratios of 30.3 to 42.4:1.
5) Very minor Cu-Mo mineralization occurs within the disseminated Au areas but Cu-Mo mineralization approaching porphyry grades occurs adjacent to the disseminated Au areas.

Introduction

Three areas of disseminated Au mineralization associated with high disseminated pyrite contents within the Sulphurets Gold Zone were described in the 1981 report. The Breccia Zone is potentially economic with Au grades of .03-.08 oz/tonne. The Canyon Zone has sections with .03 oz/tonne Au. No area of any significant size could be outlined in the Lake Zone containing .03 oz/tonne Au. All three areas have sericite dominant alteration assemblages. The potentially economic zone is mainly in intrusive rocks and intrusive breccias. However, rock types could not be positively determined until thin section examinations were made. The Breccia Zone also has minor secondary biotite, rare secondary K-feldspar and rare albite associated with minor, late quartz veins. However, the biotite is restricted to Cu-Mo-(Au) core zones where Au and Cu show no correlation. K-feldspar occurs in all the Au-bearing zones but is mainly primary in syenite and monzonite or arkosic sedimentary rocks.

Analytical data from extensive surface sampling and drill core in the three zones was processed for basic statistics. Possibly useful exploration features from Cu, Mo, Ag and minor element data are summarized in Table 8:

The characteristics of the porphyry-type showings at Sulphurets, both Cu, Mo and Au are summarized in Table 10.

Potentially Economic Breccia Zone	Uneconomic Zones Canyon Zone	Lake Zone
porphyry Cu-Mo core	absent	absent
Cu-Mo correlation coefficients:		
.84	.11	n/a
Cu-Au correlation coefficients:		
-.01	.24	.96
Zn median values:		
106	440	n/a
Zn 95%ile values:		
418	2040	n/a
Pb median values:		
18	132	n/a
Pb 95%ile values:		
37	520	n/a
Ag:Au ratios:		
	3.1:1	16.7:1

0.4-0.7:1 for low Cu areas
1.2-9.6:1 for ≥ 0.15% Cu areas

TABLE 8: Characteristics of the potentially economic and uneconomic porphyry Au areas in the Sulphurets Gold Zone. Pb and Zn in ppm.

Characteristics

Note that the Breccia Zone with potentially economic Au mineralization has a porphyry Cu-Mo core and high Cu-Mo correlation coefficients in the pyrite-Au shell around the Cu-Mo core. The Zn and Pb contents of disseminated Au mineralization increase from the Breccia Zone to the uneconomic Canyon Zone by factors of about 4 to 5 X for Zn and 7 to 14 X for Pb. Limited analyses were done for Zn and Pb (see Tables 11 and 12) because trace sphalerite was observed in core in both zones. From core logging it was originally interpreted that Au and Zn may show some correlation. Hg, As and Sb do not appear to be useful as pathfinders to Au in the Sulphurets Gold Zone.

Elements	Breccia Core	Breccia Surface	Canyon Area	Lake Zone
Au to Cu	.01	.01	.24	.96
Au to Mo	.05	.06	.01	
Au to As	.61	.06	.41	.21
Au to Sb	.40	.18	.11	.43
Au to Hg	.69	.14	.18	.54
Au to Ag	.01	.01	.98	.44
Au to F	.43			
Au to Pb	.59		.17	
Au to Zn	.16		.13	
Cu to Mo	.84	.01	.11	

TABLE 9: Correlation coefficients for samples in the three zones within the Sulphurets Gold Zone. Breccia Zone surface samples may not be reliable because of leaching of mobile elements and enrichment of others, especially Ag, due to the high pyrite content (15-40%) of the area.

Area	Type, Habit	Alteration, Intensity	Rock Type	Structure, Geometry
Kirkham	Cu diss, fract	K-feld, chl, ser, bio, mt, moderate	granite, hornfels, syenite	irregular, with pod-like intrusive masses
Mitchell	Cu diss, fract	K-feld? primary or secondary, silicification	granite, syenite, hornfels	irregular, circular?
Iron Cap	Cu, Mo diss, fract	K-feld? chl, ser, moderate	syenite, hornfels	irregular
Moly	Mo qz stockwork	ser, intense	volcanics undifferen-	consistent vein trends in roughly equidimensional qz stockworks
Gold Zone, Breccia Zone	Au and local Cu-Mo-Au diss, fract	ser, K-feld, local and rare bio, alb, widespread but rare tourmaline	syenites, undifferentiated volcanic and sedimentary rocks	sheet-like? gently dipping top of fine-grained syenodiorite body
Snowfield	Au diss + Mo on fract	ser, chl, rare local pyrophyllite and tourmaline	volcanics, mainly tuff-breccia	irregular

TABLE 10: Characteristics of Sulphurets porphyry-type showings. Compare with Table 1 for grades and tonnage comments.

