

**DL-6
PRELIMINARY GEOLOGIC DATA
DIAMOND-DRILLING FOR GEOLOGIC
INFORMATION IN THE MIDDLE PRECAMBRIAN
BASINS IN THE WESTERN PORTION OF
NORTHERN MICHIGAN**

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INTRODUCTION

This report presents more geologic data than appear in the Engineering Report for DL-6 (on the northwest flank of the Amasa Oval, in Iron County), issued in Grand Junction. More geologic information also will follow in a final report on all holes, in which thin sections and chemical analyses will be reported along with correlations among all holes.

LOCATION (Lat. 46°21'42" N., Long. 88°28'22" W.)

Drill location 6 is on wooded hilly land in the NE¼, NE¼ section 30, T.46N., R.33W., Iron County, Michigan, 150 feet northwest from a monument at 1595.14 feet altitude, 573.1 feet S.62°27'30"W. from the NE corner of section 30. This site is reached by driving twelve and a half miles northward from Amasa on U. S. 141, and thence one-half mile northwestward on old, abandoned, U. S. 141. The drill site is on a trail running westward, uphill, from the old road.

SITE SELECTION

This site was selected by the Michigan Geological Survey because U. S. Geological Survey aeromagnetic map GP-609 suggests possible east-trending anticlines and synclines in this area. DL-6 was selected near such a magnetic trough, interpreted to be a syncline, so that drilling would yield as complete a section as possible on State land available.

GEOLOGY

SALIENT GEOLOGIC FEATURES DETERMINED BY DRILLING

Notable observations include the following:

- 1) Sandy and bouldery overburden extends to a depth of 236 feet.
- 2) The orientation of the hole departed from the intended vertical by a maximum of 4½° (N.55°E.) at the terminal depth of 1093 feet, starting with a deviation up to 2° to the northwest at 316 feet, back to 0° at 796 feet, and then to the southeast, southwest, and finally northeast at the bottom. The absence of dominant slaty cleavage here explains the contrast in deviation here compared to DL-1, DL-3, and DL-7, where such cleavage was more pervasive.
- 3) The slaty cleavage at 570 feet is presumed to dip 65°N., in harmony with cleavage observed in outcrops three quarters of a mile to the northwest, as shown by M. P. Foose on U. S. Geological Survey Open File Report 78-386 on the Ned Lake Quadrangle, 1978.

CONTENTS

Introduction.....	1
Location	1
Site selection	1
Geology	1
Salient geologic features determined by drilling.....	1
Complete drill logs (mentioned).....	2
Recommendations for further exploration	2

FIGURES

Figure 1. Cross section showing gross structure at DL-6.3



Geological Survey Division
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- 4) Where both slaty cleavage and bedding occur, they appear to dip in different, and in most cases opposite, directions. The dip of bedding, varying from 55°-90° with an average of 69°, therefore is presumed to be to the south.
- 5) The near parallelism of strike of slaty cleavage and bedding at most levels suggests that the folds are gently plunging.
- 6) The lack of perpendicularity of slaty cleavage to bedding suggests that DL-6 is on the flank of a fold, rather than on its axis.
- 7) The Michigamme Formation consists of massive dark gray and graphitic argillite and slate, a₁ at 253-421 feet, a₂ at 445-630 feet, a₃ at 658-801 feet, a₄ at 903-965 feet, and a₅ at 1020-1093 feet (the latter with common pyrite and graphite), alternating with red oxidized cherty and slaty phosphatic iron-formation with pyrite b₁ at 421-445 feet, b₂ at 630-658 feet, b₃ at 801-903 feet, and b₄ at 965-1020 feet (the latter with hematitic and blue martitic variants).
- 8) Vein quartz occurs as discordant vuggy gray quartz veinlets at 279-281, 297, 372-376, 434, 630-658, and 1035 feet in both argillite-slate and iron-formation members.
- 9) Pyrite occurs in the slate parallel to cleavage, and in the iron-formation parallel to bedding.
- 10) Chalcopyrite is observable in the slate-argillite between 366-376 feet and in iron-formation between 965-977 feet. In particular, one graphitic zone in iron-formation from one of the statistical chemical samples from 848-853 feet contained 3.56% organic carbon (the highest in the hole) and 971 ppm of copper.
- 11) No pyrrhotite was observed.
- 12) No carbonate veinlets were observed.
- 13) White kaolinitic material fills fractures between 307-316 feet.
- 14) Light green talcous material fills fractures between 253-376 feet; white talcous material fills fractures and cleavage planes in the intervals 445-550 and 1077-1093 feet.
- 15) The highly fractured nature of the ground and related poor core recovery below 702 feet, falling to as little as 14% at the terminal depth, the caving, bridging, blocking, and binding of the tools at lower levels, and the difficulty of running geophysical surveys in the hole all suggest that such fractured ground is near a fault. U. S. Geological Survey Map GP-609 (1967) shows an east-west magnetic low extending for at least two miles in the southern parts of sections 19 and 20, to the north of DL-6. Possibly this magnetic trend is in a fault.
- 16) No Precambrian Y diabase was encountered in the hole.
- 17) Scintillometer measurements of the core by Jack W. Avery ranged between 50-90 c.p.s., where background was 60 c.p.s. The highest values occurred in graphitic slates; the lowest values occurred in iron-formation.
- 18) Ammonium molybdate tests of acidized core (1:1 conc. HCl) by William T. Swenor, technician, indicate that argillite and slate are non-phosphatic, whereas iron-formation is phosphatic.
- 19) Because of blockage and bridging in the hole, the Birdwell probes were unable to reach the bottom of the hole.
- 20) Figure 1, on the following page, is a cross section of the gross structure observed in drilling.
- 21) The Birdwell bulk density log shows that argillite and slate range in density from 2.68-2.95 g/cm³, whereas iron-formation varies from 2.55-3.02 g/cm³.
- 22) The gamma-ray log clearly shows that the argillites and slates are significantly more radioactive than the oxidized iron-formation.
- 23) By low values the resistivity log indicates the iron-formation and sulfide-rich zones in the argillites and slates.
- 24) Very difficult drilling, bad core recovery, and very steep formations with very acute intersections in a vertical hole caused us to terminate DL-6 at 1093 feet.

