REPORT ON EM-16 - GEOCHEMICAL AND GEOLOGICAL SURVEY ON SHINING TREE CLAIMS LEONARD TOWNSHIP, ONTARIO LARDER LAKE MINING DIVISION

by

R. S. Middleton

ALAMO PETROLEUM LTD
310 - 55 Yonge Street
Toronto, Ontario

January 15th, 1976

INTRODUCTION

Location and Access:

The Shiningtree claim group is situated in northwestern Leonard Township approximately 1 mile east of Shiningtree Lake; 10.75 miles due east of the village of Shiningtree and 14 miles southwest of the village of Gowganda. Access to the property is by road via the Bay Lumber Road in MacMurchy and Fawcett Townships then east to the main power transmission line (passing near Norman Lake in North Williams Township) then northward on the power line. In the winter, a snow machine could be used on the section of powerline road between Highway 560 and the property to make the journey shorter.

Property:

The property consists of 25 unpatented claims staked in a north-south pattern (see Figure 1. Location map). The claim numbers are:

L. 454274 - 454279 incl.

L. 425310 - 425328 incl.

All of the claims are held in the name of Alamo Petroleum Ltd.* Suite #310 - 55 Yonge Street, Toronto, Ontario, M5E 1J4.

Previous Work:

Prospecting by Newnorth Gold Mines[1] Ltd. was carried out in 1956, on the area covered by the present property. This work consisted of a vertical loop EM[1] survey.

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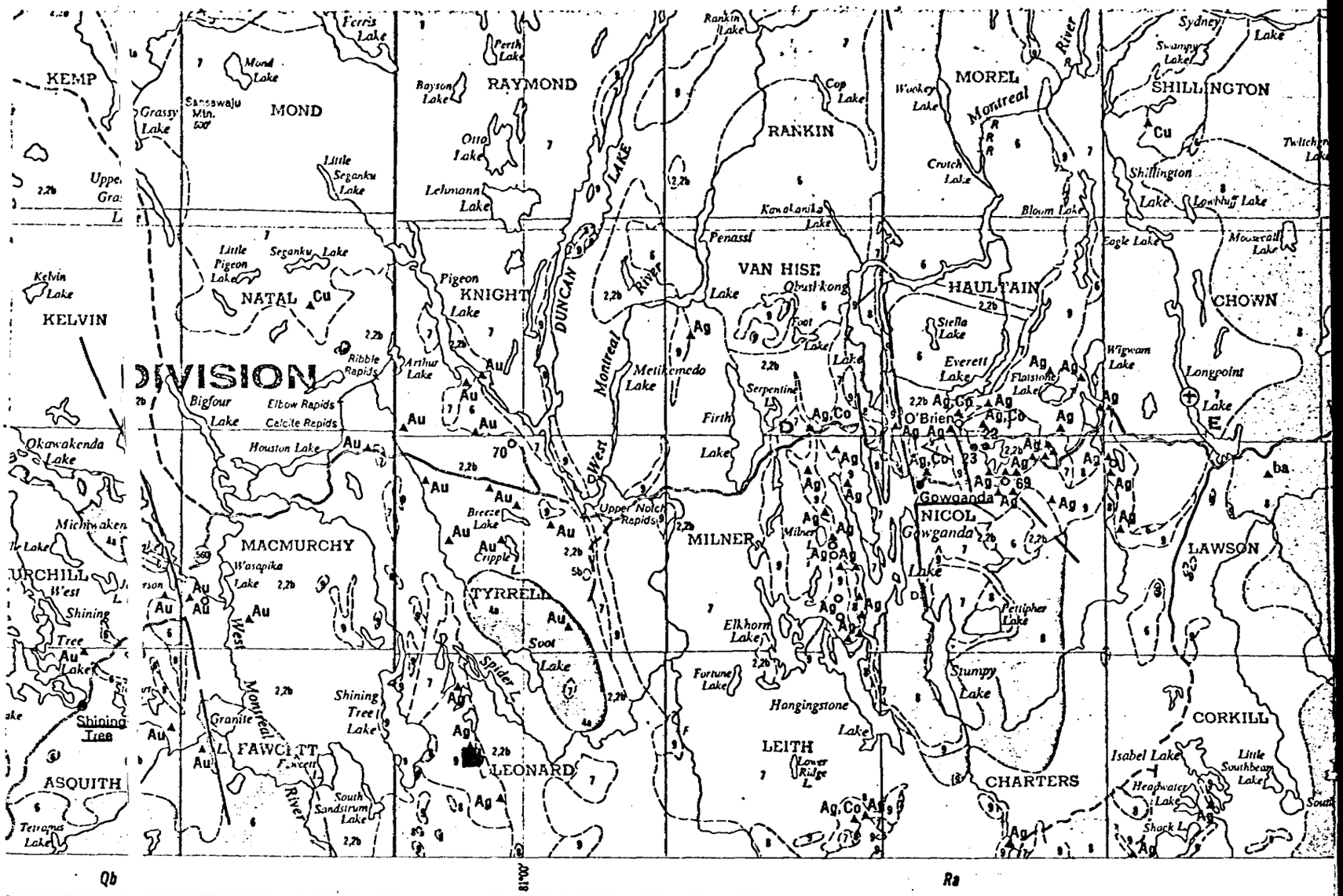
* Wholly owned subsidiary of Rosario Resources Corporation. Alamo Petroleum Limited is an Alberta corporation registered to do business in Ontario.

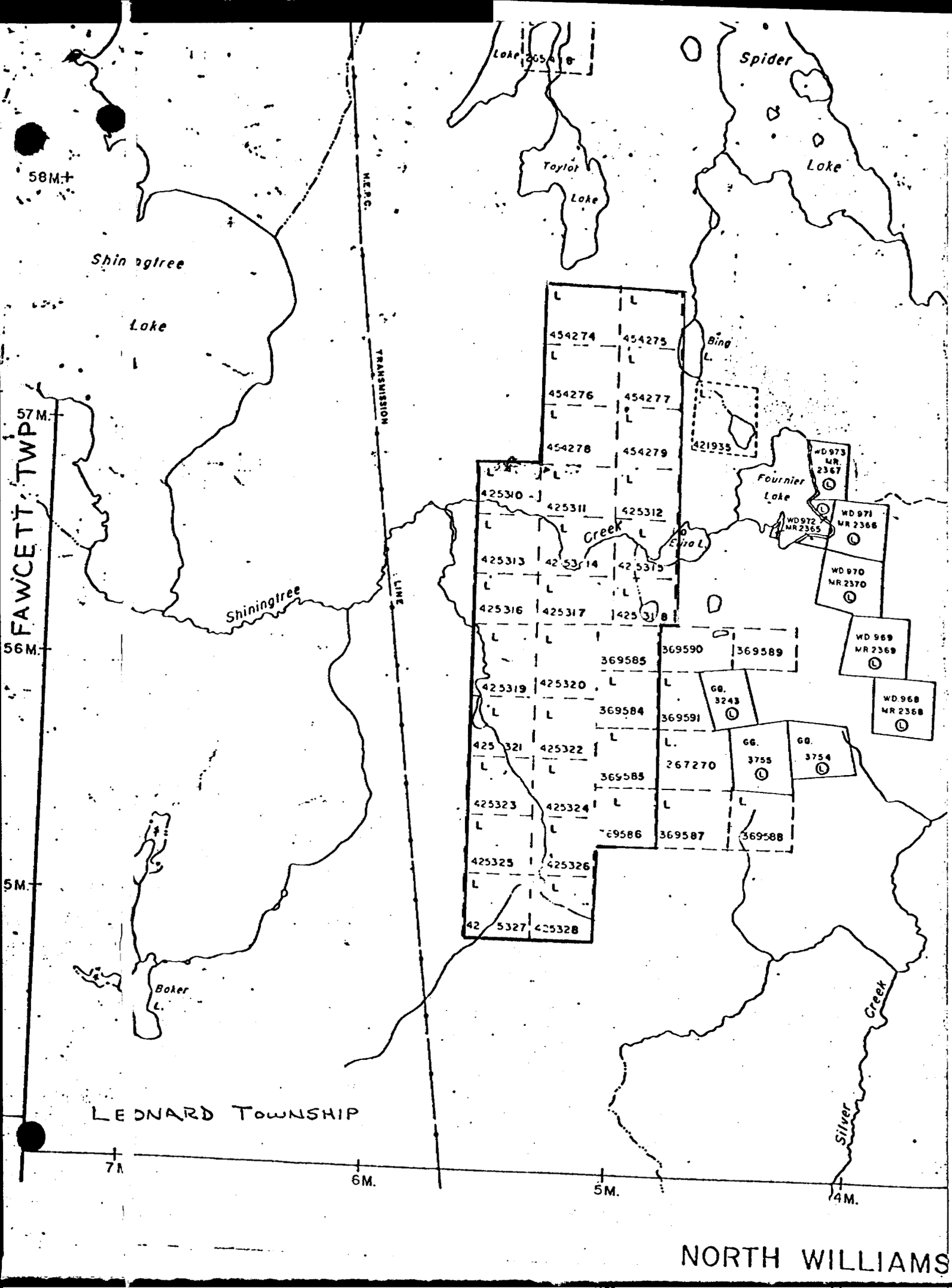
1. Survey by Don Salt. ODM File 63.704



LOCATION MAP OF SHINING TREE PROJECT

Scale: 1" = 2 mile

FIGURE NO. 1


Lake
Spider
Lake
Taylor
Lake
58M.
Shin ngtree
Lake
M.E.P.C.
TRANSMISSION
LINE
57M.
FAWCETT TWP
56M.
5M.
Shiningtree
Bing
L.
454274
454275
454276
454277
454278
454279
421935
425310
425311
425312
425313
425314
425315
425316
425317
425318
425319
425320
425321
425322
425323
425324
425325
425326
425327
425328
Fournier
Lake
Creek
to
Eliza L.
WD 973
MR.
2367
WD 972
MR 2365
WD 971
MR 2366
WD 970
MR 2370
WD 969
MR 2369
WD 968
MR 2368
369585
369590
369589
369584
369591
369583
267270
369586
369587
369588
GG.
3243
GG.
3755
GG.
3754
Boker
L.
LEONARD TOWNSHIP
7M.
6M.
5M.
4M.
Silver
Creek
NORTH WILLIAMS

In 1963 an exploration program by Coulee Lead and Zinc Mines Ltd.[2] was carried out over the northern part of the property which consisted of detailed geological mapping. Veins which trend north-northeast containing cobalt and nickel bloom were noted.

Very early prospecting was carried out during the development of the Gowganda Silver Camp, (1912 - 1927). The first prospects exposed on the property have been described by Geo. Langford (1927).[3] (See report in Appendix, and list of showings under General Geology section). The most extensive workings are found on claim L.425311 and this is known as the Caswell - Eplett shaft. A 100 foot deep shaft was sunk on a calcite vein and lateral drifting at the 100 foot level was done.

Recent mapping by the Ontario Department of Mines has been published as map P. 820 by M. Carter (1973).

Purpose of Survey:

The property covers part of the eastern contact of the Shiningtree diabase sill. Numerous north trending calcite veins occasionally mineralized with native silver, niccolite, smaltite, cobaltite and native bismuth have been located by early prospectors within the area covered by the property. North trending features have been identified from air photographs which appear to be associated with a number of the prospects. The claims were therefore staked to cover the fracture trend in order to explore native silver deposits which may occur along the trend between the known showings.

