GEOLOGICAL SURVEY REPORT

ON THE

JACKPOT PROERTY

SOUTHEASTERN BRITISH COLUMBIA

NELSON MINING DIVISION

NTS 82F/3E,6E

LATITUDE 49° 09' 22"

LONGITUDE 117° 09' 20"

by

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NEW JERSEY ZINC EXPLORATION CO. (CANADA) LTD.

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LIST OF MAPS (BACK POCKET)

INTRODUCTION

A detailed and reconnaissance geological survey was carried out on the Jackpot Property by New Jersey Zinc Exploration Co. (Canada) Ltd. during the 1981 and 1982 field seasons.

LOCATION AND ACCESS

The Jackpot Property is situated within the Salmo (lead-zinc) "Mine Belt" in the Nelson Mining Division of Southeastern British Columbia. (Figure 1)

The center of the claim group is located 6.4 Km (4 miles) south-southeast of Ymir immediately south of the junction of Porcupine and Active Creeks (Figure 2). Ymir is located on an all-weather paved highway, midway between the cities of Nelson and Trail. A bush road situated about 3 Km south of Ymir leads eastward along Porcupine Creek to the Jackpot switchback road (Figure 2).

The Porcupine Creek road cuts across the north boundary of Sharon 8 while the Hidden Creek Road cuts through the southwest corner of Sharon 1 (Figure 2). The center of the claims can most easily be reached by the Jackpot switchback road which leads south from the Porcupine Creek Road at a point just west of Active Creek.

DESCRIPTION OF CLAIMS

The Jackpot Property is comprised of 33 claims totalling 132 contiguous units including 6 crown granted and 27 recorded claims (Table 1). These claims are wholly owned by New Jersey Zinc Exploration Co. (Canada) Ltd. (Figure 2)

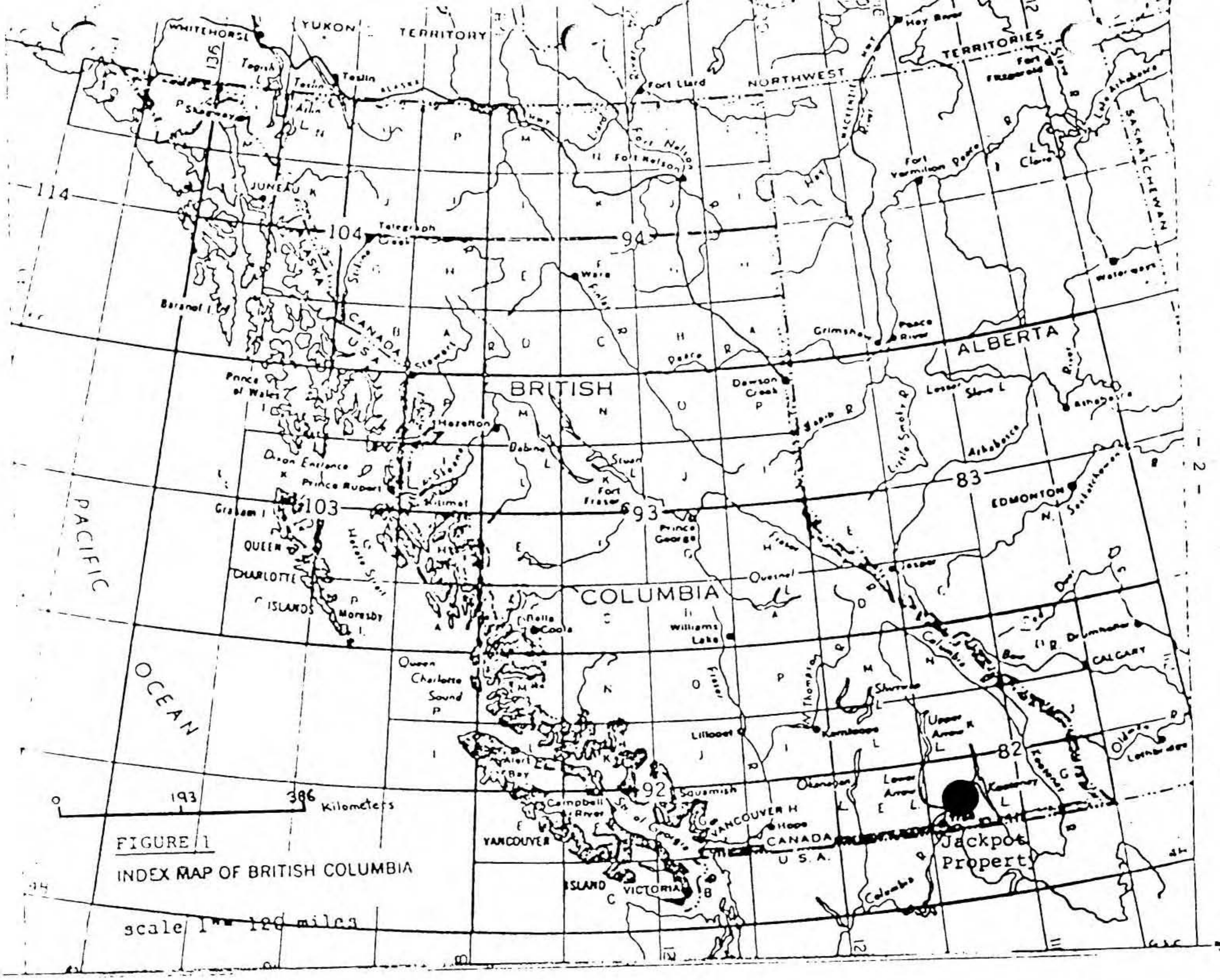


FIGURE 1

INDEX MAP OF BRITISH COLUMBIA

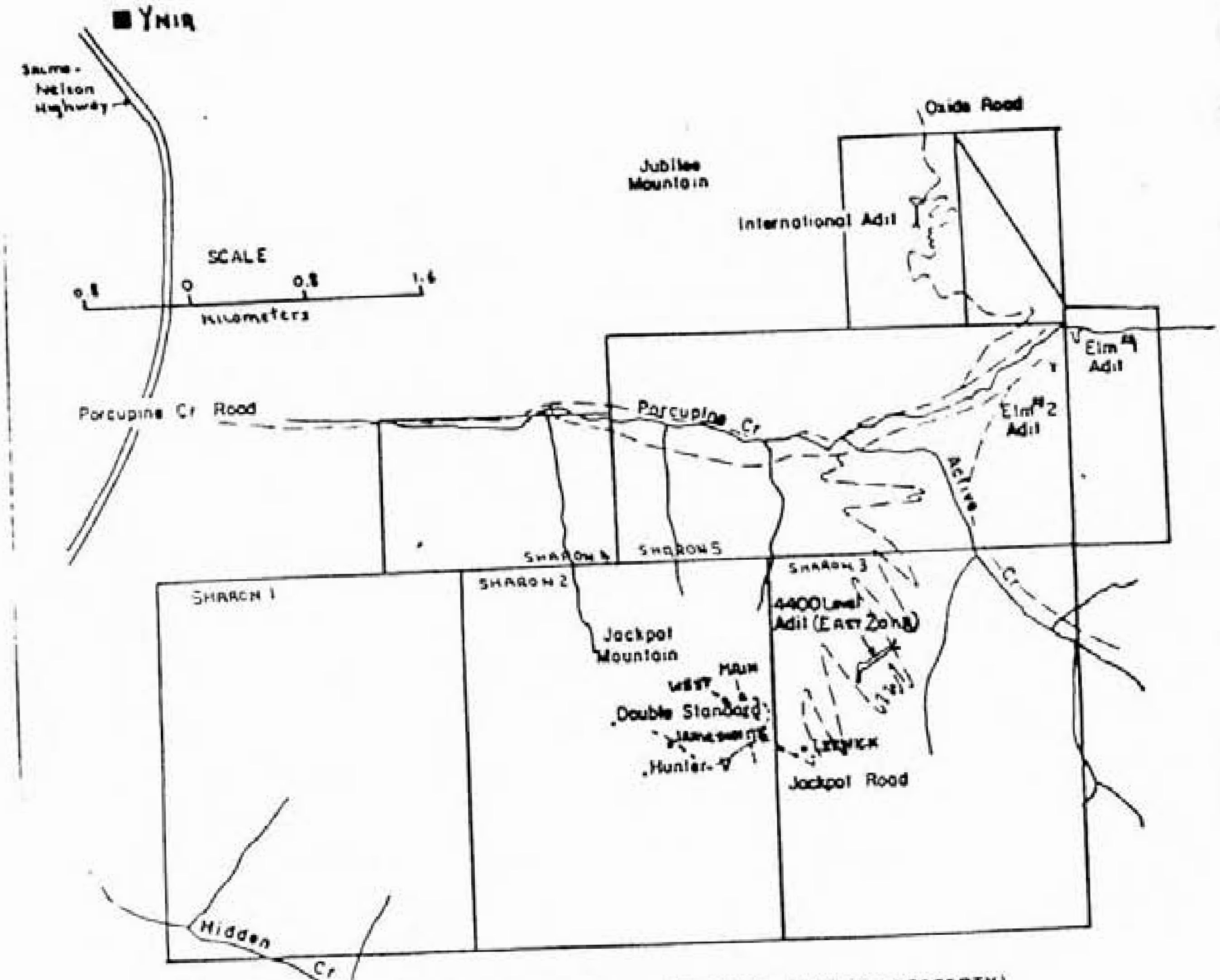


FIGURE 2: TOPOGRAPHIC NOMENCLATURE (JACKPOT PROPERTY)

TABLE I: JACKPOT PROPERTY LAND HOLDINGS (REVISED)

JACKPOT GROUP[***]

CROWN GRANTED CLAIMS

NAME (No. of units)[**]	REC/LOT NUMBER	EXPIRY DATE
Hunter V	Lot 2212	Paid 1982[*]
Double Standard	Lot 2213	Paid 1982[*]
Marcia Fraction	Lot 2214	Paid 1982[*]
Eldorado	Lot 5198	Paid 1982[*]
Chihuahua	Lot 5199	Paid 1982[*]
Charmencita	Lot 5201	Paid 1982[*]
RECORDED CLAIMS		
Ink Spot	Record 1356	Expires June 9, 1989
Jackpot	Record 1357	Expires June 9, 1990
Ace	Record 1361	Expires June 21, 1989
Jamesonite	Record 1362	Expires June 21, 1989
Elm #5 Fraction	Record 3042	Expires June 6, 1989
Canadian Boy	Record 1370	Expires July 2, 1989
Canadian Girl	Record 1371	Expires July 2, 1990
Two Spot	Record 1375	Expires July 8, 19[illegible]
Spot Fraction	Record 1384	Expires Aug. 2, 1989
Rush #1 Fraction	Record 15357	Expires Nov. 20, 1989
Chief	Record 1394	Expires Aug. 10, 1989
Jay	Record 1395	Expires Aug. 10, 1989
Chief Fraction	Record 1396	Expires Aug. 10, 1989
Jay Fraction	Record 1397	Expires Aug. 10, 1989
Jamesonite Fraction	Record 1484	Expires Oct. 18, 1989
1981 STAKING		
Sharon 1 (20)	Record 2373	Expires July 14, 1982[4]
Sharon 2 (20)	Record 2374	Expires July 14, 1982[4]
Sharon 3 (20)	Record 2375	Expires July 14, 1982[4]
Sharon 4 (6)	Record 2376	Expires July 14, 1982[4]
Sharon 5 (18)	Record 2377	Expires July 14, 1982[4]
Sharon 6 (6)	Record 2378	Expires July 16, 1982[4]
Sharon 7 (2)	Record 2452	Expires Sept. 6, 1982[4]
1982 STAKING		
Jen # 2 (1)	Record 2686	Expires July 19, 1983
Mitch #3 (1)	Record 2685	Expires July 14, 1983
Pope 2 (3)	Record 2684	Expires July 13, 1983
Sharon 8 (12)	Record 2687	Expires Aug. 20, 1983
Alder (2)	Record 2735	Expires Oct. , 1983

TOTAL 6 crown granted claims) 132 units
27 recorded claims (124 units)

* Taxes due July 2nd, annually.
** Pertaining to modified grid claims.
*** Notice to group # 2590 and supplemental notice filed; all claims except Sharon 1 and 8 are in the "Jackpot Group" proper.

4. Assessment work has been filed in August 1982 to keep these claims in good standing until 1984.

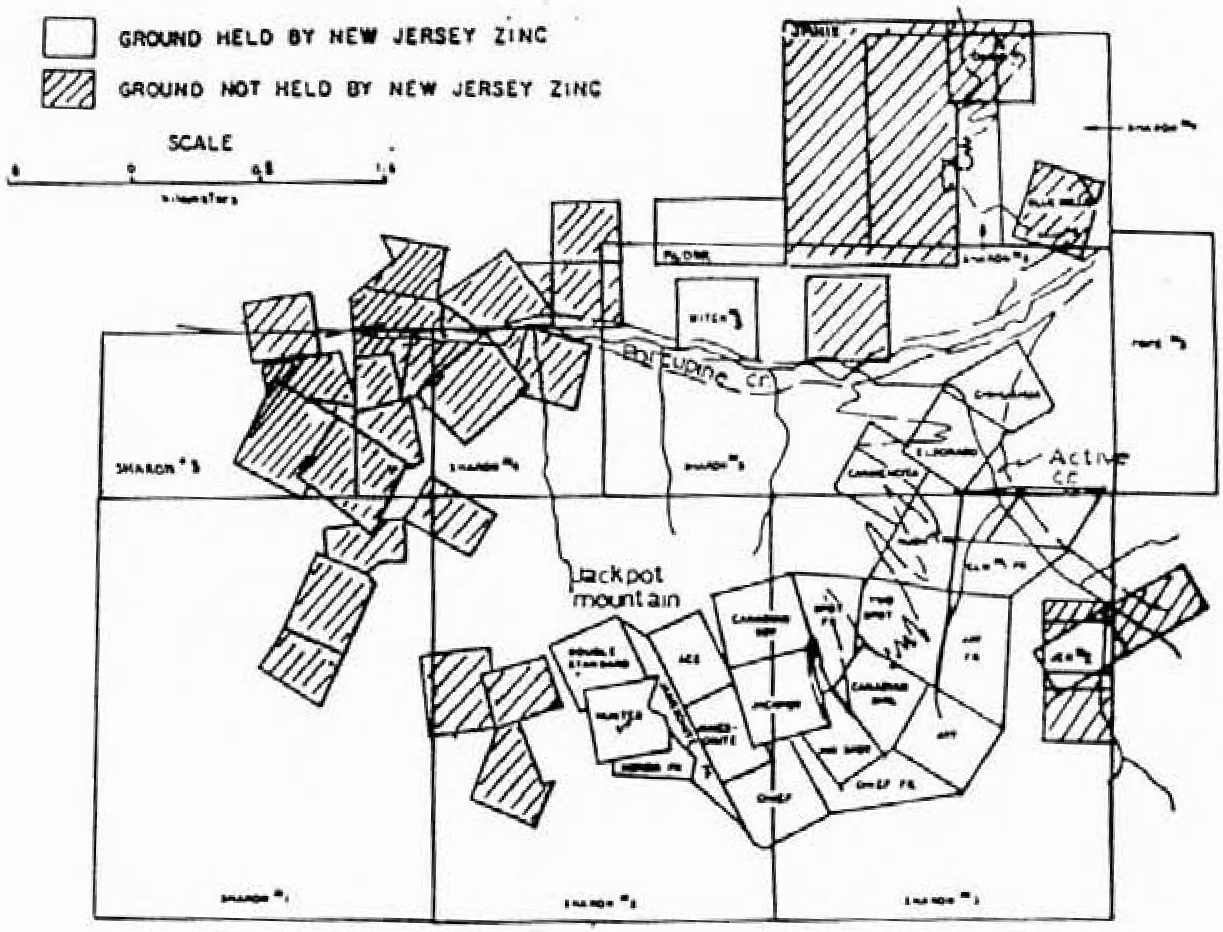


FIGURE 3 · JACKPOT PROPERTY CLAIM GROUP

TABLE II: JACKPOT PROPERTY LAND HOLDINGS

JACKPOT GROUP[1]

