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REPORT

of the

STATE GEOLOGIST

1943 - 1944

Maine Development Commission

Augusta, Me. March 1, 1945

MAINE GEOLOGICAL SURVEY

MAINE DEVELOPMENT COMMISSION

Personnel

1943

Joseph M. Trefethen, Ph. D.
State Geologist

Robert B. Bradford, B. S., Assistant Engineer
Alta C. Clifford, Secretary
Robert N. Miller, B. A., Assistant Geologist
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1944

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STATE GEOLOGIST

1943 - 1944

by Joseph M. Trefethen, *State Geologist*
and Associate Professor of Geology,
University of Maine

Maine Development Commission
Augusta, Me. March 1, 1945

". . . idle mineral resources do not create wealth of themselves; they must be studied, evaluated, processes worked out, mines opened, and materials processed to be of benefit to mankind by giving employment, creating new wealth for the state, and providing products that make for better living."

Oklahoma Geological Survey

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REPORT OF THE STATE GEOLOGIST

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PART ONE

Report of Survey Activity

In 1943, geologists throughout the nation were concerned with deficiencies of certain minerals essential to the maintenance of both quantity and quality of war production. War industries demanded unprecedented mineral output, and especially critical were certain categories of minerals. The report of the State Geologist for 1942-43 gave the "strategic list" and discussed the possible contributions of Maine to this war effort. Of the minerals on the strategic list,[1] sheet mica and manganese occur in this State. Mica and manganese projects were, therefore, given priority over other investigations. While the figures for mica output cannot be released, a substantial amount has been produced. The manganese deposits have not yet come into production, as the technique of treatment of these particular deposits has not yet been completely worked out.

The nation's war mineral supply problems were well under control, with a few exceptions, by the 1944 field season. The Maine Geological Survey, in common with most of the other State Surveys, consequently directed a portion of its endeavor to the investigation of resources with view to postwar needs and possibilities. Graphite deposits and clay beds are currently under study. The results of field and laboratory work will be published in detail as the work is carried through. In a subsequent part of this report, brief discussions of certain resources are given.

Manganese Investigations

In view of the urgent national need for manganese, the State entered into a cooperative agreement with the Federal Geological Survey to continue the mapping and study of the manganese

[1] Minerals supplying aluminum, antimony, chromium, manganese, sheet mica, mercury, nickel, quartz crystals, tin, tungsten, comprise the strategic group.

beds. A field party under Dr. Ralph Miller was consequently engaged in this work during the field season of 1943, and the last few weeks of the 1944 field season. A manuscript report on the cooperative project is in the open files of the State Survey, and may be consulted in the Survey office at Orono.

Mica Investigations

Because mica is without a satisfactory substitute in a great variety of essential war time applications, considerable time was given to the examination and mapping of mica mines and prospects. Reports, together with black and white prints of the maps, (See Appendix A) were made available to directly interested parties through the Maine Development Commission office, and placed in the open files of the Geological Survey at the University of Maine. The U. S. Geological Survey has also devoted attention to the Maine mica deposits, and has placed maps resulting from their work in the open files of the State Survey.

Recent advances in the techniques of sheet mica prospecting and prospect evaluation are particularly noteworthy, and are briefly described in a subsequent section of this report.

Dolomite and Limestone Investigations[2]

Dolomite and limestone beds, sources of magnesium and calcium carbonate, of especial interest for the production of land lime at the present time, have been mapped in reconnaissance. Because of the importance of this phase of the field work, resulting in an important addition to Maine mineral valuations, a subsequent section of this report outlines the dolomite-limestone situation. In brief, it is believed that sufficient dolomite (magnesium-calcium carbonate) has been mapped to assure a domestic (Maine) production of magnesium lime for many years. This is of special significance in view of the magnesia deficiences of the Aroostook County potato lands.

Peat Investigations

In view of fuel wood scarcity and high prices, a field party was detailed for five weeks' field work investigating the peat

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[2] The work of the Survey in calling attention to Maine deposits has resulted in the location of a new lime producing plant at Presque Isle. This plant will use local calcium lime, admixing dolomite to supply the desirable magnesia to the product.

fuel resources with particular reference to locations close to the larger cities. Laboratory examinations and tests of the various peats were carried out. The results of this survey have been published as Bulletin No. 1 of the Maine Geological Survey.[3] The field survey indicates a reserve of peat in the State on the order of one hundred fifty million tons (fuel-dry weight). The quality varies, but much of our peat is of the highest grade. The fuel possibilities of Maine peat are as yet unrealized, although in New Hampshire and in the Province of Quebec peat fuel production is underway. Laboratory investigations of industrial uses of peat are underway at the Survey Laboratory, Orono, and will be reported upon at a later date.

Grinding Pebbles

As a result of exploratory work on the utilization of certain types of Maine beach pebbles, by Trefethen and Eckstorm, some five hundred tons of these pebbles have been shipped from the beaches of Islesford, Machiasport, Jonesport, and Cutler. These are used in ball mills for grinding paints, ores, and other substances requiring pulverization. The price of the selected pebbles has ranged from twenty to forty dollars the ton. In prewar time the beaches of Northern France, Belgium and Denmark supplied the world market. As a result of the war, American substitutes have been introduced with varying degrees of success; the Maine pebbles have been reported as highly satisfactory for certain of these substitutions.

The pebbles must be as nearly spherical as possible for best results. Both felsites and basalts are serviceable.

Graphite, Clay, Spodumene

Other projects underway include studies of graphite, clay and spodumene deposits. Each of these require laboratory as well as field study before judgment as to commercial possibilities can be passed.

The study of graphite deposits is well underway. Both field work and laboratory investigations have yet to be completed. (A statement on the graphite project is found on pp. 22-23.)

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[3] Trefethen, Joseph M., and Bradford, Robert B.; *Domestic Fuel Possibilities of Maine Peat;* obtainable on request from Maine Development Commission, Augusta, Maine.

Deposits of spodumene have been mapped and described. (See maps and pp. 20-21.) The spodumene, a source of lithia, is probably not economic in terms of current local mining practice.

Inasmuch as clay is rather widespread in Maine, and at present limited to exploitation for but few products, investigations both field and laboratory, have been initiated. A brief section of Part II of this report discusses Maine clays and outlines the possibilities. It is evident that some uses beyond low grade structural products exist. As the study of the clays proceeds, the results will be released by the Development Commission.

Sulfur

In cooperation with the U. S. Geological Survey, the Katahdin Iron Works pyrrhotite deposit, Piscataquis County, has been studied. Dr. Ralph Miller of the U. S. Geological Survey was in charge of the field work. This large deposit of iron sulfide, a source of sulfur, has long been known. The ore body has an areal extent of 2,200 feet by 700 feet with an estimated 5,800,000 tons of iron, and 3,300,000 tons of sulfur for every hundred feet of depth. It is not unreasonable to estimate a depth of 500-600 feet for a deposit of this character. The depth may well exceed this estimate. A bulletin is in preparation presenting the results of this research. It is expected that this publication will be available for distribution in the near future.

Service

In accordance with policy, at request of owners, visits have been made to many properties (See Appendix B), for examination of the mineral prospects. The number of requests for information and consultation has been increasing. Due to shortage of manpower, the Survey has not been able to enlarge this service phase of the work to the extent desirable and to which taxpayers are entitled. Several hundred mineral specimens have been mailed or brought into the Survey office for identification, and an increasing number of inquiries for bulletins and geological information are received.

Other Activities

Cooperating with the other New England States and New York, the Maine Geological Survey is a member of the New York and New England States Council on Mineral Industries. This Council, comprised of the State Geologists of the respective States and representatives of the Development and Industrial Commissions, serves as a clearing house for mutual problems involving industrial minerals.

Illustrated talks on Maine geology, and discussions of Maine mineral resources have been given as a part of the Survey's educational program at request of various organizations in several parts of the State.

Laboratory

A laboratory for experimental work on the various types of Maine mineral resources has been authorized by the Maine Development Commission. It is felt that the State Geological Survey does not completely fulfill its mission by field mapping of deposits. The laboratory is designed to supplement field data on mineral deposits by determining analytically the qualities of various deposits, and establishing the ranges of possible commercial application. Experimental work in the separation of valuable from worthless material, and the preparation of samples of mineral concentrates of potential use are further provided for. The laboratory is located at the University of Maine, Orono, and operated in collaboration with the Maine Technology Experiment Station, Dr. Paul Cloke, Director.

Resume

Cooperative projects with the U. S. Geological Survey have resulted in maps and reports on the manganese beds of Aroostook County. The Manganese Ore Company of Iron River, Michigan has explored and drilled many of the occurrences, and has taken up options on certain of the properties. Mining of the manganese awaits technological developments. New developments in the lime producing and grinding pebble fields have resulted from the work of the State Geologist. The Survey is currently engaged in projects on graphite, clay and spodumene.

PART II

Geological Discussion

Sheet Mica

The deficiency of production in the United States of sheet mica of a quality meeting the exacting requirements of the electrical industries has caused an intensive study of the mica bearing pegmatites. Various state surveys and federal agencies have been engaged in the work. Because the same type of igneous intrusions, the pegmatites, yield other important industrial minerals besides the mica, the results of these intensive field studies have significance beyond the light they have yielded as to sheet mica occurrence.

Especially valuable have been the concepts of zoning brought out by the detailed studies of the U. S. Geological Survey under the guidance of Dr. H. M. Bannerman and E. C. Cameron.[4] In the biennial report of the State Geologist for 1942-43, a brief discussion of sheet mica occurrence was given. This current discussion is intended to supplement and revise to a certain extent the statements of the preceding biennial report in the light of recent investigations. The significance of the more detailed knowledge of the pegmatites now available is at once apparent to the prospectors and operators of pegmatites, especially to the producers of feldspar.

