



120022



REPORT

ON

GEOLOGICAL AND ASSESSMENT WORK

MOSEHORN PROPERTY

(4229 Yukon Ltd.)

BY

ROGER D. MORTON, B.Sc., Ph.D., P. Geol.

September, 1983



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## INTRODUCTION

This report was prepared at the request of the Directors of 4229 Yukon Ltd. and documents that assessment work performed during August, 1983 on the 22 contiguous placer claims, known herein as the Moosehorn Property. The field- and laboratory-work documented herein was done under my supervision.

## LOCATION AND ACCESS

The property, comprising 22 contiguous placer claims (Nos. P-22961, P-22963 thru P-22971 inclusive, P-22972 thru P-22979 inclusive, P-22960, P-22962, P-22980 and P-22981), is situated in the Yukon Territory, on the NE slopes of the Moosehorn Range, some 400 km NW of Whitehorse and 75 km SW of Dawson and the Klondike. The claims lie on Great Bear Creek, immediately east of the Yukon-Alaska border at Long.  $140^{\circ}55'$  W and Lat.  $63^{\circ}04'$  N. The property is situated in the west half of the Lapdudue River Sheet NTS # 115 N2. The claims were grouped into 3 groups, namely: Group #312P, Group #313P and Group #314P.

Access to the property is by fixed-wing aircraft from Whitehorse, landing on a gravel strip situated about 2.5 km to the west of the Moosehorn Property, on the western slopes of the Moosehorn Range; see Plate 1. A bulldozed trail leads across the range, direct to the claims and runs the full length of the claim, down the NW side of Great Bear Creek; see Plate 2. The landing strip can easily accommodate an "Islander" or "Navajo" aircraft. A second airstrip is situated within the area of the

claims, but is at present, unserviceable. Inspection of the strip during the period of assessment work showed that the slight erosional (run-off) damage could easily be repaired in future using a bulldozer/scrapper; see Plate 3.

During the winter, access to the property could easily be made via a 65 km long winter-road which is operated from the Alaska Highway in the vicinity of Beaver Creek, to the Goldwin Joint Venture property, just to the west of the Moosehorn Property.

#### PHYSIOGRAPHY

The area is one of rolling mountains having a maximum altitude of 4439 ft. a.s.l. The Moosehorn Property extends from an altitude of around 3800 ft. a.s.l. to around 2400 ft. a.s.l. over a lateral distance of about 3.2 km; see Plate 4. As the area did not suffer Continental or Alpine glaciation during the Pleistocene, the hills have thick covers of residual soil, mass-wasted detritus and weathered bedrocks. Where bedrock does emerge, on the hillcrests, it is present as frost-heaved felsenmeer.

The lower parts of the Moosehorn Property were found to be covered by a thick deciduous/coniferous forest; see Plate 2. In contrast, the upper claims are characterised by scrub bush, low hummocky grass and poorly-drained residual bog-soils. The area is also one of permafrost and this was noted in a number of the test pits investigated. The presence

of this permafrost would make it necessary to prepare ground for sluicing one year ahead, by stripping off the topsoil and permitting thaw-down to take place. In the upper sectors of the claims some of this had already been performed and sluicing could well begin within the first season of work on the property.

#### GENERAL GEOLOGICAL OBSERVATIONS

The general geology of the Moosehorn Range was described in Paper 73-41 by Templeman-Kluit(1974) and is illustrated on the Geological Survey of Canada Map 18-1973 (The Stewart River Sheet). In Templeman-Kluit's description the Moosehorn Range is composed of Triassic(?) biotite hornblende granodiorite and quartzdiorite, which are, in part, strongly foliated. This granodiorite-diorite suite, part of the so-called Klotassin Batholith, contains abundant xenoliths of hornblende-rich hornfels.

During the assessment work, the author examined the exposed bedrocks of the claims and found that they were composed of fresh-to weathered-granodiorite containing abundant xenoliths and skialiths of biotite- and hornblende-rich hornfels. The granitoids were found to be cut by occasional olivine diabase dikes and crossed by veins (up to 0.5 m width) of quartz with some arsenopyrite and occasionally visible free gold. The weathering profiles of the granitoids appear to be up to 10 metres thick and at the base of the weathering profile, friable weathered

granitic detritus gives way gradually to fresh bedrock. The weathered granitoids are illustrated in Plates 5 and 6. It is clear, from the geological survey performed, that the slopes of the eastern Moosehorn Range are draped with residual soils of essentially granitoid composition, which often retain the original granitic textures. Down-slope mass-wasting (perhaps in part by solifluction) has caused the creek valleys to become infilled with the granitic detritus, overlain by a thin organic, acid soil profile.

#### GENERAL OBSERVATIONS ON ECONOMIC MINERAL DEPOSITS

The claims examined have two aspects of potential economic interest worthy of note, namely:

- (i) Gold-and silver-bearing quartz veins cutting the granitoid bedrocks.
- (ii) Gold-and silver-bearing residual placer deposits in the granitoid, mass-wasting, detritus drapes on the slopes and in the valley of Great Bear Creek.

Morin (1975) in his description "Gold Mineralization of the Moosehorn Range" states that mineralized veins lay on the DEA claims of Great Bear Mining Company Ltd., above the head of Great Bear Creek. These are quartz veins, 0.1 - 0.5 metres thick, which trend N to NW and dip at  $20^{\circ}$  to  $40^{\circ}$ . Native gold, up to 2mm diameter, is associated with sphalerite, galena, arsenopyrite and boulangerite. The veins are surrounded by several cm to 0.5m of sericitized granodiorite, containing crystals of arsenopyrite.

In 1975 Great Bear Mining Company Ltd. stripped a 30 x 600 metre zone on the slopes above the Moosehorn Property claims. Several trenches revealed 3 main auriferous veins, namely the 'B', 'C' and 'D' zones. These zones were drilled in 1975 by an 18 hole program, intersecting the veins at less than 15 m depth. The best values intersected were reported (Northern Miner, Aug 28/July 31, 1975) as follows:

<u>ZONE</u>	<u>DDH#</u>	<u>Au oz/s.ton</u>	<u>Ag oz/s.ton</u>	<u>WIDTH</u>
B	Trench	6.52	-	2m x 10cm
C	5	3.62	8.75	16cm
C	6	0.65	1.22	10cm
D	1	0.07	0.10	30cm
D	2	1.6	12.4	7.5cm
D	3	0.01	-	25cm

The placer potential (for both alluvial and eluvial deposits) of Great Bear Creek was soon realized and it was first staked in 1975 by Great Bear Mining Company Ltd. The only records of any assessment of the gold values in the Great Bear Creek sector were those of Hartley (1983) who stated that coarse gold had been panned on the lower claims of the Moosehorn Property. The work on Kenyon Creek by Claymore Resources (and subsequently Goldwin Joint Venture and R. Jury Consulting Ltd.) has proven economic deposits of gold. Since 1978, a successful placer mining operation has worked the Kenyon Creek area, just over the hill, immediately west of the Moosehorn Property. It is estimated that the total production to date from the Kenyon Creek operation has exceeded 15,000 oz gold. The grades of the placer gold deposits on Kenyon Creek probably ranged around 0.1 oz per yard in the upper reaches of the creek.

