→ Windy Craggy

889642

WINDY CRAGGY PROJECT

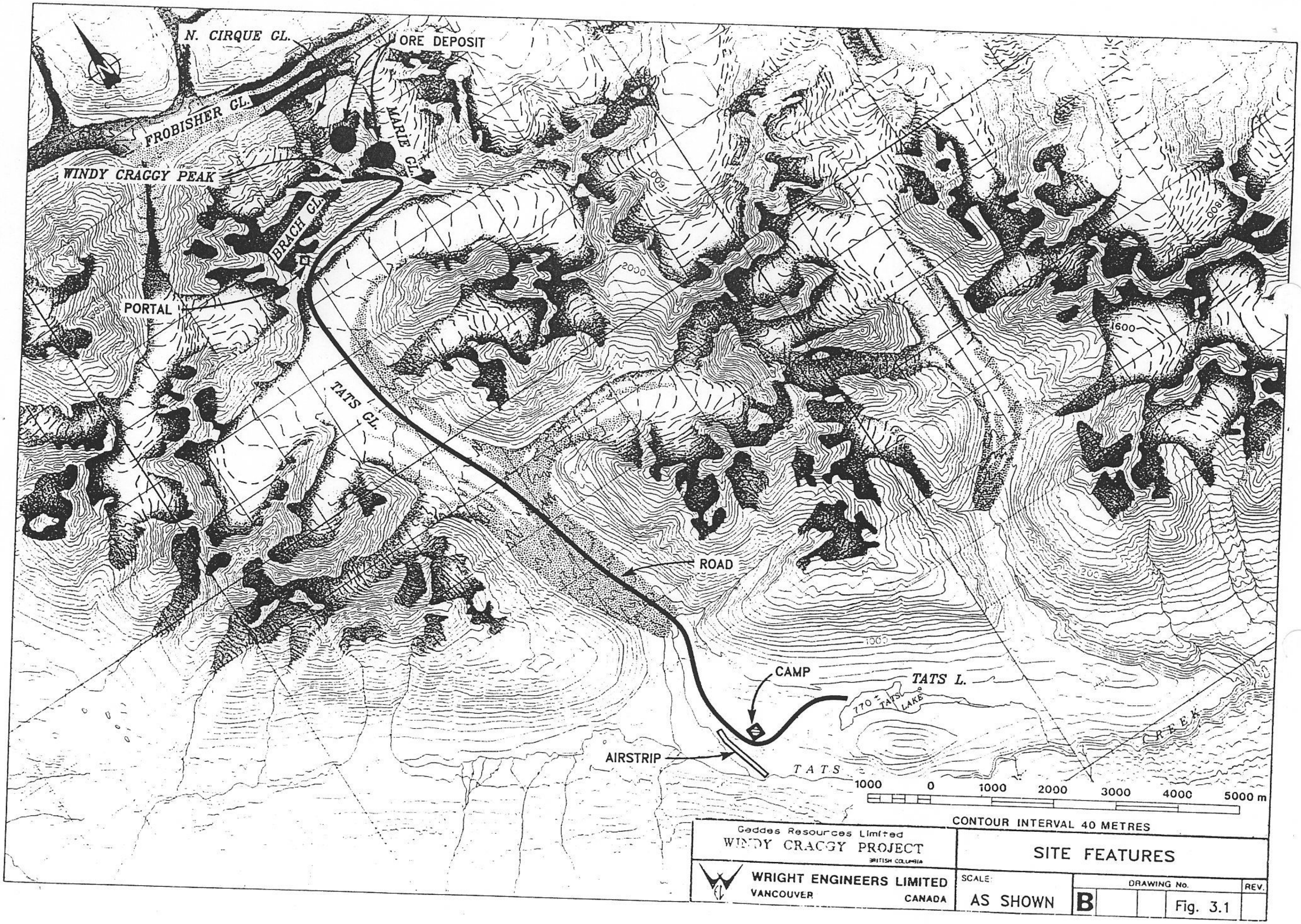
REVISED MINE PLAN
For The

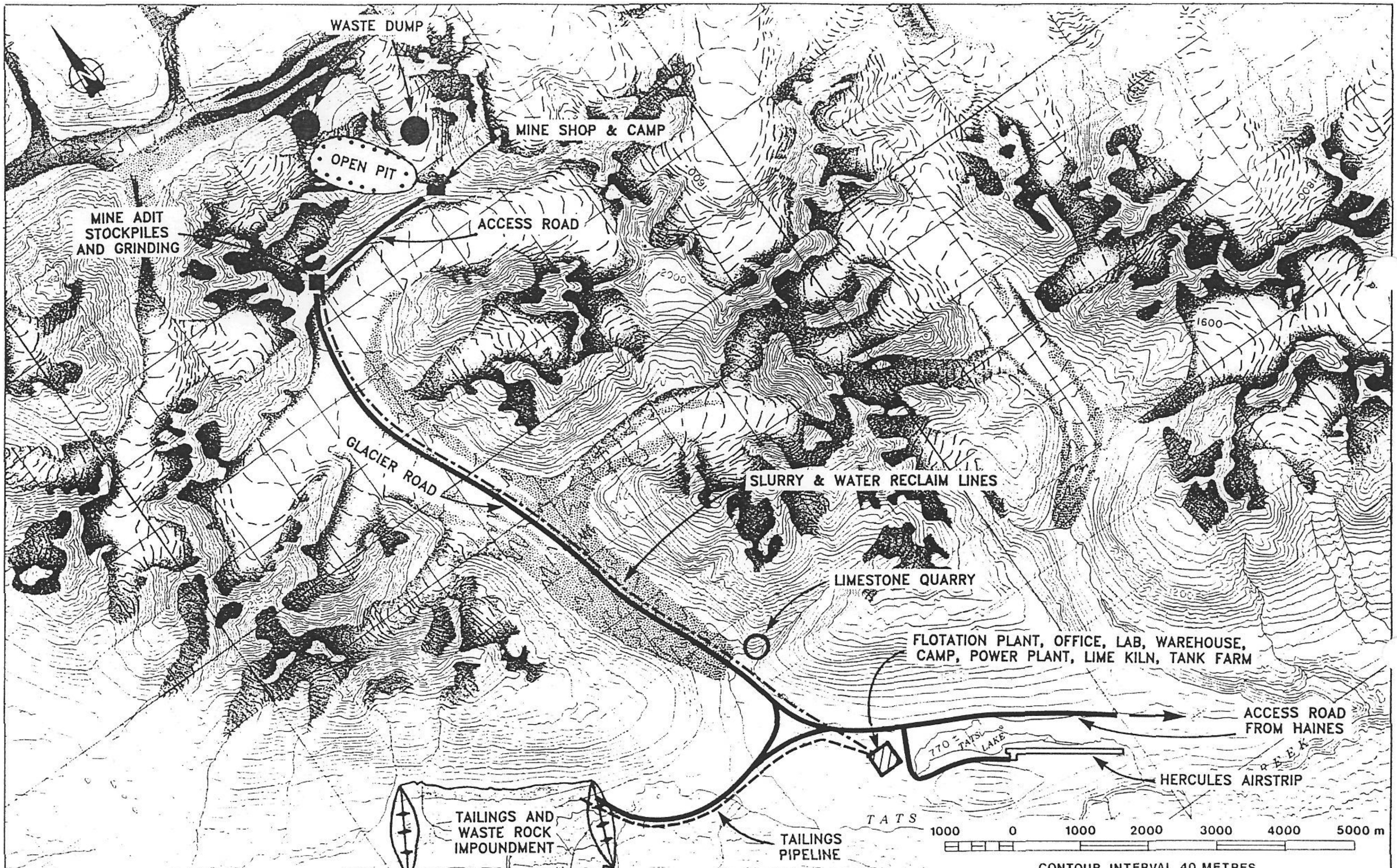
Stage I Environmental and
Socioeconomic Impact Assessment

