MAGNETITE DEPOSITS AND MAGNETIC ANOMALIES OF THE BRANDY BROOK AND SILVER POND BELTS, ST. LAWRENCE COUNTY, NEW YORK

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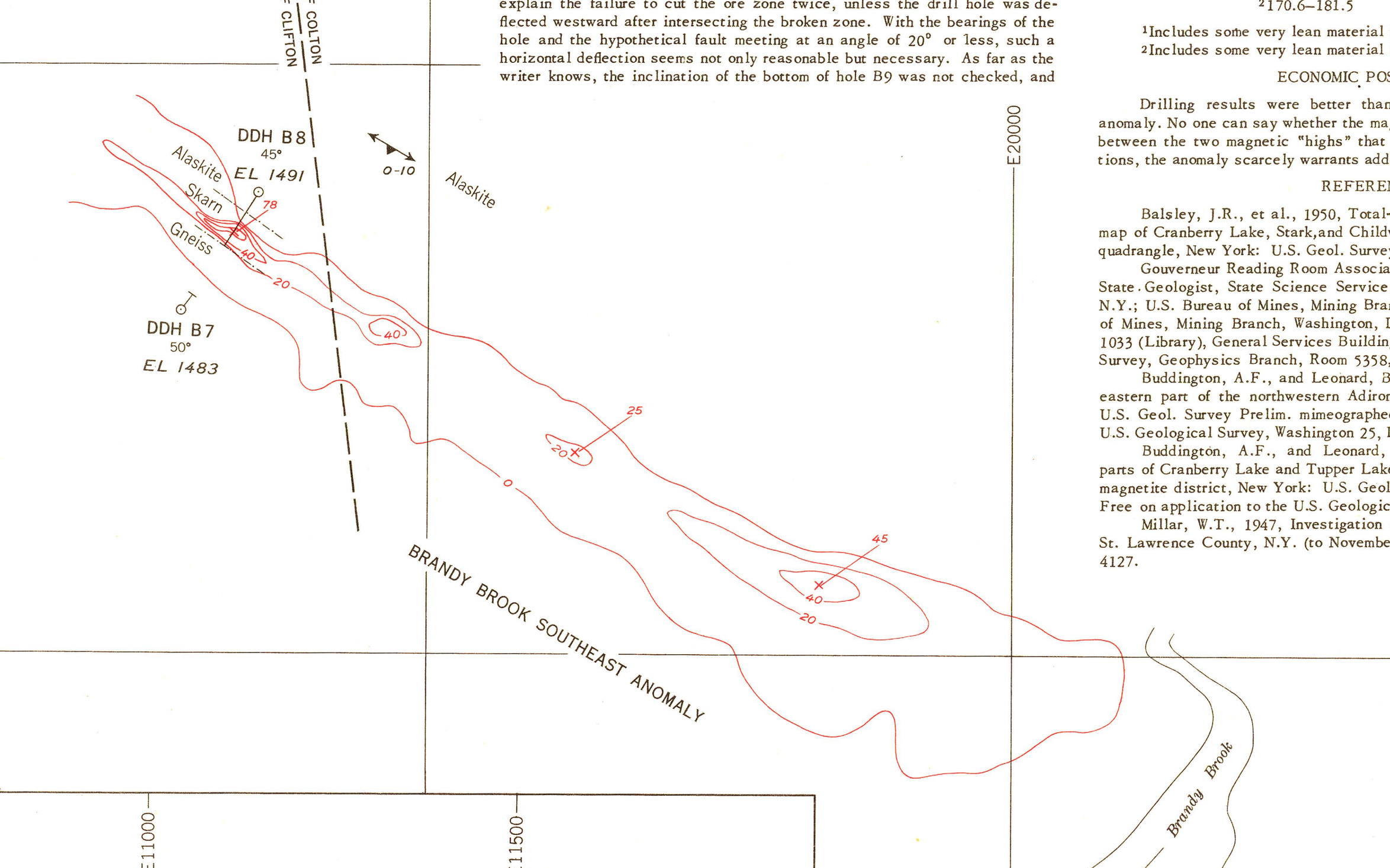

FIGURE 1—BRANDY BROOK AND SILVER POND BELTS OF MAGNETIC ANOMALIES, NORTHEAST RECTANGLE, CRANBERRY LAKE QUADRANGLE, ST. LAWRENCE COUNTY, NEW YORK

Magnetic data and drill-hole locations from unpublished maps (100-scale) of U. S. Bureau of Mines. Geologic information by U. S. Geological Survey. Original Bureau of Mines grid for central part of area has been extended arbitrarily to include the ends of the belt. Outline of Silver Pond obtained from air photos. Outline of Brandy Brook Flow not shown because of extreme distortion of air photos.

Normal dip-needle reading of -18° reduced to zero.

INTRODUCTION

This report sets forth the geology and economic possibilities of the Brandy Brook and Silver Pond belts of magnetic anomalies, Cranberry Lake quadrangle, St. Lawrence County, northwestern New York. Each belt contains a known magnetite deposit, partly explored through diamond drilling by the U.S. Bureau of Mines. The Brandy Brook Northwest deposit is a body of low-grade to medium-grade ore, possibly of lathlike shape. The Silver Pond deposit has no commercial interest at the moment. One or more promising magnetic anomalies remain to be tested by drilling.

The magnetite deposits of the district have been discussed briefly by Buddington and Leonard (1944, 1945), who interpret them as high-temperature replacement deposits genetically related to younger granite. Their maps show the geologic setting of the Brandy Brook and Silver Pond belts. Millar (1947) has summarized the exploratory work of the Bureau of Mines. Members of the U.S. Geological Survey logged drill core and mapped critical parts of the area. Most of the mapping was done by B.F. Leonard and C.L. Rogers in the spring of 1945. The relation of the two belts to the regional magnetic picture may be seen on the aeromagnetic map of Balsley (Balsley et al., 1950).