ASSESSMENT PROGRAM 1983

An assessment program was performed on the Moosehorn Property during the period 4 to 11 August, 1983. The crew consisted of:

Prof. R. D. Morton - Geological consultant  
Mr. W. C. Bale - Geologist  
Mr. R. Pruitt - Laborer  
Mr. R. Stewart - Laborer/Geological Prospecting assistant.

The following work has been performed to augment the poor data base available on the claims and in accordance with the regulations:

1. Helicopter supported Geological survey/ interpretation of air photographs for assessment of distribution of bedrock/ eluvial - and alluvial-placer deposits.
2. Compass and tape survey of the claims.
3. Prospecting and sampling of float and soils within the claims.
4. Digging of trenches at intervals up the creek to assess the degree of gold mineralization within the cover soils and detrities above the granitic bedrocks. Materials from these trenches were panned and sluiced; see Plates 7 and 8.
5. Sampling of bedrocks forming the source of the eluvial/alluvial deposits in Great Bear Creek to assess the origins of the gold in the surficial deposits.
6. Geophysical Survey (using a UG35 spectrometer to assess the degree of radioactive detritus in the heavy mineral fractions).
7. Laboratory examination of heavy concentrates from the trenching/ sluicing operations to determine the nature of gold and other minerals encountered.
8. Polished-section studies of opaque phases encountered in mineralized float discovered in Great Bear Creek.
9. Thin-section petrography of samples of the local bedrocks to the placers, to determine the nature of the source rocks.
10. Laboratory analysis of float and bedrock samples, to assess the potentials of the lower profiles at the base of the placer deposits in the Creek.

OBSERVATIONS

The following conclusions and observations may be made from the extensive field and laboratory investigations of the Moosehorn Property:

(i) The claims carry eluvial placer gold. At all localities trenched and sampled, colours were encountered. Most of the gold was fine-grained, but occasional coarse (0.5mm - 1mm) grains were encountered. The gold retains a hackly appearance (see Plate 7), which indicates little transport. The amount of gold encountered in the surface sampling program was low, as would be expected, for the gold in such instances normally works its way down through the residual soil profiles and will normally be enriched near to the contact between the weathered- and fresh-bedrocks. Mr. Jury, operator on the Kenyon Creek area observed that up to 10 metres of stripping had to be performed on parts of their ground, before the gold-bearing detritus was reached at the bottom of the profilè.

(ii) Great Bear Creek carries float-bearing arsenopyrite/vein materials, associated with abundant granitoid detritus. The granitoid boulders carry abundant xenoliths of hornblendic and biotitic hornfelses. This indicates that there has been direct derivation of detritus from the upper levels of the Moosehorn range, which must be a high-level intrusive mass, cut by veins of arsenopyrite (+ gold?). Such information, gathered during the assessment work, clearly underlines the economic potentials of the Great Bear Creek Valley.

(iii) The geological survey of the valley showed that the cover of detritus was up to 10 metres thick but in places became thin and bedrocks protruded

through the cover. In these latter cases, the bedrocks were felsenmeer, broken into 0.5 to 1.5 metres angular to subangular slabs, which could easily be moved by a bulldozer.

(iv) The testing of the gold-bearing detritus proves a direct analogy to the residual /mass-wasted gold(-silver) deposits of Kenyon Creek. It is thus concluded that an analagous operation could be based on Great Bear Creek. During the period of assessment work, Great Bear Creek was running well and the impression one gains is that there is probably more water available for sluicing on the Great Bear Creek sector than on the west side of the range in Kenyon Creek.

APPENDIX 1: Scanning electron microscope investigation of gold extracted from the Great Bear Creek placers.

Samples of detrital gold panned and sluiced from the Great Bear Creek placers were investigated on the scanning electron microscope and analyzed using a Kevex Energy Dispersive system. The detrital grains are illustrated by Plates 9, 10, 11 and 12 and the results of analyses by Plates 13, 14, 15, and 16.

It is clear from the investigations that:

- (i) The gold grains are eluvial and have not been transported far from the source. (They are thus directly analagous to the Kenyon Creek gold).
- (ii) The concentration of silver (i.e. the fineness of the gold) varies considerably, indicating considerate variation at source.
- (iii) The presence of iron in some grains is due to a coating of goethite ( $\text{FeOOH}$ ) in those grains obtained from iron-rich soil profiles.

APPENDIX 2: Petrographic investigations of the nature of the bedrocks to the placer deposits of Great Bear Creek.

Samples of the granitoid bedrocks were thin-sectioned and examined on the petrographic microscope. The predominant rock-type is a coarse-grained granodiorite with ~10-15% quartz, 75% zoned and myrmekitic plagioclase, biotite, and green hornblende. Minor epidote (pistacite), chlorite, sericite, tourmaline (schorl), zircon, opaques (oxides), apatite, prehnite and fluorite(?) were noted. Some sectors of the granodiorite are sheared and the quartz is converted to a mylonitic network. Samples of xenoliths in the granodiorite were biotite hastingsite hornfels containing ~40% plagioclase, ~40% biotite and a little hastingsitic amphibole. These are accompanied by minor quartz, apatite and some opaque phases.

Occasional mafic dikes cut the granodiorite and samples of these were sectioned. The dikes are fine-grained, holocrystalline, altered olivine diabases of a tholeiitic affinity. They contain fresh plagioclase and augite, some altered (pseudomorphed) olivine and feathery opaques (oxides).

The following descriptions of the bedrock types encountered during the assessment work are based upon examination of thin-sections:

M1: A coarse-grained, equigranular mafic hornfels with ~40% plagioclase, ~40% biotite and minor hastingsitic amphiboles, quartz, apatite and opaques.

