

827208

1990 Exploration Program  
Municipality of North Cowichan Lease Area  
Mt. Sicker Property

Victoria Mining Division  
NTS 92 B/13W  
48° 59' N Lat. 123° 51' W Long.

Minnova Inc.  
Vancouver, B.C.

G. S. Wells  
November 15, 1990

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1990 Exploration Program  
Municipality of North Cowichan Lease Area

1. Introduction

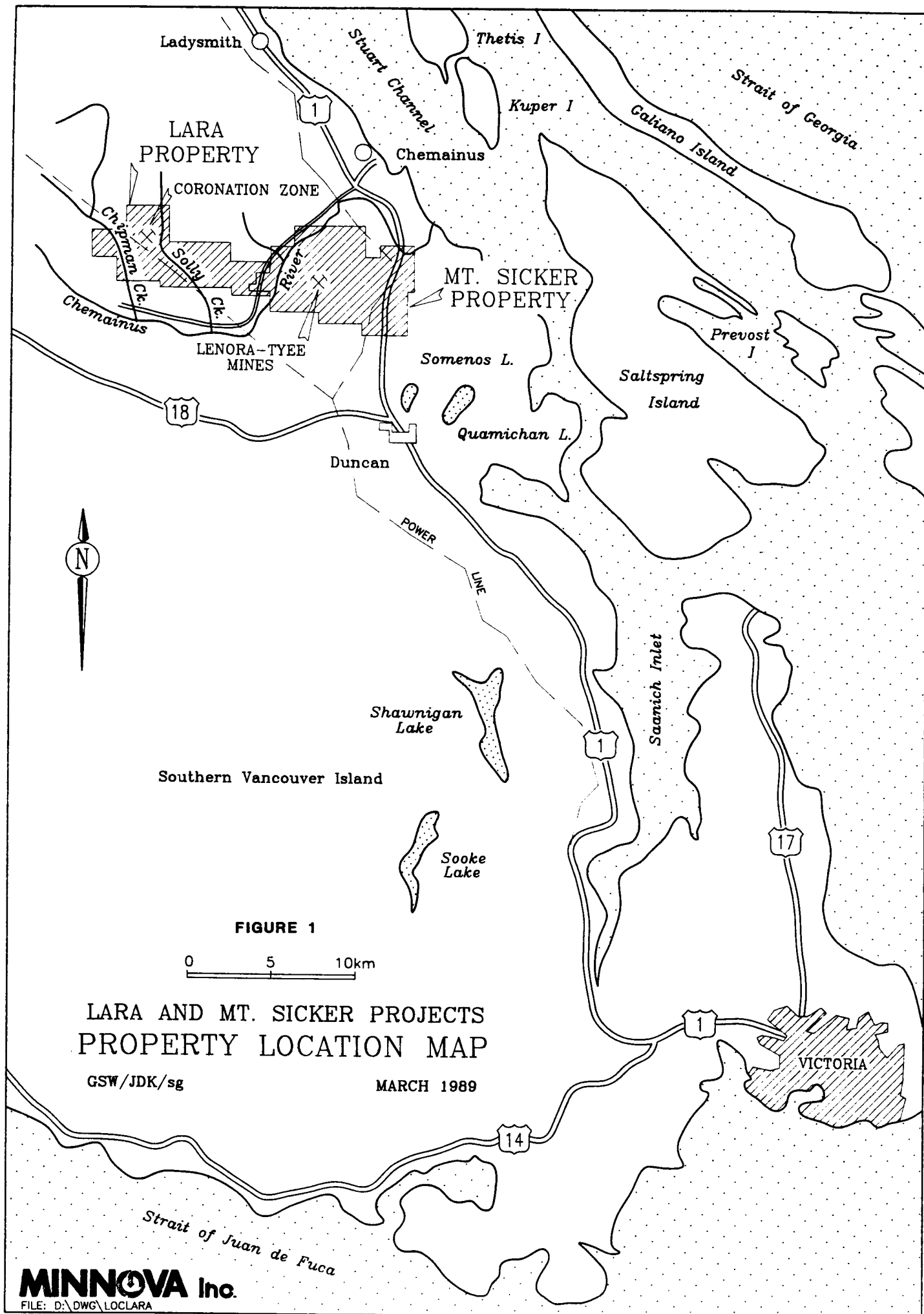
This report summarizes the 1990 exploration program on the Municipality of North Cowichan lease area which encompasses part of Minnova's Mt. Sicker property. Three diamond drill holes totalling 511.7 m tested geophysical and geochemical targets on the north slopes of Mt. Sicker. The cost of this program is estimated at \$31,896.68

