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2 UNITED STATES DEPARTMENT OF THE INTERIOR
3 GEOLOGICAL SURVEY
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7 Memorandum on
8 Mary Louise Copper Mine
9 near Charlemont, Massachusetts

10 by

11 Alonzo Quinn

12 Prepared under the cooperative geologic project
13 of the Massachusetts Department of Public Works
14 and the U.S. Department of the Interior, Geol-
ogical Survey

15 October 14, 1943
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19 **U. S. Geological Survey**
OPEN FILE REPORT

20 **This report is preliminary and has**
not been edited or reviewed for
conformity with Geological Survey
standards or nomenclature.

21 Open-File Report 79- *354*
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Memorandum report on Mary Louise Mine

(known also as the "Kork", "Davenport", or "Gray" mine)

at Rowe, Massachusetts

Location

The Mary Louise mine is 3 1/2 miles north of the village of Charlemont, Mass., and 1.3 miles west by south of the old Davis pyrite mine. It is easily accessible by paved highway, good country road, and a steep lane about a quarter of a mile long. The location is shown on the geologic map, figure 1.

Figure 1 near here.

The mine lies within a mineralized belt that is known to extend for at least 15 miles from West Cummington to Heath. The Davis pyrite mine, several pyrite and copper prospects, the Hawley iron (magnetite) mine, the Anson Betts manganese mine, and several manganese prospects lie within the belt so defined, but these various deposits occur at several stratigraphic horizons and are not localized along a single major shear zone or other distinct structural feature, so far as has yet been determined.

The present owner is Mr. Guy M. Gray of Greenfield, Mass.; he states that his property extends about 1,500 feet along the trend of the deposit.

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Figure 1. Geologic map of an area including the Mary Louise and Davis mines, Rowe, Massachusetts.

Investigation

The mineralized belt in which this mine is located was being mapped geologically by Alonzo Quinn of the Geological Survey when a request for a memorandum regarding the mine was made by the Reconstruction Finance Corporation. Consequently, Quinn concentrated, for the time being, on mapping the mine and studying the geology of the local area. L.W. Currier visited Quinn in the field at the beginning and end of this special study and collaborated in preparing this memorandum. This memorandum does not constitute a complete geologic report on the area, for the regional study is still in progress and the results will be embodied in a final geologic report on the Charlemont-Rowe portion of the mineralized belt as defined above. It is believed, however, that this memorandum contains all essential available data for the present purpose.

The deposit was resampled by Mr. W.T. Millar of the Bureau of Mines while this investigation was being made, and assay results should soon be available. Results of assays on earlier samples taken by Mr. Millar are included below.

History of past operations

Scant data are available concerning past operations at this mine. It is reported to have been opened in 1903 and to have been developed and worked intermittently up to 1912. A crushing plant and smelter were erected during that period and it is reported that a small amount of matte was produced but no production data were available to the writer.

Geologic formations

1 The rocks in the general vicinity of the mine are strongly
 2 metamorphosed sedimentary formations belonging to the Savoy and Hawley
 3 schists (B.K. Emerson, U.S. Geological Survey, Monograph 29 and
 4 Bulletin 597). The deposit and adit lie entirely within the Savoy
 5 schist (see fig. 1). In the present study this formation has been
 6 divided into three lithologic members: (1) quartzite (oldest),
 7 (2) sericite-garnet schist, and (3) chlorite-ankerite schist.
 8

9 The ore deposit of the Mary Louise mine is the quartzite member,
 10 which is here a light-gray to greenish, medium-grained quartzite or
 11 quartz-biotite schist. In places fine muscovite and chlorite are
 12 common on foliation planes. A few thin beds of biotite-schist and of
 13 dark amphibolite also occur within this member.

14 The quartzite member grades easterly into the sericite-garnet
 15 schist, within which the chlorite-ankerite schist appears as a
 16 lenticular bed.

17 To the southeast of, and stratigraphically above the Savoy
 18 schist is the very thick Hawley schist, composed of a considerable
 19 variety of rocks that includes conglomerate, quartzite, schist, and
 20 basic intrusive rocks. Individual facies of the Hawley schist are not
 21 mappable.

Geologic structure

The formations appear as bands that trend northeasterly and apparently are rather closely folded. In the general area the average strike is about N. 45° E. The schistosity is nearly parallel with the bedding, but in the immediate vicinity of the mine it is more easterly, striking N. 50° to 70° E. and dipping from 60° SE to vertical.