Zoning

Concerning the zonal distribution of sheet mica in pegmatites, it was stated,[5] " . . . . it may occur in irregular zones or 'veins' in the pegmatite, in which mica is relatively more abundant

[4] Cameron, E. N., Larabee, D. M., McNair, A. H., Page, J. J., Shainin, V. E., and Stewart, G. W., *Structural and Economic Characteristics of New England Mica Deposits,* U. S. G. S. Publication 47926, 1944.

[5] Trefethen, Joseph M., *Report of the State Geologist, 1942-43* p. 10-11.

. . . . These richer zones may occur in any part of the pegmatite body. There appears to be a tendency, however, for such zones to follow the margins of the pegmatite body.

"The zones themselves may die out, change character, becoming either better or poorer as they are worked, or may maintain their identity and character for considerable distances. This irregularity is characteristic both of horizontal and vertical extensions."

Marginal Zones

The importance of wall zone occurrences of mica is shown by the fact that in New Hampshire and Connecticut, the leading mica producing states of New England, nearly three-quarters of the sheet mica and nearly nine-tenths of the punch has been taken from wall zone concentrations.[6] The mica bearing wall zones, commonly separated by a few inches or a few feet from the actual contact by a relatively barren zone, are generally characterized by a soda-lime feldspar rather than a potash feldspar. Biotite (black mica) is generally absent in the wall zone, although it may be present in other parts of the pegmatite body. This association of plagioclase feldspar (soda-lime spar) with productive sheet mica wall zones has been repeatedly pointed out by Bannerman and confirmed by many field observations. Irregularities in the walls of the pegmatite as rolls or bends in the contact serve in many cases to localize "shoots" of richer character. These not uncommonly pitch parallel to the structural axes of the enclosing wall rocks. In the future more attention should be paid to the structural features of the wall rocks which may influence the internal structure of the pegmatites. It has been noted that many small lens-like bodies of pegmatite have a "rake" or pitch parallel to the pitch of the minor folds of the wall rocks.[7] Similar relations are expectable in the larger pegmatite lenses.

Internal Zones

"Core" Zones. Some pegmatites show cores of quartz, or coarse grained quartz and feldspar, of lenticular or irregular

[6] Cameron, E. N., and others; Op. Cit. Table One.

[7] Trefethen, J. M., *Mt. Waldo Batholith and Associated Igneous Rocks, Waldo County, Maine,* Bulletin of the Geological Society of America, July, 1944, p. 899.

shape, which may be margined by productive sheet mica zones, with soda-lime feldspar and minor minerals. The "core" margin deposits rank second to the wall zones in the quantity of sheet mica produced in this country.

"Vein" Deposits. Vein deposits consist of coarser pegmatites cutting the finer textured body of the pegmatite. In general these are not continuous over great distances. Total yield has not been great from this type of deposit.

"Pockets." Small irregular "pockets" of coarse pegmatite, sometimes carrying enough sheet muscovite to work, are found in some pegmatites. Total yield from this type has been small. Operations continued in barren zones after the exhaustion of a pocket have frequently been costly to the operator.

Disseminated Deposits. In some pegmatites the muscovite books are scattered throughout the body of the pegmatite. This type is usually a high cost operation, with small yield.

Prospecting and Operation. From the preceding summary of types, it can be seen that recognition of occurrence type is of material assistance in prospecting and development.

Future of Mica Operations

It is unfortunately true that in spite of various forms of government assistance and high wartime prices (currently $8.00 per pound for sheet mica 1½″ x 2″ full trimmed, as against less than $1.00 per pound prewar) most New England operators have not been able to do more than break even. With the exception of the larger and better deposits, therefore, it appears probable that the future of most small mica operations in this region is insecure. The future for mica production, consequently, under present indications is not bright. If the domestic production were to be protected, more deposits might be kept in operation, but could not begin to fill domestic demand.

What has been learned about pegmatites during the mica investigations, especially as to the nature of their internal structures, will probably prove of great value to feldspar operators, for good spar concentrations like those of sheet mica, appear to have zonal distribution in the pegmatites.

Limestone and Dolomite

The production of limestone and limestone products in Maine has long been an important industry. In former times, the burning of limestone was practiced in a great many townships in all parts of the State. Indeed, there is no county of the State that has not produced some limestone at one time or another. The early geologic reports of Jackson (1836) and Hitchcock (1862) are replete with references to active limestone kilns, and possibilities for extension of limestone production. It is unfortunately true, however, that the great majority of limestone beds are too impure to be of present value for their lime content. At the present time, limestone (marble) is being produced for its lime content by three major concerns in the State, all in the Rockland area. This famous limestone region has been a continuous producer for over a century and a quarter. Agricultural lime, metallurgical stone, burned lime, and stone for use in paper manufacture are the chief products of this great district.

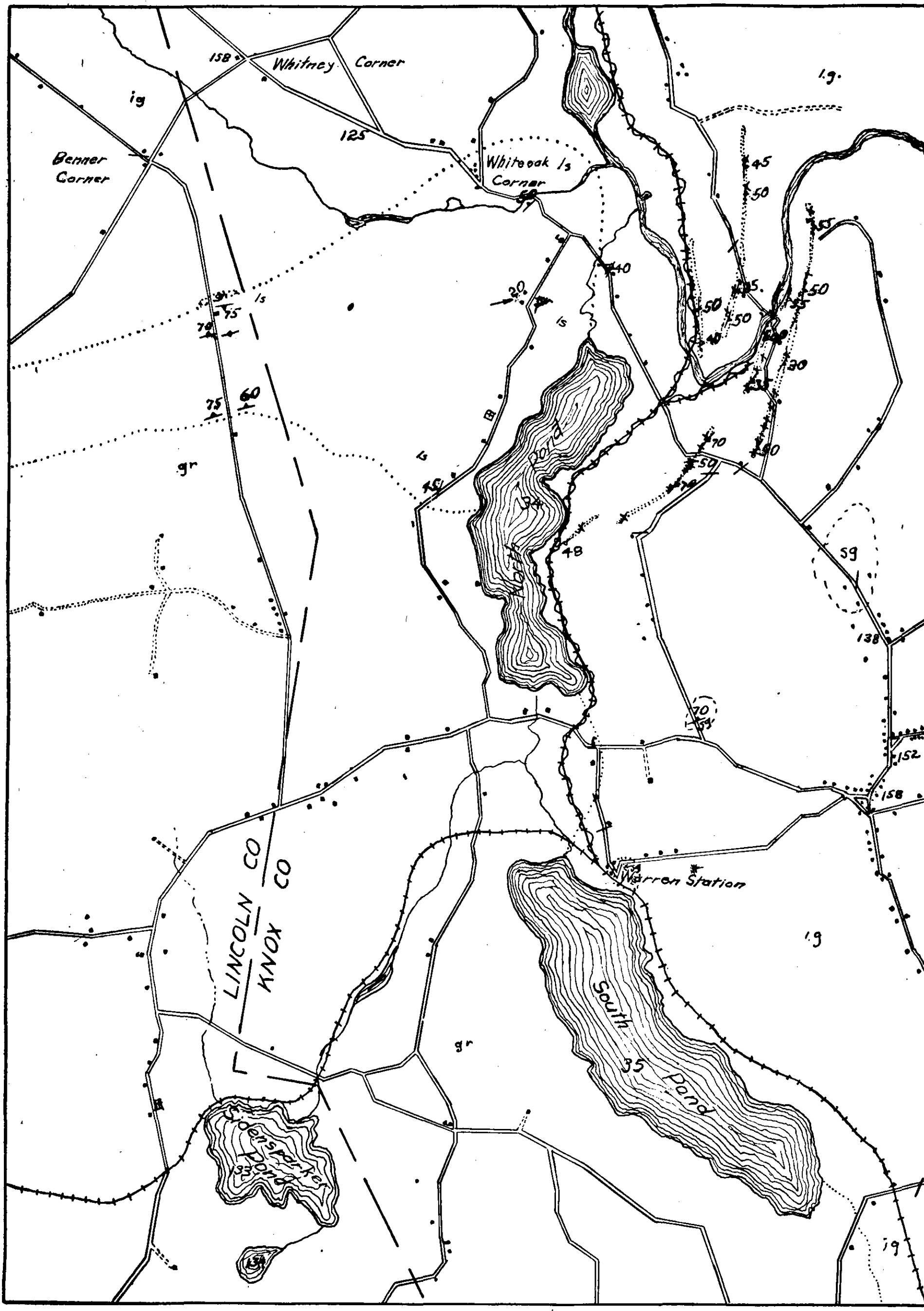
Warren Dolomite

The study of limestone resources of the State has been undertaken by the State Survey. The first of the deposits mapped in this program are the Warren dolomite beds. (Map I.) The study of these dolomite beds was initiated because, as pointed out by Dr. J. A. Chucka, Agronomist, University of Maine, magnesium lime is badly needed to replenish magnesia deficient soils in Aroostook County. In company with Mr. McKinley, Manager of the Knox Lime Company, the Warren "magnesium lime" quarries were visited. Following that inspection trip (1943 field season) a press release by the Maine Development Commission called attention to this valuable resource, not presently being exploited. Mr. Lawrence Wing of the Maine Geological Survey was subsequently detailed to examine the beds, prepare a preliminary map showing the deposits, and collect samples for analysis.

Occurrence of the Dolomite

There appear to be two horizons of the dolomite. The thickest and most favorable beds for further development are those lying adjacent to the St. George River in the north part of the town of Warren. The dolomite beds are very white, medium to coarse textured marbles. In part at least, they underly a portion of

MAP I



Scale $\frac{1}{27174}$

1 ½ 0 1 2 miles

WARREN DOLOMITE BEDS

Warren, Maine - September 1943

Maine Geological Survey : Maine Development Comm.

Base map from U.S.G.S. : Geology by Lawrence Wing the schists and gneisses considered to be Cambrian (?) age by Bastin. Plunging folds of the dolomite can be seen carrying the dolomite beneath the schists.

Map I shows the distribution of the major beds. Map II shows the location of the samples taken, with numbers corresponding to the analyses of Table I.