GRL

GEDDES RESOURCES LIMITED

November 1990


N. CIRQUE GL.
ORE DEPOSIT
FROBISHER GL.
MARIE GL.
WINDY CRAGGY PEAK
BRACH GL.
PORTAL
TATS GL.
2000
1600
ROAD
1000
CAMP
TATS L.
770
TATS LAKE
CREEK
AIRSTRIP
TATS
1000 0 1000 2000 3000 4000 5000 m
CONTOUR INTERVAL 40 METRES
Geddes Resources Limited
WINDY CRAGGY PROJECT
BRITISH COLUMBIA
SITE FEATURES
WRIGHT ENGINEERS LIMITED
VANCOUVER CANADA
SCALE:
AS SHOWN
DRAWING No.
REV.
B
Fig. 3.1



Geddes Resources Limited WINDY CRAGGY PROJECT BRITISH COLUMBIA	PROJECT COMPONENTS
WRIGHT ENGINEERS LIMITED VANCOUVER CANADA	SCALE: AS SHOWN · DRAWING No B · Fig. 3.2 · REV

mineralization and waste rock sampling. It provides fundamental information from which the deposits are defined and on which the whole project is based.

4.2.2 Deposit and Area Geology

Regionally, the Windy Craggy area is within the fault-bounded Alexander Terrane of the Cordilleran Insular Belt. Lithologies include Palaeozoic carbonates and clastics; Triassic marine clastics and volcanics. These rocks are intruded by Jurassic-Cretaceous granitoid stocks and batholiths.

The Windy Craggy deposit is hosted by Triassic clastic sediments and mafic flows and sills. Massive sulphide mineralization occurs near the transition from a predominantly clastic host to overlying volcanic assemblages. Clastic sediments comprise calcareous, carbonaceous, and sulphidic units. Intermediate to mafic volcanic units are carbonate- and chlorite-altered. Metamorphic rank is greenschist. Major faults dip steeply, strike northwesterly, and trend subparallel to contacts between enclosing lithologies. Isoclinal and open folds occur in both massive sulphides and host rocks.

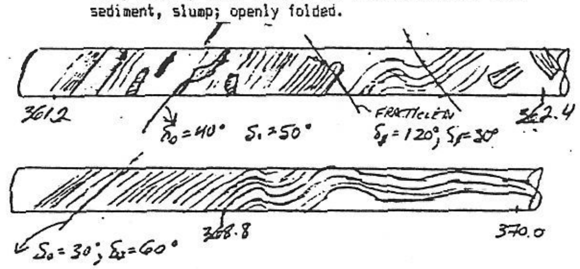
The deposit as currently defined includes two bodies, the North and South, which trend over a minimum strike length of 1.6 kilometres with a vertical extent of at least 600 metres and width up to 200 metres. Limited drilling has defined a third zone (Ridge Zone) to the northeast with a possible strike length of 400 metres. Stratigraphic sulphide zoning, recognized in both North and South bodies, passes upwards from footwall stringer mineralization to massive pyrrhotite, to massive pyrrhotite-pyrite, to massive pyrite, to massive pyrite-calcite-sphalerite, and ends in discontinuous chert-carbonate-sulphides. Zoning has been modified by subsequent mineralization and structural deformation. A sulphide stringer stockwork comprised of irregular sulphide veins within pervasively chlorite and silica altered wallrock is developed around the northern body and intermittently around the southern body.