APPENDIX 2: (continued)

- M2: Sheared granodiorite with ~75% slightly sericitized and zoned plagioclase, 5% potassium feldspar, ~10-15% quartz and minor biotite, green hornblende, tourmaline (var. schorl), epidote (var. pistacite), chlorite, zircon, apatite, opaques, prehnite and fluorite(?)
- M3: Slightly altered olivine diabase, medium-grained, with calcic-plagioclase, abundant fresh clinopyroxene (augite), pseudomorphed olivine and opaques.
- M4: Slightly sericitized granodiorite with 75% plagioclase, 5% potassium feldspar (microcline), 10-15% quartz, minor biotite, green hornblende, tourmaline (var. schorl), epidote (var. pistacite), chlorite, zircon, apatite, prehnite and opaques.

APPENDIX 3: Mineralogical investigations of the detrital heavy-mineral suite accompanying gold in the Great Bear Creek placers.

Detrital heavy minerals extracted during the sluicing/panning phases of the assessment were examined in the laboratory. The heavy concentrate was first separated by use of a magnet and the magnetic and non-magnetic fractions examined under a binocular microscope. The magnetic fraction constituted 80% by volume of the concentrate and was composed of spinels (magnetite). The non-magnetic fraction was composed of prismatic zircons, green hornblende, and biotite.

APPENDIX 4: Results of airphotograph and satellite imagery interpretation of the environs of Great Bear Creek.

An interpretation of aerial photographs of the Moosehorn Range was undertaken with the following objectives:

1. Delineation of the areas of maximum mass-wasting (i.e. potentially auriferous detritus).
2. Identification of any bedrock lithological or structural features which might positively or negatively affect the potential productivity of the property.

Aerial photographs were obtained from the Geological Survey of Canada's Institute for Sedimentary Geology in Calgary, whilst satellite imagery was examined in the Government of Alberta's Remote Sensing Laboratory in Edmonton.

The results of the studies show that the upper reaches at the headwaters of Great Bear Creek have higher potentials for the production of gold for the following reasons:

- (i) The slopes are shallower and the soil cover thicker in the upper part of the property.
- (ii) The upper parts of the creek appear to be filled by detritus derived directly from what is undoubtedly a faulted sector (veined sector) of the granodioritic bedrocks. The lower sectors of Great Bear Creek, in contrast, seem to have possibly derived their detritus from a NNW striking sequence of metasedimentary bedrocks.

APPENDIX 5: Results of geochemical investigations on materials collected in the Great Bear Creek area.

As part of the geological survey and assessment work, a series of samples were collected and submitted for geochemical analysis to Chemex Laboratories of Calgary. Five of the specimens collected were selected for spectrographic, multi-element analyses and one sample was selected for gold and silver fire-assay. The following samples were chemically analyzed:

- M1      Hornfels-upper sector of Great Bear Creek.
- M2      Sheared granodiorite, Great Bear Creek.
- M3      Mafic dyke cutting granodiorite, Great Bear Creek.
- M4      Granodiorite, Great Bear Creek.
- M5      Arsenopyrite-bearing vein float in Great Bear Creek.

The results of the spectrographic analyses are given in Table 1. The arsenopyrite-bearing vein yielded 0.006 ounces per ton Au and 0.09 ounces per ton Ag (i.e. net ~\$ 4.00/ton value).

TABLE 1 : SPECTROGRAPHIC ANALYSES

	Si	K	Na	Al	Fe	Ba	Ti	Th	As	Sb	Ag	V	Zn	ZR	Co	Cu	Ge	Pb	Sn
M2	30	1.0	1.0	10	2	1500	0.2	500	-	-	1	100	100	100	-	5	-	15	10
M4	30	1.0	1.0	10	2	3000	0.3	500	-	-	1	100	50	200	-	5	-	10	10
M1	30	0.5	1.0	10	7	1500	0.5	500	-	-	1	100	100	200	-	100	-	-	10
M3	30	0.5	0.5	10	10	1000	1.0	500	100	-	1	200	150	500	50	50	-	-	10
M5	30	0.5	0.5	0.3	20	500	0.02	500	5000	200	2	100	20	50	-	10	-	20	10

Note: Si, K, Na, Al, Fe in % wt. All others in ppm.



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GRANDE PRAIRIE, ALBERTA, CANADA T8V 5X4  
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## CERTIFICATE OF ANALYSIS

• MINERAL • GAS • WATER • OIL • SOILS • VEGETATION • ENVIRONMENTAL ANALYSIS

DATE **SEPTEMBER 19, 1983**

MINDORD RESOURCES INC.

PROJECT NO. **83-1085-1-2664**

SAMPLE NO.:	Lower Concentration Limit (PPM)	M - 1	M - 2	M - 3	M - 4	M - 5
Aluminum	0.02%	10.00	10.00	10.00	10.00	0.30
Antimony	100	<100	<100	<100	<100	200
Arsenic	100	<100	<100	100	<100	5000
Barium	2	1500	1500	1000	3000	500
Beryllium	5	<2	<2	<2	<2	<2
Bismuth	10	<5	<5	<5	<5	<5
Boron	20	<20	<20	<20	<20	50
Cadmium	50	<20	<20	<20	<20	<20
Calcium	0.05%	3.00	2.00	5.00	3.00	0.20
Chromium	10	20	100	200	70	100
Cobalt	20	<20	<20	50	<20	<20
Copper	2	100	5	50	5	10
Germanium	10	<10	<10	<10	<10	<10
Iron	0.05%	7.00	2.00	10.00	2.00	20.00
Lead	10	<10	15	<10	10	20
Magnesium	0.02%	5.00	0.70	5.00	1.50	<0.02
Manganese	5	1000	700	1000	1000	30
Molybdenum	100	<100	<100	<100	<100	<100
Nickel	10	<20	<20	100	<20	<20
Niobium	200	<200	<200	<200	<200	<200
Potassium	0.5%	0.5	1.0	0.5	1.0	<0.5
Silicon	0.05%	30.00	30.00	30.00	30.00	30.00
Silver	1	<1	<1	<1	<1	2
Sodium	0.1%	1.00	1.00	0.50	1.00	<0.05
Thorium	200	<500	<500	<500	<500	<500
Tin	10	<10	<10	<10	<10	<10
Titanium	20	5000	2000	10000	3000	200
Vanadium	50	100	<100	200	<100	<100
Zinc	20	100	100	150	50	20
Zirconium	20	200	100	500	200	50

**SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES**

>5000 ppm = <b>&gt;5000 PPM</b> 5000 ppm = 2500 - 10000 ppm 2000 ppm = 1000 - 4000 ppm 1000 ppm = 500 - 2000 ppm 500 ppm = 250 - 1000 ppm	200 ppm = 100 - 400 ppm 100 ppm = 50 - 200 ppm 50 ppm = 25 - 100 ppm 20 ppm = 10 - 50 ppm 10 ppm = <b>5-20 PPM</b>	5 ppm = <b>2-10 PPM</b> 2 ppm = 1 - 4 ppm 1 ppm = 0.5 - 2 ppm bcl = below concentration limit
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Ranges for Iron, Calcium & Magnesium are reported in %

1-48 GC 3/81



Certified by *Andrew Hunt*



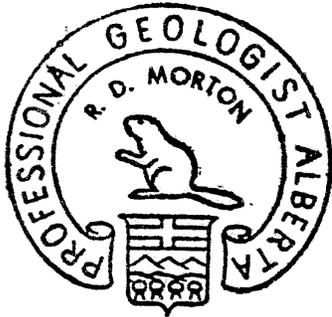
LITERATURE CITED

- Hartley, G. 1983. The Moosehorn Placer Gold Project, NTS 115N-2. Private report.
- Morin, J.A. 1975. Preliminary report on the geology of the Landue River Area. Presented at the 3rd Geoscience Forum, Whitehorse.
- Templeman-Kluit, D.J. 1974. Reconnaissance geology of the Aishihik Lake, Snag and part of Stewart River map areas, West Central Yukon; Geological Survey of Canada , Paper 73-41.

C E R T I F I C A T E

I, Roger David Morton, of the Province of Alberta, do hereby declare that:

1. I am a registered Professional Geologist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta.
2. I am employed as Professor of Economic Geology at the University of Alberta and have held that position for 16 years.
3. I practice geology under the auspices of R. D. Morton Geological Consulting Ltd. from my office at 9103 - 118 Street, Edmonton, Alberta.



Respectfully submitted,

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke extending to the right.

Roger D. Morton, B.Sc., Ph.D., P. Geol.