Personnel:

The following persons were involved in the survey and line cutting work:

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2. ODM File 63A.423
3. Langford, Geo. B. (1927): Shiningtree Silver Area, District of Timiskaming; Ontario Dept. of Mines; Vol. 36, pt. 2, p. 87-99. Accompanied by map 36C.

Line Cutting	Date
C. Chaisson	June 6 - 19, 1975
J. Plecash	June 10 - 27, 1975 - July 04 - 06
G. Russel	June 10 - 30, 1975 - July 01 - 09
G. Seymour	June 10 - 30, 1975 - July 01 - 09
J. French	July 07 - 09, 1975
Jim Wabanonik	July 15 - 30, 1975
Gil Brazeau	July 15 - 30, 1975
Harry Michel	July 15 - 30, 1975

Soil Sampling and EM-16 Survey *

Orville Hicks	July 26, 27, 31 - Aug. 01 - 09, 1975
Joe Defelice	July 26, 27, 31 - Aug. 01 - 09, 1975

Geological Survey

J. Plecash	Aug. 16 - Sept. 04, 1975
G. Plecash	Aug. 16 - 31, 1975
R. Middleton	June 10 - 13, 1975 - July 30 - 31

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* EM - 16 was done July 26, 26, 31, Aug. 1 - 2 by O. Hicks.

GENERAL GEOLOGY AND KNOWN SHOWINGS

Geological traverses were carried out on the grid by J. M. Plecash under the supervision of R. S. Middleton. A general table of Lithological units is given below that pertains to the property.

Table of Lithological Units

Recent - Pleistocene
Swamps, silts, sand, boulder clay.

Precambrian - Middle Precambrian
Nipissing diabase: Medium to coarse grained diabase with pink granophyric phases.

Huronian - Gowganda Formation?
Conglomerate, greywacke, argillite, quartzite.

Early Precambrian - (Archean)
Volcanics - Basalt flows.

The majority of the property is underlain by a diabase sill (Nipissing) which is medium - grained to coarse - grained and dark black - green to pink in colour. The dark coarse grained phases are sometimes irregular and may be actually a pegmatite development. The pinkish phases are granophyric and often contain chalcopyrite. Occasional aplite dikes are seen cutting the diabase. Coarse pinkish to white calcite veins trending northerly occur in the diabase.

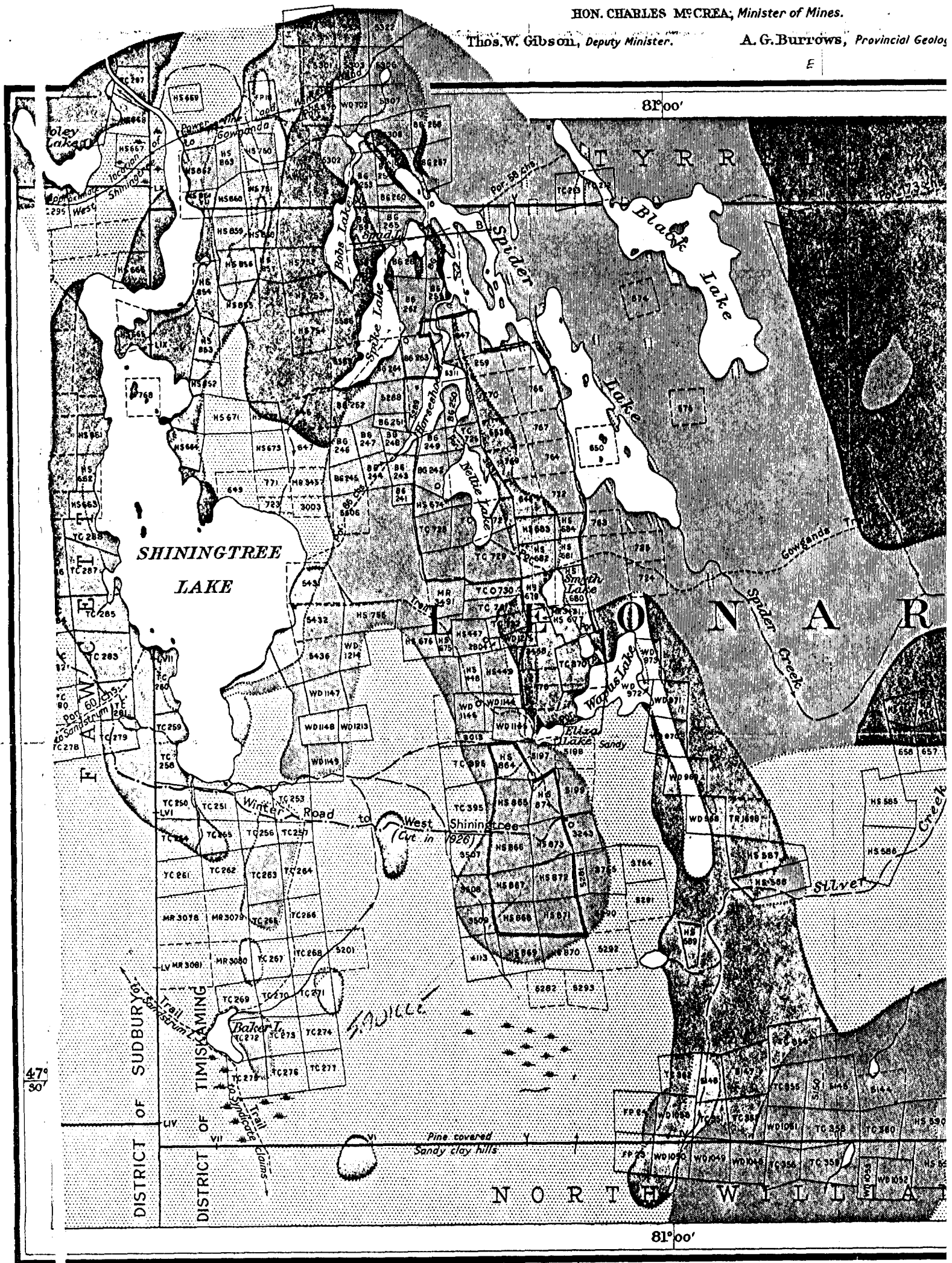
The following showings that occur on the property in diabase have been described by Geo. Langford (1927) and are identified on figure 3. The original claim distribution in 1927 is taken from Langford's map and is displayed as Figure 2.

Map No. 36c
SHIN GTREE SILVER AREA
Town ip of Leonard

PROVINCE OF ONTARIO
DEPARTMENT OF MINES

HON. CHARLES McCREA, *Minister of Mines.*

Thos. W. Gibson, *Deputy Minister.* A. G. Burrows, *Provincial Geolo*



Map No. 36c

PART OF THE
SHININGTREE SILVER

TOWNSHIP OF LEONARD, DISTRICT OF TIMISKAMI

To accompany report by G. B. LANGFORD *in Vol. XXXVI, Part 2, Ontario Department of Mine*

Scale $\frac{1}{47520}$ or ¾ Mile = 1 Inch

Chains 80 40 0 1

Metres 1000 0 1 2 3

Power Line

Taylor Lake
(Nellie Lake)

Fault

454274

454275

Silver Rock Mines

Bing Lake

Coulee Lead & Zinc Mines Ltd.

Cpy

Co, Ni, Newnorth Gold Mines Co, Ag

Co, Cpy, Py

Ag, Co, nc, Cy

Neelands Prospect

Ag, Co, nc

Caswell-Eplett Prospect

Cpy, mc

Cpy, mc

Creek

Tree

Shining

Eliza Lake

Cabin

Leonard Silver Mines

United Reef Petroleum Claim

Interpreted Fault (from airph

Old Shaft

Mineral occurrance

Calcite Vein

Mc Greevie

426327

426328

ALAMO PETROLE

SHINING TREE

Compilation of Showings
M. Carter, P 820

Location of Claims Appro

Scale: 1" = 1320'

FIG

"These claims T.C. 395 and 396 [now belonging to Leonard Silver Mines, Limited] are situated immediately west of those of the Saville Exploration Syndicate. The country rock is diabase. On one of the claims a large calcite vein has been uncovered for about three chains. This vein is three or four feet wide in places. Just west of the large vein, another one occurs that will average probably eight or ten inches in width for a distance of about three claims. The two veins have a strike of about N. 30° E. mag. In the vicinity of the large veins many small stringers occur, one of which carries cobalt bloom."

E. L. Greave

"This group of three claims [G.G. 3,507-9] is located just south of Turnbull's. Surface work was being carried on when the writer visited the property. Three veins, three to six inches wide, occur in the diabase on the most southerly claim. Small amounts of silver were seen in the three veins. The gangue material is quartz and calcite, with small quantities of copper pyrites, galena, and smaltite. Surface work on the most northerly claim has exposed two veins of quartz and calcite associated with aplitic material, but no silver had been discovered."

Caswell-Eplett

"These claims (W.D. 1,145 and 1,146) are located a little west of Fournier [Wapus] lake and immediately north of the claims of the Saville Exploration Syndicate. The formation is chiefly diabase, but the contact between the diabase and the Cobalt series occurs on W.D. 1,145. Quite extensive surface work has exposed many veins on W.D. 1,146. Cobalt bloom occurs in several of the veins. Small flakes of native silver were found in the black muck-like material in a small vein just west of the shaft.

"The most extensive underground work in the area has been done on W.D. 1,146. Mining operations were not in progress when the writer was on the property, but some information regarding the underground work was obtained from Mr. Grant Caswell. A vertical shaft was sunk 100 feet on a vein that showed silver at the surface. A crosscut was run 100 feet east and the same distance west from the shaft. On the east side a calcite vein, eighteen inches wide, and a vein of niccolite, four to six inches wide, were crossed. A calcite vein was found on the west side of the shaft.

"The plant consists of a 20 h.p. upright boiler, a 5 by 5 hoist, three pumps, and a Rand drill."

These claims are now G.G. 4,881 and G.G. 4,884.

Neelands

"This claim (H.S. 448) lies just north of W.D. 1,146. Considerable surface work has exposed six or seven veins a few inches in width and with a strike of north to N. 56° E. The formation is diabase. Quartz and calcite are the chief vein-filling materials, but copper pyrites and cobalt bloom are present, and in one vein niccolite, one to two inches wide, occurs. No silver was seen on this property, but the writer was informed that good samples of native silver had been taken from one of the veins."

Nellie Lake Syndicate

"This company have a group of nineteen surveyed claims located in the vicinity of Nellie lake. The chief underlying rock is diabase, but some claims in the group are located on Keewatin. Extensive surface work has been done on several of the claims and many veins have been exposed, of which some are very large. During the season a shaft 34 feet deep was sunk on a large vein that occurs on T.C. 730 and T.C. 731. This vein has been uncovered for a distance of about eight chains and is five to six feet wide in places. Its average width is probably about two feet. The gangue material is calcite, but cobalt bloom, smaltite, niccolite, and bismuth in small quantities are present. The vein has almost vertical dip and strikes, in a general way, about N. 25° E. No silver was seen in this vein.