Table I

Analyses of Warren Dolomite

No.	%CaO	%MgO	% Dolomite
6	29.56	20.24	93.0
11	30.51	21.30	98.0
13	31.20	21.30	98.0
14	30.57	20.24	96.2
15	30.57	20.20	93.3
16	29.52	20.08	92.6

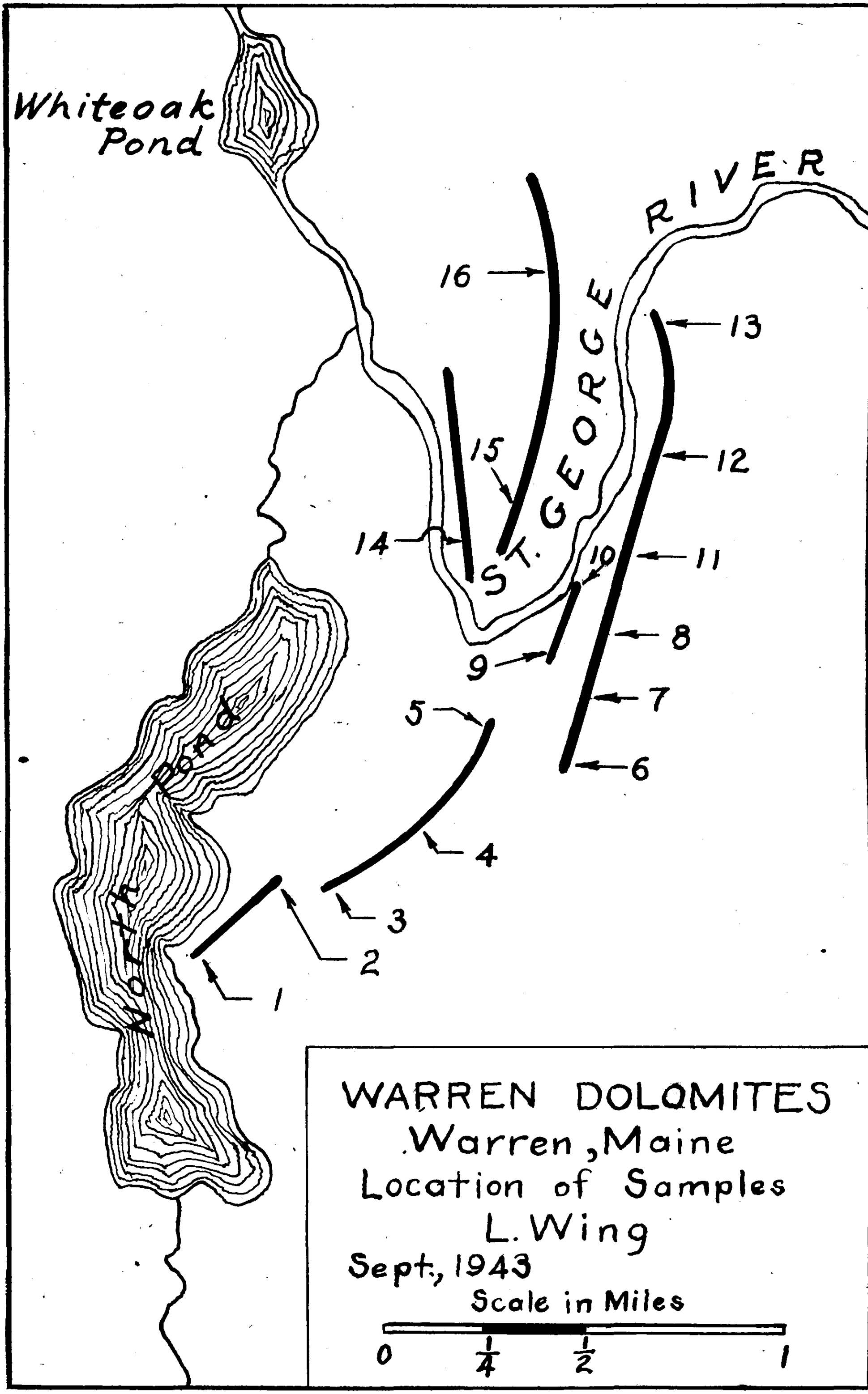
From the analyses of Table I, it is seen that the marble is a dolomite of high purity. Locally the dolomite contains patches and thin seams of talc, and, near the margins of the beds, the marble is more siliceous and impure. Until more field work has been accomplished, it is not possible to draw structural sections. That the parallel or sub-parallel bands of dolomite represent flanks of folds is obvious but as yet the details of stratigraphy are not sufficiently worked out to determine the tops and bottoms of the beds, or to establish certainly the number of dolomite beds present.

From the reconnaissance studies so far carried out, it appears conservative to state that over a million tons of relatively pure dolomite is available in the Warren district. In view of the need of magnesium limes for rehabilitation of magnesia-depleted potato soils of northern Maine, and the current practice of hauling in magnesium land lime from Massachusetts and elsewhere, a real opportunity appears to exist here for the development of one of our natural resources.

Other Uses for the Dolomite

The white marble will produce a good quality whiting, and properly prepared, a refractory for furnace bottoms and patching. Dolomite is stated to be preferred in the sulfite process of

MAP II


Whiteoak Pond
ST. GEORGE RIVER
North Pond
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
WARREN DOLOMITES
Warren, Maine
Location of Samples
L. Wing
Sept., 1943
Scale in Miles
0
1/4
1/2
1

paper manufacture "as magnesium bisulphite is more stable, more soluble, more effective in its chemical reaction than calcium bisulphite."[8]

The recovery of magnesia from dolomite, and utilization of dolomite by magnesium metal plants are noteworthy. While the United States has now a surplus capacity for production of magnesium metal, the Maine occurrences of dolomite are at least worthy of mention in this connection. It would appear further that some good quality marble suitable for use as decorative or monumental stone might be quarried from the Warren district.

So many individual property holdings are embraced in the Warren district, on which dolomite beds occur, that no attempt was made in the reconnaissance survey to determine property ownerships. The most important beds on both sides of the St. George River in the northern part of Warren township are reported to be controlled by the Great Northern Paper Company.

New Limerick Calcium Marble

The small deposit of calcium limestone at New Limerick has been mapped in reconnaissance. (See Map XV.) This is a bed of relatively pure, white crystalline marble of intermediate texture. The bed, as far as exposed, measures 355 feet in length, and averages 45 feet across the strike.

Lime was burned from this deposit in the latter part of the 1800's and more recently in the 1930's, Eben Lake operated a small agricultural lime plant. Lake's total production of ground limestone could not have been over several hundred tons. This deposit may represent exceptionally pure lenses of the Aroostook limestone, converted to marble by the contact effects of the granite mass which is exposed both to the east and west, and which probably underlies the deposit at no considerable depth.

At the east end of the marble body there has been some mineralization, with the introduction of pyrite and pyrrhotite, replacing the marble and wall rock, possibly along a fault. Locally on the southeast margin are evidences of sulfide impregnation in the form of small gossans. Dip needle readings indicate an

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[8] Industrial Rocks, p. 420-421, 1937, A. I. M. E., New York. (Section of Lime by H. H. Hughes).

area of high magnetic attraction in the south wall southeast of the 8 foot deep quarry hole near the crushing plant.

If an extension of the marble bed can be demonstrated west of the Black Road to Drew's Lake, this limestone deposit would have economic significance, because of its favorable location with respect to a market. The older operations have taken the marble down to, and below, the level of Meduxnekeag Stream, hence present an unfavorable operational site, due to water ingress. In any event, the depth of the marble should be determined by drilling before any operation of the currently exposed areas is attempted.

Spodumene

Spodumene[9] is a compound of lithium, aluminum, and silica. The formula is $LiAlSi_2O_6$. Due to replacements of lithia by soda or potash, the lithia content of spodumene commonly ranges from five to eight per cent. Spodumene resembles feldspar, but has a silky or satiny sheen which distinguishes it, and commonly a parting and cleavage which meet at an acute angle, rather than at right angles. Spodumene occurs in certain of the pegmatites, commonly in association with other lithium minerals.

Spodumene is the most common ore of lithium metal and compounds. Lithia salts in the chemical and pharmaceutical industries have long been used. The strong fluxing properties have been used extensively in some applications. Glazes for china and glass have created demand. The welding of aluminum makes use of the fluxing properties of lithium chloride and fluoride. The war has brought about new uses also, such as air purification in submarines, and other military uses. Peace time air conditioning units probably will make a strong demand for spodumene production. The addition of small quantities of lithium to bronzes is reported to give greater fluidity, better structure and greater strength and uniformity. Due to its use in bronzes and the multitude of metal works of New England specializing in fine products, there should be a good local demand for spodumene within this region.

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[9] Hess, Whitney, Trefethen & Slavin, *The Rare Alkalies in New England*, U. S. Bureau of Mines Information Circular 7232, 1943.

In the United States there is no shortage of spodumene. Large demands due to war needs overtaxed the milling facilities, but there appears to be abundant spodumene in the ground. The Black Hills, South Dakota, area has been the chief producer. More recently the Kings Mtn. area of South Carolina has become the leading producer, with enough ore blocked out of good grade to insure dominance and supply for a long time to come.

Two spodumene bearing areas in Maine have been mapped by the Survey (Maps III and XVI.)

The Hollis Starrett Spodumene Property, Warren

This property belonging to Hollis Starrett, Warren, Maine, is located in the south part of Warren township, and close to the Rockland branch of the Maine Central Railroad. There are two separate occurrences of spodumene pegmatite on this property Map XVI). The larger of these was worked by Mr. Starrett in 1930-33. About fifty tons of spodumene were produced and shipped from this opening. Mr. Starrett reported the lithia content at about five per cent. The spodumene occurs disseminated unevenly through this pegmatite, intergrown with microcline and quartz. The greater concentration appears on the southern half of the exposure. The crystals vary from a fraction of an inch to more than a foot in length, averaging perhaps 2″ x 3″ x ¾″. There is some muscovite, scrap only. The dimensions and extensions of the pegmatite body are unknown, as south and east sides have not been delimited. Data are not yet available as to the tenor of the deposit. A visual estimate of the spodumene content is ten per cent for the southern half, a width of some fifteen feet. Bulk samples have been taken and a report on the contents will be issued when the results are available.

