REPORT ON THE CUTTINGSVILLE PYRRHOTITE DEPOSIT CUTTINGSVILLE, VERMONT

By

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VERMONT GEOLOGICAL SURVEY

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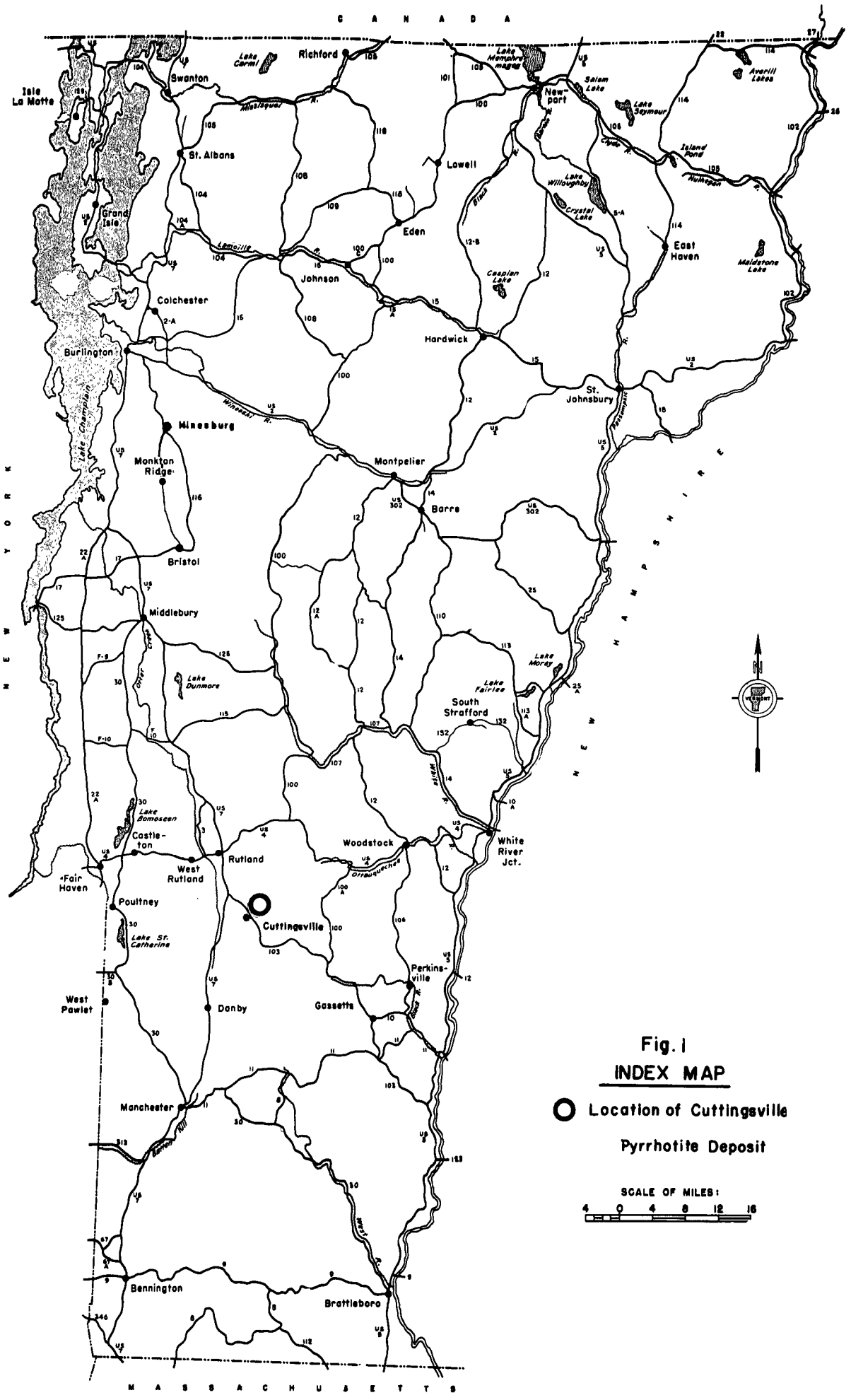
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Maidstone Lake
Lamoille
Johnson
Cassian Lake
Colchester
Hardwick
Burlington
Lake Champlain
St. Johnsbury
Winooski R.
Montpelier
Monkton Ridge
Barre
Bristol
Middlebury
Otter Creek
Lake Dunmore
Lake Morey
Lake Fairlee
South Strafford
White River Jct.
Woodstock
Ompompanoosuc
Lake Bomoseen
Castleton
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Fig. 1
INDEX MAP
Location of Cuttingsville Pyrrhotite Deposit
SCALE OF MILES:
4 0 4 8 12 16

