Memorandum on the geology of the Crown Point, New York, group of magnetite deposits

by
A. F. Buddington 1891- and B. F. Leonard, 1921
Revised by B. F. Leonard, August 3, 1949

CONTENTS

ILLUSTRATIONS

MEMORANDUM ON THE GEOLOGY OF THE CROWN POINT, NEW YORK, GROUP OF MAGNETITE DEPOSITS

A. F. Buddington and B. F. Leonard
Revised by B. F. Leonard

INTRODUCTION

The original memorandum report was prepared because of the active interest of the U. S. Bureau of Mines in the Crown Point group of magnetite deposits. That interest was, in turn, spurred by the New York State Department of Commerce and the New York State Geological Survey. The purpose of the writers was to provide the kind of geologic information essential to the first stages of intelligent exploration for magnetite in the district, particularly by means of the dip needle. The report is a careful reconnaissance, not a detailed study. As the writers had neither a sun compass nor a dip needle at that time, certain small errors - otherwise avoidable - may have crept into the work.

The report was revised by B. F. Leonard in August 1949. A few minor additions and corrections have been made in the original text in the form of the appendix. The writers have not revisited the area since 1943.

The Crown Point group of magnetite deposits is located south and southwest of the village of Crown Point, New York, in the townships of Crown Point and Ticonderoga, Essex County. The deposits lie in the northwest and west-central rectangles of the Ticonderoga quadrangle. The group comprises the Breed and Hammond mines on Breeds

Hill, the Kent mine on Dibble Mountain, the Butler and Vineyard mines on the southwest wall of the valley between Buck and Dibble Mountains, a small prospect on the east shoulder of Brooks Hill, and three prospects at the foot of the east side of Dibble Mountain. Specific locations of the individual workings are given in the section entitled Mines and Prospects. The Butler and Vineyard mines are the only ones directly accessible by auto road. None of the mines has been worked during the last 50 years.

The area investigated covers about 16 square miles. The report is based on two days' field work by Buddington and Leonard and 9 days' field work by Leonard.

ROCKS

The oldest rocks in the area mapped are metasedimentary rocks of the Grenville series, including gray biotite gneiss and amphibolite, with minor amounts of limestone, quartzite, pyroxene granulite, and biotite schist. Intrusive into these metasedimentary rocks is a pink granite, which locally gives rise to large pegmatite bodies of commercial value. The granite and the metasedimentary gneisses are commonly interlayered to form a migmatite. Granite gneisses of the Grenville Series, and their migmatite are all of pre-Cambrian age.

The pre-Cambrian rocks are locally intruded by thin diabase dikes, probably of Paleozoic age. The outcrop area represented by these dikes is insignificant.

Potsdam sandstone (Upper Cambrian) is exposed in the brook bottom 0.6 mile west of Crown Point Center, and Beekmantown limestone (Lower

Ordovician) is exposed in a quarry one mile south of Dibble Mountain. These two formations are the only representatives of Paleozoic rocks in the area.

Metasedimentary rocks of the Grenville series

Gray biotitic gneiss.--This rock, together with its migmatite, forms Breeds Hill, Dibble Mountain, and the northern two-thirds of Buck Mountain. The gneiss consists of quartz, biotite, and white feldspar, usually with a little hornblende. Locally it carries small granules of green pyroxene or is interbanded with thin layers of pyroxene granulite. At many places the migmatite contains coarse garnet crystals. On weathering, the rock resembles amphibolite.

Amphibolite.--This rock is a gray to black gneissic rock consisting chiefly of hornblende and feldspar. Locally it may be rich in biotite or garnet. It usually occurs as local layers in the gray biotitic gneiss. Keeney Mountain represents the only sizable area of amphibolite.

Limestone.--The limestone is a coarsely crystalline rock containing small, disseminated grains of green pyroxene and flakes of graphite. Interlayered with gray biotitic gneiss, it crops out at the spar bins on Route 22, 1.5 miles south of Crown Point, where it has been invaded by granite pegmatite. Limestone is exposed also just east of Forrester Pond, and west of Street Road settlement. According to Alling (1918, p. 15), limestone is exposed in the old graphite pits several hundred feet west of Buck Mountain Pond. A narrow belt of limestone probably underlies (in part) the valley of the small brook flowing east from Sugar Hill.