Plate 1      View of airstrip above Kenyon Creek



Plate 2      View of the Moosehorn Property from west

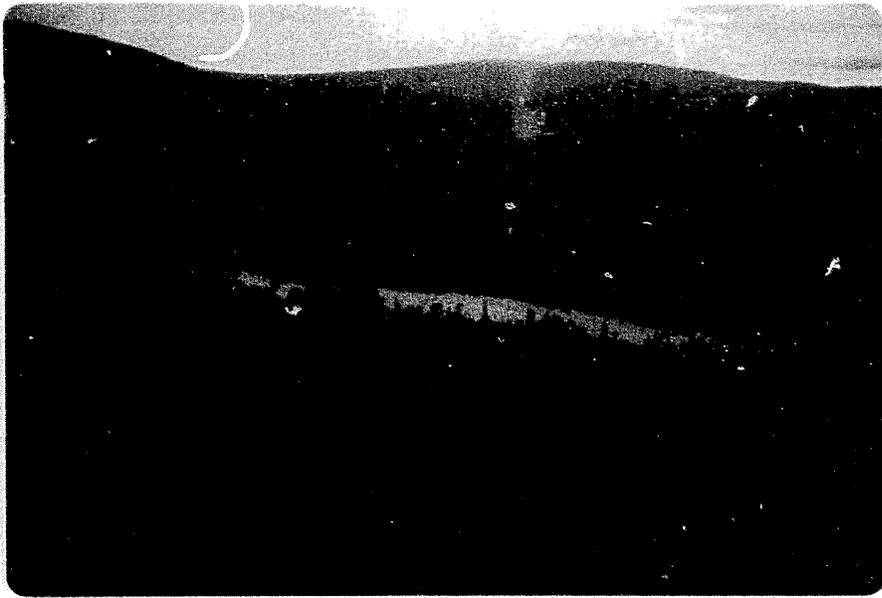


Plate 3      Airstrip on the Moosehorn Property



Plate 4      View of the Moosehorn Claims from the east

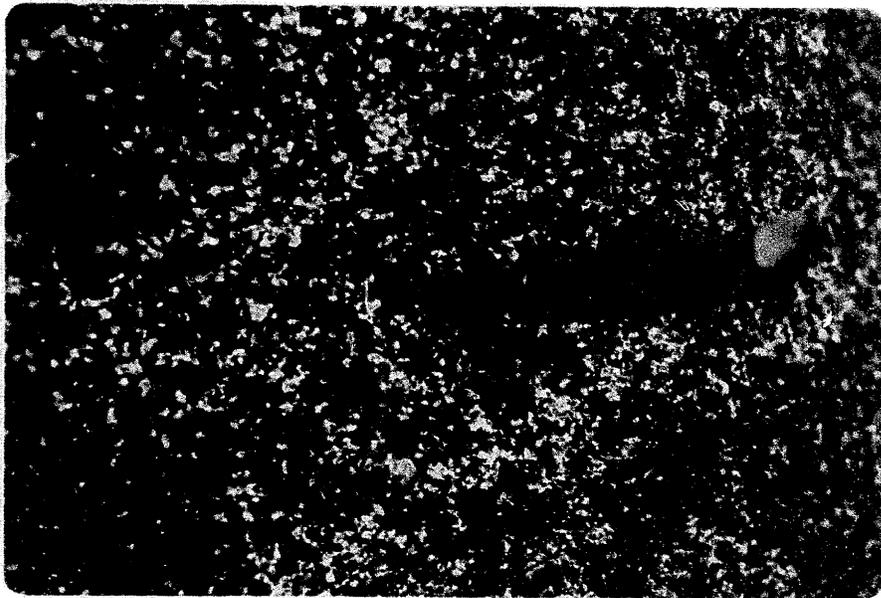


Plate 5

Weathered granodiorite, Moosehorn Claims



Plate 6

Weathered profile in granodiorite, Moosehorn Claims

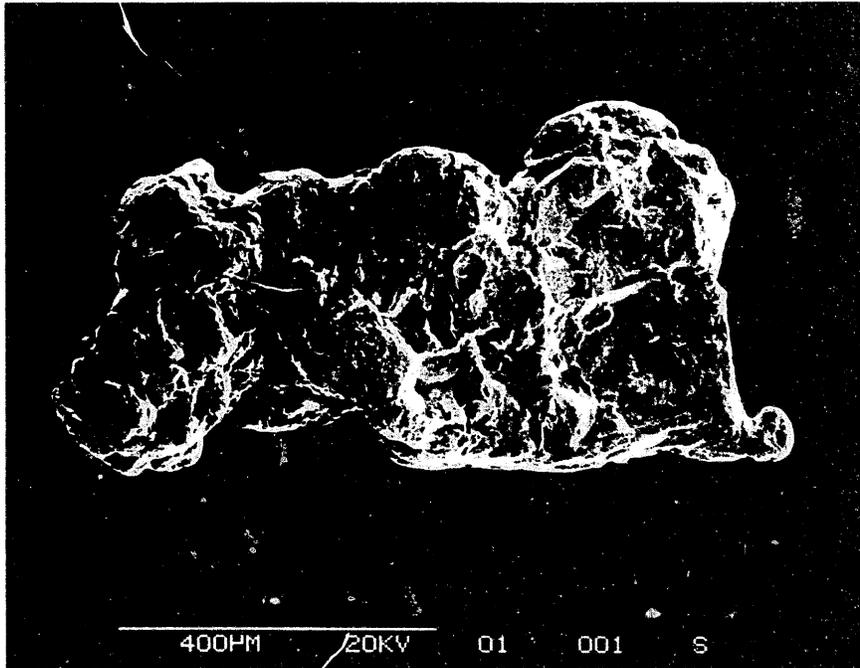


Plate 7            Trenching and sluicing on the Moosehorn Claim



Plate 8

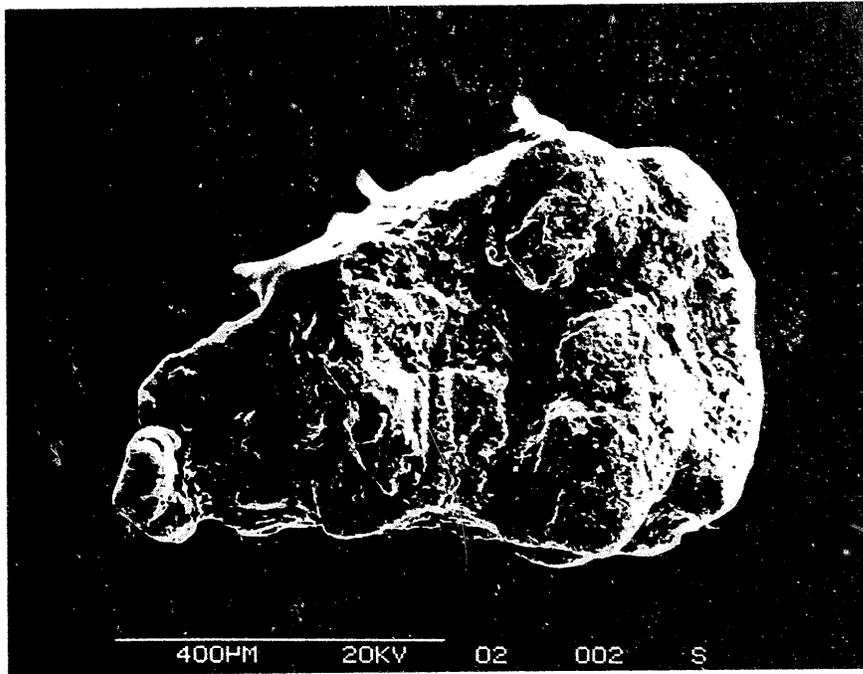
Sluicing on the Moosehorn Claims



# /

Plate 9

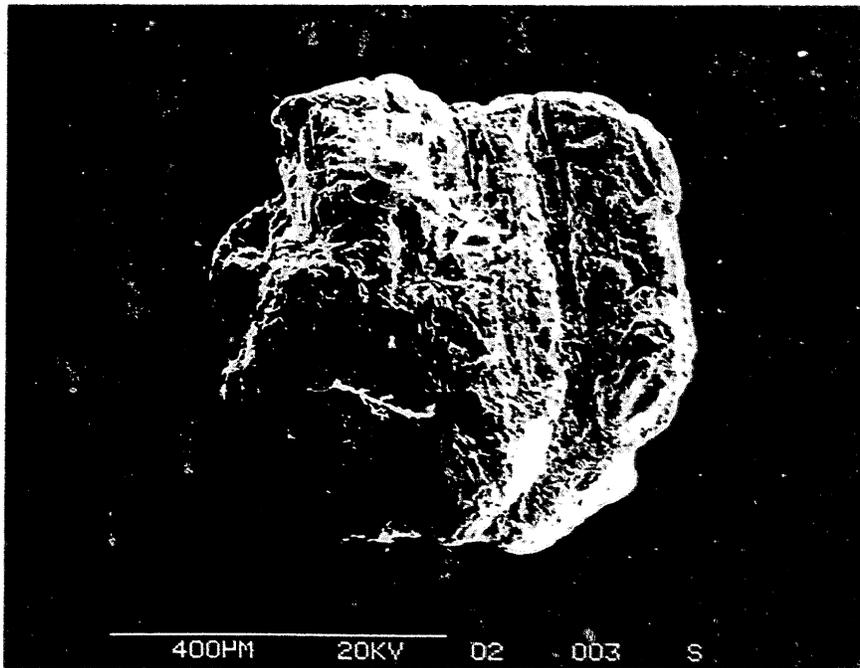
Scanning electron micrograph of gold from the Property



