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DEPARTMENT OF NATIONAL DEVELOPMENT.  
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GEOLOGY OF THE MAVIS TIN LEASE

by

P.G. Dunn.

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# GEOLOGY OF THE MAVIS TIN LEASE

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## SUMMARY

The Mavis tin lease in the Grove Hill area contains a quartz-cassiterite-hematite vein that is conformable with tightly folded, interbedded black slates and metagreywackes. The vein is exposed only in five separate excavations, and it is impossible at this stage to prove that the vein is continuous. Lack of outcrop and erratic distribution of cassiterite in the vein make it difficult to give any figures of possible ore reserves. The Prices Springs Granite is probably the source of the vein.

## INTRODUCTION

The Mavis tin lease is situated about 85 miles south-east of Darwin and 140 miles by road. It is reached by following the Stuart Highway for 112 miles from Darwin; 8 miles of bitumen road to Fountainhead siding; 10 miles of dirt track east along the railroad, passing Grove Hill; and finally by crossing the railroad and following 10 miles of bush track. It is accessible only during the dry season.

The lease was mapped by plane table and alidade in May and June of 1960. Some outcrops were located by compass and tape.

The total relief in the area does not exceed 300 feet, but the hillsides are quite steep. The best exposures are in the creek beds and in excavations along the vein. The slopes are covered by float consisting of all the rock types in the area, including vein material. Some outcrops occur on the hills, but most of them are less than 10 square feet in area.

## REGIONAL GEOLOGY

### LITHOLOGY

The rocks of the area consist of interbedded black slates and metagreywackes. Some slates are slightly hematitic with small (1/32 inch) crystals which are probably hematite derived from pyrite. The slaty cleavage is parallel to the bedding and is more pronounced in some beds than in others.

The metagreywackes have been less altered than the slates by the regional metamorphism. They are commonly reddish-brown to light brown, but in places are bleached along fractures

or joints to a light green. Quartz and feldspar form the largest grains, nearly 1/16 inch long. The micas have been contorted and are aligned subparallel with the bedding. Some of the greywackes are red, probably due to a higher content of hematite.

The only igneous rock found was a small altered basic dyke which crops out only in the creek bed immediately downstream from the point where the track crosses the mainstream. It dips vertically, is 6 to 12 inches thick, and is now composed essentially of mica.

One specimen of tourmalinised graphitic quartz schist, and another of hornfels, containing andalusite crystals 1/2 inch long were found, but neither rock was found in place.

### STRUCTURE

The beds have been folded into a series of north-plunging minor anticlines and synclines that are probably drag folds on the limb of a larger, parallel structure. Small drag folds in the area are parallel to the minor folds, and plunge 30° to 40° to the north. The structure shown on plate 2 is diagrammatic because the relative stratigraphic positions of the outcrops could not be established.

Faulting does not seem to be important in the small area mapped. Slickensides occur on some of the bedding planes; the rake of these is nearly parallel to the dip, and it is probable that they were formed by movement between the beds during folding. A small shear zone is associated with the tin vein in the open cut at the bottom of the hill, but it was not found in other exposures of the vein. The shear is parallel to the bedding, and may also be related to movement during folding.

In addition to the slaty cleavage described above, the finer grained metasediments have a second distinct cleavage, which is not quite parallel to the axial planes of the folds, although the relationship of the cleavage to the axial planes of the folds seems to be constant. This cleavage is not parallel to the bedding, but is easily confused with it.

Joint planes can also be confused with bedding. Some outcrops show a random joint pattern, and the joints are commonly filled with quartz.

### ECONOMIC GEOLOGY

A tin vein, conformable with the bedding, is exposed in three separate open cuts and in an adit towards the top of the hill in the south-eastern portion of the lease. A probable extension of this vein, also conformable with the bedding, is exposed in an open cut at the bottom of the hill. The footwall, when seen, consists of a bed of black slate.

The vein ranges in thickness from 6 to 30 inches, and is composed, in order of abundance, of quartz, cassiterite, and hematite. The cassiterite, which commonly occurs in large crystals, may comprise as much as half of the vein material.

The vein contains two types of cavities. In one type vugs contain euhedral quartz crystals, but no iron minerals; in the other, the cavities are coated with iron oxides and appear

to be caused by the leaching of iron minerals, probably pyrite.

Erosion has removed the vein at the top of the hill, and it does not seem to extend across the main stream at the bottom of the hill. The overall length between exposures is about 800 feet, but the vein may not be continuous over this length. Continuity between the bottom exposure and the adit could be tested by costeans at the places shown on Plate 1.

