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**THE ELEANOR-ARLISS LAKES AREA.  
DISTRICT OF ALGOMA.**

By H.S.K. Metcalf.

Township 29, Range 24, (FE)

**Introduction:**

The Eleanor-Arliss Lakes Area is part of the Michipicoten Area, and is situated in Twp. 29 Range XXIX. District of Algoma. The map area is about 1 mile wide in a north-south direction and stretches from the eastern islands in Eleanor (Lena) Lake about 3 miles west via the north shore of Arliss (Gull) lake, to the Magpie River. The area is composed of 34 claims in the Sault Ste. Marie Mining Division, being Nos. 13682-83-85-86-87-88. 21166-67-68-69-70-71. 22713-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29. 22874. 22945-46 and 23543-44.

These claims are held by Algoma Ore Properties Ltd., Cornwall building, Sault Ste. Marie, Ontario, in whose interests this report is submitted.

The Michipicoten branch of the Algoma Central Railroad, from mile 12.5 to mile 13.5 crosses the western portion of the group, and the old Grasset trail which runs northerly from the east end of Wawa lake, crosses the west shore of Eleanor lake, thence to the foot of Mildred lake, crosses the eastern portion of the group. The forest has grown in on this trail to the extent that the trail now exists only as a footpath but a little clearing would make that portion crossing this claim group quite passable to a jeep.

The mapping was done by pace and compass traverses at 400 foot intervals chained along the claim lines forming the north side of claims 21168, 21169, 22725, 22727, 13688, 13685, 13682 and 22716. These claim lines were used as base lines for the mapping with the following exception: Claim 21171 was covered by traverses running east from the east side of Johnston Mining Location #12, the 400 foot intervals being measured north from the #3 post of claim 21171. Claims 22714, 22946 and 22945 were covered by traverses running south from the north boundary lines, the 400 foot intervals being measured from the #1 post of claim 22945. Claims 22717, 22719 and the S.W. corner of claim 22716 were covered by traverses running north from the south boundary line, the 400 foot intervals being measured east and west from the #2 post of claim 22717.

Wherever possible all traverses were tied in with topographical features such as lakes, ponds and streams. The north-south trending claim lines were used for additional traverses throughout. The work was done from June 25th, 1952 to September 15th, 1952.

Magnetic declination was taken as 5 degrees West for the whole area.

**Previous work:**

While geologists of the Ontario Department of Mines and the Geological Survey of Canada have done a great deal of geological work in the Michipicoten area generally, no previous work in detail has been done on this map area so far as can be ascertained.

"Duplicate"

The bibliography at the end of this report contains a list of reflected references used in the preparation of this report. A more complete bibliography may be found in Burwash's report (3).

The number in parentheses above, and those in the following text, refer to the attached bibliography.

To the best of the writer's knowledge, the old prospect pits and trenches dug by earlier prospectors, and the claim survey for patent completed by E.M. Mac Quarrie, O.L.S. this summer (1952) is the only previous work performed in the map area.

#### Acknowledgements:

The writer is grateful to Mr. Wm. Young of Jalore Mining Company Ltd., for several interesting and helpful discussions on the stratigraphy of the area.

The field work was carried out under most favourable conditions. Very little time was lost due to bad weather. The efficient assistance of Mr. J.L. Betts, M.E. Carter, K. MacDougall, R. MacFarlane, F.H.M. Rutledge and W. Gagne is hereby acknowledged.

#### Topography:

The greater part of the map area is covered by two relatively flat areas. The first is a so-called sand plain which is the old floor of a bay of Pleistocene Lake Algonquin. This plain crosses the western part of the area and continues for some distance to the north east. The plain is quite flat, the only outcrops occurring where a subterranean knoll and ridge rise three or four feet above the general level of the glacial gravel.

The second plateau is a swampy area which extends from the west side of claim 22727 easterly almost to the Mildred lake fault which crosses the northeast corner of the group, and from the Johnston Mining Location #12 to the north side of claim 22721. This area is covered with dense underbrush mainly moose-maple and hazel nut. The only outcrops occur as knobs which rise precipitously out of the swamp, occasionally standing as much as 30 or 40 feet above the general level.