"Several other shafts and test pits, varying from 20 to 30 feet in depth, have been sunk on promising-looking veins on these claims."

This group is largely controlled by J. B. O'Brian of Toronto, and further development is contemplated.

Conglomerate with pink felsic fragments, reddish argillite, greywacke, quartzite and arkose beds (Huronian) occur on the north - eastern part of the property (see figure 7) extending northward from Eliza Lake. Arkose (pink-white and uniform) has also been observed west of claim 425321 on the powerline.

The extreme northeast part of the property is mainly underlain by a coarse grained chloritized rock which could be mistaken as an altered diabase, however, it is identical to mg - cg Archean basaltic lavas. Mapping by Coulee Lead and Zinc has indicated volcanics immediately north of this area (claim 454275) supporting this interpretation.

Therefore the Spider Lake fault appears to be up thrown on the east side bringing "basement" volcanic rocks to surface. Steep dips of 75° to the west in the sediments indicated on Carter's map P. 820 (which were not observed in the present survey) are interpreted to be tilling of the sediments along the Spider Lake Fault.

Geological mapping was also carried out on the claims in order to locate all previously described showings and outline all pits shafts and trenches. Each trench was surveyed in with compass and chain so that the azimuth of veins exposed in the trench could be determined. In many cases due to rubble, vegetation and water filling many veins were not observed. In addition the actual location of the survey grid was established by compass and chaining.

As a result of this work the base map for the geochemical and geophysical grid has been altered and a new base was created which is now contained on figures 5 and 6.

Four grab samples of calcite vein and diabase were taken which were assayed. The location of these samples is shown of figure 5.

Sample No.	Description	% Co	% Cu	Ag oz/ton
101	Calcite vein, L8N, 200W from dump	.11		Nil
102	Quartz-Calcite vein in trench 230'E of L8N, 480W. Has Co bloom	.53		Trace
103	Pink granophyre wall rock with visible disseminated chalcopyrite	.01	.29	Nil
104	Quartz vein with minor chalcopyrite 120' north of L68N, 1215'W	Trace	.19	Nil

STRUCTURAL SETTING AND PARAGENESIS OF THE SILVER MINERALIZATION

Silver veins in the Miller Lake basin at Gowganda mainly occur within the diabase (Collins, 1917; Moore, 1956), as opposed to the setting in the Cobalt camp where veins are predominantly found near the upper and lower contacts of the diabase sill and within the country rocks such as the Huronian - Cobalt conglomerates and varved sediments; and Archean lavas. It can be seen from figure 3 that most of the showings are within the diabase, typical of the Gowganda setting, and many of the veins parallel each other. The main features of the veins in the area have been summarized by Collins, (1918, P. 120) as follows:

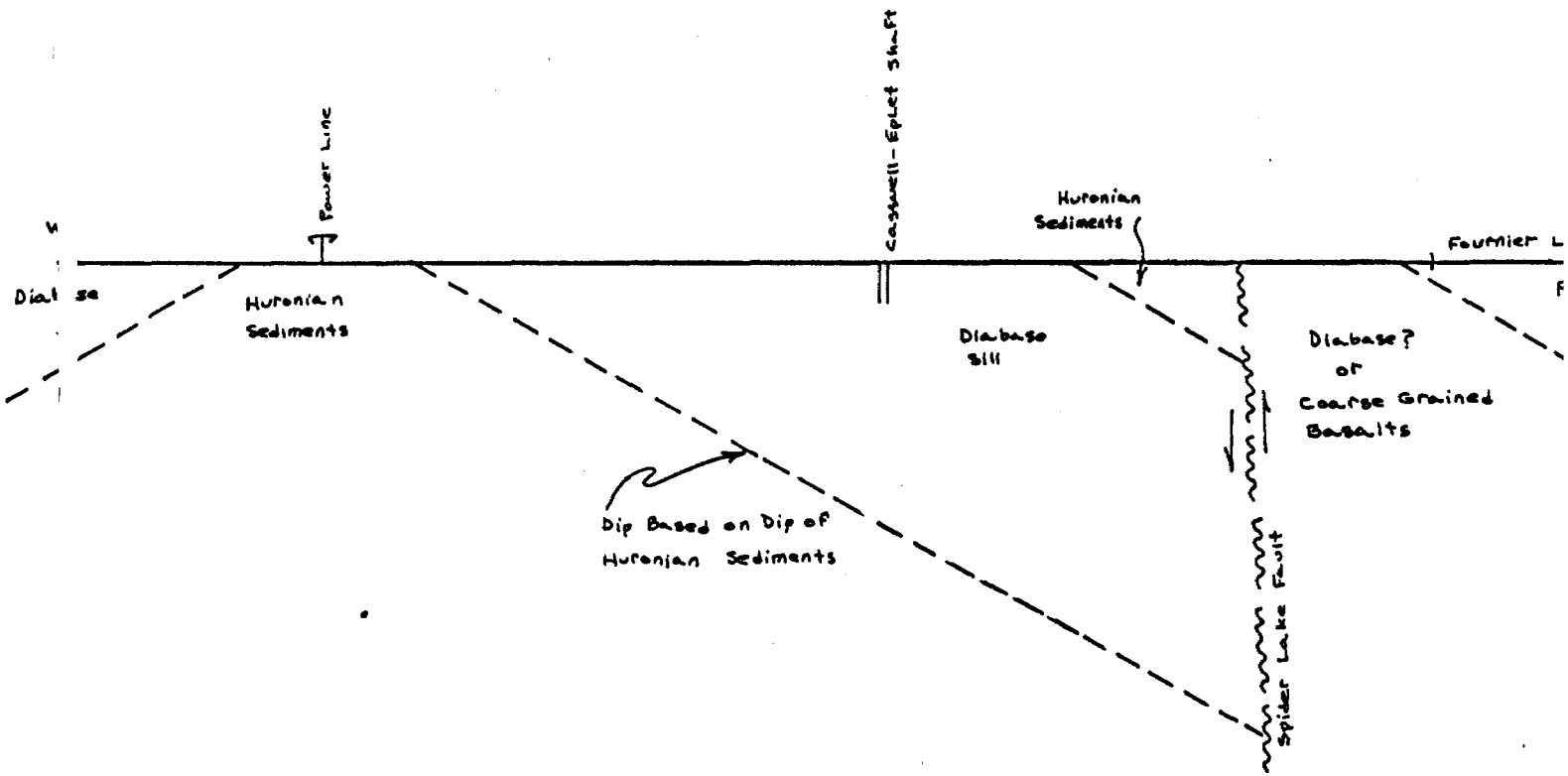
> The veins at Gowganda occur nearly altogether within the sills of post-Cobalt quartz diabase. Only two or three veins have been traced into the Huronian sediments. They are sharply defined fissure veins rarely 2 feet wide and usually less than 1 foot. They are not often traceable for more than 300 or 400 feet. They are vertical or nearly so. A distinct tendency for as many as seven veins to occur in parallel arrangement at intervals of 25 to 75 feet has been observed on the Mann property at Gowganda and on the Neelands claim at Shiningtree. But beyond this there does not appear to be any common trend to the veins in any one area or in the region as a whole.
>
> The veins contain native silver, smaltite, niccolite, and chalcopyrite in a gangue of calcite and quartz. Native bismuth, pyrite, specular hematite, stibnite, and galena are less constant constituents. Cobalt bloom, annabergite, azurite, and limonite are the chief oxidation minerals. The carmine stain of the cobalt bloom is one of the most conspicuous signs whereby the veins may be recognized. Quartz was deposited first, as it encrusts the vein walls. Chalcopyrite, galena, and specularite crystallized at about the same time, since they occur within the quartz. Campbell and Knight[1] conclude that smaltite and niccolite were deposited next. Calcite came next and then a period of slight fracturing of the vein matter, these fractures being filled with native silver. Bismuth crystallized after the silver.

This association of vein minerals, gangue as well as ore minerals, is believed to be a late differentiation product from the quartz diabase magma. The course of differentiation as far as it has been actually traced (cf. pages 90-99) points to some such end product. The earliest product to solidify was a diabase containing less than 50 per cent of silica. This was followed by an aplite the silica content of which rises to 80 per cent. Certain facts suggest that the aplite was followed by still other differentiation products. A small amount of chalcopyrite, or pyrite containing copper, is distributed through the diabase, while in the aplite this constituent is in distinctly greater amount, both disseminated through the aplite and as veins traversing that rock, e.g., at the United States mine near Elk Lake. Primary calcite, likewise, occurs sparingly in the diabase and in greater amounts in aplite. In two cases aplite dykes were found to merge into calcite veins. On the whole, there seems to have been a decided tendency for silica, calcite, and chalcopyrite, three of the principal vein constituents, to concentrate in the residual aplitic portion of the differentiated magma. With differentiation carried somewhat further these residues might well be expected to form veins like those which actually do occur in the diabase sills. Traces of silver, cobalt, nickel, or bismuth, the other vein constituents, however, could not be found in the aplite nor the diabase.

[1] Econ. Geol., 1905-06, p. 767.

A number of showings north of Shiningtree Creek and south of Taylor Lake appear to line up along a north-south trend. Examination of air photographs (numbers - 70-4723 / 23-127;70-4722 / 20-265;70-4722 / 20-264;70-4723 / 23-129) shows a well defined lineament which has been transcribed onto figure 3, that is interpreted to be a fracture related to the mineralization - vein system.

A hypothetical cross section of the northern part of the property based on data in figure 3 and personal observations, is shown in figure 4. The Spider Lake Fault appears to terminate the Huronian - Nippissing diabase rock sequence to the east. The Archean volcanics exposed east of the Spider Lake Fault are interpreted as uplifted. If this is not the case, then the diabase sill probably extends beneath the lavas in the Spider Lake area.



Hypothetical East West Cross Section of the Eastern Part of Shining Tree Diabase Sill. Horizontal Scale : 1" = 1/4 mile

F 1

Upper and lower contacts in the diabase also exist in the Leonard Twp. (Carter, 1973) area. It has been assumed that the diabase - Huronian sediment contact is parallel to the dip of the Huronian sediments - which may not be the case but is a valid assumption for regional interpretation.

EM - 16 SURVEY

Survey Method and Instrumentation:

Readings were taken at 100 foot intervals along east west lines which are spaced approximately 400 feet apart. The instrument used was the EM-16 manufactured by Geonics Ltd. (see specifications in Appendix) A total of 26.58 miles of line were cut, picketed and chained.

Inphase and quadrature values were recorded. The transmitter station used was Balboa Panama NBA 24.0 KHz which was approximately on strike with the regional fracture trend in the diabase.

Profiles of the inphase and quadrature (out-of-phase) readings are presented in figure 5 at a vertical scale of 1" = 20%. The picket line is used as zero and the profile plot points are plotted perpendicular to the line using the vertical scale.

Interpretation:

A series of north trending conductors were outlined in the survey which often correspond to the low lying areas (valleys) between outcrops. These conductors are interpreted to be associated with faults and possible shear zones within the diabase. The weak conductors are indicated by in-phase "cross overs" (positive to negative) without corresponding quadrature cross overs (negative to positive) where as the more definite conductors have both inphase and quadrature responses.

The conductors are worked in colour on figure 5 with solid colour lines indicating definite - strong conductors and dashed lines indicating weak conductors.