Quartzite.—Quartzite crops out along the road running west from Street Road settlement. The quartzite is commonly coarse, glassy, and rather thin-layered. Some of it contains disseminated pink garnet or granular green pyroxene. It is interlayered with mica gneiss, limestone, or amphibolite.

Biotite schist.—This schist consists almost entirely of biotite. It occurs only in association with the magnetites, and then only to a limited extent. It may have been developed in connection with the emplacement of the magnetite deposits.

Granite

Where it has not been contaminated by metasedimentary rocks of the Grenville series, the granite is a fine-grained granular rock consisting of quartz and pink feldspar with few or no mafic constituents. Consequently, it exhibits almost no mappable foliation. The summit of Buck Mountain is composed of such a granite. The granite of Sugar Hill and local granite sheets (presumably with incorporated Grenville) are well foliated, owing to the presence of granular green pyroxene, biotite, or hornblende. A small area of magnetite granite occurs in the vicinity of the prospects on the east side of Dibble Mountain. A little sillimanite granite gneiss crops out 0.6 mile southeast of Sugar Hill corners.

Pegmatite

The pegmatite occurs in such large and ubiquitous masses that it merits consideration separately from the granite, although it is presumed to be a facies of that rock. The massive pegmatite, consisting of coarse quartz and feldspar crystals, has a pink and white

knotty weathered surface. Locally the pegmatite carries large crystals of hornblende or plates of biotite. The pegmatite has been mined in scattered workings over much of the area, although the principal quarry lies about 1500 feet southwest of the saddle between Breeds Hill and Dibble Mountain. The quarry, not now in operation, was worked for 30 years by the Crown Point Spar Co. Some of the material was of high grade; about 10,000 tons were shipped for ceramic use.

Pegmatite has intruded and injected the Grenville rocks in many places. Where it has come into the metasedimentary rocks in large quantity, the foliation of the Grenville is greatly disturbed; numerous small crenulations are developed, crosscutting pegmatite veins form a network within which adjacent blocks of Grenville show highly divergent foliation trends, and the entire structural pattern becomes deranged.

In the migmatite, both pegmatite and granite occur as layers, eyes, and crosscutting veins.

STRUCTURE

The area is one of complex geologic structure. Various types of folding are indicated by the internal structures (foliation, lineation, contortion of pegmatite veinlets) of the rocks. The pattern as a whole has been further complicated by faulting, presumably of much later date.

Folds

Sugar Hill fan.—The foliation of the granite of the Sugar Hill area has a fan structure. Although foliation in each limb of this structure dips toward a central axis, the dip steepens as the axis is

approached. Thus the foliation passes through the vertical at the axis, rather than through the horizontal (as in a syncline). The axis strikes about N. 80° W. Although a known east-west fault roughly coincides with the position of the axis, the structure seems relatively undisturbed by the faulting.

Dibble Mountain.—The rocks that constitute Dibble Mountain possess the same general east-west trend as those in the fan structure to the north. It is possible that the Dibble Mountain structure is a continuation of the steeply dipping south limb of the fan, although a known east-west fault passes through the cross valleys between Dibble Mountain and Breeds Hill. There are minor irregularities of strike and dip bordering the north-south fault on the east side of Dibble Mountain. It is believed that the intrusion of small pegmatite masses has resulted in this disturbance of an otherwise uniform north-dipping structure.

Buck Mountain syncline.—The most significant structural feature in the area is the narrow Buck Mountain syncline, which has been traced generally S. 55°-60° W. from the intersection of the Vineyard road with the Crown Point-Ticonderoga town line, to Keeney Mountain and the west border of the Ticonderoga quadrangle. The northwest limb of the syncline dips toward the axis at angles of 30° to 5[illegible]°, flattening as the axis is approached. Where foliation is visible along the axis (the Buck Mountain granite contains almost no mafic minerals capable of indicating foliation), it is much contorted. Although the strike of the foliation is extremely varied, the axis of minor pegmatite crumples in the granite strikes generally N. 50°-80° E. The southeast limb,

south of the Vineyard Mine, is characterized by numerous minor rolls that die out westward toward Keeney Mountain, where the dip is uniformly 40°-70°. These minor rolls in the southeast limb of the syncline gradually pass southward into an anticline (of granite core) whose axis trends toward Worcester Pond. The entire structure broadens to the southeast. Granite forms the northwest limb, part of the axial region, and part of the rolling southeast limb of the syncline. Both the Butler Mine and a small, unvisited magnetite prospect lie on the axis of the structure; the Vineyard Mine is situated on the southeast limb, close to the axis. A little sulfide mineralization occurs near the axis on the east end of Keeney Mountain, and two graphite prospects, not visited by the writers, lie on or close to the structure. One of these prospects is several hundred feet west of Buck Mountain Pond__/;