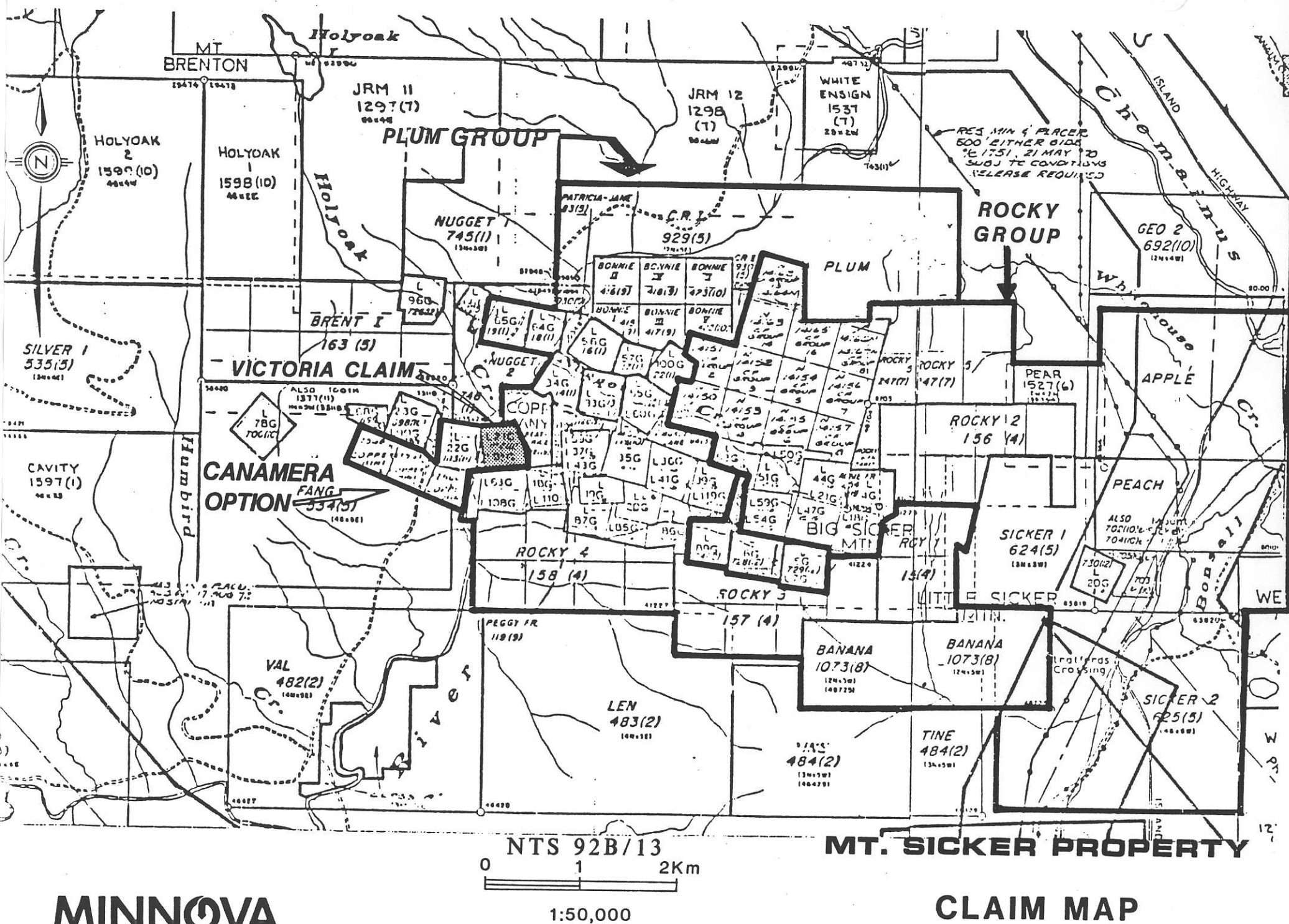
a. Location and Access

The Mt. Sicker property is located 40 km and 10 km north of Victoria and Duncan respectively (Figure 1). An extensive system of logging roads from the Island Highway provides excellent access to the property. Topographic relief is moderate with elevations ranging from 150 to 700 metres above sea level. Mt. Sicker is covered by a mixed forest of Douglas Fir, hemlock, alder and cedar which has been selectively clear cut over the last ten years.

b. Property Status

Minnova's Mt. Sicker property is presently comprised of three contiguous options and Minnova claims for a total of 207 units. The Municipality of North Cowichan owns the base metal rights for some of these claims and by virtue of the Minnova-MNC lease agreement, Minnova has the right to obtain the base metal rights in exchange for cash payments and a retained royalty interest.





### c. History

Two former producers - the Lenora and Tyee mines occur on the Mt. Sicker property. These deposits were discovered in 1898 and were largely mined out by 1909, although they were worked periodically until 1947. A total of 300,000 tons of ore with an estimated grade of 3.3% Cu, 7.5% Zn, 2.75 oz/t Ag and 0.13 oz/t Au were recovered from these two mines. Recent exploration on the property has been done by Duncanex, Mt. Sicker Mines and Serem in the vicinity of the former mines and the Postuk-Fulton and NE Copper showings. Minnova Inc. (formerly Corporation Falconbridge Copper) has been actively exploring the property since 1983 using geological, geochemical and geophysical surveys and diamond drilling. All aspects of this continuing integrated program are aimed at discovering a polymetallic volcanogenic massive sulphide deposit.

### 3. Geology

#### a. Regional Geology

The Mt. Sicker property is located in the Cowichan-Horne Lake uplift which is one of three fault-bounded areas that expose the Paleozoic Sicker Group on Vancouver Island. Müller (1980) subdivided the Sicker Group, as follows, in order of increasing age:

1. Buttle Lake Formation - consists of recrystallized crinoidal limestone interbedded with calcareous siltstone and chert.
2. Sediment - Sill Unit - thinly bedded to massive argillite, siltstone and chert interlayered with diabase sills.
3. Myra Formation - basic to rhyodacitic banded tuff breccia and lava with interbedded argillite, siltstone and chert.

4. Nitinat Formation - basaltic lavas and agglomerates with minor to massive banded tuff layers.

Recent mapping by Massey (1988) has resulted in the following revised nomenclature and stratigraphy of the Sicker Group.

Müller (1980)

Massey (1988)

Buttle Lake Formation. . . .	.Mount Mark Formation
Sediment - Sill Unit . . . .	.Fourth Lake Formation
Myra Formation . . . . .	.McLaughlin Ridge Formation
Nitinat Formation. . . . .	.Nitinat Formation

Cretaceous sediments of the Nanaimo Group unconformably overly the Sicker Group. The contact is commonly marked by a basal conglomerate containing volcanic fragments derived from the Sicker Group.

The structure of the Sicker Group is characterized by southwest verging, asymmetric and vertical, open and isoclinal folds. (Müller, 1980). West-northwest and northeast trending faults dissect the Sicker group in the Cowichan-Horne Lake uplift into a number of fault blocks. Movement along these faults is interpreted to have been mostly Tertiary in age.

b. Geology of the Mt. Sicker Property

The Mt. Sicker property is underlain by Sicker group volcanic rocks, Nanaimo group sediments and dioritic intrusions of possible Triassic age. (Figure 3). The Sicker Group can be subdivided into the McLaughlin Ridge and Nitinat formations. The McLaughlin Ridge formation consists of thick units of felsic pyroclastic and flow units with minor ash, argillite and chert. The Lenora - Tyee massive sulphide deposit is hosted in McLaughlin Ridge formation quartz - eye crystal tuffs and is intimately associated with argillaceous sediments. The Lenora-Tyee deposits are considered to be the stratigraphic equivalent of Westmin's Myra-Lynx deposits at Buttle Lake.

The Nitinat formation is restricted to the east end of the property and is well exposed along the Island Highway. The formation consists of epidotized pyroxene and/or plagioclase porphyritic andesite flows and flow breccias.

The structure of the Mt. Sicker property is dominated by a large, asymmetric, west-northwesterly trending, shallow west-plunging anticline. The fold axis is interpreted to lie 300 meters north of the Lenora-Tyee deposits. The axial plane of the anticline is reflected by a pervasive moderately to intensely developed, vertically dipping foliation. Small drag folds associated with the Mt. Sicker anticline occur at NE Copper and Lenora-Tyee.

Numerous mineralized occurrences are present on the Mt. Sicker property. Except for the former orebodies, most of the mineralization consists of disseminated and stringer sulphide zones which are thought to be an expression of a synvolcanic hydrothermal system. Several pyritic argillite and chert horizons have been identified on the property (i.e. Lenora-Tyee, Gabriel) and they are interpreted as being exhalative horizons marking a period during which sulphide deposition was occurring.

### 3. Work Completed

Three diamond drill holes totalling 511.7 meters were completed on the M.N.C. lease area in 1990. Detailed drill logs are presented in Appendix I and hole locations are shown in Figure 3.

Lithogeochemical samples were taken routinely throughout the holes and analysed for major and trace elements ( $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{CaO}$ ,  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{MgO}$ ,  $\text{Fe}_2\text{O}_3$ , Pb, Ba, Cu, Zn, Sb, As, Au) using ICP and atomic absorption techniques of Min-En Laboratories in N. Vancouver. Mineralized sections were analysed for Cu, Pb, Zn, Ag, Au and Ba.

#### 4. Drill Hole Results

Three holes (MTS-83, 86,87) tested IP and lithogeochemical anomalies associated with the Gabriel horizon which is located on the north slope of Mt. Sicker. All three holes intersected pyritic argillites that are hosted in altered felsic tuffs and crystal tuffs. Metal contents of these horizons are low (see Appendix I) and no zones of significant mineralization were outlined.