East of the Mildred lake fault, the ground rises steeply about 160 feet. The elevated plateau thus formed is broken into several blocky ridges by minor relief faults running easterly from the Mildred lake fault. This area is largely outcrop with relatively little undergrowth but the terrain makes for very rough travelling.

The remainder of the area consists of rocky hills which roll up from the edges of the sand plain.

Green timber, mainly birch with some spruce, balsam and poplar, covers most of the eastern part of the area to the line shown on the map. In the western part of the area, most of the vegetation has been killed by sulphurous fumes from the sinter plant at Sinterville, some 4 1/2 miles to the southwest. Also a forest fire swept through this section recently so that most of the outcrops are well cleaned.

## Stratigraphy.

Since the map area is relatively limited in extent, evidence regarding the ages of the various formations is very scarce, and at times completely lacking. However, the following classification is compatible with the evidence at hand:

### Cenozoic

Pleistocene: Glacial drift and lake deposits.  
Great unconformity.

### Precambrian:

Keweenawian: Younger porphyritic diabase.  
Intrusive contact.

Algoman: Porphyritic granite.  
Intrusive contact.

Haileyburian: Iron formation.  
Intrusive contact.  
Mica peridotite.  
Metadiorite.  
Older diabase  
Intrusive contact.

Timiskaming: Clastic sediments (Dore and Eleanor series  
of Collins & Quirke)  
Unconformity. (?)

Keewatin: Basic and acid volcanics.

It was noted that all the rocks in the area, except the diabase dykes, carried considerable carbonates chiefly a rusty weathering white to buff-coloured carbonate identified as ankerite.

Basic lavas in part ellipsoidal, occupy the whole area east of the Mildred Lake fault and extend west of the fault across claim 23543 and south into claim 21167. Since Moore and Armstrong (6) estimate the horizontal displacement along this fault at 3,000 to 3,500 feet, the occurrence east of the fault can not be contiguous with the western occurrence.

Young of Jalore Mining Company Ltd., states that he has found pillows in the pre-Dorean of Collins (west centre of Twp. 29 range 24), whose tops face towards each other, indicating a synclinal axis running approximately east-west on a line about  $\frac{1}{2}$  mile south of Steep Hill Falls on the Magpie River (personal communication). This supports Froberg's evidence of steep northward dips at the base of the Dore series near Gros Cap. This indicates conclusively that the Dore lies in a westward plunging syncline, which moves out at the foot of Mildred Lake.

Further, it is generally accepted that the Helen iron range is situated in a slightly overturned anticline, and that this anticline is a part of an anticlinarium which curves north through Muldred Lake and eventually swings east again, passing through the vicinity of Goudreau.

In the face of this evidence, it seems reasonable to assume that the above mentioned basic lavas west of the Mildred Lake fault, are part of a flow which came in from the east, and are therefore, contemporaneous with the lava east of the fault.

In hand specimens, these lavas are mainly fine-grained to felsitic in texture. In colour, they are dark green to black, which weathers to a light grey-green. From this evidence they have been tentatively identified as andesite.

In the vicinity of the faults, considerable chlorite schist has been developed.

East of the Mildred Lake fault, a good exposure of pillows was found, tops facing west. This conforms with the drag on the fault.

Two small bodies of acid lava were found within the basic volcanics, as shown on the map. Both were light-buff in colour, felsitic in texture and very hard. The contacts were largely obscured by overburden, but in the outcrop near Eleanor creek in Claim 23543 appeared to be gradational. These acid lavas have been tentatively identified as rhyolite.