PREVIOUS STAKING

CROWN GRANTED CLAIMS

NAME (No. of Units)[2]	REC/LOT NUMBER	EXPIRY DATES
Hunter V	Lot 2212	Paid 1982*
Double Standard	Lot 2213	Paid 1982*
Mercia Fraction	Lot 2224	Paid 1982*
Eldorado	Lot 5198	Paid 1982*
Chihuahua	Lot 5199	Paid 1982*
Charmencita	Lot 5201	Paid 1982*
RECORDED CLAIMS		
Ink Spot	Record 1356	June 9,1989
Jackpot	Record 1357	June 9,1990
Ace	Record 1361	June 21,1989
Jamesonite	Record 1362	June 21,1989
Elm #5 Fraction	Record 3042	June 6,1989
Canadian Boy	Record 1370	July 2,1989
Canadian Girl	Record 1371	July 2,1990
Two Spot	Record 1375	July 8,1990
Spot Fraction	Record 1384	Aug. 2,1989
Rush #1 Fraction	Record 15357	Nov. 20,1989
Chief	Record 1394	Aug. 10,1989
Jay	Record 1395	Aug. 10,1989
Chief Fraction	Record 1396	Aug. 10,1989
Jay Fraction	Record 1397	Aug. 10,1989
Jamesonite Fraction	Record 1464	Oct. 18,1989
1981 STAKING		
Sharon 1 (20)[3]	Record 2373	July 14,1984
Sharon 2 (20)	Record 2374	July 14,1984
Sharon 3 (20)	Record 2375	July 14,1984
Sharon 4 (6)	Record 2376	July 14,1984
Sharon 5 (18)	Record 2377	July 14,1984
Sharon 6 (6)	Record 2378	July 14,1984
Sharon 7 (2)	Record 2452	Sept. 6,1984
1982 STAKING		
Jen #2 (1)[4]	Record 2686	July 19,1983
Mitch #3 (1)[4]	Record 2685	July 14,1983
Pope 2 (3)[4]	Record 2684	July 13,1983
Sharon 8 (12)[3]	Record 2687	Aug. 20,1983

TOTAL 6 crown granted claims) 130 units
26 recorded claims (126 units)

* Taxes due July 2nd, annually

1. Notice to group # 2590 and supplemental notice filed; all claims except Sharon 1 and 8 are in the "Jackpot Group" proper.
2. Pertaining to modified grid claims
3. Notice to group filed December 1982; Sharon 1 and 8 are in the Jackpot (West) Group
4. Assessment filed and pending approval.

PROPERTY HISTORY

The history of the property dates back to about the turn of the century when early exploration endeavours focused on the silver potential in the center part of the property: Between 1902 and 1929, the Double Standard and Hunter V glory holes were excavated and mined for their silver and gold. From 1949 to present, the property has been owned by New Jersey Zinc Exploration Co. (Canada) Ltd.

PRESENT SURVEY

The geological survey was completed sporadically between July 1 to Sept 16, 1981 and between June 7 to August 30th, 1982. The survey was done in order to be able to correlate and explain the geochemical data (see other geochemical assessment reports) and to trace possible extensions of known zones of precious and base metal mineralization.

CONTROL SURVEY

An orthophotographic base map corrected for distortion was prepared by McElhanney Engineering of Ottawa, Ontario and this was used to locate and position the grid lines. Several old corner posts from the Hunder V claim were located in the field; otherwise all claim boundaries are approximated from the survey records available at the Gold Commissioners ' Office in Nelson. The Sharon Claim boundaries were all located in the field and their location is tied to topographic features recognizable on the orthophotographs.

With reference to the accompanying base maps, the grid lines were located by pace and compass traversing using a hip chain. The baseline from 4000W to 4000E is cut (1 meter wide) and blazed and is tied to topographic features such as outcrops recognizeable on the orthophotographic base map. The main detailed grid, situated between 2400W and 1600E and running from 1200S to 1800N is also cut and blazed. All other lines are marked by flagging only. The main detailed grid, base line and lines 3000N, 6000N, 3000S, 6000S, 4000W, 4000E, 7200E were completed by Renegade Mineral Exploration Services Ltd. of Kamloops, B.C. All other grid lines were put in by company personnel. South of Porcupine and Active Creeks the lines are all numbered according to their grid location. North of Porcupine and Active Creeks the line numbers are not tied to the grid. All stations are marked with white Tyvek tags indicating the line and station number. Stations are marked at intervals of 100 feet (30m) on the main detailed grid; throughout the remainder of the reconnaissance grid the tyvek tags are located at 200 foot (60m) intervals. All assistants in the field were trained in recognizing topographic features on the orthophotographs. Where possible, all lines are fairly accurately tied to such topographic features and are therefore accurately represented on the base map. In 1981 the main detailed grid totalled 20.2 kilometers (12.6 miles) while the reconnaissance grid totalled 157 kilometers (98 miles). In 1982 a further 22.4 line km (13.9 miles) were flagged and tagged; these were emplaced over previously disclosed anomalous areas.

GEOLOGICAL SURVEY

A) REGIONAL SETTING:

Regional geology of the area has been documented by Drysdale (1917) Walker (1934), Little (1960, 1965) Little and McAllister (1964) and Fyles and Hewlett (1959). The Jackpot property is situated within the critical Lower Cambrian carbonate stratigraphy that hosts a major lead-zinc province extending from the Coeur d'Alene (Washington, U.S.A.) area to the Kootenay Area (B.C.).

Fyles and Hewlett (1959) have outlined the overall stratigraphic sequence: The oldest rocks underlying the Jackpot Property are comprised of pure and impure quartzites of the Quartzite Range Formation; these are succeeded by limestone, marble and dolomite which consitute the Reeves Member of the Laib Formation. Siltstone and sandstone clastic metasediments of the Ymir Group that are in part penecontemporaneous with and in part post date the above sequences form major constituents in the west part of the property. All of this supracrustal sequence is intruded by mafic to felsic plutonic rocks of Mesozoic Age. (see Table 2).

B) DETAILED PROPERTY GEOLOGY

Reconnaissance (1 inch to 400 feet) and detailed (1 inch to 100 feet) geology of the Jackpot Property is given on maps AXL-BC-81A and AXL-BC-82A (maps 1 & 2) respectively (back pocket). In 1981 major rock groups were subdivided lithologically according to the legend in appendix A-1. In 1982 an attempt was made to subdivide the rocks stratigraphically after Fyles and Hewlett's (1959) classification (see Table 2) as per the legend indicated in appendix A-2. Both of the detailed maps (AXL-BC-82A, maps 1 & 2) are coded according to the stratigraphic (1982) legend. On the reconnaissance map, all outcrops are coded according to the lithological (1981)

Era	Period	Formation	Subunit	Member	Lithology
CENOZOIC	TERTIARY?				Granite, Syenite and Monzonite; Lamprophyre Dikes
MESOZOIC	CRETACEOUS	NELSON INTRUSIVES			Granitic Stocks, Gabbro, Diorite
	JURASSIC AND CRETACEOUS	ROSSLAND VOLCANIC GROUP * °			Mainly Volcanic Rocks
	TRIASSIC AND (?) EARLIER	YMIR GROUP			Black Argillite, Argillaceous Quartzite, Limestone, Sandstone
	EXACT CORELATION UNKNOWN	MIXED METASEDIMENTARY SEQUENCE			Sandstone, Siltstone
PALEOZOIC	ORDOVICIAN	ACTIVE FORMATION			Black Graphitic Argillite, Slate Argillaceous Limestone
	UPPER CAMBRIAN	(Stratigraphic Relationship Unknown in Map-Area)			
	MIDDLE CAMBRIAN	NELWAY FORMATION *			Limestone + Dolomite
	LOWER CAMBRIAN	LAIB FORMATION	UPPER° LAIB		Phillite + Micaceous Quartzite
			LOWER LAIB	Emerald Member	Black Argillite, Highly Recrystallized Siltstone
				Reeves Member **	Limestone ± Dolomite
				Truman Member	Argillite + Limestone
		RENO FORMATION		Upper Reno Member	Phillite + Micaceous Quartzite + Minor Massive Quartzite
				Lower Reno Member	
		QUARTZITE RANGE FORMATION		Nevada Member	White + Micaceous Quartzite
				Nugget Member	Quartzite

* ←Not present on the Jackpot Property

** All of the lead-zinc Salmo-type deposits are associated with this member

° From Little (1960)

TABLE 2: Table of Lithologic Units for the Salmo Lead-Zinc Area (after Fyles and Hewlett, 1959)

legend but the major rock unit boundaries or contacts are drawn on the basis of stratigraphy as per the simplified legend.

About 80% of the area covered by the present geological survey had never been mapped comprehensively and in detail. The work by Fyles and Hewlett (1959-Figure 8) which in part is a compilation of the earlier work done by New Jersey Zinc Exploration Co. (Canada) Ltd (1950 to 1954) until now, gave an incomplete structurally complex picture. During the present survey it is estimated that about 70% of the total possible outcrop in the area is represented on the final maps (this figure rises to 95% in the criticle area near the Reeves Limestone). In areas of poor exposure the contacts of rock units are interpolated from the zinc-lead geochemical surveys (see Jackpot Property assessment file report dated April,1983). The present geological survey was completed over the whole of the property; areas underlain by granitic batholiths were de-emphasized while the areas underlain by the Reeves Formation, especially near the Hunter V and Double Standard Glory Holes, were emphasized. Areas in which information was taken from previous mapping data are preceeded with the code "C" indicating compiled information.

The present geological survey is believed to provide the most detailed comprehensive maps of the property to date and is the first to depict individually coded outcrops.

SUPRACRUSTAL SEQUENCE

Five major supracrustal rock groups are present on the Jackpot Property and include:

1. Quartzite Range Formation
2. Reno-Truman Formations
3. Reeves Member
4. Active Formation*
5. Ymir Group*

*may in part be penecontemporaneous

In addition, intrusive rocks are subdivided into mafic to intermediate (map codes 7 and 9) and felsic to intermediate (map code 8) groups.

QUARTZITE RANGE FORMATION

Quartz-rich metasediments (map group 1) are comprised of pure white and impure light brown quartzites of the Quartzite Range Formation. This formation occupies the nose of an anticline that trends north-south and forms a linear band running from the top of the Jackpot property to Jubilee Mountain. Impurity content through addition of minute iron silicate minerals and pelitic content increases upward in the sequence (away from the anticlinal axis). The oldest phases are comprised of massive, pure white quartite correlateable to the Nugget Member. The upper (younger) phases are comprised of reddish-brown to buff-coloured, muscovite-bearing quartzite interbedded with some white quartzite and minor intercalated lenses of siliceous to argillaceous siltstone; these are correlateable to the Nevada Member (Fyles and Hewlett, 1959). The reddish-brown tone is due to iron oxide staining of the impurities or to the possible presence of hematite. In general, bedding is ill defined to commonly absent.

The purer white quartzite variety is estimated to be comprised of at least 95% granular quartz.

RENO-TRUMAN FORMATIONS

According to Fyles and Hewlett, (1959, p.31) the Quartzite Range Formation passes gradationally into micaceous quartzites of the Reno Member which in turn passes stratigraphically upwards into impure carbonate rocks of the Truman Member of the Laib Formation. Due to the fact that there does not appear tp be a complete section preserved on the Jackpot Property; these two members were not distinguished and, on the accompanying maps, they are grouped as 1 rock unit.

The Reno Formation is best exposed in the 4400 level adit and on the Jackpot Switchback road near switch-back numbers 5,9 and 16 where it is typically comprised of interbedded, grey siliceous sandstone and thin (less than 5 mm) argillaceous siltstone (as biotite partings). Locally, especially north of Porcupine Creek, the formation contains thin interbedded limestone.

Elsewhere in the vicinity of the Double Standard Glory Hole there are diffuse clots and lenses of granitic (tomalite composition) component that may or may not be intrusive. As noted by Fyles and Hewlett (1959-see their figure 8) and confirmed during the present work, north of the Double Standard Glory Hole, the Reno Formation is not easily distinguished from metamorphic rocks believed to be in part correlateable with the Ymir Group Metasediments.

North of Porcupine Creek the Reno Formation is more highly metamorphosed and is comprised of interbedded grey quartzites,grey-brown biotite phyllites (formerly argillites) and subsidiary, laminated micaceous (impure) limestone.

The Truman Member of the Laib formation is exposed on the Jackpot Switchback road but it is also present north of Double Standard (L10+100W - 0 to 1S) and south of the Hunter V (8 to 10E - 1 to 2S). The Truman is distinct from the Reno formation in that it is typically an altered, diopside-rich skarn with minor clastic remnants. At the latter two localities above, it is comprised of very finely laminated discontinuous lenses of diopside and granular, recrystallized calc-silicate. Elsewhere, on the Jackpot Switchback road, and near the Main Zone the rock unit is characterized by interlayered lenses of purple-weathered micaceous argillitic sandstone and light green-weathered calc-silicate skarn.

Essentially the Truman member is a transtional facies between siliceous clastic metasediments (below) and the Reeves Limestone (above).

REEVES LIMESTONE

Most of the known lead-zinc reserves and precious metal zones are hosted by the Reeves Limestone and recognition of the Truman-Reeves contact is critical in evaluating the potential of the property. In most cases the change from clastic to carbonate sedimentation is abrupt but north of Porcupine Creek, and along the west part of the black argillites (Active Formation) the limestone is partly gradational westward into clastic metasediments. The carbonate rocks are most extensive on the top of the Jackpor ridge where it has an apparent thickness of 1400 feet but elsewhere it averages 150 to 500 feet true thickness. Minor lime layers within the west part of the black argillite (Active Formation) sequence have a high mud content and are exceedingly impure.

Most of the Reeves Limestone is situated adjacent to and flanking the anticlinal axis that is occupied by the Quartzite Range Formation. A band of limestone situated along the east side of the black argillite sequence (Active Formation) near the east border of the property is similar to and is probably part of the Reeves Member.

