G E O L O G I C A L

A S S E S S M E N T   R E P O R T

of

Tourm Mineral Claim
Fort Steele M.D.
NTS 82F/IE and 82G/4W

Lat: 49° 06' 20" N
Long: 115° 59' 00" W

Owner: St. Eugene Mining Corporation Ltd.
Operator: St. Eugene Mining Corporation Ltd.

Author: John Wilson
Date Submitted: 19 September 1979

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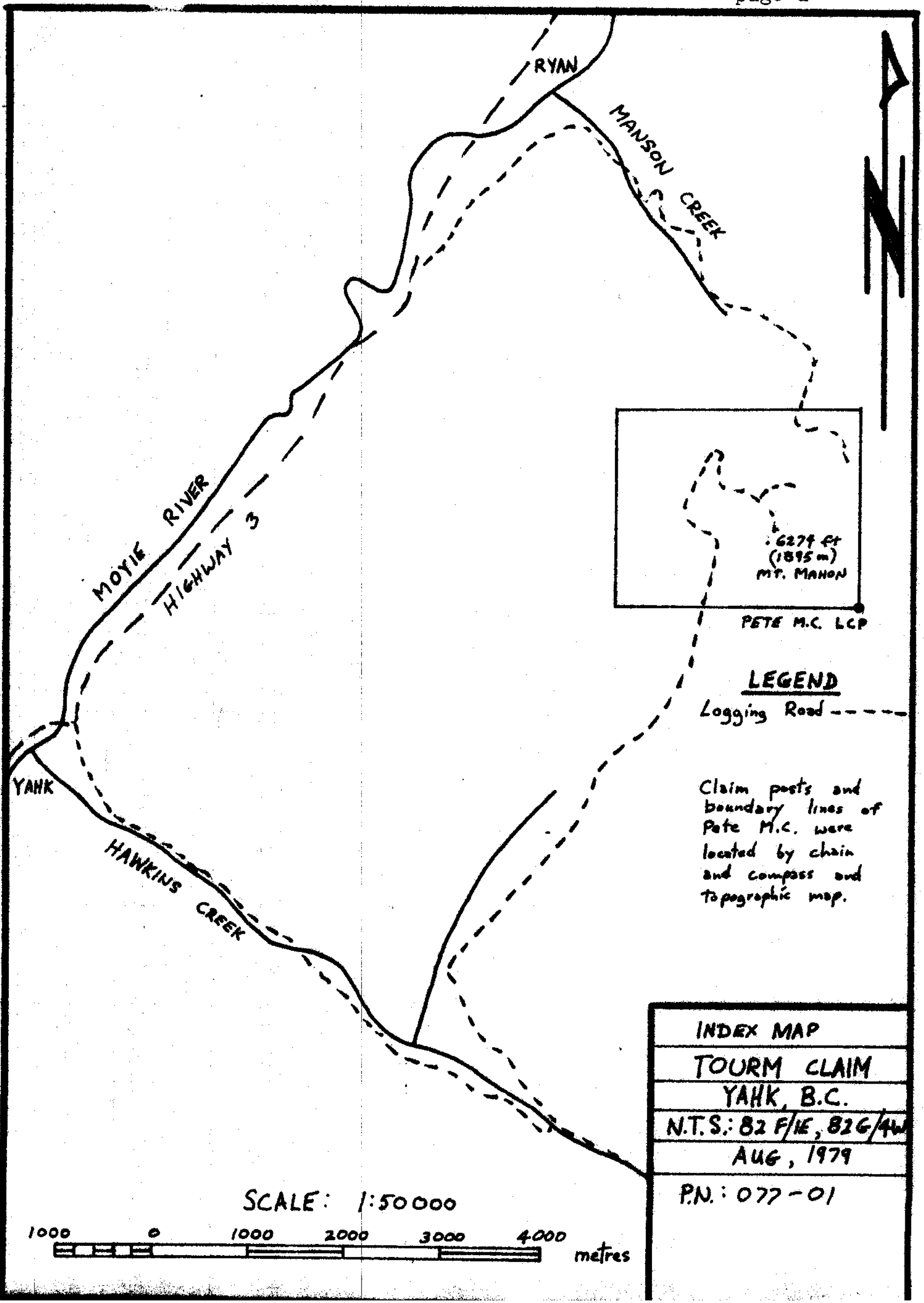
RYAN
MANSON CREEK
MOYIE RIVER
HIGHWAY 3
6274 ft
(1895 m)
MT. MAHON
PETE M.C. LCP
YAHK
HAWKINS CREEK
LEGEND
Logging Road
Claim posts and boundary lines of Pete M.C. were located by chain and compass and topographic map.
INDEX MAP
TOURM CLAIM
YAHK, B.C.
N.T.S.: 82 F/1E, 82G/4W
AUG, 1979
P.N.: 077-01
SCALE: 1:50000
1000
0
1000
2000
3000
4000
metres

Introduction

The Tourm Claim is located approximately eight kilometres east-north-east of the town of Yahk, B.C. (Lat. 49° 06' 20" N., Long. 115° 59' 00" W). Topographic elevation ranges from a maximum of 1895 metres in the centre of the claim (peak of Mt. Mahon) down to a low of 906 metres.

