

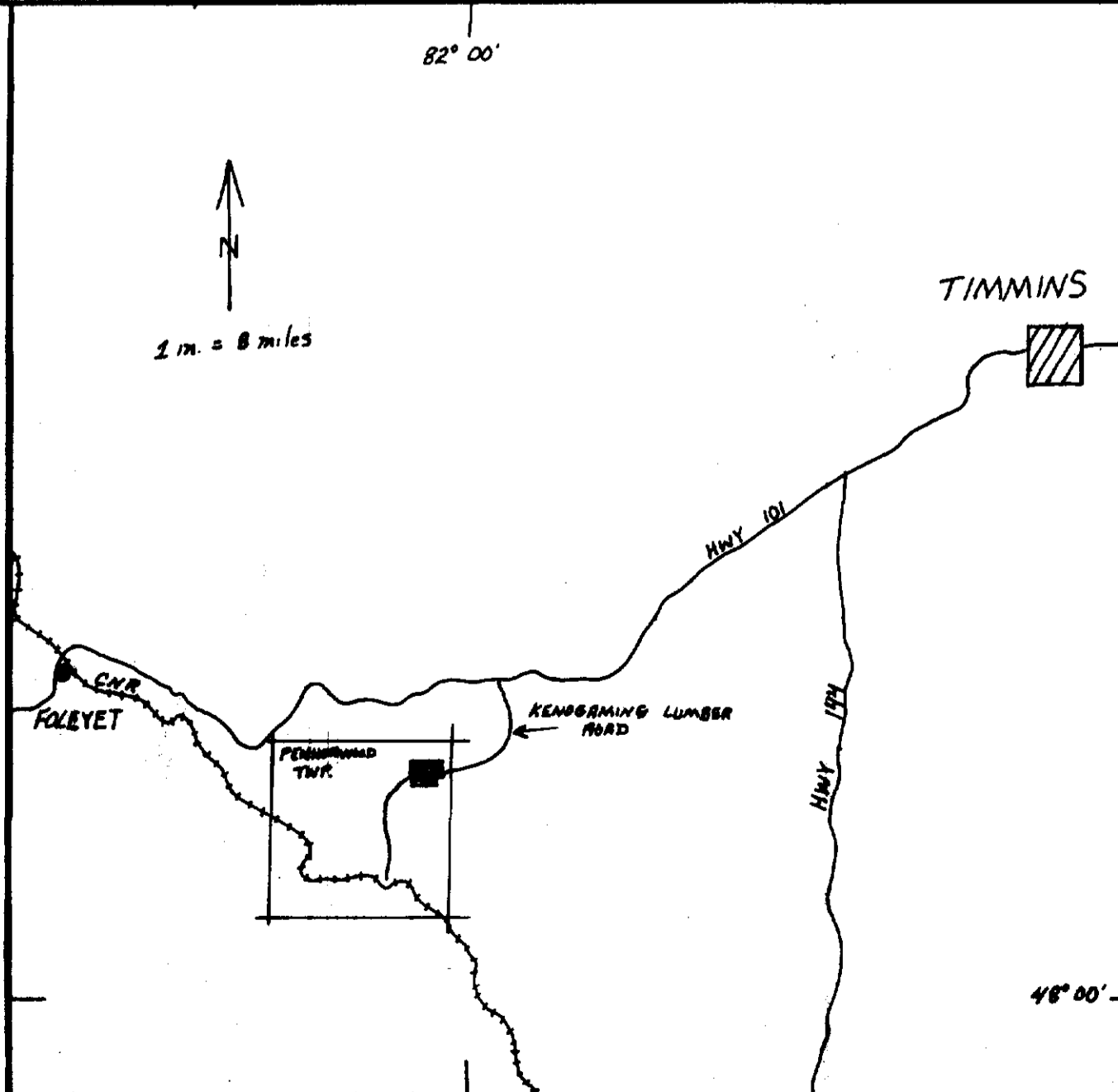
GEOLOGY OF NAT RIVER

PROPERTY

Penhorwood Tp.

W.O. Karvinen & Associates Ltd.

Sept. 1985



Location Map

LEGEND		SYMBOLS	
8	diabase		foliation
7	felsic "porphyry"		fault
6	mafic massive & pillowed volcanics		primary compositional layering
5	ultramafic tuffs and flows; 5a. mafic volcanic flows and tuffs		interpreted geologic contact
4	4a. qtz-eye felsic tuff; 4b. cherty felsic tuff		outcrop
3	mafic tuffs and minor flows		claim post
2	sulfide and oxide facies banded Iron Formation		boulders in till
1	pyritic felsic tuff		slope
			glacial striae

Alteration	
C	carbonatization
S	silicification
Sc	sericitization

Mineralization	
PY	pyrite > 5%
Zn	sphalerite
	qtz-ankerite veins
Au	gold > 500 ppb
QV	qtz. veins.
QAV	qtz-ankerite veins

28602



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W.O. Karvinen



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Geology of Nat River Gold Property,
Penhorwood Township

by

William O. Karvinen, Ph.D.