The Brandy Brook and Silver Pond belts of magnetic anomalies, though not continuous, are closely related spatially and geologically. For that reason, the general geology of the belts is discussed before details of the separate belts are given. The map of the area (fig. 1) was compiled from unpublished magnetic maps (scale, 100 feet = 1 inch) of the Bureau of Mines, to which were tied pace-compass and plane-table traverses of the Geological Survey. The coordinate system of the Bureau of Mines has been extended from the central portion to cover the entire mapped area. The Silver Pond and Brandy Brook Southeast anomalies have been adjusted to this net to give a reasonably accurate picture of the belts. Topographic profiles along the drill sections were not available for all the holes.

In this report it has been necessary to use several place names that do not appear on the accompanying map (fig. 1). Readers unacquainted with the area are referred to the Cranberry Lake topographic map (available from the Chief of Distribution, U.S. Geological Survey, Washington 25, D.C., and from many stationers) or the preliminary geologic maps of Buddington and Leonard (1944, 1945).

GENERAL GEOLOGY OF THE BELTS

The map (fig. 1) shows three belts of metasedimentary rocks and two of granitic rocks trending west-northwest across the northwest part of the area. Owing to the scarcity of outcrops, the geologic mapping is sketchy and the number, position, extent, and relations of the belts are uncertain. All the rocks are of old pre-Cambrian age. The metasediments belong to the Grenville series.

The Brandy Brook magnetic anomalies lie in the southern belt of metasediments, which comprise skarn, quartzose gneisses, and biotite gneiss, subordinate amounts of marble and amphibolite, and thin sheets of granite. This belt, of unknown width, extends through Bear Mountain Flow and Aldrich Swamp, crosses Silver Pond near its south end, and underlies the abandoned Emporium mill on the west side of the pond. Only the more resistant rocks--quartzose gneisses, amphibolite, and biotite gneiss--are exposed.

Rocks of the middle belt do not crop out within the mapped area but were cut in drill holes on the Brody Tract (Silver Pond anomaly). They are of the same general type as those in the southern belt. Their extension to the southeast is inferred from topographic evidence in the form of a swamp, about 700 feet wide, that crosses Highway N.Y. 3 about 1800 feet northeast of the bull-dozed road leading to the holes on the Gilbert Tract.

The northern belt, consisting of migmatitic biotite gneiss, is exposed along the highway half a mile northeast of the tote road. This belt has a minimum width of 300 feet; it may be 1000 feet or more wide. The northern and central belts may be parts of a single belt, as the pink granite shown separating them on the map is of unknown thickness and may be rather thin.

The granite between the Brandy Brook and Silver Pond belts of Grenville is pink, weakly foliated alaskite, in part with small nests of red garnet. East of Silver Pond it is medium-grained; west of the pond it is predominantly fine-grained and has several percent of disseminated magnetite. Locally, very thin partings of biotite gneiss, in some places accompanied by pink soda granite, are present in the alaskite.

The structural relations of the various belts are uncertain. Though the same types of metasediments are present in both the Brandy Brook and Silver Pond belts, no single unit or succession of units can be recognized to establish the identity of the two sequences. If the sequences are structurally equivalent, the most reasonable interpretation of the meager data is that the Brandy Brook belt represents the southwest (upright) limb, and the Silver Pond belt the northeast (overturned) limb, of a syncline that is overturned to the southwest. Alaskite occupies the axial zone of this structure. If the lineation is a fair guide, the axis of the inferred syncline is roughly parallel to the trace of the limbs and (in the neighborhood of Silver Pond) plunges 10° to 25° ESE. The interpretation of the structure as an overturned syncline is suggested by the somewhat gentler dip of the Brandy Brook "limb" as compared with the steeper dip of the Silver Pond "limb." It seems to be confirmed by the downward flattening of the dip in rocks of the Brandy Brook belt (see fig. 3).

Additional geologic mapping must be done before the structure enclosing the Brandy Brook Southeast anomaly can be understood.

BRANDY BROOK BELT

LOCATION, ACCESS, AND OWNERSHIP

The Brandy Brook belt of magnetic anomalies begins at the mouth of Brandy Brook, in the northeast rectangle of the Cranberry Lake quadrangle, and extends roughly N. 55° W. for about 12,000 feet to a point 500 feet southeast of a prominent curve in Highway N.Y. 3. The curve is 0.7 mile by airline east of Cranberry Lake village. The belt may be divided for convenience into three parts, with two principal areas of magnetic highs at the ends and an almost neutral area in the middle.

The Brandy Brook Northwest anomaly lies on the Gilbert Tract of the Newton Falls Paper Mill. A bulldozed road, leaving Highway N.Y. 3 at the curve noted above, runs along the north side of the anomaly. (Only the west end of this road appears on fig. 1.) The anomaly passes through a saddle on hill 1660 (see topographic map of Cranberry Lake quadrangle) and continues southeastward down the hill to Aldrich Swamp.

The Brandy Brook Southeast anomaly is on low ground east and west of the Clifton-Colton town line. It may be reached by an old tote road running through Aldrich Swamp, or by boat from Cranberry Lake. The State of New York owns this block of land and holds the mineral rights for the part east of the town line. The Shenango Furnace Co. holds the mineral rights for the Abbot Tract west of the town line. The block lies within the Adirondack State Park. When the State of New York holds the mineral rights for any land within the Park, the existing law forbids exploration or development of the minerals on that land.

The central third of the belt is on the Abbot Tract in Aldrich Swamp. Here the magnetic anomaly is very weak and of no commercial interest.

DISCOVERY AND EXPLORATION

The Brandy Brook belt was found in the winter of 1944 during a reconnaissance dip-needle survey made by the U.S. Bureau of Mines along the Clifton-Colton town line. Compass deflections along the line were noted by Benjamin Wright in 1803 during his original subdivision of Macomb's Great Tract into townships. The U.S. Geological Survey recommended reconnaissance dip-needle traversing along the line and directed its continuation southward to the belt of metasediments, where the Brandy Brook belt of anomalies was then discovered. A detailed dip-needle and dial-compass survey of the belt was made by the Bureau of Mines in 1944, and nine diamond-drill holes were bored by that organization in 1944 and 1945. The neighboring Silver Pond (Brody Tract) anomaly was found by the Bureau of Mines, and three holes were drilled on it in 1945. The Bureau's work has been summarized by Millar (1947). The results of geologic mapping and core studies by the Geological Survey are presented with the magnetic data in figure 1 herewith. Graphic logs of the drill holes are shown in figure 3.

