

'81-#372-#9215

1980 CASMO PROJECT

3091T

ASSESSMENT REPORT

9215

Part 1  
of 4

## INTRODUCTION

Shell Canada Resources 1980 field program was a follow through of the 1979 program.

The Casmo property is situated approximately 6 kilometres southwest of the Town of Cassiar (Figure 1).

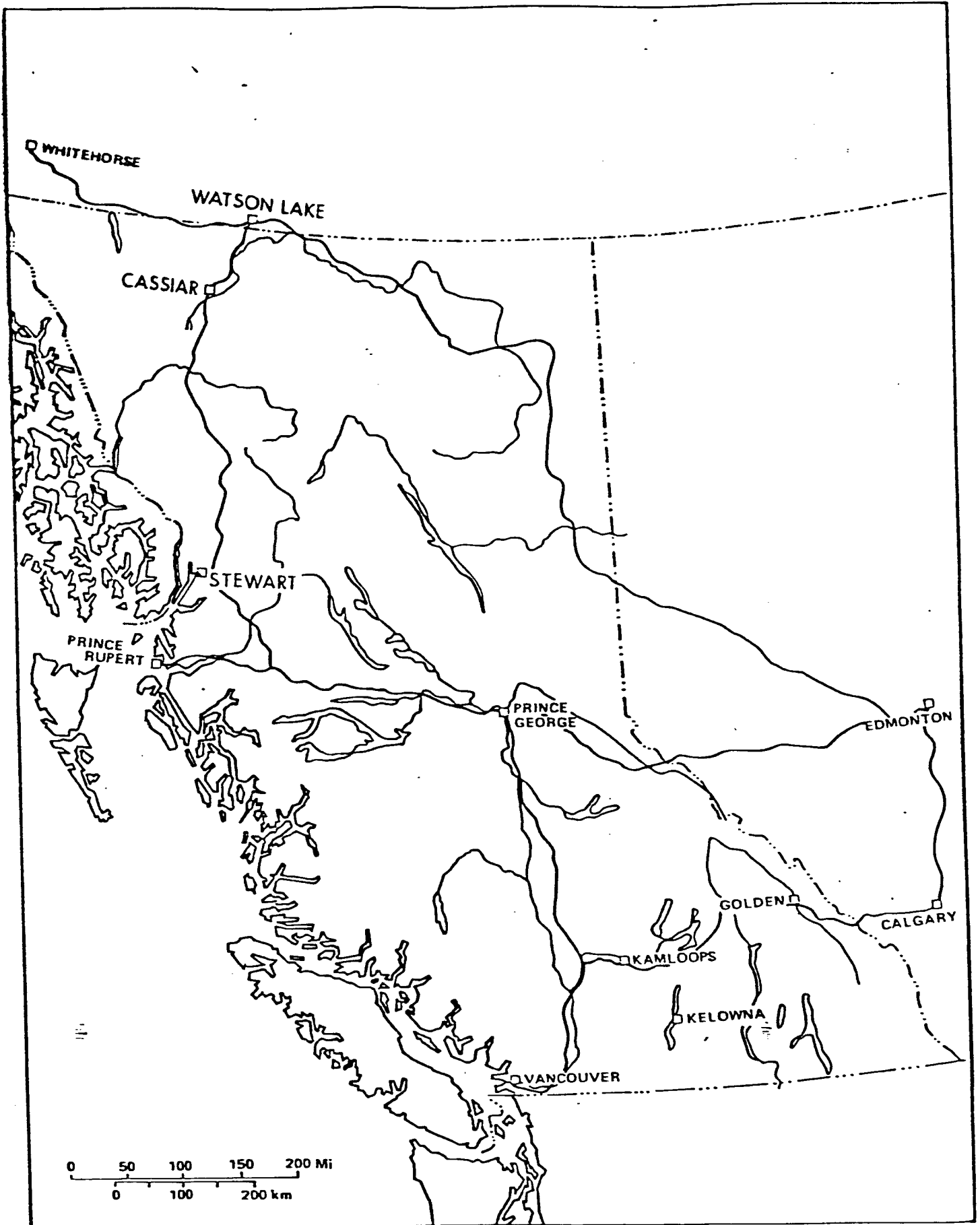
In 1979 Shell Canada Resources entered into an option agreement on the 42 claim Casmo Property with New Jersey Zinc Exploration of Canada (Figure 2). During 1979, Shell Canada endeavoured to increase tonnage and grade through efficient diamond drilling, as well as conduct test IP and magnetometer surveys. The 1979 program successfully increased the drill indicated potential to 51 million tonnes at a grade of 0.137% MoS<sub>2</sub>, and provided encouraging, useful results from the geophysical surveys.