__/ Alling, H. L., The Adirondack graphite deposits: N.Y. State Mus. Bull. 199, p. 15, 1918.

the other, known as the Madam property, is three-eighths of a mile east of Echo Lake or Worcester Pond __/. The syncline has proved to

__/ Alling, H. L., op. cit., p. 23.

be a favorable locus for mineralization.

The gray biotitic gneiss and amphibolite of the northwest end of the Buck Mountain block (1.5 miles southwest of Crown Point Center) are greatly disturbed structurally, perhaps as a result of intrusion of a small granite tongue in that area.

Faults

North-south faults.—The principal fault in the area is the north-south Champlain fault bordering the lake and giving rise indirectly to the eastern scarps of Breeds Hill and Dibble Mountain. The nearly vertical fault, the down-thrown side of which is to the east, is indicated not only by the topography but also by the presence of (1) slickensided, sheared rock surfaces along Route 22 about 1.5 miles south of Crown Point and (2) a large down-dropped mass of Beekmantown limestone just east of Route 22 and 2.0 miles northeast of the hamlet of Street Road.

The topography suggests that a fault running roughly north-south may determine the steep valley between Buck and Dibble Mountains. The valley is so choked with glacial debris that direct geologic evidence for faulting cannot be observed but a fault does seem to be indicated by a lack of continuity of structure in the pre-Cambrian rocks on opposite sides of the valley between Buck and Dibble Mountains. The structural discontinuity (steep north to vertical dips on Dibble Mountain, a gentle syncline on Buck Mountain) is not conclusive evidence of faulting, however, in a region where the structure is so complex. If faulting exists, there is little hope for continuation of a potential "Butler vein" or "Vineyard vein" beyond the east wall of the valley.

East-west faults.—A major east-west fault determines the general course of Putnam Creek, just north of the area surveyed. This fault is indicated by the presence in the creek of large masses of

← Potsdam sandstone, striking N. 10° E. and dipping 8° NW., 0.6 mile west of Crown Point Center. The valley walls are pre-Cambrian gneisses.

A minor east-west fault lies along the little brook 0.3 mile south of Sugar Hill. Faulting is indicated by (1) sheared country rock, breccia, and gouge, (2) slickensides and scale structure on vertical surfaces, and (3) extensive calcite-quartz-apatite (?) mineralization along the fault zone. Scale structure indicates that the north side moved west and downward at an angle of 30°, with respect to the south side. The amount of displacement is unknown. Apparently the fault has not disturbed the fan structure of the granite.

A second minor east-west fault separates Breeds Hill from Dibble Mountain. Again, the amount of displacement is unknown. Rough scale structure in faulted pegmatite indicates that the north side moved east and downward at an angle of 45°, relative to the south side.

MINES AND PROSPECTS

Mines on Breeds Hill

The Breeds Hill workings include an incline and vertical shaft on the gentle north slope of the hill and a vertical shaft on the east shoulder.

The Breed and Hammond (Gunnison) mines are situated in a pasture on the gentle north slope of Breeds Hill. They lie 0.65 mile air line south of the road intersection on Sugar Hill (south of Crown Point Village) and 0.6 mile west of Route 22, the main highway between Crown Point and Ticonderoga. They may be reached by driving 0.35 mile southwest from Sugar Hill to a point where the road begins its descent to a small valley. At the brow of the hill, an old tote road runs about 450 yards roughly south and east through a pasture and up a gentle slope to the dump and incline of the Breed Mine. The trench and shaft of the Hammond (Gunnison) Mine are located in a birch grove about 200 yards east of the Breed incline. Although the topographic map does not indicate it, the trench lies across and a little up slope from the incline. The trench is most easily reached by walking from the incline southeast 60 yards upslope to a wooden snake fence and following the fence upslope about 100 yards to the point where it crosses the trench. Both mines are on property owned by Mr. Harry Lawrence, of Sugar Hill, Crown Point, N. Y.

/ Died, September 1948.