Two abandoned logging roads provide access to the property. One road follows Manson Creek - southeasterly from Ryan and the other road leaves the Hawkins Creek road about seven kilometres southeast of Yahk and runs north-easterly to the claim.

The Tourm claim consists of 20 units, staked four north by five east, in September 1978 to cover a tourmalinization zone similar to that at the Sullivan mine. The current owner and operator is St. Eugene Mining Corporation Ltd.

No encouraging mineralization has been seen and the tourmalinization is limited in distribution thus further reducing interest. Economic potential is considered to be low.

Our work to date has consisted primarily of geological mapping at a scale of 1:2000. The total claim area (five square kilometres) was covered.

Scope and Methods of Work

The claim was mapped to determine the limits of tourmaline distribution and the nature of the enclosing stratigraphy.

Outcrops were located during pace and compass traverses and were later surveyed by closed chain and compass traverses, pace and compass lines and in relation to a grid (also chain and compass controlled).

A survey control point (shown on the government 1:50,000 scale topographic sheet (NTS 82G/4) as elevation 6274 feet) was located in the field and the survey was tied to this. Part of the 1:50,000 topographic map was enlarged to provide a contour base map for the area.

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All petrographic examinations were carried out on hand samples using traditional field techniques and field classifications based on the gross mineralogical and textural characteristics of the rocks.

Regional Geology

The property lies within the Aldridge Formation of the lower Purcell Supergroup. The following discription of the area is from Edmunds (1977):

"Exposed Aldridge Formation is between 4,000 and 5,000 m thick in the Purcell Mountains. It consists of greywacke units interbedded with argillites....'

'The greywackes are metamorphased, graded, impure sandstones. They possess solemarkings, including grooves, poor flutes, and longitudinal ridges, and the internal sedimentary structures of cross and convolute bedding, that suggest their similarity to units ascribed elsewhere to turbidity currents... Cross-bedding in the C (Bouma) internal indicates a basin axis running in the N-S direction through the centre of the outcrop area.'

'The greywackes are composed of quartz, plagioclase, biotite and sericite, with small amounts of K-feldspar, muscovite, and garnet. The fabric is recrystallized without being hornfelsic. The metamorphic grade increases from Greenschist facies near the International Boundary to amphibolite facies in the case of the Moyie anticline to the northe-east....'

'The argillite rock appears to be the end of a series that is transitional with the greywackes, in which sericite and biotite increase at the expense of quartz towards the argillite end. The ultimate end member is a quartz-sericite (minor biotite, graphite) rock, completely devoid of any current effects, and apparently without a detrital component ....'

' The intrusives ...are hornblende-quartz metagabbro sills in the middle and lower Aldridge Formation."

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Detailed Geology

The Tourm claim lithology is dominated by bedded wackes that are nearly quartz arenite in composition. Argillites are fairly well distributed but not obvious except in one area. Tourmaline-rich beds (tourmalinite) are very restricted in distribution.

Components of the wacke that are recognizable in hand specimen are quartz, biotite and sericite. Quartz is the coarsest of these and sometimes reaches 0.25 mm in diameter but is normally slightly less than 0.1 mm. Biotite and sericite is always finer than the quartz. The upper portion of wacke beds usually grades into finer sediments that can be classified as siltstones and argillites.

Wackes normally have a slight range of percentage compositions. Quartz is 70 to 90%, mafics (mostly biotite) is 10 to 20%, and the whitish matrix is 5 to 15%. Occasionally, however, the mafics total 50% of the rock. Other than a dark grey colour no differences can be recognized between the strongly and weakly mafic wackes.

On the upper 1 to 5 cm (rarely upper 20 cm) of most wacke beds quartz is 50 to 80%, mafics are 5 to 50%, and sericite is 1 to 5%. The percentage of matrix is difficult to estimate as fine grained constituents obscure it, but it is probably not more than 10 to 20%.