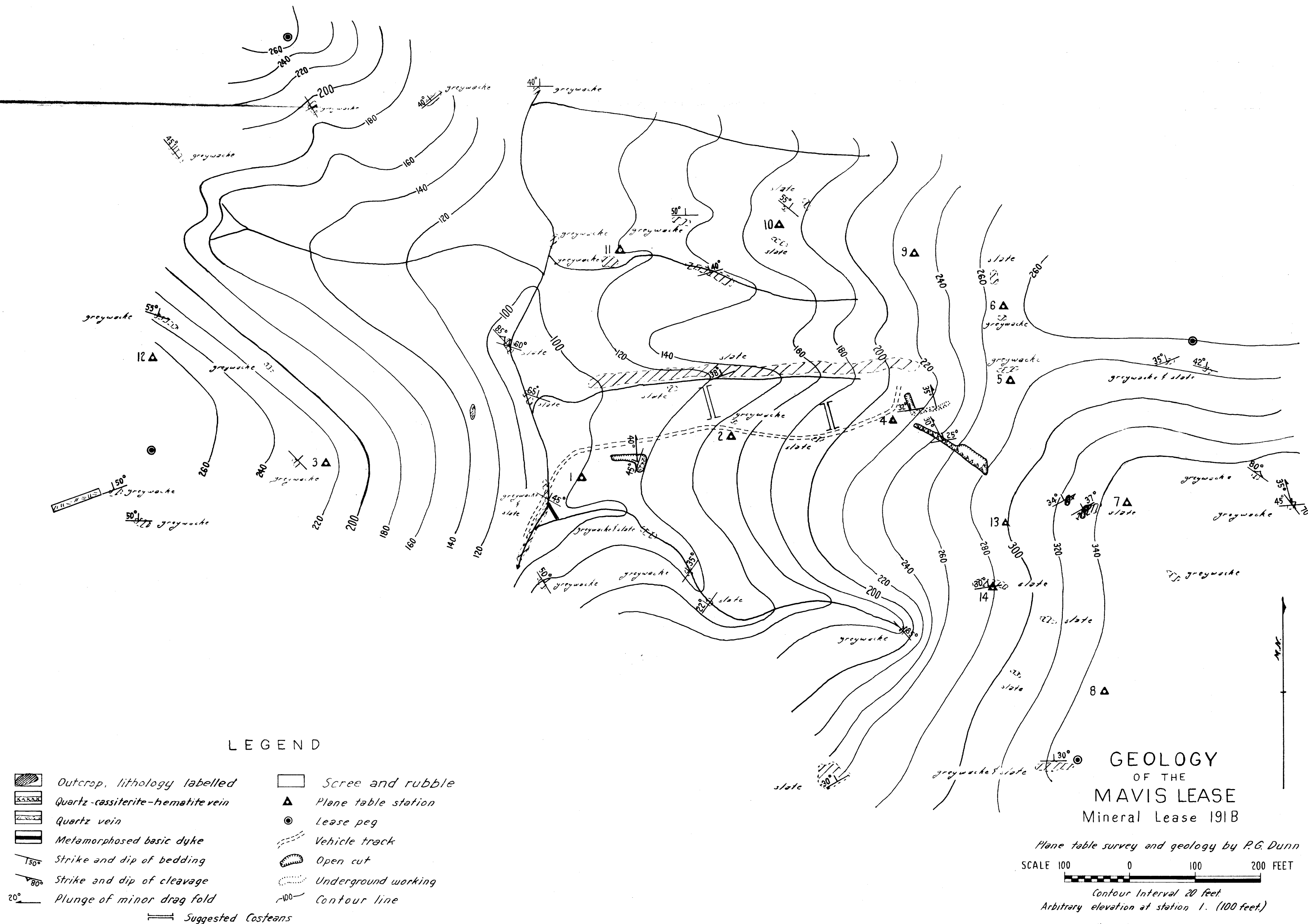
So far the only production from the Mavis lease has been from panning in the main stream downstream from the vein and dollying hand-picked material from the open cut at the bottom of the hill. Total production of cassiterite is approximately two tons. Several tons of vein material have been mined from the large open cut at the top of the hill, and this ore will probably be taken to the Government Battery at Mt. Wells, approximately seven miles away, when it begins operation.