Breed mine.—The incline, now flooded, reportedly extended 90 feet downdip and opened into a 26-foot drift at the bottom. The incline (width 10-12 feet, height about 8 feet) trends N. 10°-15° E. and dips at an angle of 45°. The ore apparently strikes N. 70°-80° W. and dips 45° N., conformable with the foliation of the country rock. Nearby, granite strikes N. 70° E. - N. 80° W. Linear structure (indicated by the alinement of biotite flakes on the footwall) trends N. 55° E. and plunges 50° NE. The hanging wall of the incline is a pink hornblende-biotite granite, strongly foliated. The footwall, as exposed, is still in ore but shows considerable biotite. The 8-feet thickness of "ore" (where exposed at the surface) is really interlayered magnetite and granite, the exact proportions of each being difficult to determine. Judging from surface indications, the ore zone pinches out along the strike at a maximum distance of about 50-60 feet east of the incline. Any possible extension of ore outcrop to the west is now obscured by the dump, which contains 60-70 cubic yards of ore with very little waste. Dump specimens of ore show coarse, compact magnetite intergrown with quartz, biotite, and pyrite. Pyrite seems to constitute 10-20 percent (by volume) of ore.

Hammond (Gunnison) mine.—The developments at the Hammond Mine are a north-south trench about 100 yards in length and of varied width (usually about 2 yards), and a small vertical shaft located at the north end of the trench. This shaft is a cubical opening measuring approximately 10 feet on a side. The trench cuts only the rocks of the footwall. These rocks, generally striking N. 50°-60° W. and dipping 60° NE.,

consist of pink granite with interlayered biotite-and hornblende-rich gray gneisses of the Grenville series. Much of the rock is a migmatite with pegmatite layers (up to 3 inches thick) parallel to the foliation. In the vertical shaft are exposed hanging walls and footwalls of pink hornblende-biotite granite enclosing magnetite ore accompanied by several layers rich in biotite and pyrite. There appears to be a 2 to 3-foot thickness of fairly sulfur-free lump magnetite with considerable hematite. The ore strikes about N. 60°-70° W., with dip varying from 75° NE. at the top to 85° NE. at the bottom of the shaft. Lineation given by hornblende crystals in the wallrock plunges 40° east on a nearly vertical surface. The dump contains mostly waste rock.

A rusted casing east of the shaft marks the site of a shallow (vertical?) diamond drill hole, which reportedly cut 6 feet of ore near the surface.

Vertical shaft on east shoulder of Breeds Hill.--A small vertical shaft is located near the head of a steep northwest-southeast valley on the east shoulder of Breeds Hill, 0.3 miles south of the intersection of the Sugar Hill road with Route 22 and 0.2 mile west of Route 22. The shaft can be reached by walking south along the north-south power line cut (parallel to Route 22) and northwest up the small valley. Because of poor timbering and caved surficial material, the shaft is inaccessible for study. Dump specimens show high-sulfur magnetite associated with biotite-rich rock. A narrow trench 10 yards long lies about 20 yards northeast (downslope) from the shaft. The trench cuts pink granite, foliation N. 80° W., 80° NE.

Evidence from nearby outcrops suggests that the ore is accompanied by a biotite-rich layer and is included in pink granite.

Of the Breed and Hammond mines Newland _/ states: "Together

_/ Newland, D. H., Geology of the Adirondack magnetite iron ores: N. Y. State Mus. Bull. 119, p. 42, 1908.

with a third opening lying on the east shoulder of the hill they form an interrupted band of ore that extends across the hill in a northeasterly direction. There is a slight offset in the lines of outcrop of the ore bodies which is suggestive of faulting." Although the Breed and Hammond mines may cut portions of the same general zone of mineralization, they do not share a continuous ore body— at least the ore body cannot be traced continuously in outcrops along its general strike. Eaton _/ however, does report a zone of magnetic

_/ Personal communication.

attraction connecting the two mines. Whether or not the east shoulder mine lies on a faulted portion of the possible Breed-Hammond vein is not known; surface evidence of faulting in the critical area could not be found.

Mines on Dibble Mountain

Kent mine.—This is the principal opening on Dibble Mountain. It is situated on the steep east flank of the mountain near the summit, 0.35 mile west of Route 22 and 150 yards southeast of the U.S.C. & G.S. triangulation station, on land owned by Mr. Donald Durkee (?). _/

/ According to Millar (letter, 1943), the mineral rights for the Kent property are controlled by Mr. L. M. Kent, Rutland, Vermont.