The best two conductors occur on claims 425322, 425320 and 425324. The west conductor of this pair appears to extend the Leonard Silver showing.

A weak conductor occurs on the boundary of claims 425313 and 425314 which appears to be related to the Caswell - Eplett showing.

Another weak conductor which extends southward through the common corner of claims 454274, 454276, 454277 and 454275 in considered to be related to a fracture system and has anomalous soil Co - Ag geochemical values associated with it on the northern end.

GEOCHEMICAL SURVEY

Sampling Method:

Soil samples were taken with a 4 foot auger from the "B" soil horizon. In all cases the soil was a brown very fine silt to clay. In many instances a soil sample could not be obtained due to extensive thickness of the "A" horizon (swamp, humus) or lack of soil on the outcrops. Sample depths ranged from one to three feet below the surface. Samples were in the order of 20 - 50 grams in size and were placed in Kraft paper envelopes. The samples were air dried, pulverized in a morter, then screened to -80 mesh. Analyses for Co and Ag using atomic absorbtion equipment were carried out by TSL on dissolved 1 gm portions of the -80 mesh soil. The metals were taken into solution with hot aqua regia acid. Extraction time was 1 hour. The detection limits were .1 ppm for Ag and 1 ppm for Co.

The number of samples collected and analysed (from the 26.5 mile grid) was 714.

Interpretation:

A number of north-south trending cobalt and silver anomalies were outlined. Anomalous silver was considered to be .5 ppm where as anomalous cobalt was considered to be 10 ppm.

The intent of the geochemical survey was to test "down ice" metal values in the till, however, it is questionable that the fine silt - clay material taken was actually till. The writer suggests that the soils encountered on the grid are very fine sediments deposited possibly by water adjacent to the large sand areas occurring to the west of the area (Fawcett Twp. and southern Leonard Twp.). Therefore the metal values may be expressing groundwater - borne metals and may be representative of localized conditions. Glacial directions based on stria are generally north to south.

Anomalous silver values are more common north of Shiningtree Creek, however, anomalies do occur around the Leonard Silver showing claim 425320.

Anomalies of importance because of the cobalt - silver co-relation occur on lines 4N, and 64N, however silver values alone suggest areas of interest south of the Leonard Silver showing (line 4S, 4W) as far as line 24S.

CONCLUSIONS AND RECOMMENDATIONS

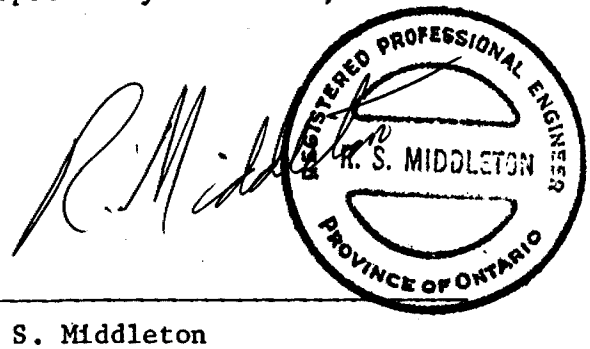
The survey has accomplished its initial objective by indicating north trending fractures which appear to be related or at least complimentary to the known calcite - silver vein directions. Furthermore, moderately anomalous silver values have suggested areas for further exploration particularly on claims 425320, 425322, 425316, 425314 and 454274 - 454277.

Detailed prospecting and sampling of explosed areas near and north of geochemical anomalies should be carried out as well as bulldozing of EM - 16 indicated shears near anomalous geochemical values. Flake native silver often occurs in fractured diabase in the Gowganda camp and the indicated shears should be prospected for such occurrences. Re-analyses of soil samples for copper may help outline the granophyric phases which appear to carry disseminated copper (chalcopyrite).

A detailed magnetometer survey would be beneficial in outlining various magnetic phases in the diabase which inturn may play an important role in controlling the vein system.

Drilling recommendations will have to be made after it has been established that silver values of interest occur in one or more of the indicated fractures.

Respectfully submitted,



R. S. Middleton
Chief Geophysicist

R E F E R E N C E S

Carter, M. W.

1973: Leonard Township, District of Timiskaming; Ontario Division of Mines, Prel.Map. P.820.

Collins, W. H.

1917: Onaping Map Area, Geol. Survey of Canada, Memoir 95.

Langford, G. B.

1927: Shining Tree Silver Area, District of Timiskaming; Ont. Dept. Mines; Vol.36, pt.2, P.87-99. Accompanied by map 36c.

Moore, E. S.

1956: Geology of the Miller Lake Portion of the Gowganda Silver Area; O.D.M., Vol.LXIV, pt.5, 1955.

Shiningtree Silver Area, District of Timiskaming

By Geo. B. Langford

Introduction

The recent successful developments in the silver areas of Gowganda and South Lorrain have raised the question as to whether there are any other areas with similar possibilities that have been overlooked. With this in view, the Ontario Department of Mines authorized a re-examination of the Shiningtree area during the summer of 1926.

For assistance, both in the field and in preparing this report, the writer wishes to thank Geo. F. Browne, assistant; Duncan MacDonnell, Edward Archibald, W. F. Currie, and J. Work.

Previous Work

The first geologist to visit this area was E. M. Burwash,[1] who was attached to Niven's survey party during the location of the Algoma-Nipissing boundary in 1896. His report dealt briefly with the iron range in the southwest corner of Tyrrell township, and the rocks immediately west of it.

In 1901, A. P. Coleman[2] made a further examination of the same iron range and traced it for a distance of three and a half miles. He also made observations on the rocks of Shiningtree lake.

R. B. Stewart[3] examined the west half of Leonard township in 1912, made a geological sketch map, and described the rocks and mining properties.

W. H. Collins[4] in his report on the Onaping Map-Area, which includes the Shiningtree area, gives detailed descriptions of all the formations mentioned in this report, together with the metamorphic, structural, historic, and economic geology of the region. Unnecessary duplication of Collins' work was avoided, and the reader is referred to his excellent treatise for more detail than is included in this report. All references to Collins' work will apply to the "Onaping Map-Area," except where otherwise stated.

Bibliography

References to the Shiningtree silver area are to be found in the following reports:—

E. M. Burwash, Ont. Bur. Mines, Vol. VI, 1896.

A. P. Coleman, "Iron Ranges of the Lower Huronian," Ont. Bur. Mines, Vol. X, 1901.

W. H. Collins, "The Florence Lakes and Montreal River District," Geol. Surv. Can., Sum. Rept., 1909; "The Montreal River District," Geol. Surv. Can., Sum. Rept., 1910; "Geology of Onaping Sheet, Ontario," Geol. Surv. Can., Sum. Rept., 1911, 1912; "Onaping Map-Area," Geol. Surv. Can., Mem. No. 95, 1917.

R. B. Stewart, "The Shiningtree Silver Area," Ont. Bur. Mines, Vol. XIX, pt. 2, 1913.

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[1] E. M. Burwash, Ont. Bur. Mines, Vol. VI, 1896, pp. 173-75.
[2] A. P. Coleman, Ont. Bur. Mines, Vol. X, 1901, pp. 182-85, 211.
[3] R. B. Stewart, Ont. Bur. Mines, Vol. XIX, pt. 2, 1913, pp. 187-93.
[4] W. H. Collins, Onaping Map-Area, Geol. Surv. Can., Mem. No. 95, 1917.

Location and Access

The Shiningtree silver area is situated about half way between the West Shiningtree gold area and the Gowganda silver area, being about fifteen miles from either by road or trail. It includes Leonard township, and small parts of the adjacent townships.

Transportation facilities have been greatly improved within the past year. A winter road fifteen miles long was cut during the winter of 1925-26 from West Shiningtree to the middle of Leonard township. This road runs around the south end of Shiningtree lake and links up with the gravelled highway from West Shiningtree to Westree on the Canadian National railroad. The total distance from the steel to the centre of Leonard township is 39½ miles. In addition to this, a power line and winter road are being constructed from the West Shiningtree area to Gowganda. They will cross the lower end of Shiningtree lake, and will serve the northern end of the area.

The best canoe route to Shiningtree lake is from West Shiningtree, via the west branch of the Montreal river. A circuitous route from Gowganda, via Spowning lake, is used when coming from the east.

Topography

The area is relatively flat, with a few northward-striking rocky ridges, the highest of which rise about 200 feet above the lakes. The southwestern and central parts are swampy. A good stand of timber covers the area, and as a result rock outcrops are not numerous. This is especially true of the eastern half where heavy glacial drift is present.

The creeks are all small and useless for canoeing, with the exception of the outlet of Shiningtree lake and the west branch of Wapus creek. The lakes all occupy rock depressions. Spider and Black lakes strike in a northwesterly direction, while the general trend of the others is north or northeast. This is due to structural differences as explained later.

General Geology

The consolidated rocks are all of pre-Cambrian age; their areal extent can be seen on the accompanying map. The following tabulation is given in descending order, the oldest being at the bottom.

TABLE OF FORMATIONS

QUATERNARY	
Pleistocene and Recent:	Boulder clay, sand, and gravel.
	Unconformity
PRE-CAMBRIAN	
Post-Keweenawan:	Quartz diabase and olivine diabase dikes.
Keweenawan:	Quartz diabase sill.
	Intrusive contact
Animikean (Cobalt Series):	Upper: Quartzite. Lower: Conglomerate, thin-bedded greywacké, quartzite, and conglomerate.
	Unconformity
Kebwatin:	Late: Rhyolite flows, tuffs, breccias, and associated sediments. *Unconformity (?)* Greenstone, pillow lava, and iron formation.

Keewatin

These are the oldest rocks in this area; they have been much folded and metamorphosed, although they have not been badly schisted. Some pillow lava is to be seen on Shiningtree lake, but for the most part the term "greenstone" is the most applicable name for these rocks.

The iron formation is of two types. The northern range, in the northwest corner of Leonard township and the southwest corner of Tyrrell township, consists of banded jasper and grey chert.[1] The outcroppings consist chiefly of hills of broken angular blocks, the result of weathering. The southern range, on the west side of Wapus lake, has been traced for a distance of 4,000 feet and consists of a highly siliceous mixture of hematite and magnetite.[2]

Late Keewatin

The late Keewatin rocks consist of rhyolite, tuff, flow breccia, slate, and arkose or feldspathic quartzite. They have been folded so that now they have dips ranging from 30 to 70 degrees, and strike generally N. 30° W. They occupy a large area in the northern part of Leonard township and extend northward into Tyrrell township.

These rocks have been subjected to much less severe metamorphism and folding than have the Keewatin greenstones. This can be seen in the difference in the degree of alteration of the feldspars, in the general appearance of the rocks, and in the fact that the rhyolite series, with dips up to 70 degrees, is lying on greenstones with vertical dips.