#### TIMISKAMING.

The clastic sediments, previously identified as the Eleanor and the Dore series, were found to be indistinguishable in the field. A section across the western end of the map area is as follows:

A fine quartz pebble conglomerate with greywacke matrix froms the small islands in the bay on the south side of Eleanor Lake. This conglomerate grades into a black slate band about 10' wide on the south side of the peninsula at the east side of the Johnson Mining Location. 3. This slate, in turn, grades into a typical greywacke which was followed around the west side of the lake north to the south bay in the small lake in Claim 21167. There were very few outcrops in Claim 21169, so that it was impossible to determine whether the conglomerate - slate - greywacke series is repeated or not. At the bay mentioned above, the sequence is repeated but the order is changed. The greywacke grades into a slate band a few feet thick, highly schisted with small drag folds and quartz veinlets. The slate grades into a narrow band of fine conglomerate which is in sharp contact with greywacke. The greywacke continues north around the west end of the lake with two more interbedded bands of slate.

This series, from south to north, of conglomerate - slate - greywacke on the south shore of Eleanor Lake and greywacke - slate - conglomerate at the small lake suggests an annual erosional cycle - conglomerate representing the spring flood season, slate the dry summer months, and greywacke the rainy fall when the streams increased their carrying capacity but not as much as in the spring floods. If this theory is correct, then the above mentioned section crosses an ancient synclinal basin.

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In the bed of the creek which drains the lake in Claim 21167, there is an excellent exposure of greenstone boulder conglomerate. This conglomerate is the coarsest bed seen in the area, the average boulder measuring about 4" x 6" while the largest one seen measured 10" x 12". Both the boulders and the matrix are green in colour, the boulders weathering whiter than the matrix. The matrix is softer than the boulders, since the stream erosion has left the boulders in high relief. When broken

the boulders appear to have a coarse granitoid texture due to the alternating dark and light green colour. The boulders have been tentatively identified as metadiorite. No fresh granitic boulders were found, although they may occur. The matrix appears similar to that of the Dore conglomerate as described by Collins and Quirke (1) P.17. At first it was thought possible that this is the southernmost band of the Dore in the area. However, a similar but finer conglomerate occurs in the bed of the stream draining the pond in Claim 22721 and again to the north in Claim 22722. This latter fine conglomerate, consisting of elongated pebbles measuring up to 2" x 4", occurs again along the north shore of Arliss Lake.

Only one small exposure of granite boulder conglomerate, typical of the Dore as described by Collins & Quirke (1) was found in the map area. This occurs some 500 feet north of the #3 post of Claim 22726 and is in contact with highly schisted black slate to the south.

The balance of the map area, with the exception of the intrusives, consists of an interbedded series of greywacke and slate, the slates usually occurring as relatively small lenses, the greywacke comprising about 85% of the total outcrop area.

While there may be some bodies of volcanics in the area, none were positively identified.

The foregoing indicates that the Eleanor and the Dore are one series. Young of Jalore Mining Company Ltd., reports that he has traced the Eleanor east from the Dore, north of the Mildred iron range in Twp.30 Range 24, and found the Eleanor to be a branch of the Dore (personal communication). This evidence lends some support to the above theory.

#### HAILEYBURIAN.

The diabase dyke which follows the Mildred Lake fault is relatively fine-grained, and not too fresh, the ophitic texture is not very distinct. On this account, it has been tentatively identified as one of the older diabase dykes and placed in the Haileyburian after Froberg. (4)

A few small outcrops of metadiorite occur just north of Arliss Lake. Two of these outcrops are cut by diabase dykes, but this is the only evidence of relative age that was found. Accordingly, the metadiorite has been classed as Haileyburian after Moore and Armstrong. (6)

Mica peridotite is the largest and most persistent intrusive noted in the area. There appears to be three bands of this rock, extending from the islands in Eleanor Lake west to the Algoma Central Railroad. There are several facies of this intrusive, which range in colour from dark brown through reddish brown and green to grey. Several of these facies were observed in the outcrops along the long lake north of Arliss Lake. Here, also, considerable gneissic structure has been developed by the faulting. The colour is dependent on the nature of the invaded host rock, and the degree of absorption of the host by peridotite. The green phase was observed in the outcrop on the west side of Eleanor Lake near the prospect pit, which was sunk on a network of veins. This phase occurs again near the northeast corner of the Johnson Mining Location #12, quartz veins again being present. These quartz veins, in both instances, are intrusive into the peridotite. Apparently the quartz permeated the coarse grained, porous peridotite, altering the ferric minerals to green chlorite and silicifying the whole body.