# 2

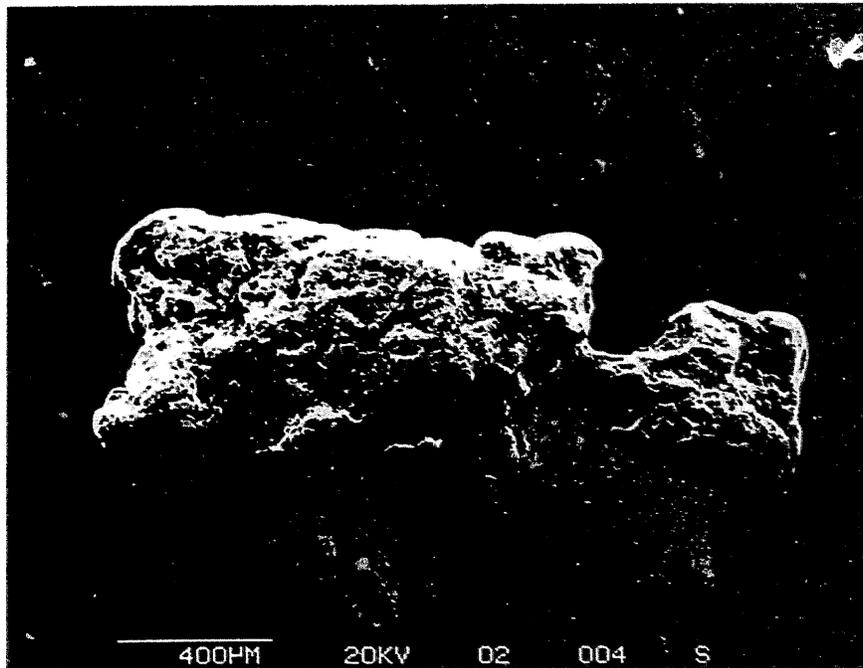
Plate 10

Scanning electron micrograph of gold from the Property



11 3

Plate 11      Scanning electron micrograph of gold from the Property



// 9

Plate 12 Scanning electron micrograph of gold from the Property

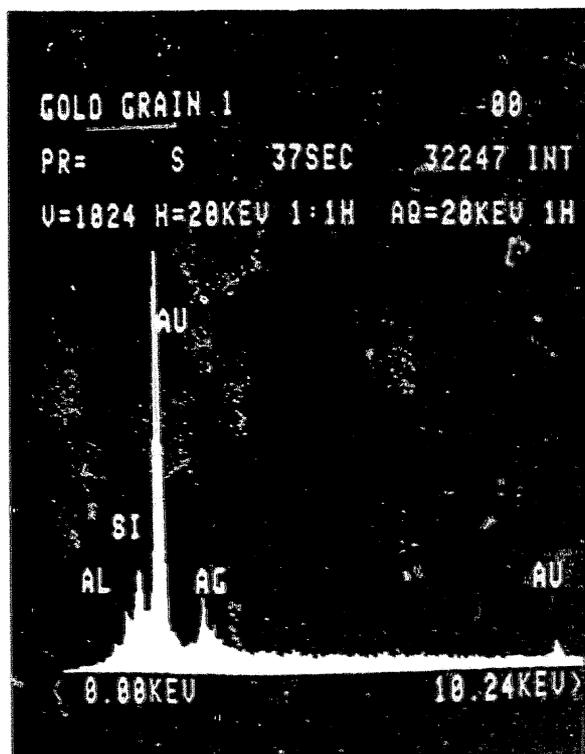


Plate 13

Kevex analytical scan of gold from the Property