Although the rhyolite, tuffs, breccias, and associated sediments probably belong to the pre-Huronian, as that term is used by Collins, it is the opinion of the writer that they are separated from the Keewatin greenstones and iron formation by an unconformity representing a considerable time interval. Collins also appreciated this when he wrote:—

> It [rhyolite of Leonard township] may have been competent enough to resist the deformative forces which affected the iron formation, but it seems more likely that it is much younger.[3]

Their stratigraphic position could not be determined any more accurately than later than the Keewatin greenstone and iron formation and earlier than the Animikean, for the following reasons:—

1. On the portage from Spider to Black lake a piece of flow breccia was found containing a 2-inch fragment of jasper. Although this piece of rock was loose, it closely resembled the bed rock which outcropped in a 10-foot bluff about 25 feet from the place where the fragment was found. A close search, however, failed to locate any more jasper fragments. The only jasper in this vicinity is generally conceded to be not older than the Keewatin. In order to contain erosion fragments of the Keewatin jasper, the rhyolite flows must be later, and probably considerably later than the jasper and greenstone.

2. Where it outcrops on Spider lake, the rhyolite series is predominantly igneous; but farther east, in the vicinity of Black lake, a change to a predominantly sedimentary character is quite noticeable. Such sedimentary series are not usually found associated with Keewatin greenstones.

3. The relationship between the rhyolite and the Animikean can be seen on the portage between Spider and Bobs lakes. Here the Animikean sediments can be seen unconformably overlying the rhyolite.

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[1] *See* Coleman and Burwash, op. cit.
[2] W. H. Collins, Geol. Surv. Can., Sum. Rept., 1910, p. 201.
[3] W. H. Collins, op. cit., p. 44.

The depressions occupied by Black Lake and Spider Lake are along the axes of folds in the late Keewatin series, thus accounting for the direction of these lakes being different from that of their neighbours. The other lakes in this area occupy depressions caused by faulting, which varies in strike from north to N. 40° E.

Animikean Cobalt Series

This is a sedimentary series consisting of two distinct formations. The older, the Lower Cobalt formation, is composed of a basal conglomerate resting unconformably on the Keewatin, thin-bedded greywacké, quartzite, and on upper conglomerate. The whole series resembles very closely the boulder clay and outwash deposits characteristic of the Pleistocene glaciation.

The basal conglomerate (see photograph below) consists of subangular and rounded boulders of granite, schist, gneiss, quartzite, and jasper, the largest being as much as three feet in diameter. These are cemented by a fine-grained matrix of rock debris, partially altered to chlorite.

Lower Cobalt basal conglomerate at Shiningtree lake. Note large boulder three feet to the right of the hammer.

The greywacké is thin-bedded, and in some instances the layers, which are about a quarter of an inch thick, are of alternate greyish-green and pinkish-grey colours. A thin conglomerate containing quartzite lenses overlies these fine-grained rocks. This contact is conformable in some cases and unconformable in others.

The thin upper conglomerate consists of boulders of a fairly uniform size, with very little cementing material. They represent the same rock types as those as seen in the basal conglomerate.

The basal conglomerate is the same rock that has been called tillite by numerous writers. Although the general appearance of the rock in the Shiningtree area would suggest a glacial origin, no positive proof could be found to support this. Consequently, the term "conglomerate" is used because this formation can be traced, with practically no interruption, to Gowganda, where the basal conglomerate of the Cobalt series contains many boulders weathered directly from the underlying rocks.[1]

[1] A. G. Burrows, Ont. Dept. Mines, Vol. XXXV, pt. 3, 1926, p. 12.

The younger or Upper Cobalt formation is a well-sorted feldspathic quartzite varying from fine to medium grained. Only small areas of it occur, and it conformably overlies the Lower Cobalt formation. It is not thick in this area.

The entire Cobalt series is relatively flat-lying, with a few folds of local character as seen on the east shore of Bobs lake (Fig. 2). Although these folds occur in the greywacké, they are not thought to be due to incompetency during folding, for nowhere in the Cobalt series is there sufficient folding to produce

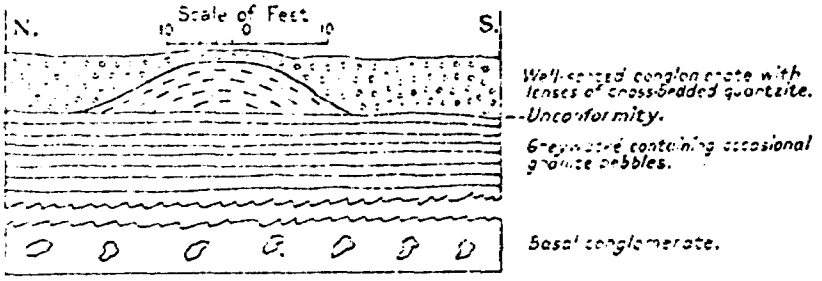


Fig. 1—Section through the Lower Cobalt formation on the north boundary of Leonard township, west of Bobs lake. Although the position of the basal conglomerate is here assumed, the relation between these rocks is well illustrated.

such an effect. Collins,[1] who postulates a glacial origin for the basal conglomerate of the Cobalt series, has attributed these folds to movements of the glacial ice before the greywacké was consolidated.

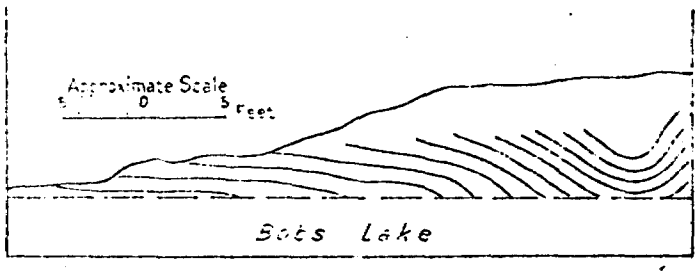


Fig. 2—Folded greywacké (Cobalt) on Bobs lake. Note how the folds die out in 20 feet. This is characteristic of the folds in this formation.

To the east of Black lake it is often difficult to distinguish between the coarse quartzitic sediments of the late Keewatin and the fine phases of the Cobalt conglomerate. This difficulty is increased by the presence of large swamp areas and the smallness of the outcrops.

Keweenawan

To this age is ascribed the major diabase intrusion, which is reponsible for the silver deposits. This rock is a quartz diabase and occurs principally in a large northward-striking sill which runs east of Shiningtree lake and dips to the east. Numerous observations made on both contacts confirmed this dip and

[1]W. H. Collins, op. cit., pp. 67-68.

showed it to vary from 15 to 30 degrees. Small patches of the same diabase are numerous. The attitude of these, and of the large area on the boundary line between North Williams and Leonard townships, was not determined.

Calculations based on a 15° dip across the wide exposure of the sill east of Shiningtree lake indicate a thickness of about 1,700 feet. This is probably exaggerated as a number of northward-striking faults, with the western or hanging walls downthrown, cut the diabase across this area. The total thickness is likely to be less than 1,000 feet. A section north of Spike lake gives a thickness of 400 to 500 feet (Fig. 5). Between Wapus and Shiningtree lakes, it is possible that the sill splits into an upper and lower branch, the upper one outcropping through the Saville Syndicate property and the lower one running towards Baker lake.

The sill diabase varies in texture from very fine or traplike, near the contacts, to coarse and gabbroic, with crystals an inch or more in length. The chief minerals are plagioclase, with about the composition of labradorite, augite, and quartz. The first two occur as ophitic intergrowths and the quartz as an interstitial filling, often in micrographic intergrowth with the feldspar. This feldspar is not entirely the soda-lime plagioclase of the normal diabase, but consists of more or less albite and occasionally a little microcline.

Concentrations of this quartz-feldspar intergrowth have given rise to small areas of red rock, which outcrop at several points along the upper contact of the diabase. Two of the most prominent of these occur, one at the point where Horseshoe lake joins Spider lake, and the other on the peninsula between Spider lake and Spud lake. On first sight these areas have the appearance of small intrusions of red syenite and are always coarsely crystalline. When one of these bodies is approached from the diabase their presence is indicated by the occurrence of red feldspar. This increases in amount, with a corresponding decrease in the pyroxene and plagioclase of the normal diabase, until it forms the bulk of the rock.

The possibility of these being due to assimilation or differentiation has been discussed by several writers,[1] and it has been well demonstrated that the melting of the Cobalt series by the intruding diabase was responsible for the production of the red rock in some areas. In the second outcrop of the red rock above noted, some patches of this material occur near the contact between the diabase and the Cobalt series which may well be partially melted fragments of the latter. This points towards assimilation as the cause of this rock type.

Numerous small aplite dikes occur in the diabase sill and the wall rocks. These are usually less than two feet in width and are probably related to the same magma that produced the diabase.

Post-Keweenawan

The rocks belonging to this age consist of a number of small diabase dikes, rarely over a chain in width, with a northerly strike. They occur in large numbers around Spider and Black lakes. Because of their unimportance from an economic viewpoint, no attempt was made to trace them or to distinguish between the two varieties that occur—quartz diabase and olivine diabase. They weather to a dark-brown colour, which makes it easy to distinguish them from the Keweenawan diabase. Under the microscope considerable magnetite can be seen in the olivine diabase. Nowhere were they seen to cut the Keweenawan.

[1] N. L. Bowen, Jour. Geol., Oct.-Nov., 1910; W. G. Miller, Ont. Bur. Mines, Vol. XIX, pt. 2, 1913, p. 103; W. H. Collins, op. cit., p. 90; A. G. Burrows, Ont. Dept. Mines, Vol. XXXV, pt. 3, 1926, p. 15.

Pleistocene and Recent

Swamp and glacial drift constitute the bulk of the overburden. Stratified clay is notably absent, although stratified sand occurs. The largest swamp areas are in the southwestern and central parts of Leonard township. The eastern quarter of the township is covered with a heavy mantle of boulder clay. In the southeast corner of the area it is arranged in a series of northerly-striking hills, which give the topography a decidedly rolling character. Near the crossing of Wapus creek is an esker which can be traced for about a quarter of a mile. Two sets of glacial striae were seen on Shiningtree lake, one striking N. 5° W., and the other N. 25° W.

Structural Geology

The faulting which has taken place in this area is particularly noticeable east of Shiningtree lake. Here a number of northerly-striking ridges occur which often have their west faces almost perpendicular and the east ones gently sloping.

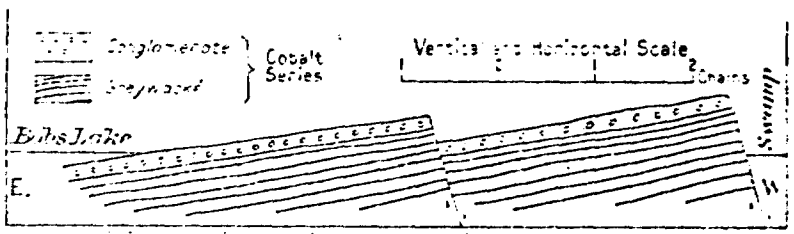


Fig. 3—Section along the north boundary of Leonard township west from Bobs lake.

Although some of these, particularly in the diabase, may be due to differential weathering, others are undoubtedly due to a number of faults with small throws. Proof of this can be seen in the ridges west of Bobs lake where conditions as shown in Fig. 3 may be seen. These ridges usually have a northerly direction, but sometimes swing towards the east as much as 40 degrees.

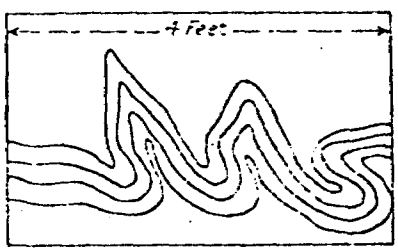


Fig. 4—Sketch showing the shortening of incompetent late Keewatin slate, seen at the south end of Black lake. A shortening of 50 per cent. is here illustrated.