September 1985

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MINING LANDS SECTION

Introduction

The Nat River gold property owned by W.O. KARVINEN & Associates Ltd. was geologically mapped by the writer during the summer of 1985. All outcrops and many pertinent boulders were examined; these were tied to a picket line grid with cross lines spaced at 400 feet.

Property Description

The property comprises 14 contiguous claims numbered P733800 to P733808 and P733810 to P733814 (Fig.1).

Location and Access

The claim group is located in northeast Penhorwood Township, approximately 50 miles southwest of Timmins (Fig.2). Access is provided via the Kenogaming lumber road which cuts across the northern part of the property. Numerous side roads provide ready access to all parts of the property.

Previous Work

There is no record of work on the property before it was first staked by the writer in the early summer of 1982, although prospect pits and old shovels in the vicinity of vein boulders near the Nat River indicate some activity, probably dating back to the early part of the century.

The writer staked 17 claims in the area, based on a few pyritic quartz vein and green carbonate boulders found mainly in the vicinity of showing No. 1. At the time, the area was covered by a mature pine and poplar forest and access was available only via an old trail leading south from the Reeves Asbestos Mine. However, later in 1982, Kenogaming Lumber Company cut over the claim group. This activity, especially the bulldozing and road building exposed many new boulders and some outcrops.

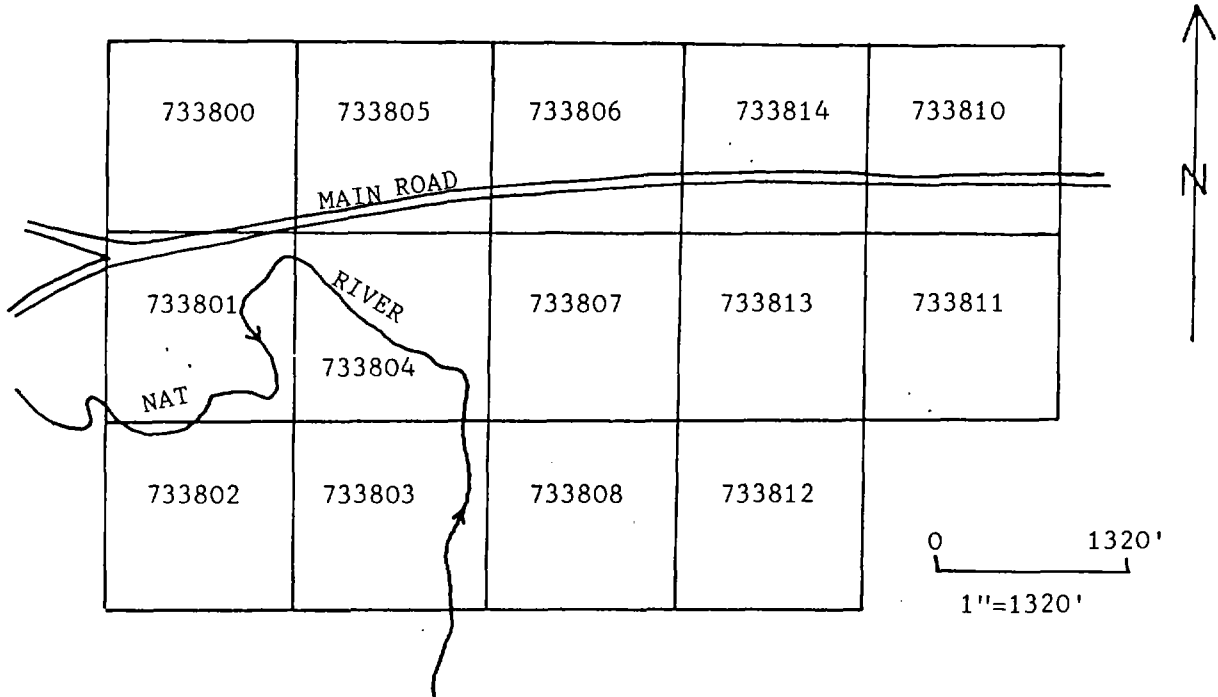


Fig. 1: Claim sketch of Nat River property, Penhorwood Township.

