GEOLOGICAL ASSESSMENT REPORT

LF, LCF, VANCOUVER AND RALF CLAIMS

OWNER: FAR NORTH JADE LTD.

LOCATION: MT. OGDEN, OMINECA MINING DIST.

LAT 55/50 N, LONG 125/50 W.

WORK DONE: JULY 24/72 to FEB 23/73.

B. PRICE, M.Sc., MANEX MINING LTD.

93N/13W

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MANEX MINING LTD.
227 - 470 GRANVILLE STREET, VANCOUVER 2, B.C. ⊕ 681-4411

DECLARATION OF COSTS APPLICABLE TO ASSESSMENT REPORT ON FAR NORTH JADE LTD. PROPERTY

WAGES: B.Price - July 24/72 to Sept 8/72.

15 days @ $95.00/day	$1425.00
4 days @ $75.00/day	$ 300.00
Sept 8/72 to Feb 23/73	
7+3/4 days @ 75.00/day	$ 581.25
TOTAL	$2306.25

DISBURSEMENTS

B.Price (expenses for library research, X-ray determinations etc.)	$ 179.63
M.J.Beley	$ 5.24
C.H.A.P photocopy	$ 76.67
Air photos	$ 29.90
Western Reproducers	$ 36.74
Van-Cal Reproduction	$ 12.45
Geotec Resources (thin sections)	$ 63.38
B.C.Tel	$ 4.62
Deakin Equipment (flagging etc.)	$ 12.89
Typing (L.Ahlberg)	$ 36.00
Okanagan Helicopters	$ 107.49
Shell Canada	$ 3.31
	$ 568.32
Service Charge add 15%	85.25
	$ 653.57

TOTAL COSTS FOR PROJECT $2959.82

B. J. Price

Declared before me at the

of , in the

Province of British Columbia, this VANCOUVER, B. C.

day of AUG 3 1973 , A.D.

Sub-Mining Recorder

A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

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NOTE OF EXPLANATION

The following geological report was prepared as a joint report for New World Jade Ltd. and Far North Jade Ltd. Upon submission as an assessment report for Far North Jade Ltd. certain portions dealing with New Worlds property have been omitted to protect the interests of that company. No information of a general nature or information dealing specifically with Far North Jade Ltd has been omitted.

Barry Price,

Barry Price, B.Sc., M.Sc.
Geologist

GEOLOGY OF MT. OGDEN JADE DEPOSITS

OMINECA M.D., B.C.

Prepared for:

FAR NORTH JADE LTD.

By

B. J. Price, B.Sc., M.Sc.,
MANEX MINING LTD.
227 - 470 Granville Street
Vancouver 2, B. C.

January 1973

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#13 Geology of Mt. Ogden Jade Occurrences

I - INTRODUCTION

In May 1972, Manex Mining was approached by Mr. L.D. Barr [Far North Jade Ltd.] regarding the feasibility of the geological mapping of Far North's jade property on Mt. Ogden. During June, New World Jade Ltd., owners of the property adjacent to that of Mr. Barr, agreed to a jointly-financed geological study of jade deposits, including geological mapping, petrographic studies, reconnaissance surveys of claims and fill-in staking where required.

The writer commenced the project on August 1, 1972, and field work was completed September 7, 1972. Slightly more time was spent on New World's property. Several new significant jade occurrences were located by the writer and the owners of both properties. All known jade occurrences were mapped; several occurrences were drilled [X-ray and packsack], numerous samples were taken for mineralogical and petrographic study, and 32 fractional and full-sized claims were staked to cover strategic areas.

The Mt. Ogden jade occurrence is one of a large number of similar occurrences found in ultrabasic rocks intruding Cache Creek Group rocks along or associated with major fault zones. The following map [fig.L1] illustrates the fault/zones and nephrite jade occurrences in B. C.

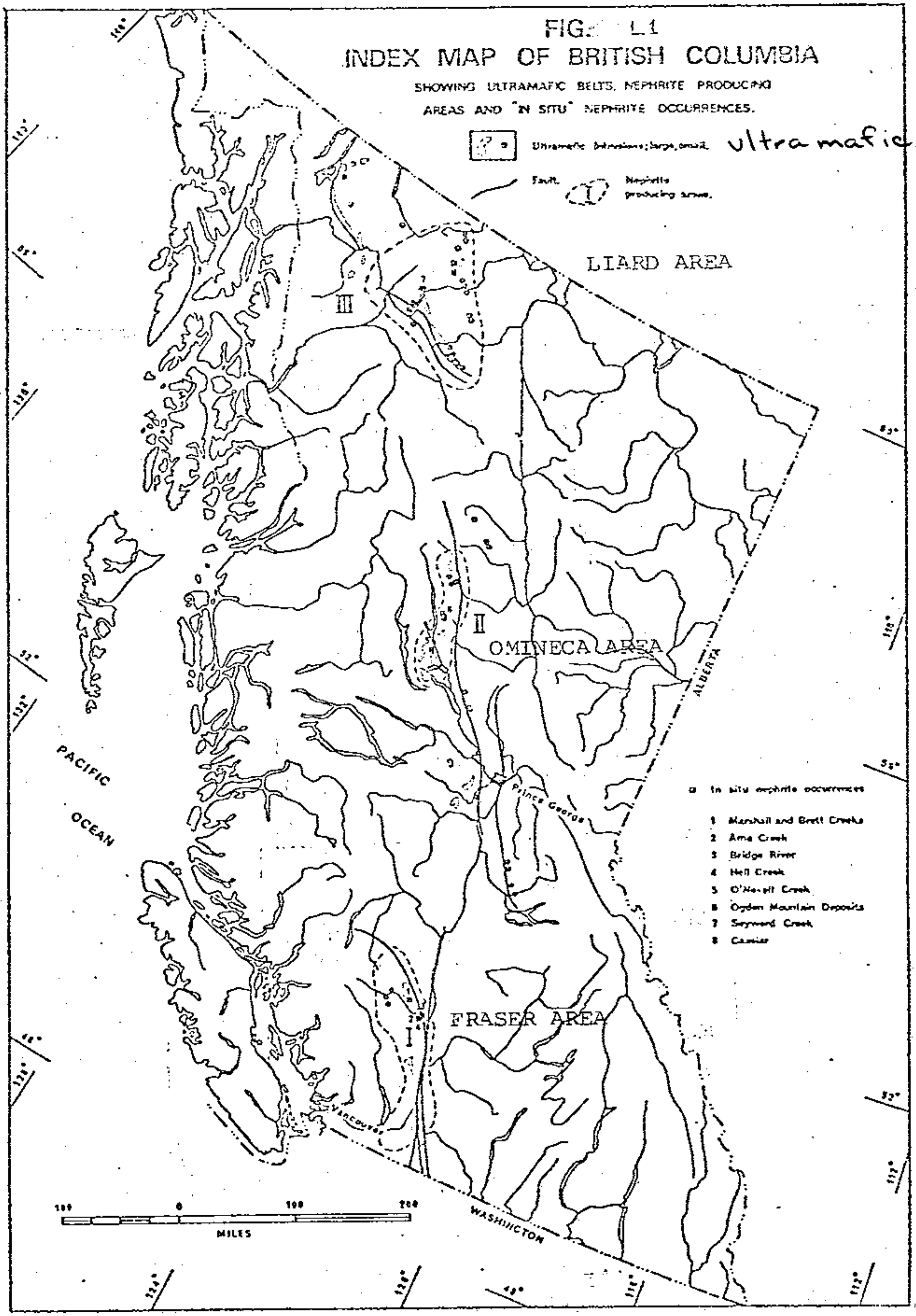

FIG. L1
INDEX MAP OF BRITISH COLUMBIA
SHOWING ULTRAMAFIC BELTS, NEPHRITE PRODUCING AREAS AND "IN SITU" NEPHRITE OCCURRENCES.

(From Fraser, J.R., 1973)

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II - LOCATION AND ACCESS

Location and access of both Far North and New World Jade properties are shown in figures L2 and L3 and are well described by L. D. Barr [1971]; his text is reproduced below:

" Mount Ogden is located in the Omineca Mountains of north central British Columbia, approximately 195 miles northwest of Prince George and 90 miles north-east of Smithers. The nearest settlements are Takla Landing, 25 miles to the south on Takla Lake, and Germansen Landing, 45 miles to the west. Both are extremely small communities, and both are relatively isolated [although the northern extension of the Pacific Great Eastern Railway is now taking it through Takla Landing]. Germansen Landing connects with Fort St. James [where the pavement ends] by 140 miles of single-lane gravel road. This road is usually not plowed in the winter, and so is closed from November through late May in most years. There is no road to Mount Ogden, although there is a good tractor trail from the mountain 35 miles to a gravel road which presently ends at a collapsed bridge at Kenny Creek. This road connects with the Germansen Landing - Fort St. James road about 10 miles south of Germansen Landing. Commercial trucking services with vehicles capable of carrying loads up to approx-imately 20 tons are available throughout the area.

The lake at the base of Mount Ogden is suitable for fixed-wing aircraft with capacities of up to 2,800 pounds incoming and 2,000 outgoing. Such aircraft are available for charter at Prince George, Mackenzie, Fort St. James and Smithers. Helicopters are based at these locations as well, and during the summer months helicopters are usually available at Germansen Landing.

The most practicable method of transporting supplies and personnel to the mining properties on the mount-ain has proven to be by air, using fixed-wing air-craft to Ogden lake and then helicopters to ferry to the mountain-top. The most practicable way to move large tonnages off the mountain has proven to be by tractor. A Caterpillar D-8H 46A was used successfully for this purpose by Far North Jade Ltd. in 1971, hauling to Kenny Creek where connections were made with trucks. "

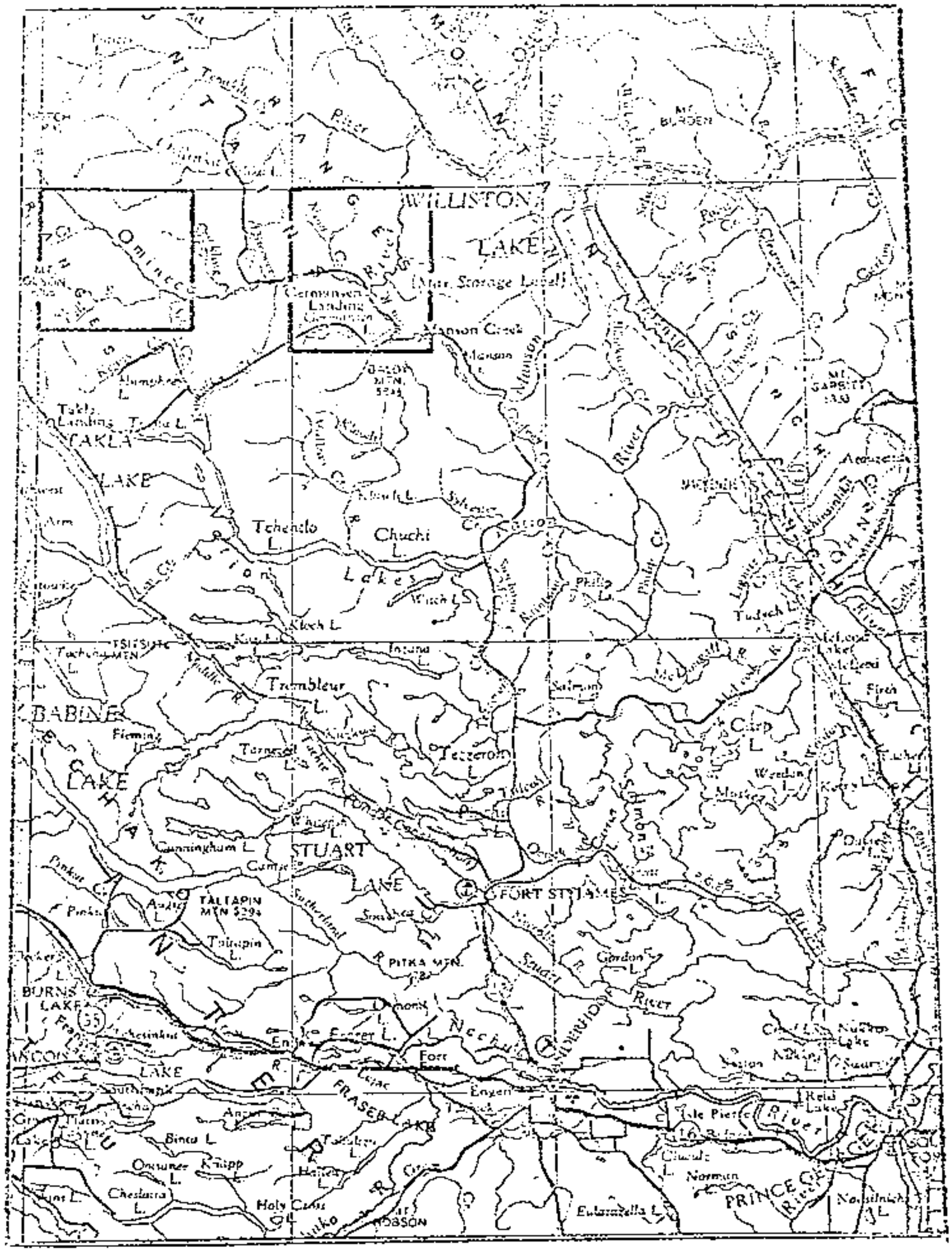

FIG. 12. Map showing position of Mt. Ogden and Manson Creek - Germansen Landing location maps. Scale: 1 in. = 30 mi.

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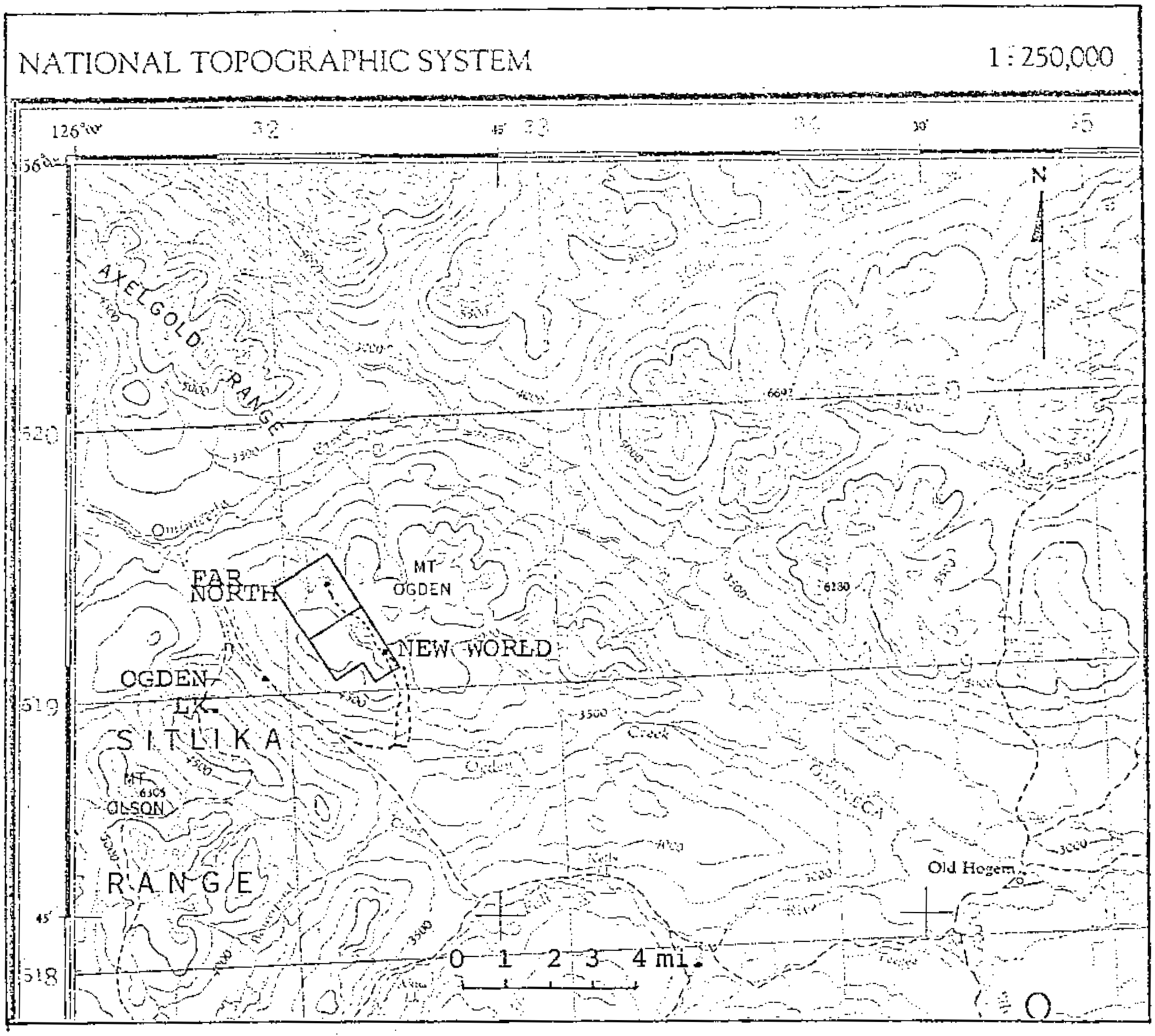

FIG. 13. Map of Mt. Ogden area showing location of New World Jade and Far North Jade camps.

In 1971, a "Foremost" tracked vehicle was used by New World Jade to transport jade to Kenny Creek. Had the vehicle been in good shape this method of transport would have been economically competitive with tractor hauling.

III - CLIMATE AND WORKING SEASON

"Temperatures in the area range from highs approaching 90 degrees in June and July to lows of 40 to 50 below zero in mid-winter. Monthly mean temperatures are below freezing from October through April. Annual precipitation exceeds 100 inches. Summers are generally rainy, but dry periods up to a month in duration are not uncommon.

The useful working season on the mountain runs from late June through October. Prior to late June conditions are too muddy, and by late October permanent snow cover can be expected. Heavy equipment can usually reach the area by mid-July. It is sometimes advisable to move heavy equipment into the area across all major streams and rivers in late April before breakup, as the combination of a late spring and wet summer can cause water levels to remain too high to permit fording until well into summer."

IV - CLAIMS

At the time of the writer's visit to the property 19 full-sized mineral claims and 6 placer mining leases were owned by New World Jade and 22 mineral claims and 6 placer mining leases by Far North Jade Ltd. During the 1972 season 18 full-sized and fractional mineral claims were staked for New World Jade and 14 full-sized and fractional claims for Far North Jade. A complete listing of claim data is included in the Appendix. Sketches of the claim blocks are shown in figures C1 and C2.

V - HISTORY OF MT. OGDEN JADE EXPLORATION

Nephrite jade was first discovered on Mt. Ogden by W.L. Owen and S.E. Porayko of Manson Creek during the summer of 1967. Alluvial boulders were found on numerous creeks in the general vicinity but good quality material was not found until the upper reaches of Ogden Creek and two of its small tributaries [including Lee Creek] were explored. The alluvial material was mined in 1967, 1968 and 1969, when the high-grade "in situ" showing was discovered and staked by Owen and Porayko. In 1968, L. D. Barr located two placer leases, on Ogden Creek [above the leases of Owen and Porayko], and three leases [1909, 1910 and 1911] on Squawkbird Creek. In 1969, after discovering jade in place on the northern portion of the mountain, twenty-four mineral claims were staked by Far North Jade Ltd. [Barr's company] and four additional placer leases were located. [see fig. 4].