#### 5. Conclusions

Drill testing of the Gabriel horizon has identified a pyritic argillite that is located in altered felsic volcanics. However sampling of these units has indicated that metal contents are low. Consequently further work on the Gabriel horizon is not warranted at this time.

6. Itemized Cost Statement1990 Exploration Program - MNC Lease Area1. Contract Costs

a.	Frontier Drilling Ltd. (3 holes; 511.7 m)	\$25,224.43
b.	Ellison Excavating (drill site and road work)	900.00

2. Salaries

P. Baxter	7 days @ \$300/day	2,100.00
G. S. Wells	3 days @ \$350/day	1,050.00
R. Knight	7 days @ \$120/day	840.00

3. Field Expenses

Truck	7 days @ \$50/day	350.00
Food/Accommodation (GSW, PB)	9 days @ \$40/day	360.00

4. Analyses of Drill Core 1072.25

Total                      \$31,896.68



## 7. References

- Müller, J. E., 1980: The Paleozoic Sicker Group of Vancouver Island, B.C., GSC paper 79-30, 22 p.
- Massey, N. W. D., Friday, S. J., 1988: Geology of the Chemainus River - Duncan Area, Van. Island, pp. 81-92 in Geological Field Work 1987, BCDM Paper.

Appendix I  
Diamond Drill Logs  
1990 Program

HOLE NUMBER: MTS-83

IMPERIAL UNITS:

METRIC UNITS: X

COLLAR DIP: -45° 0' 0"  
LENGTH OF THE HOLE: 197.20m  
START DEPTH: 0.00m  
FINAL DEPTH: 197.20m

COLLAR ASTRONOMIC AZIMUTH: 200° 0' 0"

CONTRACTOR: FRONTIER DRILLING  
CASING: 12.2 m  
CORE STORAGE: CHEMAINUS

DIRECTIONAL DATA:

[illegible]

HOLE NUMBER: MTS-83

MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
0.00 TO 12.20	«OB»					Casing
12.20 TO 17.40	Andesite Ash, Tuff «AND ASH, TUFF»	Colour: dark green Grain Size: Fine grained  Well foliated with 3-5% quartz veinlets parallel to foliation		Weak pervasive chlorite	none	
17.40 TO 22.80	Andesite Lapilli Tuff «AND LAP TUFF»	Colour: Dark green Grain Size: Fine grained  3-5% light green-grey siliceous fragments (up to 3cmx1cm) -stretched in plane of foliation Vesicular -quartz filled Upper contact sharp at 17.4m (bedding)  Matrix to fragments -fine grained ash 21.5m (foliation)	70  55	Weak chlorite	Add speck/cube of pyrite	
22.80 TO 45.35	Felsic Tuff Minor chert «F TUFF»	Colour: Greenish grey Grain size: Fine grained  Well foliated, fine grained ash/tuff Foliations crenulated with minor folds all oriented the same way.  Cherty sections at: {24.6-25.05}«CHT» 34.6-34.75m 35.2-35.35m  Bedding: 24.7m Foliation: 29.0m 39.5m 41.3m	65 50 55 50	Pervasive chlorite-sericite alteration (weak to moderate) -gives rock a greenish tinge Looks more intermediate    41.1 - 45.35m Relatively unaltered well foliated F. Tuff -dark grey in colour.	Trace pyrite   Trace - 1% disseminated pyrite assoc. with cherty sections.	
45.35 TO 46.80	Rholite Dyke? «RHY DYKE»	Colour: Grey Grain Size: Fine to medium grained  Massive with foliated upper contact Possibly a dyke?		Trace - 1% dark green randomly oriented microveinlets of chlorite	Trace disseminated pyrite	

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DRILL HOLE RECORD

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MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
						46.7 - 47.2m Blocky ground
46.80 TO 54.35	Felsic Tuff with minor Intermed. Tuff «F-I TUFF»	Colour: Grey to greenish grey Grain Size: Fine to medium grained  Generally well foliated -foliation crenulated with minor folds oriented uphole. Dealing with fine grained felsic ash/tuff  Fine grained black mafic dykes at: 48.1 - 48.6m 49.4 - 49.7m  Foliation: 51.5m	50	Weak chlorite-sericite    50.35 - 51.1m Grey bleached area associated with quartz-pyrite veining	50.35 - 51.1m 2-3% pyrite associated with quartz veining	
54.35 TO 59.25	Intermed. Tuff/Lithic Tuff «I TUFF, LI TH TUFF»	Colour: Greyish green Grain Size: Fine to medium grained  Well foliated ~5% white siliceous lithic fragments up to 3-4mm long. Elongate in plane of foliation. Contacts gradational.		Pervasive chlorite.		
59.25 TO 59.75	Argillite, I-F Tuff «ARG, I-F TUFF»	Colour: Black, greenish grey Grain Size: Fine grained  Well foliated/bedded interlayers of argillite and intermediate to felsic tuff 59.5m	35			
59.75 TO 80.20	Felsic Tuff Ash «F TUFF, AS H»	Colour: Greenish grey Grain Size: Fine grained  Well foliated Predominantly ash Foliation: 62.7m  Fault gouge and milled core at 65.05 - 65.2m Fault: 65.2m  68.3 - 80.2m Unit not as strongly foliated. 2-3% feldspar crystals/siliceous fragments -patches with 1-2% vesicles? -quartz filled	40  40	Pervasive chlorite-sericite with locally more intensely bleached areas (ie. 66.6 - 67.55m)   68.3 - 80.2m Relatively unaltered	Trace pyrite -as stringers and disseminations	

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DRILL HOLE RECORD

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DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		Foliation: 78.1m	50			
80.20 TO 81.25	Interbed Chert and Felsic Ash «CHT, F ASH »	Colour: Grey Grain Size: Fine grained  Interbedded dark grey chert and light grey ash Grading in ash indicates top up hole Sericitic beds a light brown colour  Contact: 80.2m Bedding: 81.0m	75 55	Locally sericitic		
81.25 TO 82.50	Pyritic Felsic Tuff «PY F TUFF»	Colour: Brownish grey Grain Size: Fine grained  Well foliated		Pervasively sericitic gives core brownish colour Trace green mica	2-3% pyrite as 2-3mm wide bands parallel to foliation	=IP anomaly
82.50 TO 85.60	Pyritic Argillite minor Felsic Ash «PY ARG, FA sh»	Colour: Black, grey Grain Size: Fine grained  Primarily well bedded argillite Fine grained pyrite beds adn local screens of chert and felsic ash (up to 0.2m wide) Bedding orientation fairly consistent throughout Local grading suggests tops up hole Lower contact gradational over 0.2m  Bedding: 82.6m 84.5m	55 55		Overall 3-5% pyrite	=IP anomaly
85.60 TO 115.00	«QP TUFF»	Colour: Light grey to greenish grey Grain Size: Fine to medium grained  Massive to weakly foliated QP tuff Locally have 10% quartz eyes, rounded, up to 3-4mm diameter. Trace feldspar crystals lower in unit  86.0 - 86.3m Cherty interbed. Well bedded at lower contact Bedding: 86.3m  Fine grained mafic dykes at:	50	Weakly sericitic	Trace disseminated pyrite	Unit looks somewhat similar to that underlying thick argillite in MTS-82