In order of decreasing abundance, the Reeves Member is comprised of limestone, dolomitic limestone, silicified limestone, marble and dolomite. Although no stratigraphic relationships are mentioned by Fyles and Hewlett (1959, p.32-33) the present geological survey indicates the Reeves Member is comprised of three major subfacies:

- (i) a dominantly laminated dark grey-light grey limestone unit
- (ii) a massive dolomitic unit
- (iii) a coarse-grained, inequigranular marble unit

(i) <u>Laminated Limestone</u> (unit 4a - map AXL-BC-82A)

Laminated limestone is well banded, composed of alternating layers of beds of limestone ranging in colour from white to light grey to dark grey and subsidiary dolomite bands. This dramatic change in colour from layer to layer make the carbonate deposits appear much more heterolithic than they really are. Locally the light grey beds exhibit a light bluish tinge due to the addition of talc. Most of the individual beds are ½ inch or less in thickness but in places, groups of bands combine to give a contrasting colour band that can be several feet thick. For the most part, the individual coloured layers tend to be discontinuous over 10 to 20 feet but locally a few larger bands can be used as rough marker horizons for several hundred feet.

In general, the limestone is fine-grained but locally medium to coarse-grained varieties can be observed especially north of Porcupine Creek.

In detail, the variation in colour is nearly always stratigraphically conformable and most workers indicate the colour banding is primary. However, rarely there are large, discontinuous, ill-defined lenses or blocks of dark limestone situated within light limestone; near the lateral terminations of these zones, the colour contrast appears to transgress the stratigraphy. This feature is most probably due to structural deformation (block wedging or minor thrusting during folding) but may also infer that the colour is due to secondary processes such as alteration. The limestone is texturally featureless; rarely at Double Standard there are small pods or knots of one limestone type internally incorporated within another limestone of contrasting colour and locally these zones appear brecciated.

Within the well laminated limestone (unit 4a, map AXL-BC-82A) the white bands weather high, are hard and are silicified (quartz-bearing) limestone units. The light grey and dark grey limestone both weather low and are comprised of mainly calcite. Chemical analyses (Table 2) of unmineralized ligh grey and dark limestone from the Hunter V indicate the darker limestone is enriched in iron (8x), potassium (2x) and silica (3x). In addition, the darker limestone exhibits a marked enrichment (1 to 3x) pattern in nearly all of the minor elements.

At the Hunter V, dolomite is conformable to limestone stratigraphy but elsewhere, according to Fyles and Hewlett (1959, p. 86), on a regional scale dolomite is not stratigraphic. Green (1954 p.10) sites the dolomite as being mainly conformable but at two of the lead-zinc mines in the Salmo area (the Reeves Macdonald and H.B. mines) the dolomite cuts across the limestone

	Dark Grey Limestone (%)	Light Grey Limestone (%)
SiO_2	6.13	2.07
Al_2O_3	0.01	0.01
Fe_2O_3	0.08	0.01
CaO	45.96	46.37
MgO	5.35	5.78
Na_2O	0.13	0.17
K_2O	0.11	0.05
TiO_2	0.01	0.00
MnO	0.01	0.01
P_2O_5	0.08	0.18
L.O.I.	35.85	38.50
TOTAL	93.72	93.15

	ppm values	ppm values
Cu	5	3
Pb	39	27
Zn	23	17
Ni	11	5
Co	5	3
V	47	13
Sb	13	7
Cd	<1	<1
Cr	25	11

TABLE 2: Major and minor whole rock analyses of white and dark grey limestone from the Hunter V.

stratigraphy. At the Hunter V, dolomite forms thin (less than 1/16 inch) concordant, discontinuous lenses along bedding planes and also forms a few wider bands (up to 6 or 8"). At the Hunder V the wider bands are spatially associated with the mineralized bands. The dolomite bands are easily recognized by their dull grey, positive weathering, and their fine-grained equigranular crystal structure (the limestone is nearly always inequigranular from fine to medium-grained). X-ray diffraction analysis indicates the dolomite is a mixture of dolomite and limestone.

(ii) Massive Dolomite (unit 4b-map AXL-BC-82A)

Massive dolomite occurs as broad zones up to 500 feet (152 m) thick at the Jamesonite Zone (map AXL-BC-82A, map #1). It is an important unit in that nearly all of the workers in the area indicate its close spatial association to Pb-Zn mineralization (Green, 1954 p,29,31; Fyles and Hewlett, 1959 p.86). These and other workers indicate the dolomite is secondary due to epigenetic replacement of the limestone. The XRD patterns of samples of single beds taken by the authors that indicate a mixture of dolomite and limestone concur with this replacement hypothesis. The dolomite is believed to be structurally controlled along synclinal/anticlinal fold axes (Fyles and Hewlett, 1959 p. 86). Also the dolomitization event is viewed as being pre-ore deposition by both Green (1954, p. 12) and Fyles and Hewlett (1959, p.86-87); that is the ore-bearing fluids appear to have preferentially selected a dolomitic host. Nearly all of the more extensive dolomite zones appear to be broadly concordant to stratigraphy. All of the dolomite on the Jackpot claim is massive and texturally featureless.

(iii) Inequigranular Marble (unit 4c, map AXL-BX-82A)

Marble is the metamorphic equivalent of limestone. Marble forms the dominant lithology south of the Hunter V where it constitutes about 90 percent of the exposed areas. It also forms much of the area north of the trail leading from the access road to the Double Standard site. In general, the marble appears to be concentrated near to the major granite intrusives. Marble also forms as minor diffuse isolated clots concentrated along and parallel to bedding planes within the laminated unit at the Hunter V Glory holes and these appear to be the incipient stage of marble formation.

Marble is typically unbanded and inequigranular from medium to very coarse-grained over distances of several inches. Although it can be quite competent, south of the Hunter V it is commonly friable and crumbles easily on the weathered surface.

Locally there are coarse grained, linear, commonly lineated porphyroblastic,rusty-brown (due to the presence of phlogopite mica) calcite crystals that are found in both limestone (along bedding planes) and in marble. In the latter they may indicate the site of original bedding plane horizons.

According to Green (1954, p.9,29), coarse marble typically occurs near the contact of granitic rocks but also is associated specifically with lead-zinc mineralization in other properties in the Salmo area. Green (1954, p.29) studied several other similarly hosted Pb-Zn deposits in the United States and concluded this increase in grain size was unique to the Salmo area. Apparently the increase in grain size towards granitic contacts in the Salmo area occurs only in the Jackpot and Aspen Properties (the Aspen property, located about 4 miles south-southwest of the Jackpot claim group, is reported to have a geological setting and mineralization similar to Jackpot).

Although the evidence is not at all conclusive there is a suggestion the three subunits (laminated-dolomite-marble) form a stratigraphic sequence that has not been recognized until present. That is, there is a tendency for the marble unit to be concentrated near the Truman and this is then succeeded by the dolomitic and laminated units respectively.

It should be noted here that the development of this stratigraphy could be and probably is secondary. That is, the original entire limestone sequence could have been well bedded but subsequently (i) a laminated unit was derived due to a combination of metamorphism and structural deformation, (ii) a dolomite unit was developed contemporaneous with the possible influx of hydrothermal activity involving metal (Zn+Pb)-bearing, magnesium rich fluids and (iii) a marble unit was developed due to metamorphism instigated by granite intrusion. In the latter case, much of the marble is adjacent to the granite but at least some of the marble is apparently away from granitic intrusions.

ACTIVE FORMATION

Black argillitic metasediments occur east of the Quartzite Range Formation and are correlateable to the Active Formation which is of Ordovician age. This sequence succeeds the Laib Formation; on the east part of the Jackpot Property it trends north-south, dips subvertical and consists of a monotonous succession of dark grey to black argillite to locally slate. Minor lime-rich layers are locally present and these vary in thickness from a few inches up to a maximum of 1 or 2 feet. The lime-rich beds within the main part of the Active Formation comprise less than 2% by volume. Within the "over argillite", a transitional facies between the Reeves Limestone and the main Active Formation, the limestone interbeds can constitute up to 20% by volume.

The argillite is commonly graphitic and locally contains pyrite structurally tied to bedding planes. In detail the argillite is typically comprised of two components: the most abundant (at least 85 to 90 percent by volume) is mudstone comprised of laminated clay-size and silt-size fractions; this is irregularly interrupted by interlaminated, slightly more silica-rich, fine-grained sandstone. Some of the argillite beds are up to 3 inches thick but most are finely bedded. The beds mainly dip steeply vertical but toward the contact of the Porcupine Creek Stock. There are minor warps and locally the beds are subhorizontal dipping slightly south. If there has been no structural complications, the Active Formation has an apparent thickness of approximately 3300 feet on the Jackpot Property.

Several infolded layers of black argillite that are part of the Active Formation occur as isolated raft within the Reeves Limestone on top of the Jackpot Mountain.

YMIR GROUP

The metasediments that underline the west half of the Jackpot Property (ie west of the Quartzite Range-Reeves Limestone Sequence) are for the purposes of this survey included into the Ymir Group of Metasediments. Both Fyles and Hewlett (1959, p.38-41) and Little (1960 p.42-45 and p. 57-59) were unable to correlate the eastern half of this sequence which they termed the "Mixed Rock" and "Undivided Paleozoic" sequences respectively. According to Fyles and Hewlett (1959, p.41) the lower portions of this mixed metasedimentary sequence are in part contemporaneous with all of the previously mentioned metasediments but are definitely younger than the Ymir Group. The mixed metasedimentary assemblageis regarded to be of unsubdivided Palaeozoic age.

The present mapping has shown that there are at least two distinct units that are separable and possibly correlateable to other stratigraphic units including the <u>Emerald</u> within the Ymir Group.

Unit #1 (map code 4a on map AXL-BC-81A)

North and south of Porcupine Creek, west of the Quartzite Range Formation, there are coarse, recrystallized metasediments (map code 4a-map AXL-BC-81A) that Fyles and Hewlett (1959) correlate with the Emerald Member of the Laib Formation. The Emerald Member overlies the Reeves Limestone.

The eastern (lower) protion of this metasedimentary sequence consists of fine-grained, typically laminated to finely-bedded argillaceous siltstones and minor sandstones. To the west, the greater portion of this member is extremely coarsely recrystallized. Biotite is abundant and forms clots (0.75 inches) that are aligned as a foliation that nearly always displays tight crenulations. The biotite content constitutes 50 to 60 percent by volume and indicates an original pelitic composition. Due to the metamorphic recrystallization bedding planes are absent but locally the presence of unrecrystallized sandstones beds (characterized by a lower mafic content) delimit rare bedding trends.

The dominance of pelitic compositions indicates the Emerald Member was comprised of distal facies siltstone; it is environmentally comparable to and possibly stratigraphically equivalent to the Active Formation with the only difference being that the Active Formation contains graphite and is less highly recrystallized.

Unit #2 (map codes 5a,6 (map AXL-BC-81A) and
6j(map AXL-BC-82A)

West of this possible Emerald Sequence and East of the main Ymir Group Metasediments a thick conformable sequence of quartz-rich (less than 2% mafic minerals) sandstone and minor quartz-rich siltstone occur as a discrete north-south-trending formation varying from 400 to 1200 feet thick. Quartz-rich sandstone approximates the composition of quartzite but has a more variable mafic mineral (colour index) and quartz content. This quartz-rich metasedimentary sequence differs from the Quartzite Range in that: (i) the rocks weather a multitude of colours reflecting irregular impurity contents. (ii) possess a prominant, shallow, south-plunging lineation. According to Fyles and Hewlett (1959,p.40) the lineation is "parallel to the long axes of recrystallized quartz grains separated by microscopic bands of muscovite". Fyles and Hewlett (1959,p.40) were unsure as to how to correlate these rocks and were of the opinion that they were silicified grey and black phyllites. They indicated that the variability of the silica and mafic content (ie.the presence of irregular blocks of grey quartzite and black phyllite within white quartzite characterized by diffuse margins) suggests the quartz or silica is secondary due to silicification. However, it is the present authors opinion that this unit is too discreet, extensive (at least 7200 feet strike length), and its contacts too regular to consider its origin to be solely silicification. More probably the quartz component is a primary sedimentary accumulation with the variable colour index (ie. impurity content) reflecting subsequent minor reworking in the form of internal silica mobility. In further support of the primary origin, there is an absence of any evidence of penetration of silica rich fluids in the surrounding clastic metasediments.

It remains unknown whether this quartz-rich sequence is a folded continuation of the Quartzite Range Formation or is a second, conformable quartzite metasedimentary sequence that was layed down in the early depositional history of the Ymir Group. The lack of repetitive, associated Reeves Limestone suggests the latter case to be more plausible.

YMIR GROUP PROPER

The remainder of the Ymir group to the west is comprised of clastic metasediments. These clastic metasediments are comprised of two main fractions based on grain size - sandstone and siltstone with the dividing point taken at approximately .06 mm. These two are further sub-divided according to mafic mineral content (colour index) into siliceous (2-5% mafic minerals), ordinary (5-25% mafic minerals) and argillaceous (greater than 25% mafic minerals) variaties. Where pertinant, additional modifiers include carbonate, pyrite and diopside-hedenbergite.

The sequence is dominantly comprised of complimentary paired sandstone-siltstone assemblages interbedded on a scale of 1 to 5 inches. Locally quartzite to siliceous sandstone or siltstone units are present. In most areas the metasedimentary types are complex, chaotically intermixed; locally there are distinctive sequences but even these are discontinuous over several 100 feet.

The sequence is typical of a fairly deep water environment, more proximal than the Active or Emerald group metasediments. The paired sandstone-siltstone units are possibly of turbidite origin. Pyrite occurs as desseminations (1 or 2%) and as thin discontinuous fracture/ vein fillings in siltstone and argillaceous siltstone on northwest corner of the detailed grid.

INTRUSIVE ROCKS

Two major intermediate to felsic intrusives intrude the Proterozoic to Mesozoic metasediments of the Jackpot Property. In addition, there are numerous apophyses and satelite bodies that are peripheral to the two major intrusives; most of these smaller intrusives tend to be more mafic and slightly more sodic in comparison to the main batholiths. The two main intrusives include the Hidden Creek Batholith and the Porcupine Creek Stock.

PORCUPINE CREEK STOCK

Only the west margin of this stock outcrops on the east margin of the Jackpot Property. The stock is comprised of medium grained diorite to quartz diorite but locally exhibits evidence of hydrothermal or metamorphic alteration. The alteration consists of diffuse bands of a more leucocratic granitoid phase oriented perpendicular to the margin.