Crown Point, N. Y. (Note: Route 22 lies several hundred yards east of the position occupied by the old north-south Ticonderoga road shown on map.) The dump is visible from Route 22. The mine can be reached by walking northwest from the farms 0.6 mile north of the highway intersection 1.8 miles east of Buck Mountain (intersection is near a large limestone quarry) to the pasture at elevation 220-240 feet. The dump lies about 350 yards northwest up the slope from the pasture.

The ore was mined from an east-west open-cut 15 yards long and 2 to 3 yards wide. The footwall and hanging wall are pink or gray granite with shreds of amphibolite and seams and crosscutting veins of pegmatite. The ore, striking about N. 70°-90° W. and dipping 10°-15° N., occurs as two thin seams (upper, 6-10 inches thick; lower, 15-25 inches thick) separated by about 2 feet of barren rock. The dump material is chiefly waste; 2 small stock piles (total 3 to 4 cubic yards) show solid, high-grade magnetite apparently low in sulfur.

Other workings.--(1) One-hundred and fifty to 200 yards west of Route 22 and approximately on the Crown Point-Ticonderoga township line, are a small open-cut and tunnel driven west into the mountain. The workings can be reached by walking west from Route 22 to a path running southwest diagonally up the mountain to the power line. The dump lies about 30 yards up the path from the foot of the steep slope. The cut (10 yards square and 10 feet deep) and tunnel (6 feet high, 15 feet along strike, and 12 feet west into the mountain)

lie just west of the dump. Ore is exposed only in the tunnel, where it occurs as two thin seams (upper, 6-8 inches thick; lower, 12-16 inches thick) separated by 1 foot of barren rock. The wallrock is amphibolite migmatite with several pegmatite layers up to 1 foot thick. The ore seems restricted to the pegmatitized zones. Direction of foliation in the wallrock is difficult to obtain accurately; it strikes about N. 20° E., and dips gently northwest.

(2) About 50-100 yards west of Route 22 and 200 yards north of the town line is a small, shallow prospect pit, 3 yards in diameter, at the base of the cliff. No ore is exposed in place, but dump specimens show lean magnetite with pegmatite and gray biotitic gneiss. Foliation in the wallrock strikes about N. 45° E. and dips 20°-25° NW.

(3) Fifty yards farther south is another small pit, showing 10-12 inches of good magnetite in migmatite; foliation strikes about N. 20° W., and dips gently westward. Large masses of pegmatite cross-cut the migmatite. The pegmatite carries chunky magnetite crystals.

The relation of these three prospects to one another and to the Kent Mine is unknown. A few reconnaissance dip-needle traverses, or detailed geologic work, should make the relations clear.

Vineyard and Butler Mines

The Vineyard-Butler mines are located just west of a U-curve in the north-south highway running along the west side of the steep valley between Buck and Dibble Mountains. By air line, the mines lie 2.0 to 2.3 miles southeast of Crown Point Center, 2.5 to 2.8 miles south-southwest of Crown Point, and 0.05 to 0.3 mile south of the Crown Point-Ticonderoga town line. The position of the mines is readily spotted

from the highway, because of the presence of large dumps containing several thousand tons of ore. Mr. Sheridan L. Burleigh, Ticonderoga, New York, and Mr. George C. Foote, Port Henry, New York, own the mineral rights for 3000 acres of land including the Vineyard Mine (and Butler Mine?)./

/ Millar, letter, 1943.

Newland / states: "The Vineyard mine was last worked by the

/ Newland, D. H., op. cit., p. 41.

Lake Champlain Ore & Transportation Co. during the years 1887 and 1888, but it had been under operation 40 years before. Some of the ore was used at the Crown Point furnace."

The workings consist of 3 pits (presumably on the same vein and all included in the designation "Vineyard") and a small open-cut (presumably the Butler Mine)./ The southernmost pit, which is large

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/ This open-cut is no longer referred to as the Butler Mine by the local people. Instead, the name is reserved for the workings 3 miles, airline, south-southwest of Port Henry Post Office, on the north side of Grove Brook, Port Henry Quadrangle.

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and apparently deep, is located just west of the south extremity of the U-curve. This is probably the pit concerning which Newland / says:

/ Newland, D. H., op. cit., p. 41.