The best examples of mica peridotite occur on the two large islands in Eleanor Lake, and the small island between them. This peridotite is very dark in colour, the principal minerals being olivine, pyroxene and biotite mica. The texture is fairly coarse.

Small veinlets of serpentine occur on the west end of the west island mentioned above. In places this serpentine is semi-fibrous, the fibres running across the veinlet. The widest veinlet seen was about 1/8" wide.

Since only the diabase dykes cut the peridotite, the age is obscure. Therefore, this intrusive was classified as Haileyburian after Moore and Armstrong (6).

A small outcrop of black, slaty material, permeated with rounded blibs of pyrrhotite and pyrite, occurs on the south edge of Claim 22717. This was tentatively identified as iron formation, and placed in the Haileyburian, after Burwash (3).

#### ALGOMAN:

A small outcrop of porphyritic granite was found at the northeast corner of Arliss Lake, and two other smaller exposures at the northwest corner. The diabase dykes were observed cutting similar granite on the south shore of the lake, therefore this granite must be older than the dykes.

This granite is coloured pink to grey and weathers almost white. Principal minerals are quartz and feldspar, the quartz making up 50% or more of the rock. Thus, the composition approaches that of an aplite. On account of this factor, this granite was classified as Algoman after Froberg (4).

Numerous lenses and a few small veins of quartz occur in the map area. Most of these are massive white quartz, but a few were noted which graded from white through glassy and pearl grey to black. Many of these occurrences have been pitted and/or trenched, probably as gold prospects. No noteworthy mineralization was found. One occurrence, between the two dykes in the east part of Claim 13686, contained considerable yellow mica peridotite, they can not be older than Late Haileyburian. The writer is inclined to place them in late Algoman, however, as the final extrusions from the widespread Algoman granite batholith.

Attention is here drawn to the possible similarity between the mica peridotite and porphyritic granite of the map area, and the rocks of the serpentine belt near Thetford, P.Q. - of Dresser & Denis (5). While some of the members of the series at Thetford are missing here, the principle differences between the two localities is the age of the rocks, the Thetford area being placed in the Ordovician.

#### KEWEENAWAN:

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Four porphyritic diabase dykes were mapped trending northwesterly. Three of these run north from Arliss Lake and the fourth crosses the group from the pond on the north boundary of the Johnson Mining Location #12 to the large outcrop in Claim 18643. This last dyke, is remarkable for the quantity and size of the phenocrysts, the largest ones measuring up to 1 1/2" in diameter.

Two other diabase dykes, also porphyritic, trend north-easterly from the west end of Arliss Lake. In all cases, the intersections of these two sets of dykes were buried, so no determination of relative age could be made in this way. However, in hand specimens, the northwesterly trending set appeared much the fresher of the two. Ophitic texture is well developed in both sets. Possibly the two northeasterly trending dykes are older diabase, and should be classed as Haileyburian. Examination of thin sections from each of these dykes might solve this problem.

Since these dykes cut all the other formations in the area, they are classified as Keweenaw.

#### STRUCTURAL AND ECONOMIC GEOLOGY:

Near the witness post at the southeast corner of Eleanor Lake, there is a small drag fold in the greywacke which pitches  $80^{\circ}$  in a direction slightly east of north. This fold indicates a small anticlinal structure to the west of this point, and also that tops of beds face north. The latter confirms in part, the synclinal basin theory developed on page 4, paragraph 9. The indicated anticlinal structure appears to have imparted a sinuous curve to the bands of mica peridotite, this curve centering approximately on the west boundary of the Johnson Mining Location #12. Since this curve is the only feature noted which appears to have occurred prior to the peridotite intrusion, and is, therefore, the only feature which could have affected concentration of any metallic minerals contained in the peridotite magna, it is evident that there is little probability of any commercial deposits in or connected with the peridotite.

However, the northern band of peridotite could not be found crossing Claim 21169, due to heavy overburden. There is also, a possibility of the southern band widening appreciably under the lake. Again the "drag" effected by the Mildred Lake fault is probably responsible for the serpentine developed on the large island. Therefore, the area under the lake appears to be worth some further exploration.