The spodumene of this deposit is not economic in terms of hand cobbing operation. However, there is sufficient spodumene in evidence to warrant further exploration in the region.

Hollis Starrett Spodumene Prospect No. 2

Some 1500 feet west of the preceding prospect, about 300 feet east of the railroad, is another showing of small size. Margining the west side of the pegmatite dike is a 2½ foot zone of intergrown spodumene, albite, and quartz. The spodumene here is in small crystals; the largest noted was four inches. This deposit appears richer in spodumene than prospect number one, but unless more volume can be discovered it is too small to work profitably.

The Harden, Keith, Small Spodumene Prospect, Township E

Sidney Harden, Rangeley, made one of the most interesting discoveries of pegmatite recently recorded. The deposit lies on the school lot of Township E, south of Rangeley. The deposit has access from the C. C. C. road, and lies on the southern flank of Four Ponds Mountain, Rangeley quadrangle. Three small pegmatite dikes, as shown on the map (Map III) carry spodumene intergrown with quartz and microcline. There is little mica present, and minor tourmaline. From the areas exposed at the present time, an estimated 800 to 1,000 tons of spodumene are present in the pegmatite. Visual estimate places the spodumene content at some ten per cent. The crystals vary in size from a fraction of an inch up to several inches in length. The type of deposit is similar to the Warren deposit previously described. The dikes are narrow, four to six feet wide. They stand very steep, with dips of 75° to 90°. There is a minor amount of columbite-tantalite in small grains found in the central dike.

The handicap of this deposit is its relative remoteness. It is about forty miles from the rails. As in the case of the Warren deposit, the bulk of the spodumene is of too small dimension to hand cobb.

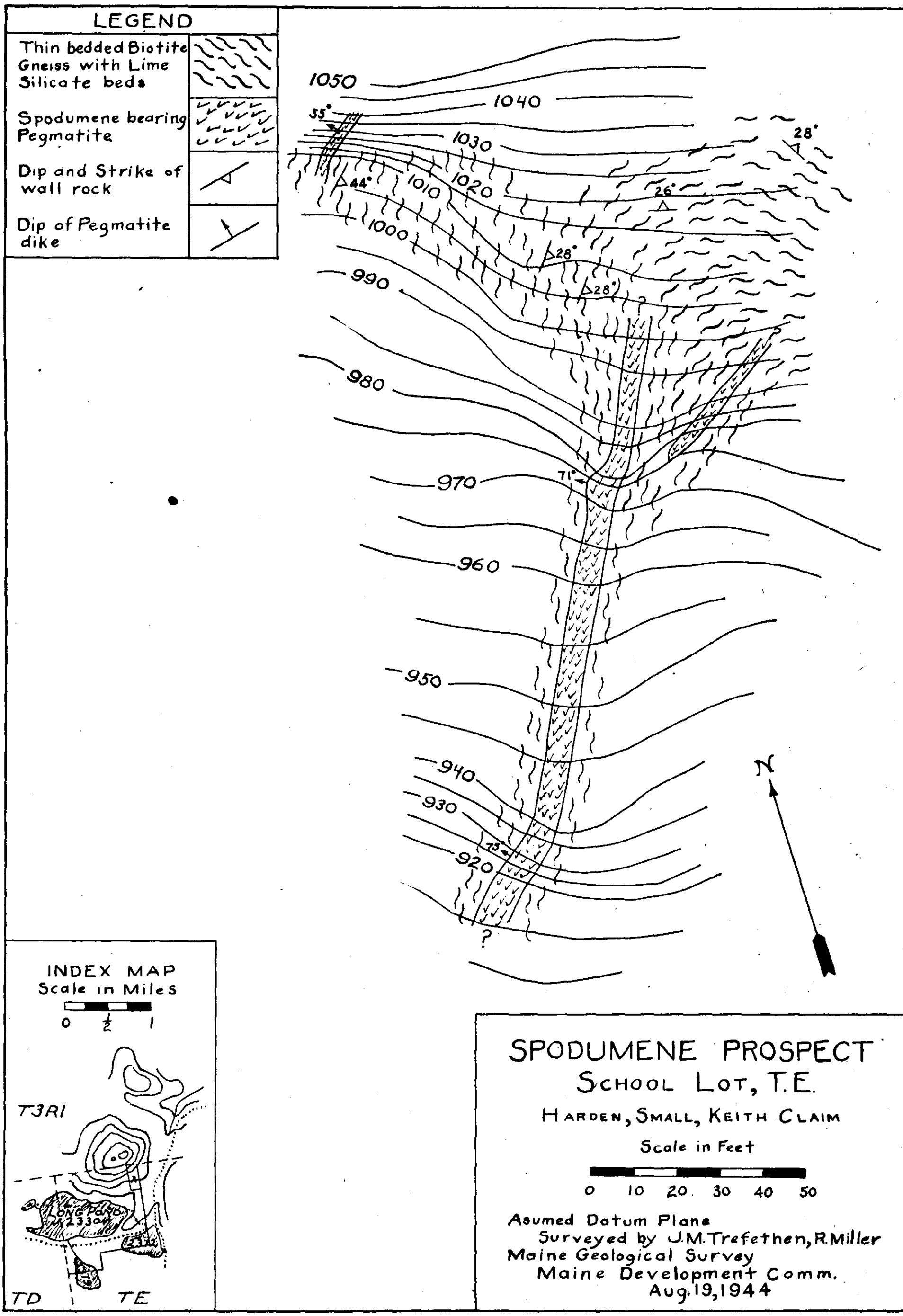
Bulk samples have been taken and a report on the laboratory results will be made subsequently, when the work has been finished.

Other Spodumene Localities

The extension of lithium bearing pegmatites north into the Rangeley area, and east into the Warren area is of significance as it calls attention to the intervening areas, which have not been thoroughly prospected as yet, although Mr. Harden has covered a great deal of the Rangeley district.

Two other localities should be mentioned in a summary of spodumene deposits. The United Feldspar operation in Newry has produced a small tonnage of excellent spodumene, some of which is almost gemmy. Until this deposit is mapped in detail

MAP III



LEGEND
Thin bedded Biotite Gneiss with Lime Silicate beds
Spodumene bearing Pegmatite
Dip and Strike of wall rock
Dip of Pegmatite dike
1050
1040
1030
1020
1010
1000
990
980
970
960
950
940
930
920
N
INDEX MAP
Scale in Miles
0 ½ 1
T3R1
LONG POND
TD
TE
SPODUMENE PROSPECT
School Lot, T.E.
Harden, Small, Keith Claim
Scale in Feet
0 10 20 30 40 50
Asumed Datum Plane
Surveyed by J.M.Trefethen, R.Miller
Maine Geological Survey
Maine Development Comm.
Aug. 19, 1944

no statement can be made as to the quantity possibly available. There is no doubt that the producing pegmatite is zoned, however, and presumably the spodumene was recovered from one of the mineralogical zones.

Black Mountain, Rumford, has also produced both spodumene and the lithia mica, lepidolite, as well as beryl, scrap mica and feldspar. The Black Mountain area has been mapped in detail by the U. S. Geological Survey, and drilled in 1943 by the U. S. Bureau of Mines. The geological map can be obtained from the U. S. Geological Survey, Washington, D. C. The Bureau of Mines has not released the drilling data.

Graphite

Graphite is a form of carbon which occurs as flakes or powder in rock formations. Occurrences of the "amorphous" or finely divided graphite are not uncommon, and there has been no apparent shortage of this material in the United States. Flake graphite has a more restricted distribution. The United States has relied largely on imports of graphite flake from distant sources. Ceylon and Madagascar have been the chief sources of supply. Korea, Mexico, and Central European States (Germany, Austria, Czechoslovakia) have also been important producers.

In the United States, flake graphite deposits have been developed in New York, Pennsylvania, Alabama, Texas, and California. Attempts have been made to mine the material, also, in a number of other States. The most important developments have been made in the Southeastern Adirondack region of New York, where the carbon content of the ore is reported as 4%-5%; Pennsylvania, with an ore reported as 4%-5%; and Alabama, with an average of 2% ore. In Alabama the graphite bearing rock is weathered into a soft material relatively easy to work.

In Maine, occurrences of graphite have been noted in several localities, and in the past, graphite has been produced from New Madrid, and Plumbago Mountain near Newry.

Foundry facings, core washers, and similar applications, dry batteries, crucibles, lubricants, and pencils constitute the principal uses of graphite. There are also many minor uses. Substitution of grades and qualities and advances in technology have reduced the importance of graphite in modern industry, but it remains an important and essential material. The U. S. Geological Survey in a release of April 26, 1944, states "Graphite suitable for use in the manufacture of metallurgical crucibles is urgently needed in war industries . . . . "

The examination, mapping, and sampling of some Maine graphite deposits have been undertaken by the Maine Geological Survey. The laboratory investigation of the material is underway. Preliminary work indicates that the graphite carbon content is higher than the Alabama deposits, and probably as high or higher than the 4%-5% grades reported from New York and Pennsylvania deposits. Samples of the graphite are being prepared for submission to graphite consuming industries to determine the usability of the graphite, and to determine the recoverable amounts of the various grades in the deposit. The results of the field and laboratory research will be issued by the Maine Development Commission when the data are assembled. The graphite flake occurs disseminated in schists, and the volume is probably considerable.

CLAY

The war has enforced changes in the practices of many large clay using industries. For example, foreign clays formerly demanded by the bulk of the paper manufacturers are being replaced by clays from Georgia and other domestic deposits. Similar shifts to domestic clays have been necessary in textile and certain other clay consuming industries. Refinement techniques have been so perfected that a natural clay is now literally "tailored" to the exacting demands of varied consuming markets. So successful are these processes of clay beneficiation that American domestic clays are now considered superior to the prewar imported clays.