During 1970, New World Jade was formed by Owen, Porayko and Galleli Resources of Calgary and in 1971 the present wire-saw was set up to cut the larger boulders into manageable pieces. Far North Jade Ltd. mined placer and "boulder" jade from its property in 1969, 1970 and 1971. A summary of production from both mining camps is as follows:

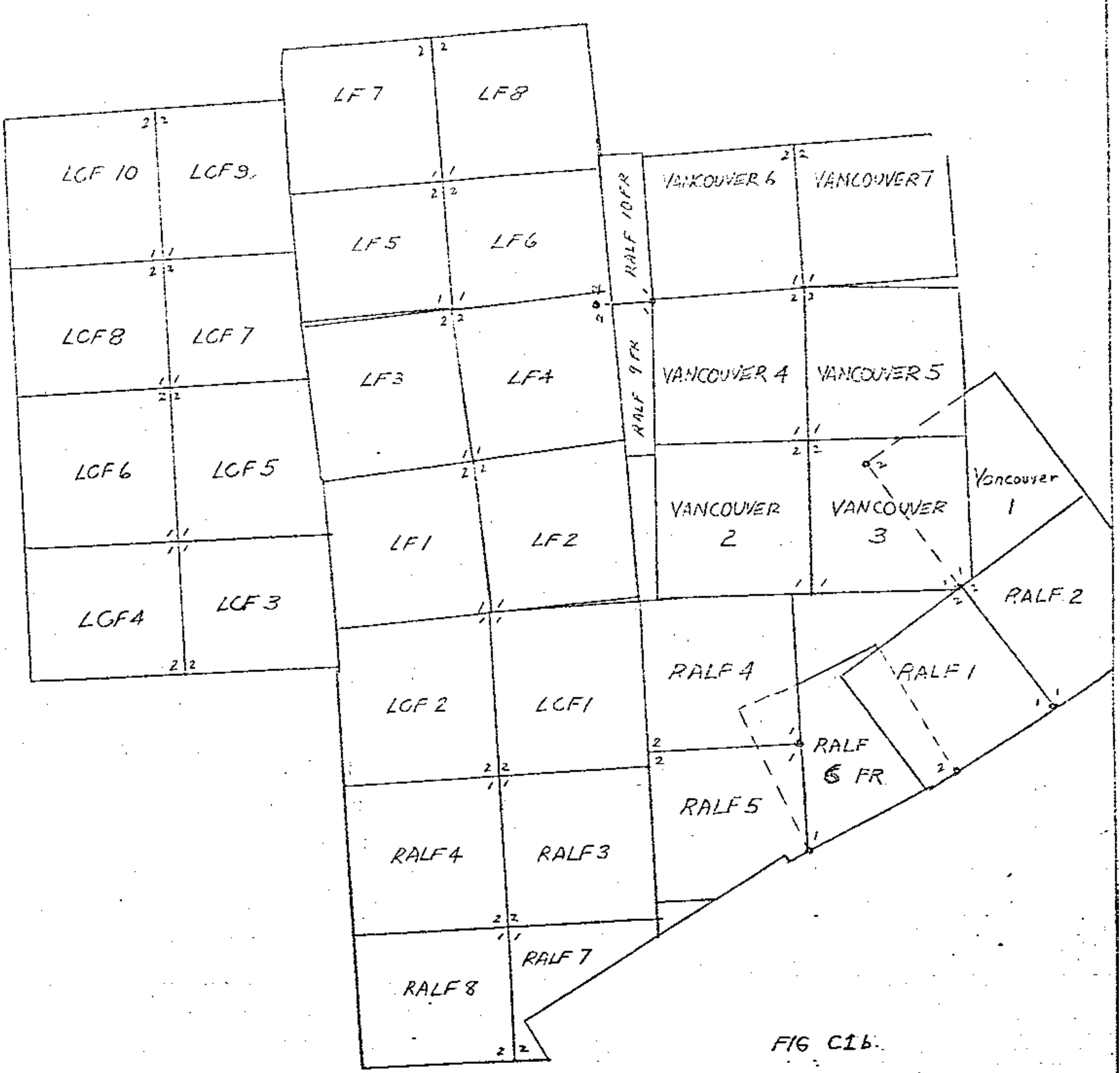

FIG C1b.

FAR NORTH JADE LTD.

SKETCH MAP OF CLAIMS
MT. OGDEN.
SCALE 1IN: 1500FT.

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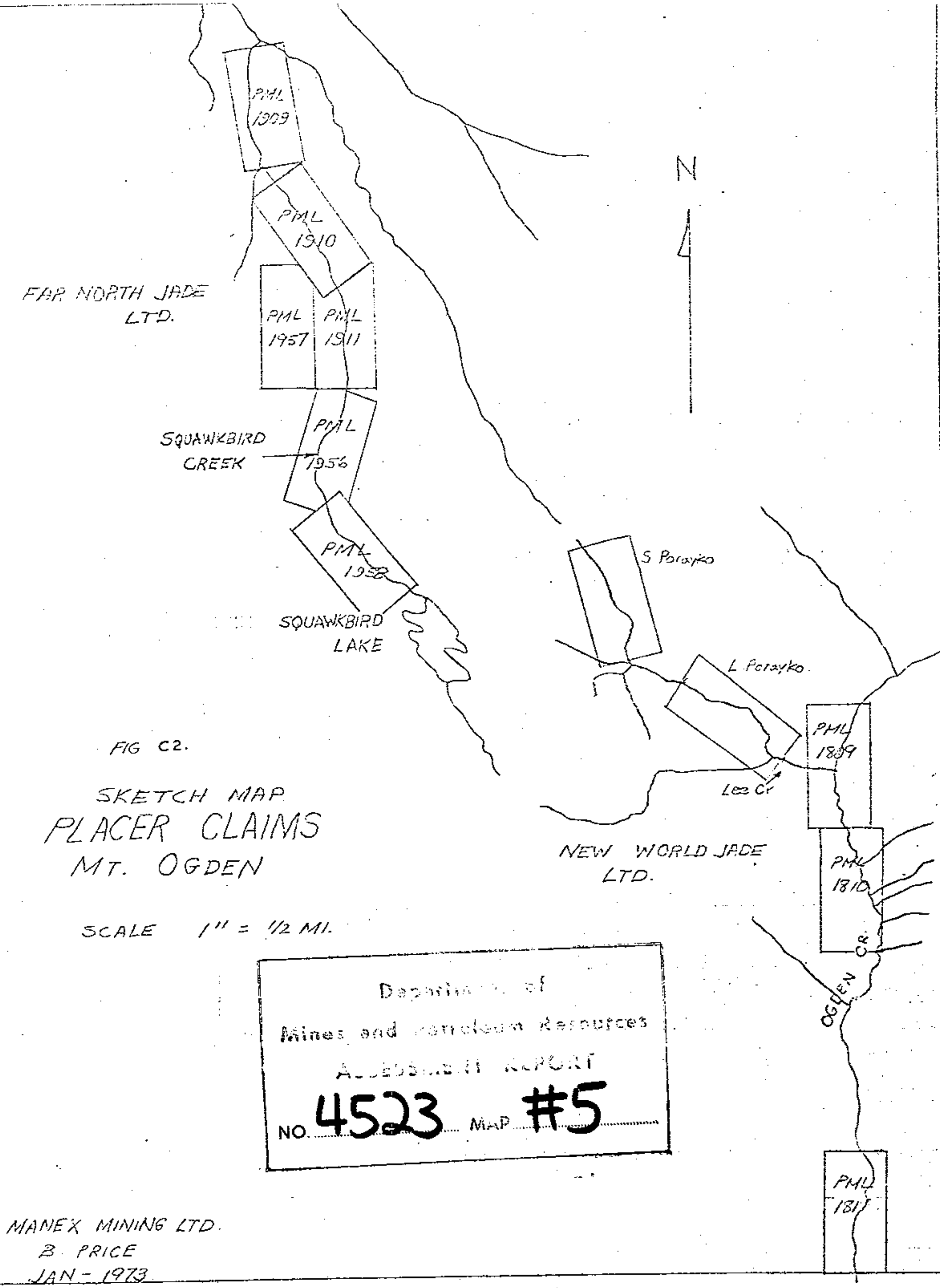

FIG C2.

SKETCH MAP
PLACER CLAIMS
MT. OGDEN

SCALE 1" = 1/2 MI.

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MANEX MINING LTD.
B. PRICE
JAN - 1973

Far North Jade

-

-

12.5 tons	)	Placer and
33 tons	)	boulder
	)	jade
30 tons	)	Kuan Yin
36 tons		
5 tons		(black)
116.5 tons		

The following sections dealing with production, mining methods, and markets, prices and uses were taken from a recent M.Sc. thesis by Mr. John Fraser [now with Noranda Exploration Ltd.]. Mr. Fraser is very conversant with all aspects of jade and the present writer could not improve on the presentation reproduced below: It will be noticed that production figures from Ogden Mtn. do not coincide with those published in the B. C. Minister of Mines reports. The figures supplied in the previous section were supplied by W. L. Owen of New World Jade and are the correct figures.

VI - PRODUCTION OF JADE IN B. C.

" Annual production figures for British Columbia nephrite have been kept since 1959; these are graphically portrayed in figure 2. During the period 1959 to 1970, a total of 596,394 pounds of nephrite were produced worth $531,670 [M.M., 1962-1970]. In 1970, due largely to production from recently discovered "in situ" deposits, the quantity mined was 262,602 pounds, a tenfold increase over the previous year.

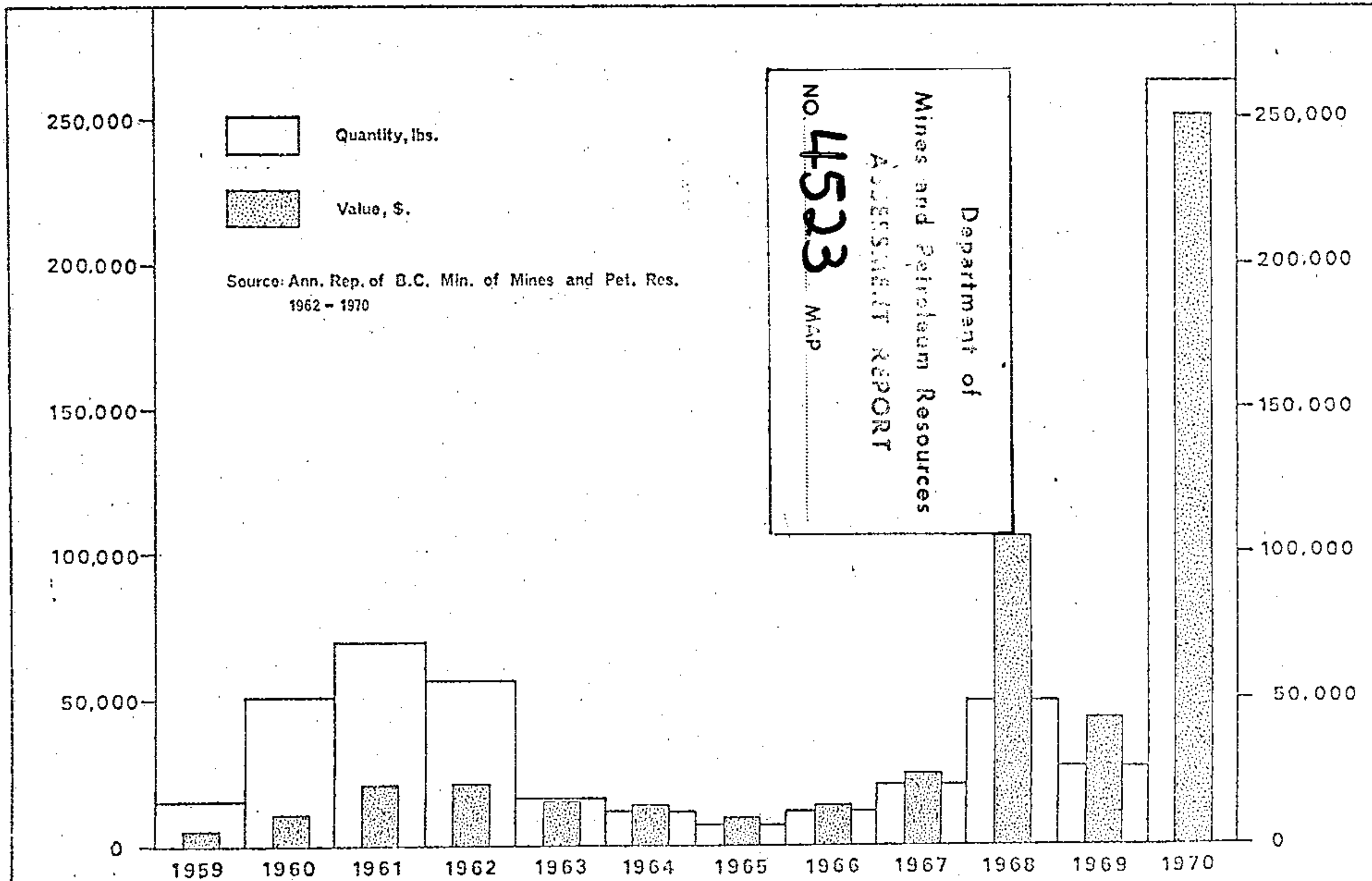

Fig. . Nephrite production in British Columbia for the period 1959 – 1970, inclusive.

REPRODUCED FROM FRASER, J.R., (1973)

Table 1

Nephrite Production from Mining Divisions, British Columbia

Year	Mining Division	Quantity (lb.)	Value ($)	Total to Date Quantity (lb.)	Total to Date Value ($)
1962	Lillooet	56,935	20,760		
1963	Lillooet	16,000	15,529	207,986	72,490
1964	Lillooet	10,337	11,404	218,323	83,894
	Omineca	1,200	2,400	1,200	2,400
1965	Liard	2,000	2,000	2,000	2,000
	Lillooet	4,129	5,249	222,452	89,143
	Omineca	1,000	2,000	2,200	4,400
1966	Liard	8,493	8,648	10,493	10,648
	Lillooet	3,140	4,577	225,592	93,720
1967	Liard	14,920	19,714	25,413	30,362
	Lillooet	5,240	4,627	230,832	98,347
1968	Liard	1,810	2,125	27,223	32,487
	Lillooet	42,095	83,899	272,927	182,246
	Omineca	5,110	19,646	7,310	24,046
1969	Liard	5,825	11,960	33,048	44,447
	Lillooet	6,060	5,237	278,987	187,483
	Omineca	14,447	25,438	21,757	49,484
1970	Liard	5,322	9,099	38,370	53,546
	Lillooet	14,280	27,583	293,267	215,066
	Omineca	243,000	213,574	264,757	263,058

Source: Annual Reports, British Columbia Minister of Mines and Petroleum Resources, 1962 - 1970.

REPRODUCED FROM FRASER, J.R., (1973)

" Undoubtedly production will continue to increase in future years as the "in situ" deposits are able to produce large quantities of consistent quality material for such potential high volume consumers as the construction industry.

Nephrite production data for the Lillooet, Omineca and Liard Mining Divisions, which enclose all or large portions of areas I, II and III, respectively, for the period 1962 to 1970 are presented in Table 1. "

VII - MINING METHODS

" The methods employed in mining "in situ" nephrite vary from deposit to deposit. As with any gemstone, the ultimate goal is to remove the maximum amount of material with the minimum amount of physical damage to it; this is often a difficult task due to the hardness and extreme toughness of nephrite and the fact that it often occurs as discontinuous lenses and veins in moderately to steeply dipping zones. Factors influencing the choice of extraction method are the geometry of the deposit, the topography of the immediate area, the nature of the enclosing rocks and the accessibility of the mine site.

Stripping the overburden and the enclosing rocks from the nephrite pods is usually accomplished by using heavy equipment such as bulldozers although at one deposit in the Takla Lake area, the overburden was washed away with high pressure water jets and the harder material in the hanging wall was broken with pneumatic hammers and very light explosive charges. Due to the potential danger of fracturing the nephrite, explosives must be used sparingly and with caution. Once the nephrite is exposed, individual lenses or large fragments are extracted with heavy equipment or hydraulic jacks or the nephrite is sawn, in place, into easily removed blocks. Several small diameter core samples are usually taken from the large pieces in order to ascertain their quality. The extracted nephrite is sawn into smaller blocks to trim waste or low quality material, to provide an easily handled piece and to provide quality control. The sawing is accomplished by means of large diameter diamond saws, diamond impregnated drag saws or large wire saws. "

VIII - MARKETS, PRICES AND USES

" The bulk of the nephrite produced in British Columbia is exported in a raw or semi-processed form to Germany, Japan, Taiwan, Hong Kong, the Peoples Republic of China and the United States of America. A smaller though significant amount, generally as thin slabs or small blocks weighing 5 pounds or less, is sold locally through retail outlets to collectors and amateur lapidaries.

Prices for nephrite are variable and are dependent upon colour, competency, purity and amount of processing that has gone into preparing the material for sale. High quality nephrite has a uniform green colour, very few fractures and veins of cross fiber tremolite and a low content of impurities such as magnetite, chromite and chlorite. Botryoidal nephrite and "mutton fat" jade or white nephrite, two extremely rare varieties, command exceptionally high prices. Medium and select grades of nephrite range in price from $4.00 to $20.00 per pound and in rare instances the price may be as high as $100.00 per pound. Low grade material has a price range of $0.50 to $2.00 per pound.

At present, the major users of nephrite are the manufacturers of jewelry, carvings and novelties. This market will account for a very small percentage of the total nephrite sales if applications can be developed in the construction industry. The nephrite producers envision the use of this material for internal and external building facing, counter tops, floor tiles and, in the crushed form, for terrazzo floors. Its hardness, extreme toughness, and resistance to corrosion and weathering make nephrite an ideal material for construction applications. The discovery of relatively large tonnage in place deposits has made it possible for the producers to supply the large quantities of consistent quality material that would be required by this industry. Research is presently being conducted in Europe to establish the feasibility of using nephrite for the fabrication of bearings for watches and other instruments [p. c. Owen, 1972; p. c. Smith, 1972]. "

[Reproduced from Fraser, J.R., 1973]

IX - REGIONAL GEOLOGY

Regional geology is illustrated in figure G1. Mt. Ogden is situated in the Omineca mountains, four miles west of the Omineca-Pinchi fault system, a significant thrust structure which brings rocks of the Cache Creek Group [Penn-Perm age] in contact with rocks as young as Upper Cretaceous [Sustut Group sediments]. Much of the area east of the Omineca fault is underlain by various phases of the Hogem batholith; intrusive into sediments and volcanics of the Upper Triassic Takla Group. Average composition of the Hogem batholith is granodiorite [Armstrong, 1949, p. 77] and K-Ar ages for two samples taken from different phases are 122 and 167 m.y. respectively [Map 1256A, G.S.C. 1970].

The Mt. Ogden ultrabasic bodies are representative of a great number of similar "Trembleur" intrusions found throughout the belt of Cache Creek rocks known as the Pinchi Geanticline. The Trembleur intrusions, varying from layered basic intrusive complexes to more irregular, serpentinized "alpine" type ultramafic bodies were emplaced in pre-Upper Triassic time; because serpentinite pebbles and chromite grains are present in basal conglomerates of the Takla sediments [R.J.W. Douglas, 1970].

X - GENERAL GEOLOGY - MT. OGDEN AREA

Serpentine

Most of the area covered by claims on Mt. Ogden is underlain by serpentine, which formed by alteration of peridotite and dunite intruded into volcanic and sedimentary rocks of the Cache Creek Group [Pennsylvanian-Permian

FIGURE G1. Regional geology in the vicinity of Mt.Ogden. Note that the serpentine bands are actually much more extensive than shown on this map. (G.S.C.Map 844a. "Takla")

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age]. Few localities were seen where any of the original ultramafic is present; the present shape of the serpentinized body can be roughly determined from the anomalous area on the aeromagnetic map [figure GP-1].

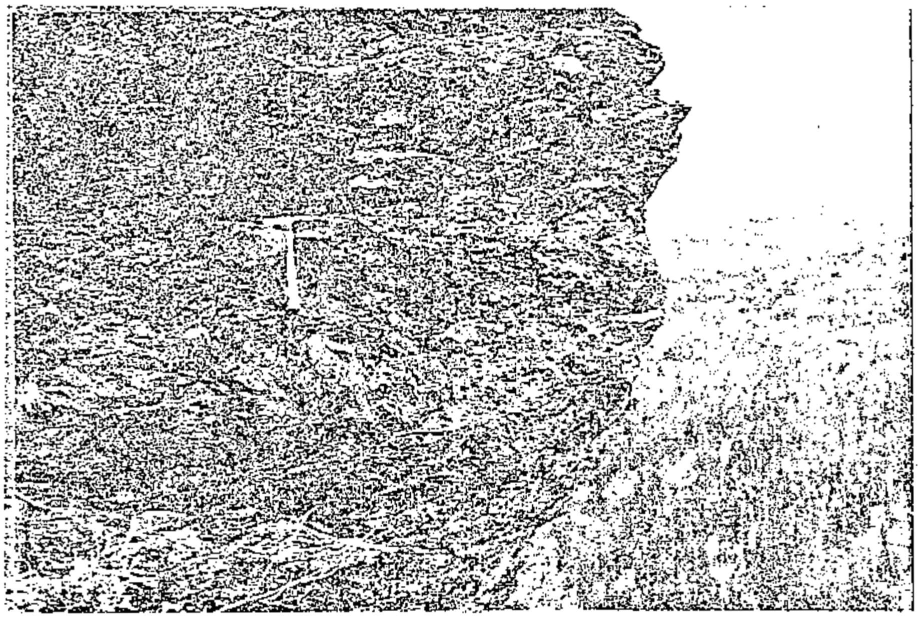
Several distinct types of serpentine were noted in the mapped area. In the jade-producing areas the serpentine is mostly dark green to brownish-green with polished nodular appearance probably resulting from shearing. Elsewhere, as at the head of Squawkbird Creek, the serpentine is medium to bright green antigorite which develops a white to light green weathering crust. On the farthest serpentine occurrences, west of the Mt. Ogden granite-granodiorite sill, the serpentine is very dense, contains relic olivine and pyroxene, and weathers rusty brown on the surface, probably because of weathering of the Fe-bearing pyroxenes, magnetite, pyrite and pyrrhotite. Serpentine shear breccias are common [see plates 1a, 1b].