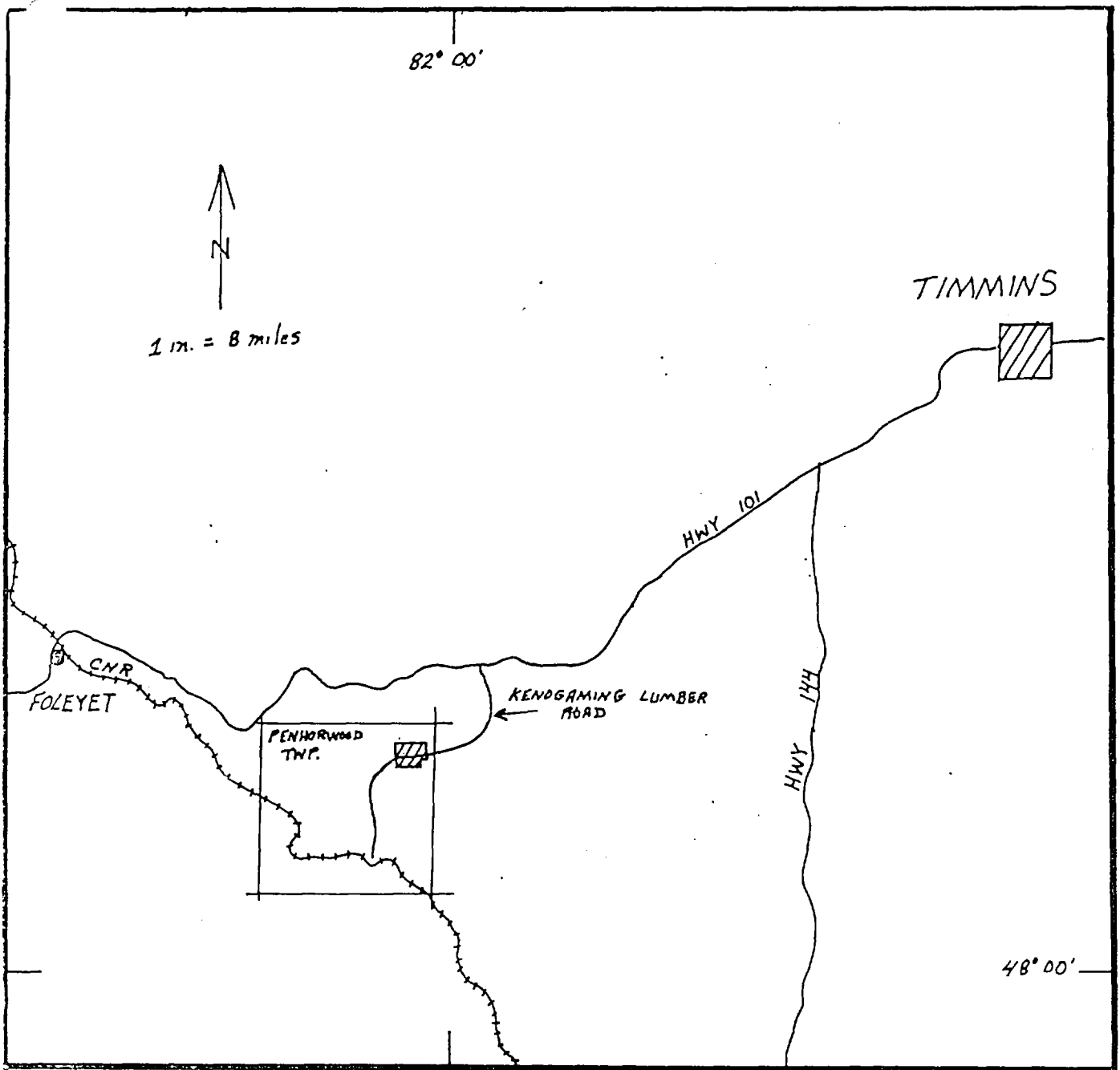


Fig. 2: Location of Nat River Property, Penhorwood Township

In the fall of 1982 the writer stripped by bulldozer a well-mineralized rock exposure at No. 1 showing which appeared to be the probable source area of the boulders found earlier. The rock turned out to be an intensely-altered (sericite and carbonate) mafic volcanic tuff (?) cut by quartz-ankerite veins with heavy pyrite along the wall rock. Analyses of 11 samples of grabs and chips from this showing ranged from 32 to 450 ppb with an average of 140 ppb. The average As value was 8 ppm. Seventeen grab samples of mineralized boulders and bedrock taken from various places on the property returned gold values ranging from 3 to 718 ppb. Four of these were above 200 ppb.