Besides the industries that require a high quality, bright clay, are other Maine industries that use clay of lesser exacting specifications. This latter group includes not only the structural product manufacturers of brick and similar clay goods, but also linoleum, roofing paper, window shade, and rubber goods manufacturers.

Because of the considerations just mentioned, the Maine Geological Survey is conducting studies of the Maine clays to determine the distribution and extent of clay deposits; types of clay present; and further, to investigate the qualities, uses, and possible beneficiation of local clays to meet the specifications of local consumers.

Clay, as the term is used at present, signifies rock material in an exceedingly fine state of subdivision. The diameter of clay particles by common definition, is less than .005 mm. However, most clay deposits have admixtures of silt of coarser grain than clay, and some have sand intermixed as well. If clay sizes dominate the deposit is called clay. From the foregoing, it can be seen that there is a great diversity of clay deposits, depending on the relative proportions of the constituent sizes. As a matter of fact, in engineering usage, "clay" varies from a composition consisting of one hundred per cent material of diameters less than .005 mm., to material composed of as much as fifty-five per cent sand or silt sized particles.

There are two principal groups of clay types: (1) clays of decomposition and (2) rock flour clays. The first group, clays of decomposition, is composed largely of hydrated aluminum silicates. The high quality, bright clays are all derived from deposits of this type, as are the more refractory clays used in manufacture of fire brick and other high temperature resistant products. This group of clays results from weathering and alteration of silicate minerals, generally in a warm humid climate over a considerable period of time. The type of transformation is illustrated by the change of feldspar, the commonest of minerals, to kaolin, a clay mineral group.

$$\underset{\text{(Feldspar)}}{2KAlSi_3O_8} + 2H_2O + CO_2 \longrightarrow \underset{\text{(Kaolinite)}}{H_4Al_2Si_2O_9} + K_2CO_3 + 4SiO_2$$

It will be noted that in this transformation the potassium (K) has been extracted, as well as part of the silica. Other minerals, also are changed into clay by decomposition, with a loss of such substances as sodium, iron, calcium, and others.

The second major group of clays is the product of mechanical grinding of rocks into clay size fragments. One of the chief natural grinding agencies was the overriding ice of the recent glacial period. This group of clays is composed of many diverse minerals from which the various constituents as potash, soda, lime, iron, and others have not been leached. These substances tend to act as fluxes, lowering the fusing point of the clay, and in part, giving color to the clay.

For comparison of the two major groups the following chemical analyses are presented:

I (Bath, S. C.)[10]		II (Thomaston, Maine)[11]	
SiO_2	45.00	SiO_2	62.8
Al_2O_3	39.85	Al_2O_3	17.4
Fe_2O_3	.35	Fe_2O_3	6.9
TiO_2	.73	TiO_2	.8
CaO	Trace	CaO	1.0
MgO	Trace	MgO	1.5
Na_2O	.12	Na_2O	2.4
K_2O	.10	K_2O	4.4
H_2O	13.82	H_2O	4.4
		Moisture	1.3

There are but few clay deposits of type one in New England. The limited kaolins of Vermont and Connecticut are the only ones known of this type in the Northeastern region. The overriding ice, which accounts for the huge deposits of rock flour clays of type two, swept away preexisting clays of the kaolin type if such existed in the region.

Summary

In the preceding discussion of clay types and origins it has been pointed out that iron (causing a red coloration on burning), soda, lime, and other substances give products of relatively low temperature resistance, and impart colors undesirable in the higher quality applications. Organic matter also imparts shades of gray undesirable for many uses. Further, admixtures of mineral and rock fragments of too coarse sizes is a handicap of many of our clay deposits for many uses.

The problems engaging the Survey at the present time consequently are these: (1) To what extent can local industries now importing clays from outside the state make use of the raw clay? Certain users of clay now brought in, may find local raw clay satisfactory, and more economical. Prepared samples have

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[10] R. T. Vanderbilt Co. Inc.

[11] U. S. Geol. Survey.

been placed in the hands of some users for trial. (2) Are there clay using industries not now represented in this state which could profitably develop the local clays and markets? (3) Are there means of beneficiation of our local clays so that they can economically compete with naturally higher grade but more distant clays for local markets? The freight differential does give some margin which could be applied to processing local clays, and further, much of the higher quality clay brought into the state requires some processing.

MAINE MINERAL PRODUCTION, 1944

Because of war time restrictions, data on some mineral production cannot be published. Mica is an example. Of more significance, however, in compiling data on mineral output is the justifiable reluctance on the part of some producers to have their production figures released. This reluctance is readily appreciated when it is understood that for a number of products very few organizations are concerned, in some instances but two or three. The release of current data therefore, from this point of view, would be questionable business practice for some and disadvantageous for others. Other types of production are so scattered, with so many small producers, that adequate figures for a summation estimate are not available. Sand and gravel output illustrates this point. The Survey has attempted to gather information so that it will have a perspective over the field of industrial minerals, and can better direct its efforts.

1944 Production

Beryl:

Beryl production in this State is, so far, strictly a by-product of other types of mining. A relatively insignificant amount was produced in the year 1944; the total being less than ten tons.

Clay:

Pottery: 33 tons of clay used in producing 44,500 pieces of pottery is reported by the Rowantrees Kiln, Blue Hill. Small amounts have been used by various individuals for similar products.

Structural products: Brick production was far below normal in 1944 due to war conditions. The majority of the yards have been inoperative since 1942. Production for 1944 totals approximately 3¼ million bricks. No other structural clay products have been reported for 1944.

Crushed Stone and Gravel:

No figures are available, but production is far subnormal.

Feldspar:

Feldspar production is estimated at 8,321 tons for 1944.

Granite:

In common with similar operations elsewhere, the production of granite was very low in 1944. A small quantity of paving and dimension stone was produced in 1943 and 1944. The normal valuation of granite output for Maine is close to a million dollars. Data at hand shows current production to be but a very small fraction of normal.

Limestone:

Limestone is produced for a variety of purposes, chemical, metallurgical, agricultural, burned lime, and cement. Three companies are producing, and a new concern has recently been incorporated for limestone production. Production figures are withheld. Limestone production is currently the most important of Maine's extractive industries.

Mica:

The mica production of 1944 fell off somewhat from the 1943 output. Figures for production are withheld.

Peat:

The production of agricultural peat has been handicapped by labor shortage, so that in spite of good demand, production dropped slightly in 1944; some bogs have been inoperative. An estimate of total output, based on incomplete data, is between thirty and forty thousand bales.

Slate:

Production of slate is down. One plant has suspended operation.

Summary:

The preceding summary of current trends in the Maine mineral industries, incomplete as it necessarily is, reflects the impact of war on one of our Maine groups of industry—a group that in normal times accounts for some four to five million dollars' worth of products. The adverse effect is particularly marked on the producers of material used in the construction trades, dimension stone, crushed rock, gravel and sand, cement, slate, and structural clay products. Other producers not so adversely affected by market conditions have suffered from manpower and equipment procurement problems, so that in spite of some increased demand have actually diminished output.

APPENDIX A

By Robert Miller and Lawrence Wing

WALTER CONWELL PROSPECT, ALBANY

The prospect is located three miles north of North Waterford village, Oxford County, on the farm of the owner, Walter Conwell. The prospect consists of a series of small pegmatite dikes. The largest of these is about 200 feet long and varies in width from 4 to 10 feet. It strikes N. 45° E. and dips 85° northwesterly. The dike is principally quartz with masses up to 2 x 2 feet. Feldspar is less abundant with masses of perthite up to 2 x 6 inches. The mica is not larger than 1½ x 2 inches and averages less than ¾ inch in diameter. Most of it is scattered throughout the pegmatite but some is unevenly concentrated along the hanging wall and about the quartz masses. It is of a clear color, but little is large enough for punch. The wall rock, well exposed, is a biotite granite gneiss.

Recommendations

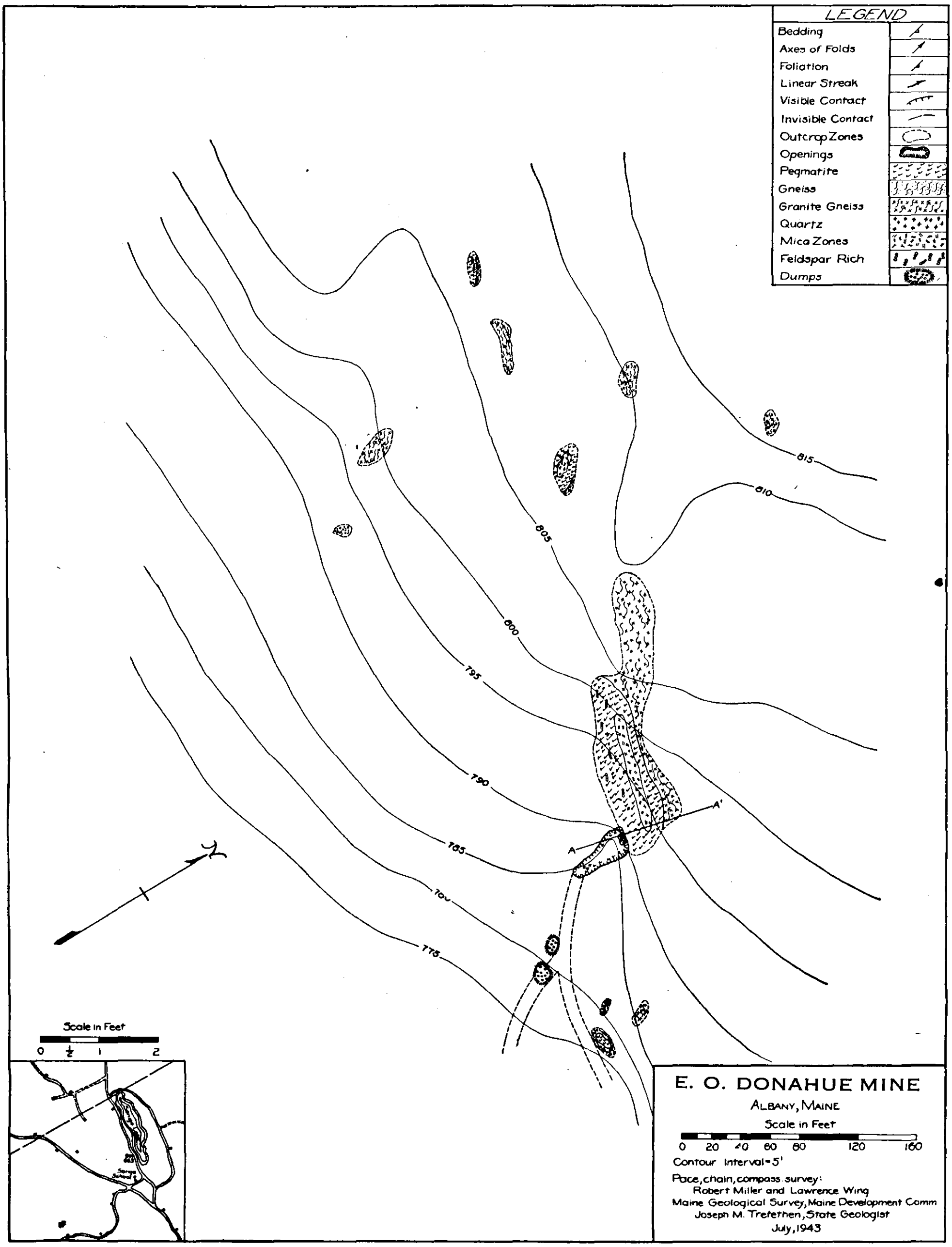
Neither the size nor quality of the mica warrants mining operation.