HIDDEN CREEK BATHOLITH

The Hidden Creek Batholith is exposed on the south part of the Jackpot Property.

a) The main batholith is comprised of a single, homogeneous phase consisting of equigranular, medium-grained biotite (3-4%) ± magnetite ($<$ 1%) granite. It exhibits only a minor tendency to fracture; those fractures that are evident are widely spaced, uncontaminated and unmineralized. The north contact of the main phase is typically smooth, sharply defined with few apophyse dikes extending into the country rock and there are few inclusions. The unrecrystallized, uniform potassic composition indicates this batholith is a typical late stage orogenic product.

b) Numerous satellite stocks, sills and dikes occur along the north margin of the batholith south west and east of the Hunter V Glory Hole. Most of these satellite bodies can be classified into one of two major granitoid suites: (i) a diorite-quartz diorite to locally leucocratic tonalite or gabbro; (ii) a leucocratic tonalite to granite. The more mafic (diorite-quartz diorite) intrusives tend to be concentrated along or very near the contact of the main granitic phase and there is a possibility that these bodies are late products genetically related to the main intrusive.

c) Satellite Diorite Stock South of Hunter V

The stock between L6 to 14E - 2 to 5S varies in composition from diorite to quartz diorite to locally tonalite. There is a tendency for this stock to be more mafic in the southwest becoming more leucocratic to the northeast and it may be partly differentiated. Locally there are hololeucocratic pods of granite or tonalite (Map code 8E) that may be consanquineous phases within the more mafic host such as at L14+50W - 1+50N. This same intrusive stock is exposed further west (between L4 to 12W - 3 to 6S) but between L4W and L6E it disappears. Associated with this west portion of the diorite stock there are biotite-bearing and hololeucocratic granitoid phases of unknown genetic relation. These latter granitoid zones dip subhorizontal (e.g. at L6W - 2+75S) to shallowly south (e.g. about 25°S at L4W - 3+50S). The heterogeneous (possibly differentiated)nature of this stock and the fact that it appears to be truncated by the main phase of the Hidden Creek Stock suggests the latter is unrelated and younger. It remains to be known if other diorite and granitoid stocks near the West and Lerwick ore zones are also older or related. Fyles and Hewlett (1959,p.42-43) indicate much of the contact of the Hidden Creek Stock is gradational. It is quite probable that the gradational nature is due to contamination by these satellite granitic bodies when in actual fact the main granitic phase has a sharply defined contact.

d) Style of Intrusion

The massive, equigranular, homogeneous potassic composition indicates the main phase is a typical late orogenic product that probably intruded as a single competent mass. There are several factors that infer this body is possibly intruded as a thrust sheet. Fyles and Hewlett (1959 p.43) indicate the metasediments on the east margin of this batholith are definitely deflected. On the north margin, south of the Hunter V Glory Hole, the limestone strata strike approximately parallel to the batholith contact and dip southwards towards the contact. Also due to the presence of magnetite as an accessory, this granite batholith shows up as a magnetic high in relationship to the metasediments (see magnetic map in geophysical assessment report dated Oct. 13, 1981). There is also a geochemical silver anomaly (see geochemical assessment report dated April, 1983) that trends south-southeast from the Double Standard Glory Hole and extends well into the batholith. Thus the presence of magnetic lows, unmanipulated limestone metasediments and the silver anomaly all infer that the limestone strata dip underneath the batholith, the latter intruding as a south-dipping, mega-sill. The gently dipping contacts of the older diorite stock corroborate with this hypothesis. The lack of inclusions of host rock (there was only one possible limestone inclusion found at L5W - 9+55S) infers this sill was not a composite intrusive coming in as stacked up sheets but was a single mass. The intrusion of such a mass was probably responsible for much of the folding and minor faulting throughout the supracrustal sequence. Just how far the limestone strata dip under or into the batholith is not known.

SUBVOLCANIC INTRUSIVES

Thin dikes (less than 100 feet wide) ranging from gabbro (mafic) to very fine-grained diorite (andesite?) intrude sub concordantly into the metasediments especially north of Porcupine Creek. The dikes are commonly plagioclase phyric and are continuous up to several 1000 feet.

LAMPROPHYRE DIKES

Several minor lamprophyre dikes intrude in the vicinity of Double Standard and in other areas mapped previously by NJZ. Most of these dikes are thin (less than 1.5 feet wide) and trend northeast. They represent the last intrusive phase in the area and may post date faulting. The dike at Double Standard is characterized by sheared host wall rock suggesting either the intrusion caused the deformation or the dike followed an earlier fault zone.

METAMORPHISM AND ALTERATION

Diopside, wollastonite, serpentine, talc, actinolite, anorthite and silica are the only silicate minerals observed at the Hunter V and Double Standard Glory Holes. These silicate minerals occur -

i) spatially associated near granitic dike contacts,

ii) as disseminations within dolomitic limestone bands, and

iii) as sharp veins that definitely crosscut the carbonate stratigraphy.

Wollastonite forms white-weathering radiating rosette-patterned, acicular to bladed composite crystals present as isolated pods along bedding planes in limestone at the Hunter V and as disseminated crystals in dolomite and/or limestone adjacent to the granitic dikes near the south chute (Figure 5) of the Double Standard.

Serpentine is yellow-green and forms ill-defined coatings on both limestone and dolomite throughout the Jackpot Property, including the Jamesonite Fraction. The serpentine is structurally controlled along -

i) major fractures conformable to the stratigraphic layering, and

ii) disconformable minor microfractures.

Talc occurs as a light blue-grey amorphous coating on limestone at the Hunter V and Double Standard where it commonly is spatially associated with the ore. Locally, especially on the Jamesonite Fraction, a mixture of talc, serpentine and carbon occur as an amorphous dull black mineral coating thin, disconformable, minor fractures.

Actinolite is restricted to thick masses and randomly oriented accicular crystals that occur in veins cutting across stratigraphy. These actinolite-rich veins were only observed in float samples from the dump at Double Standard.

Diopside occurs as fine-grained, light green bands confined mainly to the south chute (Figure 5) of the Double Standard Glory Hole. Although these bands appear siliceous, the light translucent green colouration is due mainly to the presence of diopside. XRD analysis indicates the bands to be comprised of 90 percent diopside and 10 percent calcite. Band width varies from a few inches to several feet and their strike length is traceable for tens of feet. The diopside-rich bands appear mostly conformable but near the bottom of the south chute, they appear disconformable. Rare, blue-grey-weathering diopside also occurs at Hunter V.

Tremolite was not observed in the field by the authors but is reported to be present at Hunter V and Double Standard (Little, 1960 p. 150).

All of the above silicate minerals can be produced easily by regional and contact metamorphism of a silicified dolomite and or limestone (Winkler, 1976 p. 113, 127, 97). Talc followed by tremolite are the first minerals to form during metamorphism of siliceous, dolomitic limestones (Winkler, 1976 p. 115). Talc and serpentine are widespread, found throughout the Jackpot Property and the Salmo "Mine Belt", suggesting they were formed during regional metamorphism. The presence of actinolite in veins at Double Standard is incongruous in that magnesian-rich tremolite is the expected silicate mineral. Its discordant vein-like habit suggests a hydrothermal (non-metamorphic) origin with the iron enrichment related to the tetrahedrite-bearing solutions. According to

Winkler (1974 p.126), partial replacement of Mg by Fe^{2+} in dolomite is fairly common and could also account for the iron enrichment. Fyles and Hewlett (1959 p. 83) indicate the iron content of sphalerite varies from less than 0.1 percent in the south part of the mine belt district to a high of 10 percent at the Aspen Property in the north part of the mine belt (just south of the Jackpot Property). They feel the increase in iron content is due to metamorphism. The presence of iron-enriched sphalerite in the north part of the Salmo mine district indicates iron in hydrothermal solutions was at least present and could account for the actinolite formation.

Winkler (1976, p. 97) cites the work of Melson (1966) who describes successive zones of wollastonite-diopside-tremolite associated with decreasing temperature away from granitic contacts respectively. Winkler (1976, p. 128-129) indicates the formation of wollastonite is restricted to the higher temperature range of shallow contact metamorphism in siliceous limestones as occurs during granitic emplacement. The wollastonite and diopside situated near the south chute of Double Standard are metamorphically related to the nearby granodiorite dike. Wollastonite and rare diopside are also present at Hunter V where no granitic dikes are exposed suggesting either -

i) granitic dikes closely underlie the Hunter V or,

ii) the entire Jackpot (West) Property including the Hunter V and Double Standard was affected and recrystallized during the contact metamorphic event.

Although forsterite was not found in the present analysis, Green (1954 p. 6) indicates it is present within the dolomite masses on the central and eastern parts of the Jackpot Property. The presence of wollastonite ± diopside indicate the west part of the Jackpot Property was subjected to contact metamorphic temperatures exceeding 600°C (Winkler, 1976 p. 114). If forsterite is absent at Hunter V and Double Standard, these temperatures never reached 700°C. This temperature range is indicative of high grade (contact) metamorphic conditions.

In summary, talc, tremolite and serpentine were probably formed during low to medium grade regional metamorphic conditions. Subsequently, the regional metamorphism was overprinted by contact metamorphism, causing the local formation of wollastonite ± diopside. Actinolite may be pseudomorphic after tremolite; it is considered to be hydrothermal related to iron enriched fluids.

STRUCTURAL GEOLOGY

MINOR STRUCTURES

Much of the limestone especially in the vicinity of the two glory holes and in the limestone formations east of Active Creek and north of Porcupine Creek exhibit prominent bedding defined by grain size variations and/or colour contrast. In clastic metasediments, bedding planes are diffuse and poorly defined on the basis of mafic content (colour index). Black argillite of the Active Formation has a distinct parting parallel to bedding but actual bedding is apparent through minor changes in grain size. The quartz-rich metasediments (map AXL-BC-81A-map code 5) are generally massive and do not exhibit bedding; local colour variations are present but are spatially chaotic and not ascribed to bedding. The quartzite metasediments north of Porcupine Creek display local bedding based on variations in muscovite (mica) content. Locally there are discontinuous mafic-rich layers within the quartz-rich metasediments in the northwest corner of the detail grid that commonly appear as biotite partings (map AXL-BC-81A-map code 6g).

Foliation is used to define a planar mineral fabric. It was used within the metasedimentary sequence where biotite is aligned but there is no apparent bedding.

Lineations in the form of mineral lineations or partings due to mineral concentrations are most commonly developed in the quartz-rich metasedimentary Formation (map AXL-BC-81A map code 5) that runs north from Double Standard to Porcupine Creek. These lineations invariably plunge 20° to 30° to the south. Mineral lineations in the clastic metasediments north of Porcupine Creek plunge either southwest or southeast in similar fashion.

Where fracturing is prominant it has been indicated by jointing on geological map AXL-BC-81A and as a fracture cleavage on map AXL-BC-82A. At Hunter V at least two major sets of disconformable fracturing occur at N47°E/dip 60°SE and NI35°E/dip 80° NE. In some of the bedded limestone, especially near the glory holes, the bedding is indistinct and appears more as fracturing. The fracturing developed conformable to the carbonate stratigraphy appears partly annealed and is locally sinuous following stratigraphic warps. In places it crosses the layering and brecciation is developed in these areas.

Fracturing or jointing is locally present in both the Hidden Creek Batholith. It tends to be shallow-dipping to subhorizontal, widely spaced (over 3 or 4 feet apart) and is apparently unmineralized. Fracturing where prominent in the clastic and siliceous metasediments occurs at near right angles to their overall trend.

MAJOR STRUCTURES

FOLDING

REGIONAL FOLD STRUCTURES

The regional setting and structures has been reviewed by Fyles (1970) and Fyles and Hewlett (1959). The structural history of the area is complex. The repetition of marker units such as the Reeves limestone suggests major folding has occurred in the east half of the property. The lack of specific marker units in the Ymir Croup makes it difficult to estimate if the folding has affected the west half of the property to the same extent.

The present mapping concurs with Fyles and Hewlett's (1959) interpretation: the major fold axes that are evident appear to be stratigraphically conformable in a north-south direction. The dominant structure in the area is the steeply dipping anticline that runs the length of the Quartzite Range Formation. The work by New Jersey Zinc in the 1950's indicated this anticline plunges shallowly to the southwest and is flanked to the east by a complimentary syncline situated at the East Ore Zone. The syncline.anticline pair are isoclinal; on a regional scale their axial trace is curvalinear and the dip varies steeply from west to east due to broad, open (to the east) refolding about a near horizontal axis. The nose of the anticlinal fold itself has been deflected slightly west by intrusion of the Hidden Creek Batholith. In fact, the nose of the anticlinal fold is partly outlined by the configuration of the dolomite and limestone formations on the detailed grid.

North of Porcupine Creek there are several complimentary syncline-anticline pairs whose axis are all overturned to the east. The anticline within the core of the Quartzite range is undoubtedly an extension of the major anticline structure to the south. Whether the complimentary syncline-anticline axes north of Porcupine Creek extend south remains unknown.

Most of the remainder of the stratigraphy strikes north-south and dips moderately steep to the east; exceptions occur in proximity to the major Batholith intrusions which cause major deflections and locally minor folding. Minor warping or deflection is associated with the Porcupine Creek Fault.

The configuration of the stratigraphy to the south near the major (Hidden Creek) batholith is extremely complex (map AXL-BC-82A); in some cases this complexity is more apparent than real due to topographic affects.

MINOR FOLD STRUCTURES - HUNTER V - DOUBLE STANDARD AREA

The repetition of stratigraphy within the Reeves limestone in the vicinity of the Hunter V - Double Standard area (units 4a,4b,4c-map AXL-BC-82A, map 1) suggests the presence of a shallow, south dipping, east-west-trending isoclinal fold. Dependant upon whether this stratigraphy is primary or if it is secondary related to metamorphism, the presence of this fold remains to be verified.

Minor structures and folds at Hunter V indicate a multi-directional, complex, cross folding event where at least three and possibly four directions of folding are indicated. F_1 folds are tightly isoclinal with subhorizontal axial planes that plunge southwest parallel to carbonate stratigraphy. F_2 folds have steeply dipping axial planes approximately perpendicular to F_1 axial planes, they appear as multiple fold axes subparallel to the contact of the Hidden Creek stock and are not as tightly closed as F_1 fold structures. At the intersection of F_1 and F_2 fold structures, circular structural patterns indicative of superimposed cross folding are present. These crossfold structures were not observed in place in the field but are present in many of the dump samples. Also the F_1 fold structure on the northwest wall of Hunter V exhibits partial closure in both directions along its axial trace, indicative of cross folding. F_3 fold structures have axial planes approximately perpendicular to F_1 and F_2 axial planes. These are broad, open folds of large amplitude that cause gentle warps in F_2 axial traces and in the carbonate stratigraphy at Hunter V. F_4 fold axis may be represented by the anticline but this folding is possible coincident with F_2 structures. Relatively open "S" kinks at Hunter V are sympathetic to the F_2 or F_4 fold structures.

Some of these fold structures appear to have failed at the fold nose giving rise to sharp kink-like structures. A mega kink structure is situated at the south end of the Double Standard glory hole and is similar to minor S-kink folds at Hunter V that are probably related to F_2 structures. This type of structure is undoubtedly fairly common throughout the carbonate sequence and in some of the clastic metasedimentary sequence.

YMIR GROUP - ACTIVE FORMATION AREA

Minor open and/or kink-like fold structures and rare tight isoclinal fold structures are present within the clastic metasediments but in general these are much less conspicuous and more rarely observed than in the Reeves limestone. The few structures seen were found to plunge sub-horizontal to shallowly south.

FAULTING

Faulting is present at all scales on the Jackpot property. The major faults are represented on the accompaying maps; numerous micro to minor faults with offsets rarying from 1 inch to several tens of feet are apparent in the field but at the present scale could not be adequately represented on the maps.

MAJOR FAULTING

Two major types of faults are represented in the property: Thrust Faults that parallel stratigraphy and Block Faults that cut stratigraphy. Fyles and Hewlett (1959, p.55) indicate the former are older than the granites while the latter appears to be caused by granite intrusions coincident with or at least later than the F_2 kink folds.