The mineralized zone follows the strike of the schistosity, but is apparently vertical, for the outcrop of the mineralized zone at prospect pit #3 and the shaft collar are directly above the drift and winze in the ore body, 120 feet below the surface.

The schistosity of the quartzite near the mine is parallel with the axial planes of small drag folds and hence not exactly parallel with the bedding. The mineralized zone itself, besides showing very small drag folds and crenulations, shows also some degree of fracturing and brecciation, but these features are not prominent and though they suggest localized shearing effects, there is no discernible displacement of beds nor are there any sharply defined walls. The distribution of sulphide minerals within the zone may be influenced to some extent by the linear structural elements which plunge 30° to 35° N. 80° E.; if so, the mineral body may be more extensive toward the east than the west.

It is apparent that the deposit at the Mary Louise mine is not at the same stratigraphic position as the deposit at the Davis mine, and there is no evidence that these mines are in the same zone of mineralization.

Ore deposit

General description.--The ore body lies in a poorly defined fracture zone that ranges up to 15 feet or more in width where now exposed. Within this zone are thin veinlets of quartz and chalcopyrite that range up to 8 inches or more in thickness, but in which the proportion of chalcopyrite is greatly variable. The veinlets are not uniform in trend or thickness and they commonly wind irregularly through the mineralized zone. Individually they do not appear to be continuous for long distances, though their general continuity cannot be determined in present accessible workings. There is some disseminated chalcopyrite in the walls of these veinlets, but much of the fracture zone material appears to be barren.

The deposit is apparently that referred to by W.H. Weed (Copper deposits of the Appalachian states: U.S. Geol. Survey Bull. 455, 1911, p. 34), though Weed places the property slightly farther west. Weed states: "About 2 miles west of the Davis mine a property opened in 1900 and intermittently worked since that date shows, according to information furnished.....by Prof. W.O. Cushy, an approximately vertical vein, conforming in strike and dip to the inclosing Savoy schist. 'It is apparently a fahlband, lacking well-defined walls, the ore being scattered through 15 to 20 feet of schist. There is a seam of well-mineralized quartz, 6 to 12 inches wide, lying along the south wall, and on the north wall there is a streak of chalcopyrite 1 to 2 feet wide. The vein is exposed by stripping and cross-cutting for a distance of 700 feet.'" Except for the 1 to 2 foot streak (which may

1 appear in other parts of the mine now inaccessible), and the inaccuracy
2 of the stated distance from the Davis mine, this description fits
3 the Mary Louise deposit.

4 Mineralogy.--The minerals of the deposit, besides those that
5 compose the enclosing country rock, are quartz, chalcopyrite, and
6 pyrite. A very little fine-grained molybdenite was seen in loose
7 pieces of ore, but this mineral was not seen in place.

8 Underground workings.--The old shaft is 125 feet deep, and
9 apparently follows the mineralized zone. About 120 feet below the
10 collar it meets the adit, which was driven into the steep hillside for
11 710 feet and through the ore body. From the adit a west drift 25 feet
12 long, and an east drift 50 feet long were driven in the ore body.
13 A few feet east of the adit is a winze that was sunk about 50 feet
14 below the adit level; this winze has been developed into an underhand
15 stope.

16 The shaft and old stopes above the adit level were not accessible.

17 Within the adit, 143 feet from the portal, is a 6 inch quartz-
18 pyrite vein that strikes N. 70° E. and dips 65° SE. About 20 feet
19 farther north is a barren shear zone N. 40° E, 60° SE.

20 On the floor of the winze two veins were seen, each containing up
21 to 2 inches of chalcopyrite. On the east face of the winze-stope the
22 following section was seen:
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12" mica schist (south end of section).

6" to 12" quartz and chalcopryrite, not more than 25 percent
chalcopryrite.

60" quartzite and schist.

2" to 7" vein of quartz and chalcopryrite (predominantly quartz).

12" biotite-schist with a few grains of pyrite and chalcopryrite.

30" quartzite.

1/2" chalcopryrite.

8" biotite schist (north end of section).

The face of the west drift showed the following section:

1/8" rusty quartzite (south end of section).

53" quartzite.

2" to 6" vein of quartz and chalcopryrite, the chalcopryrite
totalling less than 1". This vein extends about 40 feet
upward into the stope, so far as can be seen.

11" quartzite, barren.

42" schistose quartzite, much folded, with a few 1/8" stringers
of chalcopryrite.

24" quartzite (north end of section).

Description of surface workings.--At prospect no. 1 (see fig. 2), a

Figure 2 near here.

vertical cut about 6 feet high on the side of the hill shows two
half-inch weathered veins of quartz and chalcopryrite.