MAGNETIC ANOMALIES

The Brandy Brook Northwest anomaly has three substantial strips, arranged tandem, within the 20° isoclinal. The most important strip is 2200 feet long and generally 100 feet wide. The closed 40° isoclinal within it is 1300 feet long and 40 to 50 feet wide. This contains four elongate areas within 60° isoclinals. Their aggregate length is 950 feet. Two shorter strips within the 20° isoclinal, each 400 to 450 feet long, are present between grid lines 12,400 E and 13,150 E. Each of these has a length of 200 to 250 feet within the 40° isoclinal. An isolated "hot spot" is found at (10,400 N, 10,100 E), and an insignificant strip of +20° readings, 200 feet long, centers at (8,400 N, 13,330 E). Overburden above the Brandy Brook Northwest anomaly is relatively shallow, perhaps averaging 20 feet. Five of the eight peaks on the anomaly were drilled.

The Brandy Brook Southeast anomaly contains two long strips within the 20° isoclinal and an insignificant "bead" between them. The strips are arranged tandem. The northwest strip is 1300 feet long, 30 to 110 feet wide, and has two small areas within the 40° isoclinal. The peak of this anomaly was tested by hole B8. Here the overburden is probably shallow, though it increases rapidly to the southwest. The southeast strip is 1,000 feet long and ranges in width from 40 to 200 feet. It contains an elliptical area of +40° readings, 300 by 100 feet in maximum dimensions. The character of the magnetic profiles across this part of the anomaly suggests that the overburden is thick--possibly about 100 feet. If this is so, the economic possibilities of this part of the Brandy Brook Southeast anomaly may be considerably more favorable than those indicated for the part drilled by hole B8. Indeed, the entire length of the southeast strip within the 20° isoclinal, from 18,800 E to 19,700 E, is worthy of prospecting.

Throughout the length of the Brandy Brook belt of anomalies, the magnetic profile is steeper on the northeast side than on the southwest. The steepness of the northeast slope of the Brandy Brook Northwest anomaly is accentuated by a negative anomaly, of intensity generally less than -10°, that runs along part of the northeast side of the positive anomaly. The negative anomaly does not appear on figure 1 because of the 20° contour interval adopted for that map. The asymmetry of the magnetic profile has been taken by some to indicate that the ore zone dips southwest. This view is totally unsupported by the drilling done so far.

ROCKS

Four main rock units or zones were cut in drilling the Brandy Brook belt (see fig. 1). These are, from the surface downward: alaskite, felsic gneisses, skarn (the host of the ore), and felsic gneisses with contaminated granite. All the units are continuous except the felsic gneisses above the skarn. These form a lens cut by holes B4, B5, and B6.

The alaskite is pink, medium-grained, and homogeneous, with an extremely faint foliation. It contains sporadic nests of red garnet and a few thin, scattered layers or schlieren of metasediments. A pink soda granite that looks much like alaskite has been developed in some places where alaskite comes against biotite gneiss.

The lens of felsic gneisses found locally above the skarn is 12 to 40 feet thick. These rocks are generally gray or greenish, fine-grained, regularly foliated or laminated, and often granulose. They include quartz-feldspar gneisses (feldspathic quartzites) with a little biotite or pyroxene, biotite quartzite, aplitic granite, and dark biotite gneiss. Some types are slightly migmatitic.

GRADE

Details of the grade of ore and magnetite-bearing rock are given by Millar (1947, pp. 10-12). The more important information is summarized in tables 1, 2, and 3 below.

Table 1. Assays of core from drill holes B1 to B9, Brandy Brook Northwest deposit [Assays by U. S. Bureau of Mines; data condensed from Millar, 1947, pp. 10-12. The table below omits all layers whose thickness is less than 1 foot or which assay less than 12 percent Fe.]

Hole	Footage	Apparent thickness (feet)	True thickness (feet)	Percent: Soluble Fe	Magnetic Fe	P	S	SiO_2	TiO_2
B1	481.5–497.3	15.8	13.5	35.2	33.5	0.018	0.38	10.4	0.06
B2	405.9–408.2	2.3	2.0	28.5	24.9				
B3	[1]126.5–153.0	26.5	23.6	27.1	21.8	[2]0.040	4.05	17.3	0.50
	197.0–213.1	16.1	14.4	42.2	35.9	[2]0.038	4.47	10.0	0.15
B4	[3]246.2–253.1	6.9	6.3	26.3	22.2	0.033	6.83	20.7	0.30
	275.1–283.6	8.5	7.7	28.8	26.7	0.020	2.40	14.4	0.44
B5	393.8–395.2	1.4	1.2	22.0	19.3				
	404.8–410.4	5.6	4.9	38.4	36.4	0.038	2.06	18.8	0.18
B6	127.1–130.9	3.8	3.6	26.5	22.0				
	140.0–141.0	1.0	0.9	29.1	25.0				
	146.2–147.7	1.5	1.4	19.8	14.5				
	152.3–153.7	1.4	1.3	16.7	15.6				
	[4]163.3–165.3	2.0	1.9	25.3	1.2				
	165.3–169.2	3.9	3.7	23.7	20.3				
B7	Abandoned before ore zone was cut.								
B8	88.0– 91.2	3.2	3.0	–	28.3				
	115.6–120.8	5.2	4.9	–	29.1				
B9	168.2–171.5	3.3	2.8	–	17.8				
	171.5–188.2	16.7	14.2	–	35.7				
	188.2–190.4	2.2	1.9	–	18.4				

[1]Includes 126.5–127.5 assaying 10.3 percent soluble Fe, 5.3 percent magnetic Fe. If this foot of core is excluded, the interval 127.5–153.0 assays 28.3 percent soluble Fe and 23.7 percent magnetic Fe.
[2]Values for P, S, SiO_2, and TiO_2 from unpublished assays made by U.S. Bureau of Mines.
[3]Includes 246.2–247.7 assaying 13.4 percent soluble Fe, 10.3 percent magnetic Fe; 247.7–253.1 assays 30.1 percent soluble Fe, 25.8 percent magnetic Fe.
[4]This interval is hematite-rich.