Alteration Zones

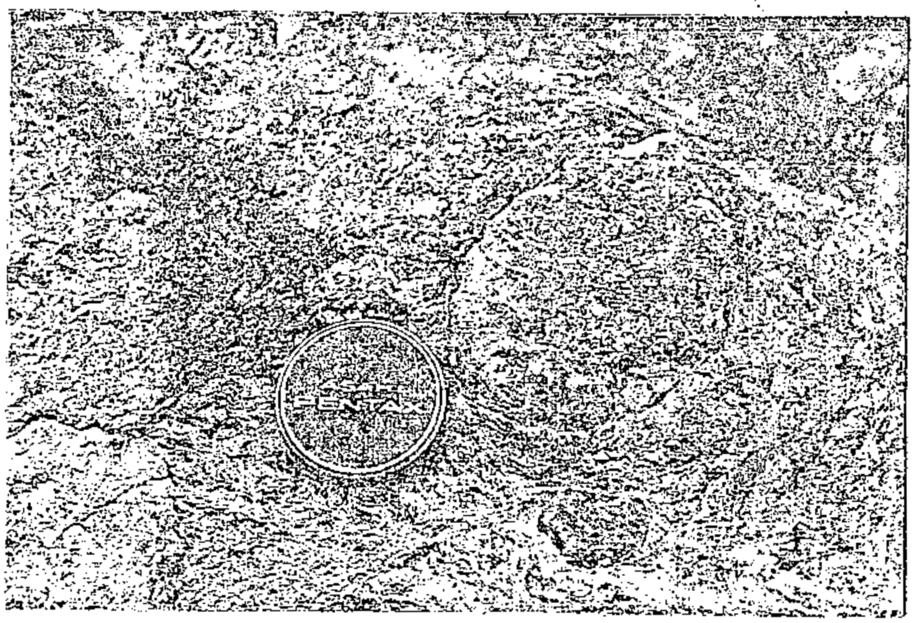
Several occurrences of "rodingite" were noted on the property; some associated with jade occurrences but some isolated in the serpentine. In the Far North jade pit area a thin band of tremolite-diopside-vesuvianite-serpentine [thin-section FN 4a] cuts the sheared, light green serpentine. At the roadcut locality 2,000 feet southwest of the New World pit area, quartz, calcite, chlorite, uvarovite and grossularite are also present [thin section NW 10]. Alteration zones at several of the jade localities are described in a subsequent section.

Cache Creek Group Rocks

Most occurrences of Cache Creek rocks can be categorized as graphitic phyllites or as altered basic



PL. 1a . Serpentine shear-breccia. Fragments of massive serpentine in sheared serpentine matrix. This type of breccia is common throughout the Mt.Ogden serpentine body.



PL.1b . Close up of fragment in serpentine shear-breccia. Both photos taken near Squawk-bird creek at Far North Jade property.

volcanic rocks. The phyllites are soft and black with pronounced foliation; in some areas they are strongly silicified and resemble quartzites. Near the jade occurrences, the metasediments are often chloritized and tremolitized [see plates 2a, b]; the tremolite is visible to the naked eye as bundles of fibers. The altered volcanic rocks, judging from original and present mineralogy, were probably basaltic in composition. Reaction zones at serpentine contacts contain tremolite, chlorite, grossularite, hydrogrossular and talc. [see plates 3a, b, and 4a].

One small area of recrystallized limestone is present near Squawkbird Lake. At the contact with serpentine, alteration minerals chlorite, tremolite, grossularite and vesuvianite are produced. On the ridge of Mt. Ogden above the New World Jade camp numerous limestone exposures were seen. Most limestone here is dense and fetid with veins and patches of coarse calcite. Sheared limestone sedimentary breccia was seen in one locality.

Where cut by sills or dykes of granodiorite, for example west of Squawkbird Ridge, the sediments and volcanic rocks may be converted to hard, dense hornfels.

Other rock types occasionally seen in the project area are quartz-sericite and biotite schists, but these rocks comprise a small percentage of the total volume of Cache Creek Group rocks.

Omineca Intrusions

The large sill-like mass of granite and granodiorite west of Squawkbird Ridge is believed to be related to the Omineca intrusions [as is the Hogem batholith to

PL. 2a Silicified-chloritized "pseudo cherts" lying above "capping" at New World jade deposit.

PL. 2b. Contact of soapstone and chloritized sediments or volcanics, New World jade deposit.

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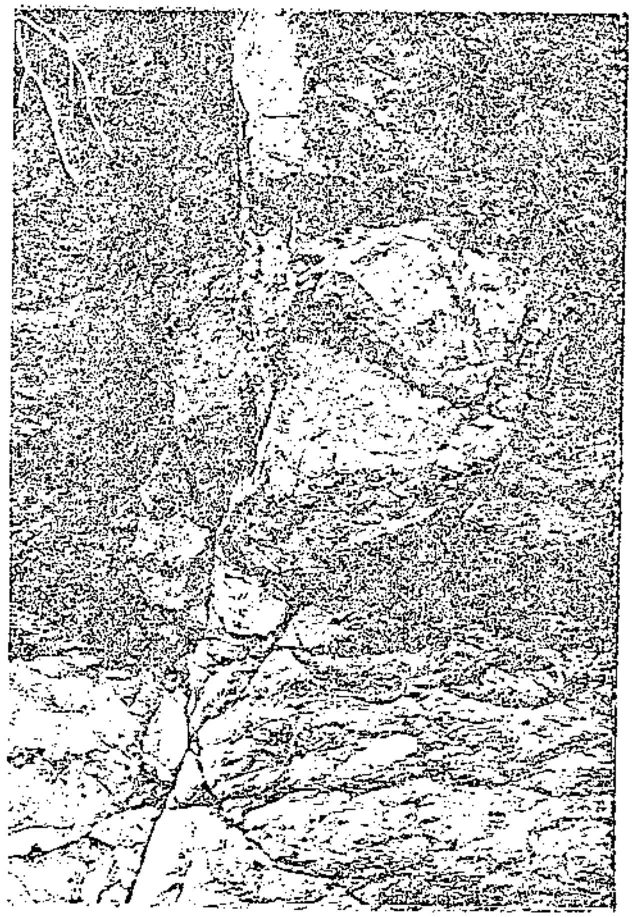
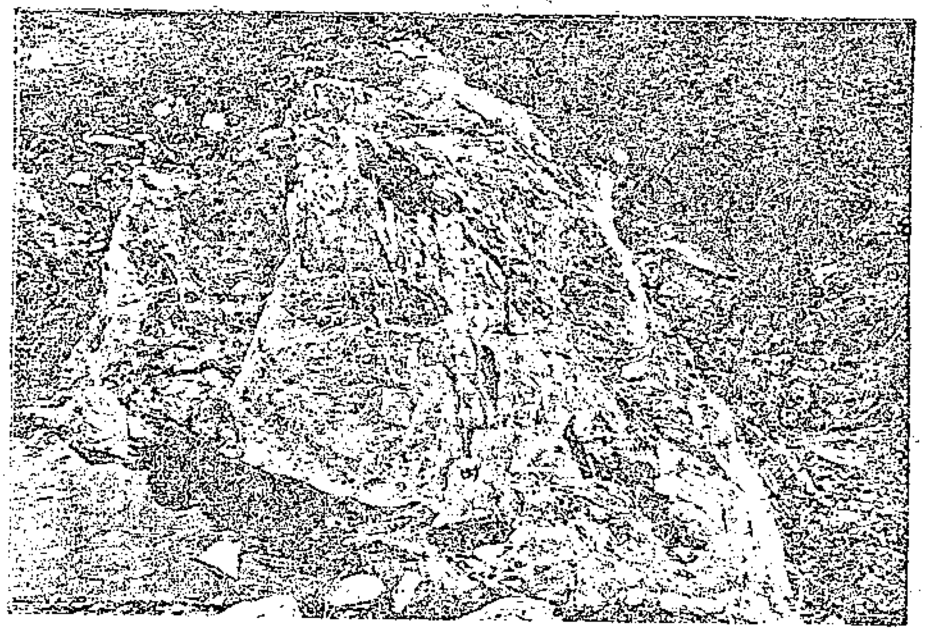


PL. 3a. Small inclusion of volcanic rock in Squawkbird Creek canyon. Margins are altered to talc.



PL. 3b. Narrow alteration zone in serpentine in Squawkbird Creek. Margins are tremolitic and central portion is steatite (soapstone).

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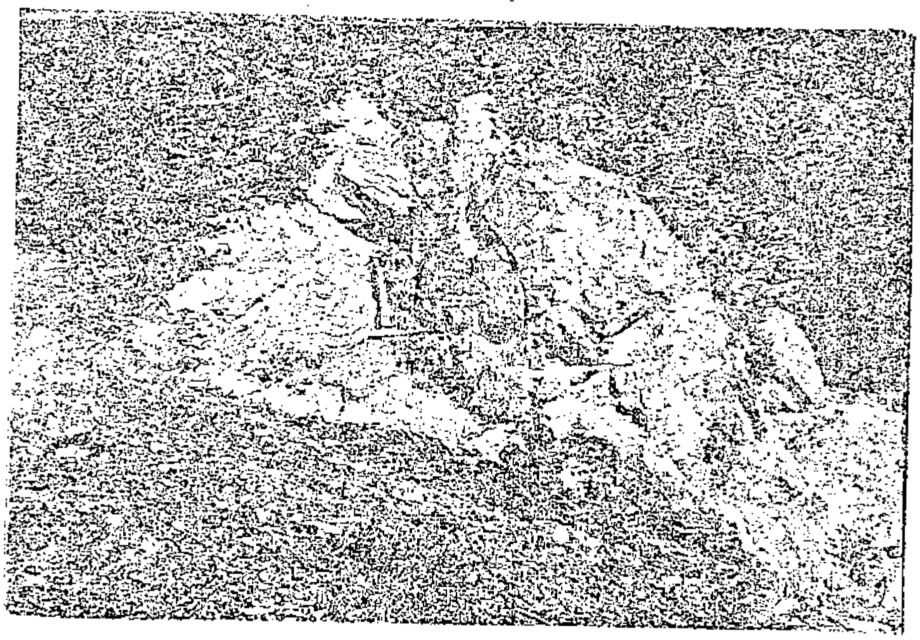

PL. 4a Inclusion of volcanic rock in serpentine--"Volcanic Ridge". Margin of inclusion is altered to tremolite schist, talc, and chlorite schist toward inclusion.

PL. 4b Talcy jade from Serendipity Creek area--jade is soft, has poor color, numerous fractures and abundant dark picotite specks.

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the east]. Composition of the intrusive material on the property is similar to that of the Omineca intrusions and age relations appear to be the same [post-Trembleur].

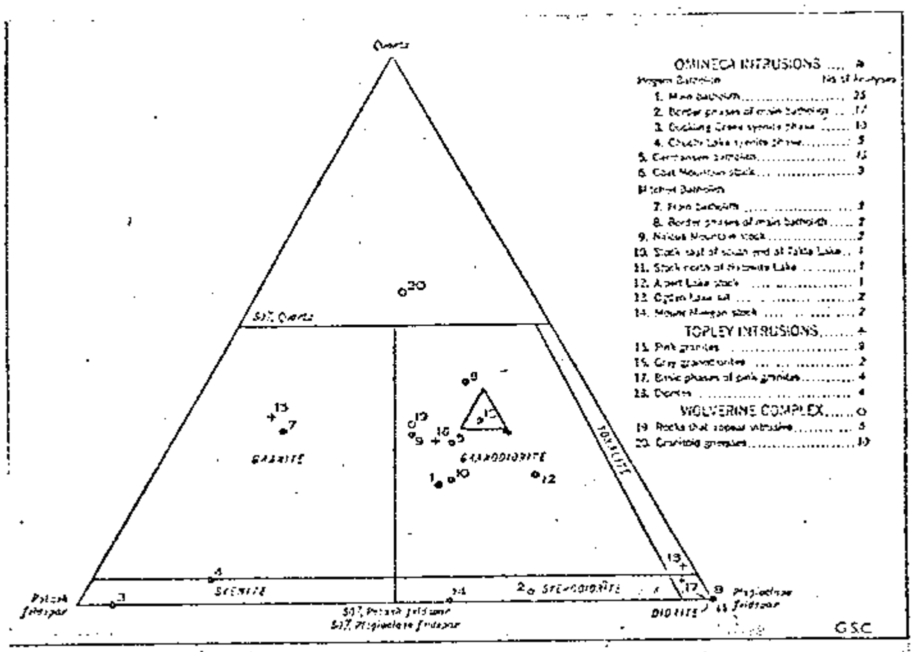


FIG 5 . Composition of the Mt.Ogden sill in comparison to other igneous rocks in the Fort St.James map area. (From J.E.Armstrong, 1949.)

The following description of the Ogden Lake sill is taken from Armstrong [1949, p. 109]:

" A sill outcrops on the east side of Ogden Lake. It is about 9 miles long, 4000 feet wide, strikes northwesterly and has an area of 7 square miles. It consists of medium-grained, grey to pink, equigranular granodiorite bordered on both sides by serpentine sills. The average mode, as determined from two specimens by the Rosiwal method is as follows:

Quartz	29.6%	
Orthoclase	20.4%	
Plagioclase	41.1%	[oligoclase-andesine]
Chlorite	6.7%	
Minor sphene and apatite		"

Numerous dyke-like bodies are scattered throughout the Cache Creek rocks and serpentine as well. The dykes are generally narrow [less than 10 feet], discontinuous [probably because of faulting] and have sharp contacts. Porphyritic phases were seen cutting normal medium crystalline granodiorite at one locality. Composition of the igneous material may be affected by assimilation at the margin of the bodies - more mafic minerals are present and textures are quite variable. Contacts with serpentine are usually marked by zones of alteration - with a wide variety of minerals represented in the alteration assemblages. Tremolite was noted in at least three localities but more commonly talc-carbonate rocks or chlorite schists with calcite, garnet, and vesuvianite are present [see plates 5a, b]. The new jade locality [B] at New World Jade's property is at a granodiorite-serpentine contact.

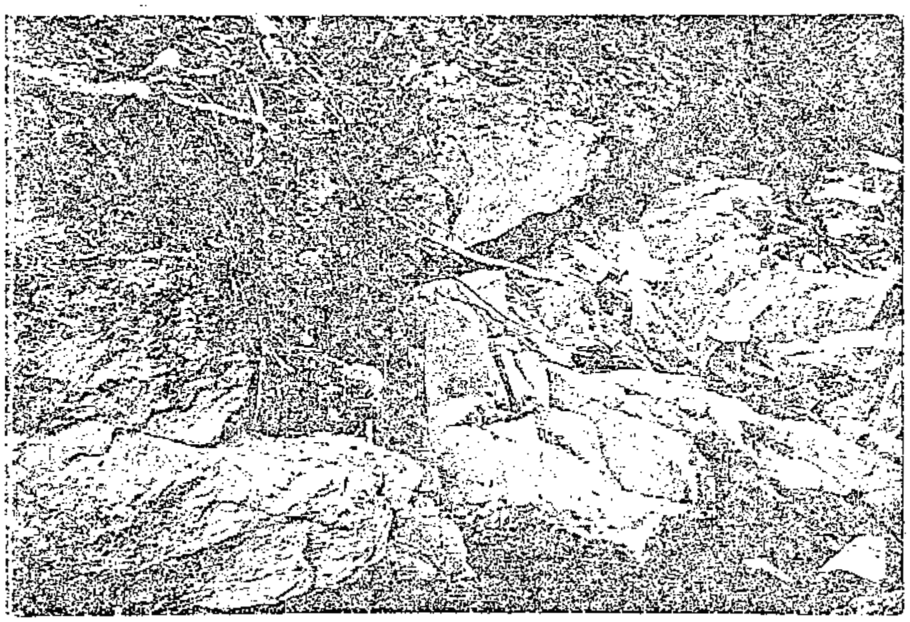
Coarse diorite or gabbro was seen in the area between Squawkbird and Serendipity Creeks. It is suspected that this occurrence represents a variant of the Omineca intrusion, although gabbros with gravity stratification features were noted by Lord in the ultrabasic bodies in the Axelgold Range to the north of Mt. Ogden.

Pervasive saussuritization of the intrusive rocks is common, and is well displayed by most thin sections studied [FN 4-5-9, NW 12, 13, 14]. In this type of alteration the normal igneous minerals are converted to clinozoisite, calcite, kaolinite, chlorite, sericite with minor biotite.

Jade

Nephrite jade occurs at numerous localities in the area studied. The only predictable feature of the

PL. 5a Contact of granodiorite sill and chlorite-garnet-resuvianite rock (altered serpentine) near "D" jade occurrence. Contact dips 40° to southwest.



PL. 5b Contact of granodiorite and serpentine in canyon of Squawkbird Creek. Serpentine is strongly tremoltized at contact and thin tremolite-diopside-garnet zone is present.

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deposits is that jade will be in the serpentine at or near contacts with Cache Creek rocks or Omineca intrusives. The presence at intrusive contacts puts a lower limit on the age of jade formation but does not necessarily imply a genetic affiliation of the two phenomena, since jade also occurs in the absence of intrusive material. The jade must form in an "open" system, since mineralogy and jade quality are widely variable even within the same lens.

Structure

From reconnaissance traverses, it is known that folding and faulting are common in the Cache Creek sequence. Shearing must have occurred over the whole area under the influence of regional compressive stress, because foliation directions in phyllites, volcanics and serpentine have a common orientation, averaging 130°. Slight evidence is present for strike-slip faulting; Thrust faulting probably occurred, for example at the phyllite-granodiorite contact in a small tributary of Ogden Creek.

The last structural event was probably normal faulting transcurrent to regional foliation and shearing. Several transcurrent faults must be present to account for juxtaposition of differing rock types. Orientation of cross structures and major fractures [seen in all rock types] is 30 - 60° NE strike with steep NW dip. Cross faults are associated with talc-carbonate-quartz-mariposite alteration zones in several localities - for instance the lower portion of Ogden Creek canyon, but cross-cutting features do not appear to have any definite association with the formation of nephrite. On the other hand, shearing may have played a major part in the stretching and isolation of large fragments of country rock, granulation of the margins and exposure to altering hydrothermal solutions. Also shearing has probably affected the shape of jade bodies by post-depositional deformation. [see plates 6a, b]

Glaciation

Few glacial striae are present in the area of the claims because of the soft, easily weathered nature of the rocks. However, large scale glacial grooving and drumlinoid features are visible on aerial photographs. These suggest that the last glacial movements were southeasterly, approximately parallel with regional foliation direction. Tracing of jade boulders along glacial strike would have led to discovery of several of the jade deposits and certainly to the most important of these. The presence of jade boulders in areas far from known deposits intimates that further in situ jade localities will be found. Much of the polish on "slick" boulders found in the creeks could have resulted from glacial transport rather than fluvial; this theory is supported by the ease with which the soft jade "rind" is removed when boulders are dragged for any distance with a bulldozer.

Comparison with Jade Queen Mines Deposit

A full description of the jade deposit on O'Ne-ell Creek is provided by Price [1969] and Fraser, M.Sc. thesis, U.B.C. [1973]. At both Mt. Ogden and O'Ne-ell Creek deposits of jade are associated with altered Cache Creek rocks at their contacts with serpentinized Trembleur intrusions. Similarity of all rock types is remarkable, even to later dykes and fault-associated alteration zones.