REPORT ON THE CUTTINGSVILLE PYRRHOTITE DEPOSIT CUTTINGSVILLE, VERMONT

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INTRODUCTION

The examination of the pyrrhotite deposit at Cuttingsville, Vermont, was made during the late summer and fall months of 1948 and 1949[1]. It was undertaken primarily for the purpose of determining the extent, geological relationship, and evaluation of the ore body. Preliminary to drilling, which constituted the major part of the examination, a plane table map on a scale of 50 feet to the inch was made of the area (Plate 1). This map made it possible to locate the drill holes accurately, for which 17 sites were marked and 19 holes drilled.

The deposit is located 9 miles southeast of Rutland City and on the southwest spur of Copperas Hill which extends into the valley of Mill River in the village of Cuttingsville. (Fig. 1). It lies on properties owned by Dora Flanagan[2], Stephen Korzun, and Pratt Institute of New York City. Cuttingsville is located in the town of Shrewsbury, Rutland County[3]. A group of old open-pit mine workings occur just above the gravel road leading eastward from the site of the former Cuttingsville railroad station.

There are no indications that the deposit was probed in depth by either shafts or tunnels. The ore mined was confined to the surface and near-surface horizons which would not yield appreciable tonnages. Hence, it was thought feasible to undertake some exploration by means of diamond drilling in order to determine the presence or absence of deeper ore horizons. It might become profitable in the future to extract the iron and sulphur content of the pyrrhotite.

The Cuttingsville deposit was exploited in the early days for the manufacture of iron sulphate, called copperas, which was used in the tanning industry. The process of extracting the iron sulphate from the pyrrhotite ore consisted in stacking the ore on wooden pyres adjacent to the pits and burned, which was known as heap roasting. At a crucial temperature the sulphur would burn and the resulting roasted ore was then leached by water to recover the remaining iron and sulphur as iron sulphate. The conspicuous, large piles of this leached, roasted ore on the slope bear witness to these operations of the past.

PHYSICAL FEATURES

The known ore body extends from elevation 1580 feet southwesterly to elevation 1060 feet at the tracks of the Boston division of the Rutland Railroad[4]. There is ample room for a spur track where the ore can be loaded directly into railroad cars. The upper half of the ore body underlies a 22% slope while the lower half is under a 7% slope. The area of the pits on the steeper slope is forested in contrast to open pasture downslope beyond the gravel road. The deposit is favorably located for inexpensive mining, as the steeper part of the slope can be tunneled where necessary or open-pit mined in the shallower ore horizons. Ground water should be of small consequence here. Where the slope is less steep the ore is close to the surface and can be mined by quarrying methods. An adequate water supply is obtainable from Mill River in Cuttingsville, 1000 feet from the site. Electric power suitable for ordinary mining purposes is also at hand. The area is bisected by the gravel road referred to above, which extends slightly more than a quarter mile beyond the hard surface highway at the site of the former Cuttingsville railroad station (Plate 8).

GEOLOGY

The regional rocks are schists and crystalline limestones of Pre-Cambrian age (Plate 1), (1961). The ore occurs predominantly in the crystalline limestones, chiefly as a replacement deposit. The metamorphic rocks and associated ore strike and plunge toward nearby Granite Hill, an igneous stock whose rocks crop out in the bed of Mill River in Cuttingsville (1918). The deposit appears to be in a contact aureole in which mineralized, fine-grained dikes are common and undoubtedly related to the adjacent igneous stock. These dikes may have had some bearing on the localization of the ore. The rocks are strongly folded and frequent

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[1] The work of this report was supported by a special fund donated for "Research in Copper."

[2] Property now owned by George Brigham.

[3] See topographic map, 15-minute Wallingford Quadrangle. The 7½-minute Wallingford Quadrangle is nearing completion.

[4] Now Vermont Railway, Inc.

brecciation indicates that the ore developed in a fault zone.

Crystalline limestones are exposed in three additional places at the border of the igneous stock (1918) and a mineralized outcrop of brecciated metamorphic rock occurs beside the tracks about three-fourths of a mile west of the Cuttingsville railroad station site. Mineralization is also noted in Granite Hill where some drilling was done to determine the potential of an occurrence of molybdenum ore.