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DRILL HOLE RECORD

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MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		91.65-92.05m 94.0-94.3m 95.0m  Fine grained green/grey intermediate tuff at: 97.0-97.3m Cherty F. Tuff 97.3-98.3m I Tuff 100.05-101.75m I Tuff  Bedding: 97.1m Contact: 97.3m Foliation: 118.0m	55       60 50 50	       114.6 - 115.0m Quartz-carbonate vein Distorted foliation around vein.		
115.00 TO 129.50	QP Lapilli Tuff «QP LAP TUF F»	Colour: Greenish grey Grain Size: Medium grained  Contact with above unit indistinct Have fine grained grey QP fragments set in green chloritic and crystal rich matrix -fragment outlines are generally diffuse 5% quartz eyes with locally 10%  118.65 - 118.95m Fine grained light green mafic dyke with chilled margins  Foliation: 122.2m  129.35 - 129.5m Fine grained dark green mafic dyke	       50	Patchy chlorite and sericite alteration	Trace pyrite stringers throughout 117.4-118.65m 5% pyrite as stringers parallel to foliation.	
129.50 TO 139.90	Felsic Ash, Tuff «F ASH, TUF F»	Colour: Light grey Grain Size: Fine grained  Well foliated, aphyric ash/tuff  Foliation: 131.00m  131.6 - 132.6m Blocky core and fault gouge  Foliation: 135.5m  Lower contact gradational	       35    40	Patchy sericite -gives core a very light grey colour	1% pyrite, trace chalcopryrite in stringers oriented parallel to foliation	

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DRILL HOLE RECORD

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MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
139.90 TO 145.15	Intermed. Ash, Chert «I ASH, CHT »	Colour: Brownish grey Grain Size: Fine grained  Interlayered chert and coarser intermediate ash  Screen of sericitic F. Ash at 141.1-143.2m  Bedding: 140.3m 143.6m	60 62	Trace green mica with light brown sericite patches	Trace disseminated pyrite	
145.15 TO 145.60	Intermed. Dyke «I DYKE»	Colour: Light green Grain Size: Fine grained  Massive, chilled margins  Contact: 145.15m	60			
145.60 TO 146.85	Felsic Ash «F ASH»	Colour: Grey Grain Size: Fine grained  Foliated Fine grained ash		2-3% quartz - Fe carb veins	none	
146.85 TO 155.25	Argillite, Chert, Intermed. Ash, Felsic Ash «ARG, CHT, I-F ASH»	Colour: Grey, black Grain Size: Fine grained  Interlayered sediment and intermediate to felsic ash. Bedding in argillite folded. Argillite has thin (2-3mm) fine grained pyrite beds  Argillite, chert beds noted below: 147.4-149.4m «Argillite» 153.8-154.3m Argillite 155.25-155.25m Argillite  Bedding: 148.0m 148.8m 154.5m	10 10 50	Felsic interbeds - pervasive sericite -gives core light brown colour	3-5% very fine grained bedded pyrite, primarily in argillite and cherty beds	

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MINNOVA INC.  
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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
155.25 TO 175.20	Felsic Ash «F ASH»	<p>Colour: Light grey Grain Size: Fine grained</p> <p>Moderately foliated fine grained ash with occasional chert and argillite layer mm sized green flakes aligned parallel to foliation</p> <p>Bedding: 161.5m 161.8 - 161.85m Argillite</p> <p>164.5 - 166.4m Fault gouge and blocky core</p> <p>Fine to medium grained, mafic dykes at 166.6 - 166.95m 167.75 - 168.1m 169.1 - 169.4m</p> <p>Foliation: 168.3m 174.0m</p>	50        53 50	<p>Patchy brown sericite becoming pervasive at 160.4 - 166.4m</p> <p>169.4 - 175.2m Unit is well-foliated and has pronounced siliceous look -sericitic alteration more intense towards lower contact</p>		
175.20 TO 176.95	Cherty Argillite «CHTY ARG»	<p>Colour: Black Grain Size: Fine grained</p> <p>Well bedded, cherty argillite with thin (0.5cm) fine grained pyrite beds</p> <p>Bedding: 175.2m 176.8m</p>	42 60	Pervasive carbonate veining	2-3% very fine grained pyrite as disseminations and beds	
176.95 TO 178.20	I Tuff, Chert «I TUFF, CH T»	<p>Colour: Grey Grain Size: Fine grained</p> <p>Intermediate tuff with minor chert beds</p>		Weak sericite	Trace pyrite	
178.20 TO 189.70	«QP TUFF»	<p>Colour: Light grey Grain Size: Fine to medium grained</p> <p>Argillite fragments and minor chert beds near upper contact 3-5% rounded quartz eyes becoming more abundant (10%) towards bottom of unit</p> <p>Foliation: 183.4m</p>	50	Weak to moderate sericite		

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MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
189.70 TO 190.00	Argillite and F. Tuff «ARG, F TUF F»	Colour: Black Grain Size: Fine grained  Interlayered argillite and sericitic felsic tuff			1-2% pyrite	
190.00 TO 197.20	F Tuff «F TUFF»	Colour: Brownish grey Grain Size: Fine grained  Well foliated, siliceous F. Tuff similar to unit from 169.4 - 175.2m  193.7 - 194.55m Carbonate-rich dark green mafic dyke		Weak to moderate sericite		

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## ASSAY SHEET

DATE: 15-November-1990

Sample	From (m)	To (m)	Length (m)	ASSAYS					GEOCHEMICAL								COMMENTS
				Cu %	Zn %	Pb %	Ag g/t	Au g/t	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Ba ppm	Ba %	
13749	80.20	81.25	1.05						11	161	38	3.6	5000				
13750	81.25	82.50	1.25						47	67	21	2.1	2000				
13751	82.50	83.50	1.00						51	49	8	1.8	80				
13752	83.50	84.50	1.00						69	86	15	2.3	3				
13753	84.50	85.60	1.10						64	77	11	1.7	275				
13754	85.60	86.30	0.70						43	56	12	1.5	34				
13986	139.90	141.15	1.25						33	48	35	1.6	16	51	77		
13987	143.20	144.40	1.20						58	94	43	2.3	45	93	74		
13988	144.40	145.60	1.20						59	78	37	2.3	16	99	81		
13989	147.40	148.40	1.00						76	67	39	1.9	3	7	71		
13990	148.40	149.50	1.10						87	61	35	1.7	1	44	72		
13991	153.70	154.55	0.85						57	17	36	1.5	2	57	83		
13992	155.25	155.70	0.45						48	43	32	1.3	4	44	107		
13755	175.20	176.10	0.90						33	101	28	1.7	102				
13756	176.10	176.95	0.85						73	78	33	1.5	40				
13757	177.45	178.20	0.75						61	42	45	1.7	84				

