1.00 SUMMARY

A total of 24.9 line miles (1317 stations) of magnetometer surveys was completed over the 23 claims of this group and 13.2 line miles (773 stations) of induced polarization surveys were completed over a smaller group of 15 claims.

The magnetic data clarified the structural relationships of the intrusive complex to a considerable degree but no significant anomalies were detected by the polarization survey over the main area of interest.

Meagre geological data suggested an acid syenite intrusive surrounded by a rim structure composed of steeply-dipping gneisses. A drill test of two of the weak polarization anomalies encountered only a dike rock believed to be an "alnoite." No mineralization of any significance was intersected.

There appears to be no chance of significant sulphide mineralization occurring near surface in this claim group and no further work is warranted on the basis of these data.

2.00 INTRODUCTION

Early in the third quarter of 1969, a group of claims covering part of the Shenango carbonatite complex were obtained by option and an additional twenty-three (23) claims were staked to complete the coverage. On this latter claim group, a total of 25.6 miles of line were cut, 24.9 line miles of magnetometer surveys and 13.2 line miles of induced polarization surveys were performed.

The objective of the work was to locate any occurrences of sulphide mineralization that might have economic significance and which might be present near surface in what is possibly a favourable geological environment.
LOCATION AND ACCESS

The survey area is located astride the boundary between Shenango and Sherlock Townships; approximately two miles south of the north boundary of these townships and about one mile southwest of Shiners Lake in the Porcupine Mining Division of Ontario at about 48° 24' north latitude and 82° 48' west longitude.

The property is only readily accessible by aircraft to Shiners Lake or by helicopter directly to the small lakes on the property. South Porcupine some 75 miles to the east and Gogama approximately 70 miles to the southeast are two of the possible air bases for supporting an operation in this locality.

TOPOGRAPHY

The overall relief of the property is not great but a series of low ridges form a roughly concentric pattern about a relatively low central core. This pattern appears to be a reflection of the underlying geological features and is also reflected in the magnetic pattern.

The lower areas are quite swampy and growth is mainly alder. Some areas are predominantly jackpine but spruce, poplar and birch are the most common growth over most of the property.

Overburden cover, while not excessively deep is quite widespread and few outcrops were seen during the work on the property.

GENERAL GEOLOGY

Rock Types

The geological features of this complex area are not known in detail because of the scarcity of outcrops.

However, the outer rim of the complex appears to be composed of alternating bands of biotite gneiss and medium-grained hornblende syenite. The former occasionally contains a few specks of chalcopyrite and veins of pyrite. Two drill holes located in this region encountered a dark green porphyritic dike rock thought to be an alnoite. The central core of the structure appears to be composed of a coarse-grained syenite which occasionally contains minor amounts of molybdenite.
5.20 Structural Features

The topographical features, rock trends and the magnetic data suggest that this claim group is underlain by a circular structural feature. The topographically and magnetically low central portion appears to be mostly underlain by the coarse-grained syenite with the higher topographic and magnetic portions of the rim being underlain by steeply dipping bands of biotite gneiss, medium grained hornblende syenite and dark dike rocks thought to be alnoite.

There is some suggestion that northeast trending faults cut across the complex but it is difficult to trace these with any degree of accuracy.

6.00 WORK PERFORMED

In the period Sept. 15 to 30, 1969, a total of 25.6 miles of line were cut by a contractor L. Nabigon and in the period October 1 to 20, 1969, 24.9 line miles of magnetic surveys (1317 stations) were completed by a student employee H. Arden. In the period October 7 to 21, 1969, 13.2 line miles of induced polarization work was completed by a crew contracted from Geosearch Consultants Limited, 77 York Street, Toronto, under the responsibility of Robert Lee. A total of 773 induced polarization readings were taken. H.W. Fleming compiled the magnetic data and interpreted both surveys.

The magnetic work and line cutting were performed over a total of twenty-three (23) claims while the induced polarization work was limited to a total of fifteen (15) claims.

The magnetometer readings were taken at 100-foot intervals while the induced polarization data were obtained by employing a 300-foot dipole-dipole array and reading to the fourth separation.