The principal sulphide minerals in the deposit are pyrite, pyrrhotite, and chalcopyrite with lesser sphalerite. Gangue components include silica, iron carbonates, chlorite,

GEDDES RESOURCES LIMITED	DEPTH	AZIM.	DIP	DEPTH	AZIM.	DIP	PROPERTY: WINDY CRAGGY	LENGTH:	HOLE: 88 - 46
COMMENTS:	COLLAR						LOCATION:	VERT. COMP.	SHEET 7 of 10
							SECTION:	HOR. COMP.	LOGGED BY: J.M. Peter
							COORDINATES: N	BEGAN: COMPLETED:	SAMPLED BY: Dreise / Stanley
							E	CORE SIZE: RECOVERY:	DRILLED BY: Advanced
							ELEVATION:	PURPOSE:	

DESCRIPTION —

m FROM - TO	DESCRIPTION
342.0-343.4	Laminated chert, carbonate, pyrrhotite; laminae 2-4mm wide; chert 60%, carbonate (calcite) 30%, po 10%; very broken 1-3cm.
343.4-343.6	Very broken quartz/calcite vein.
345.1-347.1	Laminated chert-carbonate-sulphide horizon as 342.0-343.4; δ_o = 30° at 346m.
352.9-353.4	Chert-carbonate-sulphide (laminated as above) but with several green chloritic laminae, δ_o = 20° at 353.3m bedding (S_o)= 70° , laminae convoluted and disrupted (soft sediment deformation).
353.4-358.05	Dark green, fine-grained, massive; pervasively, slightly chloritized; contains approx 2% crosscutting 0.5-1cm wide quartz/calcite and 50% wispy po veins.
358.05-358.75	(mislatch at 358.7m); blotchy po and calcite, vein--diffuse, in mafic volcanic.
358.75-359.2	Dark grey with hint of green, massive, very fine-grained, tuffaceous argillite; very broken; graphite along fracture surfaces; trace po as wisps and blebs; very broken core <1cm.
359.2-360.05	Silicified green mafic volcanic.
360.27-363.0	Laminated chert-carbonate (calcite)-po-cp-magnetite-hematite (very minor); chert laminae and bands brecciated-soft sediment, slump; openly folded.



m FROM - TO	DESCRIPTION
363.0	Contact between mafic volcanic and chert-carbonate-sulphide is sharp, defined by a 3cm-wide vein of pure white, fine-grained calcite (50%) and fine-grained po at 40° (δ = 50°).
363.0-363.9	Highly foliated dark green chloritic, mafic volcanic; S_1 = 30°, δ_1 = 60°; contains approx 10% fine-grained po as foliated streaks and wisps; lower contact not visible--ground core.
363.9-364.85	Laminated to mottled, milky light grey-brown, chert-hematite, calcite, ankerite, po, cpy. Prominent cleavage approx 10cms apart δ_1 = 115°, δ_o = 45°, chert bands 1mm-2cm wide disrupted and partly brecciated (soft sediment deformation), lower contact knife sharp with chert clasts in volcanic.
364.85-365.20	Medium green chloritic, fine-grained, mafic volcanic, massive, knife-sharp contact with chert, etc.

Po	Py	Cp	Cht	Carb	RECY	RMR	No.	FROM	TO	LGTH	WC Au (g/t)	CDN Au (g/t)	CDN Ag (g/t)	WC Cu (%)	CDN Cu (%)	CDN Zn (%)	CDN Co (%)
-	-	-	-	-													
10	-	-	40	20			63298	342	344	2		0.04	<0.5		0.22	0.02	0.011
5	-	-	40	20			63299	344	346	2		0.05	<0.5		0.18	0.02	0.010
5	-	-	40	20			63300	346	348	2		0.08	3.5		0.09	0.23	0.011
-	-	-	-	-	90	52	63351	348	350	2		<0.01	3.0		0.03	0.02	0.005
TR	-	-	-	TR													
TR	-	-	-	TR													
TR	-	-	-	TR													
TR	-	-	-	TR													
TR	-	-	-	TR	90	52											
20	-	3	60	15			63352	360	362	2		<0.01	8.0		1.02	0.02	0.018
20	-	2	60	15			63353	362	364	2		0.06	4.5		0.20	0.02	0.011
20	-	1	60	15			63354	364	366	2		<0.01	5.0		0.32	0.02	0.013
20	-	TR	60	15			63355	366	368	2		<0.01	4.0		0.46	0.02	0.009
20	-	TR	60	15	80	49	63356	368	370	2		0.03	6.0		1.10	0.06	0.019

GRAPHIC LOG: 340 – 350 – 360 – 370

COMMENTS:

Fig. 4.1

calcite and magnetite. Surface portions of each zone demonstrate supergene copper sulphide enrichment overlain by gossan caps enriched in gold and silver.

The gold content of the massive sulphides averages 0.22 grams per tonne and exists in part as native gold. Gold mineralization also exists in carbonate-sulphide-chert units within argillites adjacent to the southern massive sulphide body. Cobalt content of the massive sulphides averages about 0.09 percent.