The skarn zone ranges in thickness from 65 to 175 feet and averages about 120 feet. It is thickest at the ends of the belt and thinnest in the neighborhood of holes B4, B5, and B6. The zone consists principally of green pyroxene skarn and some reddish-brown garnet skarn, both of which are massive and medium- to fine-grained. In addition, subordinate layers of silicated marble, feldspathic skarn, green amphibolite, quartzose gneisses, scapolitic rocks, and contaminated granite are present. Purplish fluorite is visible locally in the feldspathic skarn. Alteration of skarn and some marble to "greenstone"--a soft aggregate of very fine serpentine, chlorite, or both--is prominent in some cores. Hematite grains or stains, and veinlets of calcite, accompany the greenstone or occur independently in the wall rocks. The present evidence suggests that the alteration is mostly due to downward-percolating waters whose course was controlled by faults, joints, marble layers, and certain mica-rich zones.

The lowermost unit, of unknown thickness, is the most heterogeneous. Various quartzose gneisses and contaminated granite predominate, but biotite gneiss, migmatitic pyroxene skarn, and contaminated pegmatite are present as well. A little red garnet occurs in some pyroxenic and biotitic quartzites. Generally, the unit is gray or greenish and characterized by an abundance of light-colored minerals--quartz and feldspar.

ORE

OCCURRENCE

All the ore occurs in pyroxene skarn. Minor concentrations of magnetite--sub-ore or mineralized rock--are present as thin, scattered zones in silicated marble, skarn, feldspathic skarn, and pyroxene-contaminated granite or pegmatite. The magnetite itself has the form of disseminated grains, small blotches or amoeboid masses, and irregular, coalescing layers of variable thickness. Mineralization has been restricted to two zones well inside the skarn unit. In general, the lower zone is thicker, has a higher concentration of magnetite, and is the one of commercial interest. In holes B2 and B8, however, the lower zone is represented only by sporadic grains of magnetite. In hole B5, the upper zone is similarly faint. (These weakly mineralized zones have been omitted from the cross sections, fig. 3.) Magnetite in the lower zone is confined to pyroxene skarn, whereas in the upper zone (still within the skarn unit) magnetite replaces a variety of rocks--skarn, marble, and the pyroxene aggregates in contaminated granite-- apparently preferring marble wherever relics of that rock were present. In hole B8, relations are reversed: the upper zone is in skarn and the lower one is in mixed rocks consisting of feldspathic skarn with granite or granite pegmatite veins.

MINERALOGY

Magnetite is usually accompanied by some sulfides, chiefly pyrite with a very little chalcopyrite. Pyrrhotite is present locally. The quantity of sulfides ranges from nil to about 10 percent; it averages perhaps 3 or 4 percent. Some thin layers in hole B3 carry as much as 75 percent sulfides. One portion was rich in chalcopyrite (see table 2, footage 213.1-219.8; actually, most of the chalcopyrite was concentrated in less than 1 foot of this sample interval). Ten percent of black hematite accompanies magnetite in some places, particularly where sub-ore is present in marble. This hematite is probably secondary.

Pyroxene is the principal gangue mineral. In places, small amounts of calcite, feldspar, scapolite, apatite, and fluorite are also present.

Table 2. Assays for copper, gold, and silver in ore zones and selected sulfide-rich zones from hole B3, Brandy Brook Northwest deposit [Unpublished assays by U.S. Bureau of Mines.]

Footage[1]	Percent Cu	Ounces per ton: Au	Ag
126.5–153.0	0.06	nil	0.68
153.0–170.0	0.01	nil	nil
197.0–213.1	0.04	0.02	1.13
213.1–219.8	4.91	0.01	1.68

[1]See table 1 for apparent and true thicknesses, or multiply apparent thickness by 0.89 to get true thickness.

Table 3. Assays for precious metals in sulfide-rich core from hole B6, Brandy Brook Northwest deposit. [Assays by U.S. Bureau of Mines; data from Millar, 1947, p. 12.]

Footage[1]	Ounces per ton: Au	Ag
127.1–130.9	0.02	0.14
140.0–141.0	0.02	0.30
146.2–147.7	0.14	0.90

[1]See table 1 for apparent and true thicknesses.

As tables 2 and 3 show, several sulfide-rich portions of the core from holes B3 and B6 were assayed for gold and silver. The value for Au (0.14 oz per ton) in the sample from 146.2 to 147.7 feet, table 3, may be high. It was not possible to obtain a duplicate of the whole sample; but part of it, assayed for the Geological Survey by Ledoux & Company, gave 0.40 oz Ag per ton and only a trace of Au. There is no check assay for the high value for Ag reported in table 2, 213.1–219.8 feet.

STRUCTURE

Planar and linear structure. The structure of the magnetite bodies is still a matter of conjecture. The upper surface of the higher magnetite-bearing zone in skarn dips about 55° to 60° NE. at hole B1 and about 45° NE. in hole B6. Thus the dip in this neighborhood flattens toward the southeast. In addition, the dip flattens with depth. These relations are shown in figure 3. In general, the magnetite bodies are parallel to the planar structures (foliation) in the wall rocks; but the drilling undertaken so far indicates that the bodies themselves are not continuous and sheetlike in shape. For example, in the main or lower mineralized zone hole B1 cut 13.5 feet of ore; hole B2 cut thin, scattered stringers of magnetite-bearing rock; hole B3 cut two layers of ore, 23.6 and 14.4 feet thick. The limited drilling fails to determine whether the magnetite occurs as small pockets, commercially unattractive, or as shoots of a size warranting development. The apparently discontinuous distribution of magnetite, together with the presence of a pronounced lineation in certain wall rocks, suggests the hypothesis that the ore occurs as shoots parallel to the linear structure (see fig. 4). Plunging ore shoots of this type are typical of magnetite deposits of the New Jersey Highlands and are also found at the 81 mine, Lyon Mountain, New York (Zimmer, 1948, personal communication). However, these shoots are not in skarn; and at present we do not know if ore bodies in skarn behave the same way.