6.10 Description of Instruments

For the magnetic survey a Craelius Minimag mounted on a tripod was employed. This is a null-reading instrument whereby changes in the earth's magnetic field are compensated for by altering the position of the compensating magnets. The instrument is adjusted to the local magnetic intensity and in the lower range an accuracy of ± 25 gamma is normal. At the higher ranges of compensation the absolute accuracy is not as good but is of the same order of magnitude which is about one percent of the departure from the normal field.
The induced polarization work was performed employing a McPhar Model P-650 I.P. unit which measures the apparent resistivity of the ground at two frequencies to an accuracy of better than five percent. In this work frequencies of 0.31 and 5.0 Hertz were used and readings were taken to the fourth separation using the Eltran electrode array, with a dipole separation of 300 feet. (See accompanying report by Geosearch Consultants Ltd.)

6.20 Assessment Credits

A total of 25.6 miles of line were cut on this part of the property and 1317 magnetometer stations (24.9 line miles) were read at 100-foot intervals along these lines. The pertinent data concerning this work are as follows:


A credit of nine hundred and twenty (920) days work is being requested for this survey under the "Special Provision of the Mining Act" to be applied equally over the group of twenty-three (23) claims designated as P-209603 to P-209625 inclusive for a credit of forty (40) days per claim.

In addition a total of 773 induced polarization stations (13.2 line miles) were read for which the pertinent data are as follows:

*Contractor* - Geosearch Consultants Ltd., 77 York Street, Toronto 1, Ontario.


*Consultant* - J.A. Woodard, 77 York Street, Toronto 1, Ontario - Dates of Work, October 24 to 31, 1969.
A credit of three hundred (300) days work is being requested for this survey under the "Special Provisions of the Mining Act" to be applied equally over a group of fifteen (15) claims designated as P-209605 to P-209610 inclusive; P-209615 to P-209620 inclusive; and P-209623 to P-209625 inclusive for a credit of twenty (20) days per claim.

Total Credits requested are as follows:

Claims P-209603, P-209604, P-209611 to P-209614 inclusive; P-209621 and P-209622.

40 days for each claim; Total 320 days

Claims P-209605 to P-209610 inclusive; P-209615 to P-209620 inclusive; P-209623 to P-209625 inclusive.

60 days for each claim; Total 900 days

Total Credits 1220 days

Claims P-209606, 209610 and 209614 are held in the name of P. Barry whose Mining License bears the number M-17924. His address is Suite 1612-2 Carlton Street, Toronto.

Claims P-209603 to P-209605 inclusive; P-209607 to P-209609 inclusive; P-209611 to P-209613 inclusive; and P-209615 to P-209625 inclusive; are held in the name of R. Nabigon whose Mining License number is P-9634. His address is Box 39, White River, Ontario.

7.00 GEOPHYSICAL INTERPRETATION

General

On the basis of available aeromagnetic data and known geology in adjacent areas, this claim group was believed to cover a portion of a carbonatite complex. The magnetic survey was performed to clarify as well as possible the details of the magnetic anomaly indicated by the airborne work while the induced polarization survey was carried out to indicate whether or not significant occurrences of sulphide mineralization were present within the complex and in combination with the magnetic data to determine the association of any such mineralization with particular rock members or structures within the complex.

7.10 Magnetic Survey

The magnetic data have been contoured at a 500 gamma interval and the maps have been colour-coded at intervals of 1000 gamma up to the 4500 gamma value. Because of our prior knowledge of the magnetic pattern from the aeromagnetic maps, the geological nature of the area and the topographic features a certain amount of bias has been intentionally allowed to influence the contouring of these ground magnetic data and where reasonably possible to produce a concentric pattern. In some cases other alternatives could be chosen but these did not appear to present a
clear or logical picture of the probable geological structures.

The region covered by this survey appears to be underlain by a magnetic complex, subsidiary to the main Shenango complex to the south. The relatively high magnetic rim on the west side is continuous with the west rim of the main complex and curves around the north side of a magnetic low which lies mostly between 40N and 56N and zero and 13E on this grid. The same magnetic pattern exists on the east and south sides of this low but is not as intense. Faulting does not appear to be clearly defined by the magnetic data.

The magnetic data suggest that the central magnetic low could be caused by a central core of carbonate or acid intrusive rock, possibly with moderately heavy overburden and surrounded by a steeply-dipping series of sedimentary rocks, gneisses or basic dikes. These members of the rim structure could be somewhat discontinuous or at least have varying magnetic properties. All appear to be near-surface features and if any of the magnetic anomalies were caused by pyrrhotite, they should be capable of detection by electrical methods. One peripheral magnetic low appears to be coincident in part with an alnoite dike.