In the western section, there is a series of almost east-west striking faults north of Arliss Lake, which have displaced all the diabase dykes in this locality. The strongest of these faults lies in the long pond just north of Arliss Lake. These are all right hand faults, displacement, if any, is unknown. Since these faults are younger than the diabase dykes, which in turn are younger than the peridotite, they can not have had any concentrating effect on the peridotite magna. While there is a little chalcopyrite disseminated sporadically through the peridotite along the long pond, no other concentrating influences were noted. It would, therefore, seem highly improbable that any worthwhile mineral deposits will be found in, or resulting from, these intrusions.

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GEOLOGIST, ONT. DEPT. OF MINES

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ALGOMA CENTRAL RAILWAY

RECEIVED

JAN 4 1966

RESIDENT GEOLOGIST  
SAULT STE. MARIE

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**NAMES AND ADDRESSES OF MEN  
EMPLOYED ON GEOLOGICAL SURVEY  
ARLISS LAKE - NORTH AREA, MICHIGICOTEN**

| NAME             | POSITION          | ADDRESS                                   | FROM    | TO       |
|------------------|-------------------|---|---------|----------|
| H. S. K. Metcalf | Field Engineer    | Janestown, Ont.                           | June 25 | Sept. 15 |
| J. Betts         | Student Assistant | 450 George Street<br>Fredricton, N.B.     | "       | "        |
| R. McFarlane     | "                 | 121 Main Street,<br>Nashwaaknis, N.B.     | "       | "        |
| F. Rutledge      | "                 | B 4 Alexander College<br>Fredricton, N.B. | "       | "        |
| M. Carter        | "                 | 307 Victoria Street<br>Fredricton, N.B.   | "       | "        |
| K. MacDougall    | "                 | 145 Pin Street,<br>Sault Ste. Marie, Ont. | "       | "        |
| W. Gagne         | Prospector        | Goudreau, Ontario                         | Aug. 1  | Aug. 25  |

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**ARLISS LAKE NORTH AREA  
MICHIPICOTEN AREA**

**DAYS WORK**

| <b><u>EMPLOYEE</u></b> | <b><u>POSITION</u></b> | <b><u>MAPPING</u></b> | <b><u>LINE CUTTING</u></b> | <b><u>DRAUGHTING</u></b> | <b><u>REPORT</u></b> | <b><u>TOTAL</u></b> |
|------------------------|------------------------|-----------------------|----------------------------|--------------------------|----------------------|---------------------|
| H. Metcalf             | Field Engineer         | 65                    |                            | 5                        | 5                    | 75                  |
| R. McFarlane           | Student Assistant      | 62                    |                            | 3                        |                      | 65                  |
| F. Rutledge            | "                      | 60                    |                            | 5                        |                      | 65                  |
| M. Carter              | "                      | 65                    |                            |                          |                      | 65                  |
| K. MacDougal           | "                      | 65                    |                            |                          |                      | 65                  |
| J. Betts               | "                      | 65                    |                            |                          |                      | 65                  |
| W. Gagne               | Prospector             |                       | 20                         |                          |                      | 20                  |