SAMPLES AND TONNAGE ESTIMATES

Ore grades and tonnage estimates are based on selected average samples of diamond drill cores obtained from 19 relatively shallow drill holes which were directionally drilled at 15 sites in a distance of approximately 2300 feet (Plates 2–7). Two ore horizons are recognized, one exposed in five old open pits which were exploited well over a hundred years ago and the other at a fairly uniform depth of 100 feet below the floors of the pits on the upper slope (Fig. 2 and Plate 8). The calculable ore in the open-pit horizon is estimated to be 50,000 tons carrying 18% sulphur. Analyses of core samples from the lower ore zone average 22.4% sulphur in an estimated 95,000 tons of ore.

Diamond drilling has further indicated the lower ore body to be more extensive, but present data is insufficient to permit determination of its minability. The mineral zone, beyond the estimates cited above, is revealed by the limited drill-core data to contain a probable 150,000 tons. However, more exploratory work is necessary to fully substantiate this figure; it could be appreciably higher.

It was originally planned to investigate only the area of the old open pits, hence the limited coverage of the geologic map (Plate 1). However, discovery of the lower ore horizon and its continuation downslope brought about an extension of drilling operations to the area south of the gravel road in the direction of the railroad tracks (Plate 8). Although a thicker section of ore was revealed in this part, brecciated zones made drilling difficult, resulting in poor core recovery and the abandonment of one hole (DDH-M). Drill-hole Site L, somewhat east of the ore zone, was not drilled, but is shown on the geologic map. Although drilled and logged, DDH-O is not shown in Plate 6 because it contributed little to the project.

Copper assays show extremely low values. Traces of chalcopyrite are reported in the lower ore zone (Plate 5). The assays of two drill holes (DDH-I and DDH-P) indicate 0.365 and 0.405 ounces of gold per ton of 2000 pounds, respectively (Fig. 3). Iron averages 36.13% and is associated with manganese averaging 4.72% in the uppermost drill holes (DDH-A, C). Manganese is beneficial in the manufacture of steel. Averages for sulphur have already been stated earlier in this report. It is notable that DDH-A and C which contain an appreciable amount of manganese are low in sulphur.

SUMMARY

In summary, it may be said that a small amount of drilling, due to limited funds, has disclosed the existence of an ore horizon in addition to the one exposed in the open pits. The ore showings and the assay reports are sufficiently attractive to warrant further explorations on the surface and at depth. More geological work, especially in the contact zone at the margin of the igneous mass of Granite Hill, should be undertaken.

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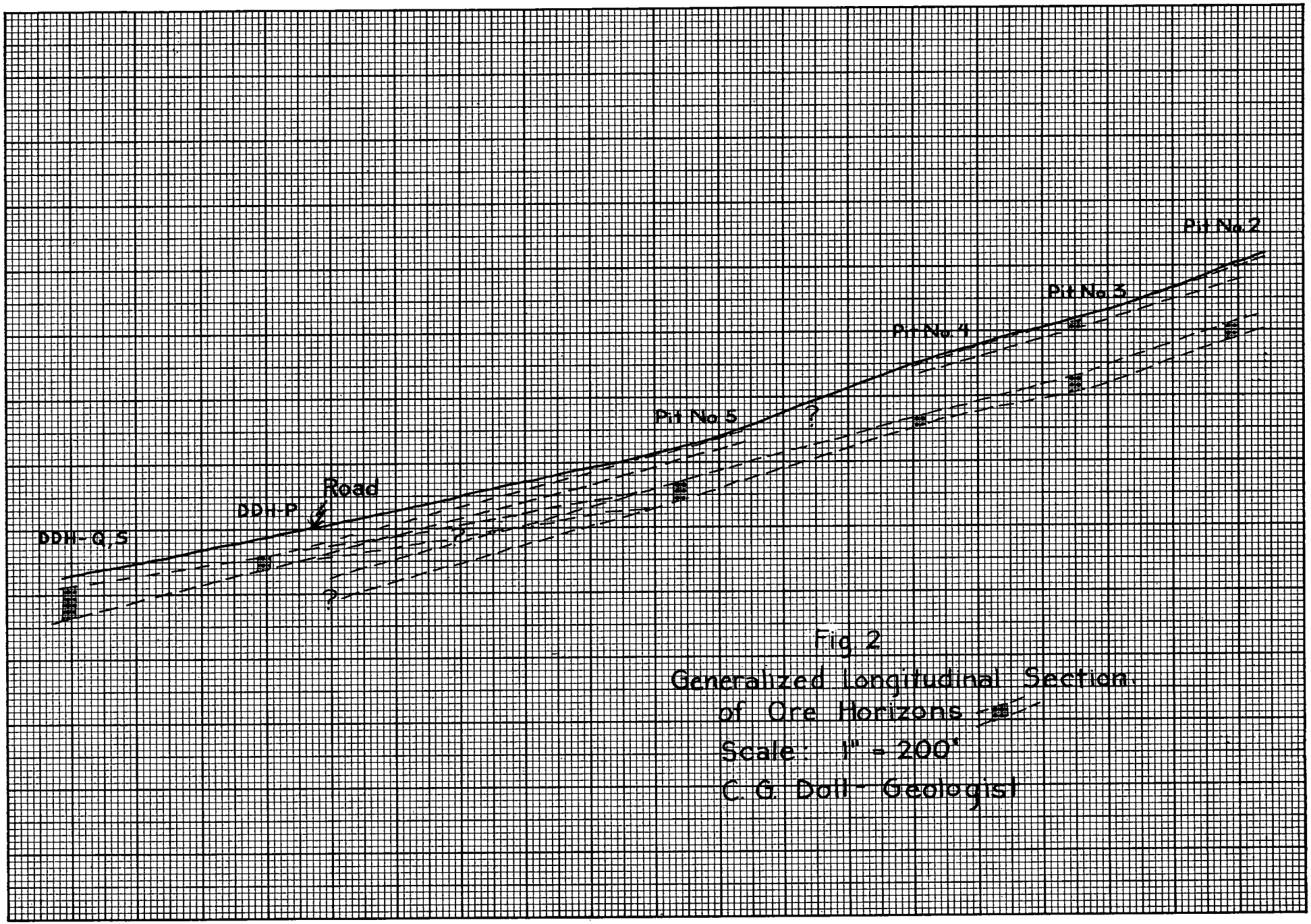