Near the center of the Brandy Brook Northwest anomaly, where the foliation strikes about N. 62° W. and dips about 60° NE., the lineation trends S. 70° E. and plunges 17° ESE. Where the dip flattens to 45°, the plunge decreases to 10°. Following this trend, two hypothetical ore shoots are shown schematically in horizontal projection in figure 2. Of course, the dimensions of the shoots are unknown. The hypothesis of pitching ore shoots parallel to the lineation helps to explain the irregular distribution of ore cut in holes B1 through B6 and suggests where additional drilling might be done to follow the good showings of ore.

Detailed geologic mapping of the few outcrops in the neighborhood of the Brandy Brook Southeast anomaly must be done before the structure is clearly understood there. Present information indicates that foliation in outcrops closest to the anomaly, north of it, dips about 10° SW. (locally 30° SW.), whereas the drilling results from holes B7 and B8 indicate that the rocks underlying the anomaly dip northeast, probably at about 25°. The lineation in the wall rocks is horizontal. Thus the anomaly appears to lie very close to the axis of an open syncline, either a minor one or the prolongation of the major structure inferred to be an overturned syncline in the neighborhood of Silver Pond.

Faults. The map (fig. 1) shows a small, isolated magnetic "hot spot," centered at (10,400 N, 10,100 E), detached from the main Brandy Brook Northwest anomaly. The "hot spot" was drilled by hole B9, which passed successively through alaskite, an ore-bearing skarn zone, and a thick sequence of footwall gneisses. The apparent thickness (and probably the true thickness) of skarn and ore in hole B9 is about equal to the true thickness of corresponding members cut in hole B1. The dip of the foliation ranges from 70° N. to vertical (see section through hole B9). From 481 to 511.5 feet, hole B9 cut broken, chloritized, hematite-stained, calcite-seamed rock that had to be grouted repeatedly.

The facts can be interpreted in several ways: sharp swing in foliation from northwest to north and extreme thinning of rock units beneath the "hot spot"; sharp right-angle or zigzag fold that still maintains the same thickness for the units and gives them a northwesterly strike beneath the "hot spot"; fault of unknown direction and displacement passing through the broken zone in footwall rocks and giving the ore zone an apparent horizontal displacement of approximately 200 feet. The hypotheses cannot be developed in detail in this report. The assumption of a fault fits more facts and raises fewer questions. For that reason, it has been favored in preparing the geologic map (fig. 1).

To satisfy the positions of the anomalies and the results of drilling, the fault must strike just a little east of north. This raises the question why a very thick sequence of footwall gneisses was cut by hole B9; that is, why the ore zone was not cut twice. If the fault has a moderate eastward dip, all relations appear to be satisfied. However, a vertical dip seems more likely, judging from the nature of known Adirondack faults. This will not explain the failure to cut the ore zone twice, unless the drill hole was deflected westward after intersecting the broken zone. With the bearings of the hole and the hypothetical fault meeting at an angle of 20° or less, such a horizontal deflection seems not only reasonable but necessary. As far as the writer knows, the inclination of the bottom of hole B9 was not checked, and none of the holes was surveyed for azimuth after drilling. Thus there is no check on the supposition of a deflected drill hole.

One way of getting additional structural information was proposed at the time of drilling. Overburden between the "hot spot" and the main anomaly is certainly shallow--probably 10 feet or less. A bulldozer could clear the critical area without difficulty, permitting examination of the bedrock for evidence of faulting or sharp folding.

Another fault is inferred from zones of altered, broken rock found in holes B1 and B2. The magnitude and significance of this fault are also unknown. The horizontal projection of broken zones in holes B9, B1, and B2 falls on the same line. However, a single fault, striking east-southeast, will not by itself explain the problems outlined in discussing hole B9 above.

Other zones of broken rock are present in the cores, but so little is known of their relations that speculation about them seems futile at this time.

Many major faults in the pre-Cambrian show little evidence of breccia, mylonite, or alteration. Elsewhere, these features are present where movement has been negligible. For these reasons, we can only call attention to the evidence, note its implications, and wait for additional work on which to base reliable conclusions.

ECONOMIC POSSIBILITIES

At present, the most favorable area for additional drilling lies between grid lines 10,000 E and 12,000 E, particularly between 10,000 E and 11,200 E. The possibility that the ore occurs in shoots parallel to a lineation in the wall rocks has been mentioned. The hypothetical shoots could be tested by a series of vertical holes laid out along their inferred trend. Though the present drilling data show the dip flattening somewhat with depth, the possibility that it may steepen again--giving rolls--is always present. Until more is known about the structural habit of the ore, no intelligent guess can be made about reserves. There is a good chance that ore bodies of commercial interest may be developed by intelligent drilling and geologic study of the area.

The 1000-foot strip of +20° readings with a low peak at (4250 N, 19,300 E) in the Brandy Brook Southeast anomaly deserves to be drilled. The character of the magnetic profiles suggests that the overburden may be thick--perhaps 100 feet--and may be masking a promising ore body. Such an interpretation is obviously not certain but is worth checking. Mineral and surface rights on this block are owned by the State of New York.

Reconnaissance dip-needle work along the projection of the Brody Tract anomaly has not been done, so far as the writer knows, except for a small area in the northern part of Silver Pond. Drilling on the Brody Tract showed nothing of immediate commercial interest, and the aeromagnetic survey (Balsley, 1950) detected no sizable anomalies southeast or northwest of the Brody Tract anomaly. Nevertheless, reconnaissance traverses are warranted, as they might at least yield information of value in interpreting geologic structure.