The thrust faults parallel stratigraphy and are shown to occur where older strata underlie younger strata such as the west contact of the quartzites (Quartzite Range Formation) and the limestone (Laib) formation. In affect all of the metasedimentary lithologic contacts west of the quartzites can be considered possible thrust faults in that the sequence gets younger but is overturned to the west. On the geological map (AXL-BC-81A) these contacts have not been shown as faults because there is little evidence to say that they are. A fault between the quartzites and black argillite is apparent in the 4400 level of the Jackpot Adit and indicates the fault along the east side of the Quartzite Range Formation does exist. The faults as placed on the regional geological maps are schematic; they splay and are probably much more complicated and in places much wider than indicated. Fyles and Hewlett (1959 p.55) indicate "zones of breccia, mylonite and intense shearing are found only locally along the faults".

The overall amount of displacement in the thrust faults is not known but the general lack of evidence of their presence suggests they have not moved any great distance.

Dramatic changes in strike attitude indicate block faulting is present in the vicinity of the Double Standard - Hunter V Glory Holes and all along the Quartzite Range-Reeves Limestone Formation. In most cases the amount of displacement is in the order of several hundred feet or less and is not dramatic. Some of these faults such as the Allan Fault are at a sharp angle to the Hidden Creek Batholith and are probably related to its intrusion. The VLF (see geophysical assessment report dated May, 1983) and gold-silver geochemistry (see geochemical assessment report dated May, 1983) indicate there are two major structural orientations on the detailed grid: east-northeast and north. The faulting on the detailed grid coincides with changes or termination of magnetic and VLF geophysical trends. The southern part of the Allan Fault is coincident with a strong VLF trend and a weak magnetic anomaly.

Some of the faults have a rotational component: Drilling has shown that the Rubble Fault which passes through the East Zone dips to the east at -45° and has a right lateral displacement component. The amount of apprarent offset of marker units on either side of this fault increases from approximately 100 feet in the south to approximately 300 feet in the north.

All other major cross-faults including the Porcupine Fault are based upon major lithologic discrepancies.

MINOR FAULTING

Examination of the East Zone ore in the 4400 level adit and the Double Standard stratigraphy indicates ample evidence of micro brecciation and micro displacement of individual units. These micro faults vary from conformable to disconformable with displacements ranging from less than 1 inch to several feet to locally complete disappearance of units. Undoubtedly this micro faulting is related to the major faults and is present throughout the property.

ECONOMIC GEOLOGY

The Jackpot Property contains known deposits of precious and/or base metal mineralization. These deposits are stratabound, hosted within carbonate rocks and comprise two main types:

i) Pb-Zn mineralization associated with dolomite (map unit 4b)

ii) Ag-Au with attendant Pb-Zn mineralization in limestone (map unit 4a)

There are also known showings of gold ± silver associated with quartz veins in metasediments in the northwest corner of the Jackpot Propery. These have been previously described in a Geological and Geochemical Report dated December 1982 and filed as assessment on the Sharon 1 & 8 claims (Bond 1982 A,B).

BASE METAL (LEAD-ZINC) MINERALIZATION

The early work by New Jersey Zinc outlined five major base metal zones and these are described by Fyles and Hewlett (1959, p.122-126). The 5 main zones include the East, Lerwick, Main, West and Jamesonite Zones. Much has been written on the setting of the lead-zinc deposits in the Kootenay Lake and Salmo areas

(Fyles, 1970; Hoy, 1982) and because most emphasis was placed on the precious metal mineralization the reader is referred to these previous publications for detialed description.

Essentially, the 5 known deposits are all stratigraphically tied to massive dolomite of the Reeves Formation. The lead-zinc mineralization occurs in semi-massive bands that are probably nearly continuous throughout the extent of the Reeves Formation but become locally structually concentrated to form potentially economic deposits such as at these 5 known zones. Structure has played the most important role in the concentration of the base metal mineralization: eg. at the East Zone (the largest of the known deposits) the mineralization occurs in a faulted off segment (below the Rubble Fault) of the nose of a synclinal trough that flanks the major anticline axis in the core of the Quartzite Range. The known Pb-Zn deposits all yield Pb-Zn geochemical anomalies and the presence of newly defined Pb-Zn geochemical anomalies in the Reeves Limestone suggest other possible deposits may be present (see Jackpot Property Geochemical Assessment report,April 1983).

One other major base metal zone is also situated on the Pope claim within the limestone unit along the east border of the property. The mineralization on this Pope Claim is similar to the other known deposits. The mineralization is mainly sphalerite which is oxidized; it occurs as disseminations and diffuse to semi-massive concentrations that form as small isolated clots and bands up to 10 feet (3.3m) wide. Several bands of mineralization appear to be present but due to lack of outcrop, it is not known if these are continuous, related by folding.

SILVER-GOLD MINERALIZATION

The precious metal mineralization is associated with limestone and dolomitic limestone and appears to be concentrated near the Hidden Creek Stock. This type of mineralization has been mainly found in the vicinity of the Hunter V and Double Standard Glory Holes. Samples of the Hunter V and Double Standard mineralization were submitted for positive identification to Minmet Scientific Ltd. (Toronto). The results (Gasparrini, 1980-see appendix A-3) indicate that the precious metal mineralogy is much more complex than that of the Hunter V. It should be noted that the sample (DS-1f) submitted from the Double Standard was taken near the south shaft. Most of the mineralogy and geology at Double Standard is similar to Hunter V. The exception might be the south shaft area, in that it is characterized by associated anomalous concentrations of diopside and gold and silver appear to be more abundant here.

At Hunter V, the mineralogy is fairly simple and consists mainly of sphalerite (ZnS) + galena (PbS) + boulangerite ($Pb_5Sb_4S_{11}$) and tetrahedrite ($[Cu,Fe,Ag]_{12}Sb_4S_{13}$). A few other silver-bearing minerals, including rare orange-bronze-weathering native silver, are present but are minor constituents. The mineralogy at Hunter V is about 3 to 4 times coarser (100 microns) than that of the south shaft of Double Standard (average 20-30 microns). In the sample near the south chute, silver-bearing minerals constitute just over 90 percent of the opaque minerals. In order of decreasing abundance, the silver-bearing minerals include: bournonite, $CuPbSbS_3$ (35-40%); tetrahedrite, $(CuFeAg)_{12}Sb_4S_{13}$ (20-30%); dycrasite, Ag_3Sb (10-15%); pyrargrite, Ag_3SbS_3 (5-10%); argentite, Ag_2S (<5%); native silver, Ag (1%). Gold is a very minor constituent and is present in an unknown sulphide compound comprised of gold, silver, antimony and sulphur. The remaining opaque minerals constitute less than 10% of the opaques and include galena (PbS), lollingite ($[Fe,Ni]As_2$) and native antimony (Sb). In general, the most abundant silver minerals contain the least amount of silver and the reverse is also true. At the South Shaft of Double Standard, dycrasite and tetrahedrite, are the major silver-bearing compounds. Tetrahedrite is the major silver-bearing compound at Hunter V and may well be throughout the remainder of the Double Standard. In the field, tetrahedrite is conspicuous in that it is commonly characterized by a green (malachite) or blue (azurite) copper stain.

According to Ramdohr (1969), nearly all of the above silver-bearing minerals are typical of epithermal, hydrothermal vein deposits, especially those with attendant Pb-Zn mineralization. Native silver, dycrasite, tetrahedrite and bournonite occur both singly (within the calcite gangue) and as composite grains (associated with each other); they are considered to be of hypogene origin. That is, they are primary minerals and, like the lead-zinc-bearing sulphide minerals, are part of the primary mineral concentration/deposition event. Argentite and pyrargyrite form alteration rims around bournonite; they appear to be of supergene origin, concentrated through a possible later reworking event. In its most common natural habit, gold normally occurs as free native gold or as telluride compounds (Gasparrini, 1980 p.3). At the South Shaft of Double Standard, its association (in an unknown sulphide compound) may signify it too is secondary, possibly associated with this later (supergene) reworking event. This gold-bearing silver-antimony sulphur compound is commonly associated with the other silver-bearing minerals.

Lollingite is typically pneumatogenic, associated with contact hydrothermal deposits (Ramdohr, 1969). Many of the silicate-forming metamorphic reactions described in this report produce CO_2; undoubtedly lollingite is a late-forming mineral associated with this vapour production.

DOUBLE STANDARD GLORY HOLE

Two areas of known mineralization occur at the Double Standard: one is situated underground and is visible on the southwest wall of the upper chamber and the other is situated near the south shaft by the south chute on surface.

UNDERGROUND MINERALIZATION

The bulk of the visible mineralization underground at the Double Standard is similar to the Hunter V and consists of galena ± sphalerite ± tetrahedrite. Metallic mineralization underground at the Double Standard is found in the following associations:

i) diffuse, ill-defined disseminations and stringers of no definite continuity or limitations;

ii) thin to thick (.01 to .5 inches wide) discontinuous, disconformable tension fractures (these are commonly oriented at shallow angles to the carbonate stratigraphy);

iii) thin, continuous, conformable to disconformable fractures;

iv) associated with rare breccia zones related to thrust faulted displaced blocks. These breccia zones acted as porous pressure shadow zones to which the precious metal-bearing fluids migrated;

v) whether apparent or real, there is a tendency for the metallic metals to be anomalously concentrated in the darker limestone stratigraphy.

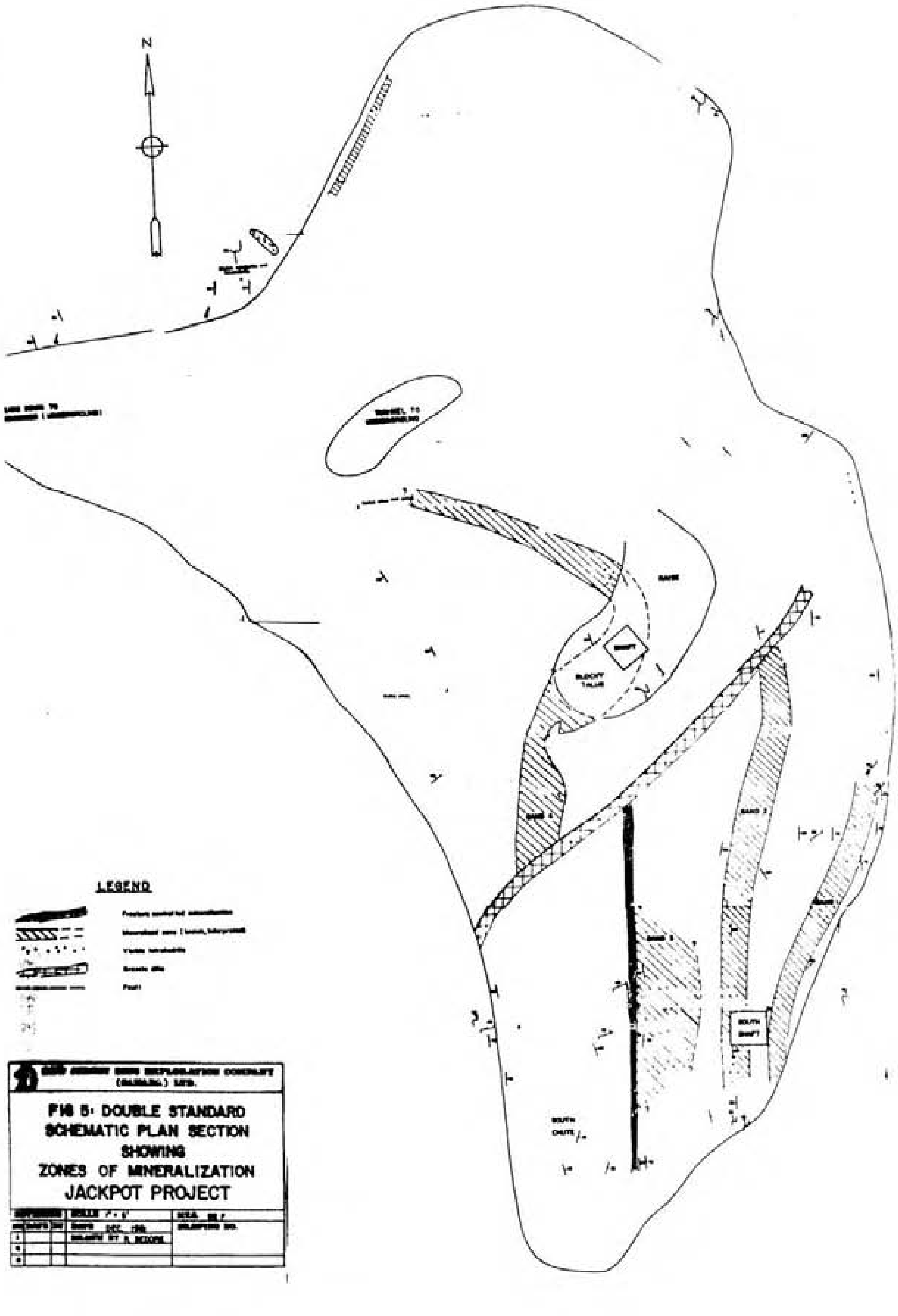
The mineralization underground at the Double Standard differs from that of the Hunter V in that it does not concentrate into discrete bands. The mineralized zone underground strikes north-northwest, dips 50^{o} to the west south-west, is 20 feet wide and appears to cut the carbonate stratigraphy at a shallow (20^{o}) angle.

ABOVE GROUND MINERALIZATION

Above ground three main bands of mineralization occur at the Double Standard (Figure 5). Two of the three bands completely disappear across a fault zone while the third possibly continues as band four. This fourth band (north of the fault zone) probably continues down dip to join onto the mineralized zone situated underground. The mineralized bands above ground are dominantly stratabound but locally reworked along fractures. The most extensive fracture (Figure 5) occurs near the hinge of the fold at the east wall of the South Chute. There, a main fracture trends parallel to stratigraphy but there are subsidiary, haphazard fractures leading off the more prominant fracture. The latter are controlled by bedding surfaces; they are perpendicular to the main fracture zone and are only 0.5 to 1 inch in depth being terminated abruptly against the stratigraphy. This fracture zone is observed to carry anomalously high concentrations of tetrahedrite mineralization.

HUNTER V MINERALIZATION

At Hunter V there appears to be three separate mineralized bands (Figure 6). Mineralization within these bands varies from massive to disseminated and there are diffuse discontinuous pockets of disseminated mineralization between the bands. Tetrahedrite + galena form the most readily visible mineralization. The mineralized bands at Hunter V are visible on the west side of the glory hole. They are conformable to stratigraphy and are structurally deformed by F_1 and F_3 fold structures.