Wacke beds usually range in thickness from 20 to 50 cm, are a maximum of 110 cm, and have a mean thickness of about 30 cm. The beds are tabular, normally indurated, poorly sorted and massive, showing no internal features except in the top few centimeters where all grain sizes decrease, quartz content decreases, and mafic and/or sericite content increases. The siltstone or argillite tops of many wacke beds are occasionally friable and clayey.

Top parts of wacke beds sometimes display faint laminations (1 to 10 cm) over 5 cm of width as mafic and less mafic laminae alternate. Convoluted internal structures are sometimes recognized in the laminated zone. Cross bedding at this level is rare and indicates a northward current trend.

Commonly, above or in place of the laminations or cross-bedding is a semi-schistose top.

A vertical colour change is normal in wacke beds. Fresh rock is usually pale to medium grey throughout most of the beds and quickly changes to dark grey at the top if argillic. Weathered rock, usually medium grey at the base, becomes reddish-brown to buff on top (if very sericitic) and black (if very mafic).

The base of wacke beds often contain, striations, groove casts and long ridges all oriented north to north-easterly.

Concretions up to 50 cm in length occur erratically throughout the wacke beds and can't be related to horizons or trends.

Argillites appear either as distinctly separate silt sized units or as graded, strongly mafic, very fine sand to silt sized tops of wacke beds. They seldom reach 15 cm in thickness and are normally less than 5 cm thick. They are massive if separate and semi-schistose to schistose where they represent a graded top. Argillites are softer than the wackes, black to dark grey in colour and weather black. Occasionally they are fissile. Beds are tabular to lensoid and sometimes show loadcasts and cut and fill surfaces in contact with overlying wackes. Rip-up clasts (platey very angular fragments to 6 cm in length) of argillite also can be seen.

Tourmalinite has been identified previously on Mt. Mahon (Ethier and Campbell, 1977). The rock they describe was found to be very hard, bedded, dark grey to black in colour, black weathered and composed of silt and finer sized grains. It is normally massive and has a conchoidal fracture. Ethier and Campbell's analysis of rocks show 40 to 44% tourmaline, 28 to 43% quartz, 3 to 10% muscovite, 1 to 19% microcline, and up to 8% biotite. They describe tourmaline found in

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Aldridge Formation rocks as either a felted mass of 5 to 10 mm long crystals or disseminated 250 mm long crystals. This rock is normally interlayered with wackes or argillites as 1 to 5 mm laminations over 3 to 20 cm. Massive fine tourmalinite is rarely found up to 5 cm in thickness.

Often associated with the above rock is a very fine sand sized black rock that contains up to 15% visible quartz. Otherwise, it resembles the silt sized tourmalinite. It is believed that this is also a tourmaline-rich rock. The finer tourmalinite layers sometimes cap a coarser bed and in one case, fragments of the fine rock (to 1 cm in length) are visible in the top 3 cm of a coarse bed. These coarser beds reach a maximum of 150 cm in thickness but are normally 30 cm.

Rare traces of disseminated fine grained pyrite occur in the coarser tourmalinite and a single 5 mm pyrite bed was seen in the finer type.

Only one small outcrop of gabbroic rock was found on the claim.

Geological mapping reveals bedding that normally dips gently to the north and north east although two areas of bedding irregularities occur. An examination of bedding attitudes in figure 077-79-3/E suggests a northeasterly sloping trough. Most of the claim's argillite and tourmalinite is located in and around this structure. Sole markings here parallel the apparent trough and cross-bedding also shows a northeasterly current flow. These factors suggest the trough may be a paleochannel.

In the north-central part of the claim (fig. 077-79-3/E & W) several easterly dipping apparently erratic bedding values might be due to rotation by faulting; however, other evidence of faulting is minimal: a strong northeasterly depression/ lineament is located here and local outcrops display strong schistosity, fracturing, and quartz veining. Another explanation of the apparently erratic bedding attitudes is that schistosity planes may have been measured instead of bedding in poorly exposed outcrops. Local schistosities are occasionally intense enough to obscure bedding.

Interpretation

According to the Bouma Turbidite Facies model we can recognize the A and AB intervals as dominating the sedimentary pile. ABE and ABEE sequences are locally important. C and D components are rare. The recognition of Bouma's sequence and sole markings throughout the stratigraphy confirms a turbidity current origin of the wackes and argillites.