The faulting took place at two different periods and at about the same time as the vein filling. The first faulting was the more pronounced and accounts for most of the movement. It preceded the injection of the gangue minerals into the veins and was followed by a fracturing and slight movement, which reopened the veins or formed new cracks. Into these later-formed fissures were injected the metallics, accompanied by more gangue. The importance of this last faulting is thus emphasized.

The Keewatin rocks have been highly folded with the production of some schisting and vertically dipping beds. The next series, the late Keewatin, was subjected to disturbances along a northeast-southwest line and thrown into a series of folds with some wrinkling up of the incompetent beds (Fig. 4). This series now has dips of from 30 to 70 degrees. Since Keewatin time very little folding has taken place. The Animikean series does not show dips greater than 15 degrees, except in the small flexures already noted. Fig. 5 is a section showing all of the pre-Cambrian formations in this area and demonstrates their stratigraphic and structural relationship.

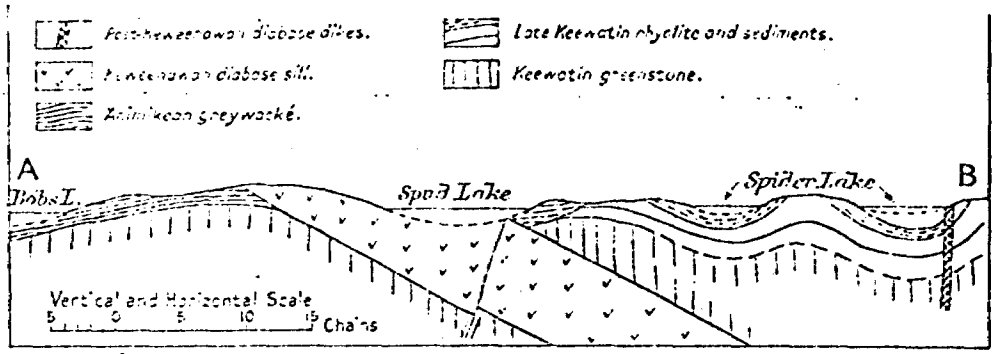


Fig. 5—East-west structure section along line A-B north of Spike lake. The diabase sill here is dipping at 30 degrees, which is the maximum for this area. Further south it flattens to about 15 degrees. The thickness of the late Keewatin and Animikean rocks is assumed, while the vertical attitude of the Keewatin is diagrammatic only.

Economic Geology

Silver

The silver-bearing veins occur chiefly in the Keweenawan diabase sill near the upper contact, and occupy vertical fissures running in directions which range from north to N. 40° E. They vary in width from knife edges up to several feet. The widest seen was a stockwork, on the west shore of Nellie lake, which has a width of six feet.

The filling of the fissures, which occured shortly after the intrusion of the diabase, took place at two periods synchronous with the faulting. The first filling was chiefly calcite with some quartz. Many of the large veins were filled at this time and can be recognized by the coarsely crystalline white calcite and comb quartz. The second filling was of grey or pink calcite accompanied by quartz, silver, niccolite, chalcopyrite, smaltite, and bismuth. These later-filled veins are usually narrow (less than one foot), and the pink or grey calcite is medium grained. In some cases they consist of two or three inches of solid niccolite and smaltite. The silver occurs as small flakes or scales in cracks in the calcite, or adhering to the diabase walls.

The first vein-filling occurred after the first faulting and before the second faulting, while the second vein-filling followed the second period of faulting. For this reason the metal-bearing veins may cut either the diabase or the large, coarsely crystallized veins. On the Archibald claim, silver-bearing veins also cut the diabase at right angles to the general direction of faulting.

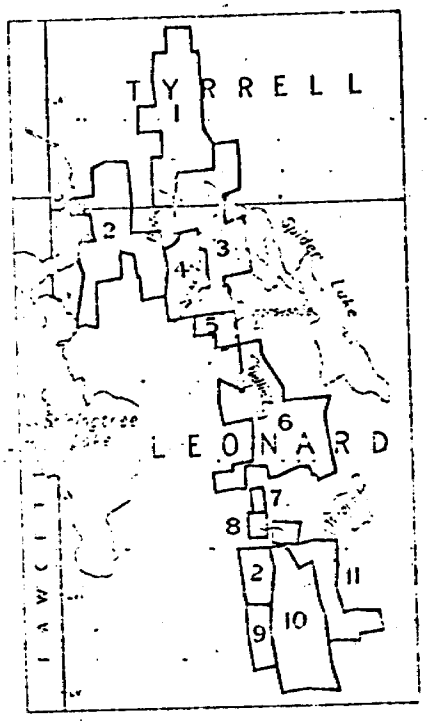
Iron

The northern iron range has never been seriously developed. Consisting as it does of jasper and chert, it is rather unattractive as an iron deposit. The

Wapus Lake range, which consists of a mixture of silica, magnetite, and hematite, has a known length of 4,000 feet and in places is 40 feet wide. Although picked samples of it are said to run 52 per cent. iron,[1] no large bodies of ore have been found.

Development of the Area

The first staking to be done in Leonard township was in 1908,[2] when prospectors from Gowganda recognized the similarity in the two areas. By the end of 1909, five-eighths of Leonard had been staked.[3] Silver was discovered on several claims, and this led to considerable activity during the years 1910, 1911, and 1912. With a few exceptions, nothing has been done on the properties since 1912, and as a result the surface showings have been practically all covered up by the washing in of mud and sand, and the second timber growth. The parts quoted in the following descriptions have been taken from the report of Stewart, who visited the area in 1912.[4]



REFERENCE

1. Currie.
2. Leonard Silver Mines, Limited.
3. Walker Silver Mines, Limited.
4. G. E. Martel.
5. Steep-Thompson.
6. Nellie Lake Syndicate.
7. Neelands.
8. Caswell-Eplett.
9. E. L. Greave.
10. Saville Exploration Syndicate.
11. Archibald.

Key map showing the principal groups of mining claims. Scale, 2 miles to the inch.

Description of Properties

Saville Exploration Syndicate

"The holdings of this company comprise a group of eleven claims, which are situated south and west of Fournier [Wapus] lake. Silver was first found in the area on this property in May, 1909. Considerable surface work has been

[1] W. H. Collins, Geol. Surv. Can., Sum. Rept., 1910, p. 201.
[2] A. G. Burrows, Ont. Bur. Mines, Vol. XVIII, pt. 2, 1908, p. 2.
[3] T. W. Gibson, Ont. Bur. Mines, Vol. XIX, pt. 1, 1910, p. 52.
[4] R. B. Stewart, Ont. Bur. Mines, Vol. XIX, pt. 2, 1913.

done on the claims. Many well-defined veins occur in several places on the property. Much bloom, with smaltite, copper pyrites, and a small amount of bismuth, was observed in several of the veins. No silver was found in place, but small specks were found in pieces of vein matter that had been taken out of one of the veins. The trenches are filling up again to a certain extent, so that small isolated showings of silver could easily escape detection. All the veins that were visited are in the diabase. No work was in progress on this property during the season."

Surface work has been carried out recently, and veins have been uncovered on claims H.S. 864-68 and H.S. 872-74. Silver has been reported from a number of these veins and was seen in place in one. W. F. Currie, of Toronto, now owns this group.

Turnbull

"These claims T.C. 395 and 396 [now belonging to Leonard Silver Mines, Limited] are situated immediately west of those of the Saville Exploration Syndicate. The country rock is diabase. On one of the claims a large calcite vein has been uncovered for about three chains. This vein is three or four feet wide in places. Just west of the large vein, another one occurs that will average probably eight or ten inches in width for a distance of about three claims. The two veins have a strike of about N. 30° E. mag. In the vicinity of the large veins many small stringers occur, one of which carries cobalt bloom."

E. L. Greave

"This group of three claims [G.G. 3,507-9] is located just south of Turnbull's. Surface work was being carried on when the writer visited the property. Three veins, three to six inches wide, occur in the diabase on the most southerly claim. Small amounts of silver were seen in the three veins. The gangue material is quartz and calcite, with small quantities of copper pyrites, galena, and smaltite. Surface work on the most northerly claim has exposed two veins of quartz and calcite associated with aplitic material, but no silver had been discovered."

Caswell-Eplett

"These claims (W.D. 1,145 and 1,146) are located a little west of Fournier [Wapus] lake and immediately north of the claims of the Saville Exploration Syndicate. The formation is chiefly diabase, but the contact between the diabase and the Cobalt series occurs on W.D. 1,145. Quite extensive surface work has exposed many veins on W.D. 1,146. Cobalt bloom occurs in several of the veins. Small flakes of native silver were found in the black muck-like material in a small vein just west of the shaft.

"The most extensive underground work in the area has been done on W.D. 1,146. Mining operations were not in progress when the writer was on the property, but some information regarding the underground work was obtained from Mr. Grant Caswell. A vertical shaft was sunk 100 feet on a vein that showed silver at the surface. A crosscut was run 100 feet east and the same distance west from the shaft. On the east side a calcite vein, eighteen inches wide, and a vein of niccolite, four to six inches wide, were crossed. A calcite vein was found on the west side of the shaft.

"The plant consists of a 20 h.p. upright boiler, a 5 by 5 hoist, three pumps, and a Rand drill."

These claims are now G.G. 4,881 and G.G. 4,884.

Archibald

"This claim lies immediately east of the group of claims of the Saville Exploration Syndicate. Part of the property is heavily overburdened with sand that shows slight stratification. The rock formation is diabase. Surface work has exposed three veins from three to six inches wide and having a general north-south strike. Many smaller stringers and fissures occur in the vicinity of these veins. A small quantity of native silver was observed in one of the larger veins. Quartz and calcite are the chief vein-filling materials. Small amounts of galena, copper pyrites, and cobalt bloom are present."

This group now includes seven claims and during the summer of 1926 was under option to a Toronto syndicate. A shaft was sunk, which showed silver for a depth of eighteen feet over widths of six to eight inches. This silver occurred as flakes or scales in cracks in the diabase and calcite of the vein and was accompanied by chalcopyrite and smaltite.

Neelands

"This claim (H.S. 448) lies just north of W.D. 1,146. Considerable surface work has exposed six or seven veins a few inches in width and with a strike of north to N. 60° E. The formation is diabase. Quartz and calcite are the chief vein-filling materials, but copper pyrites and cobalt bloom are present, and in one vein niccolite, one to two inches wide, occurs. No silver was seen on this property, but the writer was informed that good samples of native silver had been taken from one of the veins."

Nellie Lake Syndicate

"This company have a group of nineteen surveyed claims located in the vicinity of Nellie lake. The chief underlying rock is diabase, but some claims in the group are located on Keewatin. Extensive surface work has been done on several of the claims and many veins have been exposed, of which some are very large. During the season a shaft 34 feet deep was sunk on a large vein that occurs on T.C. 730 and T.C. 731. This vein has been uncovered for a distance of about eight chains and is five to six feet wide in places. Its average width is probably about two feet. The gangue material is calcite, but cobalt bloom, smaltite, niccolite, and bismuth in small quantities are present. The vein has almost vertical dip and strikes, in a general way, about N. 25° E. No silver was seen in this vein.