Fig. 2
Generalized Longitudinal Section
of Ore Horizons
Scale: 1" = 200'
C. G. Doll - Geologist

PER TON OF 2000 POUNDS

FIGURE 3

HOLE CORE SAMPLES	GOLD OZ. PER TON	SILVER OZ. PER TON	COPPER PER CENT	ZINC PER CENT	IRON PER CENT	SULPHUR PER CENT	MANGANESE PER CENT	INSOL. PER CENT
A1-4	0.010	0.3	0.05	0.10	35.8	7.3	3.72	17.9
A5-7	0.005	0.3	0.07	0.20	33.0	1.3	5.35	7.4
C1-2	0.005	0.2	0.07	0.15	36.2	2.5	5.69	6.1
C3-5	0.020	0.4	0.06	0.15	33.6	6.6	4.11	18.4
D1-2	0.060	1.0	0.14	0.87	38.2	26.7	2.82	19.1
G1	0.020	0.15	0.18	0.15	42.6	24.9		27.3
G2-6	0.017	0.1	0.07	0.10	27.6	12.3	2.14	17.1
I1	0.365	0.4	0.15	0.30	44.0	26.0		19.3
I2	0.020	0.1	0.04	0.10	11.4	5.0		42.3
I3	0.027	0.15	0.13	0.03	34.6	19.4		9.6
P1-2	0.405	0.25	0.27	0.05	50.6	30.2		10.4
Q1	0.015	0.1	0.26	0.05	52.6	31.2		11.6
Q2	0.005	0.1	0.13	0.05	25.0	14.6		24.0
Q3	0.005	0.15	0.23	0.03	35.2	21.5		26.0
S1	0.015	0.1	0.23	0.05	37.2	21.2		32.1
S2	0.015	0.1	0.35	0.03	50.0	29.0		14.6
T1	0.007	0.15	0.10	0.03	18.4	9.5		30.0
T2	0.005	0.2	0.18	0.03	34.4	20.2		21.2
K1							1.12	

Diamond Drill Core Assays Random Samples
Assay Report by Union Assay Office, Inc.
Salt Lake City, Utah

Legend

Ore

Dike

Gneisses and schists

Limestone

Ore Dumps

Formation Boundary

Boundary wooded area

DDH O
Drill hole site

GEOLOGIC MAP OF AREA OF OPEN PITS
CUTTINGSVILLE, VERMONT

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

C. G. Doll - Geologist

PLATE I

CUTTINGSVILLE PROJECT

0 50 100 150 FEET
SCALE

CONTOUR INTERVAL 10'

Pit No. 1

1570'

Pit No. 2

1550'

1540'

1530'

3" Qtz. Vein Sulphides

5' Qtz. Vein

1.5" Qtz. Vein

Micaceous Run with Qtz. veins carrying sulphides

Chlorite and Qtz. veins

Disseminated sulphides

Disseminated sulphides

9" Qtz. vein

Black fine-grained limestone

Qtz.-calcite veins

Qtz. vein

Chloritic bands

Sulphide traces

Blotches tan-colored calcite; bands of Qtz.