Based on turbidite models (Walker, 1976 and 1978) an environment of deposition of the observed sequence can be suggested. Exposed stratigraphy in the claim area can be considered as occupying the transitional zone between the braided channels of the suprafan lobe and the smooth outer part of the suprafan lobe. This would account for the Bouma sequences, grain sizes, and paleochannel. The processes envisioned are similar to that described by Walker (1976):

"The massive sandstones...are less regularly bedded (than classical turbidites) and the common presence of channelling suggests that they be assigned to the braided suprafan channels. As the channels become plugged, and shift in position, a sand body is gradually built up that consists of coalesced channels but no overbank deposits. In the absence of levees on the suprafan, and with the lateral channel shifting, any overbank fines that are deposited are rapidly eroded again.... The gradual termination of the suprafan channels is likely to result in a very gradual facies change across the suprafan lobes -- some classical turbidites might be preserved in wide shallow channels."

Thus, the unique coicidence of most of the claim's argillite and all of its tourmalinite within the "paleochannel" might be partly due to turbidity currents.

Ethier and Campbell (1977) write, "the textural evidence at Mt. Mahon...indicates that local concentrations of tourmaline are not the result of residual magnetic fluids introducing boron into a sedimentary column long after lithification. On the contrary, it must have been introduced at or near the depositional interface." They found

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"tourmalinized rock (preserving) clastic sedimentary features" such as tourmaline-rich and tourmaline-poor laminae and tourmaline-rich, angular, laminated rip-up clasts. "The source of the clasts was nearby, from laminated material anomalously rich in boron before the clasts were ripped up." Our work confirms the existence of clastic sedimentary features displayed by tourmalinized rock.

Ethier and Campbell also suggest that "...fractures in the basin floor (allowed) boron-rich fluids to discharge and be concentrated within local troughs...". It is impossible to judge whether the Mt. Mahon tourmaline is proximal or distal with respect to its source vent. It is also impossible to decide whether the tourmalinite beds consists of primary material or components reworked by sedimentary transport. In an environment where turbidity currents were prominent, some of the primary boron-rich material must have been attacked by currents and were probably incorporated into the flow. Where current scour was severe all traces of boron-rich material may have been removed. In other places only slight disruptions need have occurred.

Mapping defined two tourmaline zones. The upper zone is clearly related to the channel recognized from detailed mapping. The lower zone is 120 meters stratigraphically below the upper and is close to the channel axis but poor outcrop exposure here prevents a thorough study.

Conclusions

The Tourm Claim is underlain by at least 234 metres of Aldridge Formation turbidites that are predominently wackes. Thin bedded argillites are not common except with tourmalinite around the axis of a possible northeast trending paleochannel. The wacke grains are normally all less than 0.1 mm in diameter and the rocks usually approximately quartz asenite in composition. The metamorphic grade is greenschist facies. Little structural deformation can be suggested except minor possible faulting in the north central area of the claim. Intrusives are not important. Only one small outcrop of gabbroic rock was found.

According to the Bouma Turbidite Facies model A and AB units dominate the sedimentary pile. ABE and ABEE or locally important. C and D components are rare.

Based on grain size, Bouma sequence, and an assumed paleochannel the environment of deposition is transitional between the braided channels of the suprafan lobe and the smooth outer part of the suprafan lobe (following Walker's 1978 model). The direction of sediment transport was from the southwest to the northest. The presence of two tourmalinite zones near the presumed paleochannel axis indicates an upslope source of boron that (following Ethier and Campbell's model, 1977) eminated along fractures in the basin floor. The fractures allowed boron-rich fluids, and perhaps metal-rich fluids to discharge onto the sea floor. The presence of minor pyrite in the tourmalinite ties the early history of metals and boron together.

Based on the present survey, the possibility of finding economic concentrations of Sullivan-type mineralization on the Tourm claim is poor. At the Sullivan mine tourmalinite is prominent in the footwall and the collapse structure below the deposit is viewed as the probable conduit for boron and metal-rich solutions. On the Tourm claim there is no room

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above the lower tourmalinite for metal accumulation. Furthermore, the claim's paleotopography sloped gently to the northeast and no depressions or traps for metal "pooling" can be recognized. Finally, no structural features were located that can be considered a vent.

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List of References

Edmunds, F.R., 1977 Kimberley to Creston
Stratigraphy and Lithology of the Lower Belt series in the Purcell Mountains, British Columbia, in GAC, SEG Joint Annual Meeting, 1977
Field Trip No. 1 Guidebook, Published by B.C. Ministry of Mines and Petroleum Resources, Victoria. Pages 22 to 32.

Ethier, V.G. and F. A. Campbell, 1977. Tourmaline concentrations in Proterozoic sediments of the Southern Cordillera of Canada and their economic significance.
Can. J. Earth. Sci V. 14, pages 2348 to 2363

Walker, R. G., 1976. Facies Models 2. Turbidites and Associated Coarse Clastic Deposits. Geoscience Canada. V 3 no. 1, pages 25 to 36.