SILVER POND (BRODY TRACT) BELT

LOCATION, OWNERSHIP, AND MAGNETIC ANOMALIES

The magnetic anomaly on the Brody Tract, now or formerly owned by the Emporium Forestry Co., Conifer, N. Y., lies northwest of the north end of Silver Pond, northeast rectangle, Cranberry Lake quadrangle. It begins 400 feet northwest of the "Y" on the recently abandoned Grasse River Railroad and runs N. 58° W. Three very short strips of +20° readings, arranged tandem, are present in the belt (see fig. 1). Two of these, each about 250 feet long and 20 to 50 feet wide, were drilled by the Bureau of Mines in the summer of 1945. The anomaly, sometimes called the Brandy Brook Flow Extension, was found by the Bureau of Mines when it extended its survey of the Brandy Brook belt to the northwest. The area between the Brody Tract anomaly and the Brandy Brook Northwest anomaly, including much of Silver Pond, was also dip-needled. No significant anomalies were found there. The Geophysical Division of the Bureau of Mines traversed part of the same area with an Askania magnetometer. As far as the writer knows, nothing of consequence was found. The work was done to check one interpretation, advanced by the Bureau, that the two discontinuous magnetic belts (Silver Pond and Brandy Brook) reflect parts of a single (canoe-shaped?) ore shoot that trends northwest and is too far beneath the surface to give a readily detected anomaly in the area between grid lines 7500 E and 10,000 E. Geologic mapping, admittedly sketchy because of the scarcity of outcrops, lends no support to that interpretation. Geologic relations of the two belts are summarized in a preceding section of this report.

ROCKS

No rocks are exposed within 1000 feet of the Brody Tract anomaly. Drilling of holes B10, B11, and B12 indicates that the rocks at the anomaly are, from the top downward: interlayered metasediments and amphibolite; hornblende granite gneiss, locally biotitic; skarn with magnetite; pyroxenic and biotitic gneisses and quartzites; and alaskite (see fig. 3).

The uppermost unit, of unknown thickness, consists of many relatively thin layers of biotite gneiss (locally garnetiferous), pyroxene gneiss, amphibolite, subordinate migmatitic mica-pyroxene skarn, and a little silicated marble or diopside skarn. The upper part of the unit is mostly biotitic, the lower part pyroxenic. Locally the biotite gneiss has 5 percent of disseminated magnetite; and a 0.4-foot layer rich in magnetite was observed in hole B11 in the skarn just above the granite gneiss sheet.

The granite gneiss sheet is 30 to 60 feet thick. It is pink or pinkish-gray, well-foliated, fine- or medium-grained, and has 10 to 20 percent of mafic minerals. Hornblende predominates, but some of the rock is biotitic. Though zones of "clean" granite are present, much of the rock is contaminated, with the mafic minerals rather evenly distributed or else concentrated in schlieren. A very little disseminated magnetite is present locally.

The principal skarn zone is 12 to 30 feet thick. It is mostly dark-green, medium-grained pyroxene skarn. In places garnet, feldspar, scapolite, and calcite accompany some of the pyroxene. A 10-foot parting of gneissic rocks splits the skarn in hole B11. (This has been omitted from the cross section, fig. 3, in order to emphasize the presence of a zone of skarn.)

The unit below the skarn is 20 to 40 (?) feet thick. Like the uppermost unit, it is heterogeneous. Biotite quartzite, in part feldspathic, predominates. Biotite gneiss, pyroxene gneiss, amphibolite, a little skarn, and contaminated granite are also present, though not all in the same hole.

The alaskite sheet, cut only by hole B11, is a fine- to medium-grained, pink, faintly foliated rock that is identical in composition with the hanging-wall alaskite of the Brandy Brook belt.

The repeated sequences of biotite quartzite-biotite gneiss, amphibolite, and marble (or its metasomatized equivalent, skarn) in the Silver Pond drill holes are suggestive of cyclic sedimentation from sandstone to shale to limestone. Not knowing the phase in which any given cycle began, we cannot use the cycles to determine tops and bottoms for the sequence. If the phase were known, it might be possible to prove or disprove the hypothesis that the Silver Pond metasediments are on the overturned limb of a syncline.

STRUCTURE

The rocks strike N. 58° W. and dip 65° to 75° NE. The dip is steeper than in the Brandy Brook belt, and dips measured on the cores are consistent with those recorded on the first outcrops south of the Silver Pond anomaly.

"ORE"

Magnetite concentrations of immediate commercial interest were not found in drilling the anomaly. Several thin zones relatively rich in magnetite are present in the main skarn zone. These are described below. In addition, a 0.4-foot layer of high-grade "ore" was cut just above the contaminated granite sheet in hole B11. Disseminated grains and layers of magnetite, with or without a little sulfide, replace pyroxene skarn, forming mineralized layers 2 to 6 feet thick. In holes B11 and B12, which cut the main skarn zone about 100 feet below the topographic surface, the magnetite occurs as two layers separated by 8 to 10 feet of barren skarn. Only one layer rich in magnetite was cut in hole B10, and that was at a depth of 300 feet below the surface. Assays by the Bureau of Mines (Millar, 1947, p. 13) gave:

Hole	Footage	Magnetic Fe (percent)
B10	356.3–358.7	33.6
B11	141.0–146.0	28.7
	[1]150.0–158.0	22.9
B12	161.6–164.0	36.6
	[2]170.6–181.5	20.1

[1]Includes some very lean material from hanging wall.
[2]Includes some very lean material from footwall.

ECONOMIC POSSIBILITIES

Drilling results were better than expected, considering the feeble anomaly. No one can say whether the magnetite-bearing layers are continuous between the two magnetic "highs" that were drilled. Under present conditions, the anomaly scarcely warrants additional drilling.