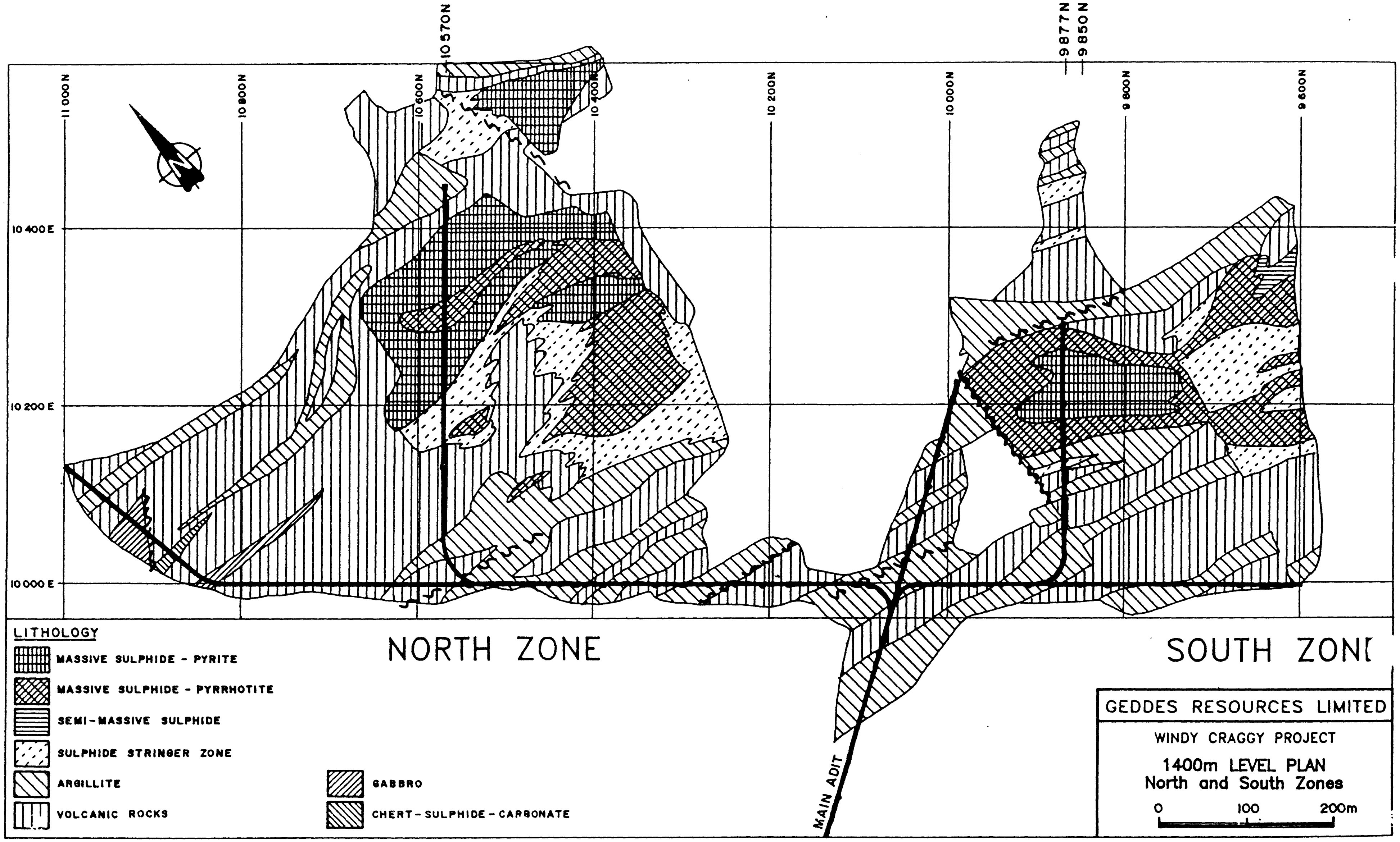
The deposit has similarities in common with both Besshi and Cyprus type massive sulphide deposits.

4.2.3 Rock Type Distribution

The nature of the occurrence of mineralization at Windy Craggy is complex. There are a variety of host rocks, with or without sulphide mineralization, all of which have been affected by alteration, deformation and intrusion of other rocks. Therefore, sulphides and carbonates (the acidic and alkaline agents in the rocks) cannot be simply and directly correlated with a few easily recognized rock types. Relationships are more complex and a picture must be built up: from the scale of the individual minerals, through recognition of the roles of certain key types of rocks, to an understanding of the structural relationship of these rocks.

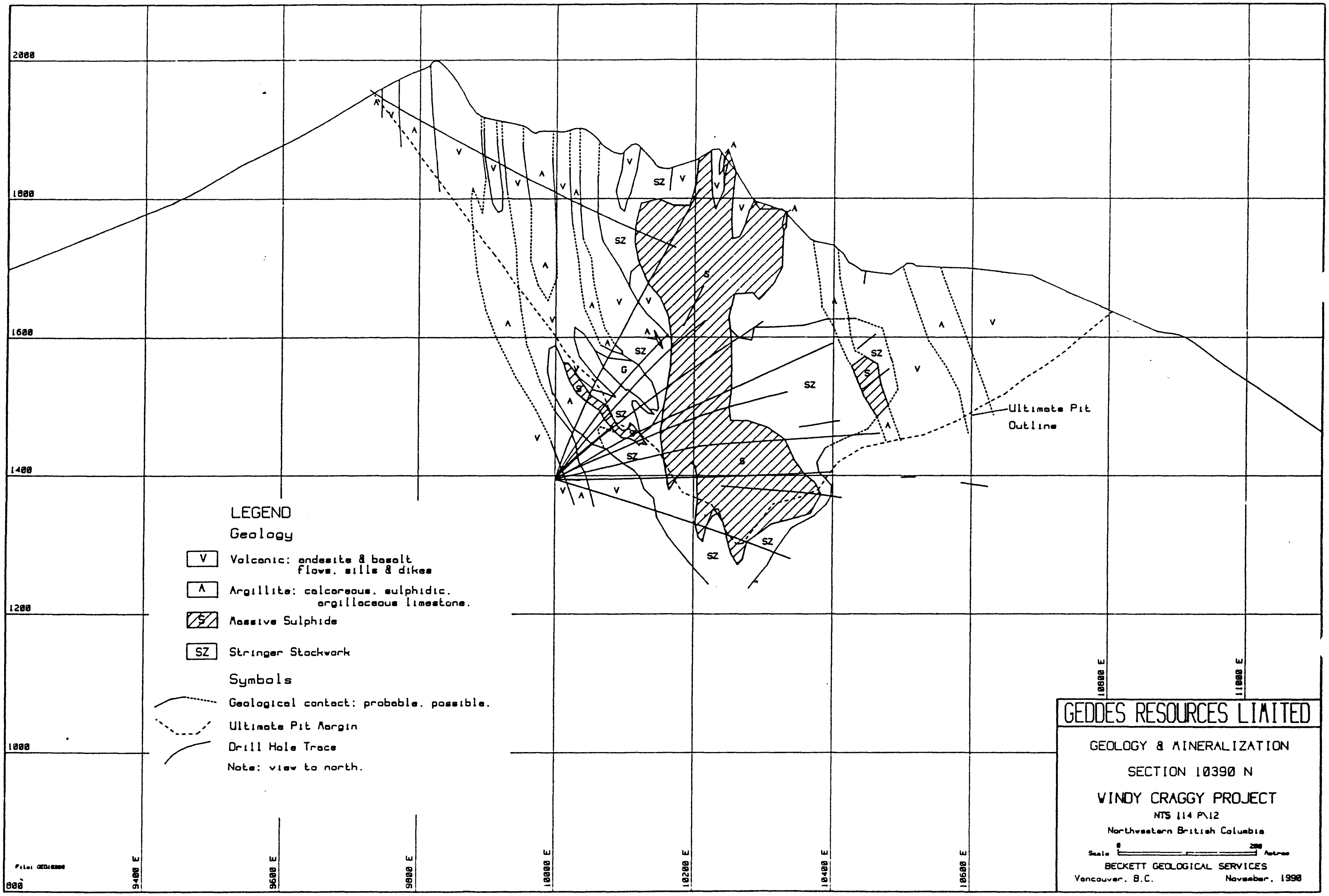
Geological mapping from Tats Lake to the Frobisher Glacier shows the lithologic units to the west to be limestone and calcareous argillite. The lithological units to the east are mafic to intermediate volcanics, gabbro, and interbedded calcareous argillite, siltstone and limestone. The volcanics range from weak to strongly calcareous. Massive grey gritty limestone occurs on the ridge behind Tats Lake. From a regional perspective, the rocks can be classified as calcareous.