The 1980 program consisted of 5940 metres of diamond drilling, 51 line kilometres of linecutting, IP and magnetometer surveys, geological mapping, and the staking of 32 additional claims.

At present, the drill indicated potential of the ultimate pit design stands at 100.5 million tonnes at a grade of 0.129% MoS<sub>2</sub>, using a cut-off grade of 0.07% MoS<sub>2</sub>.

The mineralization is open to the east, north, and west of the present drilled area.

FIGURE 1



## SUMMARY

The 1980 program began on March 15, 1980 with the opening of camp and the commencement of snow removal and road building by Grant Stewart Construction crews. Construction of permanent washroom and kitchen facilities adjoining the existing structure also took place at this time.

Shell crews arrived in Cassiar on March 27, 1980. Work for the following two weeks consisted of snow removal, road construction, and drill site preparation. Heavy snow and progressive spring breakup required constant road building through the early part of the drill program. Deteriorating road conditions during the month of May necessitated the use of a helicopter to service the drills and to make shift changes.

A drill core handling and storage area was prepared in early April. A permanent booth for the photography of core under constant conditions was constructed, along with the erection of core racks capable of holding 7,000 metres of core. All core is presently stored at the Cassiar camp.

D. W. Coates personnel arrived on April 9, 1980, and drilling commenced with one machine on April 12, 1980, with the second machine starting on April 13, 1980. Drilling continued, with only minor down time on one machine, using both machines until June 12, 1980, when both machines were moved off the property. Twenty-one new holes were drilled, as well as three extensions of holes drilled in 1979, totalling 5,940 metres (Table 1). All holes were drilled at  $170^{\circ}$  with an inclination of  $-70^{\circ}$ . All holes were drilled with mud and overall core recovery was 95%.

An extension of the 1979 test grid over the mineralized zone began in mid-June. A 51 line kilometre IP and magnetometer survey was completed by the end of August 1980. A complete report on the geophysics by S. Saydam is included in Appendix I.

Consulting geologist, W. G. Smitheringale, conducted a mapping program on the Alta 6, 8; Storie 1, 2, 3, 4, 5; Bright 3, 4, 5, 6 claim groups from early August to mid-September. All the claims were mapped at a scale of 1:5,000. Smitheringale's report is found in Appendix II.

All 1980 drill hole locations were surveyed and tied into the existing UTM Co-ordinate grid by Sheltech personnel.

All core was photographed, logged for fractures, and then split and sampled in 10 foot intervals. One half of the core was sent to Chemex Labs in Calgary and assayed for %  $\text{MoS}_2$ , the other half was returned to its box for lithologging.

TABLE 1  
SUMMARY OF DRILL HOLES

<u>Hole</u>	<u>Section</u>
DDH 80-18	451 - 132 E
DDH 80-19	451 - 132 E
DDH 80-1	451 - 070 E
DDH 80-2	451 - 070 E
DDH 80-4	451 - 070 E
DDH 80-21	450 - 947 E
DDH 80-8	450 - 947 E
DDH 80-6	450 - 947 E
DDH 80-5	450 - 947 E
DDH 80-3	450 - 885 E
DDH 79-5A	450 - 885 E
DDH 80-20	450 - 885 E
DDH 80-10	450 - 824 E
DDH 80-9	450 - 824 E
DDH 80-7	450 - 762 E
DDH 79-3A	450 - 762 E
DDH 79-4A	450 - 762 E
DDH 80-13	450 - 703 E
DDH 80-17	450 - 703 E
DDH 80-15	450 - 703 E
DDH 80-11	450 - 643 E
DDH 80-12	450 - 643 E
DDH 80-14	450 - 576 E
DDH 80-16	450 - 576 E

The drill indicated potential of the ultimate pit is 100.5 million tonnes with a grade of 0.129% MoS<sub>2</sub>, using a cut-off grade of 0.07% MoS<sub>2</sub>.

The work carried out to date has confirmed the existence of a size-able deposit, and that there exists the potential for additional mineralization.