In the spring of 1983 a winkle drill hole on the stripped rock showed it to be a large (12 ft.) boulder.

The trenching by bulldozer to a depth of about 12 feet revealed the presence of two tills in the No. 1 showing area. The upper till is gray and generally devoid of vein and mineralized boulders whereas the lower till is reddish, rusty brown and consists mainly of mineralized clasts of altered mafic volcanics, felsic quartz-eye tuffs and "porphyry" as well as a large proportion (30%) of quartz vein material. An analysis of the heavy fraction of the lower till returned a value of 5728 ppb or 0.17 oz./ton Au.

In late 1983 the property was optioned to Quintera Resources Inc. and Highland Crow Resources. In the fall of that year trenching by backhoe in the vicinity of No. 1 showing, exposed an outcrop under 6 feet of till, about 150 feet north of the above described mineralized rock. Additional digging in the vicinity of the big mineralized boulders revealed similar boulders at depth. It was concluded from this that the material is very near if not overlying its bedrock source.

In the fall of 1983 a grid was established on the property and a magnetometer survey carried out.

During the summer of 1984, Quintera and Highland-Crow carried out trenching, sampling and prospecting on various parts of the property east of the river. Much emphasis was placed on the pyritic iron formations and less on the No. 1 showing area. Results of this work returned no values in gold > 1000 ppb and thus the option was terminated in late 1984. Because of the optioners failure to submit assessment work, the claims came open in the fall of 1984. These were restaked by Quintera and later transferred to the present owner.

During 1984 and early 1985, tree planting activity as well as cutting of the trees on the southwest side of the river totally destroyed the earlier grid. In 1985 the writer re-established the grid and for the first time, new exposures of potential rock and boulders were available for examination and sampling west of the river.

Regional Geological Setting

Bedrock in the area consists predominantly of metavolcanics of the large Archean Abitibi Greenstone Belt. Detailed mapping by Milne (1972) for the Ontario Government, indicates this part of Penhorwood Township to be underlain by felsic tuffs, oxide and sulfide iron formation, mafic and ultramafic volcanics and some small felsic intrusive bodies. Regional reconnaissance of the area by the writer indicates that the large package of felsic rocks overlain by the Nat River iron formation may correlate with the Upper volcanic Formation of the Deloro Group in Timmins (see Pyke, 1982). Similarly, the overlying ultramafic flows and tuffs would correspond to the Lower Volcanic Formation of the Tisdale Group.

Detailed Geology

The suite of major rock types on the property, in apparent chronological order are: felsic tuff, iron formation, mafic flows and tuffs, quartz-eye felsic tuff, ultramafic flows and tuffs, massive and pillowed mafic volcanics, felsic "porphyry" and diabase.

Felsic tuff: is fine-grained and light gray in color with lapilli size fragments. It invariably contains 2 to 5% pyrite. One analysis revealed a gold content of 22 ppb.

Iron Formation: this is part of the Nat River iron formation which was extensively explored for iron by the Kukatush Mining Corp. in the 1950's. It comprises predominantly banded chert, magnetite, hematite and pyrite. It is interbedded with felsic and mafic tuffs and in places is carbonate-rich. Some of the areas trenched at the southeast part of the property are cut by large, white quartz veins. Gold values range from 12 to 903 ppb based on numerous chip samples from five separate trenches. In some of the sulfidic portions thin layers (up to 1½ cm) of sphalerite with some chalcopyrite are present. These returned values of 1400 to 9800 of Zn, 54 to 1250 ppm of Cu and 0.4 to 11.2 ppm of Ag. The higher values are from selective grab samples.

Mafic flows and tuffs: are poorly exposed on the property. They are generally chloritic, massive to partly foliated and have few primary-flow features. At the junction of central and No. 2 roads, these rocks host a narrow (2" to 6") conformable pyritic quartz vein. Values in this range from 600 to 900 ppb Au.

Quartz-eye felsic tuff: is a distinctive rock type on the property and serves as a useful marker horizon. It is normally green-gray in color and comprises of clear quartz eyes (1 mm to 5 mm) in an aphanitic matrix. It is well-foliated and on some outcrops primary layering can be seen. In the vicinity of No. 1 showing and northeast across the main fault, it is distinctly reddish and contains disseminated pyrite. Three grab samples of the pyritic reddish quartz-eye tuff gave values of 3, 12 and 18 ppb Au. The average of eight 5-foot chip samples of the same yielded 9 ppb Au and a range of 2 to 29 ppb. Six 5-foot chip samples of unaltered quartz-eye tuff returned the same average gold content and a range of 3 to 20 ppb.