Walker, R. G., 1978. Deep-water Sandstone Faces and Ancient Submarine Fans: Models for Exploration for Stratigraphic Traps. AAPG Bull V 62 no. 6, pages 932 to 966.

Itemized Cost Statement

One geologist, 29 days of mapping (June 27 to 29, July 2 to 18, 23 to 24, 28 to 31, August 1 to 3) @ \$60./day =	\$1,740.00
One geologist, 3 days of data analysis and report writing (August 5 to 7) @ \$60./day =	\$180.00
One assistant, 2 days (July 4 and 8) @ \$40./day =	\$80.00
One assistant, 1 day (July 4)@ \$30./day =	\$30.00
33 man-days, food and accommodation (dates and personnel as above) @ \$15./day =	\$495.00
29 days of truck rental @ \$20./day =	\$580.00
Report drafting and typing	\$55.05
GRAND TOTAL	\$3,160.05

Authors' Qualifications

John Wilson graduated from the University of B.C. in 1972 with a B. Sc. (honours geology) and has worked for Falconbridge Nickel Mines Companies since graduation as an exploration field geologist. He was supervised on the project by Leslie A. Tihor, project geologist.

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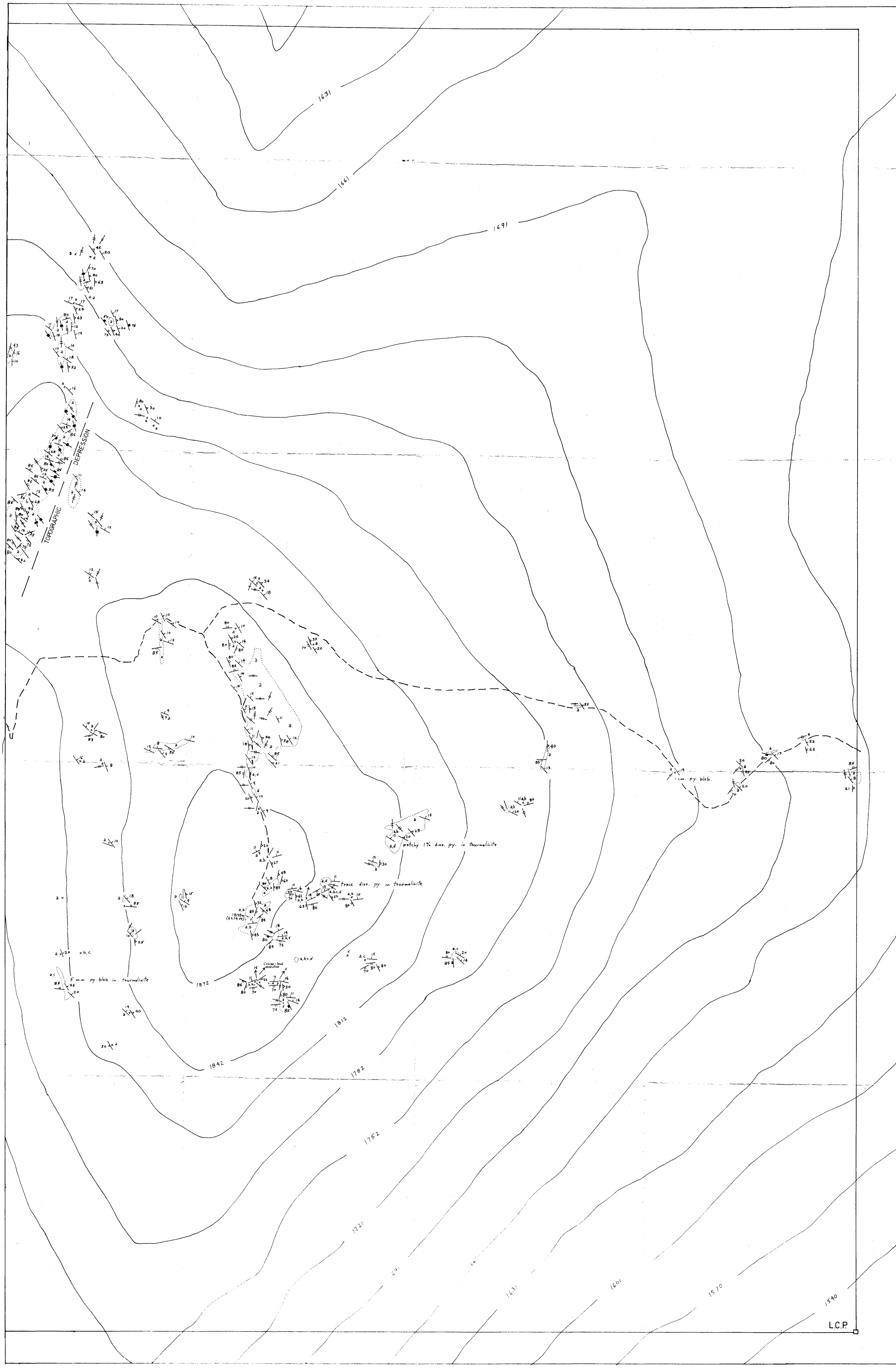