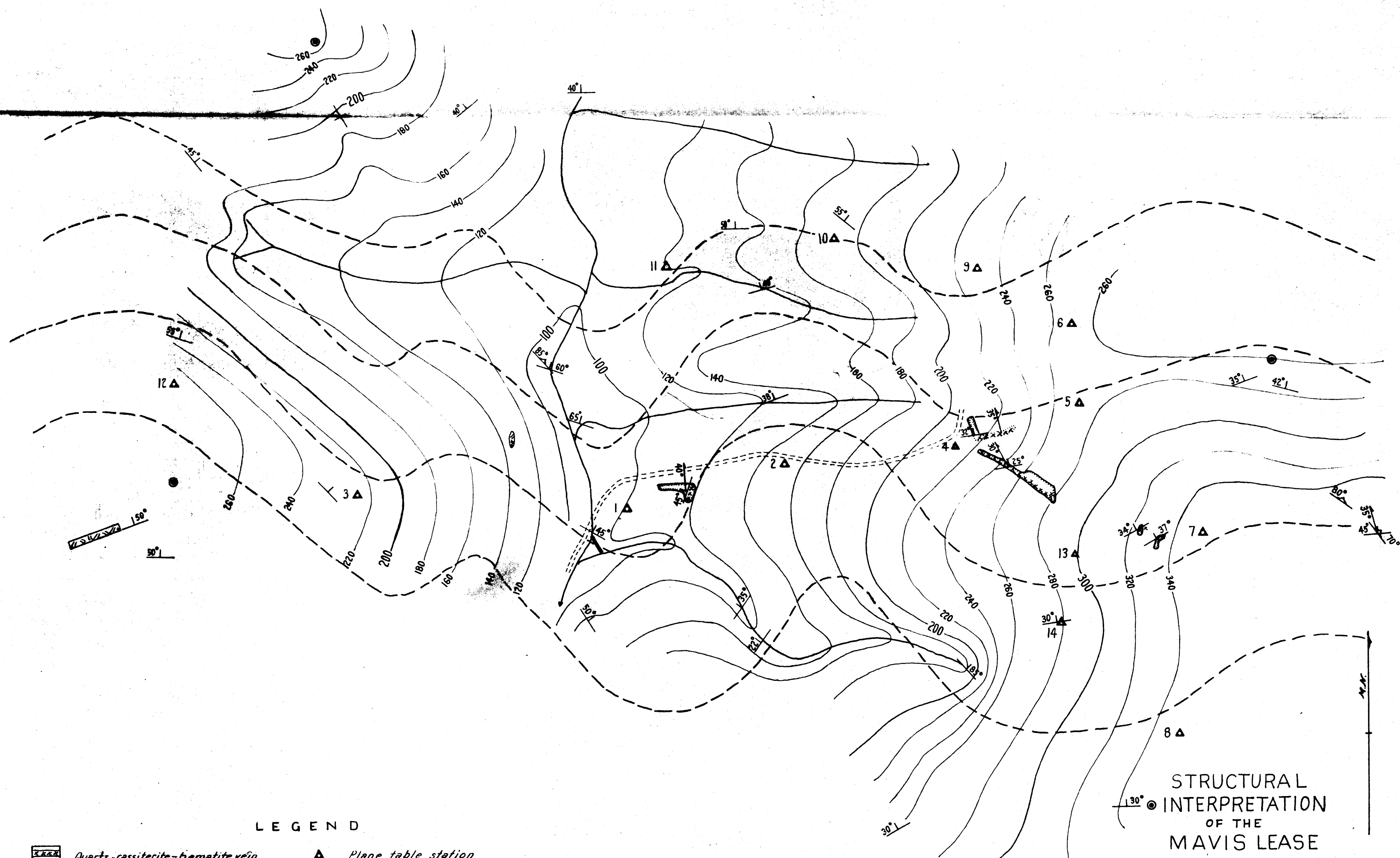
The cassiterite occurs erratically in the vein, and the grade of the ore cannot be estimated at present. The stock-piled ore would be a good bulk sample of the vein in the large open cut, but other bulk samples should be taken from the ends of the vein, and from any exposures of the vein that are found in costeans.

It is not possible at this stage to make any reliable estimate of the total tonnage of vein material available; not only does the thickness of the vein vary, but it is not known whether the various exposures are on a continuous vein. However, further investigation of tonnage and grade is well warranted, because if the vein persists along the strike, some thousands of tons would probably be mineable.

A quartz vein, nearly 10 feet thick, crops out about 100 feet southwest of the southwestern lease peg. It appears conformable with the bedding, but contains no tin. Another barren quartz vein crops out nearly 500 feet east of the southwestern lease peg, but the attitude of this vein could not be determined. Many small conformable stringers of quartz occur in the slates, particularly those that are hematite rich.

The obvious source of the tin vein, and probably also of the barren quartz veins, is the Prices Springs Granite, which is exposed less than one mile southwest of the Mavis lease. The presence of vugs with euhedral crystals makes it unlikely that any of the large veins were formed by any metamorphic process.





LEGEND

- |                                  |                     |
|----------------------------------|---------------------|
| Quartz-cassiterite-hematite vein | Plane table station |
| Quartz vein                      | Lease peg           |
| Metamorphosed basic dyke         | Vehicle track       |
| Strike and dip of bedding        | Open cut            |
| Strike and dip of cleavage       | Underground working |
| Plunge of minor drag fold        | Contour line        |
| Diagrammatic Bedding             |                     |

STRUCTURAL  
INTERPRETATION  
OF THE  
MAVIS LEASE  
Mineral Lease 191B

Plane table survey and geology by P.G. Dunn

SCALE 100 0 100 200 FEET

Contour Interval 20 feet.  
Arbitrary elevation at station 1. (100 feet.)

Resident Geologist's Office, Bureau of Mineral Resources,  
Darwin, N.T. June, 1960.