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## 1. PROPERTY

The Casmo Property is situated in the Liard Mining District of the Province of British Columbia (Figure 2). The Casmo Property is composed of 177 claim units and the lands are divided as follows:

- 42 claim units of the SQE, KON, and WEST claim groups were optioned from the New Jersey Zinc Company in June of 1979.
- Alta 6 and Alta 8 claim groups (32 units) were staked by Shell Canada in the summer of 1979.
- The New Jersey Zinc Company purchased the Storie 1, 2, 3, 4, and 5 claim groups (71 units). These lands are included in the Casmo Property.
- In 1980 the Bright 1 and Bright 2 claim groups (32 units) were staked on the southern boundary of the Casmo Property.

TABLE 2

CASMO PROJECT CLAIM HOLDINGS AND PRESENT STATUS				
CLAIM GROUP				
NAME	NUMBER	UNITS	RECORDING DATE	PRESENT ASSESSMENT GOOD UNTIL
SQE	9	1	13 May 1961	1989
	10	1	13 May 1961	1989
	11	1	13 May 1961	1989
	12	1	13 May 1961	1989
	13	1	13 May 1961	1989
	14	1	13 May 1961	1989
	15	1	13 May 1961	1989
	16	1	13 May 1961	1989
	17	1	13 May 1961	1989
	18	1	13 May 1961	1989
KON	1	1	13 Nov 1963	1989
	2	1	13 Nov 1963	1989
	3	1	13 Nov 1963	1989
	4	1	13 Nov 1963	1989
	5	1	13 Nov 1963	1989
	6	1	13 Nov 1963	1989
	7	1	13 Nov 1963	1989
	8	1	13 Nov 1963	1989
	9	1	13 Nov 1963	1989
	10	1	13 Nov 1963	1989
	11	1	13 Nov 1963	1989
	12	1	13 Nov 1963	1989
	13	1	13 Nov 1963	1989
	14	1	13 Nov 1963	1989
	15	1	13 Nov 1963	1989
KON FRACTIONS	1	1	18 Oct 1965	1989
	2	1	18 Oct 1965	1989
	3	1	18 Oct 1965	1989
WEST	1	1	8 Aug 1966	1989
	2	1	8 Aug 1966	1989
	3	1	8 Aug 1966	1989
	4	1	8 Aug 1966	1989
	5	1	8 Aug 1966	1989
	6	1	8 Aug 1966	1989
	7	1	8 Aug 1966	1989
	8	1	8 Aug 1966	1989
	9	1	8 Aug 1966	1989
	10	1	8 Aug 1966	1989
	11	1	8 Aug 1966	1989
	12	1	8 Aug 1966	1989
	13	1	8 Aug 1966	1989
	14	1	8 Aug 1966	1989
STORIE	1	20	15 May 1979	1989
	2	5	15 May 1979	1989
	3	20	24 May 1979	1989
	4	20	24 May 1979	1989
	5	6	24 May 1979	1989
ALTA	6	16	31 May 1979	1982
	8	16	21 Aug 1979	1982
BRIGHT	1	12	13 May 1980	1981
	2	20	13 June 1980	1981