7.20 Induced Polarization Survey

The induced polarization work proved to be conclusive only in the negative sense that no significantly good anomalies were recorded.

On the larger separations a resistivity high appears to be present centred along line 52N between zero and 13E with lobes extending southeasterly and southwesterly for about 2000 feet in each direction. Elsewhere resistivities are relatively low and trends, where apparent, seem to follow the concentric magnetic pattern. The high resistivity values suggest that the core of this complex is more likely to be an acid intrusive rock than a carbonate rock.

Only in five locations, line 44 north at 11 to 14 west and 20 to 23 west, line 52 north at 9 to 11 west and 16 to 19 west and line 48 north at 23 to 25 west were readings obtained that could be considered as polarization anomalies. All these were considered to be too weak to be indicative of significant quantities of sulphide mineralization and a drill test by two inclined holes totalling 1006 feet, confirmed this prediction on line 52 north. The remaining three anomalies appear to be of lesser interest and were not drilled.
### SUMMARY OF CREDITS

<table>
<thead>
<tr>
<th>Claim No.</th>
<th>Recorded Holder</th>
<th>License No.</th>
<th>Assessment Credits Requested</th>
</tr>
</thead>
</table>

**Totals**
- Line Cutting: 460
- MAG Survey: 460
- I.P. Survey: 300
- Total: 1220
8.00  CONCLUSIONS

The magnetic data were a strong factor in outlining the presence of an acid intrusive complex subsidiary to the main Shenango complex and this indication was roughly verified by the resistivity data.

Polarization data, however, only gave five poor anomalies, the best of which proved to be of no economic interest as only an alnoite dike essentially barren of sulphides was encountered in two drill holes. Small amounts of sulphide mineralization are known from outcrops but these do not appear to have any significant size.

9.00  RECOMMENDATIONS

On the basis of the small amount of known geology, the results of the magnetic and induced polarization surveys and the limited drilling program, there appears to be no opportunity of locating significant amounts of sulphide mineralization in near-surface locations on this property.

No further work is therefore recommended.


10.00 ENCLOSURES

Plate 1: Index Map - Location of Survey Area
Scale: 1 inch = 4 miles.

Plate 2: Magnetic Survey - Shenango Property,
Shenango Township, Porcupine M.D.,
Ontario.
Scale: 1 inch = 200 feet.

11.00 REFERENCES

1. Geophysics Paper 2248, Shenango Lake, Ontario
   Sheet 42 B/7 - Scale: 1 inch = 1 mile.

2. Geosearch Consultants Limited - Induced Polarization
   Survey for Kennco Explorations, (Canada)
   Limited, Shenango Township Property, Foleyet
   Area, Ontario - accompanies this submission.
INDUCED POLARIZATION SURVEY
for
KENNCO EXPLORATIONS (CANADA) LTD.
SHENANGO TOWNSHIP PROPERTY
FOLEYET AREA, ONTARIO.

(To Accompany Map No. 69-61)

November 19, 1969.
INTRODUCTION

A variable frequency induced polarization survey was carried out for Kennco Explorations (Canada) Limited on the Shenango Township property in October, 1969. The property is located on both sides of the Sherlock-Shenango Township boundary, 19 miles northwest of Foleyet, Ontario. Access was made by helicopter from Foleyet.

The purpose of this survey was to outline geoelectrically anomalous areas which might prove to be sulphide deposits of economic importance. A few possible anomalous areas were outlined. The accompanying plan and sections show the area surveyed and the results obtained.
METHOD

This survey used the variable frequency method in which a sinusoidal current at two low but well separated frequencies (0.3 Hz and 5.0 Hz) was passed through the current electrodes into the ground. By means of another set of electrodes a potential difference was indirectly measured from which apparent resistivities $R_1$ and $R_2$ at the low and high frequencies respectively, may be calculated.

The apparent resistivities will vary with frequency, if the ground can be polarized. This effect is expressed as the "frequency effect" (FE) which is equal to: 

$$\frac{100(R_1 - R_2)}{R_1}.$$ 

The frequency effect is directly related to induced polarization effects which are established whenever a current flows across an interface between ionic and electronic conducting mediums, as when current flows through a volume of rock containing metallic minerals such as most sulphides, graphite, magnetite and some other less common oxides.