Augusta, Maine
August 5, 1943

E. O. DONAHUE PROSPECT, ALBANY
(Map IV)

The owner is E. O. Donahue. This mine has not been operated for many years. There is only one small opening located on the south side of the ledge. The country rock is a fine grained feldspathic granite gneiss. Cutting this, striking approximately N. 60° W., is a pegmatite dike which dips 35° southerly. This sheet is irregular and is at most probably not over 6 or 7 feet thick. A contact zone extends from a few inches to 2 feet outside the dike. It is finer grained than the gneiss with a higher percentage of biotite. The dike shows a feldspar zone near the footwall. In this footwall zone, probably not more than 2 feet in thickness, lies the mica concentration. The feldspar-mica zone grades into a coarse feldspar zone with crystals, some over a

MAP IV (Assumed datum plane)



foot in length. In the center of the dike is a quartz zone. A feldspar zone appears again on the hanging wall side. There are few hanging wall exposures, and in none was seen any mica concentration. The order of minerals is feldspar, quartz, mica and black tourmaline. The average mica books are 3 or 4 inches wide and 1½ inches thick. No extremely large books were seen. Nearly all examined have "A" structure. The mica is hard.

Recommendations

There is a good concentration of mica showing, but as its quantity is limited, it is suggested that operation be started with a small crew and equipment. Only shallow blasts are required to obtain any mica in the exposed zones. It is doubtful if the mica zone extends along the strike of the sheet very far beyond the exposed ledge. However, it might be advisable to follow down the dip of the footwall. The feldspar is of good quality and should be saved.

The access road to this prospect needs very little repair.

Augusta, Maine
July 25, 1943

PRESTON FLINT PROSPECT, ALBANY

This prospect is owned by Preston Flint and is located one-fourth mile south of his farm in Albany, one mile south of Hunts Corner. In 1941, two test pits were opened but no development followed. The pegmatite is irregular in shape, containing inclusions of biotite gneiss, but no contacts were determined. The mass is medium grained with about equal proportions of quartz and feldspar. Mica appears in small books near the quartz concentrations, but none are over 1 inch in diameter. Biotite laths are disseminated throughout the mass.

Recommendations

The limited amount and quality of the mica and feldspar do not make mining operations advisable.

Augusta, Maine
August 5, 1943

CHESTER HOLT PROSPECT, ALBANY

This prospect is located two miles north of North Waterford village in Albany on the Chester Holt farm. There is one test pit made about 175 feet west of the farm building in an open field. The rock is a biotite gneiss with small stringers of pegmatite (1 to 2 inches in width). No feldspar or mica is present in any sizes over 1 inch in diameter.

Recommendations

This property merits no consideration.

Augusta, Maine
August 5, 1943

GUY JOHNSON PROSPECT, ALBANY

(Map V)

This property is owned by Guy Johnson, and under lease to the Douglass Mining Corporation of Portland, Maine. This mine has not been operated for many years. The pit is littered with rubbish and is growing up to bushes.

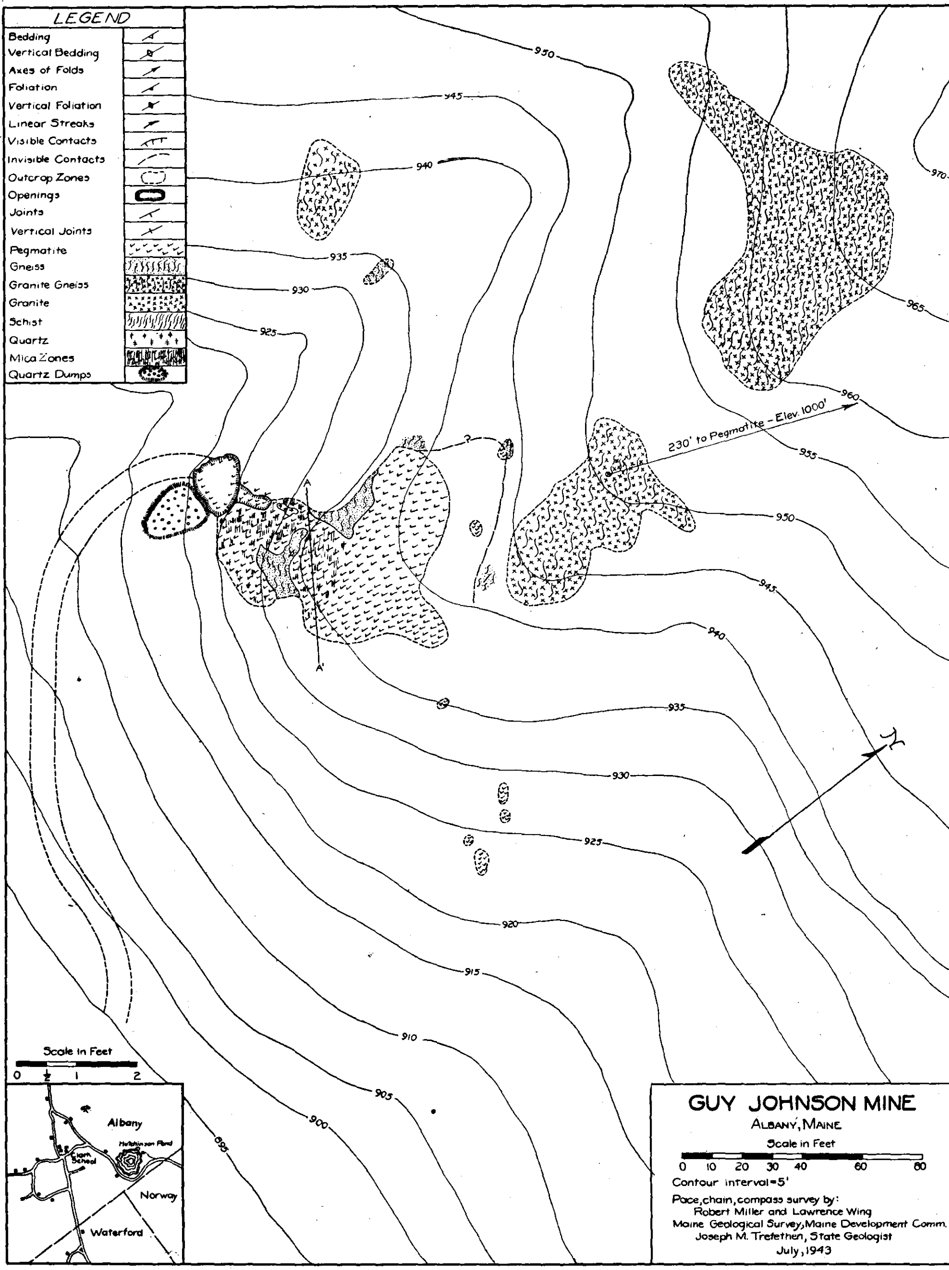
The pegmatite mass is irregular, and the structure is obscure. North of this body some 250 feet is a pegmatite that extends approximately 700 feet along a N. 45° W. axis. This is medium grained and barren of commercial mica. The country rock nearest the pegmatite is gneiss, and nearby this are large masses of granitic gneiss.

Because this report is primarily concerned with mica, only the lower pegmatite is discussed. In the pit at the southwest end, there is a large percentage of quartz. Some masses measure up to 3 by 6 feet. The feldspar is less abundant, with masses, however, as large as 2 feet by 2½ feet. Nearly all of this is perthite. The mica is primarily concentrated about the quartz masses in the adjoining feldspar. Books as large as 6 inches by 8 inches are present, but the average is approximately 1½ by 2 inches. In general, this is ruled, but some books are suitable for small sheet and punch mica. In the pegmatite exposure directly north of the pit is a good concentration of mica. This extends nearly 30 feet and is several feet wide. This concentration is possibly not far from the footwall. Minor minerals are beryl, which appears only in one local concentration, and considerable black tourmaline.

Recommendations

It is recommended that this mine be operated as a mica prospect. It is suggested that development commence at the present

MAP V (Assumed datum plane)



pit and work along northerly for a distance of at least 35 feet. It would appear that some mica can be taken out cheaply and quickly. The feldspar and beryl produced during the operation should be saved.