The Windy Craggy deposit is hosted by a mixed volcanic and sedimentary sequence of Triassic age. This sequence comprises argillites with lesser limestone and mafic to intermediate volcanic flows, sills and dykes. Small ultramafic bodies are presumed to



10570N
9877N
9850N
11 000N
10 800N
10 600N
10 400N
10 200N
10 000N
9 800N
9 600N
10 400E
10 200E
10 000E
LITHOLOGY
MASSIVE SULPHIDE - PYRITE
MASSIVE SULPHIDE - PYRRHOTITE
SEMI-MASSIVE SULPHIDE
SULPHIDE STRINGER ZONE
ARGILLITE
VOLCANIC ROCKS
GABBRO
CHERT-SULPHIDE-CARBONATE
NORTH ZONE
SOUTH ZON
MAIN ADIT
GEDDES RESOURCES LIMITED
WINDY CRAGGY PROJECT
1400m LEVEL PLAN
North and South Zones
0
100
200m

Fig. 4.2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10000 E
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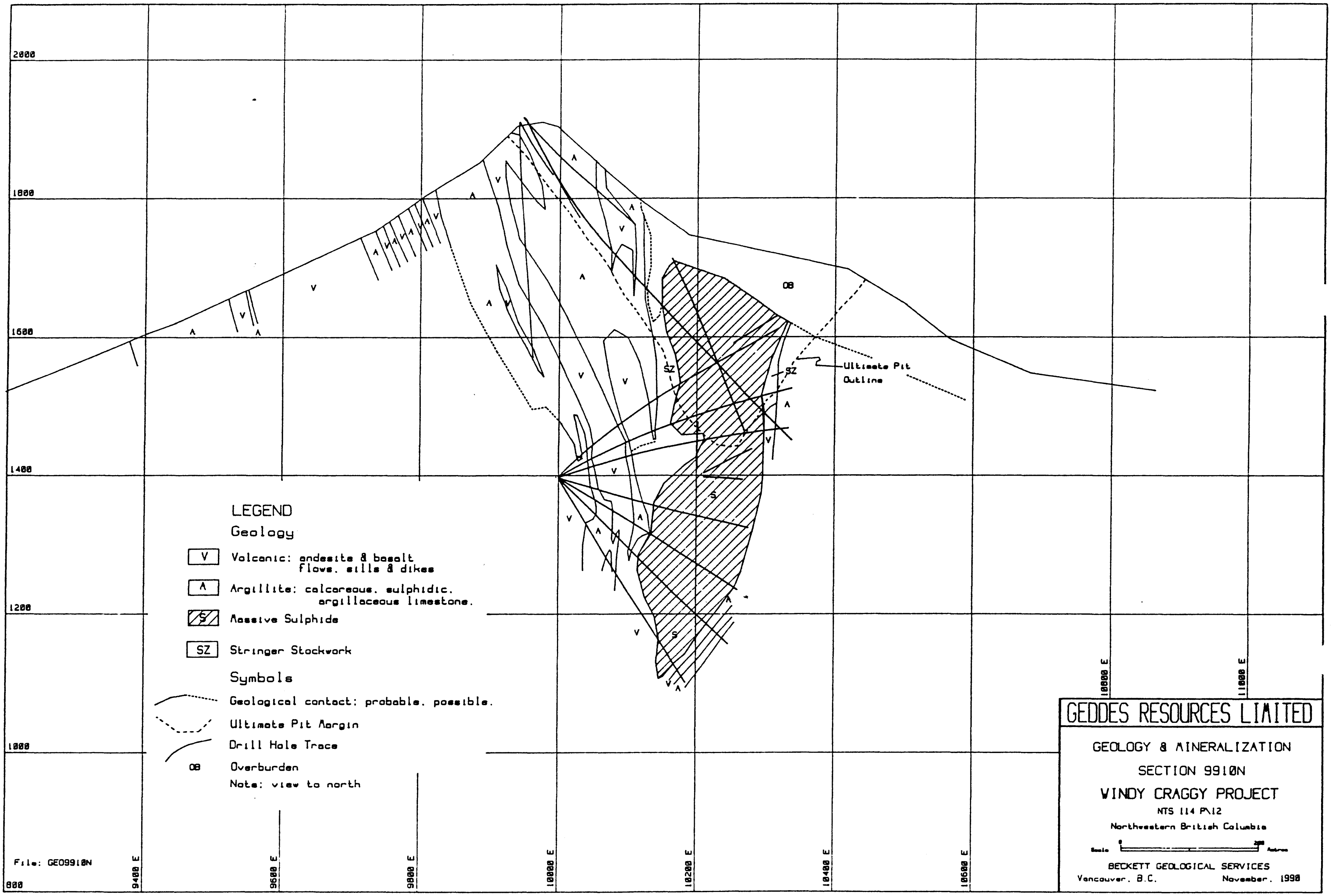
10400 E
10600 E
10800 E
11000 E
Ultimate Pit Outline
LEGEND
Geology
V Volcanic: andesite & basalt flows, sills & dikes
A Argillite: calcareous, sulphidic, argillaceous limestone.
S Massive Sulphide
SZ Stringer Stockwork
Symbols
Geological contact: probable, possible.
Ultimate Pit Margin
Drill Hole Trace
Note: view to north.
GEDDES RESOURCES LIMITED
GEOLOGY & MINERALIZATION
SECTION 10390 N
WINDY CRAGGY PROJECT
NTS 114 P\12
Northwestern British Columbia
Scale 0 200 Metres
BECKETT GEOLOGICAL SERVICES
Vancouver, B.C.
November, 1990