N
LEGEND
FIG 5: DOUBLE STANDARD
SCHEMATIC PLAN SECTION
SHOWING
ZONES OF MINERALIZATION
JACKPOT PROJECT

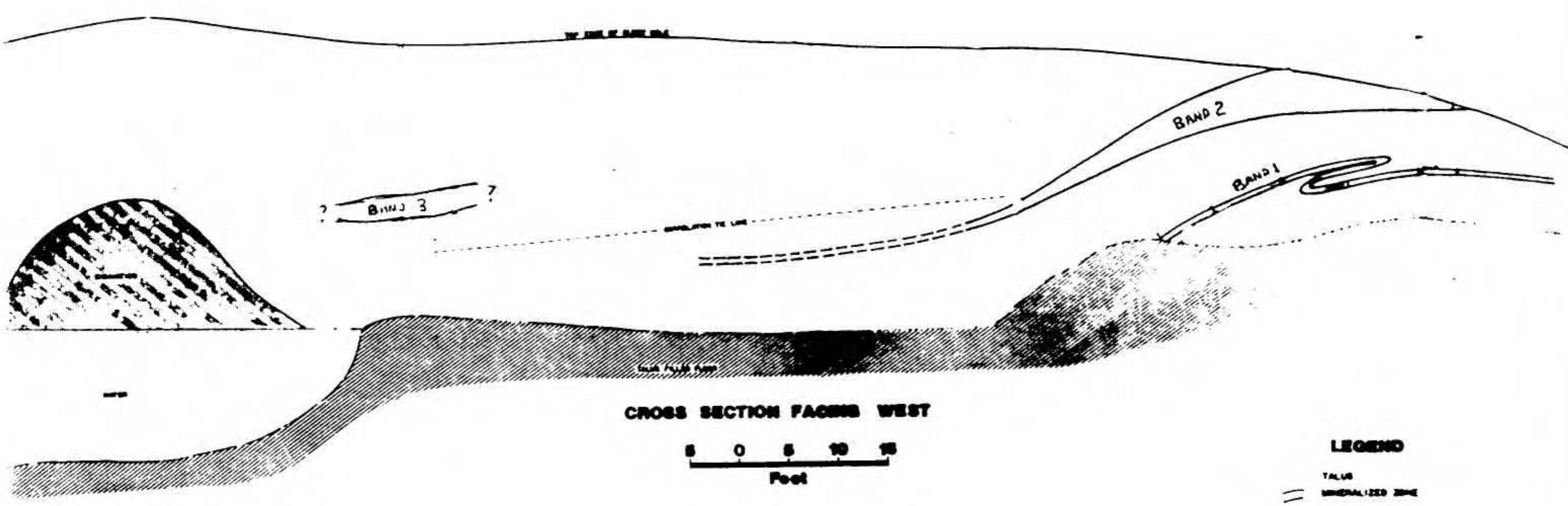


FIGURE 6: CROSS SECTION AND PLAN SECTION OF WESTERN PART OF THE HUNTER V SHOWING CORRELATION OF ASSAY RETURNS AND MINERALIZED BANDS

Band 1 mineralization is concentrated toward the nose of F_1 fold structures implying ore deposition occurred prior to or penecontemporaneous with folding. The mineralization in Band 1 is traceable for about 60 feet to the north before being folded around forming a semi-closed elongated elliptical structure. Band 1 mineralization varies from less than 1 inch wide up to a maximum 8 to 10 inches.

Band 2 mineralization is situated approximately 3 to 4 feet above Band 1 mineralization and is traceable for about 50 to 60 feet. This band varies from 8 inches in the south up to 50 inches in the north.

Band 3 mineralization may or may not be a separate zone. It may be just a pod or may in fact be a faulted segment that was once continuous with Band 2 mineralization. The zone is situated approximately 3 feet above band 2.

There is a possibility that all three bands may be continuous through tight isoclinal folding although it is the authors opinion that the bands are in fact successively mineralized stratigraphic zones.

The precious metal mineralization located at 6+75W-3+205 and 8+55W-5+10S (detailed grid - map AXL-BC-82A) are undoubtedly extensions of the Hunter V mineralization. Whether the mineralization at those former areas, the Double Standard and the Hunter V are all related,representing a continuous zone,is not known.

SUMMARY STATEMENT

Major base metal deposits are known to occur in dolomite of the Reeves carbonate unit; these sphalerite-galena deposits occur mainly as strata-bound bands and disseminations. Elsewhere within the laminated limestone unit and near to the major granitic batholith there are stratabound bands of precious metal (silver + gold) mineralization with subsidiary amounts of sphalerite + galena. The silver-gold mineralization is typical of epithermal vein deposits. The base metal mineralization contains minor, sporadic amounts of silver, and traces of gold, copper and cadmium while the precious metal mineralization contains minor lead and zinc. Whether or not there is a time or genetic relationship between the precious metal mineralization and the major lead-zinc deposits is not known.

REFERENCES

Bond, W. D.
1982A: Geological and Geochemical Survey of the Jackpot (West) Property. New Jersey Zinc Exploration Co. (Canada) Ltd. Assessment Report filed December, 1982, 22p

1982B: Geochemical Survey of the Jackpot (West) Property. New Jersey Zinc Exploration Co. (Canada) Ltd. Assessment Report filed December, 1982, 15p.

Drysdale, C.W.
1917: Ymir Mining Camp, British Columbia, Geological Survey Canada Mem. 94; Accompanied by Map 175A (Ymir, Kootenay District), Scale 1:63, 360

Cocksfield, W.E.
1936: Lode Gold Deposits of Ymir - Nelson Area Nelson Area British Columbia, Canada Department of Mines, Bureau of Economic Geology, Memoir 191 78 p.

Fyles, J.T. and Hewlett, C.G.
1959: Stratigraphy and Structure of the Salmo Lead-Zinc Area, B.C. Department of Mines Bulletin No. 41, 162 p.

Fyles, J.T.
1970: Geological setting of the Lead-Zinc Deposits in the Kootenny Lake and Salmo areas of British Columbia in Lead-Zinc Deposits in the Kootenny Arc, Society of Econ. Geologists 1970 Northwest Field Conference Guidebook edited by A.E.Weissenborn, State of Washington Dept. of Natural Resources, Olympia, Washington.

Green, L.H.
1954: Wall - Rock alteration at certain lead-zinc replacements deposits in limestone, Salmo Map-Area, British Columbia. G.S.C. Bull. 29, 37p.

Gasparrini, C.
1980: Study of the Gold and Silver Mineralogy at the Jackpot Property, Minmet Scientific Ltd. Report on files with NJZ Canada Ltd. Mississauga Office.

Levinson, A.A.
1974: Introduction to Exploration Geochemistry, Applied Publishing Ltd. Wilmette (Illinois, U.S.A.) 924 p.

Little, H.W.
1960: Nelson Map-area West Half, British Columbia G.S.C. Memoir 308 p. Accompanied by Map 1090 A (Nelson) Scale 1:253.440 (1 inch to 4 miles)

1965: Salmo Map Area British Columbia; G.S.C. map 1145A, Scale 1:63, 360 (1 inch to 1 mile)

Little, H.W. and McAllister, A.L.
1964: Ymir Map Area, British Columbia; G.S.C. map 1144A, Scale 1:63, 360 (1 inch to 1 mile)

Melson, W. G.
1966: Am. Mineral., Vol. 51, pp 402-421

Muraro, T. W.
1966: Metamorphism of Pb-Zn Deposits in Southeastern British Columbia; CIM Sp. Vol. No. 8, pp 239-247.

Ramdohr, P.
1969: The Ore Minerals and Their Intergrowths, Pergamon Press, Toronto, 1174 p.

Trygue Hoy
1982: Stratigraphic and structural setting of stratabound lead-zinc deposits in southeastern B.C. C.I.M. Vol. 75, No.840 p 114-134.

Walker, J.F.
1934: Geology and Mineral Deposits of Salmo Map-area, British Columbia, Geological Survey Canada Mem. No. 172, Accompanied by Map 299A (Salmo Sheet) Scale 1 inch to 1 mile of 1:63, 360.

Winkler, H. G. F.
1976: Petrogenesis of Metamorphic Rocks; Springer-Verlag, 4th edition

Weissenborn, A.E. (Editor)
1970: Lead-zinc deposits in the Kootenay Arc, Northeastern Washington and Adjacent British Columbia, Society of Economic Geologists 1970 Northwest Field Conference Guide Book, State of Washington Department of Natural Resources, Division of Mines and Geology, Olympia Washington, 123p.

CERTIFICATE

I, William D. Bond, of the City of North York, Province of Ontario, do hereby certify that:

1. I am a geologist residing at 137 Alfred Avenue, City of North York, Ontario;

2. I am a graduate of the University of Waterloo, (1970) - Hons, B.Sc., Degree and the University of Manitova (1973) M. Sc. Degree;

3. I am a Fellow of the Geological Association of Canada;

4. I have been practicing my profession for thirteen (13) years;

5. The statements made in this report are based on private unpublished and published reports. The geochemical data is new data collected by members of New Jersey Zinc Exploration Co. (Canada) Ltd. during the period May 15 to Sept. 15, 1981 and June 1 to Sept. 1, 1982.

Dated at Mississauga, Ontario this 17th day of May, 1983

William D. Bond, B.Sc., M.Sc.

ASSESSMENT DETAILS

PROPERTY:	Jackpot Property
PROVINCE:	British Columbia
MINING DIVISION:	Nelson
LOCATION:	Southeast of Ymir 82F/3E, 6E
OWNER/OPERATOR:	New Jersey Zinc Exploration Co.(Canada) Ltd.
TYPE OF SURVEY:	Geological
OPERATION DATES:	July 1 to Sept. 16, 1981; sporadically between June 7 - Aug.30, 1982

OPERATING MAN DAYS-	1981: 75	
	1982: 120	Total 195
OFFICE MAN DAYS (Report writing, compilation)		
	1981: 8	
	1982: 18	Total 26
DRAFTING MAN DAYS:	1981: 10	
	1982: 20	Total 30
TOTAL MAN DAYS:	1981: 103	
	1982: 180	Total 251
EXPENDITURE:	1981: $13,135	
	1982: $31,090	Total $40,275

GEOLOGIST/Supervisor: 1981 and 1982

W. D. BOND : 137 Alfred Avenue, City of North York, Ontario

1981 FIELD ASSISTANTS

Temporary Staff

W. J. McGuinty - 45 Southpark Drive, Ottawa, Ontario

R. Mitchell - Don Mills, Toronto, Ontario

K. Pope - Guelph, Ontario

Drafting

R. Sedore - 95 Paisley Blvd. West, Apt. 804, Mississauga, Ont.

1982 FIELD ASSISTANTS

Temporary Staff

J. Pinto Vasquez - 3455 Aylmer St. # 304, Montreal, Quebec

W. J. McGuinty - 45 Southpark Drive, Ottawa, Ontario

J. R. Foster - 3477 Glen Erin Dr. Mississauga, Ontario

Drafting

R. Sedore - 95 Paisley Blvd. West, Apt. 804, Mississauga, Ont

COMPILATION AND REPORT WRITING

W. D. Bond - 137 Alfred Ave. Willowdale, Ontario

1981 STATEMENT OF COSTS

PERIOD: Sporadically between July 1 - Sept. 16, 1981

FIELD EXPENSES:

ACCOMODATION/MEALS: covered in previously submitted assessment		
TRAVEL: 2 airfare trips from B.C. Border and return at $120/each		240.00
VEHICLE:2 weeks at $1750/month (all inclusive)		875.00
FIELD EQUIPMENT: clip boards, packsacks tape measures,hammers etc.		500.00
POSTAGE/EXPRESS/TELEPHONE		400.00
WAGES:		
Permanent staff-1 x $120/day x 5 days	1,800	
Temporary " -1 x $ 80/day x 30 days	2,400	
2 x $ 65/day x 30 days	3,900	
TOTAL	8,100	8,100.00

OFFICE EXPENSES

OFFICE SUPPLIES-drafting pens,scales rulers etc		200.00
WAGES-compilation 1 person x $90/day x 8 days	720	
drafting of initial copy 1 person at $90/day x 10 days	900	
	1,620	1,620.00
GRAND TOTAL		$ 11,935.00

1982 STATEMENT OF COSTS

PERIOD: Sporadically between June 7 and August 30, 1982

FIELD EXPENSES:

ACCOMODATION: 2 Kitchenette units at $500.month for 1.5 months		1,500.00
MEALS: 2 persons@ $23/day x 15 days	690.00	
1 person @ $23/day x 65 days	1,495.00	
1 person @ $23/day x 5 days	575.00	
Total	2,760.00	2,760.00
VEHICLE: 1 truck @ $60/day x 45 days		2,700.00
FIELD EQUIPMENT: brunton compasses, tape measure, packsacks, hammers, flagging, clipboards, rulers, elevation meter, sampling bags, rainsuits, camera etc.		2,000.00
POSTAGE/EXPRESS/TELEPHONE		1,000.00
WAGES: Permanent staff supervisor 1 x $135/day x 15 days	2,025.00	
Temporary staff 1 geologist @ $110/day x 65 days	7,150.00	
1 geologist @ $ 95/day x 15 "	1,425.00	
1 assistant @ $ 80/day x 25 "	2,000.00	
Total	12,600.00	12,600.00

OFFICE EXPENSES:

OFFICE EQUIPMENT: mylar, drafting pens etc		500.00
COPYING: base map construction, photocopying, whiteprint copies etc.		850.00
WAGES: Contract Drafting (Final Copies) 1 person @ $100/day x 20 days	2,000.00	
Map Compilation 1 geologist/supervisor @ $135/day x 8 days	1,080.00	
Report Writing 1 geologist/supervisor @ $135/day x 10 days	1,350.00	
Typing-4 days @ $65/day	260.00	
Total	4,430.00	4,430.00
GRAND TOTAL		$ 28,340.00

APPENDIX I

TABLE A-1 : 1981 LEGEND

CENOZOIC

TERTIARY

MAFIC INTRUSIVE ROCKS

9a Lamprophvre[w]

MESOZOIC

CRETACEOUS

INTRUSIVE ROCKS[a]

FELSIC TO INTERMEDIATE INTRUSIVE ROCKS

HIDDEN CREEK STOCK[b,c]

8a Magnetite-biotite granite; locally granodiorite
8b Biotite granite
8c Biotite granodiorite to tonalite
8d Hornblende-biotite granodiorite to tonalite (± magnetite)
8e Fine-grained hololeucocratic granite, tonalite
8f Hybrid, Inclusions[d]
8m Aplite

NELSON BATHOLITH[b]

8g Magnetite-biotite granite[e]
8k Magnetite-hornblende-biotite granodiorite
8f Inclusions
8l Muscovite ± biotite granite
8m Biotite granodiorite to tonalite

INTRUSIVE CONTACT

INTERMEDIATE TO MAFIC INTRUSIVE ROCKS[f]

7a Quartz diorite to tonalite
7b Biotite-hornblende quartz diorite
7c Biotite-hornblende diorite
7d Biotite-hornblende diorite to quartz diorite
7e Gabbro[v]
7f Porphyritic[g] (hornblende) diorite
7g Subtly porphyritic (hornblende) diorite to quartz diorite
7h Porphyritic (plagioclase) gabbro, feldspar porphyry

INTRUSIVE CONTACT

PERMIAN TO LOWER TRIASSIC

CLASTIC METASEDIMENTS[h,k]

6 Unsubdivided
6a Siliceous siltstone (CI 2 to 5)[z]
6b Siliceous sandstone (CI 2 to 5)[z]
6c Siltstone (CI 5-25)[z]
6d Sandstone (CI 5-25)[z]

CLASTIC METASEDIMENTS[h,k] (cont'd)