XI - ORIGIN OF JADE

The following discussion is taken from Fraser's thesis, [1973] with his permission. The present writer concurs with Mr. Fraser in his theories on the formation of jade:

General Statement

" Nephrite is often associated with serpentinized ultramafic rocks and usually occurs in the serpentinite at the contact with country rock, dykes or tectonic in-inclusions [Coleman, 1966; Coleman, 1967; Kolesnik, 1970]. The rocks in contact with the serpentinite are metasomatically altered, usually with the formation of calcium silicates. Altered basic igneous rocks are characterized by the presence of hydrogrossular, which predominates, prehnite, idocrase, diopside, tremolite-actinolite and chlorite. The alteration of sedimentary rocks produces albite, potassium feldspar, fibrous tremolite-actinolite and prehnite. The serpentinites at the contacts are altered to rocks containing actinolite-tremolite and chlorite. The alteration of the serpentinite and the inclusions, dykes and country rocks involves the movement of calcium and, in some cases, magnesium away from the serpentine, the movement of alkalis away from the contact into the country rock or inclusions and the movement of silica towards the serpentine. Rocks in the reaction zone generally have a higher specific gravity than the unaltered rocks and the altered sedimentary and igneous rocks generally contain more water than do the unaltered equivalents.

Colemen [1966] has described mineral zoning at the contact between serpentinite and metasomatized argillite and greywacke in New Zealand [Figure 6]. At the contact, a monomineralic zone of actinolite-tremolite is developed. This zone may contain small amounts of prehnite, chlorite or diopside. Away from the contact, into the sediments, the amphibole zone gradually changes to an albite-amphibole rock characterized by the predominance of amphibole over albite. This amphibole-rich rock then changes to a hard, flinty albite-amphibole-quartz rock. Accessory minerals that may be present in the albite-amphibole zones are chlorite, diopside, prehnite and stilpnomelane. This zoning is very similar to the situation that occurs at O'Ne-ell Creek. "

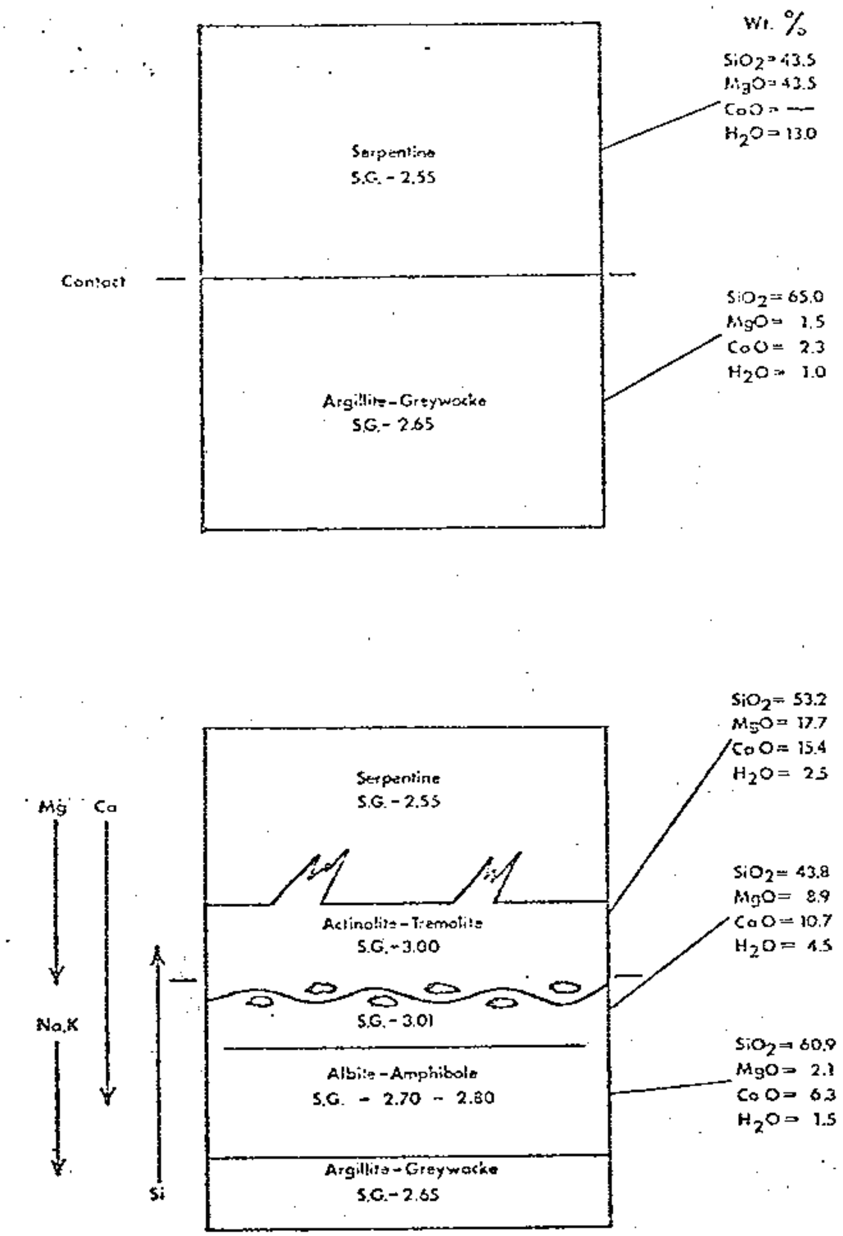

Fig. ■. Diagrammatic representation of mineral zoning at the contact between serpentinite and metasomatized argillite and greywacke. (after Coleman, 1966)

Origin of the Nephrite

" The nephrite and the tremolite-chlorite rock have been formed by the metasomatic alteration of the serpentinite. This is suggested by the presence of chrome spinel in all three rock types, and by the similarity in the average amounts of nickel, manganese, lead, zinc and chromium contained in the nephrites and the serpentinites [Table 14].

Table 14

Average Iron and Trace Element Contents of Nephrite and Serpentinite from O'Ne-ell Creek

	Fe %	Co ppm	Ni ppm	Mn ppm	Cu ppm	Pb ppm	Zn ppm	Cr ppm	Ti ppm	V ppm
Nephrite (5 samples)	3.17	57	1431	660	17	17	45	6100	285	126
Serpentinite (8 samples)	6.05	91	1597	680	35	20	34	5750	41	14

Note: The averages for nephrite do not include the values for two greenish grey specimens (#34, #35) as they are rare and contain anomalously low chromium and high titanium.

The metasomatic alteration of serpentinite is dependent upon the activities of silica and calcium, [Coleman, 1967]. An activity diagram showing the stability fields of serpentine, diopside, tremolite and talc is presented in Figure 7. Several assumptions are made concerning this diagram; the activity of water is high and constant and the activity of magnesium is constant. Alsom temperature and pressure are constant but not specified. From the diagram, it can be seen that if the activities of calcium and silica are increased, serpentine will react to form tremolite. A possible reaction of this type is given below [Coleman, 1966].

$$\underset{\text{Chrysotile}}{5(3MgO.2SiO_2.2H_2O)} + \underset{\text{Added}}{\underline{14\ SiO_2 + 6CaO}} \quad \underset{\text{Tremolite}}{3(2CaO.5MgO.8SiO_2.H_2O)} + \underset{\text{Lost}}{7H_2O}$$

Coleman suggests that the serpentinite becomes unstable as silica moving towards the ultramafic body meets calcium migrating away, forming tremolite at the boundary.

Temperature and pressure constant but not specified.
The activity of water is high and constant; the activity of magnesium is constant.

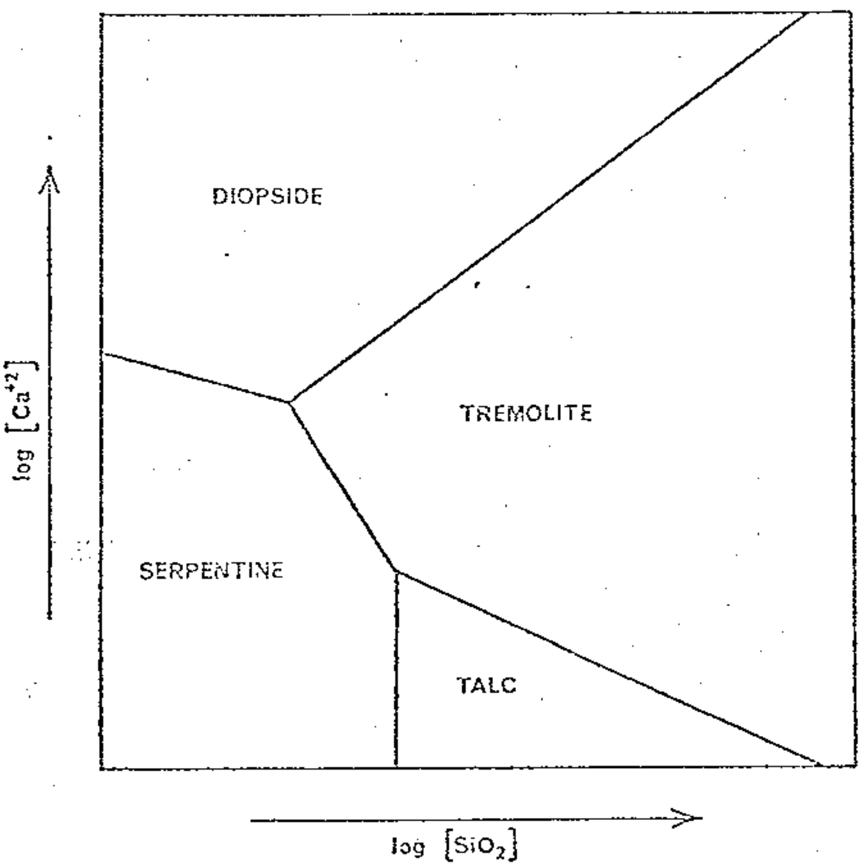

Fig ● Ca(activity)—SiO_2(activity) for calcium and magnesium silicates.(after Coleman, 1967)

" The products of this reaction have a smaller volume than the reactants [V = 13 percent] and, hence, is favored by high pressure.

The source of the calcium is the pyroxenes that are altered during the process of serpentinization. The average CaO content for 23 peridotites and 19 dunites is 3.5 weight percent and 0.75 weight percent, respectively [Poldervaart, 1955]. The average CaO content of 26 serpentinites investigated by Faust and Fahey [1962] is 0.08 weight percent. This considerable difference in the amount of CaO contained in peridotite-dunites and serpentinites indicates that calcium is liberated during serpentinization. Much of the calcium may combine with CO_2 to produce carbonate but some could migrate to contacts and raise the activity of calcium in the reaction zone.

The silica required for the reaction is readily obtained from the quartzites, cherts and argillites in the surrounding country rock.

The origin of the fine fibrous habit, characteristic of nephrite, is explained by Kolesnik [1970] in the following manner. Crystals of actinolite-tremolite have two types of faces with very different structures. One type of face corresponds to lattices made up of similar ions, that is a cation layer superimposed on an anion layer. The second type of face corresponds to lattices with a maximum total density of anions and cations. If the actinolite-tremolite forms in an environment in which calcium and sodium are perfectly mobile, and magnesium, silicon, aluminum and iron are relatively inert, the crystal form is dependent upon the availability of ions. Under these conditions, growth of the faces corresponding to lattices made up of similar ions is hampered by the low mobility of magnesium, silicon, aluminum and iron. Faces corresponding to a lattice of maximum total density of ions grow more rapidly because they require fewer of the less mobile ions. The resulting amphiboles have a prismatic habit. Elongation along the c-axis is variable but is markedly higher for a high activity of calcium and, hence, prismatic forms give way to fine fibers.

Shearing stress has been considered to be the critical factor in producing the characteristic nephritic microstructure [Finlayson, 1909; Turner, 1935; Crippen, 1951] but recent studies by Kolesnik [1970] and Sherer [1969] suggest that this is not the case. Kolesnik reports

" that in many of the European and Siberian nephrite deposits, the tremolite fibers exhibit a preferential orientation that is perpendicular to the walls bounding the nephrite body. Sherer describes euhedral crystals of quartz in Wyoming nephrite; if shearing stress had been operative during the nephrite formation, the crystals would not have retained their form. The foliation observed in many specimens is a result of the environment in which most nephrite forms. The majority of occurrences are situated in alpine serpentinites at or near the contact with the enclosing rocks. The contacts of these serpentinite bodies are sheared and mylonitized due to the tectonic avents that followed the initial emplacement of the ultramafic mass and continued during serpentinization. Reaction rocks formed at the contacts, including nephrite, are usually involved in these tectonic movements and, as a result, are foliated and brecciated.

The foliation in the tremolite contact rocks at O'Ne-ell Creek has provided channel-ways for the migration of the aluminum bearing solutions that have caused the partial alteration of the tremolite to chlorite. The source of the solutions is either the dyke rocks or the ultramafic body. "

Temperature and Pressure Conditions

" At O'Ne-ell Creek, the tremolite-chlorite rock containing the nephrite is in direct contact with serpentinite. In other nephrite deposits associated with ultramafic rocks the metasomatites are always in contact with or are surrounded by serpentinite. Such rocks in contact with unserpentinized ultramafic rocks have not been reported. This suggests that the metasomatic reactions take place at temperatures below the breakdown of olivine and/or pyroxene to serpentine. Bowen and Tuttle [1949] have determined that, at a pressure of 1 kilobar, pure magnesium serpentine cannot exist at temperatures above 500°C; at higher pressures the breakdown temperature increases only a few degrees.

In New Zealand, semi-nephrite often occurs at the contact between serpentine and hydrogrossular bearing inclusions of altered gabbro [Coleman, 1966]. The temperature of formation of the garnet has been determined by Coleman [1967], on the basis of the relative hydration state, to range from 290°C to 450°C. Although hydrogrossular was not observed at O'Ne-ell Creek, the presence of this mineral in other nephrite occurrences

" also suggests that the metasomatism takes place in the temperature range where serpentine is stable.

Minerals, such as aragonite or jadeite, that could be used to estimate the pressure during metasomatism were not observed in the O'Ne-ell Creek deposit. Because of the general increase in the density of the rocks in the reaction zones and the substantial water content of the metasomatized country rock, Coleman [1967] postulates that the total pressure is high, probably in excess of 4000 bars, and that the water pressures are nearly equal to the total pressure. "

[Reproduced from Fraser, J. R., 1973]

XII - INTERPRETATION OF AEROMAGNETIC MAPS

Aeromagnetic coverage of the Mt. Ogden area is provided by G.S.C. map 5286G [Geophysical paper 5286], 1970. Serpentinized ultrabasis bodies [Trembleur intrusions] show up as elongate magnetic anomalies superimposed on a relatively featureless background [see Fig. GP-1]. In the Mt. Ogden area the ultrabasic bodies are roughly outlined by the 6000 gamma contours with deviations from this relationship caused by:

1] Variations in the magnetite content of the serpentinite.

2] The geometry of the serpentine bodies.

3] Variations in contrast with the magnetic properties of the country rock.

4] Position of flight lines and record stations.

Areas of Cache Creek rocks are relatively featureless, with magnetic intensity values ranging between 5500 and 6000 gammas. Areas of limestone, mapped from traverses and aerial reconnaissance are characterized by negative

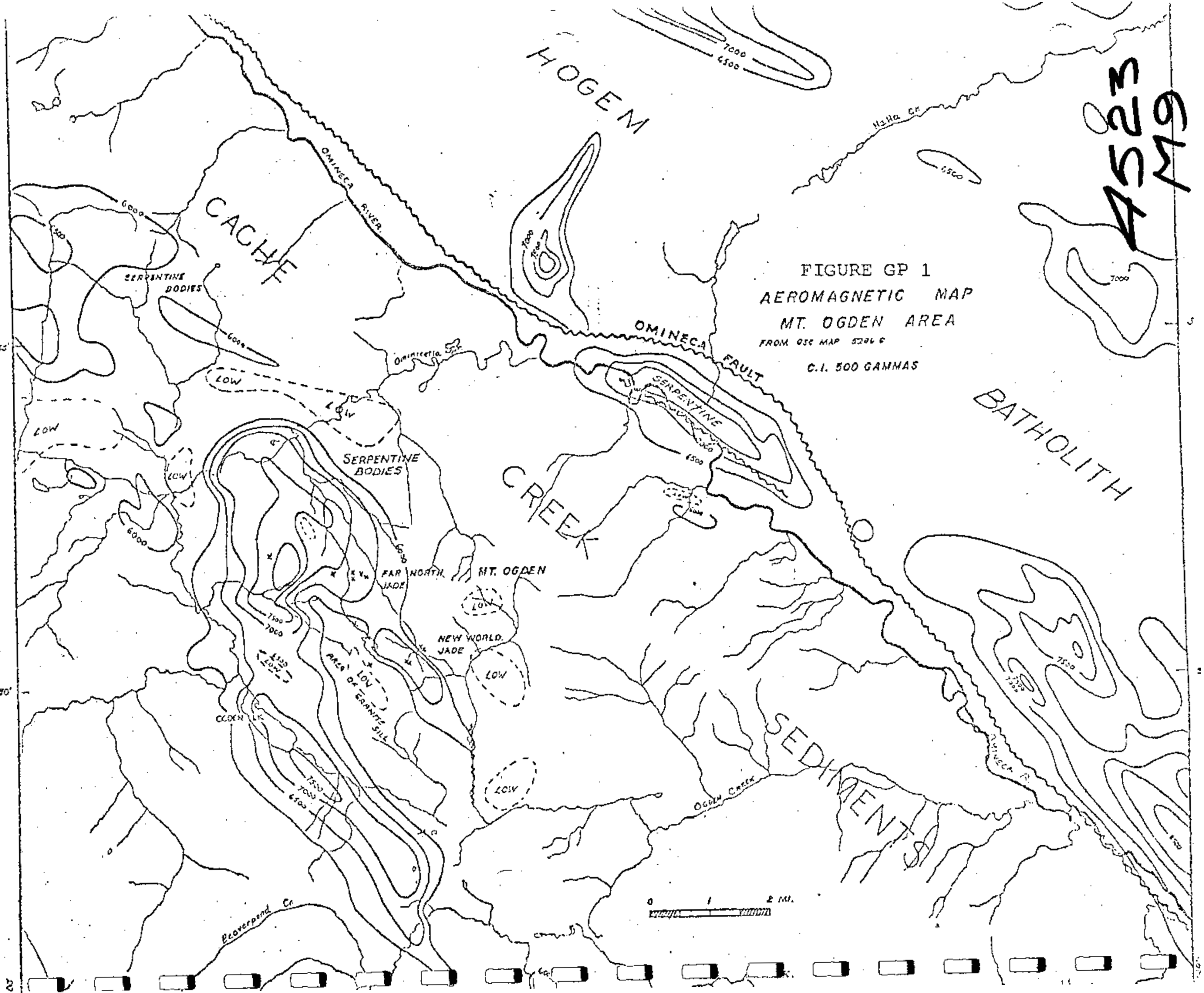
FIGURE GP 1
AEROMAGNETIC MAP
MT. OGDEN AREA
FROM GSC MAP 5284 G
C.I. 500 GAMMAS
HOGEM
CACHE
CREEK
BATHOLITH
SEDIMENTS
OMINECA RIVER
OMINECA FAULT
SERPENTINE BODIES
SERPENTINE
LOW
FAR NORTH JADE
MT. OGDEN
NEW WORLD JADE
OGDEN LK.
AREA OF GRANITE SILL
OGDEN CREEK
Beaverpond Cr.
Omineca R.
A523
M9

anomalies [less than 5500 gammas]. Thus all the area southeast of Ogden Creek, which was originally staked by Northern Jadex Ltd. in 1969, has little potential for "in situ" jade.

Several magnetic anomalies other than those being actively explored are noted from the map. These can be regarded as having relatively high potential for the discovery of jade, and should be investigated by ground and/or aerial reconnaissance, and protected by staking where warranted.

2] FAR NORTH JADE PROPERTY

Numerous in situ jade occurrences are present on the Far North jade property in addition to much boulder and placer jade. The occurrences are discussed in alphabetical order with respect to figure G2 not necessarily in order of importance.

F_1 Showing (see plate 11b)

A narrow band of poor quality jade occurs on the west bank of Squawkbird Creek approximately 1,500 feet northwest of the lake. Coarse tremolite schist crops out at the contact of serpentine with light green altered volcanic rocks similar to those on "volcanic ridge". The volcanic rocks probably represent the end of a long complexly faulted inclusion of the Cache Creek Group rocks within the serpentine.

F_2 Showing

Approximately 1,200 feet northwest, just 100 feet west of the road is another small occurrence of jade. This exposure has not been drilled, and is worthy of evaluation by drilling and of cat-work. An estimate of possible tonnage here is 150 tons of unknown quality.