Bridge (1982) has shown that most porphyry Cu-Au deposits which have at least 0.3 g/tonne Au have Ag:Au ratios of 10:1 (see Appendix 5). Core sections in the Breccia Zone which have ≥ 0.15% Cu contain 0.3 to 0.9 g/tonne Au and have Ag:Au ratios of 2.1 to 9.6:1 (Table 13). These low Ag:Au ratios fit the pattern for world wide porphyry Cu-Au deposits. However, the porphyry Cu areas on the property have Ag:Au ratios ranging from averages of 30.3:1 to 42.4:1 in three separate areas (Tabel 15). From Tables 11, 12 and 13 it appears that potentially economic disseminated Au areas (Breccia Zone) and fringing areas (Canyon Zone) have Ag:Au ratios from 1 to 10:1 contracted to ratios of 30 to 42:1 for low-Au, porphyry Cu and Cu-Mo areas (Table 15).

Thus there appears to be two populations of porphyry-type mineralization at Sulphurets based on Au and Ag contents. The Cu-Mo-Au-low Ag population is the 'porphyry Au' group. It has average Ag grades in areas of ≥ 0.15% Cu of 1.50 to 4.98 g/t Ag and Ag:Au ratios of 1.2 to 15.7:1 and generally < 10:1. The Cu-Mo-Au-high Ag population has average Ag grades of 4.55 to 9.55 g/t and Ag:Au ratios of 30.3 to 42.4:1.

Element	Breccia Core	Breccia Surface	Canyon	Lake
Cu	590	500	818	114
Mo	22	142*	12	
As	176	56*	34	211
Sb	92**	26*	50**	66
Hg	310	245*	400*	325
Ag	1.4	1.0	2.0	8.6
F	1775*			
Pb	18**		132*	
Zn	106		440*	
Au	.019	.015	.017	.010
Ag:Au	2.2	6.5	3.4	2.9

Cu, Mo, As, Sb, Ag, F, Pb, Zn in ppm
Hg in ppb
Au in oz/ton
*less than 50 samples
**less than 25 samples

TABLE 11: Median values for Sulphurets Gold Zone areas.

Element	Breccia Core	Breccia Surface	Canyon	Lake
Cu	6300	6640	2160	960
Mo	276	480*	58	
As	700	198*	212	867
Sb	270**	68*	101**	154
Hg	1330	860*	1500*	1880
Ag	4.0	6.1	6.8	88.5
F	2260*			
Pb	37**		520*	
Zn	418		2040*	
Au	.083	.075	.075	.134
Ag:Au				

Cu, Mo, As, Sb, Ag, F, Pb, Zn in ppm
Hg in ppb
Au in oz/ton
*less than 50 samples
**less than 25 samples

TABLE 12: 95%ile for Sulphurets Gold Zone areas.

Hole or Area	% Cu	% Mo	Au g/t	Ag g/t	Ag:Au
DDH 12	.56	n/a	0.93	2.74	2.9:1
DDH 18	.19	.004	0.24	3.78	15.7:1
DDH 19	.68	.024	0.93	4.98	5.4:1
DDH 20	.22	n/a	0.27	2.59	9.6:1
DDH 37	.62	.020	0.89	1.89	2.1:1
DDH 39	.27	.005	0.48	1.88	3.9:1
MCZ (80)	.45	.015	0.87	(0.92)	(1.1:1)
MCZ (81)	.15	.003	0.72	n/a	
UCA	.20	.006	0.82	1.50	1.8:1
3133-3135	1.23	.042	1.12	1.33	1.2:1

TABLE 13: Metal values and Ag:Au ratios for drill holes and surface sampled areas in the Sulphurets Gold Zone which contain 0.15% Cu. DDH 18 is from the Canyon Zone and the other holes and samples are from the Breccia zone.

The drill hole data is from the following intervals:
DDH 12 19.14 m from 147.10-166.24 m
DDH 18 36.45 m from 125.55-162.0 m
DDH 19 19.50 m from 108.0-127.5 m
DDH 20 9.25 m from 109.5-118.75 m
DDH 37 51.95 m from 126.55-178.50 m
DDH 39 8.95 m from 185.57-194.16 m

MCZ (80) is an average of 45 m of trench sampling in the Main Copper Zone in the vicinity of DDH 4, 5 and 6. (Refer to map 2153-38, 1981 Report). The Ag values are shown in brackets because they appear low as compared to values from core in the Breccia Zone. MCZ(81) is an average of 24 m of chip sampling down the cliffs from the southwest corner (trench 071) of MCZ (80).

UCA is a 30 m chip sample line in a creek bed in the Upper Canyon Area

The Cu-bearing intervals in this table can be megascopically detected in outcrop. Except for DDH 37 the Cu-bearing intervals occur vertically below and partly overlap with the areas of significant Au content.