MINERAL RESOURCES BRANCH ASSESSMENT REPORT

7785

LEGEND

g	gabbro
a	wacke
b	argillite
c	tourmalinite (silt and clay sized)
d	tourmalinite (sand sized)
1601	approximate elevation contours (metres)
	road
x	outcrop
	area of outcrops
10	quartz vein attitude
10	albitic vein attitude
10	schistosity attitude
10	bedding attitude
10	fracture attitude
	trend of sole mark
	direction of sole mark
diss.	disseminated
py.	pyrite

Claim posts and boundary lines were located by chain and compass and topographic map.

METRES

0 50 100 150 200 250

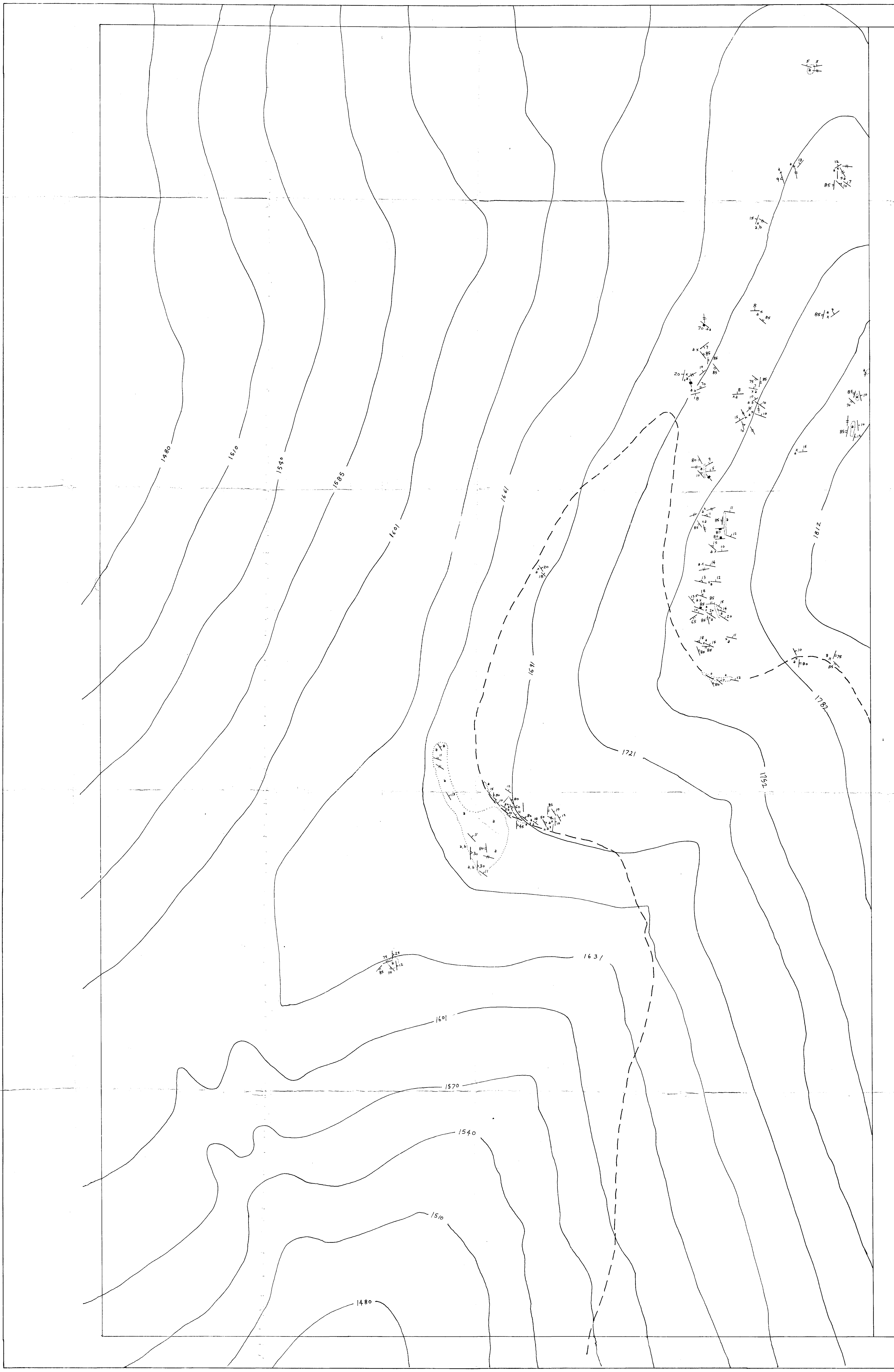
SCALE: 1:2000

TOURM CLAIM

YAHK, B.C.