COMPLETE DRILL LOGS

Inasmuch as many valuable details are included in Jack W. Avery's on-site logs, these are being reproduced in their entirety.

RECOMMENDATIONS FOR FURTHER EXPLORATION

No ore grades or tonnages were penetrated by the drill. A slight possibility exists for copper mineralization related to the 971 ppm copper detected in the interval 848-853 feet, in graphitic, broken, cherty oxidized iron-formation (item 10, page 2). If continued up dip, northward, to its subcrop at the base of overburden, it may become relatively shallow mineralization, appropriate for exploration. If continued down dip to the south, this unit may come up and reappear on the south (opposite) limb of the syncline, one mile south of DL-6, in a patch of iron-formation shown by H. P. Foose (1978) on U. S. Geological Survey Open File Report 78-386, Geologic Map of the Ned Lake quadrangle. Alternatively, copper mineralization may occur in the postulated fault stretching for over two miles, from west to east in sections 19 to 20, a short distance north of DL-6 (see item 15, page 2).

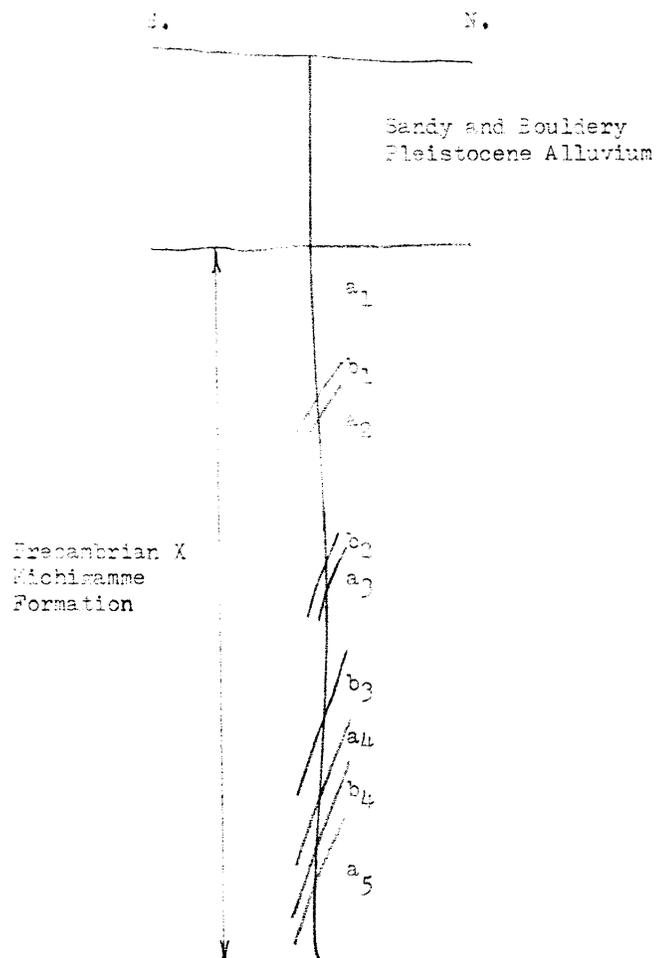


Figure 1.--Cross section showing gross structure at DL-6. For brief description of strata see item 7, page 2.