Ultramafic flows and tuffs: are poorly exposed and where observed they are intensely carbonatized. Crude textures and structures suggest primary volcanic features. As a result of the alteration they are invariably cut by barren quartz carbonate veins which in places make up more than half of the rock. Chip samples from trenches cutting these rocks indicate a range of 3 to 30 ppb Au with an average of 7 ppb. Intercalated with these rocks are also some poorly pillowed to massive mafic flows.

Massive and pillowed mafic volcanics: outcrop on the north portion of the property. They are fine-grained and chloritic and exhibit primary flow features and layers. Pillows are poorly formed and thus no top determinations could be made.

Felsic "porphyry": is one of the more important rocks on the property in terms of mineralization. It is typically medium to fine-grained, white to greenish-brown rock, which is invariably altered to sericite and carbonate.

Quartz veins and veinlets are ubiquitous and disseminated pyrite (1-3%) is common. The "porphyry" is made up predominantly of clear quartz (~35%) and white feldspar (albite). This felsic rock appears to be intrusive in that it cross-cuts the volcanic trends, but textures indicate a high level, hypabyssal intrusive environment. The porphyry is typical of those found associated with major gold deposits in the Archean, such as the Pearl Lake and Paymaster porphyries in Timmins. A partial chemical analysis of a least altered sample of the Nat River porphyry shows high alkali (5.11% Na₂O and 2.3% K₂O) and silica (72%) contents. This compares to the average silica and alkali compositions of the Timmins porphyries.

Distribution of the porphyry at Nat River is not well-known, however, detailed magnetic data suggest a major part of the northwest portion of the property to be underlain by it. This interpretation is conjectural, however, and the same area could equally be a mixture of felsic porphyry sills and carbonatized ultramafics.

Gold contents of the porphyry range from 3 to 415 ppb with the average of 16 channel samples being 15 ppb.

Diabase cuts all other rock types on the property. The biggest is an olivine diabase dike which trends east-northeast across the property. The two smaller north-northeasterly trending dikes may be part of a different swarm and possibly older.

Structural: the volcanic sequence dips steeply and has a general northeast-southwest trend. Based on pillows and other primary features, Milne's (1972) mapping indicates the succession to top northwestward. Penetrative linear and planar elements, most obvious in the tuffaceous rocks, are found in all

rock types except the diabases. These suggest at least one phase of isoclinal folding. Lineations and drag folds appear to plunge northeast at about 50 degrees.

The most obvious fault on the property trends north-northeast just east of No. 1 showing. Magnetic and bedrock geologic data indicate left hand displacement of about 800 feet. This fault is probably part of the large Hardiman Bay fault system evident at Horwood Lake, several miles to the south. There is also evidence for a north-northwest-trending set of faults. One is located in the creek near the eastern boundary while another may underly Nat River just west of No. 1 showing.

Magnetic data and some field evidence suggest a major east-west "break" or zone of shearing to occur beneath the creek north of the main road. This zone is in talc-chlorite ultramafic rocks poorly exposed off the property to the east. This break coincides with the Joburke break delineated 8 miles to the west (Prest. 1951). The magnetic data show the Hardiman Bay fault displacing this break on the Nat River property.

Metamorphism: the mineral assemblages indicate greenschist conditions to have prevailed during metamorphism. Contact effects of the porphyry are more due to alteration by hydrothermal solutions rather than heat.

Mineralization

Evidence of hydrothermal activity and resulting concentrations of metals, particularly iron, copper and gold are common and widespread on the property. This evidence manifests itself mainly as quartz-carbonate veins and mineralogic alterations of four main types: sericitization, silicification, carbonatization and sulfidization. To date exposures of hydrothermal activity

have been found closely associated with the porphyry, mostly along the south contact, although the one and only outcrop of porphyry on the north side also has much veining and pyrite.

Veining: a single striking feature of this property is the abundance of quartz veining and vein boulders. Most of the veining exposed to date covers an area roughly 4500 feet long and 2000 feet wide stretching north-east from No. 2 showing to the junction of road No. 2 and the main road. Few exposures in the northwest also have much veining.

Except at showings 1 and 2 and the northwest outcrop of porphyry, these veins are predominantly white bullish quartz with varying amounts of ankerite and little to no pyrite. At the main showings, the veins and their wall rock contain marked amounts of pyrite, some chalcopyrite as well as massive sericite. Vein sizes range from fractions of an inch to a foot or two in width and judging by some of the boulders, some buried veins must be several feet thick.

The veins are often fracture-filled and cross-cutting with well bleached and altered pyritic walls (e.g. No. 1 showing) whereas others are concordant, layered or composite veins often with cross-cutting ladder veins (e.g. No. 2).