GEOLOGY

JUNE TO AUG 1979	P.N:077-01	FIG. NO.: 077-79-3/E
DRAWN BY: JW	NTS:82F/1E, 82G/4W	



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LEGEND

g	gabbro
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c	tourmalinite (silt and clay sized)
d	tourmalinite (sand sized)
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	area of outcrops
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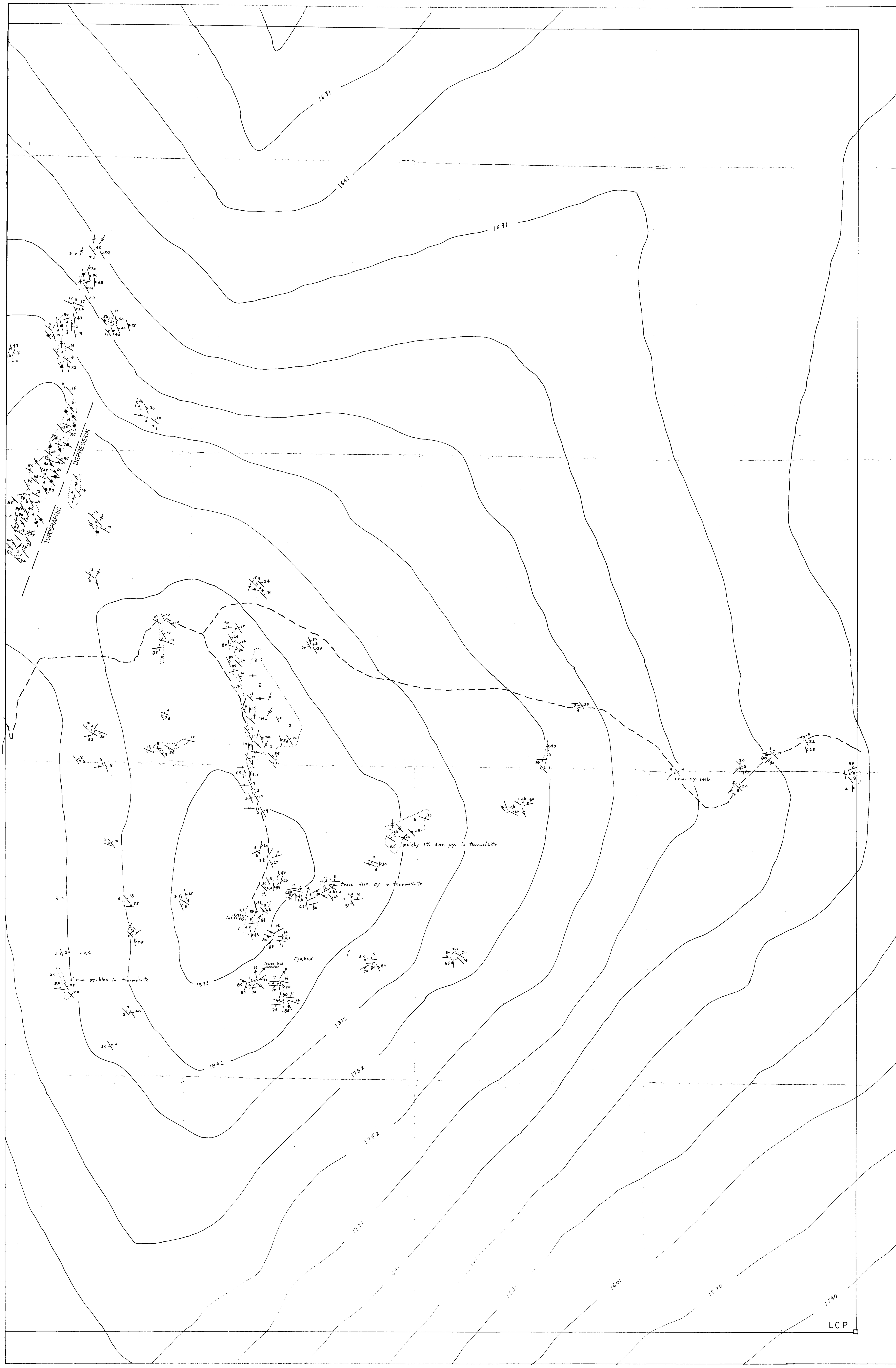
TOURM CLAIM

YAHK, B.C.