- 6e Argillaceous siltstone (CI >25)[z]
- 6f Argillaceous sandstone (CI >25)[z]
- 6g Interbedded siliceous sandstone and argillaceous siltstone (as biotite partings).
- 6h Calcareous
- 6j Pyrite
- 6k Diopside
- 6l Granitized Metasediments (diffuse granitoid components)[j]
- 6m Porphyroblastic feldspar
- 6n Quartz veining
- 6p Diopside
- 6q Silicified-Siltstone, sandstone

QUARTZ-RICH METASEDIMENTS

- 5 Unsubdivided
- 5a Quartz-rich sandstone, quartzit (buff, white, grey; CI < 2)[u]
- 5b Quartz-rich siltstone (CI <3)

CAMBRIAN

CLASTIC METASEDIMENTS (HIGHLY METAMORPHOSED)[h,]

- 4a Coarsely recrystallized siltstone, argillite; minor sandstone[L]
- 3 Unsubdivided
- 3a Black argillite, graphitic argillite[m]
- 3b Black slate, shale[m]
- 3c Pyrite
- 3d Grey argillitic siltstone[m]
- 3e Argillite

CHEMICAL METASEDIMENTS

CARBONATE-RICH METASEDIMENTS[n]

- 2 Unsubdivided
- 2a Laminated to well layered limestone (white, light)
- 2a Laminated to well layered limestone (interbedded white, light, grey, darkgrey limestone)
- 2b Massive white to dark grey limestone
- 2c Dolomitic limestone
- 2d Dolomitic
- 2e Inequigranular marble (massive to locally subtly layered)
- 2f Skarn
- 2g Diopside
- 2h Wollastonite
- 2j Serpentine[p], serpentine + carbon[q]
- 2k Calcite porphyroblasts (rusty brown)
- 2l Asbestos, talc

CONFORMABLE CONTACT

QUARTZ-RICH METASEDIMENTS[r,t]

- 1 Unsubdivided
- 1a Quartzite, white (CI 1)[r,u,z]
- 1b Impure quartzite[t,u]
- 1c Micaceous and phyllitic quartzite[y]
- 1d Impure quartzite with inercalated siliceous to argillaceous sandstone/siltstone

A	Laminated	(1 1 cm)
B	Thin bedded	(1 - 3 cm)
C	Medium bedded	(3-30 cm)
D	Thick bedded	(< 30 cm)

a. Dominantly massive and equigranular

b. Relative age relationship unknown

c. Dominantly medium-grained

d. Type of inclusion given in brackets where noted

e. Dominantly coarse-grained

f. Probably older than Felsic to Intermediate Plutonic rocks

g. May be porphyroblastic

h. Clastic metasedimentary groups 3 and 6 may in part be equivalent in age.

j. Due either to intrusion or metamorphic segregation

k. Equivalent to "Mixed Unit" as described by Fyles and Hewlett (1959)

l. Equivalent to Emerald Member as described by Fyles and Hewlett (1959)

m. Equivalent to Active Formation as described by Fyes and Hewlett (1959)

n. Equivalent to Reeves Member (Laib Formation) as described by Fyles and Hewlett (1959)

p. Typically green-weathering

q. Typically black-weathering

r. Equivalent to Nugget Member (Quartzite Range Formation) see Fyles and Hewlett (1959)

t. Equivalent to Nevada Member (Quartzite Range Formation) see Fyles and Hewlett (1959)

u. Muscovite is a common accessory

v. May in part be extrusive or subvolcanic

w. Occurs as dikes

y. Equivalent to the Reno Formation

z. CI refers to colour index which is the % of mafic (silicate) minerals present (see A.G.I. Glossary pg 141).

APPENDIX 2

TABLE A-2 : 1982 LEGEND

CENOZOIC

TERTIARY

LAMPROPHYRE

9a Lamprophyre[a]

MESOZOIC

CRETACEOUS

INTRUSIVE ROCKS

FELSIC TO INTERMEDIATE INTRUSIVE ROCKS

HIDDEN CREEK BATHOLITH

8	Unsubdivided
8a	Granite
8b	Granodiorite to tonalite
8c	Inclusions, hybrid[c]
8d	Hololeucocratic granite

NELSON BATHOLITH

8a	Granite
8b	Granodiorite tonalite
8c	Hololeucocratic granite

INTERMEDIATE TO MAFIC INTRUSIVE ROCKS

7	Unsubdivided
7a	Diorite, quartz diorite
7b	Tonalite, quartz diorite
7c	Gabbro
7d	Porphyritic

PERMIAN TO LOWER TRIASSIC

YMIR GROUP

CLASTIC METASEDIMENTS

6	Unsubdivided
6a	Argillaceous siltstone and sandstone
6b	Argillaceous siltstone, siliceous sandstone (minor siliceous siltstone locally)
6c	Siltstone, sandstone

CLASTIC METASEDIMENTS (cont'd)

6d	Interbedded siliceous sandstone and argillaceous siltstone (as biotite partings)
6e	Granitized metasediments (diffuse granitoid components)
6f	Coarse recrystallized siltstone, minor argillaceous sandstone
6g	Black argillite, phyllite
6h	Sandstone, siltstone, partially silicified

QUARTZ-RICH METASEDIMENTS

6j	Quartzite (buff, white, grey) rare siliceous siltstone
6k	Quartz rich siltstone

ACTIVE FORMATION[d,b]

5	Unsubdivided
5a	Black argillite, graphitic argillite
5b	Grey argillite siltstone, minor quartzite
5c	Black state hornfels
5d	Rusty impure quartzite
5e	Pyrite
5f	Dolomitic limestone with argillite streaks

LAIB FORMATION

REEVES MEMBER

4	Unsubdivided
4a	Layered to laminated limestone, dolomitic limestone (minor dolomite, marble, cherty limestone)
4b	Dolomite, dolomitic, limestone (minor marble)
4c	Marble, limestone (minor dolomitic limestone, rusty porphyroblastic calcite)

TRUMAN MEMBER

3	Unsubdivided
3a	Altered limestone, dolomitic limestone
3b	Grey phyllite and quartzite, minor lenses of limestone
3c	Thinly bedded to laminated grey phyllite and dolomitic limestone
3d	Thinly laminated diopside hornfels
3e	Massive limestone, dolomitic limestone
3f	Marble
3g	Garnet-bearing skarn

RENO MEMBER (cont'd)

- 2 Unsubdivided
- 2a Interbedded siliceous sandstone and argillaceous siltstone (as biotite partings)
- 2b Grey, micaceous, siliceous siltstone
- 2c Dark grey hornfels, biotite schist
- 2d Granitized metasediments
- 2e Limestone, dolomitic limestone, marble

QUARTZITE RANGE FORMATION

- 1 Unsubdivided
- 1a White quartzite, brown micaceous quartzite
- 1b White quartzite

a. Occurs as dikes
b. Age relationship unknown
c. Type of Inclusion given in brackets where noted
d. Possibly time equivalent to Active Formation

APPENDIX 3

Report no. 218

STUDY OF THE GOLD AND SILVER MINERALOGY OF THREE SAMPLES OF CARBONATE ROCKS

Claudia Gasparrini

November 12 1980

Prepared for:

NEW JERSEY ZINC COMPANY

268 Lakeshore Road East,
Mississauga, Ontario,
L5G 1H1.

Attention: James R. Foster

of x-ray sepctra showing peaks at the energy positions of all the elements constituent of the analysed microarea down to approximately 0.5 per cent.

The mineral identifications, when obtained, were done on the basis of the optical properties and chemistry together;

- Photomicrographs of grains and assemblages chosen as representative of the mineralogy of the three samples were taken by a polaroid camera attached to the microscope.

RESULTS

Samples DS-IL and DS-IF are rather similar in their opaque mineralogy and grain sizes and are described together in the present report. Sample HV is different.

The precious metal mineralogy of *samples DS-IL and DS-IF* is complex as it consists of large number of different minerals, mostly compounds of silver with sulphur, antimony, lead and copper. These were identified as *native silver*, *dycrasite*, *argentite*, *pyrargyrite*, *tetrahedrite and bournonite*. A compound of *silver with gold*, *sulphur and antimony* was also found and was not identified. Other opaque minerals identified are *galena*, *löllingite*, and *native antimony*. The average grain size for all these minerals is fine, 50 microns in diameter and less. Larger grains, up to several 100 microns in diameter are however also present.

Minerals identified in the gangue are calcite, predominant, serpentine, diopside and graphite.

Native silver, *Ag*. This mineral is not very common and, when present, forms very fine grains, 10 microns in size and less. It contains minor amounts of copper, sometimes of antimony, but no gold. The grains observed were all enclosed in the calcite gangue, with some of them attached to other silver minerals.

The native silver accounts for approximately 1 per cent of the silver minerals.

Dycrasite, Ag_3Sb. This mineral is relatively abundant, 10 to 15 per cent of the silver minerals, and, because it contains high amounts of the element (approximately 75 per cent), is probably the major silver-bearing phase. Dycrasite was observed most of the time enclosed in the gangue as free grains or attached to other silver minerals and galena. Occasionally it was found enclosed in or intergrown with the lollingite. The average grain size is 20 to 30 microns, but larger grains up to 100 microns in diameter are not uncommon.

Argentite, Ag_2S. This mineral is not very common, probably less than 5 per cent of the silver minerals and appears to be a secondary product, as it often forms alteration rims over the bournonite. When in discrete grains, the average size is 10 to 20 microns.

Unidentified sulphosalt of silver with gold, antomony and sulphur. Grains of this mineral were found three times. They were very fine, a few microns in size, and sometimes formed intergrowths with other minerals including native antimony. They were the only gold bearing grains found and are probably responsible for all the gold in the samples. Gold very seldom occurs in minerals other than native gold and compounds with tellurium. Such occurrence could be that of a new mineral. The grains however are too fine for a more detailed study.

Pyrargyrite, Ag_3SbS_3. This mineral accounts for 5 to 10 per cent of the silver minerals and was observed forming both discrete grains and alteration rims over the bournonite (intermediate stage to argentite?) When in discrete grains, the size is in the 10 micron diameter range and smaller.

Tetrahderite, $(Cu,Fe,Ag)_{12}Sb_4S_{13}$. This mineral is relatively common as it accounts for 20 to 30 per cent of the silver minerals. Its content in the element varies between a few and approximately 15 per cent. The grain size is normally fine in the 20 to 30 micron diameter range, but may reach up to 100 microns. Tetrahedrite may be associated with other silver minerals or just enclosed in the calcite. Intergrowths and other associations with galena were also observed.

Tetrahderite grains were also found completely surrounded by graphite. An association such as this may lead to problems when trying to separate the silver minerals from the gangue, due to the fine size of the components and the refractory behaviour of the graphite.

Bournonite, $CuPbSbS_3$. This is the most abundant of the silver-bearing minerals as well as of the opaque minerals. Its silver content however is the lowest as it varies between 0 and a few percentage only. The grain size varies between less than 10 microns and several 100 and the grains may be associated with other silver minerals or free and enclosed in the calcite. Most of the grains observed showed the light etching property of tarnishing when exposed to the microscope light, a property not reported for bournonite. The other optical properties however, as well as the chemistry are those of the mineral. Because bournonite was identified in similar samples at the Geological Survey of Ontario, it is assumed that the light etching property must occur in some bournonites.

The other opaque minerals observed, *galena*, PbS, *lollingite*, $(Fe,Ni)As_2$, *and native antimony*, Sb, are not very common, probably less than 10 per cent of the opaque minerals altogether, and form normally grains of fine sizes.

All the above described minerals are shown in plates 1-16 (photographed in sample DS-IL) and 17-26 (photographed in sample DS-IF). Slight differences, like higher native silver and pyrargyrite in sample DS-IF are possibly only due to local changes within the scale of a polished section.

The mineralogy of *sample HV* is much simpler than that of the other two, as it consists of *sphalerite*, ZnS, *galena*, *boulangerite*, $Pb_5Sb_4S_{11}$ and tetrahedrite with an average grain size in the several 100 micron diameter range. That is much coarser than that of the previous two samples.

Major silver bearing mineral is tetrahedrite, with grains 100-200 microns in average diameter and associated with galena. Other silver minerals may be present in smaller amounts. The sections of this sample were not studied in as much detail as those of the other two.

Plates 27-30 show typical assemblages of the sample.

CONCLUSIONS

Conclusions drawn from the study are:

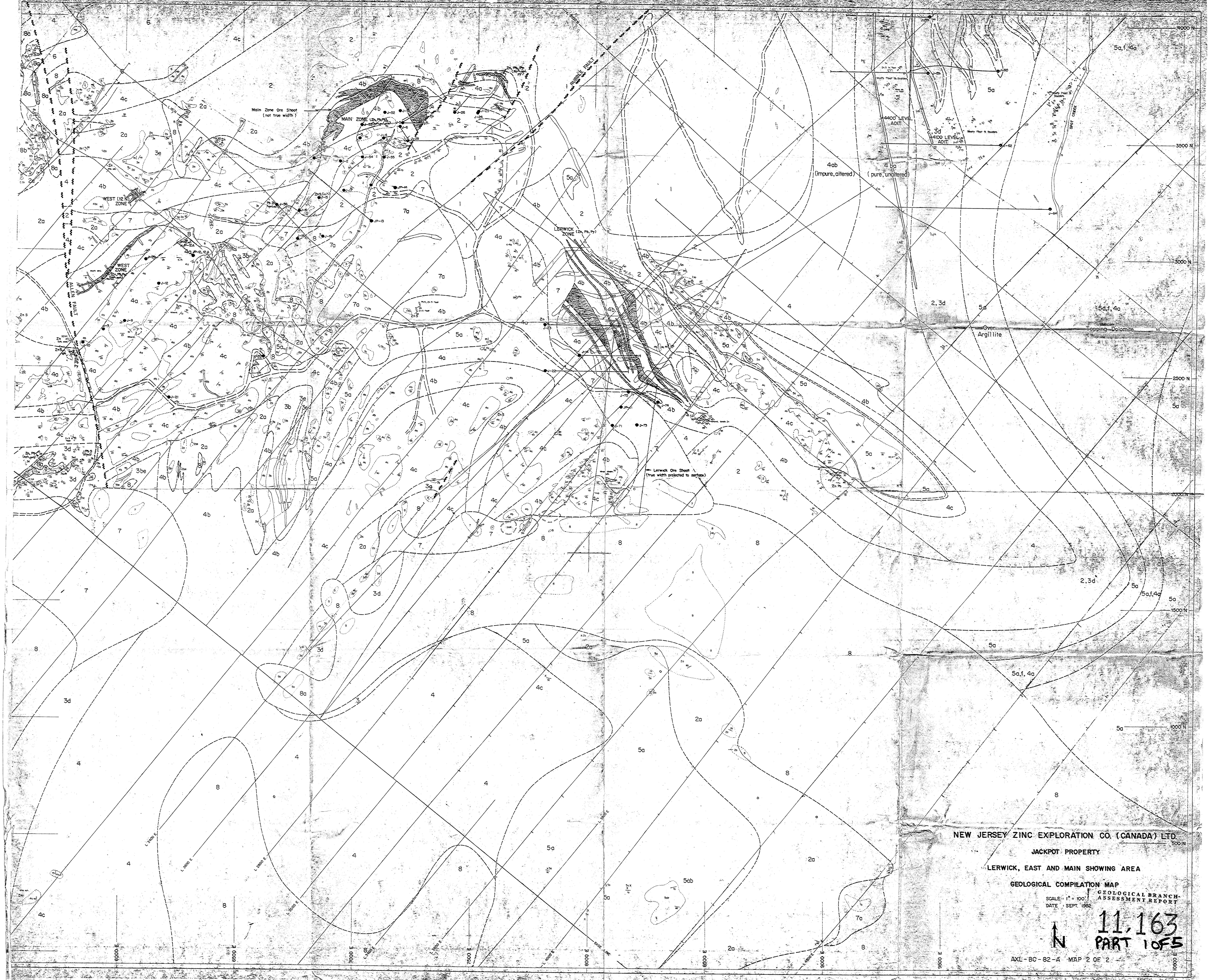
- Silver-bearing minerals in samples DS-IL and DS-IF are native silver, dycrasite, argentite, pyrargyrite, compound of silver with sulphur, antimony and gold, tetrahedrite and bournonite. It is difficult to indicate which or how many of these bear the element in higher amounts because the most abundant ones contain less silver and vice-versa. All of them should be separated for an optimum recovery of the precious element;