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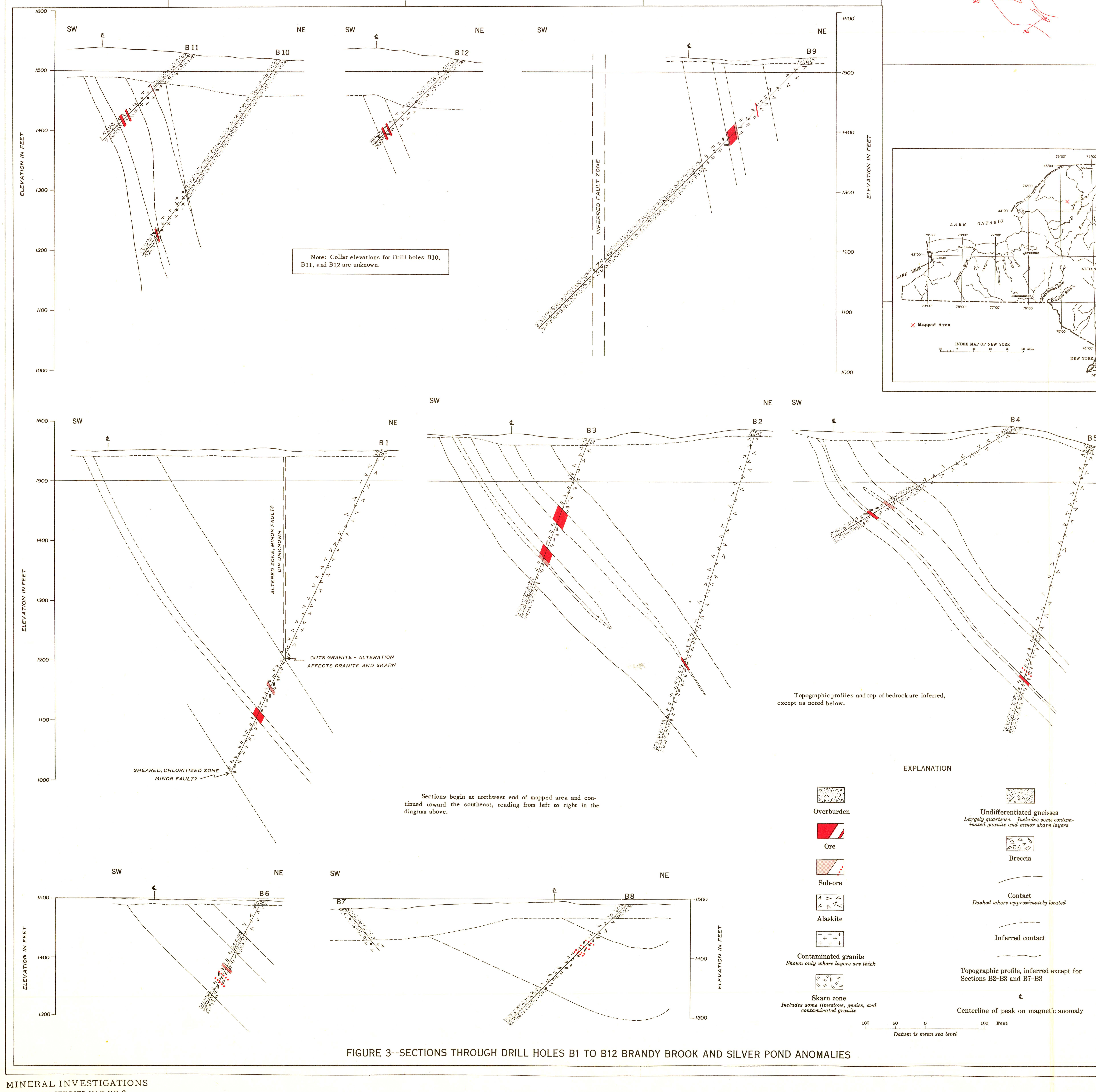
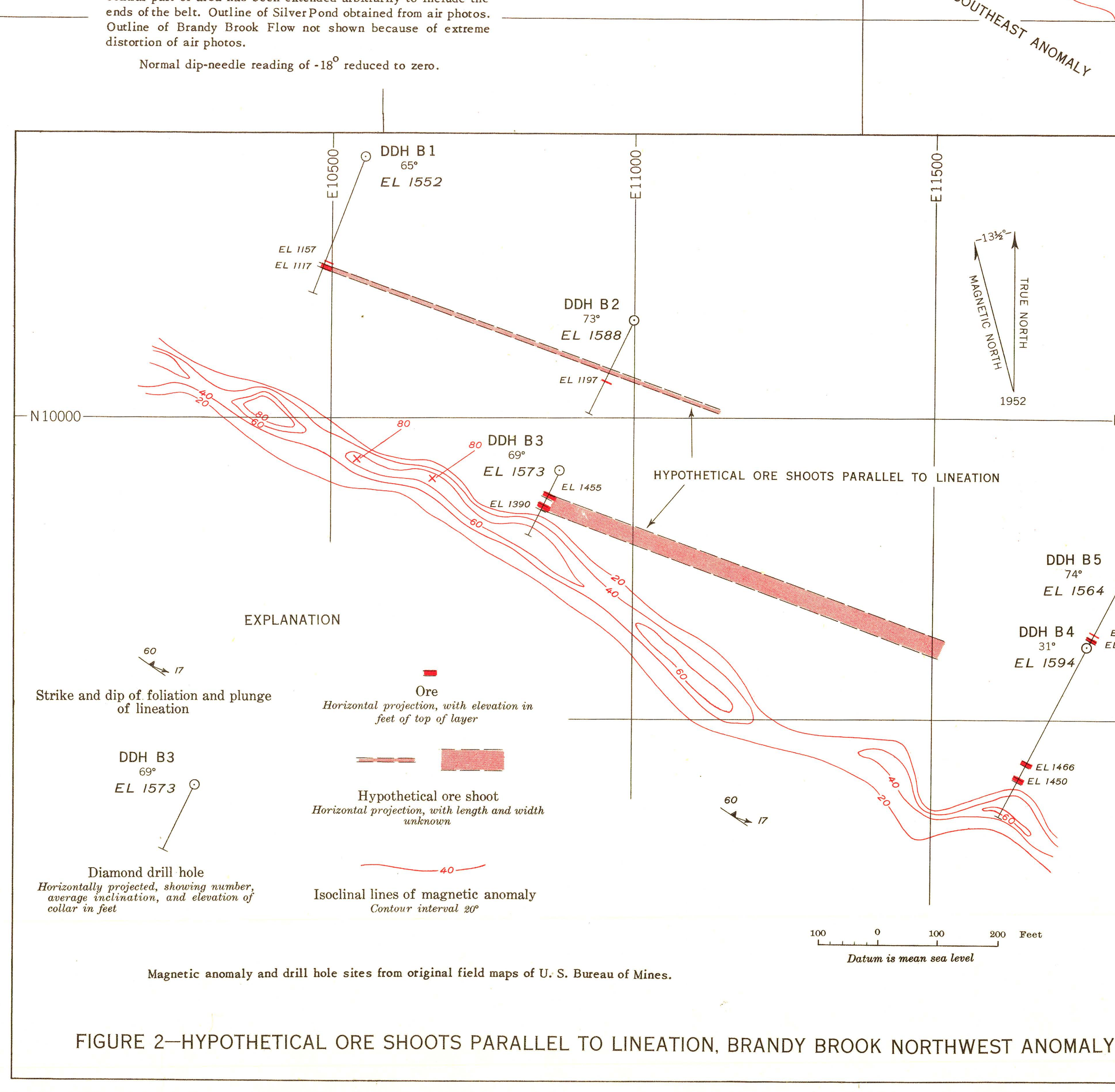