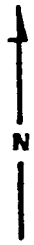
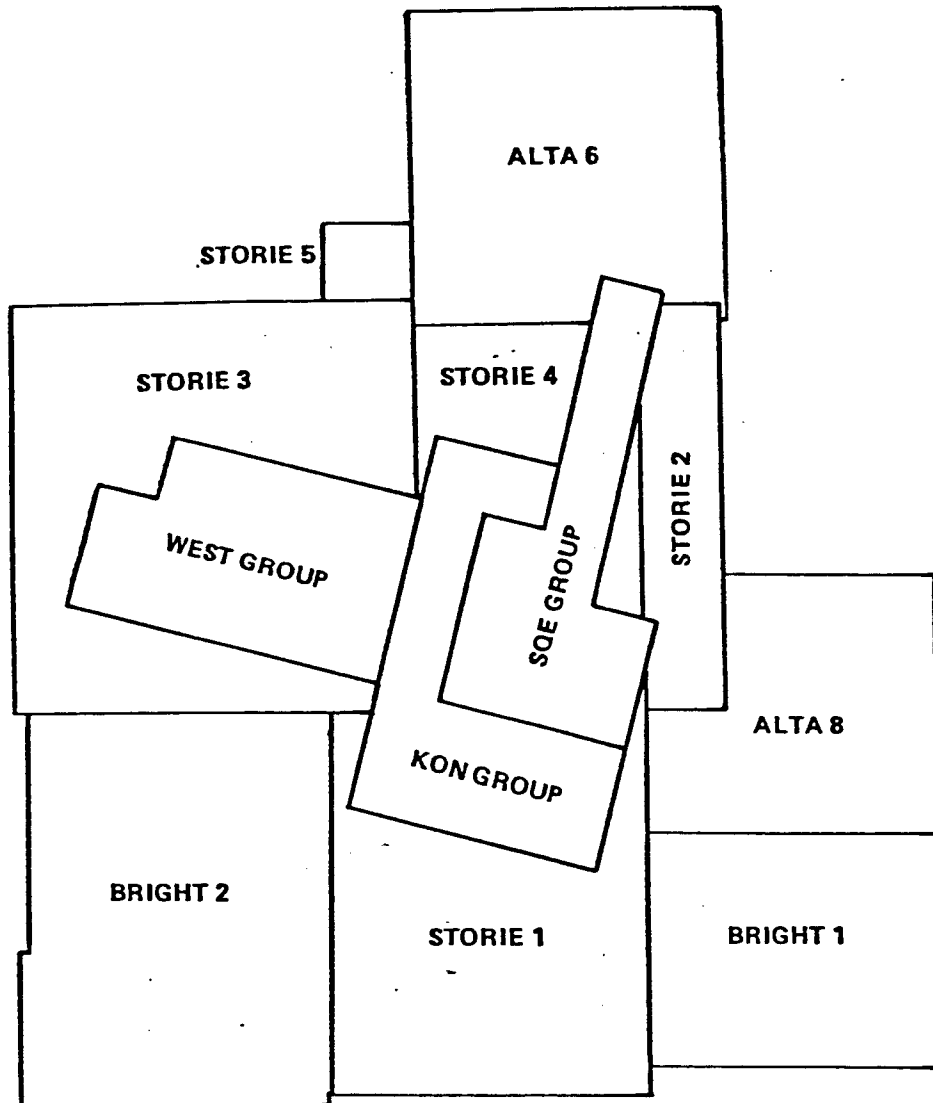
9215

Part of 4

CASSIAR

TOWNSITE

CAMP



CASMO  $M_0S_2$  PROPERTY  
PROPERTY MAP  
CASSIAR - B.C.  
LIARD MINING DIVISION  
SCALE 1:50 000  
MARCH 23, 1981  
FIGURE 2

## 2. LOCATION AND ACCESS

The Casmo molybdenite deposit is located about 6 kilometres southwest of the Town of Cassiar, at  $59^{\circ} 14' 30''$  N. Latitude, and  $129^{\circ} 51' 24''$  W. Longitude.

Cassiar is 540 kilometres from tidewater at Stewart, British Columbia, and 160 kilometres from the Alaska Highway at Watson Lake, Yukon Territory. Cassiar is connected to both Watson Lake and Stewart by a two-lane, all season, gravel and pavement highway. A gravel airstrip lies 3 kilometres from Cassiar.

The Casmo property, at an elevation of approximately 1,550 metres, is accessible by four wheel drive vehicle from Cassiar.

### 3. GEOLOGY

Four mappable intrusive rock units have been recognized on the property (Table 3). All are classed as quartz monzonites and are distinguished on the basis of color, grain size, and phenocryst content. Information gathered primarily from drill core indicates that the contacts are mostly gradational to abruptly gradational, with zones of mixing between some units.

The lithologies grade from an older, coarse grained outer phase, Unit 1, into two medium grained phases, Units 2 and 3, and finally into a younger, fine grained core phase, Unit 4.

Unit 1 is a light pinkish-grey, coarse grained, k-feldspar porphyritic, biotite quartz monzonite. Unit 1 is distinguished by its potash feldspar phenocrysts that range in size up to 4 cm megaphenocrysts from an average of 1 cm to 2 cm. The groundmass is inequigranular and ranges from 1 mm to 3 mm.

Unit 2 is a light to medium grey, medium to fine grained, quartz and k-feldspar porphyritic, biotite quartz monzonite. Unit 2 is distinguished by its bimodal biotite, occurring as 2 mm to 3 mm clusters of flakes and as flakes less than 1 mm in the groundmass that impart a distinct "pepper biotite" texture. Some k-feldspar phenocrysts display a Rapakivi texture.

Unit 3 is a light pinkish-grey, inequigranular, plagioclase and k-feldspar porphyritic, biotite quartz monzonite. Unit 3 ranges from slightly porphyritic to porphyritic.

Unit 4 is a pink, fine grained, quartz-feldspar porphyry. The groundmass has a distinct sucrosic texture, and ranges from fine grained to very fine grained. Phenocrysts are rarely more than 5 mm in size, being individual k-feldspar phenocrysts and individual or aggregates of quartz grains. Biotite is a rare accessory mineral.