End of Hole B - 60°S15°E
Total Length 268'

Dark-gray limestone with increase in chlorite

Tan-colored limestone with pyrrhotite vein

End of Hole A - 45°S15°E
Total Length 200'

End of Hole C - 45°N15°W
Total Length 151'

Disseminated sulphides pyrite cubes

Sulphides

Contorted brown mica bands

Diamond Drilling Project

Cuttingsville, Vermont

0 10 20 30 FEET

SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

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Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid Ore

PLATE 2

1520'
1510'
1500'
Pit No. 3
1480'
1470'
Scattered sulphides
Occasional ore blotches
Tan-colored sections and sulphides
22" disseminated ore with 4" ore band
10" section ore veinlets
Disseminated graphite
Sulphide veinlet
Scattered pyrite and pyrrhotite
Fine-grained black limestone
Tan color
Scattered sulphides
Disseminated sulphides
Disseminated and veined sulphides
6" fine-grained black limestone
Green and purple coating on fracture surfaces - fluorite; sulphides disseminated and in veinlets
Fine-grained black limestone
Epidote veins and breccia
2" ore
End of Hole D - 45°S10°E
Total length 222'
End of Hole F - 45°N10°W
Total length 141'
2" ore
Tan-colored sections
Tan areas
Sulphides
End of Hole G - 75°N55°E
Total length 175'
End of Hole E - 60°S10°E
Total length 307'

Diamond Drilling Project
Cuttingsville, Vermont

0 10 20 30 FEET
SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

C.G. Doll - Geologist

PLATE 3

Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid Ore

Diamond Drilling Project
Cuttingsville, Vermont

0 10 20 30 FEET

SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

C.G. Doll - Geologist

Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid Ore

PLATE 4

1310'

1300'

1300'

1300'

Pit No. 5

1290'

1280'

1270'

Breccia

Ore band

Breccia

Breccia

Ore band

Ore band

Ore

Breccia

3" ore

3" ore

Ore

Ore

Breccia and ore

Sulphides

Ore bands

Ore with chalcopyrite

Ore

Chalcopyrite

Ore bands

Sulphides

Breccia

Breccia

Chalcopyrite

Scattered ore in section

Chalcopyrite

Chlorite bands

End of Hole I - 45°S26°E
Total length 181'

Sulphides

End of Hole J - 60°S26°E
Total length 237'