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Figure 2. Mary Louise Mine, Rowe, Massachusetts, plane table survey.

1 At prospect #2, a rectangular opening 15 feet long, 10 feet
2 wide, and 3 feet deep exposes an 8-inch vein of rusty quartz sulphides,
3 pyrite crystals distributed sparsely in the adjacent rock material, and
4 a 1-inch vein of quartz and sulphides.

5 At prospect #3, a zone 6 feet wide is exposed, in which may be
6 seen a 1-inch vein composed chiefly of chalcopyrite, a 6-inch zone of
7 chalcopyrite and quartz stringers, and a 2 to 6-inch vein of quartz
8 and chalcopyrite; the proportions of chalcopyrite and quartz are
9 markedly variable, but quartz predominates. The rest of the exposed
10 zone is apparently barren schist.

11 At prospect no. 4, the exposed part of the mineralized zone is 4
12 feet wide, and shows four chalcopyrite veinlets, each about a quarter
13 of an inch wide.

14 At prospect no. 5 a mineralized zone 2 to 4 feet wide is exposed
15 in a pit 2 feet deep, and on an adjacent bluff to the east. It is
16 composed mainly of rusty quartz with a few veinlets and scattered
grains of partly weathered sulphides.

17 Summary statement.--The ore body lies in a general but vague
18 fracture zone 10 to 15 feet wide (as now exposed) and consists of
19 several narrow discontinuous veinlets of quartz, chalcopyrite, and
20 pyrite. In places the sulphide minerals are disseminated in the rock
21 rather than being in veins. Generally at any one place in the
22 mineralized zone there are three or four veinlets, each varying from a
23 quarter of an inch to 8 inches in width and each varying from almost
24 solid chalcopyrite where narrow to mainly quartz with only a few grains
25

1 of chalcopyrite. At no place does the chalcopyrite form more than a
2 very small fraction of the total width of the rock which would have to
3 be mined.

4 Prospect cuts indicate that the mineralized zone extends over a
5 distance of 500 feet (see fig. 2) along the schistosity. To the
6 east of the bluff at prospect #5 there are no further exposures along
7 the strike of the zone for 500 feet. To the west of prospect #1
8 scattered outcrops show a very few small rusty patches through a
9 distance of 600 to 700 feet; no copper mineralization was seen in these
10 outcrops.

11 The small veinlets of ore tend to follow the schistosity, but
12 also cut irregularly across it and in places follow small folds in the
13 quartzite. Within the mine, the mineralized zone is almost vertical,
14 which is not in agreement with the expectation that it might dip
15 southeast with the schistosity. The vertical extent revealed by
16 mining is 170 feet.

17 Mineralogical evidence indicates a hydrothermal origin at great
18 or moderate depth. The solutions came in along the fracture zone and
19 in part replaced the rock adjacent to the fractures. The mineralogical
20 character, together with structural evidence, gives reason to believe
21 that the deposit may continue downward for a considerable distance,
22 but marked increase of values with depth is not indicated or suggested
23 by any available data. The vein is perhaps a little richer at the adit
24 and winze levels than at the surface, but this would need to be
25 confirmed by careful sampling.

Mr. Millar, of the Bureau of Mines, has recently taken samples at several points in the mine, and has furnished the following results of assays:

<u>Sample No.</u>	<u>Description</u>	<u>Cu percent</u>
1A	147 feet north of adit portal	trace
2A	4-foot cut across face of west drift	0.94
4A	Sorted ore in boxes	14.5
WTM 104	North 26 inches across face in bottom of winze stope	5.03)
WTM 105	2-foot center cut from same face	0.37)
WTM 106	3-foot south cut from same face	0.52)
		average 1.84