Augusta, Maine
July 21, 1943

FRED SCRIBNER MINE, ALBANY

(Map VI)

This mine is located in the town of Albany, Oxford County, Maine, about 3 miles south of Hunts Corner. The mine is on the land owned by Fred Scribner and is operated by E. L. Curtis. The mining rights are held by the Douglass Mining Corporation of Portland, Maine.

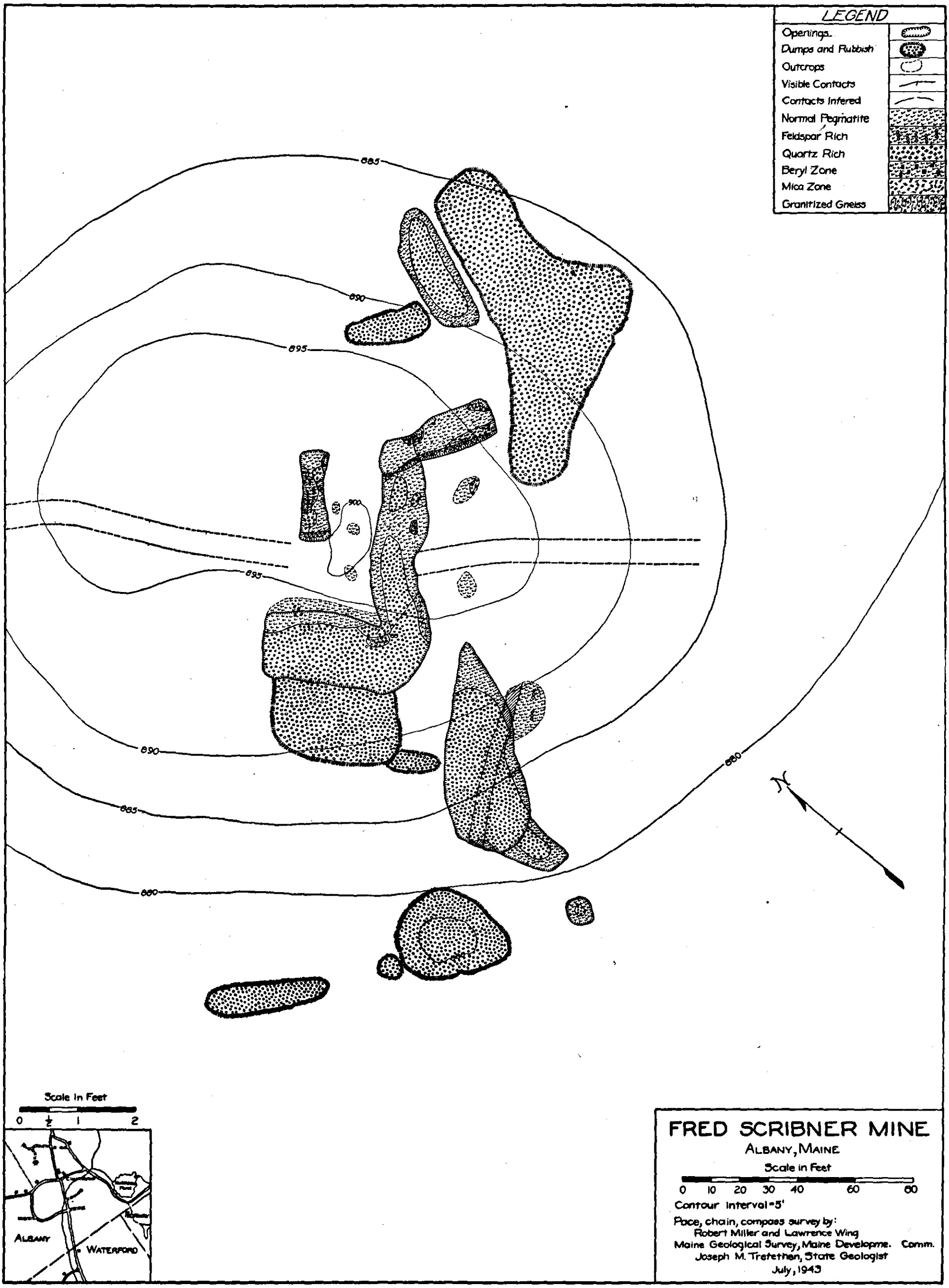
The development consists of numerous blast holes scattered over the entire hilltop, with, however, only one hole of any size, which is an older pit operated several years ago for feldspar. Results have been discouraging. The mine is now in operation, but is not expected to be much longer. The pegmatite limits have not been exposed, hence, structure of the pegmatite is uncertain. The intrusion is large, however. The mica is chiefly found near inclusions and around quartz concentrations, although it occurs scattered throughout the mass in small books. Quartz, feldspar, and mica is the order of the most common minerals, while less abundant are black tourmaline, beryl, garnet, and apatite. The quartz appears in masses as large as 6 feet by 8 feet, and grades from rose to deep smoky. Most of the feldspar is perthite although small amounts of plagioclase are present. Some crystals of perthite are as large as 2 feet by 3 feet. In general, much of the quartz and feldspar appear as graphic intergrowths. There is more muscovite than biotite, although both are found throughout the mass. The muscovite books are small, but are of a fair quality. The color is deep amber and very little staining is present. Most of the mica is punch and scrap.

Recommendations

The limited amount and the quality of the mica do not warrant further operation.

Augusta, Maine
July 28, 1943

MAP VI (Assumed datum plane)



ROY WARDWELL MINE, ALBANY

(MAP VII)

This property, owned by Roy L. Wardwell, is situated three and one-half miles south of Hunt's Corner. It is operated, under lease, by Joseph Pechnik.

The development consists of five openings, along the strike of the pegmatite, N. 75° W. The dip is steep to the south. The most westerly of these pits is now in operation. The dike has a width of about forty feet and has been quarried down to a maximum depth of about thirty feet. A second pegmatite body lies just southeast, and has been opened at the western end of the property.

The muscovite from this operation appears as a concentration around the quartz rich core, and to a lesser extent scattered through biotite rich zones near the walls. Some beryl, chiefly from the south side of the quartz core has been recovered. The mica is of good quality, yielding some trimmed mica up to 4″ x 6″. The average is probably less than 2″ x 2″ trimmed, however. Perthite surrounds the quartz, with some graphic granite. Biotite is more abundant in the marginal zones of the dike. Some garnet is associated with the biotite.

In the eastern dike, plagioclase is abundant. Rose tinted quartz masses occupy the central portion. Mica is abundant, but not of a strategic grade.

Recommendations

Operation should continue along the dike. Feldspar and beryl recovery will help carry the operation.