"It is less than 100 feet deep and shows 5 feet of ore at the surface which widens to nearly 15 feet at the bottom." It is now inaccessible for study. The second pit lies about 200 feet north of the first. The hanging wall exposed in this pit is granite gneiss with sparse amphibolite schlieren. The third pit lies about 140 feet north of the second. The exposed thickness of ore in this last pit is estimated at about 20 feet. The hanging wall is amphibolite migmatite with a large pegmatite vein. The footwall is granite pegmatite and granite gneiss with a few inches of mica rock between it and the ore. The foliation strikes N. 60°-65° E., and dips 30°-40° NW. Assuming that all three pits were sunk on the same vein (an assumption that may not be valid), the vein has a minimum length of approximately 350 feet.

The Butler Mine is a small open-cut beside the highway, 50 or 60 yards south of the town line. Solid pyritic magnetite, striking N. 30°-35° W. and dipping 18° SW., is exposed.

Newland _/ states: "The (Vineyard) deposit can be traced along

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_/ Newland, D. H., op. cit., p. 41.

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the outcrop for 100 rods or more following the highway that leads to Crown Point Center." On page 42 he says: "The Butler mine is located on the northern continuation of the Vineyard." These statements would seem to be assumptions, rather than facts. The outcrops immediately north of the third Vineyard pit show foliation striking N. 35°-40° E. Such a structure would block the ore from continuing north along the highway. If the vein continues at all, it must cross the highway just northeast of the third pit. This same structural condition would

preclude the possibility that the Butler vein is a continuation of the Vineyard. Rather, the Butler vein (almost 500 yards north and across the strike from the Vineyard pit) seems to lie in or very near the trough of a small syncline, whereas the Vineyard vein lies on the south limb of the same syncline (but not at the same "stratigraphic horison").

The Vineyard-Butler ore is coarse, solid magnetite associated with quarts, biotite, and pyrite. Newland _/ says that the pyrite is more

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_/ Newland, D. H., op. cit. p. 41.

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abundant near vein walls than in the central part of the vein. He adds: "The following analysis by J. B. Britton is quoted from Maynard who states that it was made from a sample after rejecting the most sulfury portion.

Iron	51.34
Silica	21.07
Sulfur	1.17
Phosphorus	.36
Water	.24

Following is the analysis of a "general sample" from the dumps of the Vineyard Mine. The sample was collected by R. G. Srodes, of the Sherango Furnace Company, and analyzed by the Tonoeda Laboratory, Albany, New York, October 2, 1943. _/

_/ Srodes, personal communication.

Metallic Fe	54.95
SiO_2	21.15
TiO_2	0.24
S	1.41
P	0.02

RECOMMENDATIONS

A geophysical survey of part of the area is recommended. The Buck Mountain-Keeney Mountain syncline deserves first consideration. The Butler Mine is located in the trough of this syncline, whereas the Vineyard Mine lies on the southeast limb. Another magnetite prospect (not visited by the writer) reportedly lies about 500 yards east-northeast of Buck Mountain Pond, or in the trough of the syncline. Thus there is known mineralization in the structure at two points almost one mile apart. The fact that the syncline trends generally south and west toward the Skiff Mountain mineralized area on the Paradox Lake Quadrangle may or may not be significant.

Detailed geophysical work should be done to the northeast and southwest of the Butler Mine. The geology, however, suggests that the best possibilities for extension might be found west-southwest towards Buck Mountain. Similarly a detailed magnetic survey should be made to the northeast and southwest of the Vineyard Mine. A fault is inferred between Buck and Dibble Mountains, but in view of some uncertainty about it, geophysical work should be extended far enough east across the valley and onto the west slope of Dibble Mountain to test possible continuation of the Butler and Vineyard veins in that direction. This may call for the use of a magnetometer over the valley, which carries a thick burden of drift. Work should be carried for at least a mile to the southwest along the general strike of each of the veins. In addition, a systematic geophysical reconnaissance should be made of a belt about a mile wide and a little more than a mile long running southwest from the road, with the center line of the area through the Vineyard

Mine. Some magnetometer work done by Eaton suggests that the magnetic anomaly at the Butler Mine may be an unbroken high, larger than the Vineyard, and that the 3 vineyard pits occupy two small, separate magnetic highs.