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ASSAY SHEET

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## GEOCHEM. SHEET

DATE: 13-November-1990

Sample	From (m)	To (m)	Length (m)	SiO2 %	Al2O3 %	CaO %	MgO %	Na2O %	K2O %	Fe2O3 %	MnO2 %	TiO2 %	Ba %	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Sb ppm	Sr %	Zr %	Tot %	GBa ppm	S %
16890	31.40	34.40	3.00	62.62	15.46	4.22	1.1	2.93	2.16	4.87	0.12	0.45	0.075	14	47	21	2.4	5	1	1			94.27	57	0.08
16891	55.50	58.50	3.00	64.45	15.72	3.04	1.73	3.34	1.54	4.07	0.1	0.41	0.045	14	48	21	3.5	5	1	1			94.57	70	0.01
16892	75.30	78.30	3.00	56.58	16.9	4.69	1.49	1.67	3.19	5.76	0.17	0.6	0.135	27	50	26	2.2	5	7	1			91.47	104	0.1
16893	105.50	108.50	3.00	68.73	14.08	2.6	1.31	0.5	3.24	2.77	0.11	0.28	0.075	17	36	21	1.9	5	19	1			94.12	64	0.32
16894	135.60	138.60	3.00	64.19	15.36	2.98	1.89	0.47	3.35	4.31	0.21	0.38	0.1	24	76	105	1.9	5	35	1			94.79	68	1.41
16895	160.60	163.60	3.00	52.63	14.49	7.23	3.43	0.62	2.19	7.32	0.24	0.59	0.095	90	47	29	2.1	5	46	3			91.06	82	2.02
16896	194.60	197.20	2.60	65.57	15.78	2.68	2.32	0.32	3.15	3.87	0.12	0.41	0.115	20	49	25	1.4	15	8	1			94.81	78	0.39

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GEOCHEM. SHEET

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MINNOVA INC.  
DRILL HOLE RECORD

IMPERIAL UNITS: METRIC UNITS: X

PLOTTING COORDS	GRID: MTS
	NORTH: 765.00N
	EAST: 955.00E
	ELEV: 408.00

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ALTERNATE COORDS  GRID:
                   NORTH:  0+ 0
                   EAST:   0+ 0
                   ELEV:    0.00

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COLLAR DIP: -45° 0' 0"  
LENGTH OF THE HOLE: 114.90m  
START DEPTH: 0.00m  
FINAL DEPTH: 114.90m

COLLAR GRID AZIMUTH: 195° 0' 0"

COLLAR ASTRONOMIC AZIMUTH: 195° 0' 0"