GEOLOGY

JUNE TO AUG, 1979	PN: 077-01	FIG. NO. 077-79-3/W
DRAWN BY: J.W.	NTS 82F/1E, 82G/4W	



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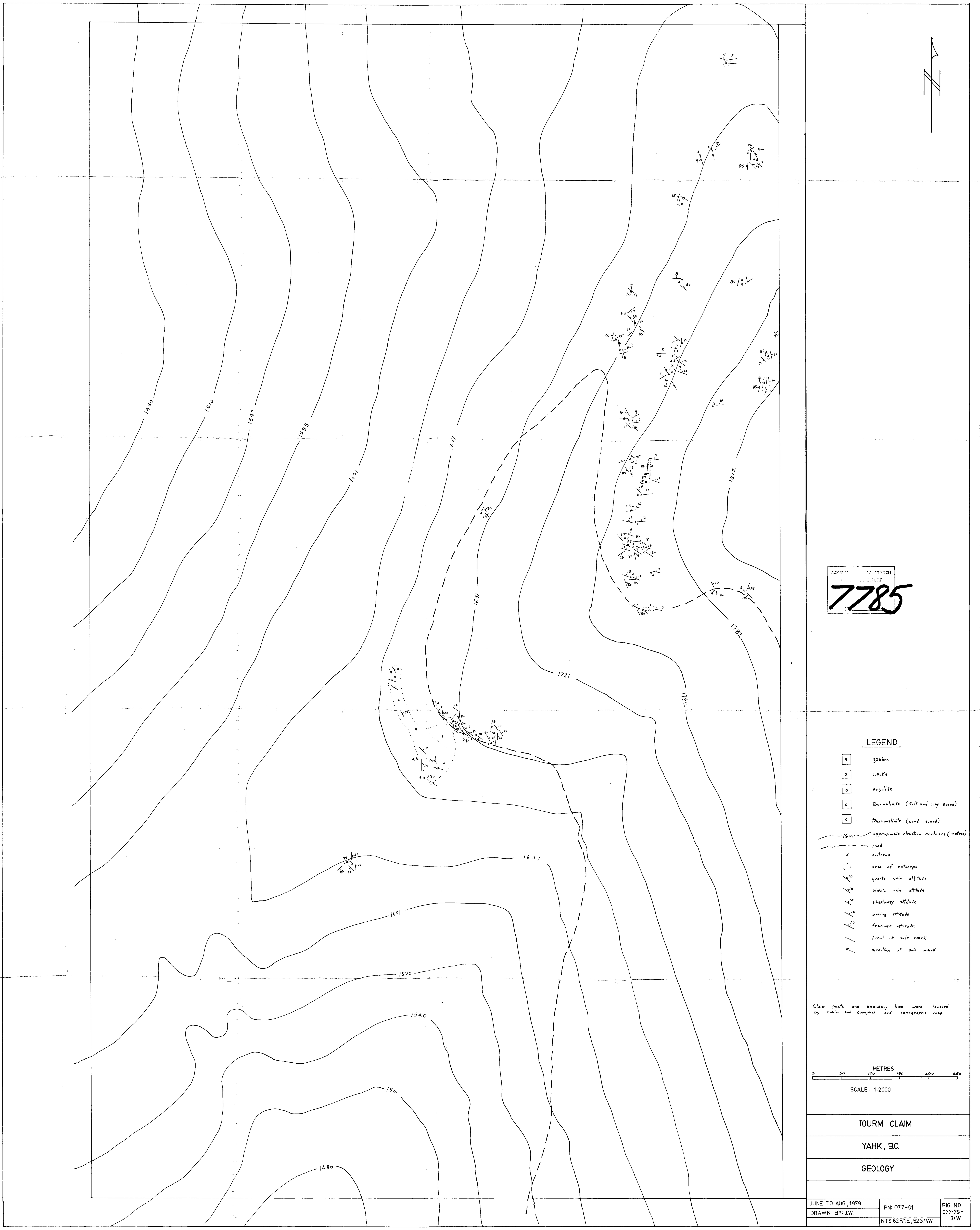

7785
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TOURM CLAIM
YAHK, B.C.
GEOLOGY
JUNE TO AUG, 1979
DRAWN BY: J.W.
PN: 077-01
NTS 82F/1E, 82G/4W
FIG. NO. 077-79-3/W
1480
1510
1540
1585
1601
1631
1661
1691
1721
1752
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1812
1570