Diamond Drilling Project
Cuttingsville, Vermont

0 10 20 30 FEET

SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

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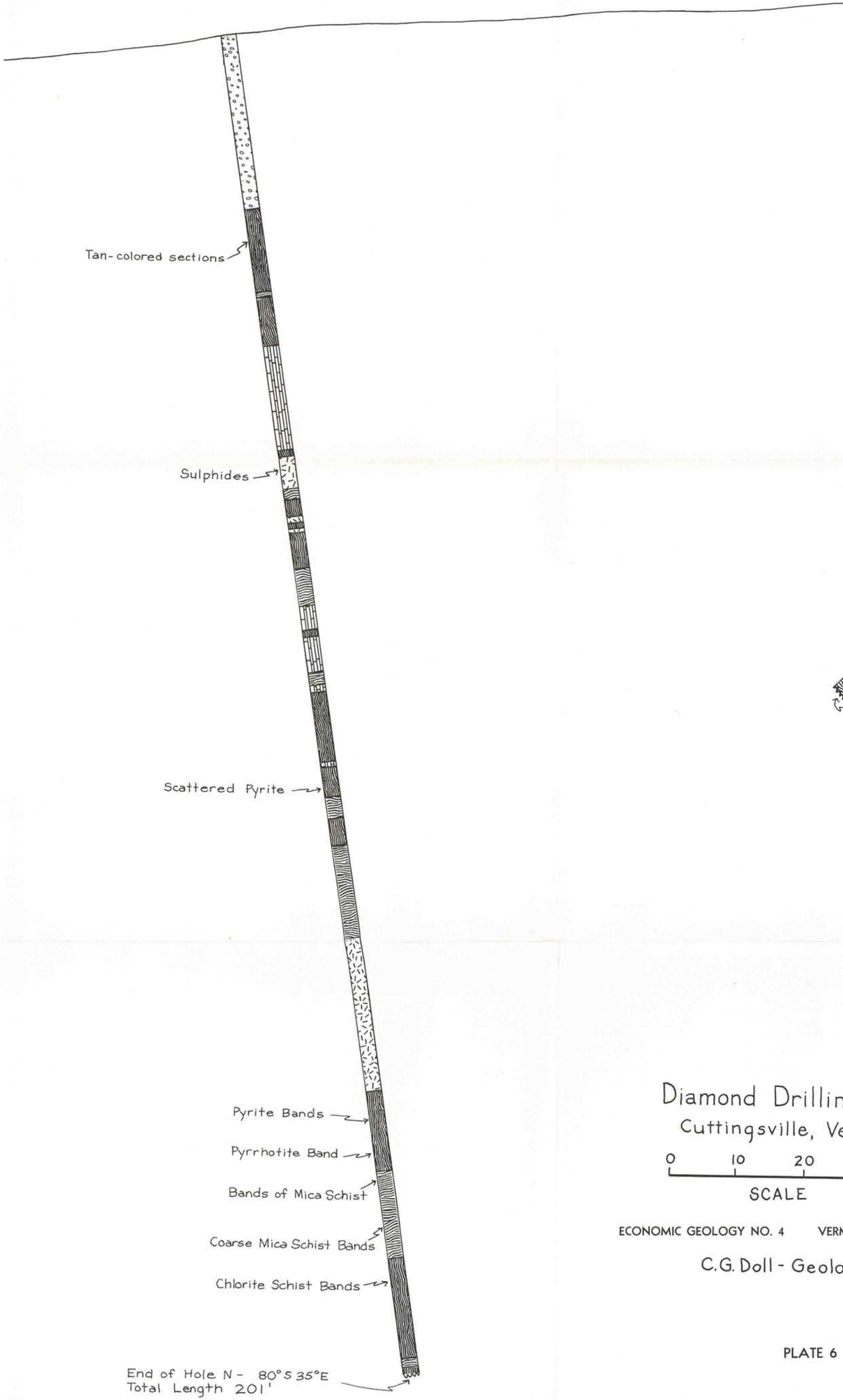
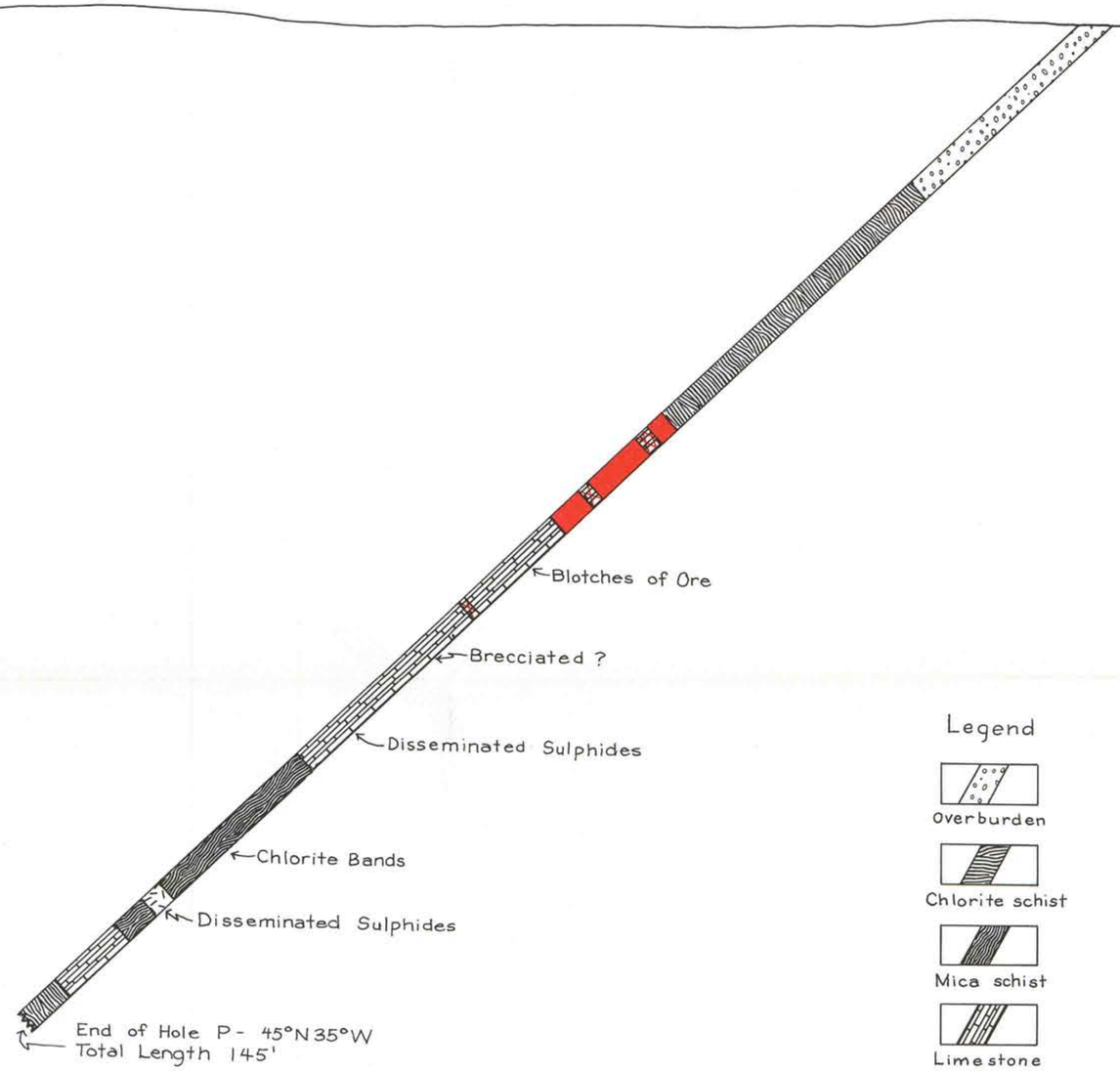
Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid ore