Fig. 4.3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10200 E
10400 E
10600 E
10800 E
11000 E
OB
SZ
Ultimate Pit Outline
LEGEND
Geology
V Volcanic: andesite & basalt flows, sills & dikes
A Argillite: calcareous, sulphidic, argillaceous limestone.
S Massive Sulphide
SZ Stringer Stockwork
Symbols
Geological contact: probable, possible.
Ultimate Pit Margin
Drill Hole Trace
OB Overburden
Note: view to north
File: GEO9910N
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GEOLOGY & MINERALIZATION
SECTION 9910N
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Northwestern British Columbia
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November, 1990

Fig. 4.4

5.0 MINING PLAN

5.1 INTRODUCTION

The Mining Plan describes the mining operation from initial development until closure. A detailed design will be completed at Stage II and therefore this plan is preliminary. A principle feature of the Mining Plan is the incorporation of measures to protect the environment from unacceptable impacts resulting from acid generation in the pit and waste dumps, during operation and after closure. The Mining Plan includes pit design and development, ore and waste rock handling systems, and the general minesite layout.

This section begins with a description of the conditions influencing the choice of mining methods and design, such as rock quality and groundwater. The design criteria are then summarized. The mining methods that were considered are described, together with the rationale for selecting the optimum method. This is followed by an outline of the Mining Plan. This section concludes with a description of the closure conditions at the end of mine life.

5.2 BASE CONDITIONS AFFECTING MINING METHOD SELECTION

5.2.1 Orebody Location and Geometry

The shape and position of a mineral resource has a fundamental influence on the choice of a mining method. Large resources which are close to surface are usually extracted by surface methods since these are far cheaper than underground methods. Economics generally dictate the transition from surface to underground extraction. Underground extraction is also very sensitive to the size and shape of an orebody; massive, regular bodies are much cheaper to extract than small irregular bodies.

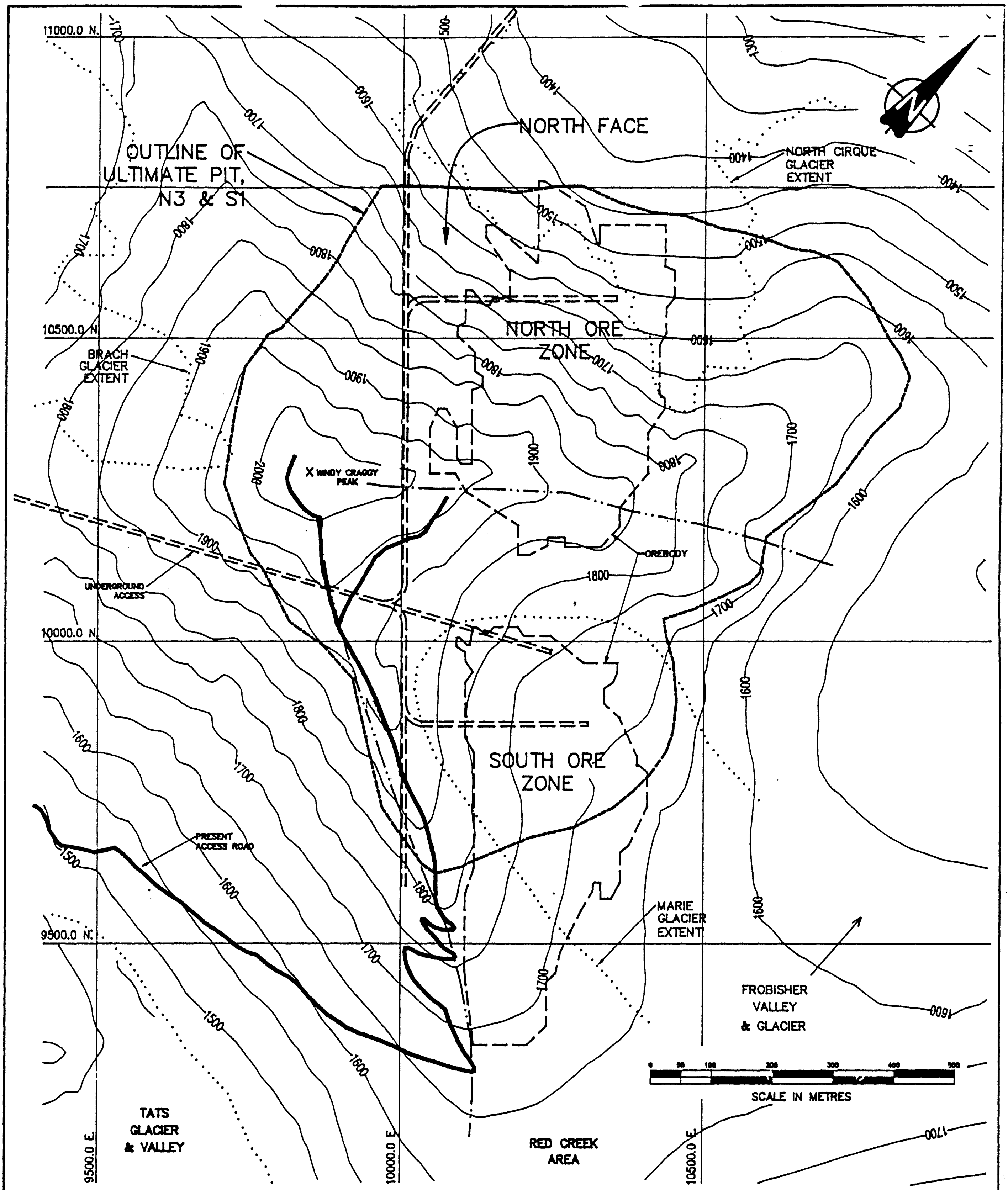
The two massive sulphide orebodies at Windy Craggy are tabular to irregular in shape, extending over a strike length of at least 1.6 km, a vertical extent of at least 600 m and a width of at least 200 m (Figure 5.1). The North Ore Zone outcrops in the northeast ridge area of Windy Craggy Peak, where slopes vary from approximately 60° on the north side to 40° on the south side. The South Ore Zone is under the Marie Glacier.