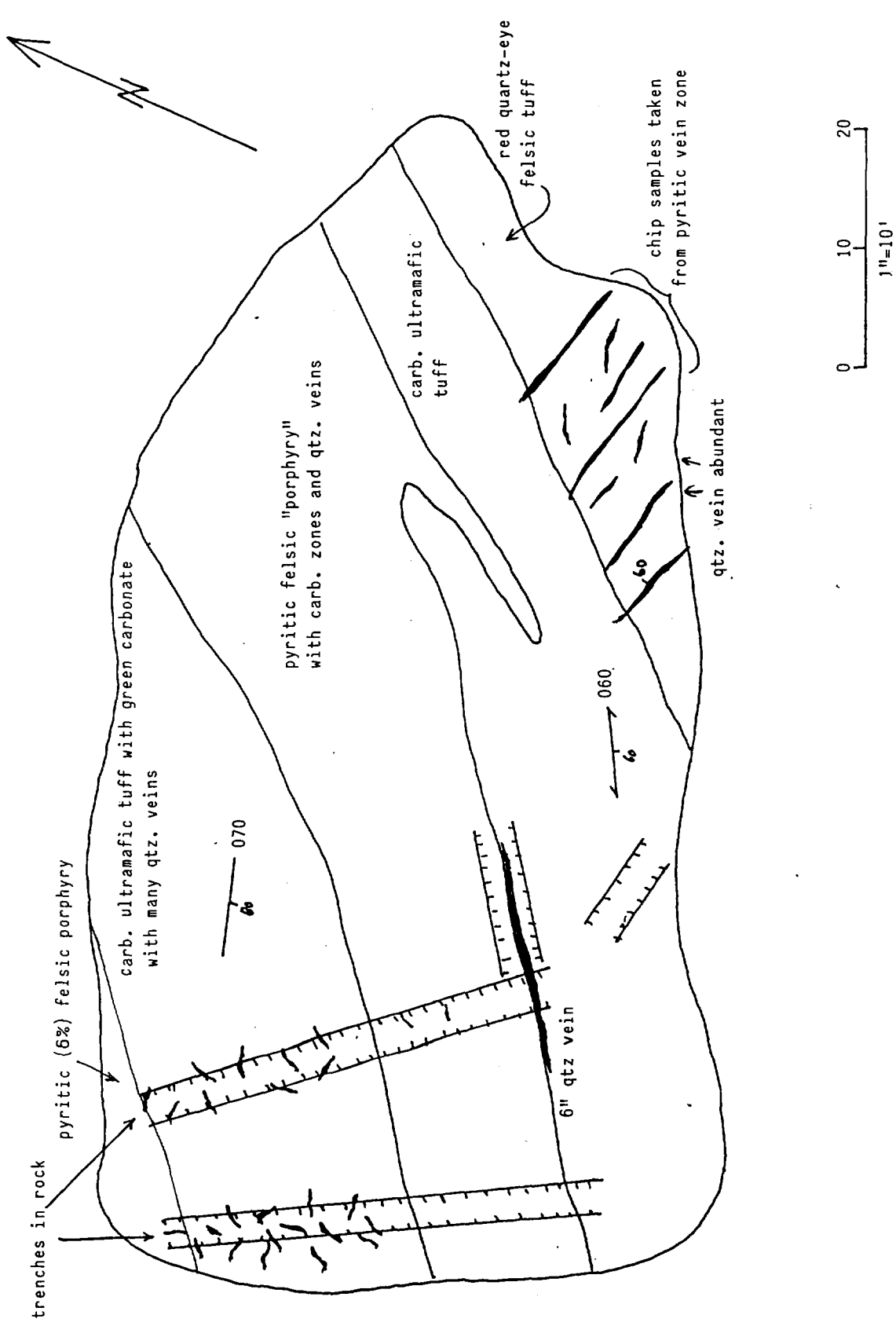
Alteration: most of the ultramafic rocks have been pervasively altered to green and brown carbonate, chlorite and quartz, while the mafic volcanics and porphyry show varying degrees of ankeritization. Combined sericitization and carbonatization in areas of extensive veining have resulted in a bleached rock. Next to carbonatization, sericitization, especially in and near the porphyries where veining and sulfides are common, is intense. The extreme are veins of nearly massive sericite several inches wide (No. 1 showing).