Contacts are generally abrupt gradations that are characterized by changes in groundmass size and changes in phenocryst content and size. These gradations take place in zones that range in size from 10 cm to 2 - 3 m. Occasionally aplite lenses up to several metres in thickness mark the contacts. The contact between Unit 3 and Unit 4 shows the greatest variation ranging from gradational to abruptly gradational to zones where it is masked by shearing, slickensides, and brecciation.

TABLE 3

CONTACT RELATIONSHIPS	ROCK UNITS
GRADATIONAL AND ABRUPTLY GRADATIONAL	Unit 1: Light pinkish-grey, coarse grained, k-feldspar porphyrite, biotite quartz monzonite
GRADATIONAL CONTACT	Unit 2: Light to medium-grey, medium to fine grained, quartz and k-feldspar porphyritic, biotite quartz monzonite bimodal biotite
GRADATIONAL AND MIXED CONTACT	Unit 2A: Finer grained Unit 2 loss of bimodal biotite Unit 5: Med. grained nonporphyritic border phase of Unit 3 some aplite
	Unit 3: Light pinkish-grey, inequigranular plagioclase and k-feldspar porphyritic biotite quartz monzonite
	Unit 3A: Pink, finer grained variety of Unit 3 Unit 4: Pink, fine grained, quartz-feldspar porphyry. Sugary texture groundmass

MINERALIZED

CASMO PROJECT-TABLE OF ROCK UNITS

#### 4. STRUCTURE

The Casmo deposit is cut by northerly and easterly trending faults reflecting regional trends.

The most prominent structure is the Crone Fault. A strong topographic feature, the Crone Fault cuts the southwest corner of the property at  $070^{\circ}$ . Movement is normal with a dip-slip component of approximately 100 metres downthrow to the north. Other northerly trending and easterly trending faults are inferred from the juxtaposition of Units 2 and 3 at surface.

In drill core the faults appear as shears with gouge seams, slickensided fractures, and crushed or breccia zones. These shear zones are numerous and not easily correlated between holes. The phase boundaries between units appear to be favoured sites for faulting and shearing. In general, faulting has further complicated the contact relationships between the units.

The faulting has not severely displaced the orebody. It has, however, severely disrupted the mineralization as illustrated by molybdenite bearing black clay in gouge zones, slickensided molybdenite fractures, and broken molybdenite bearing quartz veins. Brecciation is regarded as post mineralization and related to faulting.



## 5. ECONOMIC GEOLOGY

### 5.1 Terms of Reference

Mineralization at Casmo is fracture controlled. Molybdenite is the only economic mineral present, occurring primarily as selvages on quartz-pyrite veinlets, and to a lesser degree as coatings on fracture surfaces, and grains and smears along slip surfaces and slickensided fractures. Some sub-oregrade molybdenite is also present as microscopic grains interstitial to muscovite and altered feldspars in fresh rock usually in Units 1 and 2. The zone of mineralization does not show a preference for a particular rock type.

In its present configuration, the orebody forms a flat-lying, northward dipping blanket. At the south end of the property the mineralization is thinner, plunging and thickening to the north. A higher grade core zone appears to delineate the rough axis of the deposit that plunges to the northwest.

To date, the drill indicated reserves are 100.5 million tonnes at a grade of 0.129%  $\text{MoS}_2$  using a 0.070%  $\text{MoS}_2$  cutoff. The total tonnage from the ultimate pit is based on data from all the drill holes on the property, both NQ drilling with mud and BQ drilling without mud.

### 5.2 Economic Evaluation

The work carried out to date on the Casmo project has proven the existence of a sizeable deposit.

In order to further define the deposit, the data base was used to carry out ultimate and optimum pit design calculations utilizing data from past and present programs. The ultimate pit contains 100.5 million tonnes at a grade of 0.129%  $\text{MoS}_2$  using a 0.07%  $\text{MoS}_2$ .

The deposit is open to the north, east and west. All calculations have shown the average grade of the deposit to be approximately 0.130%  $\text{MoS}_2$ . Since the average grade has proven consistent, further in-fill drilling along existing sections is not required at the present time. Further exploration drilling is, however, required beyond the present hypothetical pit boundaries to substantiate the probable extension of the mineralization.