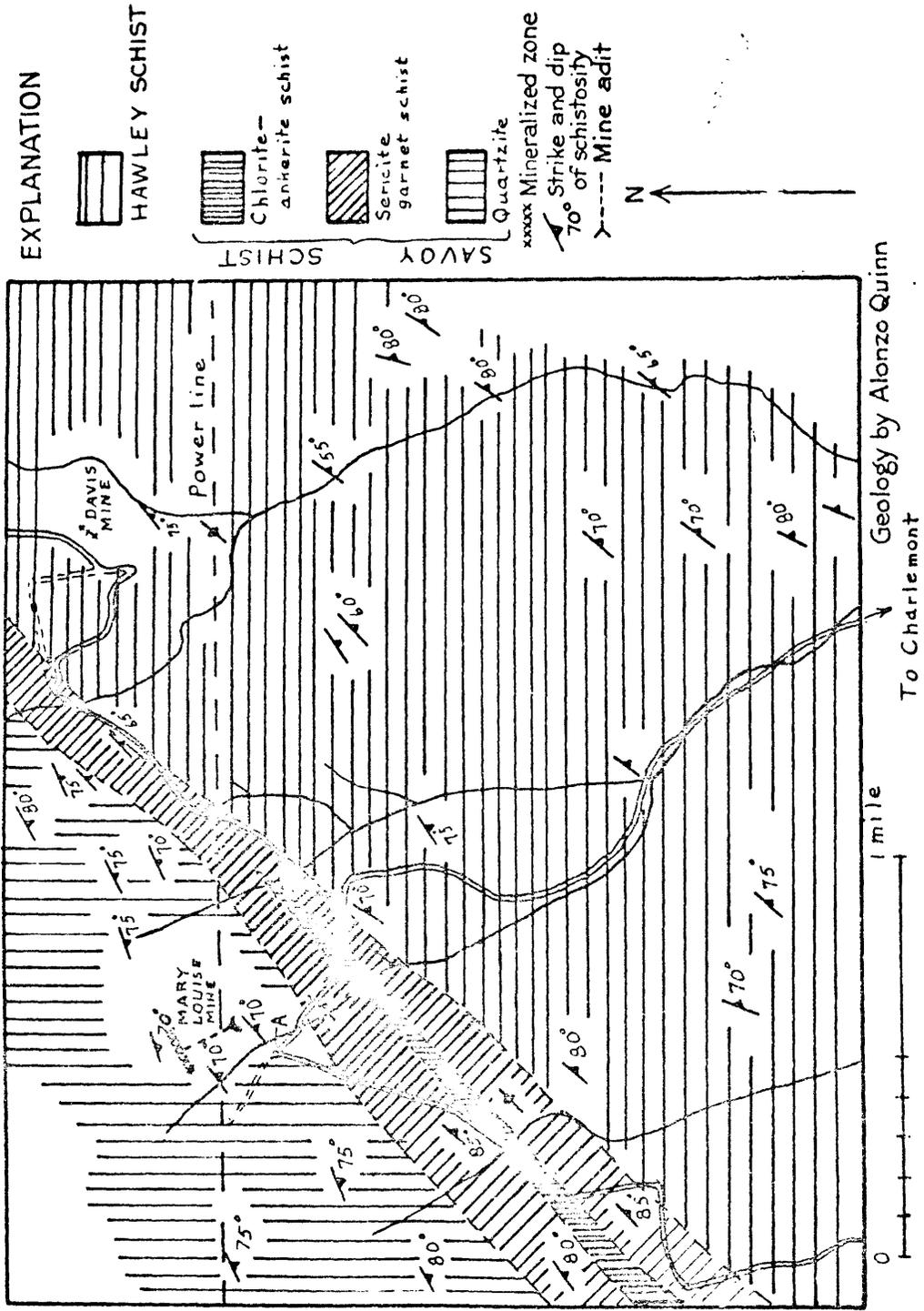
The last 3 analyses comprise a complete cut across a 7-foot face, and should be averaged as one. These samples, of course, represent but a small fraction of the deposit and cannot be interpreted as representing the mineralized zone as a whole. Good values appear to be obtainable only from narrow zones within the mineralized body, but inasmuch as most of the chalcopyrite appears to be present as thin irregular stringers throughout the zone, it would be necessary to mine the larger part or all of the zone. Whether or not most of the values tend to occur toward either wall has not been demonstrated.

During this investigation, Mr. Millar returned to the mine to take more samples. The results of this sampling are not yet available.