Main showings found to date have been labeled 1 and 2. No. 1 was the result of initial prospecting and was described earlier, while No. 2 was discovered in Sept. 1985 (see Figures 3 and 4). The main outcrop at No. 1 comprises carbonatized, chloritic ultramafic tuffs cut by a narrow porphyry body in contact to the south with a reddish quartz-eye tuff unit. Several generations of quartz veins are abundant on the outcrop and pyrite is unevenly distributed in the walls. Trenching and channel sampling were done by Quinterria; results indicate a low range of gold values (3 to 415 ppb). Pyritic (3%) quartz veins trending about $140^{\circ}/60NE$ are common in the reddish quartz-eye felsic tuff. Sampling and analysis of nine samples from this zone by the writer in 1985 yielded values ranging from 4 to 250 ppb with an average of 62 ppb.

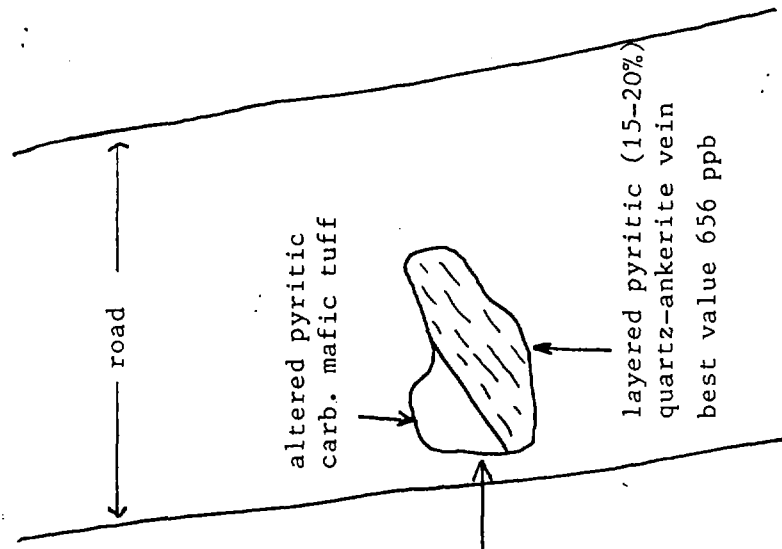
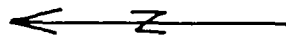
The mineralized veined and altered boulders 150 feet to the south are believed to be broken outcrop. Here the veining cuts mafic tuffs of unit 3 located stratigraphically below the quartz-eye felsic tuff.

Thus at showing No. 1, low-grade gold values are associated with extensive veining and alteration as well as pyritic zones (5 to 15%) across a stratigraphic interval of over 250 feet.

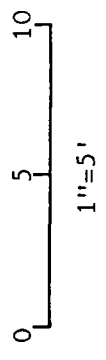
At No. 2 showing a composite conformable quartz-ankerite vein with thin layers of nearly massive pyrite was exposed by the writer by hand trenching on the southwest side of the river. The vein layers consist of a light gray to buff mixture of quartz ankerite cut by numerous quartz veinlets and cross ladder veins. Pyrite content averages about 10% in the vein and up to 20% for a distance of a foot or so into the wall. Chalcopyrite is also present, but generally less than $\frac{1}{2}\%$. Only the northwest contact of this vein zone has been exposed and samples have been taken across four feet of it.



Detailed Map of No. 1 Showing, Nat River Property.



80' to
48W 2070S



Detailed Geology of No. 2 Showing, Nat River Property

Results of five representative samples ranged from 74 to 656 ppb with an average of 320 ppb. One boulder of similar material 1000 feet to the southwest assayed 26 ppb.


Economic Potential

The Nat River property has potential for economic concentrations of gold for the following reasons:

1. it is located stratigraphically in a similar sequence of volcanic rocks as many of the major deposits are in Timmins;
2. gold mineralization appears to be closely related chemically and chronologically to a quartz-feldspar porphyry body similar to many found near Archean gold deposits;
3. quartz veining is abundant and widespread; such extensive veining is only found in mineralized gold areas;
4. hydrothermal alteration, specifically involving sericite, carbonate, sulfides, and silica, which is typically associated with economic deposits, is intense and widespread; high background of gold (several hundred ppb) are associated with these altered zones;
5. the porphyry, alteration and veining is located in proximity to some major faults such as the Hardiman Bay fault and the Joburke break;
6. the heavy mineral fraction gold content (5.7 ppm) of the lower till compares with similar fractions of tills immediately down-ice from known gold deposits (e.g. Owl Creek and Golden Pond).

Conclusions

Mineralization at Nat River gold property is typical of that found around economic gold deposits. It appears that an intensive, widespread hydrothermal system was in operation in the area where the felsic porphyry is intruded. Several generations of veins suggest a prolonged period of hydrothermal activity. It is quite possible that at some time during this period, economic concentrations of gold were deposited on the property.