The magnetite deposits of Dibble Mountain and Breeds Hill appear to be of secondary importance. Eaton _/ states that a discontinuous zone

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_/ Oral communication

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of weak magnetic attraction connects the Breed and Hammond mines on Breeds Hill. The exposed workings and the geology suggest that these bodies are small, pinching both along the strike and down the dip, and of dubious commercial value. However, in order to make certain that something of value is not casually passed up, a systematic reconnaissance magnetic survey should be run across the mineralized east-west belt including the Breed and Hammond mines and the pit on the east, and similarly over the mineralized belt including the Kent Mine and the prospects to the east.

Some years ago, E. R. Easton, a former engineer with the U. S. Bureau of Mines and now a resident of Crown Point, carried out a magnetometer survey of a limited area including the Vineyard and Butler mines and the ore zone of Breeds Hill. The maps showing data that he obtained are no longer available, except the map of the Vineyard-Butler area. Eaton considers that the Breeds Hill-Dibble Mountain deposits are merely small, discontinuous magnetite bodies. Insufficient work has been done on the Buck Mountain syncline to permit drawing a definite conclusion on the nature of that occurrence.

APPENDIX

In December 1944, a Thalen-Tiberg magnetometer survey of the Breeds Hill deposits was made by J. G. Broughton, now State Geologist, and N. L. Smith, temporary mining geologist of the New York Department of Commerce. The results of the magnetic work and examination of the workings are presented in a typed report by Broughton, dated September 25, 1944, entitled "Geological and geophysical survey of area near Crown Point, N. Y." A copy of this report, a topographic map of the area (scale, 1 inch = 200 feet), and two magnetic maps (for horizontal and vertical components of the earth's magnetic field) are on file in the Office of Geology, New York State Science Service, State Education Building, Albany 1, New York.

The magnetic maps of Broughton and Smith show a continuous zone of anomalies connecting the Breed incline, a filled shaft (noted by Broughton; not detected by Leonard) at the south end of the Hammond (Gunnison) or Nedeau trench, and the opening on the east shoulder of Breeds Hill. The vertical shaft at the north end of the Hammond or Nedeau trench lies on a separate magnetic high. The pattern of anomalies, with fishhook shape, suggests an isoclinal fold in the bedrock. Inasmuch as the arc of the anomalies is at the west end, the foliation dips northward, and a lineation given by hornblende crystals trends about S. 70°–80° E. and plunges 40° E., it is inferred that the possible fold is an isoclinal syncline overturned southward and plunging eastward. On the other hand, the two zones of anomalous magnetic readings may belong to "stratigraphically" separate magnetite layers. Mapping the area outcrop by outcrop should permit one of these alternatives to be discarded.

In any event, one ought to bear in mind that the continuous zone of anomalies, with its separate peaks, does not necessarily indicate a continuous layer of ore, though it does point to general continuity of the mineralized zone.

In the summer of 1946, the U. S. Geological Survey made an airborne magnetometer survey of the Eastern Adirondack magnetite district, which includes the Crown Point area. The results of this survey have not yet been published, and the preliminary results have not been seen by the writers. The air-detected anomalies were turned over to the New York State Science Service for a ground check by dip needle. This work is under the field direction of B. M. Shaub of Smith College. Work has been done in the Paradox Lake and Ticonderoga quadrangles and the survey is expected to be completed by the end of the 1949 field season /.

/ J. G. Broughton, New York State Geologist, personal communication.

Matt S. Walton, Jr. is now mapping the pre-Cambrian areas of these quadrangles.

The recommendations made in the memorandum have been left in their original form. Without a study of the aeromagnetic anomalies and an intimate acquaintance with the present and future program of the New York State Science Service, it is not possible to make the necessary revision of these recommendations. Obviously, the need for a magnetic survey of the Bruce Hill area has already been satisfied by the painstaking work of Broughton and Smith.

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Map
Showing Location and Geology
of the
CROWN POINT GROUP OF MAGNETITE DEPOSITS,
Crown Point, Ticonderoga Quadrangle, N. Y.