Hole and Interval	Au g/t	Ag g/t	Ag:Au
Breccia Zone			
DDH 12, 98.0-146.0 m	2.06	0.77	0.4
DDH 19, 17.6-75.1 m	2.17	1.48	0.7
DDH 39, 141.0-171.0 m	2.64	1.57	0.6
Canyon Zone			
DDH 18, 3.0-51.0 m	1.32	3.21	2.4
DDH 23, 6.0-96.9 m	1.17	1.43	1.2

TABLE 14: Ag and Au contents and ratios for drill holes in the Breccia and Canyon Zones with 1.0 g/t Au and very low Cu contents. The calculation for DDH 19 excludes an unusual chlorite-epidote-calcite-quartz vein with visible Ag-rich electrum which assayed 600 g/t Ag over 0.45 m. If included this one vein increases the Ag:Au over a 57.6 m interval to 2.9 from 0.7.

Hole or Area	% Cu	% Mo	Au g/t	Ag g/t	Ag:Au
DDH 16	.202	.019	0.24	9.55	38.1:1
Mitchell Zone	.182	n/a	0.14	5.94	42.4:1
Kirkham Zone	.159	n/a	0.15	4.55	30.3:1

TABLE 15: Metal values and Ag:Au ratios for three areas at Sulphurets which are interpreted to be in normal porphyry copper environments with the mineralization wholly or partly within intrusives. DDH 16 is a 296 m hole in the centre of the zone of higher Mo values in the Iron Cap area. The hole is only partly in intrusive rocks but is in an area with abundant mineralized syenite. The Mitchell Zone samples represent 94 m of chip sampling within mineralized but weakly to unaltered syenites and granite. The Kirkham Zone samples represent 110 m of channel sample in mineralized and altered syenite. The Mitchell and Kirkham Zone samples were not analyzed for Mo because they are in areas with very low Mo backgrounds and contain no visible Mo.

LEGEND

- U — Unaltered - possible late magmatic K-feldspar
- H — Hornfels
- Quartz Stockwork
- K — K-feldspar-quartz-pyrite
- S — Sericite - quartz - pyrite
  - t - tourmaline
  - *p - pyrophyllite
- C — Chlorite - sericite - quartz - pyrite
- cb — Carbonate - sericite - quartz - pyrite
- P — Pyropylitic
  - w - weak
  - s - strong
  - c - chlorite
  - e - epidote
  - cb - carbonate
- Gl — Glacial Overburden

- Permanent Ice
- Mineralized Zone
- Alteration Contact

- Bedding - top known, unknown
- Schistose Foliation or Slip Cleavage
- Fault - defined / - approximate / - inferred
- Anticline - defined with plunge / - approximate
- Syncline - defined / - approximate
- Overturned Anticline

inches 0 1 2 / centimetres 0 1 2 3 4 5

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

0 1 2 Km.

1: 20,000

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ESSO MINERALS CANADA

SULPHURETS PROSPECT

ALTERATION

(to accompany a report by R.M. Britten, March, 1983)

Project No. 2153	Mining Division SKEENA
NTS 104 B	Drawn By: R.M. Britten
Date: March, 1983	Map No. 2153-73

426 000 E | 426 400 E | 426 800 E | 427 200 E

6 259 800 N | 6 259 400 N | 6 259 000 N | 6 258 600 N

BRUCE-JACK FAULT

LAKE
WL 1454.0

BRUCEJACK CREEK

BRUCEJACK PENNINSULA

BRUCEJACK LAKE

Sedimentary and Volcanic Rocks
- 1,2 unaltered
- A silica, sericite, chlorite, carbonate
- B silica, sericite, pyrite

Intrusive Rocks
- 4 unaltered
- C silica, sericite, pyrite

Unknown Original Lithology
- D silicification, sericite, pyrite
- E intense silicification, sericite, pyrite
- F intense silicification and sericite, pyrite
- G intense sericite, silicification, pyrite
- H chloritized

Geologic contact, known, inferred

Alteration contact, known, inferred

Outcrop

Note: Reconnaissance Map
Control derived from
1:50 000 N.T.S. Maps
104B/9 & 104B/8

SCALE 1:2000

METRES 50 0 50 100 150 200 250 300 METRES

CONTOUR INTERVAL: 10 Metres
AUXILIARY CONTOUR INTERVAL: 5 Metres

SHEET INDEX
1
2

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ESSO MINERALS CANADA

SULPHURETS PROJECT

NORTH BRUCEJACK AREA ALTERATION MAP

Project No. 2122	Mining Division SKEENA
NTS 104 B/8	Drawn By: G.T.
Date: MAY 1983	Map No. 2153-78