G Showing

A small outcrop of serpentine was found 250 feet northwest of an animal lick [mudhole] near claim post I.P. LCF 3, 4. One corner of the small outcrop consists of coarse tremolite schist and finer grained jade. Lateral extent of the jade is concealed by overburden, but further exploratory work is recommended. Estimated possible tonnage-50 tons.

H Showing

One of the most significant jade showings on the Far North Jade property is the "Rill" showing discovered by L. Barr and R. Straight during the 1972 season. The showing is located on LCF 8 and 10 claims and is reached by a good pack trail built in 1972. The showing occurs on both banks of an anomalous topographic depression or "rill". Detailed geology of the area is illustrated by figure G4. The depression is believed to mark the contact between serpentine on the southwest and altered Cache Creek rocks on the northeast. Trenching and hand stripping on the northeast bank uncovered several jade showings 250 feet apart. Investigation of the opposite bank uncovered numerous small to large boulders. Similarities to the New World jade showing are marked; tremolitized chert outcrops a short distance away and Ca-metasomatism has played a large part in altering volcanic rocks nearby [thin sections FN 6, FN 7].

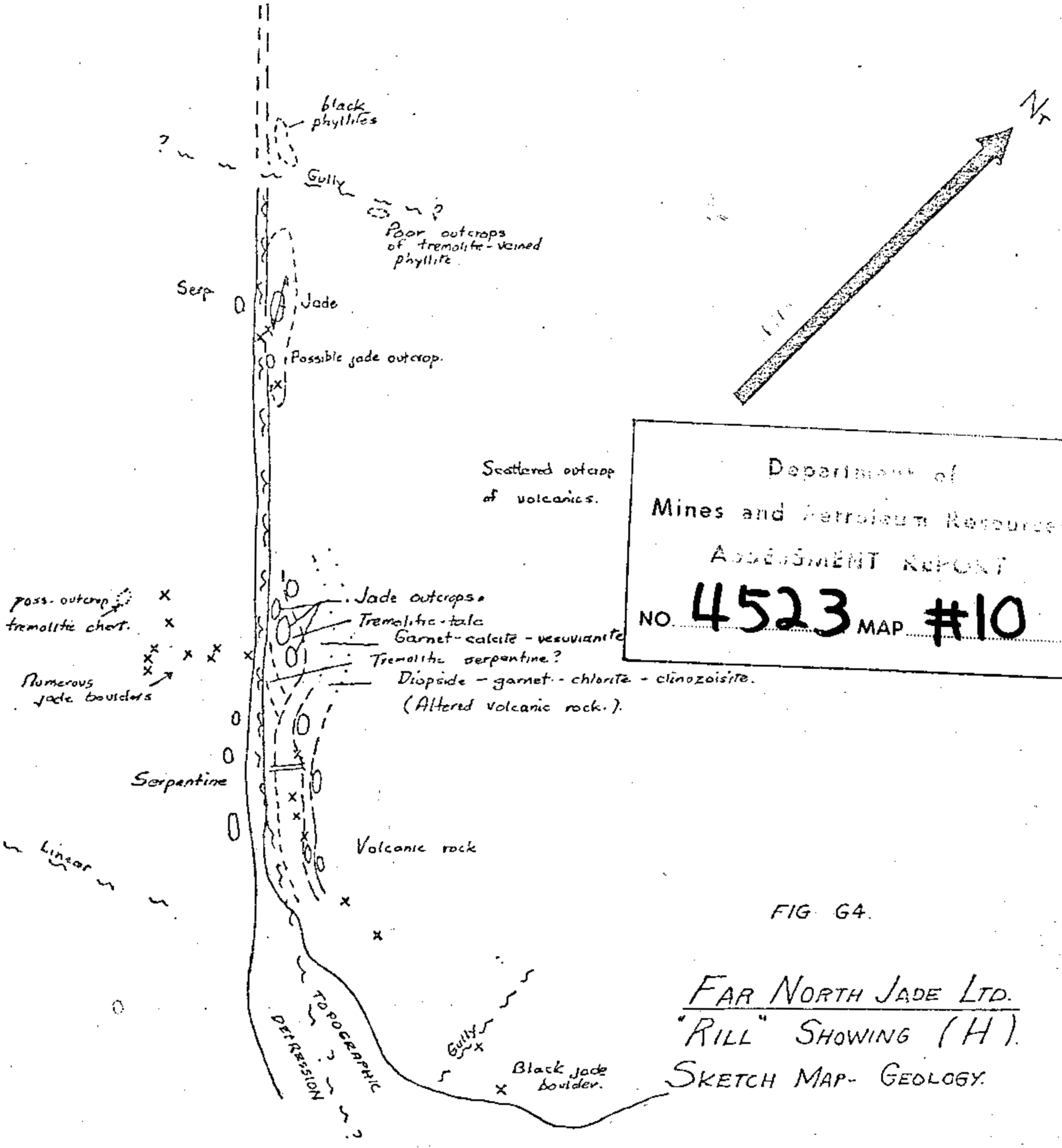

FIG G4.

FAR NORTH JADE LTD.
"RILL" SHOWING (H).
SKETCH MAP - GEOLOGY.

X = Jade boulder

SCALE 1" = 100 FT

MANEX MINING LTD.
B. PRICE. JAN 1973.

Estimate of possible reserves at the locality are:

In situ jade:	300 tons	Total 550 tons
Boulder jade:	250 tons	

X-ray and backpack drilling of some of the boulders showed the jade to be hard, and relatively free of feather fractures. None of the in situ jade has yet been drilled. This locality is worthy of considerable exploration efforts.

I Showing

At the Far North Jade campsite a large boulder estimated to have originally contained 150 tons of jade, is still available for exploration. Part of the boulder is dark and discolored by "water-marks", but approximately 30 tons of high grade material was produced from the boulder and further drilling or sawing could disclose an additional 30 - 40 tons of commercial jade. The boulder is seen in plate 10a.

J_1 Showing

Several jade occurrences are associated with a small inclusion of Cache Creek volcanics 300 feet east of I.P. LF 3, 4. The showings are accessible by cat road [see figure G5]. At the first locality [J_1] a crescent-shaped zone of jade approximately 40 feet long and 10 feet wide is situated at the contact of serpentine [altered to talc-carbonate rock] and volcanics [silicified and chloritized]. A thin band of chlorite schist separates the jade from the altered volcanics.

Although the amount of jade at this locality could be as high as 300 tons, mining would be a problem,

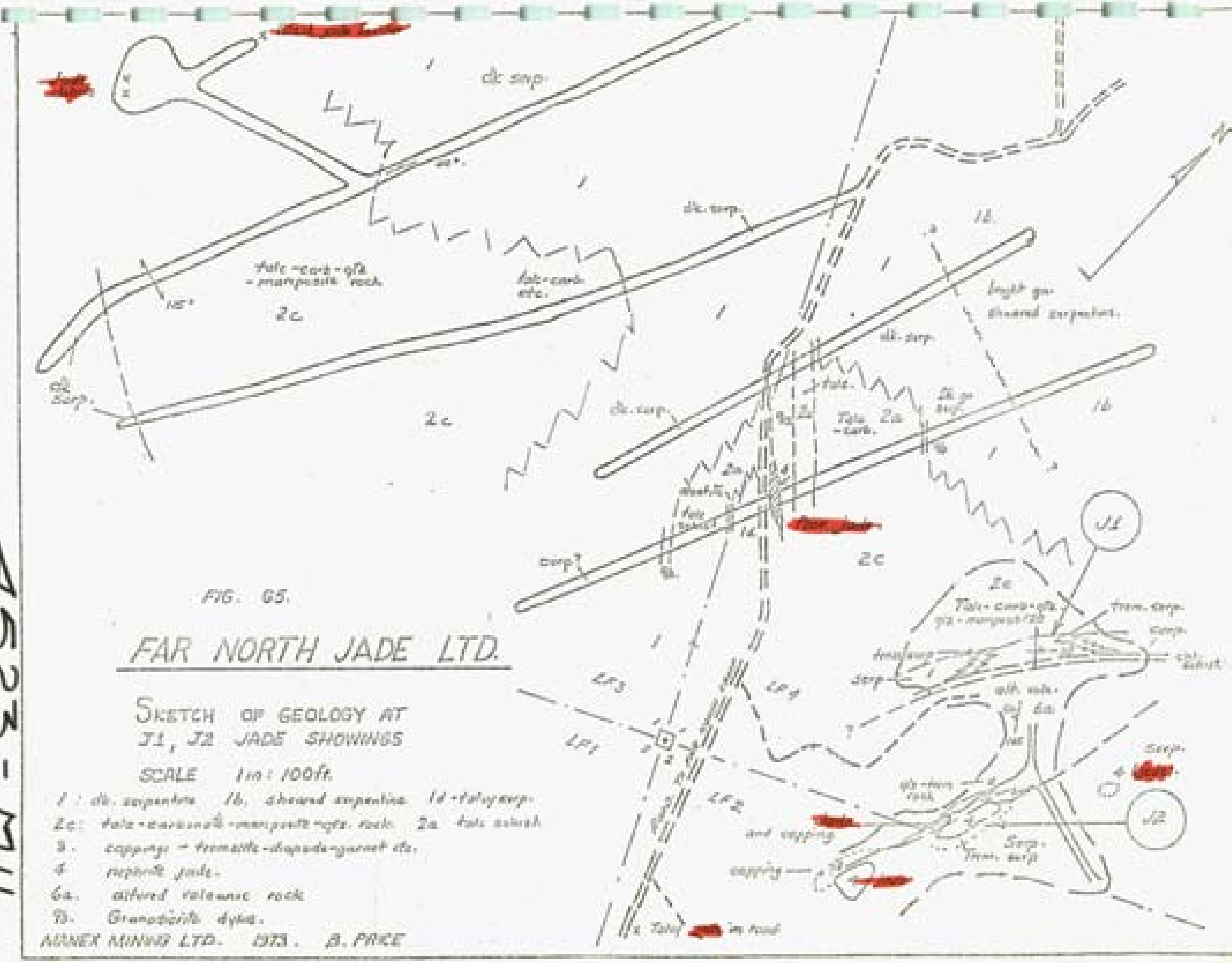
FIG. G5.
FAR NORTH JADE LTD.
SKETCH OF GEOLOGY AT
J1, J2 JADE SHOWINGS
SCALE 1 in : 100 ft.
1 : dk. serpentine 1b, sheared serpentine 1d - talcy serp.
2c: talc-carbonate-mariposite-qtz. rock 2a talc schist
3. cappings - tremolite-diopside-garnet etc.
4 nephrite jade.
6a. altered volcanic rock
9b. Granodiorite dyke.
AMNEX MINING LTD. 1973. B. PRICE
dk. serp.
talc-carb-qtz -mariposite rock
2c
dk. serp.
J1
J2
2c
capping
in road

A523-M11

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because the dip of the body is steep and the adjacent talc-carbonate rock is more competent than the sheared serpentine present at other localities. The showing should be drilled by X-ray drill to determine whether quality is sufficiently high to warrant development.

J_2 Showing

On the southeast side of the volcanic inclusion, several jade masses have been uncovered by cat-trenching and stripping. The jade occurs as large rounded masses with "tremolite-diopside capping" on one side and a gradational contact with tremolitized serpentine on the other side. One mass has been drilled with the X-ray drill. Grade is "commercial" and tonnage is estimated at 50 tons. At least two other masses are present in close proximity, but these have not been tested by drilling. The total reserves at this locality is estimated at 150 tons. Further stripping is needed to check for other jade occurrences on the serpentine-volcanic contact, and more drilling for quality checks is warranted.

K Showing

Several bands of tremolite schist or "semi-jade" crop out on the steep bank of Squawkbird Creek opposite the Far North Camp. Adjacent serpentine is tremolitized and weathered, and slumping on the bank prevents observation of thickness of the band but lateral extent is probably at least 100 feet. Hand trenching at this locality might expose mineable jade bodies but it is suspected from surface indications that quality of the material is not commercial. Prospecting on strike from this locality could result in new jade finds.

L Showing   Fig. G6   plate 11a.

Close to the claim line on Vancouver 4 claim a relatively large mass of jade crops out [see figure 8 and plate 11a] on the bank of a small easterly flowing stream. About 400 tons of jade are indicated by surface exposures, but backpack drill results were not encouraging as far as quality is concerned. X-ray drilling in several holes would give a better idea of quality and quantity available at this locality. Approximately 500 feet southeast, near the creekbank, a large boulder [35 tons] shows good promise for gem quality jade. X-ray drilling must be done on this boulder; a high priority target.

M Showing [see figure G6]

A short distance northeast of location L is a small area of complicated topography and geology. Numerous slight topographic depressions are associated with jade outcrops and/or boulders. The most significant jade outcrops is associated with the serpentine-volcanic rock contact, and at least some of the topographic anomalies coincide with faults or fault zones. Several of the boulders were tested by packsack drill; quality though not poor, is not gem grade. The in situ jade was not tested with the drill. With the quantity of jade present in this small area it is likely that bulldozer trenching would uncover more zones of in situ jade. Reserves at locality M are 20 tons [boulder jade] and estimated 50 tons in situ jade [unknown quality].

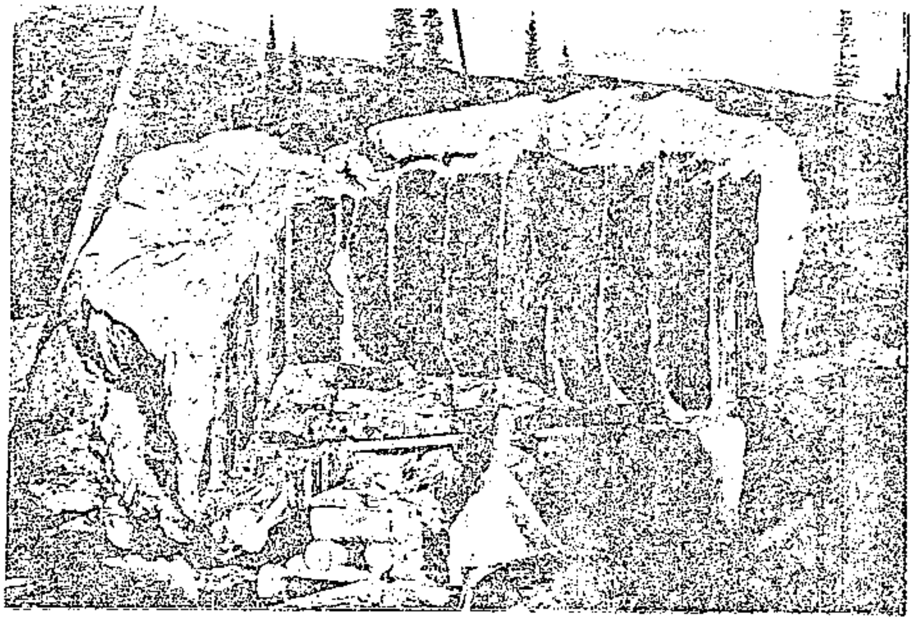
BLACK JADE [see plate 10b]

Origin of the black jade is uncertain, but most of the material is found in the Northwest portion of Far

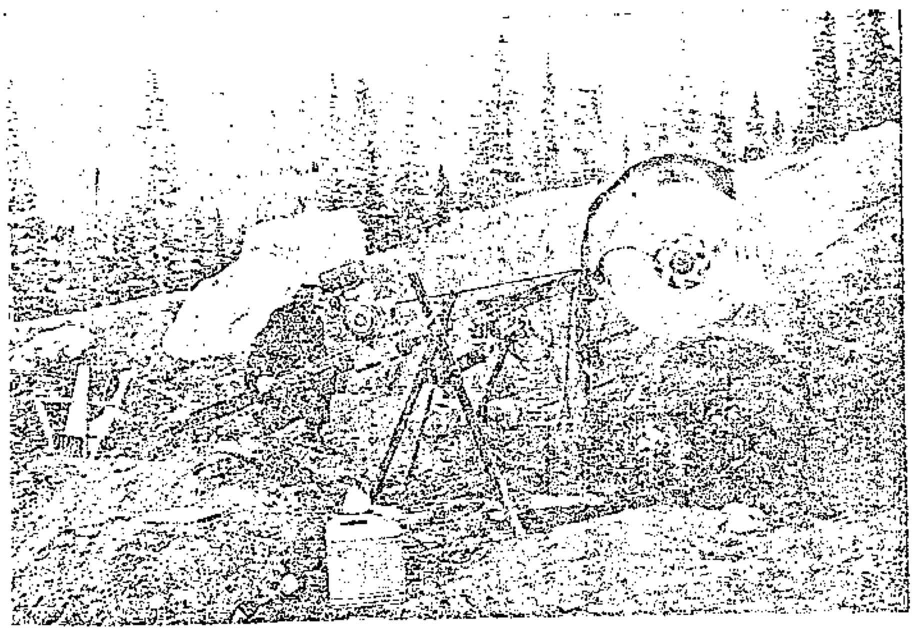
North's claim block, and tremolitized black phyllites are common in the same area. The black nephrite may form by pervasive tremolitization of pre-existing graphitic phyllites or carbonaceous limestones. Further staking should be done beyond LCF 9 and 10 to protect the possible source of this material. Positive identification of the black jade is given in a separate report reproduced in the Appendix.

PLACER JADE [see plate 12b]

Several large boulders of placer jade were found in Squawkbird Creek directly below the Far North jade camp. Some of these have weathering rinds, some are "slick" indicating some glacial and/or stream transport. Estimated reserves at this location are 150 tons of unknown grade. On the creek further east, unofficially called "Serendipity Creek" a camp was set up in 1970 to exploit numerous placer jade boulders. The camp was discontinued because the jade was found to be poor in quality. Source of this type of jade is unknown.

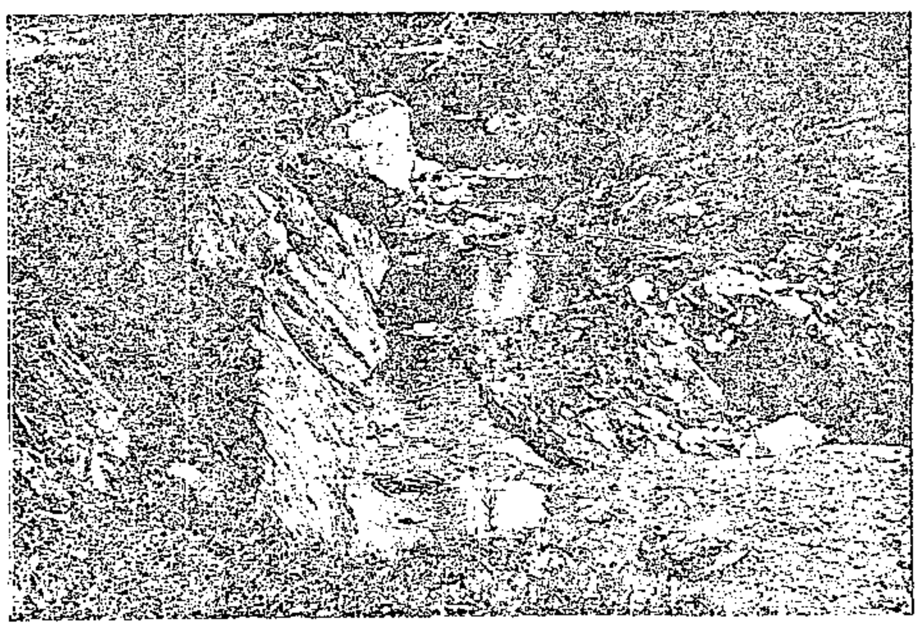


PL.10a Jade boulder originally 150 tons. Far North Jade camp area.