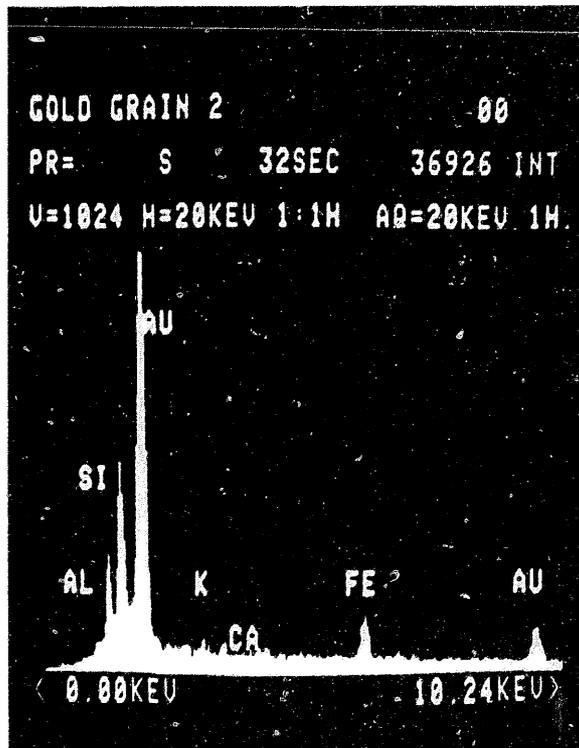


Plate 14

Kevex analytical scan of gold from the Property

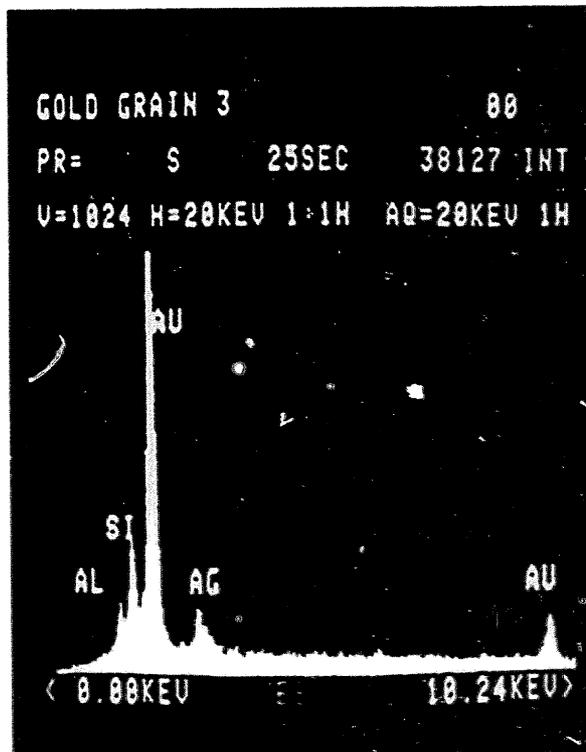


Plate 15

KeveX analytical scan of gold from the Property

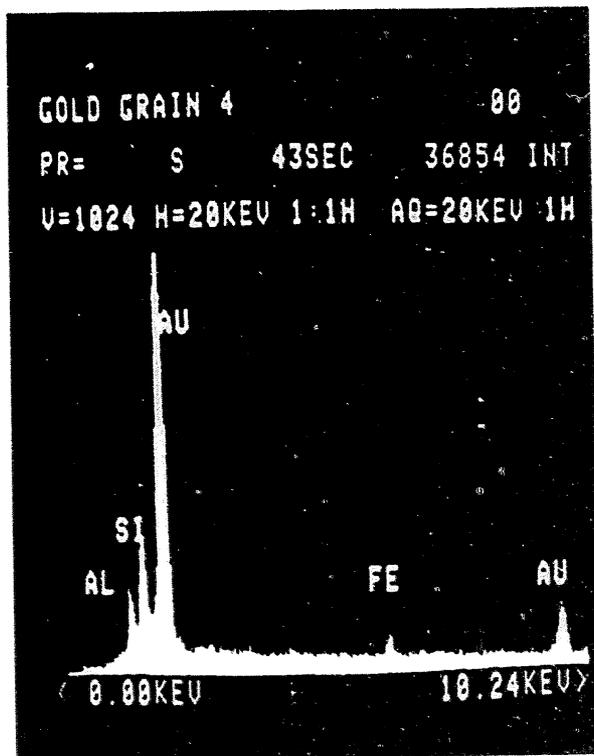
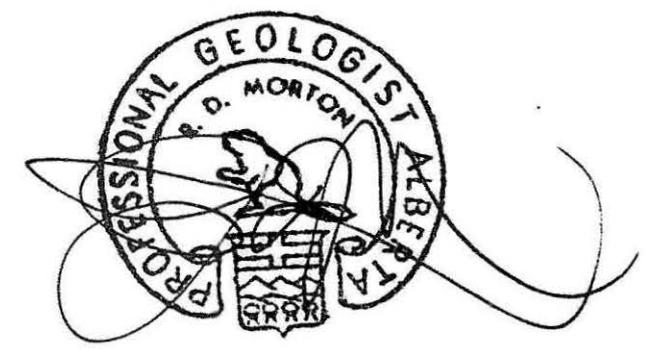
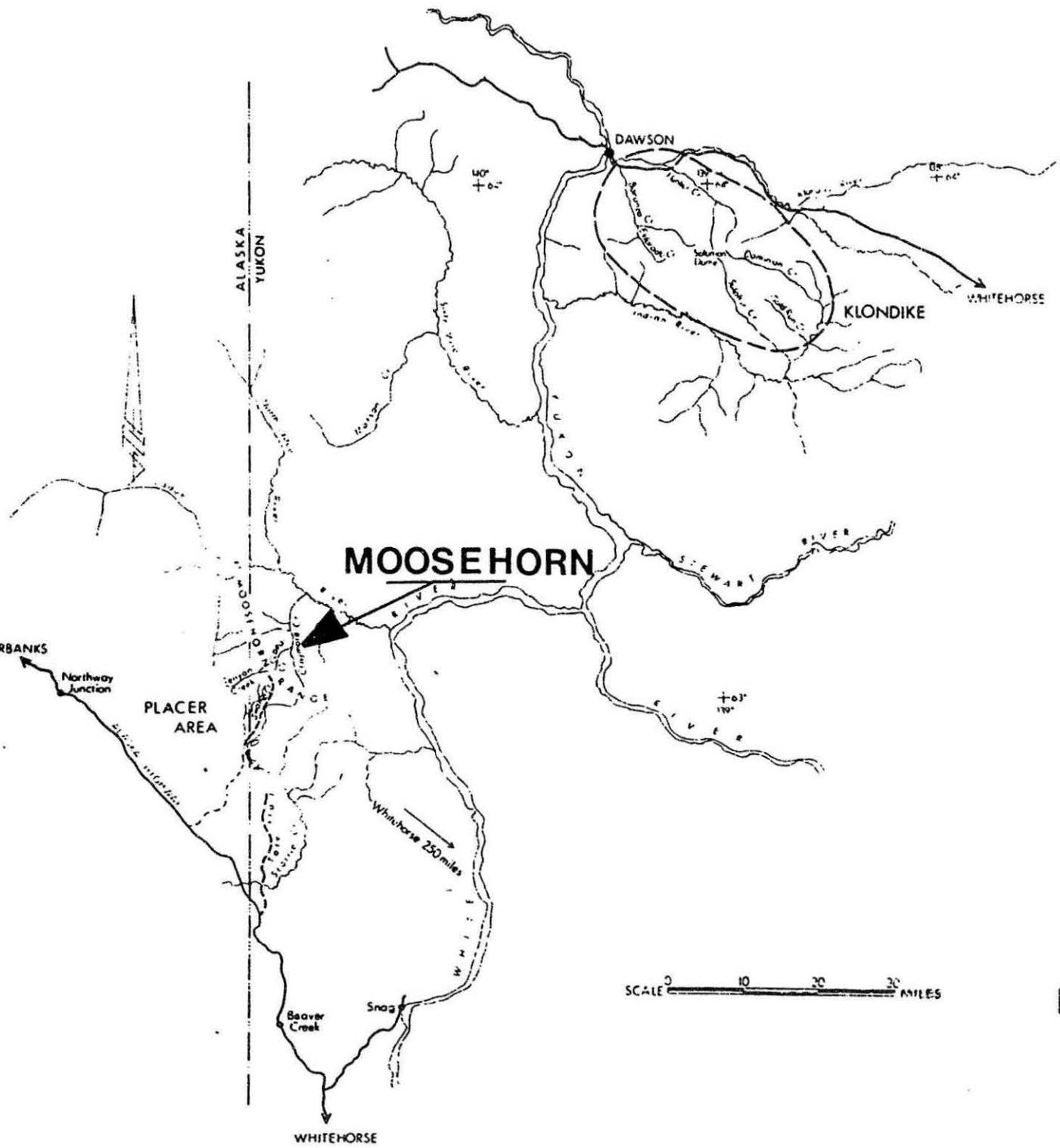