"Several other shafts and test pits, varying from 20 to 30 feet in depth, have been sunk on promising-looking veins on these claims."

This group is largely controlled by J. B. O'Brian of Toronto, and further development is contemplated.

McIntosh Mines, Limited

"This company's claims [now known as Walker Silver Mines, Limited] are located west of Spider lake in Leonard township.

"The prevailing formation is diabase, but areas of the underlying conglomerate and banded slate occur on several of the claims.

"Just east of Spike lake, a vein six to eight inches wide has been uncovered for several chains. The gangue is quartz and calcite, with considerable copper pyrites and cobalt bloom. This vein dips at a high angle to the west. The surrounding rock has been severely shattered, and many smaller veins occur in the immediate vicinity. A shaft 65 feet deep has been put down on this vein.

"Just east of the vein described above, another vein has been located. This is a very long vein, that runs in a southwesterly direction on to B.G. 264, crosses the northwest corner of Dalton Thomas' [G.G. 5,288] claim and appears in B.G. 252 for several chains. This vein varies in width from a mere crack to five feet in width. It dips in places at a high angle to the west. Calcite and quartz are the chief vein-filling materials, but copper pyrites and cobalt bloom are abundant. Where the vein crosses Dalton Thomas' claim, niccolite one inch wide occurs."

L. O. Hedlund

"This group of three claims is located in the southeastern portion of Leonard. The formation is diabase overlying the Cobalt series. A vein striking about northeast has been uncovered for several chains. A test pit has been put down on this vein, which is about a foot wide at the pit. Calcite and quartz are the chief vein materials. Cobalt bloom, small quantities of smaltite and copper pyrites are present."

Exploration Syndicate of Ontario

"This company control a very large number of claims in the area. At Shiningtree lake a number of claims have been located on the west side. South of the lake a group of 28 claims has been staked on several areas of diabase that occur in that locality. No veins were seen on this group, but the writer was informed by Mr. Smith, formerly engineer for the company, that a strong vein of smaltite occurs on one of these claims."

Steep-Thompson

These claims, G.G. 5,288 and 5,289, are situated on Horseshoe lake, and the veins seen suggest that they are an extension of the McIntosh veins. They strike N. 20° E. magnetic, and carry niccolite, smaltite, chalcopyrite, and cobalt bloom in veins of quartz and calcite.

Currie

This is a group of thirteen claims north of Bobs lake, in Tyrrell township. Surface work and a 20-foot test pit have uncovered several veins. The gangue minerals are quartz and calcite and occupy fissures running about N. 20° E. magnetic. Some of the veins are three to four feet wide and are mineralized with chalcopyrite, smaltite, pyrite, bismuth, and cobalt bloom.

Evidence of surface work and test-pitting could be seen at many points in Leonard township, but unfortunately the workings were all but obliterated, and no information was available as to the showings uncovered.

In 1910 and 1911, considerable stripping was done on the Wapus Lake iron range. This deposit, in the 4,000 feet uncovered, failed to show any large bodies of ore and was abandoned. No interest has been shown in these iron deposits since that time.

Future of the Area

The prospects of finding commercial deposits of iron in this area are not good. The only deposits seen were hard and siliceous, and the failure to locate any large ore bodies on the most promising of them is significant. On the other hand, the future of the silver deposits has yet to be decided. Silver occurs in the area, and the geological conditions are favourable for its concentration in veins. The question to be answered is, Did the diabase bring in a large amount of silver?

The answer to this can only be made after the country has been carefully prospected and developed.

In prospecting in this area the following points should be kept in mind:—

1. The diabase sill dips to the east, and the upper or eastern contact is the more favourable.

2. Veins may be found in the overlying or underlying rocks, but the diabase itself seems to be the most promising.

3. Small veins of grey or pink calcite, which may cut either the diabase or the large veins, are more promising than these large veins.

Ministry of Natura

Ontario

GEOPHYSICAL – GEOLOGIC/
TECHNICAL DATA

41P10SW0105 2.2025 LEONARD

900

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

RECEIVED
JAN 21 1976
PROJECTS UNIT

Type of S rvey(s) EM16, Geological, Geochemical
Township r Area Leonard
Claim Hol er(s) Alamo Petroleum Ltd.
310 - 55 Yonge St. TORONTO
Survey Co apany
Author of Report R.S. Middleton
Address o Author 7 Fiesta Ln, TORONTO, Ontario
Covering l ates of Survey June 10/75 Jan 16/76
(linecutting to office)
Total Mile of Line Cut

SPECIA , PROVISIONS
CREDI S REQUESTED

ENTER 40 days (includes line cut ng) for first survey.

ENTER 20 days for each addition l survey using same gri .

x 12.418 days

DAYS per claim

Geophysical
--Electromagnetic 40 Dn
–Magnetometer
–Radiometric
–Other
Geological 20 Dn
Geochemical *

AIRBORN E CREDITS (Special provision credits do not apply to airborne surveys)

Magnetom ter Electromagnetic Radiometric
(enter days per claim)

DATE: J anuary 16/76 SIGNATURE: R. Middleton
Author of Report or Agent

L.D.

Res. Geol Qualifications on this file

Previous S rveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
L.	454274
	454275
	454276
	454277
	454278
	454279
	425310
	425311
	425312
	425313
	425314
	425315
	425316
	425317
	425318
	425319
	425320
	425321
	425322
	425323
	425324
	425325
	425326
	425327
	425328

TOTAL CLAIMS 25

If space insufficient, attach list

OFFICE USE ONLY

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations 1308 Number of Readings 1308

Station interval 100' Line spacing 400'

Profile scale 1"=20%

Contour interval

MAGNETIC

Instrument

Accuracy – Scale constant

Diurnal correction method

Base Station check-in interval (hours)

Base Station location and value

ELECTROMAGNETIC

Instrument EM-16

Coil configuration

Coil separation

Accuracy

Method ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line

Frequency 24.0 KHz (Balboa Panama)
(specify V.L.F. station)

Parameters measured In phase and Quadrature

GRAVITY

Instrument

Scale constant

Corrections made

Base station value and location

Elevation accuracy

INDUCED POLARIZATION RESISTIVITY

Instrument

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time Frequency

– Off time Range

– Delay time

– Integration time

Power

Electrode array

Electrode spacing

Type electrode

SELF PO ENTIAL

Instrumer _____ Range _____

Survey M hod _____

_____ _____

Correctio made _____

_____ _____

RADIOM TRIC

Instrumen _____

Values me sured _____

Energy wi dows (levels) _____

Height of i strument _____ Background Count _____

Size of det ctor _____

Overburde _____

(type, depth – include outcrop map)

OTHERS (EISMIC, DRILL WELL LOGGING ETC.)

Type of su vey _____

Instrumen _____

Accuracy _____

Parameters measured _____

_____ _____

Additional nformation (for understanding results) _____

_____ _____

_____ _____

AIRBORN SURVEYS

Type of su vey(s) _____

Instrumen s) _____

(specify for each type of survey)

Accuracy _____

(specify for each type of survey)

Aircraft us d _____

Sensor alti tde _____

Navigation nd flight path recovery method _____

_____ _____

Aircraft alt ude _____ Line Spacing _____

Miles flowr over total area _____ Over claims only _____

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken L. 454274 – 454279
L. 425310 – 425328 incl.

Total Number of Samples 714
Type of Sample Soil
(Nature of Material)
Average Sample Weight 30 grams
Method of Collection Auger

Soil Horizon Sampled B
Horizon Development A humus over "B" (gravel)
Sample Depth 1'-3'
Terrain 50-100' hills of outcrop, flat soil over in between hills
Drainage Development Good (recent)
Estimated Range of Overburden Thickness 0-30'

SAMPLE PREPARATION
(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis -80
air dried, pulverized in mortar

General

ANALYTICAL METHODS

Values expressed in: per cent ☐
p. p. m. ☑
p. p. b. ☐

Cu, Pb, Zn, Ni, (Co), (Ag), Mo, As,-(circle)

Others

Field Analysis (_____ tests)
Extraction Method
Analytical Method
Reagents Used

Field Laboratory Analysis
No. (_____ tests)
Extraction Method
Analytical Method
Reagents Used

Commercial Laboratory (714 tests)
Name of Laboratory TSL
Extraction Method Hot Aqua Regia
Analytical Method AA
Reagents Used

General

TYRRELL TWP. - M.253

FAWCETT TWP. - M.803

LEITH TWP. - M.231

NORTH WILLIAMS TWP. - M.240

THE TOWNSHIP OF

LEONARD

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES CANCELLED	C.

NOTES

400' surface rights reservation around all lakes and rivers.

DATE OF ISSUE
JAN 26 1976
SURVEYS AND MAPPING BRANCH

PLAN NO. M.232

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

47°29'30" 80°55' (approx)

41P10SW0105 2.2025 LEONARD

200

FIGURE 7

ALAMO PETROLEUM LTD.

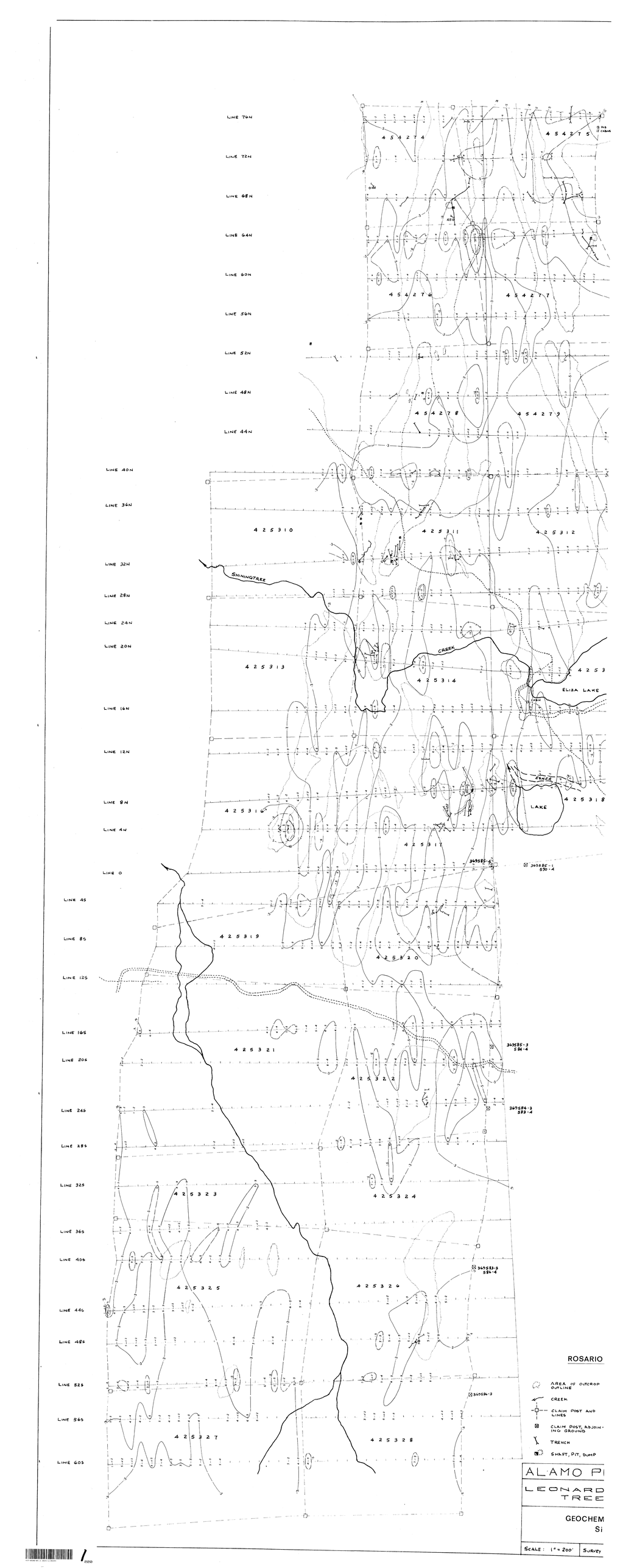
LEONARD TWP. – SHINING TREE PROJECT

GEOLOGY MAP

SCALE: 1" = 400'	SURVEY BY: R. S. Middleton & J. M. Piecash	DATE: 16 August – 04 Sept '75