A. F. Buddington and B. F. Leonard

September, 1943

EXPLANATION

Lower Ordovician — Ordovician

Ob Beekmantown limestone

Upper Cambrian — Cambrian

€p Potsdam sandstone

Peg Pegmatite

Gr Granite

Grenville Series — Pre-Cambrian

Gvm Gray biotitic gneiss and amphibolite, more or less migmatized; minor limestone and quartzite

Gva Amphibolite, where predominant in mappable areas

Strike and dip of foliation; linear structure

Vertical foliation

Dip of foliation; strike variable

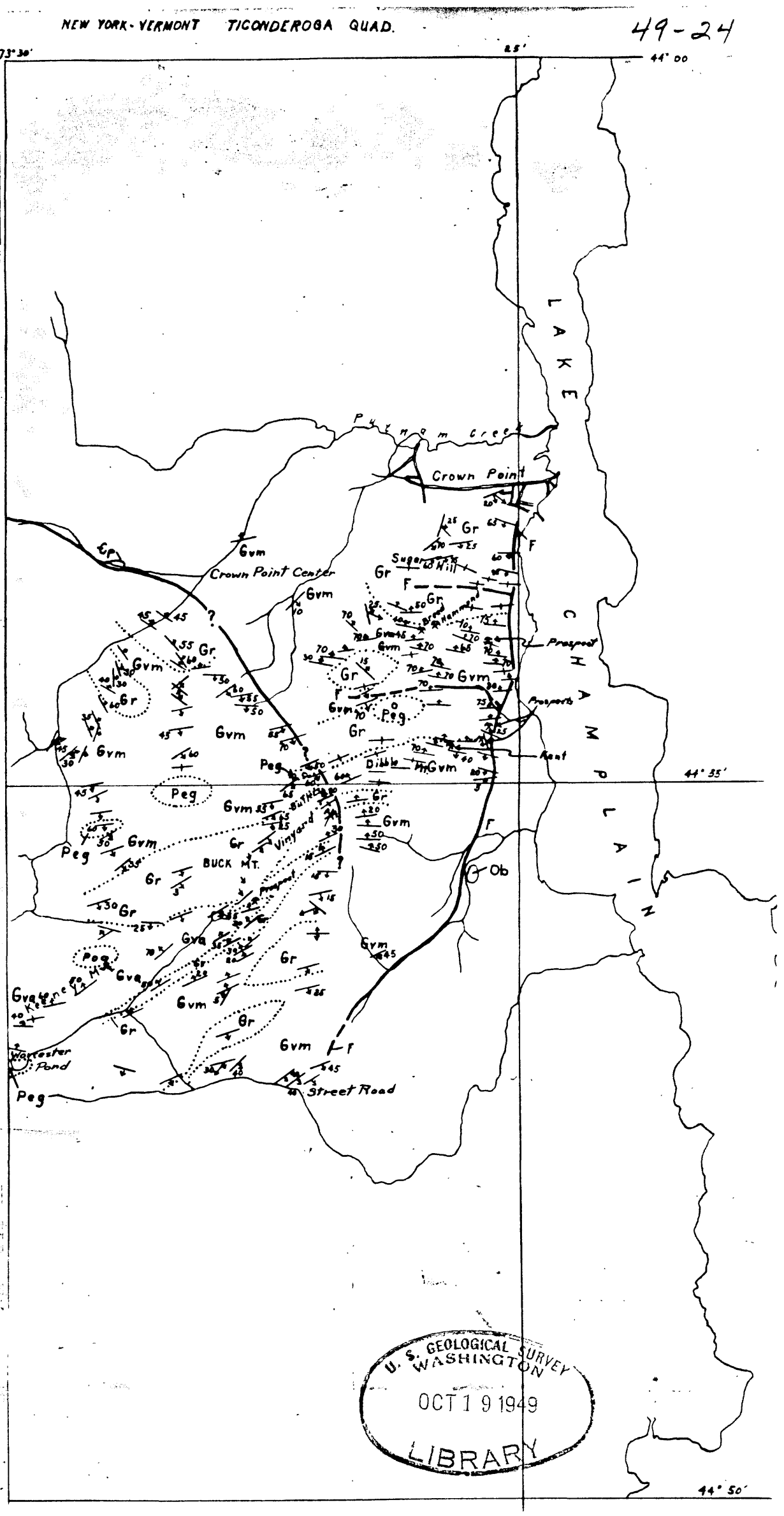
Minor anticlinal axis

Known fault

Inferred fault

Magnetite mine or prospect

Feldspar quarry



CROWN POINT MAGNETITE DEPOSITS

Map by A.F.Buddington and B.F.Leonard,

September, 1943.