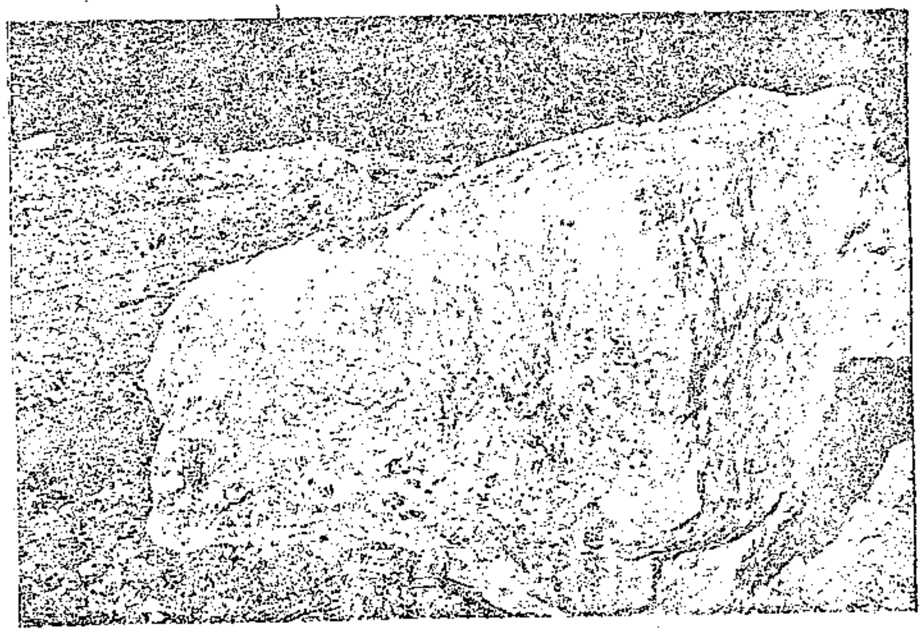


PL.10b Field diamond saw cutting 3 ton black jade boulder at Far North jade camp.

PL. 11a Laminated and contorted surface of jade outcrop on Vancouver 4 claim. Jade is underlain by serpentine and overlain by volcanics.



PL. 11b Narrow outcrop of jade at Squawkbird Creek, at similar serpentine - volcanic contact.



PL. 12a Typical weathered surface of jade boulder. Some of the coarse white talc-tremolite weathering product has been removed by glacial transport.

PL. 12b Typical "slick" (stream-polished boulder) in creek bed below Far North Jade camp.

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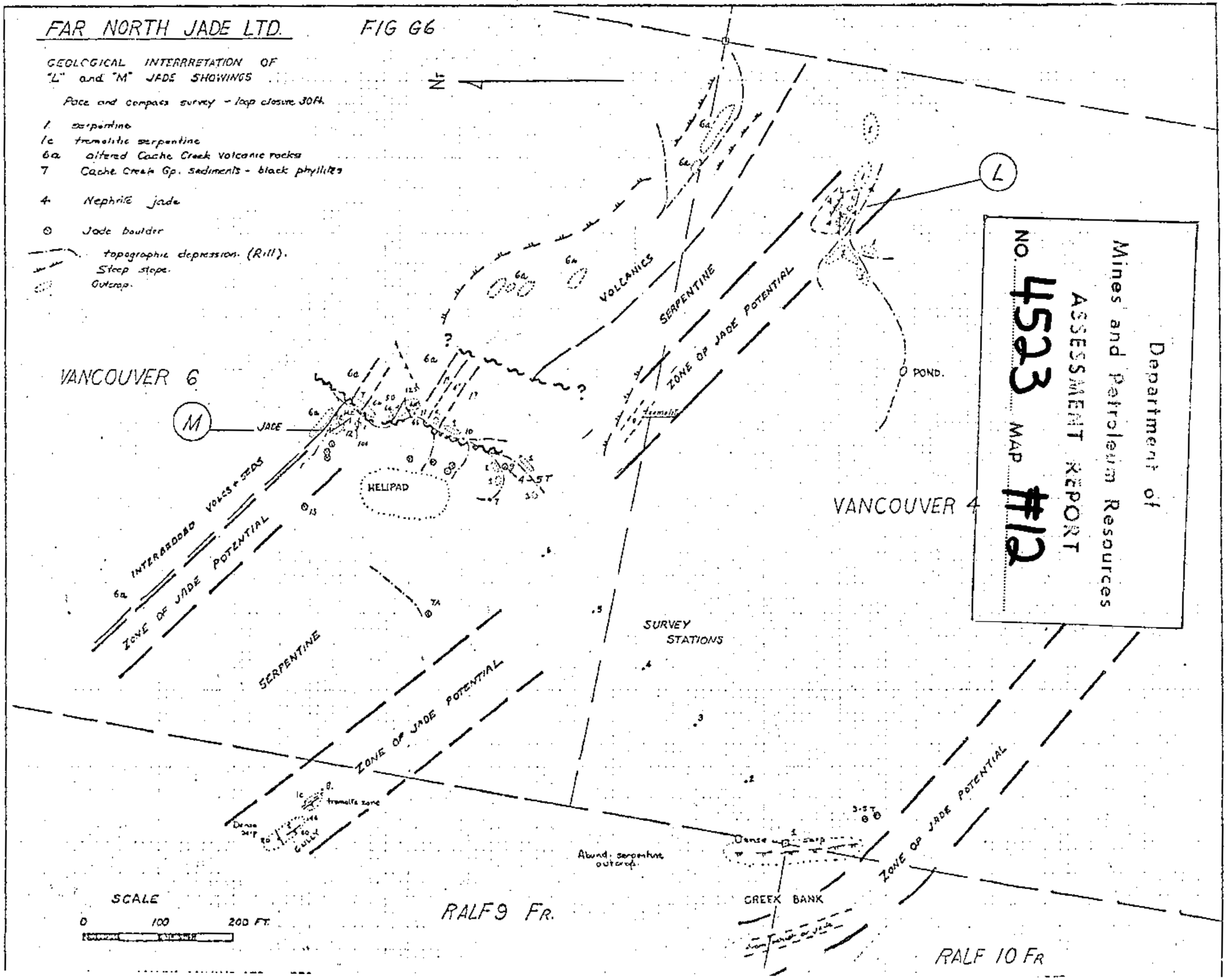
FAR NORTH JADE LTD.
FIG G6
GEOLOGICAL INTERPRETATION OF "L" and "M" JADE SHOWINGS
Pace and compass survey – loop closure 30ft.
1 serpentine
1c tremolitic serpentine
6a altered Cache Creek Volcanic rocks
7 Cache Creek Gp. sediments – black phyllites
4 Nephrite jade
Jade boulder
topographic depression. (Rill).
Steep slope.
Outcrop.
N
L
M
JADE
VANCOUVER 6
VANCOUVER 4
VOLCANICS
SERPENTINE
ZONE OF JADE POTENTIAL
INTERBEDDED VOLCS + SEDS
HELIPAD
POND.
SURVEY STATIONS
tremolite zone
GULLY
Abund. serpentine outcrop.
CREEK BANK
SCALE
0
100
200 FT.
RALF 9 FR.
RALF 10 FR
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ESTIMATES OF TOTAL RESERVES [Cont'd]

Far North Jade	Indicated	Inferred	Quality
F_2 Showing		100 T	Untested
G Showing		50 T	Untested
H Rill Showing			
- boulders	250 T		Fair
- in place		300 T	Unknown
I Campsite Boulder	30 - 40 T		
J_1 Showing	300 T		Untested
J_2 Showing	150 T		Fair
L Showing - in place	400 T		Unknown [no deep holes tested]
L Boulder	35 T		Good
M Showing boulders	20 - 40 T		Poor to fair
in situ	50 T		Unknown
Placer [Squawkbird Cr.]		150 T	Unknown

TOTAL RESERVES [indicated and inferred] 1835 T

XIV - PROSPECTING FOR JADE DEPOSITS

During the course of mapping and sampling on the jade properties of Mt. Ogden several "indicators" were noted which could prove helpful in locating further jade deposits. These are:

a] Jade deposits at Mt. Ogden are found at or near contacts of serpentine with various types of country rock including metasediments, metavolcanics, granodiorite.

b] At both New World and Far North deposits jade boulders are found associated with a cherty-material which is dense, tough, brownish-green and partially translucent. In hand specimen the material often resembles jade in that its surfaces may appear fibrous. Probable reason for the jade-like texture is the high content of tiny tremolite-actinolite needles which must have been added metasomatically, probably in conjunction with formation of jade.

c] At several of the localities the serpentine adjacent to the jade is dark green to dark brownish-green and highly sheared - resulting in "polished" surfaces and nodules. Often the serpentine is cut by veinlets of asbestiform tremolite which weathers to a soft white fibrous powder.

d] At both New World and Far North "Rill" deposits, much Calcium-metasomatism is visible as "rodingite" or "capping" material, characterized by finely crystalline light green to white rocks composed of one or more of the following minerals, in order of abundance: diopside, grossularite, vesuvianite, tremolite, hydrogrossular, calcite, wollastonite, albite, uvarovite, talc and chlorite. The individual constituents are often unidentifiable except in thin section. The The writer feels that the presence of tremolite in the material may be critical to the discovery of jade in proximity.

e] At the Far North jade property most jade exposures are found associated with anomalous topographic depressions or "rills". These may result from erosion along fault zones or zones of incompetent, sheared serpentine. In one area the "rills" form a pattern not unlike that of glacial outwash channels, but no outwash gravels are present in these depressions, and a "structural" origin is more likely.

XV. ENVIRONMENTAL CONSIDERATIONS:

Exploration efforts at present have disturbed little of the area of Mt.Ogden. Animal population of the area is small and no harm appears to have been done by exploration efforts although some damage to the camps and equipment has been incurred by animals. The creeks are on the arctic drainage and support no sport fishing; hence placer operations are possible at any time of the year.

The jade companies have complied with forestry regulations regarding the cutting of slash on newly built roads and the covering of slash in trenching and stripping operations. The serpentine which covers most of the claimed area supports only a thin soil cover and sparse non-commercial timber.

Both camps are very clean; sanitation and water facities have presented no problems.

XVI RECCOMMENDATIONS

A) Long Range Planning:

It is important to use long range planning while setting up development programs for operations of this type. Non-perishable materials such as fuel,parts, and bulk foodstuffs sufficient for the whole seasons operation should be moved onto the property as soon as work commences. This will permit economies of scale in purchasing and reduce transportation costs which are inevitably higher when operations are run on a day to day basis.

B) Bulk Removal of Jade:

Removal of jade in boulder or slab form should be considered as a possible means of reducing costs in wages, transportation and maintainance. An additional benefit might be the availability of large volumes of lower quality jade which could be used in commercial or construction applications. Advertising, demonstrations and experimentation would be necessary to make the products better known. The writer feels that most of the non-lapidary public is relatively unaware of the availability of low-grade material for fireplaces, tiles etc. The selling of a large volume of low quality material would reduce the overall transportation costs, allowing a higher profit margin on gem quality jade.

Probably the most effective means for removal of large volumes of jade from the mountain would be by caterpillar tractor. The same vehicle could be used for transporting supplies to the property and fpr surface exploration (trenching and stripping) If both companies could use the same tractor, transportation charges and standby time would be reduced considerably.

C <u>Exploration</u>

1. <u>Geology</u>: Only a limited amount of geology is needed on each claim block during the coming season. This would include supervision of prospecting,magnetometer work, diamond-drilling and trenching. Probaly one or two weeks work at the start of the season would suffice.

2. <u>Prospecting</u>: Numerous areas on each claim block are worthy of further prospecting, these areas correspond to serpentine-country rock contacts and are shown on the accompanying maps (figures R1,R2). Several other areas off the property boundaries may be worthy of at least recconnaissance prospecting. These include the lower slopes of Mt.Ogden toward Ogden Lake, where tremolite occurrences have been discovered in the course of road construction. One claim on this area is believed to be in good standing.

Other areas which should be prospected thoroughly by the individual companies concerned are:

1) Placer occurrences on Ogden and Squawkbird creeks shoul be rechecked and drilled where necessary. Placer boulders are by far the easiest targets to evaluate.

2) The base of the diorite-gabbro body on lower part of Squawkbird creek. The serpentine-gabbro contact could be productive.

3) The west facing slope of Mt,Ogden above serendipity creek

4),The area notth and west of the rill (H) showing should be prospected thoroughly for the source of the black jade seen as trails of glacially-transported boulders elsewhere on the property.

3) Drilling

All areas of "capping" and all jade showings should be evaluated by X-ray and/or packsack drilling during the next season. The packsack drill is sufficient for preliminary evaluation but does not penetrate deep enough to evaluate boulders thoroughly. Drilling should concentrate on major targets first and systematically evaluate all known jade occurrences. All holes should be plotted on maps, cores carefully labeled and kept intact as has been the practise by operators of the properties in the past.

4) Magnetometer surveys:

The writer reccommends that magnetometer surveys be carried out on two or three of the known nephrite occurrences to see if the serpentine -country rock contacts can be sharply defined. If the method works(and in most cases sufficient contrast in magnetic properties should exist) then the program of magnetometer surveys should be extended to all favorable geological contacts and jade showings. One weeks work with magnetometer operator and helper should be sufficient to evaluate the usefulness of the method.

For a complete evaluation of all targets on each property probably two weeks work would be necessary. Expected costs for one man plus magnetometer for two weeks would be $1000.00. If the method works it could aid greatly in definition of, reserves and discovery of additional drill targets.

5. Topographic map: Perhaps the most useful single tool in the further exploration and development of the jade properties on Mt.Ogden would be a detailed topographic map prepared from air photos, on a scale of 500 (or less) feet per inch and contour interval of 50 feet or less. Geological investigations have shown that much of the jade is associated with anomalous topographic depressions; thus a good topographic map might lead to discovery of new deposits. In several areas bush is dense and few landmarks exist. In these areas detailed topographic information would be invaluable in the plotting of claim data and geology. Costs of the map might be as high as $2000.00.

6. Claim staking:

It would be advisable for both companies to,stake additional claims on Mt.Ogden on the areas of favorable geology as shown on the accompanying maps (figures R3,R4). The arbitrary line of division of interest that was used in 1972 staking should be adhered to, to avoid conflicts. The staking could be done at the same time as prospecting. If no new showings are turned up the claims, as well as some of the prior claims might be safely dropped

7 Trenching:

An integrated exploration program reccommended for the H,J.L, and M showings is as follows: - other showings should be investigated as well but have a low priority.

1) Geological mapping (detailed) accompanied by magnetometer surveys to determine potential of the serpentine-granodiorite contact

2) Drilling with x-ray drill to determine dimensions and provide additional geological information.

3) Trenching and stripping with caterpillar tractor with subsequent geological mapping and additional diamomd drilling where necessary.

4) Complete evaluation of jade lenses by X-ray drilling prior to production.

D. <u>Costs</u>:

Because the report is urgently needed by both companies at the present time, a detailed breakdown of costs for the exploration program outlined will not be included. A rough estimate of exploration expenses necessary to evaluate the jade showings is as follows:

Geology	$1500.00
Topographic map	$2000.00
Magnetometer work	$2000.00
Drilling	$5000.00
Trenching	$7500.00
Claimstaking	$1000.00
Prospecting	$1500.00
Total costs	$20500.00
Costs per company	$10250.00

Barry Price

Barry Price, B.Sc., M.Sc'
Manex Mining Ltd.

Barry Price
July 17, 1973

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APPENDIX A

CLAIM DATA SHEETS

Placer Mining Lease Number	Date Lease Granted	Term	Work Recorded to	Rental Paid to
1909	14 Jan 69	20 yr	13 Jan 77	13 Jan 72
1910	14 Jan 69	20 yr	13 Jan 77	13 Jan 72
1911	14 Jan 69	20 yr	13 Jan 77	13 Jan 72
1956	30 Oct 69	20 yr	29 Oct 76	29 Oct 72
1957	30 Oct 69	20 yr	29 Oct 76	29 Oct 72
1958	30 Oct 69	20 yr	29 Oct 76	29 Oct 72

Name of Mineral Claim	Recorded	Work Recorded to	Record Number
LF #1	6 Aug 69	6 Aug 75	79755
LF #2	6 Aug 69	6 Aug 75	79756
LF #3	6 Aug 69	6 Aug 75	79757
LF #4	6 Aug 69	6 Aug 75	79758
LF #5	6 Aug 69	6 Aug 75	79759
LF #6	6 Aug 69	6 Aug 75	79760
LF #7	8 Oct 69	8 Oct 73	81070
LF #8	8 Oct 69	8 Oct 73	81071
LCF #1	2 Sep 69	2 Sep 73	79871
LCF #2	2 Sep 69	2 Sep 73	79872
LCF #5	8 Oct 69	8 Oct 73	81064
LCF #6	8 Oct 69	8 Oct 73	81065
LCF #7	8 Oct 69	8 Oct 73	81066
LCF #8	8 Oct 69	8 Oct 73	81067
LCF #9	8 Oct 69	8 Oct 73	81068
LCF #10	8 Oct 69	8 Oct 73	81069
Vancouver #2	8 Oct 69	8 Oct 73	81056
Vancouver #3	8 Oct 69	8 Oct 73	81057
Vancouver #4	8 Oct 69	8 Oct 73	81058
Vancouver #5	8 Oct 69	8 Oct 73	81059
Vancouver #6	8 Oct 69	8 Oct 73	81060
Vancouver #7	8 Oct 69	8 Oct 73	81061

FORM #108

MANEX MINING LTD. (N.P.L.)
200-535 THURLOW ST.
VANCOUVER 5, B.C.

CLAIM STAKING DATA

Include: 1) Location Map – 4 mile
2) Claim Map

CLAIM NAME	TAG NUMBER	LOCATED BY	FOR	STAKING DATE	RECORD DATE	RECORD NO.
LCF 3	379436M	B.Price	Far North Jade	Aug 29/72	Sept 7/72	115684
LCF 4	379437M	"	"	"	"	115685
Ralf 1	379438M	"	"	Sept 1/72	"	115686
Ralf 2	379439M	"	"	"	"	115687
Vancouver 1	379441M	"	"	"	"	
Ralf 5 Fr.	379443M	"	"	"	"	
Ralf 9 Fr.	379444M	"	"	"	"	
Ralf 10 Fr.	379445M	"	"	"	"	
Ralf 3	379446M	"	"	Sept 2/72	"	115688
Ralf 4	379447M	"	"	"	"	115689
Ralf 7	379448M	"	"	"	"	
Ralf 8	379449M	"	"	"	"	
Ralf 5	379450M	"	"	"	"	115690
Ralf 6	379451M	"	"	"	"	

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Ralf 1	379438M	"	"	Sept 1/72	"	115686
Ralf 2	379439M	"	"	"	"	115687
Vancouver 1	379441M	"	"	"	"	
Ralf 5 Fr.	379443M	"	"	"	"	
Ralf 9 Fr.	379444M	"	"	"	"	
Ralf 10 Fr.	379445M	"	"	"	"	
Ralf 3	379446M	"	"	Sept 2/72	"	11 38
Ralf 4	379447M	"	"	"	"	115689
Ralf 7	379448M	"	"	"	"	
Ralf 8	379449M	"	"	"	"	
Ralf 5	379450M	"	"	"	"	115690
Ralf 6	379451M	"	"	"	"	

APPENDIX D

BLACK JADE REPORT

JADE TERMINOLOGY

Sufficient confusion exists concerning the terms "jade" "nephrite" and "tremolite-actinolite" to warrant clarification of terminology used in this report.

Jade is a term reserved for varieties of the minerals nephrite and jadeite. "Nephrite" includes all tough, compact micro-crystalline or micro-fibrous forms of the tremolite-ferroactinolite solid solution series represented by the chemical formula $Ca_2Mg_5Si_8O_{22}(OH)_2 - Ca_2Fe_5Si_8O_{22}(OH)_2$.* Tremolite contains 0-20 mole % ferroactinolite, actinolite contains 20-80 mole % and ferroactinolite contains 80-100 mole %. (Deer, Howie and Zussman, 1963, p.250.)

Jadeite is a mineral of the pyroxene group and has the formula $Na(Al,Fe)Si_2O_6$. A solid solution series exists between jadeite and Diopside, $Ca(Mg,Fe)Si_2O_6$. Specimens containing significant amounts of the diopside molecule should probably not be classified as jade, although chemical analyses may be necessary to differentiate the two minerals. Specimens of Jadeite or Actinolite-Tremolite which are not micro-crystalline should not be called jade.

Table 1 describes numerous mineral species often misnamed jade. Other terms encountered in the literature are:

California jade: compact variety of vesuvianite
Styrian jade: compact variety of chlorite
South African jade: massive green grossularite
Oregon jade: " " "
Bowenite: dense, finely crystalline serpentine.

* after James R. Evans, California Div. Mines and Geology Mineral Inf. services Bull. v 109. Sept, 1966)

Table 1. Comparison of microfibrous or microgranular compact forms of minerals which have been called jade.

All varieties are transparent or translucent to subtranslucent. Only nephrite (tremolite-actinolite) and jadeite can properly be jade. All varieties except serpentine, chrysoprase, chert, phrase, and plasma are typical of contact metamorphic and metasomatic zones developed between carbonate and intrusive rocks. Serpentine is a common alteration product of iron-magnesium-rich ultrabasic rocks. Chrysoprase typically occurs as veinlets and as cavity fillings in serpentine. Chert is a sedimentary rock and occurs in beds one inch or less to as much as several feet in thickness. Beds may have great lateral extent or may lens out rapidly in several feet. Phrase and plasma occur in vugs and as cavity fillings in many types of rocks.