The orebodies trend northwest-southeast, subparallel to the trend of the host rocks (Figure 5.2). The northern margin of the South Zone plunges subvertically in a steep southeasterly direction, while the southern margin of the North Zone plunges northwesterly at about 50°. The sulphide mineralization is open at depth and on strike in both the North and South zones. Geophysical and geological evidence indicates potential for additional zones.

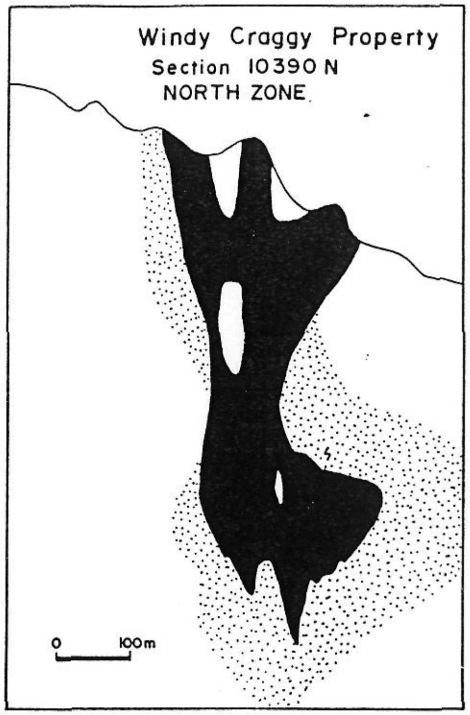
Copper mineralization is contained within the massive sulphides and to a lesser extent in stringer sulphide rock close to the massive sulphide margin. Chalcopyrite is the predominant copper mineral. Chalcocite is found within sections of supergene-enriched massive sulphide, especially near the upper margins of the South Zone. Higher grade copper mineralization is contained within both pyrite massive sulphide and patchy pyrite in pyrrhotite massive sulphide. The higher grade sections exist as tabular bodies with long axes parallel to the trend of the sulphide deposits. Lower grade copper mineralization is extensively distributed within all massive sulphide types.

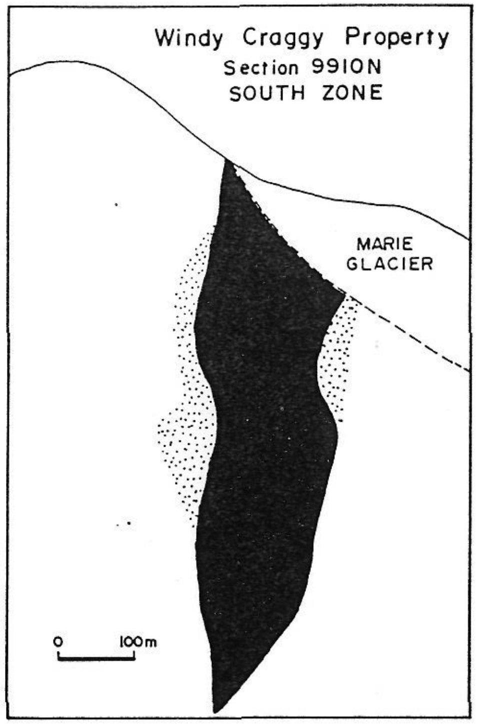
Gold mineralization is present in carbonate-chert/silica-sulphide units within argillites. The gold-mineralized units occur near the northern margin of the South Zone at the 1550 m elevation; unit true thicknesses range from 5 m to 10 m.

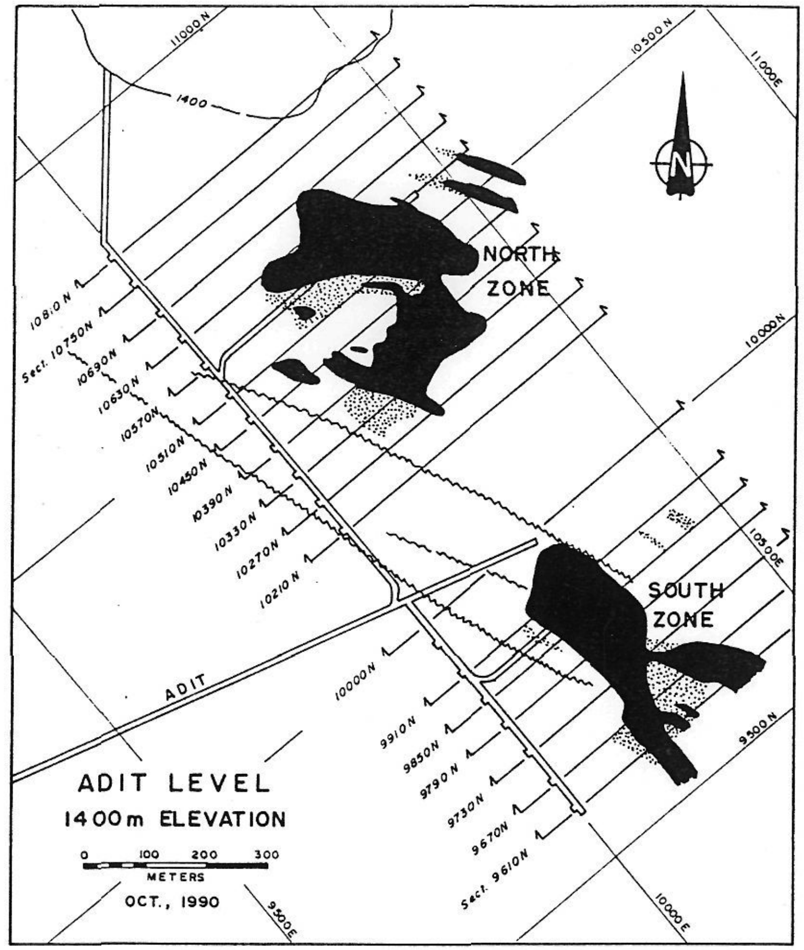
The orebody has been explored by diamond drilling from surface and from the 1400 m elevation. Additionally the 1400 m elevation development has crosscut both the North and South zones.