- The average grain size of the silver minerals is less than 50 microns in diameter and a fine grinding will be necessary for a good separation by mechanical methods. Coatings of graphite over some of the finer grains may cause problems during recovery;

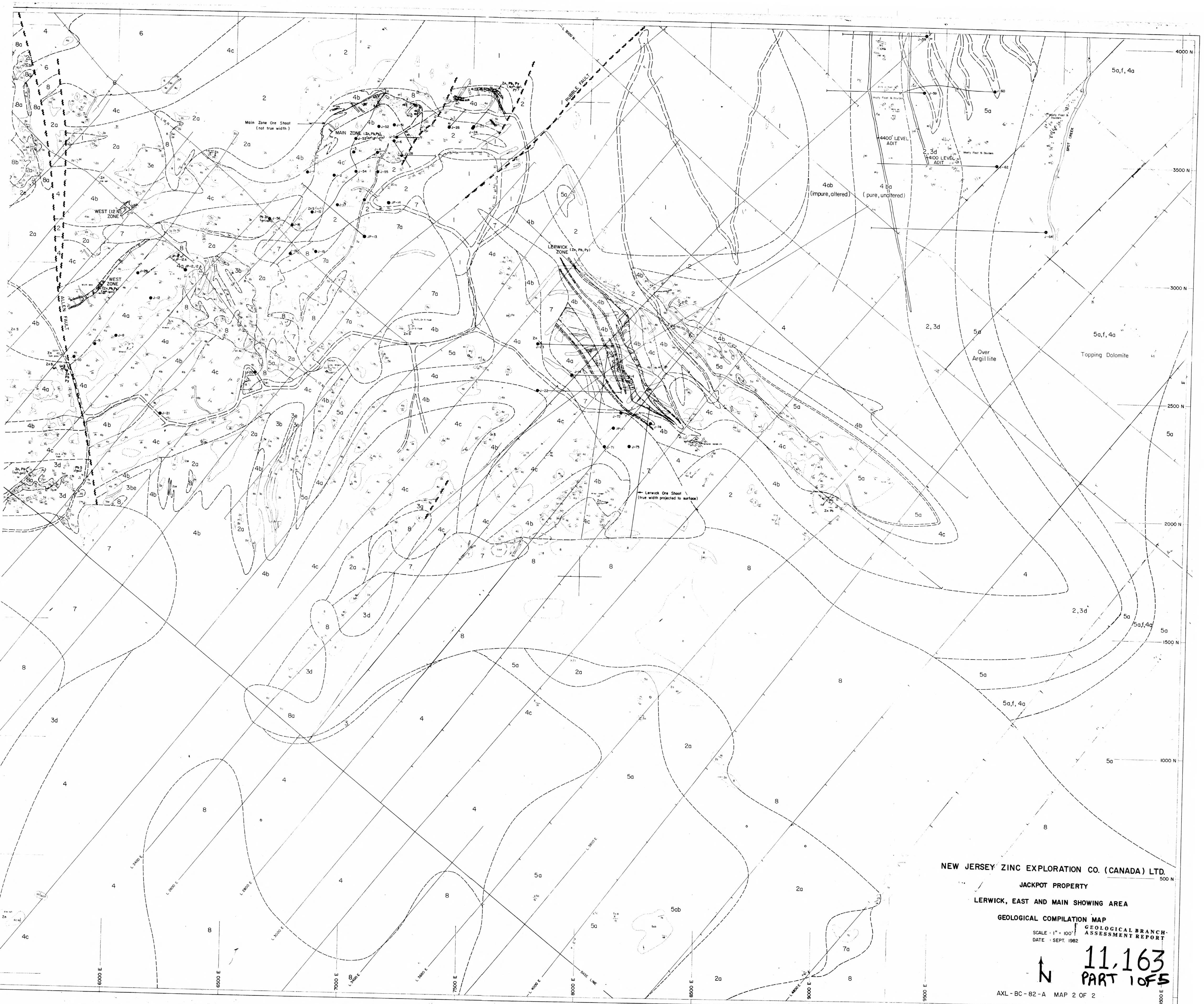
- Gold bearing-mineral is the compound of silver with antimony and sulphur. This is very fine, associated with other silver-bearing minerals and will probably all be recovered with the silver;

- Major silver-bearing mineral in sample HV is tetrahedrite. The study done on this sample was not detailed enough to draw some conclusions as to its silver recovery.

★



NEW JERSEY ZINC EXPLORATION CO. (CANADA) LTD.
JACKPOT PROPERTY
LERWICK, EAST AND MAIN SHOWING AREA
GEOLOGICAL COMPILATION MAP
SCALE : 1" = 100'
DATE : SEPT. 1982
GEOLOGICAL BRANCH ASSESSMENT REPORT
11,163
PART 1 OF 5
N
AXL-BC-82-A MAP 2 OF 2
Main Zone Ore Shoot (not true width)
MAIN ZONE (Zn, Pb, Py)
RUBBLE FAULT
ALLEN FAULT
WEST (12 N) ZONE
WEST ZONE
LERWICK ZONE (Zn, Pb, Py)
Lerwick Ore Shoot (true width projected to surface)
4400 LEVEL ADIT
4100 LEVEL ADIT
4ab (impure, altered)
4 ba (pure, unaltered)
Over Argillite
Topping Dolomite
SPOT CREEK
3500 N
3000 N
2500 N
2000 N
1500 N
1000 N
500 N
6000 E
6500 E
7000 E
7500 E
8000 E
8500 E
9000 E
9500 E
10500 E



Main Zone Ore Shoot (not true width)
MAIN ZONE (Zn, Pb, Py)
WEST (12 N) ZONE
WEST ZONE
ALLEN FAULT
RUBBLE FAULT
LERWICK ZONE (Zn, Pb, Py)
Lerwick Ore Shoot (true width projected to surface)
4400' LEVEL ADIT
4100' LEVEL ADIT
4ab (impure, altered)
4 ba (pure, unaltered)
Over Argillite
Topping Dolomite
SPOT CREEK
BASE LINE
4000 N
3500 N
3000 N
2500 N
2000 N
1500 N
1000 N
500 N
6000 E
6500 E
7000 E
7500 E
8000 E
8500 E
9000 E
9500 E
10500 E
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AXL - BC - 82 - A MAP 2 OF 2

LEGEND

Lamprophyre

- 9a Lamprophyre[a]

Felsic to Intermediate Intrusive Rocks

- 8 Unsubdivided
- 8a Granite
- 8b Granodiorite to tonalite
- 8c Inclusions, hybrid[c]
- 8d Hololeucocratic granite

Intermediate to Mafic Intrusive Rocks

- 7 Unsubdivided
- 7a Diorite, quartz diorite
- 7b Tonalite, quartz diorite
- 7c Gabbro
- 7d Porphyritic

Ymir Group[b]

- 6 Unsubdivided
- 6a Argillaceous siltstone and sandstone
- 6b Argillaceous siltstone, siliceous sandstone (minor siliceous siltstone locally)
- 6c Siltstone, sandstone
- 6d Interbedded siliceous sandstone and argillaceous siltstone (as biotite partings)
- 6e Granitized metasediments (diffuse granitoid components)
- 6f Coarse recrystallized siltstone, minor argillaceous sandstone[d]
- 6g Black argillite, phyllite
- 6h Siliceous sandstone, siltstone, partially silicified
- 6j Quartzite (buff, white, grey), rare siliceous siltstone
- 6k Quartz rich siltstone

Active Formation[d, b]

- 5 Unsubdivided
- 5a Black argillite, graphitic argillite
- 5b Grey argillitic siltstone or quartzite
- 5c Black slate hornfels
- 5d Rusty impure quartzite
- 5e Pyrite
- 5f Dolomitic limestone with argillitic streaks

Laib Formation

Reeves Member

- 4 Unsubdivided
- 4a Layered to laminated limestone, dolomitic limestone (minor dolomite, marble, cherty limestone)
- 4b Dolomite, dolomitic limestone (minor marble)
- 4c Marble, limestone (minor dolomitic limestone, rusty porphyroblastic calcite)

Truman Member

- 3 Unsubdivided
- 3a Altered limestone, dolomitic limestone, limestone
- 3b Grey phyllite and quartzite, minor lenses of limestone
- 3c Thinly bedded to laminated grey phyllite and dolomitic limestone
- 3d Thinly laminated diopside hornfels
- 3e Massive limestone, dolomitic limestone
- 3f Marble
- 3g Garnet bearing skarn

Reno Member

- 2 Unsubdivided
- 2a Interbedded siliceous sandstone and argillaceous siltstone (as biotite partings)
- 2b Grey, micaceous, siliceous siltstone
- 2c Dark grey hornfels, biotite schist
- 2d Granitized metasediments
- 2e Limestone, dolomitic limestone, marble
- 2f Siliceous sandstone

Quartzite Range Formation

- 1 Unsubdivided
- 1a White quartzite, brown micaceous quartzite
- 1b White quartzite

a Occurs as dikes
b Age relationship unknown
c Type of inclusion given in brackets where noted
d Possibly time equivalent to active formation

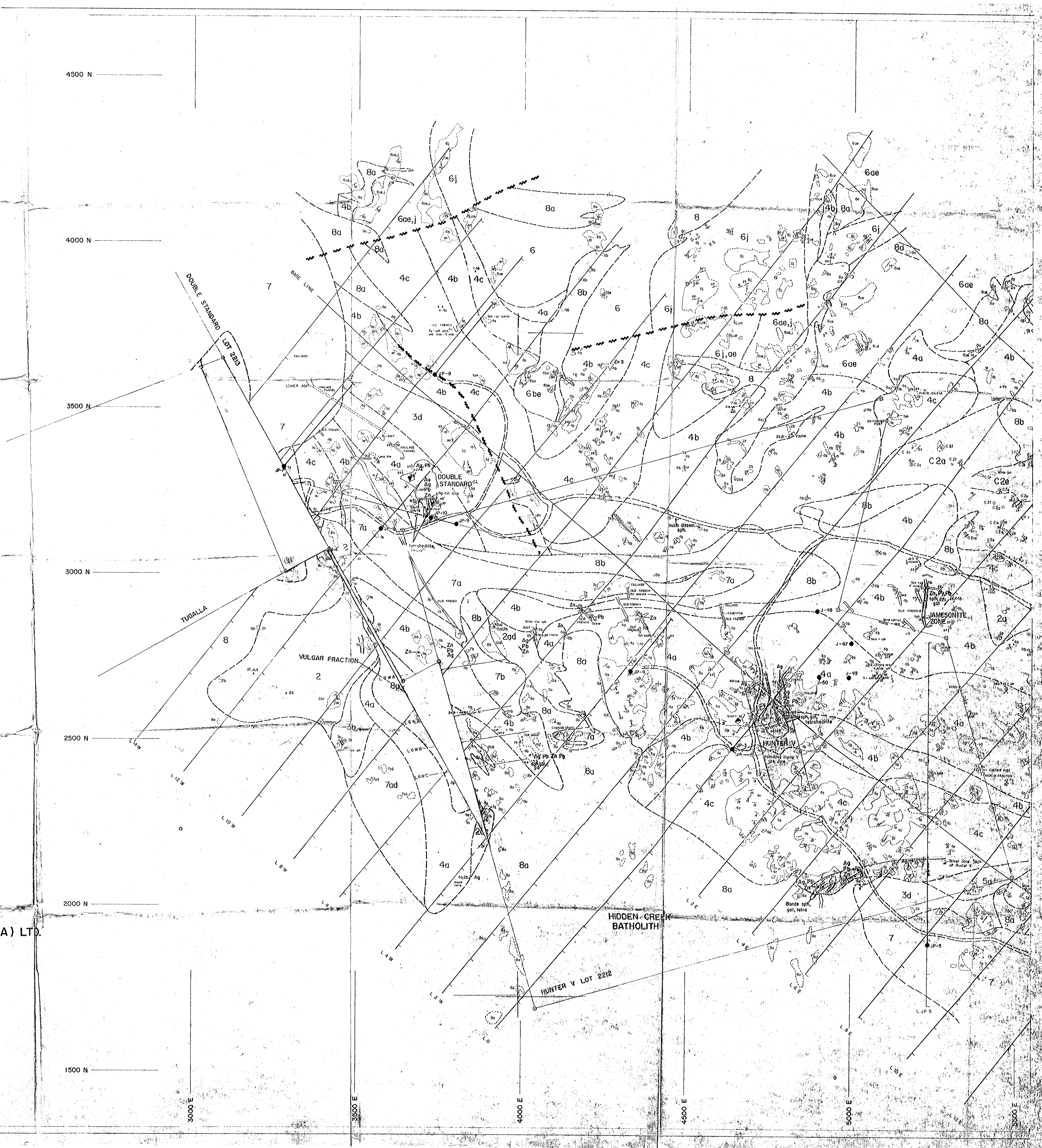
Note : "C" preceding any code indicates data compiled from other sources

GEOLOGICAL AND MINING SYMBOLS

- Area of bedrock outcrop, small outcrop
- Tailings
- Geological contact
- Fault
- Anticline, antiform
- Syncline, synform
- Overturned anticline, overturned antiform
- Overturned syncline, overturned synform
- Jointing (vertical, inclined)
- Lineation (with plunge), fold axis, shearing
- Foliation (vertical, inclined)
- Bedding (vertical, inclined)
- Trench, pit, adit
- Fracture cleavage
- Drillhole
- Mineralized zone

ABBREVIATIONS

Ag	Silver
Au	Gold
gal	Galena
Pb	Lead
po	Pyrrhotite
py	Pyrite
sph	Sphalerite
Zn	Zinc



NEW JERSEY ZINC EXPLORATION CO. (CANADA) LTD.

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DOUBLE STANDARD — HUNTER V AREA

GEOLOGICAL COMPILATION MAP

[GEOLOGICAL BRANCH
[ASSESSMENT REPORT

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PART 1 OF 5 N

AXL - BC - 82 - A MAP 1 OF 2