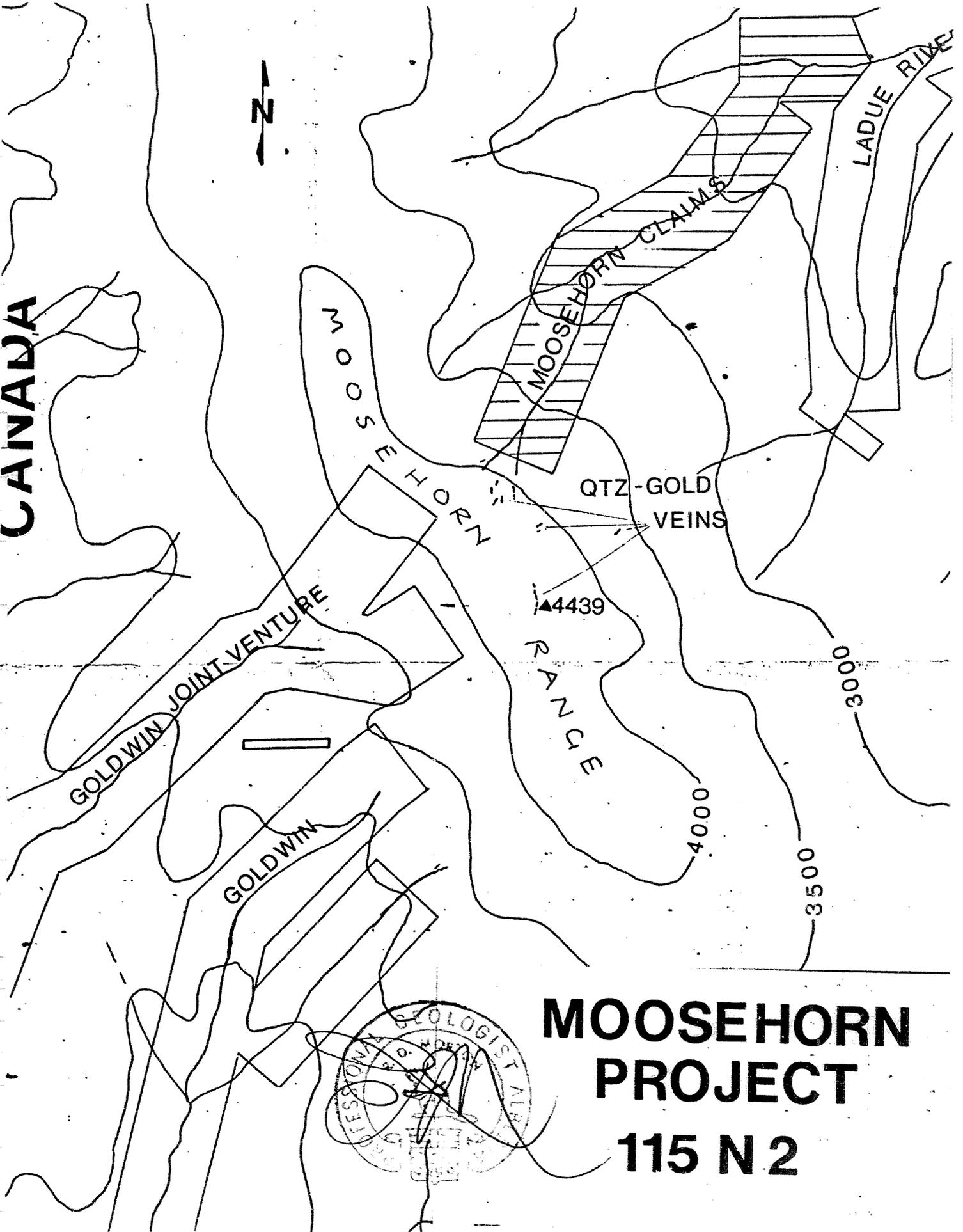
Plate 16

Kevex analytical scan of gold from the Property

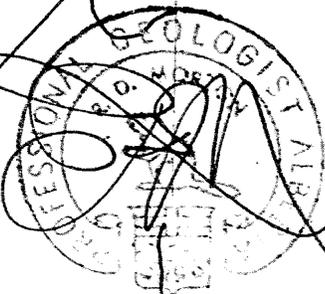


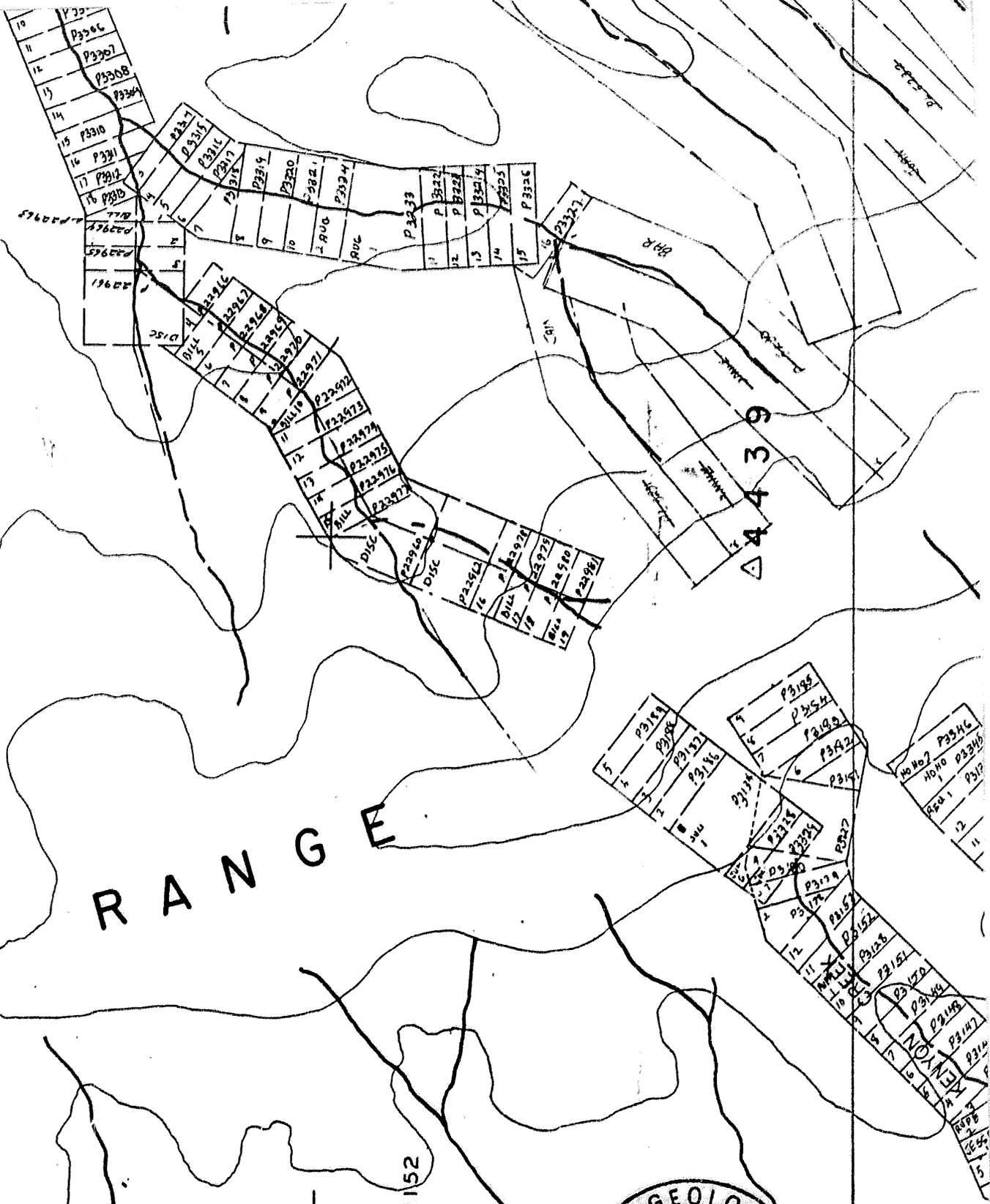
**LOCATION MAP  
MOOSEHORN PROJECT**

CANADA



**MOOSEHORN  
PROJECT  
115 N 2**





R A N G E

4439

152

L

A

5'

115 N-2 PLACER