1 The zone of mineralization has been proved for a length of about
2 500 feet horizontally and a depth of nearly 200 feet. The shape of
3 the mineral body is rather regular, and the structural relations indicate
4 probable continuity of the zone both laterally and vertically for
5 considerable distances, but the copper minerals are irregularly
6 distributed and there is no clear evidence that the ore will be
7 appreciably richer at depth.
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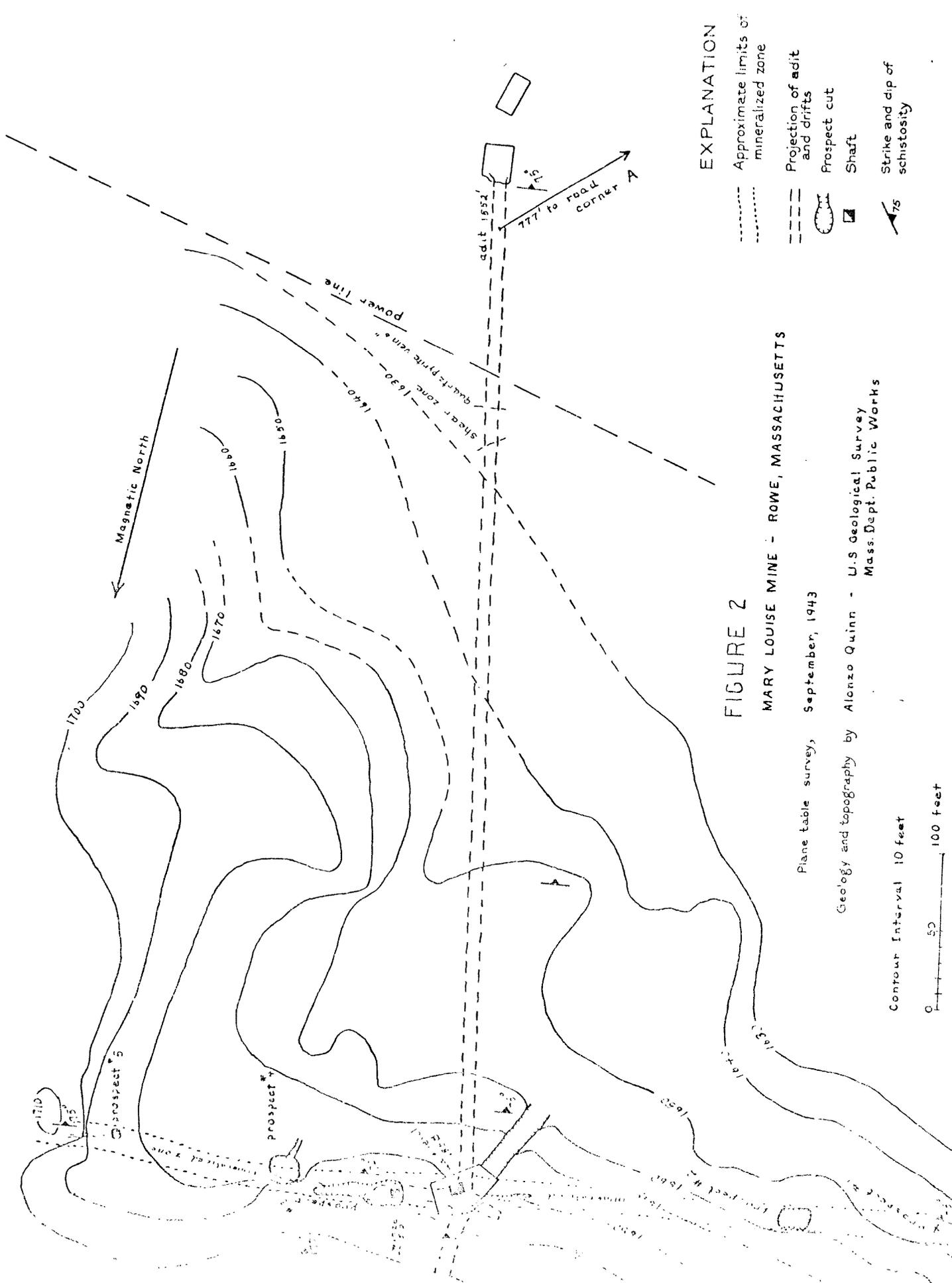
FIGURE 1 STRATEGIC MINERAL INVESTIGATION
PRELIMINARY MAP



EXPLANATION

-  HAWLEY SCHIST
-  Chlorite-ankerite schist
-  Sericite garnet schist
-  Quartzite
-  Mineralized zone
-  Strike and dip 70° of schistosity
-  Mine adit

Figure 1. Geologic map of an area including the Mary Louise and Davis mines, Rowe, Massachusetts.



- EXPLANATION**
- - - - - Approximate limits of mineralized zone
 - - - - - Projection of adit and drifts
 - ⊂ Prospect cut
 - ▣ Shaft
 - ↙ Strike and dip of schistosity

FIGURE 2
MARY LOUISE MINE - ROWE, MASSACHUSETTS
 Plane table survey, September, 1943
 Geology and topography by Alenzo Quinn - U.S. Geological Survey
 Mass. Dept. Public Works

Contour Interval 10 feet
 0 50 100 feet