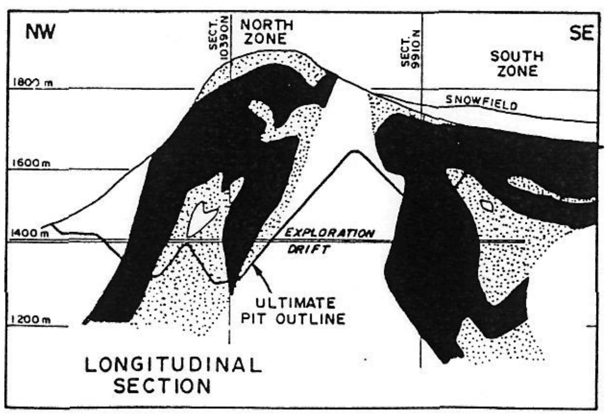


GEDDES RESOURCES LTD.	WINDY CRAGGY PROJECT	DATE OCT., 1990
SCHEMATIC PLAN OF WINDY CRAGGY AREA		PROJ. NO. 65804
		APPROVED
		Fig. 5.1
STEFFEN ROBERTSON & KIRSTEN, Consulting Engineers		







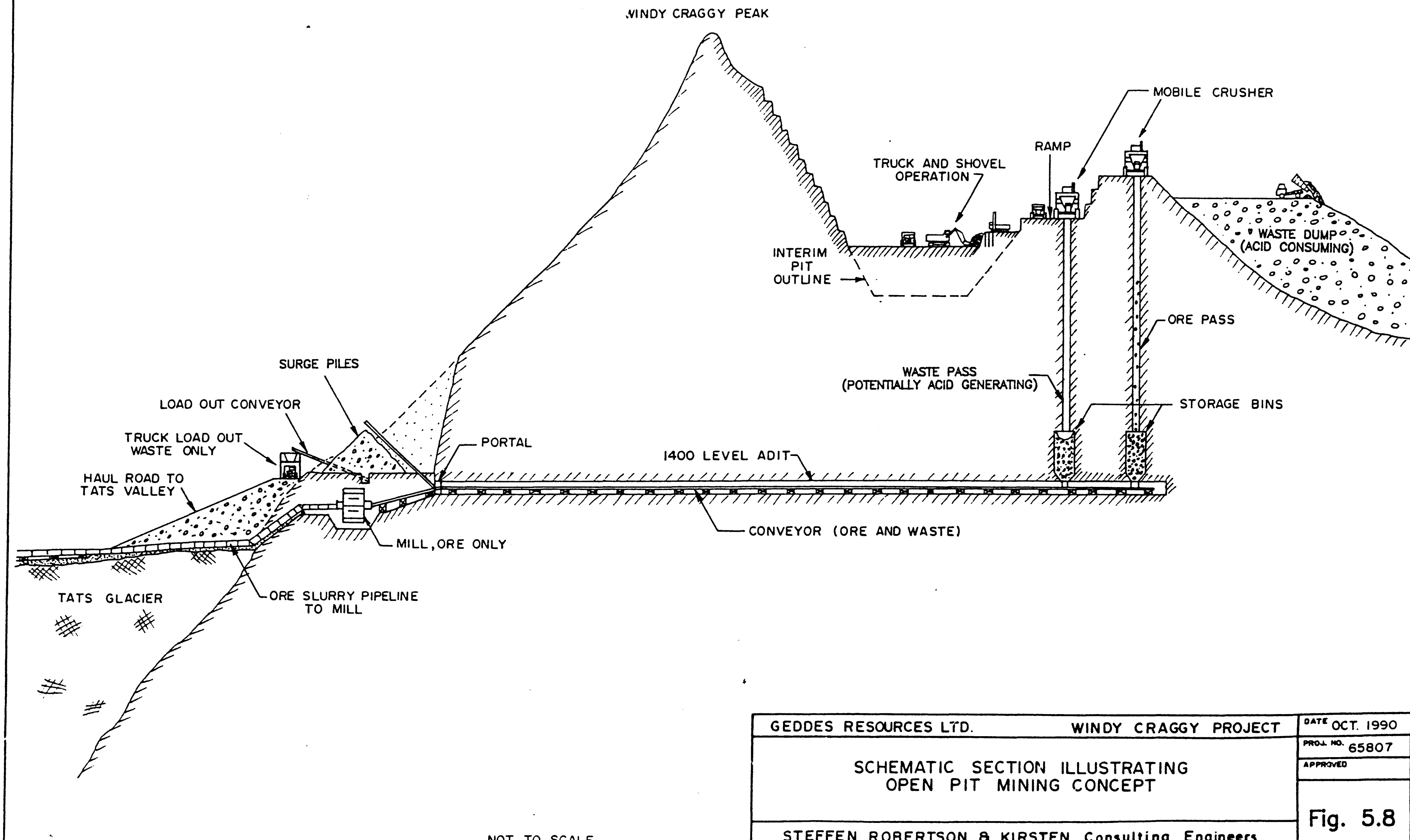


LEGEND

■ MASSIVE SULPHIDES

▒ STRINGER SULPHIDES

GEDDES RESOURCES LTD.	WINDY CRAGGY PROJECT	DATE OCT. 1990
		PROJ. NO. 65807
OUTLINE OF OREBODIES		APPROVED:
		Fig. 5.2
STEFFEN ROBERTSON & KIRSTEN, Consulting Engineers		



GEDDES RESOURCES LTD.	WINDY CRAGGY PROJECT	DATE OCT. 1990
SCHEMATIC SECTION ILLUSTRATING OPEN PIT MINING CONCEPT		PROJ. NO. 65807
		APPROVED
STEFFEN ROBERTSON & KIRSTEN, Consulting Engineers		Fig. 5.8