## 6. CONCLUSIONS

The 1980 drill program successfully increased the tonnage potential at Casmo to 100.5 million tonnes at a grade of 0.129% MoS<sub>2</sub>, using a cutoff of 0.07% MoS<sub>2</sub>.

The use of four mappable rock units was continued in core logging. The intrusive rocks grade from an older, coarse grained porphyritic quartz monzonite through a medium grain variant to the youngest quartz-feldspar porphyry. In general, alteration is widespread but weakly developed. The mineralized zone does not show a preference for a particular rock type. The rock units and mineralization appear to dip steeply to the north, and are flat-lying to shallowly dipping to the west.

Geophysical surveys outlined a significant apparent resistivity low and a broad magnetic low over the main zone. Both of these trends continue to the northeast to the intrusive-sediment contact.

Based on the data collected to the end of the 1980 program, potential for increased tonnage exists to the east, west, and north. Further drilling is required to test these potential areas.

## 7. RECOMMENDATIONS

Additional drilling is recommended for the 1981 Field Season. This drilling will take place beyond the hypothetical pit boundaries to substantiate the probable extension of the mineralization.

### QUALIFICATIONS OF AUTHORS

I, Christopher J. C. Bloomer, state that I am a geologist in Minerals Exploration of Shell Canada Resources Limited of Calgary, Alberta. I have obtained a B.Sc., '77 degree at the University of Toronto and have practiced by profession since graduation. I was directly involved with the work submitted here in this report.

*Christopher Bloomer*

C. J. C. Bloomer  
Geologist  
Minerals Exploration  
Shell Canada Resources

I, Andrew W. Gourlay, state that I am a geologist in Minerals Exploration of Shell Canada Resources Limited of Calgary, Alberta. I have obtained a B.Sc., '77 degree from the University of British Columbia and have practiced by profession since graduation. I was directly involved with the work submitted here in this report.

*Andrew W. Gourlay*

A. W. Gourlay  
Geologist  
Minerals Exploration  
Shell Canada Resources



- Appendix I Saydam, A.S., 1981, Ground Geophysical Investigations over the Casmo Molybdenite Deposit
- Appendix II Smitheringale, W. G., 1980, Preliminary Report on the 1980 Casmo Geological Mapping Program
- Appendix III Chemex Certificate of Analysis for 1980 Core Assays

SUMMARY OF EXPENDITURES

Labour	\$ 44,797.50
Room and Board	61,200.00
Camp Supplies and General Materials	23,135.98
Fuels and Lubricants	29,769.33
Laboratory and Analytical Services	14,107.66
Geophysical Contract (CMG)	29,510.00
Drilling Contract (D. W. Coates)	445,305.64
Line Cutting	9,844.00
Truck Rental	2,098.27
Helicopter	24,044.77
Air Photos, Maps, Reports, etc.	2,438.22
Postage, Express, Air Freight for Core	19,537.96
Employee Travel	16,374.07
Aircraft	<u>5,524.04</u>
Total Expenditures:	\$727,687.44













## EMPLOYEE CUMULATIVES OF LABOUR AND ROOM AND BOARD

	WAGES CHARGED DAYS	ROOM AND BOARD CHARGED DAYS
CHRIS BLOOMER	76	76
HAYDEN BROWN	51	51
CARL DULLE	72	72
AUDREY GARVEN	27	27
ANDREW GOURLAY	100	100
BRUCE JAGO	16	16
DAVE KNIGHT	4	4
GRANT KNOWLES	24	24
ADAM LILLY		39
BOB LO.	18	18
BRUCE MARTEL		39
GORDON MOFFAT	7	7
ANDY OLNEY	62	62
GEOFF ORR	51	51
DAVE PARBERRY	31	31
BILL SMITHERINGALE		40
BRIAN YAMAMURA	4	4
IP. CREW (3 men)		141
DRILL CREW (9 men)		558
TOTAL	543	1360

**CASMO 3091T**  
**MONTHLY CUMULATIVE OF LABOUR AND ROOM AND BOARD**

	APRIL	MAY	JUNE	JULY	AUGUST	TOTAL MAN DAYS	TOTAL \$
TOTAL ROOM AND BOARD MAN DAYS @ \$45.00 MAN/DAY	244	517	235	134	230	1360	61,200.00
TOTAL LABOUR MAN DAYS @ AN AVERAGE WAGE OF \$82.50 MAN/DAY	73	233	119	51	67	543	44,797.50

**TOTAL: LABOUR + ROOM AND BOARD = \$61,200.00 + \$44,797.50 = \$105,979.50**