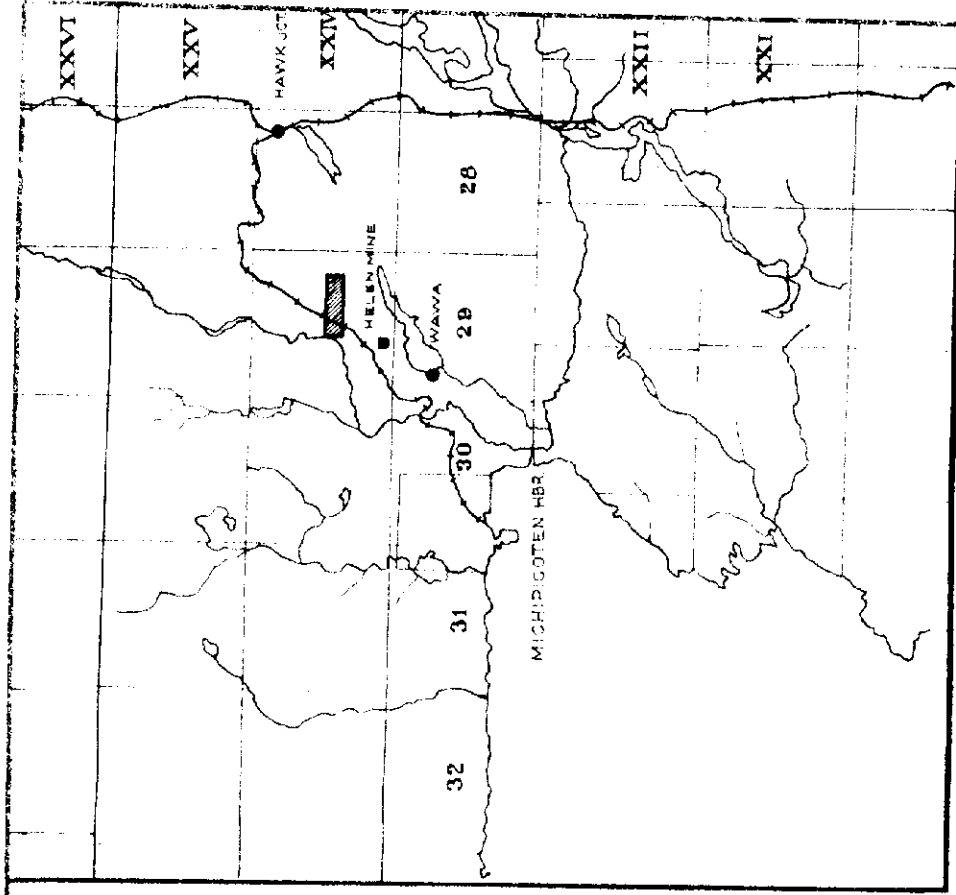
Total man days spent on survey (minus prospector's time) = 400

Total number of claims surveyed = 34.

Man days per claim =  $\frac{400}{34} = 11.8$

Assessment work credit per claim @ 4 days work for each man necessarily employed =  $11.8 \times 4 = 47.0$  days work.

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SCALE 1"=8 MILE

**-SYMBOLS-**

- CONTACT (DEFINED)
- CONTACT (ASSUMED)
- OUTCROP BOUNDARY
- FAULT
- STRIKE & DIP OF BEDDING
- STRIKE & DIP OF CLEAVAGE JONING
- DIRECTION OF TOP OF BEDDING
- WIND
- WIRE WORKINGS

**-LEGEND-**

- CEANOZOIC
  - PLEISTOCENE
    - GLACIAL DRIFT AND LAKE DEPOSITS, GREAT UNCOMFORTS
  - PRECAMBRIAN
    - KELENAWAN
      - YOUNGER PORPHYRIC DIABASE
      - INTRUSIVE CONTACT
    - ALGOMAN
      - PORPHYRIC GRANITE
      - INTRUSIVE CONTACT
      - HAILEBURIAN
      - IRON FORMATION
      - INTRUSIVE CONTACT
      - MICA PERIDOTITE
      - MELADIORITE
      - OLDER DIABASE
      - INTRUSIVE CONTACT
      - TIMISKAMING
      - CLASTIC SEDIMENTS (CORE & ELLESMERE SERIES)
      - KEEWATIN

*-Annotated in field by S.S.M. with only 2 small acid outcrops.*

NOT TO BE REMOVED FROM THE OFFICE OF THE DISTRICT CLERK OF THE MINES SAULT STEPHEN, ONT.

|          |         |                     |               |
|----------|---------|---------------------|---------------|
| PROVINCE | ONTARIO | GEOLOGICAL MAP      | SCALE 1"=400' |
| TRACED   |         | ARLISS LAKE - NORTH | DATE 24/9/52  |
| CHECKED  |         | TWP-29, R-XIV       |               |
| APPROVED |         | DISTRICT OF ALGOMA  |               |

ALGOMA ORE PROPERTIES LIMITED  
HELEN MINE ONTARIO