The "metal factor" is a function of the apparent resistivities and the frequency effect. It is calculated by:

$$\frac{1000 \ FE}{R_2}.$$ 

The depth of penetration is directly proportional and the resolution inversely proportional to the value of x and the distance nx, the electrode separation and the array separation.

Metallic minerals are not the only causes of I.P. effects. A number of possible contributory agents has been established, such as some types of clay minerals; however, many I.P. anomalies are yet unexplained.
The Eltran electrode array was used in the present survey. It is illustrated in the accompanying diagram. In this procedure current was applied to the ground at two electrodes a distance \( x \) apart. The potentials were indirectly measured at two other points also \( x \) distance apart and separated by a distance \( nx \). Measurements were made along a line perpendicular to the assumed strike, at the indicated number of separations or values of \( n \).

Both the apparent resistivity and frequency effect values were measured for each change in electrode separation. These measurements are plotted as pseudo sections, the values plotted at the intersection of 45 degree lines from the centre of the two electrode arrays. The apparent resistivity values in ohm-feet divided by 2 \( \pi \), for the higher frequency are plotted above the solid line and the frequency effect readings below the line. The metal factors, when significant, are plotted in a similar array below the frequency effect readings.
RESULTS

Possible anomalous zones have been indicated on the sections on Lines 44N, 48N and 52N of the north grid. On Line 44N the zone between 11W and 14W reflects anomalous N-3 and N-4 FE readings. A steep gradient exists between the N-4 resistivity readings plotted at 11W and 14W which is difficult to explain. The possible anomaly indicated at the west end of this line may indicate some conductivity in the bedrock. The pattern of the anomalous zone from 22E to 25E on line 48N suggests that this may not be a legitimate anomalous zone. The anomalous zones between 9W and 19W on Line 52N are the strongest located by this survey. The pattern suggests 2 separate zones but they may be narrower or wider than indicated on the section.

The remaining lines contain a few isolated anomalous FE readings, but as these are not associated with resistivity lows, no anomalous areas have been indicated.

RECOMMENDATIONS

The anomalous zones on Line 52N appear to warrant some further investigation. A local magnetic high occurs at 9W which may be of some significance.

Respectfully submitted,

GEOSEARCH CONSULTANTS LTD.

J. A. Woodard, P. Eng.,
Consulting Geophysicist.
INDUCED POLARIZATION SURVEY
BY
GEOSEARCH CONSULTANTS LTD.

KENNCO EXPLORATIONS

SHENANGO TWP. PROPERTY

ELECTRODE CONFIGURATION

APPARENT RESISTIVITY

FREQUENCY EFFECT

METAL FACTOR
ELECTRODE CONFIGURATION

INDUCED POLARIZATION SURVEY
BY GEOSEARCH CONSULTANTS LTD.

APPARENT RESISTIVITY

FREQUENCY EFFECT

METAL FACTOR
ANOMALOUS AREA

PROPERTY

300 FEET

FREQUENCIES: 0.3 & 5.0 Hz
ELECTRODE CONFIGURATION

FREQUENCY EFFECT

METAL FACTOR

APPARENT RESISTIVITY
ANOMALOUS AREA

ONTARIO

FREQUENCIES: 0.3 & 5.0 Hz
KENNCO EXPLORATIONS (CANADA) LIMITED

ON SURVEY CONSULTANTS LTD.

SHENANGO TWP. PROPERTY ONTARIO

SCALE: 1 INCH TO 300 FEET

ANOMALOUS AREA
DEFINITE
PROBABLE
POSSIBLE

FREQUENCIES: 0.3 & 5.0 Hz

LINE 38N SOUTH GRID
INDUCED POLARIZATION SURVEY
BY
GEOSEARCH CONSULTANTS LTD.
ANOMALOUS AREA

PROPERTY ONTARIO

TO 300 FEET

FREQUENCIES: 0.3 & 5.0 Hz
INDUCED POLARIZATION SURVEY
BY
GEOSURCH CONSULTANTS LTD.

KENNCO EXPLORATIONS (CANADA) LIMITED

SHENANGO TWP PROPERTY ONTARIO

SCALE: 1 INCH TO 500 FEET

ELECTRODE CONFIGURATION

INDUCED POLARIZATION SURVEY
BY
GEOSURCH CONSULTANTS LTD.

KENNCO EXPLORATIONS (CANADA) LIMITED

SHENANGO TWP PROPERTY ONTARIO

SCALE: 1 INCH TO 500 FEET