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DATE STARTED:  April 23, 1990      COLLAR SURVEY: NO
DATE COMPLETED: April 24, 1990    MULTISHOT SURVEY: NO
DATE LOGGED:    0, 0               RQD LOG: NO

```

PULSE EM SURVEY: NO  
PLUGGED: NO  
HOLE SIZE: NO

CONTRACTOR: FRONTIER DRILLING LTD.  
CASING: 6.1m  
CORE STORAGE: CHEMAINUS

PURPOSE: TEST IP ANOMALY AND ZONE OF NA2O DEPLETION.

DIRECTIONAL DATA:

[illegible]

HOLE NUMBER: MTS-87

MINNOVA INC.  
DRILL HOLE RECORD

DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
0.00 TO 6.10	«OB»					
6.10 TO 14.05	«AND TUFF» Andesite Tuff	<p>Colour: streaky dark green Grain Size: fine Weak to moderately foliated enhanced by moderately abundant, streakly white &lt; 1 cm wide calcite veinlets</p> <p>8.3 9.8 -&lt; 10 cm green milled gougy zones</p> <p>foliations 6.6 12.8</p> <p>Sharp lower contact marked by the end of calcite veining</p>	40 50	Weak chlorite	Nil	
14.05 TO 21.55	«I LITH TUFF» Intermed. Lithic Tuff	<p>Colour: med. green Grain Size: fine Weak to moderately foliated, very fine granular texture with 2-3%, 1-4 mm felsic lithic grains and &lt;1% felsic and intermediate lapilli form 0.3 x 1 cm to 0.5 - 4 cm in size; patchy, weak calcite veining</p> <p>15.75-16.45 -Mafic Dike</p> <p>foliations 17.0 19.5</p> <p>10 cm fault gouge at lower contact</p>	50 50	Weak ser chl	Nil	

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MINNOVA INC.  
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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
21.55 TO 28.40	«HEM I TUFF » Hematitic Intermed. Tuff	<p>Colour: streaky dak red, med. green Grain Size: fine Very similar to above unit but this interval has discrete layers of hematite as well as patchy more pervasive hematite within the tuff; layering-streaking parallel to foliation; streaky calcite veining, slightly more abundant than previous units</p> <p>foliation 23.1 28.0</p>	52 50			
28.40 TO 50.80	«I LITH TUFF F» Intermed. Lithic Tuff	<p>Colour: streakly med green to tan green Grain Size: fine Pervasive streaky foliated appearance from weak-moderate calcite veinlets and wispy tan green, light green indistinct flattened fragments, parallel to foliation</p> <p>28.4-29.3 -1-2%, 0.5 x 2-3 cm, felsic fragments</p> <p>30.6-30.85 -Mafic Dyke</p> <p>35.0-35.65 -darker muddy, brownish green, possibly more andesitic, strong pervasive calcite veining</p> <p>36.45 -fault gouge, milled core</p> <p>37.75-39.7 -Andesite Tuff: dark green, fine, weak, wispy calcite veining</p> <p>45.4-47.2 -Fault zone, rubbly gougy core, poor recovery</p>	60	Weakly chloritic, pervasive calcite	<p>Trace pyrite</p> <p>34.0-34.25 -2-3% pyrite and &lt;1% chalcopyrite as a very fine stockwork veining</p>	

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FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		40.5-50.8 -occasional <10 cm screens of lighter green felsic tuff  49.8-49.95 -Mafic Dyke  foliations 33.5 48.0	55 50			
50.80 TO 66.85	«INT TUFF» Intermed. Tuff	Colour: med. green Grain Size: fine Weakly foliated; unit lacking the pervasive streaky appearance of previous unit  52.4-53.05 -Mafic Dyke: dark green, fine grained, upper and lower contacts parallel to foliation  55.5-58.9 -Intermediate Lithic Tuff: stronger granular texture from <1-2 mm grey, siliceous granules; indistinct stretched and flattened grey and green felsic fragments  65.8-66.4 -felsic fragments  Sharp lower contact	50	Weakly chloritic	Rare 2-5 mm wide siliceous pyrite veinlets	
66.85 TO 70.60	«F TUFF» Felsic Tuff	Colour: light green Grain Size: fine Patchy, very fine green specks, weakly foliated, rare rounded 1 mm quartz eyes		Weakly sericitic	Trace pyrite	

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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
70.60 TO 78.40	«F ASH» Felsic Ash	Colour: light green Grain Size: aphanitic Weakly foliated, rare 1 mm quartz eyes; patchy darker green fine x-cutting stockwork  foliation 71.4	50	Weakly sericitic	No visible sulphides except from 76.3-76.6: 2% pyrite as < 1mm veinlets parallel to foliation	
78.40 TO 83.65	«ARG» Argillite	Colour: black, dark grey Grain Size: fine Finely laminated to thinly bedded; numerous dis- continuous layers (transposed bedding); other areas preserved  bedding 78.8 80.6 80.8 83.7	70 65 65 65		Occasional <0.5 cm wide pyrite laminations	
83.65 TO 96.00	«QP TUFF»	Colour: light grey Grain Size: fine 3-5% subangular, <1-3 mm quartz eyes, weak frag- mental appearance below 90.2 m  93.15-93.55 -Mafic Dyke  contacts 93.15 93.55  93.55-94.3 -strongly brecciated with a creamy white calcareous infilling stockwork	40 10	Weakly sericitic	<1% pyrite as disseminations and rare siliceous stringers	

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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
96.00 TO 98.70	«INT ASH» Intermed. Ash	<p>Colour: med. green Grain Size: fine</p> <p>96.0-96.15 -brownish clay-ash zone</p> <p>96.15-98.3 -med green intermediate tuff, weakly foliated, aphyric</p> <p>98.3-98.7 -silver grey ash-sediment, fine grey wispy felsic fragments</p>		<p>96.0-96.06 -quartz vein mixing with pyritic seds</p>	<p>96.06-96.15 -10% fine disseminated pyrite within this interval from 96.09-96.12 is a sphalerite-galena-chalcopryrite mineralization</p> <p>98.3-98.7 -7-10% disseminated pyrite</p>	It is significant to have a pyritic sed and base metal mineralization at the top of this interval