MINERAL	COLOR	HARDNESS	SPECIFIC GRAVITY (APPROX.)	LUSTER	CHEMICAL COMPOSITION	SOME SIMPLE DISTINGUISHING TESTS	DERIVATION OF NAME	CRYSTAL SYSTEM AND CLASS
"Nephrite": Tremolite	White to green	5–6	2.90–3.07	Vitreous	$Ca_2Mg_5(Si_4O_{11})(OH)_2$	Not soluble in HCl (see wollastonite); difficultly fusible under blowpipe; some specimens distinguished from jadeite by hardness.	Nephrite from the Greek word for kidney, as it was once thought to aid or prevent diseases of that organ.	Monoclinic; prismatic
"Nephrite": Actinolite	Green	5–6	3.07–3.32	Vitreous	$Ca(Mg,Fe)_5(Si_4O_{11})(OH)_2$	In some specimens, from tremolite by color, and specific gravity; difficultly fusible under blowpipe; not soluble in HCl.	Tremolite for Tremola Valley, south side of St. Gottard, Switzerland. Actinolite from Greek words, ray and stone because commonly found in radiating crystals.	Monoclinic; prismatic
Jadeite	White to green	6–7	3.24–3.43	Vitreous	$Na(Al,Fe)(Si_2O_6)$	Not soluble in HCl; fuses at 2½ to transparent glass under blowpipe (see tremolite-actinolite).	From Spanish *Piedra de yjada*, loin stone, because it was thought to prevent nephritic colic.	Monoclinic; prismatic
Serpentine	Light to dark green	2–4	2.55–2.61	Greasy, waxlike, or dull rough	$(Mg,Fe)_6(Si_4O_{10})(OH)_8$	Low in scale of hardness; greasy luster; infusible; soluble in HCl	For green serpent-like mottling or discoloration on massive specimens.	Monoclinic; prismatic
Diopside	White to green	5–6	3.22–3.38	Vitreous	$Ca(Mg,Fe)Si_2O_6$	Fusible at 4 to green glass; insoluble in HCl.	From Latin words *di*, two, and *opsis*, appearance—vertical prism zone can be oriented two ways.	Monoclinic; prismatic
Epidote	Yellowish green to green	6–7	3.38–3.49	Vitreous	$Ca_2(Al,Fe)Al_2O(SiO_4)(Si_2O_7)(OH)$	Partially soluble in HCl; fusible at 3-4 to black slag which is not fusible under blowpipe.	From Greek *epidosis*, increase—because in many crystalline specimens the base of the rhomboidal prism has one side longer than the other.	Monoclinic; prismatic
Vesuvianite (Idocrase) var. Californite	Brown to green	6–7	3.33–3.43	Vitreous to resinous	$Ca_{10}(Mg,Fe)_2Al_4(Si_2O_7)_2(SiO_4)_5(OH)_4$	Fusible at 3 to a greenish brown glass; from garnets by specific gravity; partially decomposed by HCl, after fusing completely soluble.	Mt. Vesuvius, Italy, where mineral occurs in ejected lava blocks—later idocrase, because crystal forms resemble those of other minerals; from Greek, *eidos* appearance, and *krasis*, a mixture.	Tetragonal; ditetragonal-dipyramidal.
Garnets: Grossularite, and hydrogrossularite	White to green	6½–7½	3.59	Vitreous to resinous	$Ca_3Al_2Si_3O_{12}$, and $Ca_3Al_2Si_2O_8(SiO_4)_{1-m}(OH)_{4m}$	Grossularite fuses at 3 to glass; andradite at 3½; uvarovite at 6 (nearly infusible); all fused globules soluble in HCl except uvarovite; andradite globule magnetic; hydrogrossular soluble in HCl without heating; distinguished from each other, and other minerals by specific gravity.	Garnet is possibly from Latin, *granatus*, pomegranate, because its color is similar to the fruit pulp color. Grossularite from botanical name, *grossularia*, for pale green gooseberry. Andradite for Portuguese mineralogist, J. B. d'Andrada; melanite, from Greek word for black. Uvarovite for Count S. S. Uvarov, past President of St. Petersburg (Leningrad) Academy, Russia.	Isometric; hexoctahedral
Andradite var. melanite	Green melanite dark brown or black (from Ti)		3.86		$Ca_3Fe_2Si_3O_{12}$ (Melanite $Ca_3(Fe,Ti)_2Si_3O_{12}$)			
Uvarovite	Green (from Cr)		3.90		$Ca_3Cr_2Si_3O_{12}$			
Wollastonite	White	4½–5	2.87–3.09	Vitreous	$Ca(SiO_3)$	Soluble in HCl; fusible at 4 to white glassy globule; from jadeite by hardness.	After W. H. Wollaston, British chemist and mineralogist.	Triclinic; pinacoidal
Chrysoprase	Green (from Ni)	6½	2.57–2.64	Waxy to subvitreous	$SiO_2 + nH_2O + nNi$	Uneven or conchoidal *fracture*; brittle, and may be cracked; infusible; insoluble in HCl; soluble in HF.	From the Greek words meaning gold and leek green.	Hexagonal -R, trigonal, trapezohedral
Phrase and plasma	Various shades of green	6½	2.57–2.64	Waxy to subvitreous	$SiO_2 + H_2O +$ finely disseminated crystals of green silicate minerals such as chlorite	Both species infusible; insoluble in HCl, soluble in HF; plasma nearly opaque; smooth to conchoidal fracture; phrase usually more translucent than plasma.	Phrase from the Greek word meaning leek green; plasma from Greek for form.	Hexagonal -R, trigonal, trapezohedral
Chert	Green	6½	2.57–2.64	Dull to subvitreous	$SiO_2 + nH_2O$	As above; dull luster may be diagnostic	Old local English term for rock, taken into geologic literature because of common use.	Hexagonal -R, trigonal, trapezohedral

DENSITY DETERMINATIONS

Density determinations were carried out, on several small blocks of jade cut from cores and hand specimens obtained by the writer. The results are as follows:

NERTS

SAMPLE	DESCRIPTION	SPECIFIC GR.
1	Normal green jade, drill core from 150 ton boulder on Far North claims	3.005 g/cc
2	Dark greem jade, drill core from small boulder on Far North claims.	3.018 g/cc
3	"Wyoming Black" jade, thin slice from Mr. L.D.Barr. (Sample is actually dark green.)	3.096 g/cc
4	Black jade from boulder on Far North claims, but sold to New World Jade. (a) fresh sample, (b) partially weathered sample	(a) 3.006 g/cc (b) 2.997 g/cc 3.002 g/cc

Density determinations were carried out on a Jolly balance provided by the university of British Columbia. Accuracy is expected to be to two decimal places. Comparing results with established density determinations for members of the tremolite-actinolite-ferroactinolite series, samples 1, 2, and 4 contain approximately95% of the tremolite molecule, whereas sample no. 3 likely contains 25 % actinolite molecule, sufficient to be properly termed actinolite nephrite jade.

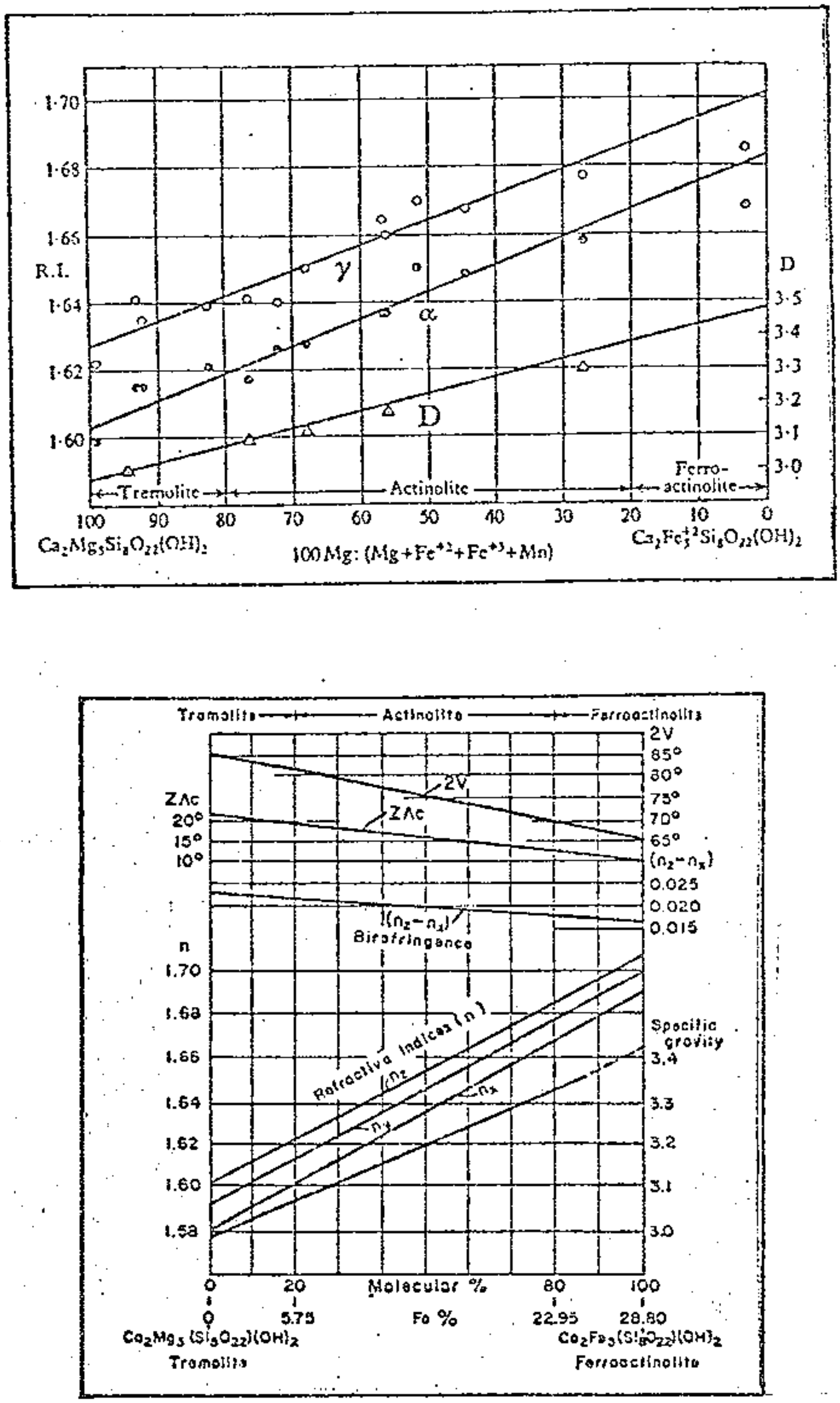


FIG. . Relationship of density, birefringence, extinction angle, refractive indices, and 2V of jade minerals with respect to chemical composition. (From Deer, Howie and Zussman, 1966, and Evans, J.R., 1966.)

Department of

Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 4523 MAP

NUMBER	LOCATION	ROCK TYPE	DESCRIPTION-MINERALOGY
FN-1	Far North camp area-core	Jade	Dark green "chrome" (uvarovite) rich jade tremolite-uvarovite-picotite
FN-2	Far North camp area-core	Jade	Normal green jade tremolite-picotite
"OGDEN"	Far North camp area-slice	Jade	Black jade from 3 Ton boulder tremolite-uvarovite-(carbon?)
FN-11	Serendipity Creek-boulder	Jade	Botryoidal stongly planar-oriented dark green jade tremolite-diopside.
NW-22(2)	New World jade-boulder	Jade	Dark green jade with white "capping" patches diopside-tremolite-picotite-uvarovite
NW-1	New World pit	Alteration Zone	White, finely-crystalline rock-possibly dyke? albite-kaolinite-diopside-(sphene)
NW-2	New World pit	Alteration Zone	Pink, crystalline soft rock adjacent to NW-1 wollastonite-albite-kaolinite-sphene
NW-3	New World pit	Alteration Zone	Light green capping above jade exposure tremolite-diopside-calcite-picotite
NW-20	400 ft. south of New World pit	Alteration Zone	Ca-silicate metasomatic zone in open cut garnet-calcite-albite-(vesuvianite)
NW-21	400 ft. south of New World pit	Alteration Zone	Light green "capping" material diopside-calcite-garnet-picotite
NW-16	location unknown	Alteration Zone	Light colored rock resembling muttonfat jade calcite-tremolite
NW-10	open cut in road 2030 ft. SW of New World camp	Alteration Zone	White "rodingite" with large garnets diopside-garnet (grossularite)-calcite
NW-15	limestone Ridge	Alteration Zone	Contact of limestone and serpentine chlorite (penninite)-grossularite-calcite-"capping" material
FN-3	Far North camp area	Alteration Zone	"capping" material diopside-nephrite-tremolite-uvarovite
FN-4(a)	Far North camp area	Alteration Zone	"capping" with coarse crystals vesuvianite-grossularite-diopside-(albite)
FN-6	"H" jade occurrence (Hill)	Altered Volcanic Rock ?	Light green dense rock resembling capping clinozoisite-calcite-(albite)
FN-7	"H" jade occurrence	Alteration Zone	Ca-metasomatism zone, white sugary dense rock grossularite-calcite-(vesuvianite)
FN-8	Far North camp area	Alteration Zone	Altered serpentine below capping diopside-antigorite-serpophite-picotite-tremolite
NW-4	New World pit-just above capping	Altered Volcanic Rock	Dense green contorted rock albite-quartz-tremolite-actinolite-(magnetite?)
NW-5	New World pit-just above capping	Altered Volcanic Rock	Massive green-grey rock clinozoisite-chlorite-hydrogrossular-albite-tremolite
FN-6	"H" jade locality	Altered Volcanic Rock?	Dense light green rock clinozoisite-calcite-(albite)
NW-17	"E" jade locality	Altered Volcanic Rock	Dark green crystalline rock in inclusion chlorite-albite-augite-clinozoisite-sphene
NW-19	Large rounded knob near "H" jade locality	Altered Volcanic Rock	Dense grey-green rock albite-anthophyllite-hydrogrossular-clinozoisite-clinopyroxene-chlorite
NW-6	New World pit area	Metasediments	Silicified and tremolitized phyllite quartz-chlorite-tremolite
NW-7	New World pit area	Metasediments	Dark silicified, tremolitized phyllite quartz-tremolite-carbon
NW-8	New World pit area	Metasediments	Dense flinty rock resembling ribbon chert quartz-tremolite
FN-3	Boulder from Far North camp area	Metasediments	Dense flinty rock resembling ribbon chert quartz-tremolite
NW-18	Near "E" jade locality	Altered Peridotite	Dark serpentinized rock with masses of radial tremolite olivine-enstatite-tremolite-serpentine-calcite-magnetite
NW-12	New World Jade "B" locality	Granodiorite	Igneous rock with medium and fine phases plagioclase-quartz-chlorite-sericite-magnetite-sphene
NW-13	New World Jade "B" locality	Granodiorite	Medium grained igneous rock plagioclase-quartz-calcite-chlorite-clinozoisite-ilmenite-sphene
NW-14	New World Jade "B" locality	Granodiorite	Porphyritic dyke (?) rock plagioclase-quartz-hornblende-clinozoisite-chlorite-kaolinite-sericite-sphene-zircon?
FN-4(b)	Trenches near old camp-Far North claims	Granodiorite	Medium grained igneous rock plagioclase-quartz-chlorite-clinozoisite-sericite
FN-5	Trenches near old camp-Far North claims	Granodiorite	Albitized medium-grained igneous rock plagioclase-chlorite-clinozoisite
FN-9	Bluffs on lower portion of Squawkbird Creek	Diorite-or Gabbro	Coarse grained saussuritized intrusive plagioclase-hornblende-clinozoisite-ilmenite-sphene

APPENDIX B

THIN SECTION DATA

X-RAY DIFFRACTION AND X-RAY FLUORESCENCE ANALYSES OF GREEN AND BLACK JADE SAMPLES

by

G. MEDFORD, M.Sc.

for

MANEX MINING LTD.

VANCOUVER, B.C. JAN. 9, 1973.

JADE SAMPLES ANALYSED

Sample 1: Medium green jade from drillcore, Far North Jade property.

Sample 2: Dark green jade, drill core, Far North jade property

Sample 3: "Wyoming black jade" obtained from L.D.Barr.

Sample 4: "Black jade" from Far North jade property

X-RAY DIFFRACTION AND X-RAY FLUORESCENCE ANALYSES OF GREEN AND BLACK JADE SAMPLES

SAMPLES

Four samples of jade (nephrite) were submitted by Mr. Barry Price of Manex Mining Ltd. These ranged in color from light green (#1) to black (#4). The writer was asked to determine:

a) whether all samples could be called nephrite jade.

b) If the darker material were actinolite or ferroactinolite.

c) If the color differences could be ascribed qualitatively to variations in one or more of the elements present.

RESULTS

X-ray diffraction patterns of all four samples index as tremolite-actinolite,but it is impossible to differentiate the two end members by this procedure.

Qualitative x-ray fluorescence analyses indicate variations in the relative amounts of elements present. Elements detected by scanning include iron, nickel, cobalt, manganese, and strontium. Iron is enriched in sample #3 relative to samples #1 and #4; #2 was not run because of insufficient powder. It is estimated that #3 contains about twice as much iron as #1 or #4. It would seem that iron is not the cause of the black coloration of sample #4.

Nickel: Samples #1 and #4 have similar Ni contents,with concentrations several times higher than that of sample #3.

Manganese: This element is present in small,but uniform concentrations in all samples.

Cobalt: Trace quantities of cobalt are present in all samples but concentration is relatively lower in sample #4.

Strontium: This element is present in trace quantities uniformly in all samples.

ANALYTICAL PROCEDURES :

X-ray diffraction was done using -60 mesh powder ground in a Spex mill. Because of difficulties in obtaining a randomly-oriented sample slide, peak intensities do not correlate well with those of ASTM indices, however, peak positions (2θ) do match well.

X-ray fluorescence was done using fusion pellets. One gram of sample was fused with two grams of Li-tetraborate to equalize absorption effects. The pellets were crushed for two minutes in a Spex mill and pressed into pellets with a borax backing.

The procedure used allows qualitative estimation of relative amounts present by comparison of peak heights on the different scans. As this dilution procedure reduces lower detection limits for any given element, a scan was also made on crushed natural powder; no other elements were detected.

All traces completed in the study are included inthis report on the following pages.

G.Medford, M.Sc.,
Geologist.

G. Medford

INTERPRETATION OF DATA CONCERNING MT.OGDEN BLACK JADE

Optical examination of the black jade from Mt.Ogden shows that the material has similar crystal size and textures as normal green nephrite and contains similar amounts of uvarovite garnet.