PLATE 5





Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid Ore

Diamond Drilling Project

Cuttingsville, Vermont

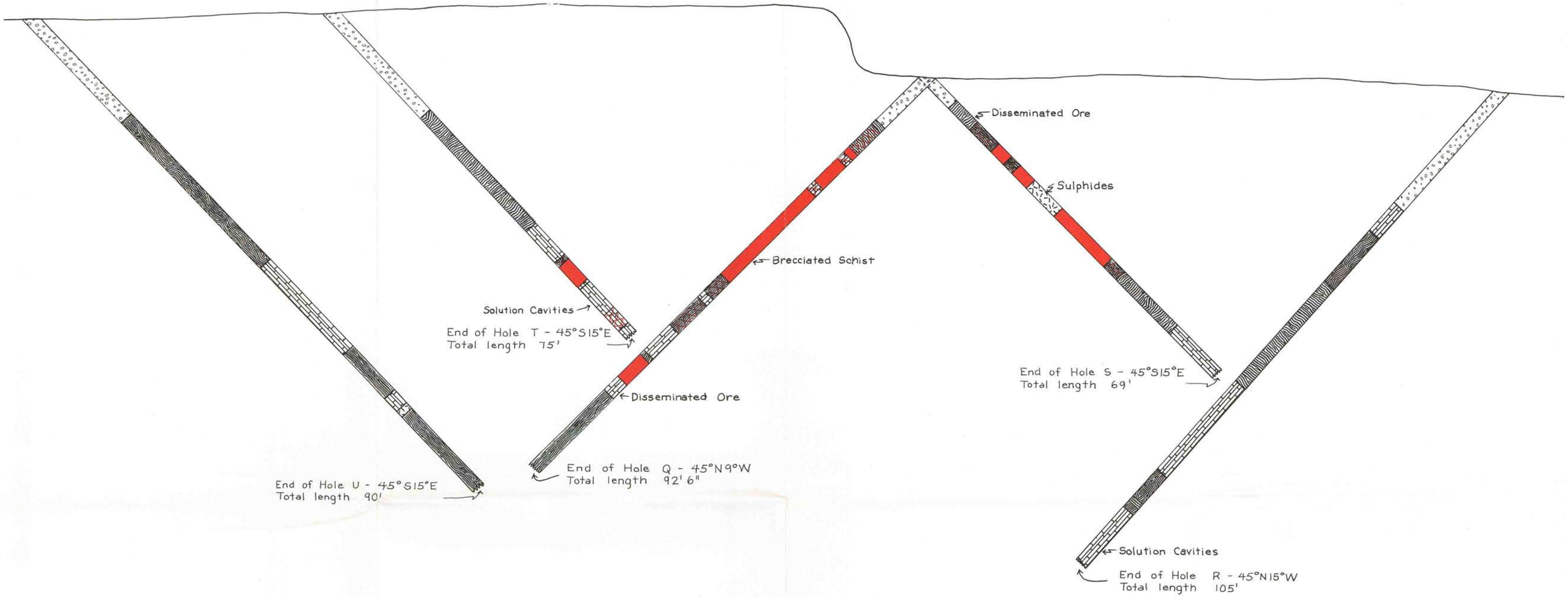
0 10 20 30 FEET

SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

C. G. Doll - Geologist

PLATE 6



Diamond Drilling Project

Cuttingsville, Vermont

0 10 20 30 FEET

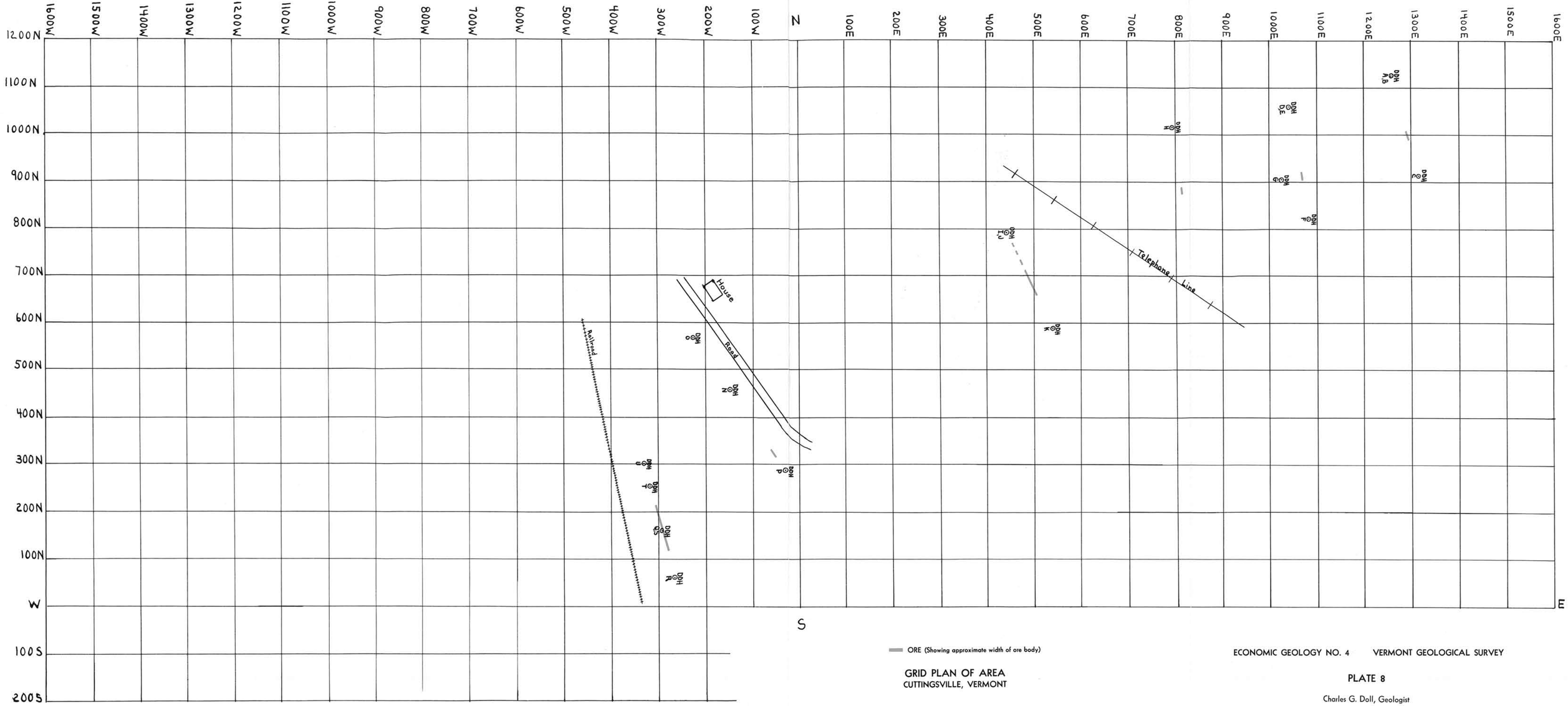
SCALE

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

C.G. Doll - Geologist

Legend

- Overburden
- Chlorite schist
- Mica schist
- Limestone
- Acid dike
- Disseminated Ore
- Solid Ore



ORE (Showing approximate width of ore body)

GRID PLAN OF AREA
CUTTINGSVILLE, VERMONT

ECONOMIC GEOLOGY NO. 4 VERMONT GEOLOGICAL SURVEY

PLATE 8

Charles G. Doll, Geologist