98.70 TO 114.90	«QP TUFF, LAP TUFF» QP Tuff, Lapilli Tuff	<p>Colour: light grey, light green Grain Size: fint to coarse Weakly foliated 2-3%, 1-3 mm subrounded qtz eyes Weak stretched fragmental appearance starting at 104.5 becoming much stronger with a more definite outline of felsic fragments below 111.5 m</p> <p>107.05-107.5 -Mafic dyke</p> <p>107.5-108.45 -Intermediate Tuff</p> <p>foliations 102.8 105.5 113.0</p>	70 60 50	Weak to moderately sericitic	Trace pyrite as occasional < 1 cm siliceous stringers	
	E.O.H.					

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## ASSAY SHEET

DATE: 13-November-1990

Sample	From (m)	To (m)	Length (m)	ASSAYS					GEOCHEMICAL								COMMENTS
				Cu %	Zn %	Pb %	Ag g/t	Au g/t	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Ba ppm	Ba %	
13783	35.00	35.65	0.65						22	170	42	1.4	5				
13784	78.40	79.65	1.25						70	81	23	1	5		810		
13785	79.65	80.90	1.25						71	70	22	0.8	5		750		
13786	80.90	82.15	1.25						52	78	14	0.6	5		930		
13787	82.15	83.65	1.50						61	64	20	0.7	5		800		
13788	96.00	96.20	0.20						325	1620	565	7.5	70		1090		
13789	98.30	98.70	0.40						350	1600	620	8.2	65		1020		

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ASSAY SHEET

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## GEOCHEM. SHEET

DATE: 13-November-1990

Sample	From (m)	To (m)	Length (m)	SiO2 %	Al2O3 %	CaO %	MgO %	Na2O %	K2O %	Fe2O3 %	MnO2 %	TiO2 %	Ba %	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Sb ppm	Sr %	Zr %	Tot %	GBa ppm	S %
16920	9.50	12.50	3.00	46.75	19.98	6.46	2.49	3.21	1.01	9.61	0.16	0.94	0.025	63	75	20	1.6	5	11	5			90.87	24	0.01
16921	31.00	34.00	3.00	60.07	17.8	4.38	1.08	2.26	1.75	4.88	0.08	0.65	0.055	61	86	20	0.9	5	19	2			93.25	76	0.07
16922	60.00	63.00	3.00	65.06	15.46	3.16	0.94	2.95	2.03	3.81	0.1	0.4	0.075	10	47	15	0.7	5	13	1			94.42	101	0.29
16923	72.30	75.30	3.00	63.49	14.99	3.76	0.99	1.8	2.71	3.98	0.13	0.42	0.1	5	34	17	0.6	10	15	1			92.52	94	0.08
16924	87.20	90.20	3.00	72.77	13.46	1.77	0.73	0.46	3.06	2.22	0.08	0.25	0.05	13	268	15	1.1	50	29	1			95.46	49	0.57
16925	112.00	114.90	2.90	68.98	13.8	2.73	1.34	0.44	3.29	2.57	0.11	0.26	0.095	14	35	19	0.9	5	17	1			93.86	167	0.15

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GEOCHEM. SHEET

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IMPERIAL UNITS: METRIC UNITS: X

COLLAR DIP: -44° 0' 0"  
LENGTH OF THE HOLE: 199.60m  
START DEPTH: 0.00m  
FINAL DEPTH: 199.60m

COLLAR ASTRONOMIC AZIMUTH: 195° 0' 0"

CONTRACTOR: FRONTIER DRILLING LTD.  
CASING: 6.7m  
CORE STORAGE: CHEMAINUS

PURPOSE: Test IP anomaly and zone of Na<sub>2</sub>O depletion and Zn enrichment.

DIRECTIONAL DATA:

[illegible]

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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
0.00 TO 6.90	«OB»					
6.90 TO 12.50	«AND TUFF» Andesite Tuff	<p>Colour: streaky tan dark green Grain Size: fine Moderately foliated, patchy 2-5% rounded 1-3 mm and up to 1 cm grains of siliceous felsic tuff, sericitic tuff, siliceous black magnetic grains + rare qtz grains; some felsic grains may contain pyrite Minor streakly calcite veinlets</p> <p>11.2-11.9 -weak layering at 65-70 deg to c.a. sharp lower contact @</p>	47	Moderate sericite/chlorite probable result of sediment type nature	<1% py mainly within felsic grains	Not typical of the andesites seen on the Sicker and Lara properties; poss. more like a sediment
12.50 TO 28.30	«F TUFF LAP TUFF» Felsic Tuff  Lapilli Tuff	<p>Colour: streaky light green Grain Size: fine Moderately foliated streaky light green and beige tan; rare well outlined 1-2 cm stretched green felsic frags; some streaking and layering may be result of stretched frags; rare qtz eyes</p> <p style="text-align: center;">foliations 15.0 m 22.0 m 26.0 m</p> <p>-rubbly lower contact</p>	40 50 60	Weak - mod sericitic	<1% py as 1-2 mm wide siliceous pyrite veinlets parallel to foliations	
28.30 TO 55.70	«F ASH, VOL SEDS» Felsic ash, volcanic seds.	<p>Colour: tan, beige, green, med grey Grain Size: fine Clay rich reworked tan, beige green felsic? ash + tuff interbedded with light to medium grey felsic ash and some volcanic seds of possible andesitic compositions</p>		Weak - moderately sericitic	<1% pyrite dissem. in <10 cm zones where py reached 2-3% and as rare <0.5 cm siliceous veinlets	

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DRILL HOLE RECORD

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MINNOVA INC.  
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DATE: 13-November-1990

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		<p>Entire unit may be of a more mafic composition; finely foliated, weak layering in ashy intervals</p> <p>29.5-32.6 34.5-35.8 37.5-38.3 -intervals of mixing of grey felsic ash and tan grey reworked volcanics</p> <p>Layering in ashes 29.6 m 30.3 m 31.9 m 34.6 m 35.0 m</p> <p>40.9-46.4 -possible andesitic composition of reworked volcanics; patchy 1-2 mm siliceous grains; 44.9-45.8: 5% 2-3 mm round, creamy balls some showing weak internal layering (accretionary lapilli?)</p> <p>Foliations 40.5 43.3 55.0</p>	<p>55 45 55 62 60</p> <p>50 60 45</p>			
55.70 TO 56.80	«ARG» Argillite	<p>Colour: dark grey Grain Size: fine Thinly bedded (argillite and med. grey felsic ash) Bedding poorly developed, possibly transposed</p>			<1% py as occasional ,0.5 cm pyrite rich layers	
56.80 TO 84.40	Reworked Int-And Volc. Seds «I-AND SEDS »	<p>Colour: streaky grey - dark green Grain Size: fine Unit characterized by pervasive streaky foliated appearance enhanced by abundant calcite veinlets parallel to foliation. Possible stretched felsic frags. from 59.3-61.5</p> <p>57.0-57.55 -mafic dyke</p>		Weak sericite chlorite alteration	Trace pyrite as rare 1-2 mm veinlets	