Sections begin at northwest end of mapped area and continued toward the southeast, reading from left to right in the diagram above.

Topographic profiles and top of bedrock are inferred, except as noted below.

FIGURE 3--SECTIONS THROUGH DRILL HOLES B1 TO B12 BRANDY BROOK AND SILVER POND ANOMALIES



Magnetic anomaly and drill hole sites from original field maps of U. S. Bureau of Mines.

FIGURE 2—HYPOTHETICAL ORE SHOOTS PARALLEL TO LINEATION, BRANDY BROOK NORTHWEST ANOMALY

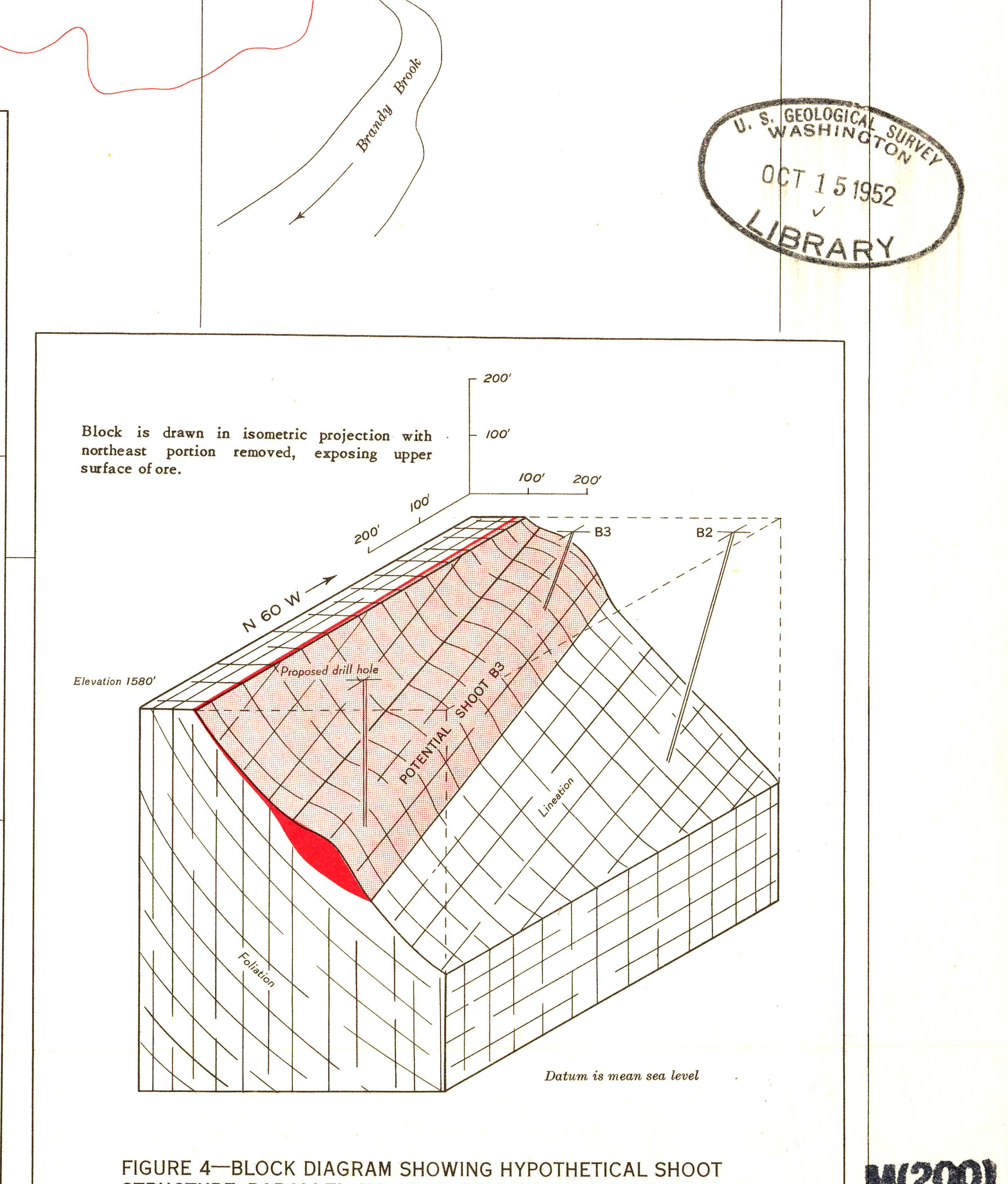


FIGURE 4—BLOCK DIAGRAM SHOWING HYPOTHETICAL SHOOT STRUCTURE PARALLEL TO LINEATION AT BRANDY BROOK

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