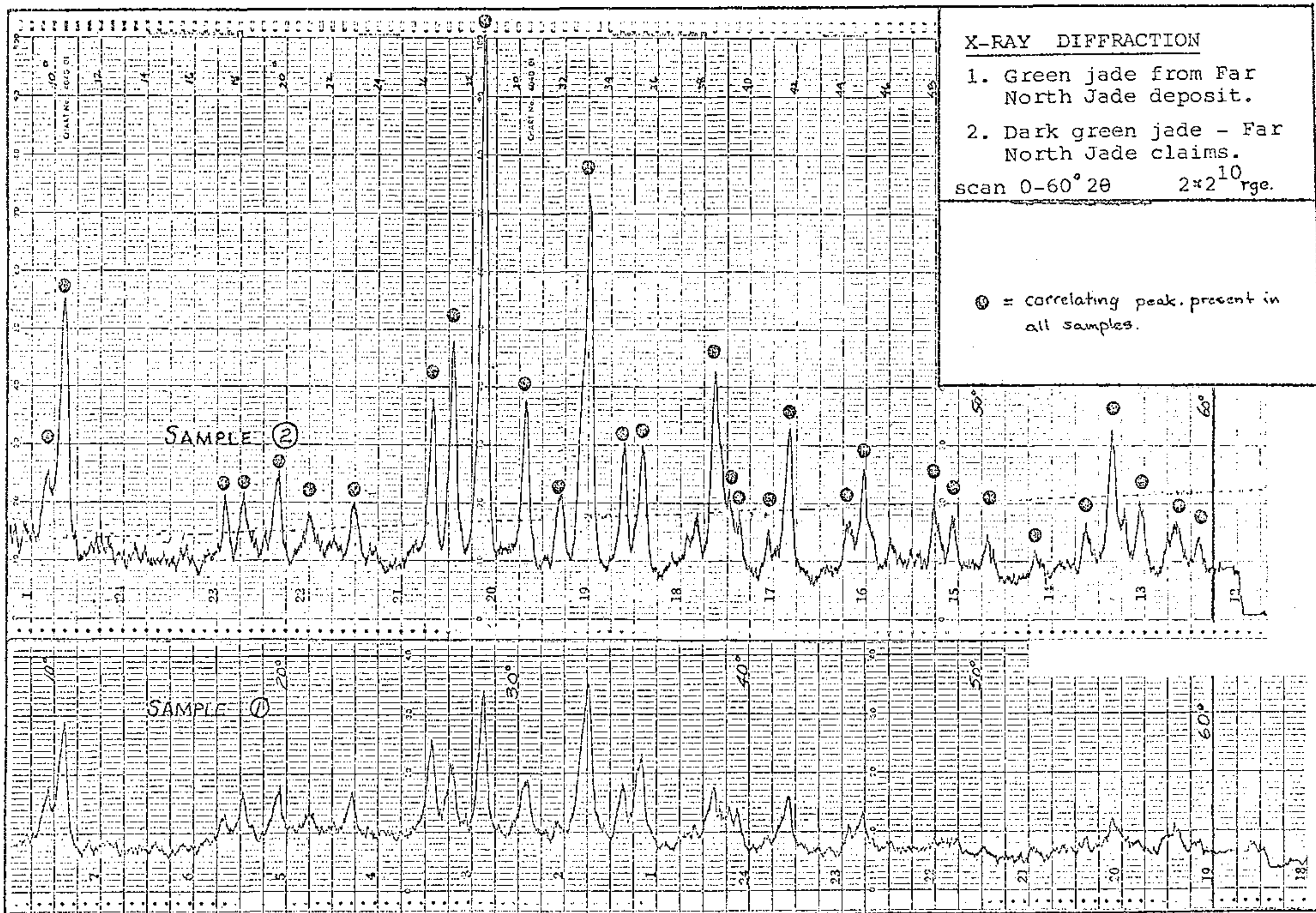
X-ray studies (see accompanying report) prove that the black material belongs to the tremolite-ferroactinolite solid - solution series. The iron content of the black material from Mt.Ogden is about half that in the "wyoming black jade" analyzed at the same time, and is similar to the iron content of normal green jade from Mt. Ogden.

Density determinations show that the Mt.Ogden black material has a density of 3.006 g/cc., statistically identical to that of normal green nephrite. The density indicates that the material, contains at least 95 % of the "tremolite" end-member, in contrast to the sample from Wyoming, which contains sufficient iron to place it in the actinolite portion of the series.

Terminology researched in Evans (1966) and Deer, Howie, and Zussman (1966) defines nephrite as dense compact, microcrystalline varieties of the tremolite-actinolite series that take an attractive polish.

CONCLUSIONS: From optical, x-ray, and density determinations the writer concludes that the black jade from Mt.Ogden is true nephrite jade and can be marketed as such with complete confidence

Barry Price.
Barry Price, M.Sc.


X-RAY DIFFRACTION
1. Green jade from Far North Jade deposit.
2. Dark green jade - Far North Jade claims.
scan 0-60° 2θ
2×2^10 rge.
= correlating peak. present in all samples.
SAMPLE ②
SAMPLE ①
10°
20°
30°
40°
50°
60°

Department of

Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 4523 MAP

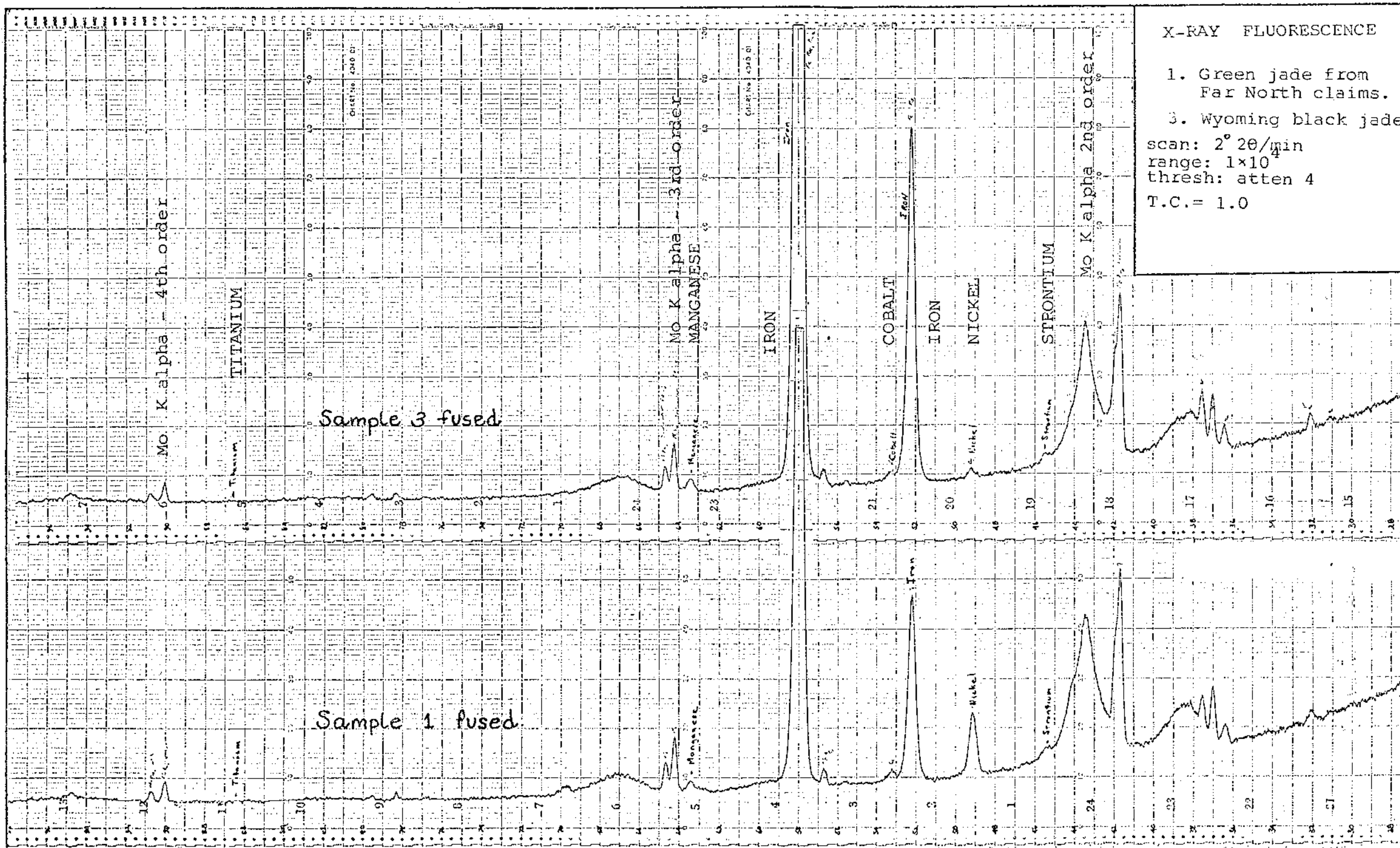
QUALIFICATIONS

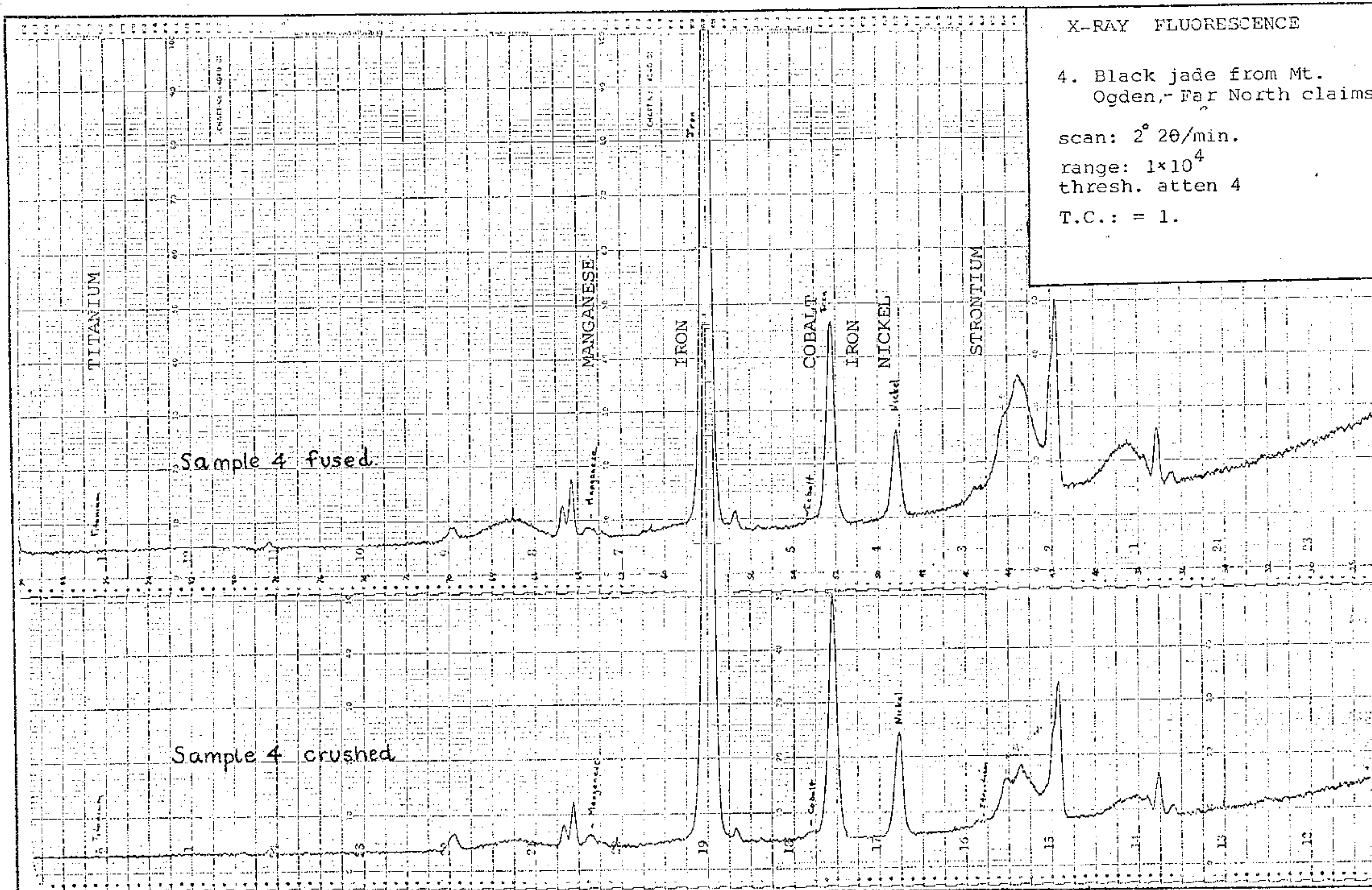
The writer obtained his Bachelors degree [B.Sc.-Honors Geology] from the University of British Columbia in 1965 and received his Masters degree [M.Sc.- Economic Geology] from the same institution in 1972.

EXPERIENCE

1965-1968	CHEVRON STANDARD LTD., Alberta - reconnaissance mapping, subsurface geological studies, carbonate reef research, production department wellsite work.
1968 [Summer Employment]	MANEX MINING - diamond drill supervision, geological mapping.
1969 [Summer Employment]	Geological mapping, supervision of diamond drilling, evaluation of geochemical and geophysical studies, property evaluation [including Jade Queen Mines Property].
1970	ARCHER-CATHRO AND ASSOCIATES. Party Chief. Regional study of sedimentary copper potential - Mackenzie Mts. Reconnaissance mapping, geochemical interpretation.
1971	J. R. WOODCOCK CONSULTANTS - Project geologist in charge of exploration of massive sulphide prospect, including geological mapping, geochemistry, I. P. evaluation and diamond drilling. Concurrent regional program including geological mapping, stream-sediment geochemistry and property evaluation.
1972	MANEX MINING LTD. - Senior geologist in charge of field projects including line-cutting, geochemistry, geological mapping, property evaluation.

The writer has no beneficial interest, direct or indirect, in New World Jade, Far North Jade or any associated companies and will receive no remuneration other than wages for work completed on properties belonging to the above-mentioned companies.


X-RAY FLUORESCENCE
1. Green jade from Far North claims.
3. Wyoming black jade
scan: 2° 2θ/min
range: 1×10^4
thresh: atten 4
T.C.= 1.0
Mo. K alpha - 4th order
TITANIUM
Mo K alpha - 3rd order
MANGANESE
IRON
COBALT
IRON
NICKEL
STRONTIUM
Mo K alpha 2nd order
Sample 3 fused
Sample 1 fused

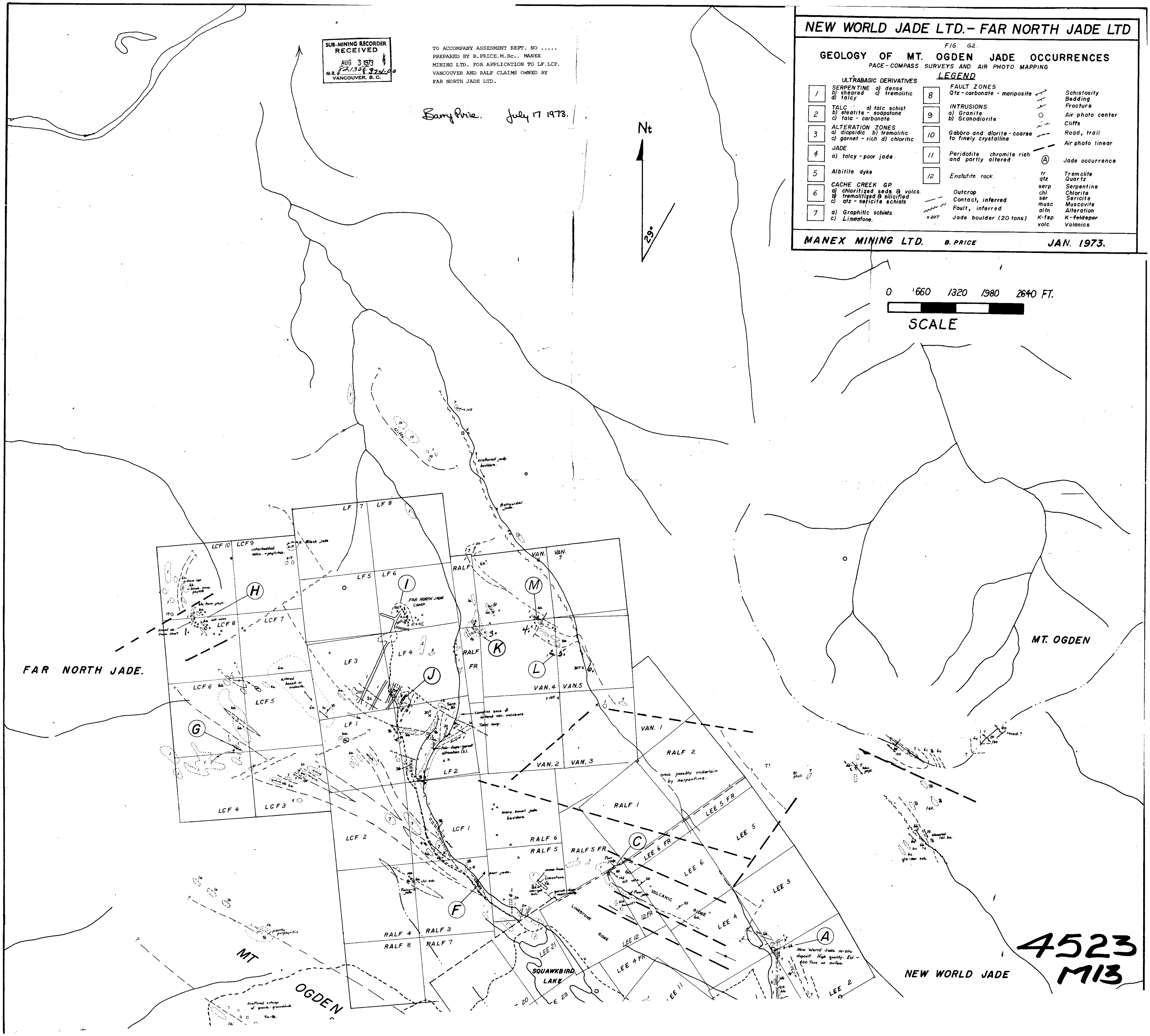

X-RAY FLUORESCENCE
4. Black jade from Mt. Ogden,- Far North claims
scan: 2° 2θ/min.
range: 1×10^4
thresh. atten 4
T.C.: = 1.
TITANIUM
MANGANESE
IRON
COBALT
IRON
NICKEL
STRONTIUM
Sample 4 fused
Sample 4 crushed

Department of

Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 4523 MAP


SUB-MINING RECORDER
RECEIVED
AUG 3 1973
M.R.# 82135 $ 374.00
VANCOUVER, B. C.
TO ACCOMPANY ASSESMENT REPT. NO .....
PREPARED BY B.PRICE,M.Sc., MANEX
MINING LTD. FOR APPLICATION TO LF,LCF,
VANCOUVER AND RALF CLAIMS OWNED BY
FAR NORTH JADE LTD.
Barry Price. July 17 1973.
NEW WORLD JADE LTD.- FAR NORTH JADE LTD
FIG. G2.
GEOLOGY OF MT. OGDEN JADE OCCURRENCES
PACE-COMPASS SURVEYS AND AIR PHOTO MAPPING
LEGEND
ULTRABASIC DERIVATIVES
1 SERPENTINE a) dense b) sheared c) tremolitic d) talcy
2 TALC a) talc schist b) steatite - soapstone c) talc - carbonate
3 ALTERATION ZONES a) diopsidic b) tremolitic c) garnet - rich d) chloritic
4 JADE a) talcy - poor jade
5 Albitite dyke
6 CACHE CREEK GP. a) chloritized seds & volcs. b) tremolitized & silicified c) qtz - sericite schists
7 a) Graphitic schists c) Limestone.
8 FAULT ZONES Qtz - carbonate - mariposite
9 INTRUSIONS a) Granite b) Granodiorite
10 Gabbro and diorite - coarse to finely crystalline
11 Peridotite chromite rich and partly altered
12 Enstatite rock.
Outcrop
Contact, inferred
Fault, inferred
x 20T Jade boulder (20 tons)
Schistosity
Bedding
Fracture
Air photo center
Cliffs
Road, trail
Air photo linear
(A) Jade occurrence
tr Tremolite
qtz Quartz
serp Serpentine
chl Chlorite
ser Sericite
musc Muscovite
altn Alteration
K-fsp K-feldspar
volc Volanics
MANEX MINING LTD. B. PRICE JAN. 1973.
Nt
29°
0 660 1320 1980 2640 FT.
SCALE
MT. OGDEN
FAR NORTH JADE.
NEW WORLD JADE
MT OGDEN
SQUAWKBIRD LAKE
LIMESTONE RIDGE
VOLCANIC RIDGE
FAR NORTH JADE CAMP.
scattered jade boulders.
Botryoidal jade.
Black jade
interbedded volcs.-phyllites.
many small jade boulders.
area possibly underlain by serpentine.
New World Jade in-situ deposit. High quality. Est. ~ 600 Tons on surface.
Talc-diops-garnet alteration (3).
poor jade.
LF 7
LF 8
LF 5
LF 6
LF 3
LF 4
LF 1
LF 2
LCF 10
LCF 9
LCF 8
LCF 7
LCF 6
LCF 5
LCF 4
LCF 3
LCF 2
LCF 1
VAN. 6
VAN. 7
VAN. 4
VAN. 5
VAN. 2
VAN. 3
VAN. 1
RALF
RALF FR.
RALF 2
RALF 1
RALF 6
RALF 5
RALF 5 FR.
RALF 4
RALF 3
RALF 8
RALF 7
LEE 5 FR.
LEE 5
LEE 6 FR.
LEE 6
LEE 3
LEE 4
LEE 12
12 FR
LEE 4 FR
LEE 21
LEE 11
LEE 2
E 23
20
A
C
F
G
H
I
J
K
L
M
4523
M13