41P12SW0105 2.2025 LEONARD

210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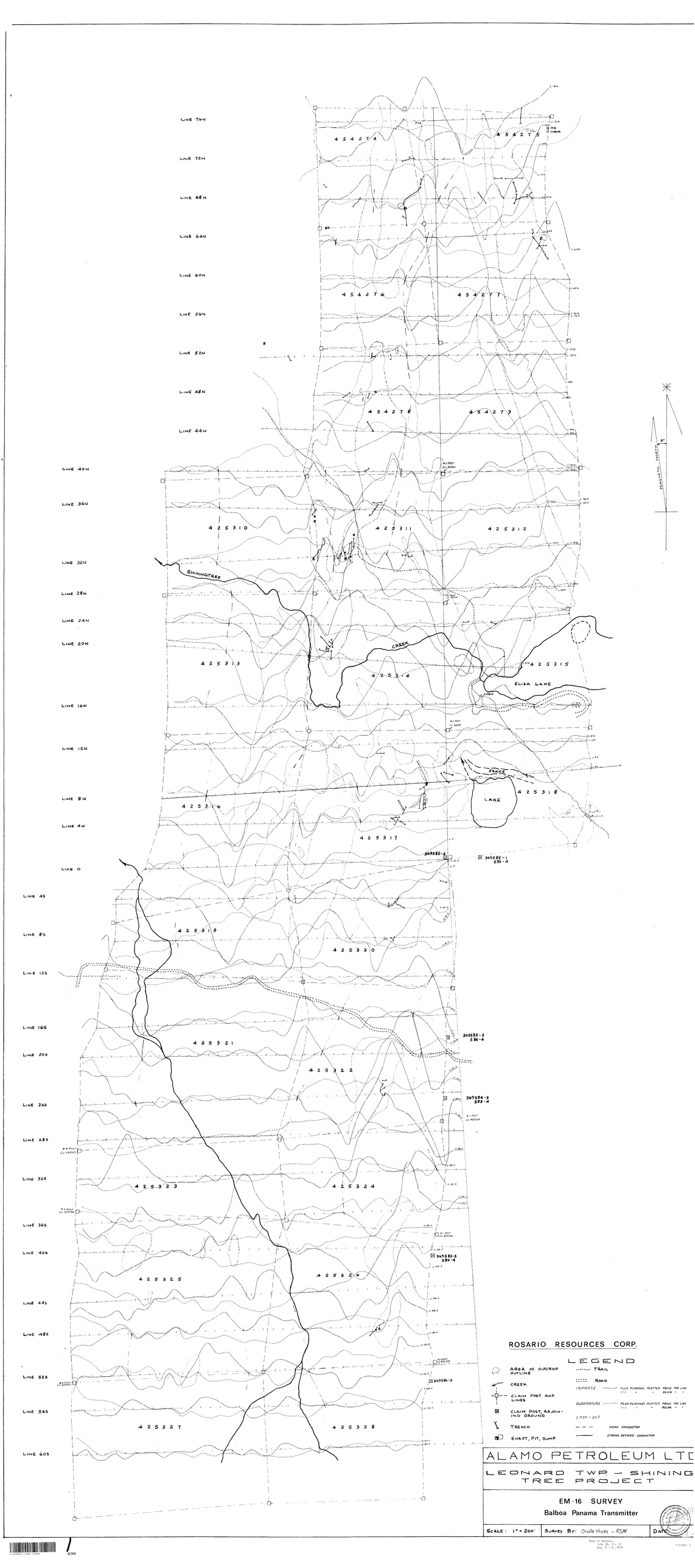
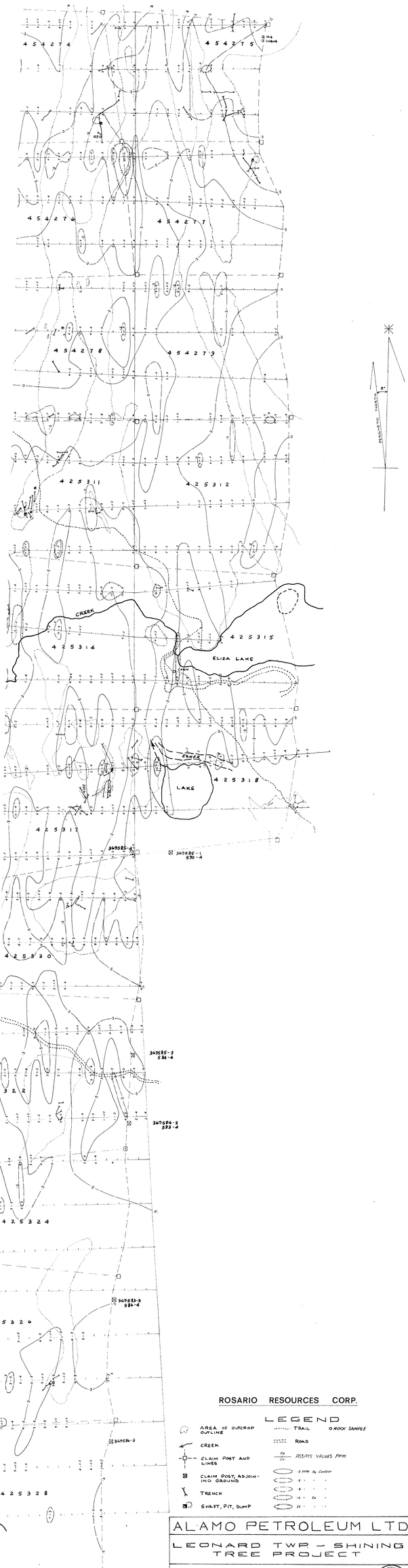
LINE 72N
LINE 68N
LINE 64N
LINE 60N
LINE 56N
LINE 52N
LINE 48N
LINE 44N
LINE 40N
LINE 36N
LINE 32N
LINE 28N
LINE 24N
LINE 20N
LINE 16N
LINE 12N
LINE 8N
LINE 4N
LINE 0
LINE 4S
LINE 8S
LINE 12S
LINE 16S
LINE 20S
LINE 24S
LINE 28S
LINE 32S
LINE 36S
LINE 40S
LINE 44S
LINE 48S
LINE 52S
LINE 56S
LINE 60S
4 5 4 2 7 4
4 5 4 2 7 5
4 5 4 2 7 6
4 5 4 2 7 7
4 5 4 2 7 8
4 5 4 2 7 9
4 2 5 3 1 0
4 2 5 3 1 1
4 2 5 3 1 2
4 2 5 3 1 3
4 2 5 3 1 4
4 2 5 3 1 6
4 2 5 3 1 7
4 2 5 3 1 8
4 2 5 3 1 9
4 2 5 3 2 0
4 2 5 3 2 1
4 2 5 3 2 2
4 2 5 3 2 3
4 2 5 3 2 4
4 2 5 3 2 5
4 2 5 3 2 6
4 2 5 3 2 7
4 2 5 3 2 8
SHINNGTREE
CREEK
ELIZA LAKE
LAKE
369585-1
530-4
369585-3
584-4
369584-3
523-4
369583-3
584-4
369584-3
ROSARIO
AREA OF OUTCROP OUTLINE
CREEK
CLAIM POST AND LINES
CLAIM POST, ADJOINING GROUND
TRENCH
SHAFT, PIT, DUMP
ALAMO PI
LEONARD
TREE
GEOCHEM
Si
SCALE: 1" = 200'
SURVEY


LINE 76N
LINE 72N
LINE 68N
LINE 64N
LINE 60N
LINE 56N
LINE 52N
LINE 48N
LINE 44N
LINE 40N
LINE 36N
LINE 32N
LINE 28N
LINE 24N
LINE 20N
LINE 16N
LINE 12N
LINE 8N
LINE 4N
LINE 0
LINE 4S
LINE 8S
LINE 12S
LINE 16S
LINE 20S
LINE 24S
LINE 28S
LINE 32S
LINE 36S
LINE 40S
LINE 44S
LINE 48S
LINE 52S
LINE 56S
LINE 60S
454274
454275
454276
454277
454278
454279
425310
425311
425312
425313
425314
425315
425316
425317
425318
425319
425320
425321
425322
425323
425324
425325
425326
425327
425328
SHININGTREE CREEK
ELIZA LAKE
LAKE
3405851
3405851-1
530-4
3405853
534-4
3405843
533-4
3405833
538-4
3405823
LEONARD TWP. - SHINING TREE PROJECT
ROSARIO RESOURCES CORP.
LEGEND
AREA OF OUTCROP OUTLINE
CREEK
CLAIM POST AND LINES
CLAIM POST, ADJOINING GROUND
TRENCH
SHAFT, PIT, DUMP
TRAIL
ROAD
INPHASE
QUADRATURE
PLUS READINGS PLOTTED ABOVE THE LINE
1 INCH = 20%
WEAK CONDUCTOR
STRONG DEFINED CONDUCTOR
ALAMO PETROLEUM LTD
LEONARD TWP. - SHINING TREE PROJECT
EM-16 SURVEY
Balboa Panama Transmitter
SCALE: 1" = 200'
SURVEY BY: Orville Hicks - RSM
DATE:
Date of Survey:
July 24, 27, 31
Aug. 3 - 5, 1975
FIGURE 5



ROSARIO RESOURCES CORP.

LEGEND

- AREA OF OUTCROP OUTLINE
- CREEK
- CLAIM POST AND LINES
- CLAIM POST, ADJOINING GROUND
- TRENCH
- SHAFT, PIT, DUMP
- TRAIL
- ROAD
- Ag / Cu — ASSAYS VALUES PPM.
- 3 PPM Ag Contour
- 5 " " "
- 8 " " "
- 10 " Cu "
- 20 " " "
- ROCK SAMPLE

ALAMO PETROLEUM LTD.

LEONARD TWP — SHINING TREE PROJECT

GEOCHEMICAL SOIL SURVEY
Silver —— Cobalt

SCALE: 1" = 200'	Survey By: Orville Hicks – RSM	DATE:

Date of Survey:
July 26, 27, 31
Aug. 2 - 9, 1973

FIGURE 6