September 1985

Dr. William O. Karvinen

REFERENCES

- MILNE, V.G., 1972: Geology of the Kukatush-Sewell Lake Area, Dist. of Sudbury, Ont. Div. Mines, G.R. 97.
- PREST, V.K., 1951: Geology of the Keith-Muskego Townships Area, Ont. Dept. Mines Ann. Rept., Vol. 59, pt. VII.
- PYKE, D.R., 1982: Geology of the Timmins Area, Dist. of Cochrane, Ont. Geol. Survey, Rept. 219

C E R T I F I C A T E

I, William Oliver Karvinen of 32 Lakeland Point Drive, Kingston, Ont., Geologist and President of W.O. KARVINEN & Associates Ltd., do hereby certify that:

The information contained in this report is accurate and correct;

I hold a Doctorate of Philosophy and an Honours B.Sc. in geology from Queen's University (1974 and 1968) and a Master of Science in geology from the University of British Columbia (1970);

I am a fellow of the Geological Association of Canada and a member of the Canadian Institute of Mining and Metallurgy;

I personally carried out the survey described herein;

I have been actively carrying out mineral exploration and consultative services in Canada for over seven years.



Kingston, Ontario
October 21, 1985

Dr. William O. Karvinen



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900

Mining Lands Section

File No 28602

Control Sheet

TYPE OF SURVEY

- GEOPHYSICAL
- GEOLOGICAL
- GEOCHEMICAL
- EXPENDITURE

MINING LANDS COMMENTS:

Lgd.
T.A.

S. Hurst

Signature of Assessor

17 Oct 7/85

Date



Report of Work
(Geophysical, Geological,
Geochemical and Expenditures)

Instructions: - Please type or print.
- If number of mining claims traversed exceeds space on this form, attach a list.
Note: - Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.
- Do not use shaded areas below.

NOV 22

347/85
28602

The Mining Act

Type of Survey(s) Geological		Township or Area Penhorwood	
Claim Holder(s) W.O. KARVINEN & Associates Ltd.		Prospector's Licence No. T-1889	
Address 32 Lakeland Point Drive, Kingston, Ont. K7M 4E7			
Survey Company William O. Karvinen		Date of Survey (from & to) 04 07 85 16 09 85 Day Mo. Yr. Day Mo. Yr.	
Name and Address of Author (of Geo-Technical report) 32 Lakeland Point Drive, Kingston, Ont. K7M 4E7		Total Miles of line Cut 13	

Credits Requested per Each Claim in Columns at right

Mining Claims Traversed (List in numerical sequence)

Special Provisions	Geophysical	Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	40
	Geochemical	

Man Days	Geophysical	Days per Claim
Complete reverse side and enter total(s) here	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	

Airborne Credits	Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	
Electromagnetic	
Magnetometer	
Radiometric	

Mining Claim			Mining Claim		
Prefix	Number	Expend. Days Cr.	Prefix	Number	Expend. Days Cr.
P	733800	40			
	733801	40			
	733802	40			
	733803	40			
	733804	40			
	733805	40			
	733806	40			
	733807	40			
	733808	40			
	733810	40			
	733811	40			
	733812	40			
	733813	40			
	733814	40			

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OCT 19 1985

MINING LANDS SECTION

RECORDED
OCT - 3 1985

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits

Total Expenditures \$ ÷ 15 = Total Days Credits

Total number of mining claims covered by this report of work. **14**

Instructions
Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

For Office Use Only

Total Days Cr. Recorded **560** Date Recorded **Oct 3/85** Mining Recorder **[Signature]**

Date Approved as Recorded **85.11. B** Branch Director **[Signature]**

Date **Sept. 30, -85** Recorded Holder or Agent (Signature) **[Signature]**

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying

W.O. Karvinen & Associates Ltd.

Mineral Exploration • Consulting • Overburden Prospecting

October 28, 1985

Land Management Branch
Ministry of Natural Resources
Whitney Block, Rm 6643
Queen's Park
Toronto, Ontario
M7A 1W3

Re: assessment work report.

Enclosed are two copies of a geological report and maps. This technical data applies to claims P733800 to P733808 inclusive and P733810 to P733814 in Penhorwood Township, Porcupine Mining Division. A work report applying for 40 days credit per claim was sent to the Timmins Mining recorder on Oct. 10, 1985. Any inquiries should be directed to the undersigned.

Sincerely,

WOKarvinen

Dr. William O. Karvinen

*Recd
2.3962*

WOK/ajk

Enclosure

x.c. Mining Recorder's Office, Timmins