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MINNOVA INC.  
DRILL HOLE RECORD

FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		<p>58.6 -8 cm of grey fault gouge with 7-10% of pyrite fault</p> <p>61.5-65.7 «Dior» -medium green, f.g., 1-2 mm fsp phenocrysts, massive</p> <p>65.7-71.1 «AND TUFF» -weakly foliated, patchy weak layering, aphyric except for 70.05-71.1 with 2-3 mm epidotized grains = fsp</p> <p style="padding-left: 40px;">foliation 66.4 m 67.0 m layering 68.0 m 69.9 m</p> <p>71.1-81.65 -continuation of streaky grey green volc. seds. with unit becoming more consistently green below 76.8 m -fine grained massive green mafic dykes from 81.65-82.15; 82.35-82.6; 82.75-83.6</p> <p style="padding-left: 40px;">foliation 59.0 m 72.0 m 75.5 m</p>	<p>60</p> <p>55 60 65 60</p> <p>60 60 60</p>			
84.40 TO 199.60	«QP TUFF»	<p>Colour: light green-grey Grain Size: f.g. Weak - moderately foliated; 4-6% 2-5 mm subrounded quartz eyes</p> <p>84.4-86.8 -interfingering with previous unit</p> <p>86.8-90.7 -occasional indistinct green 1-2 cm pumice frags</p> <p>101.95-102.7 -mafic dyke, weakly foliated</p>	<p>Weak - moderately sericitic</p>	<p>1-2% pyrite disseminated + occasional 2-3 mm veinlets parallel to foliation</p>	<p>foliations: 89.0 m 48 95.1 m 58 101.5 m 50 117.5 m 55 125.7 m 55 134.7 m 58 145.4 m 45 152.6-153.1: zone of distorted and folded foliations 153.8 m 38</p>	



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FROM TO	ROCK TYPE	TEXTURE AND STRUCTURE	ANGLE TO CA	ALTERATION	MINERALIZATION	REMARKS
		<p>129.2-131.15 -mafic dyke - contact parallel to foliation</p> <p>128.7-160.25 -indistinct fragmental appearance from QP felsic frags, grey felsic frags and + tan beige 0.5 x 2-4 cm sericitic fragments</p> <p>160.25-160.75 «ARG» -argillite: thinly laminated at 40-50 deg to c.a., &lt;1% pyrite</p> <p>160.75-161.85 «Fel Ash» -weakly argillaceous</p> <p>-fragmental appearance continuing below argillite</p> <p>180.2-181.3 -occasional irregular 2-3 mm wide dark grey muddy veinlets/slips</p> <p>187.6-188.05 -tan silver grey ashy unit or possible very large fragment</p>		<p>133.5-199.6 -strongly sericitic</p> <p>178.8-179.5 -quartz carbonate vein</p>	<p>below 149 -2-4% pyrite - increasing pyrite as dissemination and veinlets</p> <p>Below 172 -3-5% pyrite</p>	<p>156.6 m 52 165.8 m 40</p> <p>foliations 170.0 m 40 184.5 m 45 195.6 m 45</p>
	E.O.H.					

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## ASSAY SHEET

DATE: 13-November-1990

Sample	From (m)	To (m)	Length (m)	ASSAYS					GEOCHEMICAL								COMMENTS
				Cu %	Zn %	Pb %	Ag g/t	Au g/t	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Ba ppm	Ba %	
13777	34.75	35.20	0.45						127	40	21	1.4	5				
13778	38.00	38.50	0.50						88	61	15	1.2	5				
13779	55.70	56.80	1.10						83	52	19	1.5	10		1100		
13780	160.25	160.75	0.50						96	103	60	1.5	5				
13781	160.75	161.85	1.10						70	318	72	1	10				
13782	163.70	164.40	0.70						51	122	45	1	10				

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ASSAY SHEET

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HOLE NUMBER: MTS-86

## GEOCHEM. SHEET

DATE: 13-November-1990

Sample	From (m)	To (m)	Length (m)	SiO2 %	Al2O3 %	CaO %	MgO %	Na2O %	K2O %	Fe2O3 %	MnO2 %	TiO2 %	Ba %	Cu ppm	Zn ppm	Pb ppm	Ag ppm	Au ppb	As ppm	Sb ppm	Sr %	Zr %	Tot %	GBa ppm	S %
16910	7.90	10.90	3.00	43.16	17.64	6.77	3.37	1.06	0.88	14.99	0.32	1	0.03	100	93	32	0.6	5	19	10			89.58	36	0.14
16911	23.50	26.50	3.00	63.38	14.77	4.04	1.88	1.44	1.89	4.5	0.16	0.41	0.085	14	54	19	0.7	10	15	1			93.19	91	0.5
16912	29.50	32.50	3.00	55.97	11.21	7.03	3.9	0.93	1.63	5.98	0.36	0.47	0.06	174	66	49	2.1	70	63	4			88.81	66	1.03
16913	52.10	55.10	3.00	37.14	12.1	9.47	10.68	0.78	0.43	9.1	0.2	0.58	0.02	30	51	1	1.4	5	36	5			80.87	25	0.1
16914	58.20	61.20	3.00	48.75	17.66	5.93	4.11	1.29	2.4	9.42	0.23	0.78	0.155	92	73	26	1.1	10	39	4			92.38	103	1.44
16915	75.30	78.30	3.00	45.91	17.04	7.17	4.37	0.52	2.61	10.11	0.26	0.86	0.08	56	77	28	1.3	5	37	8			89.46	57	0.29
16916	89.30	92.30	3.00	67.48	14.38	2.69	1.55	0.61	3.31	3.05	0.15	0.31	0.08	15	38	20	1.1	5	28	1			93.94	59	0.25
16917	114.90	117.90	3.00	72.42	14.44	0.51	0.64	0.6	3.83	2.6	0.05	0.27	0.06	17	32	14	0.6	40	23	1			96.7	42	1.2
16918	145.40	148.40	3.00	73.63	15.5	0.01	0.3	0.68	3.79	2.21	0.01	0.28	0.09	11	16	12	0.2	10	21	1			97.9	52	1.42
16919	175.30	178.30	3.00	71.33	14.93	0.82	0.9	0.67	3.57	2.24	0.08	0.27	0.11	10	38	16	0.2	10	20	1			96.23	75	1.24

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GEOCHEM. SHEET

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# LEGEND

## CRETACEOUS

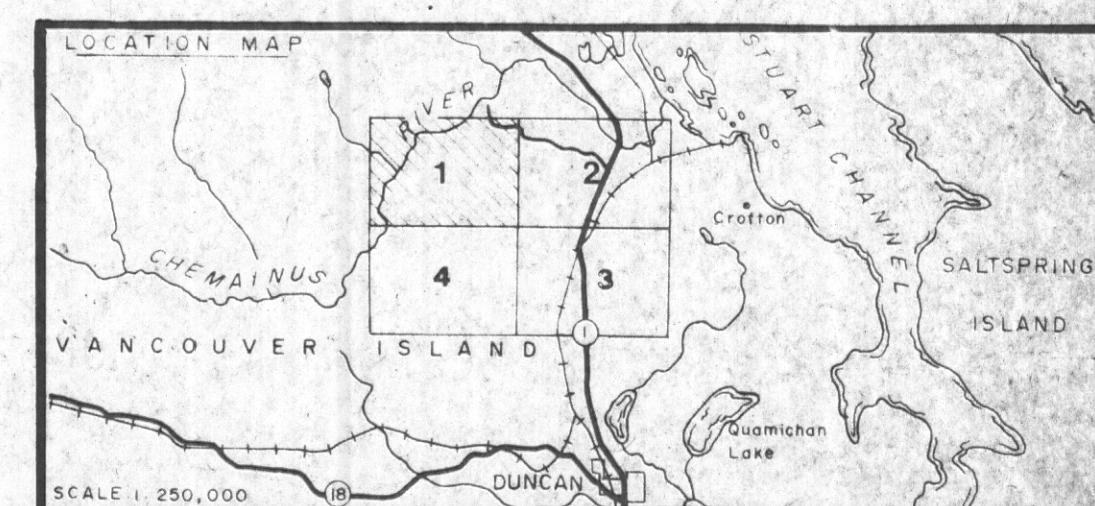
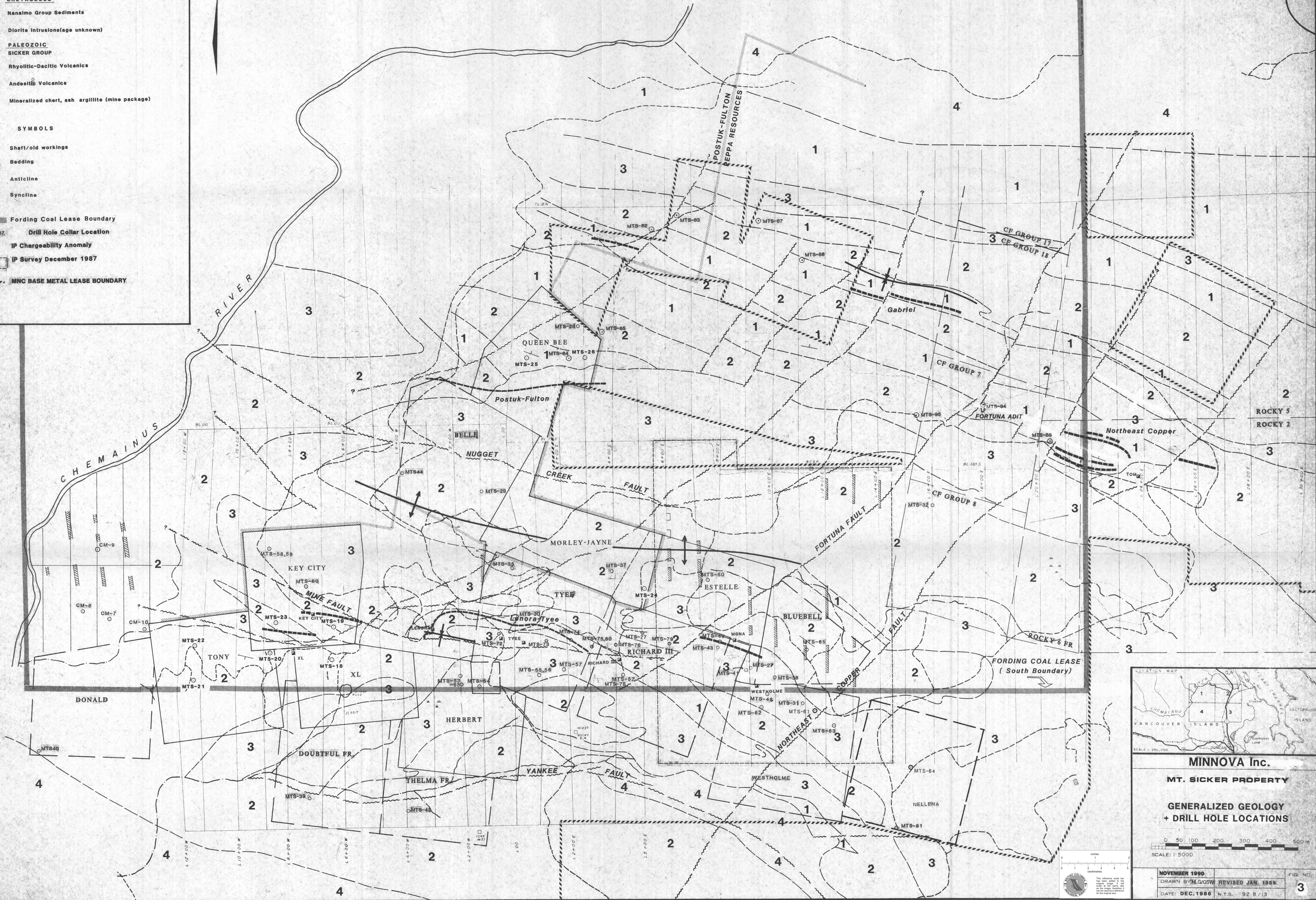
- 4 Nanaimo Group Sediments
- 3 Diorite Intrusions (age unknown)

## PALEOZOIC SICKER GROUP

- 2 Rhyolitic-Dacitic Volcanics
- 1 Andesitic Volcanics
- Mineralized chert, ash argillite (mine package)

## SYMBOLS

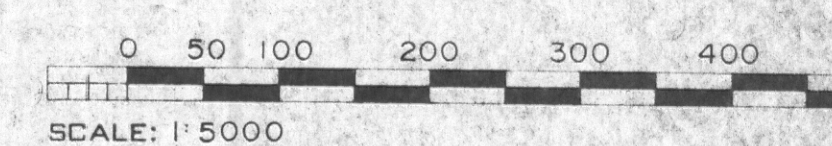
- Shaft/old workings
- Bedding
- Anticline
- Syncline
- Fording Coal Lease Boundary
- Drill Hole Collar Location
- IP Chargeability Anomaly
- IP Survey December 1987
- MNC BASE METAL LEASE BOUNDARY



MINNOVA Inc.

MT. SICKER PROPERTY

GENERALIZED GEOLOGY  
+ DRILL HOLE LOCATIONS



NOVEMBER 1990

DRAWN BY MLG/SW

REVISED JAN. 1989

DATE: DEC. 1986

N.T.S. 92 B / 13

FIG. NO.

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