July 27, 1943

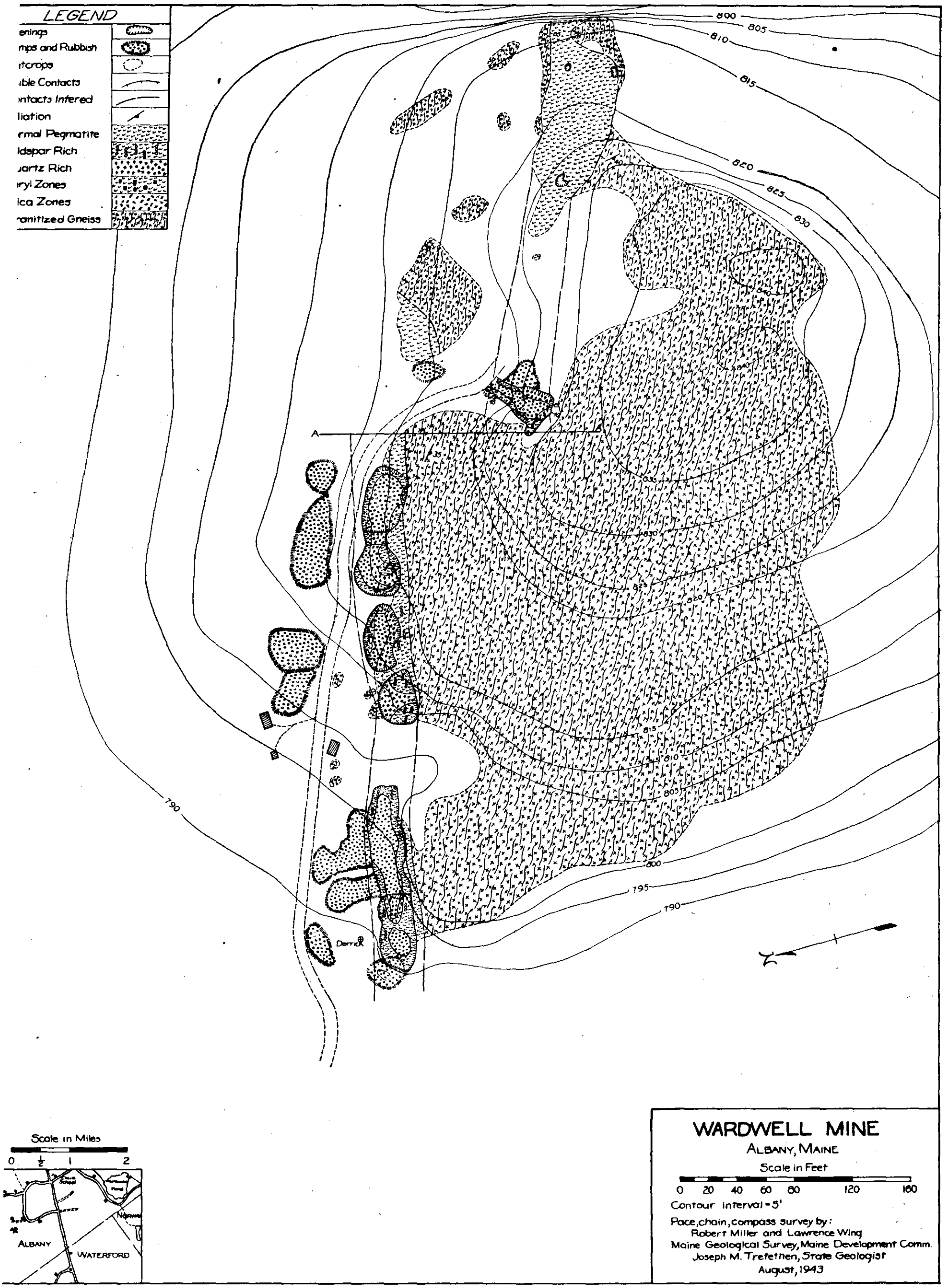
ERNEST WENTWORTH MINE, ALBANY

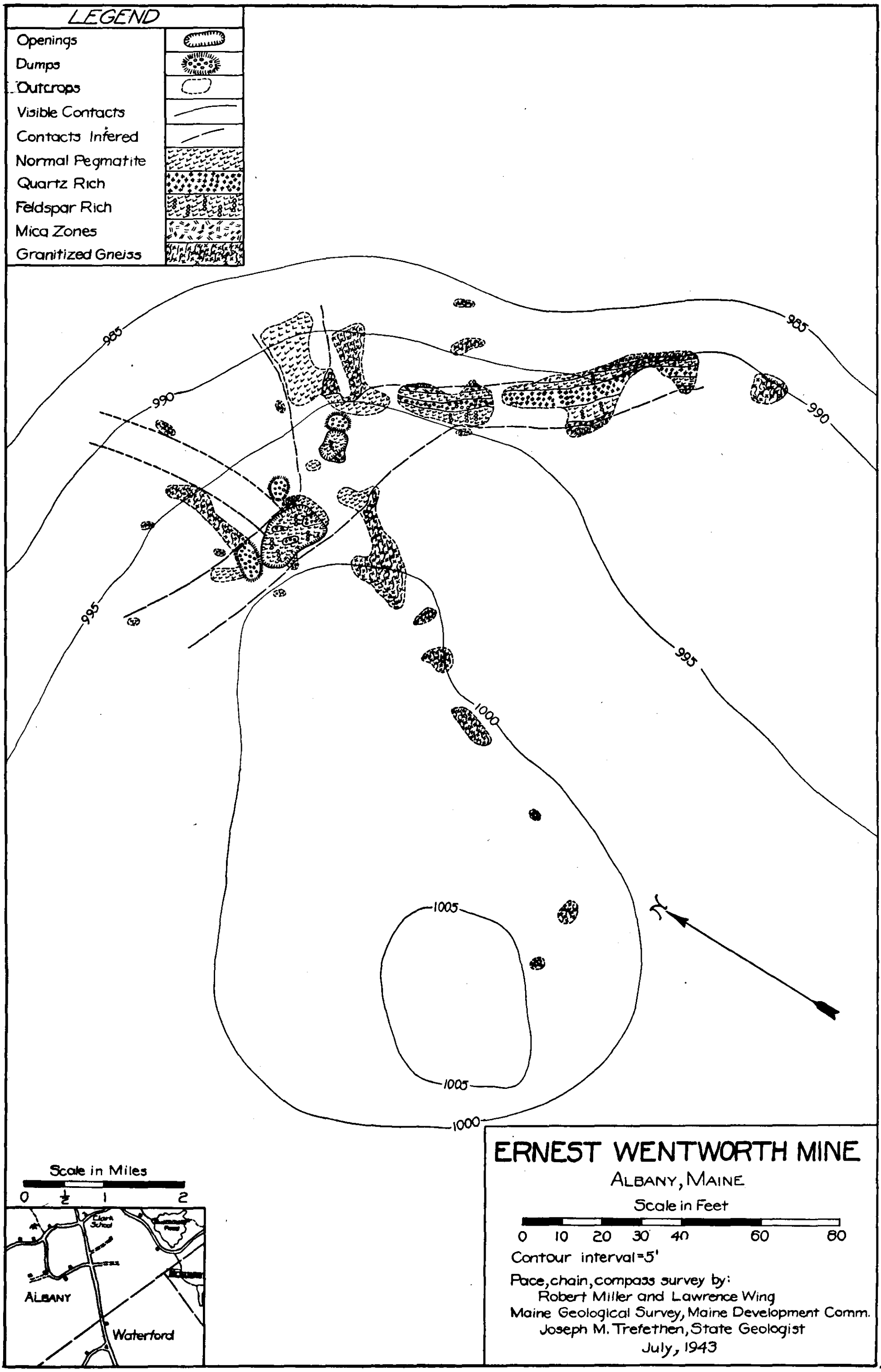
(Map VIII)

The Ernest Wentworth mine is located 2 miles south of Hunt's Corner in the town of Albany, Oxford County, Maine. The mineral rights are held by Ernest Wentworth and son of Albany. The mine consists of two small pits made three years ago. Three tons of feldspar are said to have been removed at that time.

The pegmatite body is an irregular dike cutting a gneissic biotite granite. The pegmatite follows a general N. 65° W. di-

MAP VII (Assumed datum plane)




LEGEND
Openings
Dumps
Outcrops
Visible Contacts
Contacts Infered
Normal Pegmatite
Quartz Rich
Feldspar Rich
Mica Zones
Granitized Gneiss
985
990
995
1000
1005
N
Scale in Miles
0 ½ 1 2
Clark School
Pond
ALBANY
Waterford
ERNEST WENTWORTH MINE
ALBANY, MAINE
Scale in Feet
0 10 20 30 40 60 80
Contour interval=5'
Pace, chain, compass survey by:
Robert Miller and Lawrence Wing
Maine Geological Survey, Maine Development Comm.
Joseph M. Trefethen, State Geologist
July, 1943

rection. The pegmatite varies in width from 4 to 15 feet. It appears to dip steeply, although reliable readings could not be made. Both walls have a mica concentration, the heavier being on the west side. The core is of nearly clear quartz, which varies from 2 to 4 feet in width. This is bordered by feldspar rich zones. Light buff perthite is abundant and one mass measures 5 feet by 6 feet, nearly clear feldspar. Feldspar is followed in abundance by quartz and muscovite. Less common minerals are beryl and apatite. Columbite is reported to have been found here, but none was seen at the time of this visit. The mica is in small books (maximum 4 inches by 4 inches), and is badly ruled. Very little is strategic grade.

Recommendations

The feldspar is of good quality, but limited in amount. The mica is not of a size or quality to warrant development.

Augusta, Maine
July 31, 1943

THE ERNEST WENTWORTH PROSPECT, ALBANY

Bryant Pond Quadrangle (7-B-10-S)

The Ernest Wentworth Prospect is located in Albany, Oxford County, Maine. It is a recent test pit for mica found south of the owner's farm on a small brook. This is apparently a pegmatite sheet dipping eastward gently at 15°. The mica concentration is along the hanging wall. The country rock is a weathered biotite gneiss probably of sedimentary origin. This is shot through with iron pyrite. The mica itself is found in books up to 3 inches by 4 inches. It is mostly fishtail and heavily stained with limonite as a result of weathering. A few books are free from stain and would cut splitting mica 2 by 3 inches. The mica is of light rum color and firm texture.

Recommendations

It is not advisable to open operation without further tests being made west of the present one in order to determine possible extension, and mica in more quantity.

Augusta, Maine
July 30, 1943

BENJAMIN COOMBS MINE, BOWDOIN

Benjamin Coombs owns the mining rights although the mine has not been operated for many years. At present there are four openings which follow along an approximately N-S direction. Apparently all are on one large dike. These show the pegmatite to be at least as much as 35 feet wide in places. In one place the dike was measured as dipping 40 degrees westerly under a granitic gneiss. Observations were limited at the time of this visit as all three of the larger openings were filled with from 10 to 20 or more feet of water.

Feldspar is the most abundant mineral, chiefly microcline with some perthite. Some masses measure 1 foot by 2 feet, but the average is nearer 2 inches by 4 inches. Quartz masses are present up to 2 feet by 3 feet in size, but are not abundant. Most of the quartz is in small irregular masses. Considerable graphic granite is present. There is a slightly greater percentage of muscovite. Sheets as large as 10 inches by 12 inches are present, but the average was less than 2 inches by 3 inches. Most of the mica is tangle sheet and badly ruled. Little staining is present. In the most northerly of the openings there is some strategic mica in the smaller sizes. Biotite shows both in tabular and lath structure. Less common minerals are iron pyrite, garnet, black tourmaline, and some beryl.

Recommendations

The second hole from the north should be pumped. This will expose the hanging wall contact. The mica seen at present is badly ruled and "A" structure is prominent. There is therefore a high percentage of scrap mica. Much of the feldspar is of good grade.

The access road needs but little repair.

Augusta, Maine
July 2, 1943

CHESTER JACK PROSPECT, BOWDOINHAM

The owner of this deposit is Chester Jack. The main area is approximately ½ mile east of the Jack farmhouse. The pegmatite mass is large and irregular. The only contact seen is on the southwest side. Two small openings had been made within the last two or three years. The most abundant mineral is feldspar (perthite). Next in order are quartz and biotite. Less common are badly ruled muscovite and black tourmaline. Much of the quartz and feldspar are in graphic intergrowth.

Recommendations

This pegmatite does not appear to merit consideration as a mica operation; but a fair grade feldspar can be produced.

Augusta, Maine
July 14, 1943

WALLACE TRUFANT PROSPECT, BOWDOINHAM

This prospect is located on the east side of the Bowdoin-Bowdoinham town line on route 201. Earl Williams of Brunswick holds the mineral rights. Wallace Trufant owns the deposit.

The pegmatite appears to be an irregular mass exposed for about 45 feet in length along a N. 15° W. direction. The contacts were not located. Two or three small openings were made some time ago. Feldspar, quartz and mica are the principal minerals. Garnet is present; beryl is present but rare. The feldspar is mostly perthite in corduroy. Through this is scattered lath biotite. The muscovite is concentrated about masses of quartz. Muscovite is present in books as large as 5 inches by 6 inches, but the average is less than 2 inches by 3 inches. Most of it is badly ruled and very little of strategic grade is seen.

Recommendations

As there appears to be considerable mica about the quartz masses, it is suggested that test operations should take this localization into account. The deposit does not merit high recommendation as neither the mica nor feldspar are of a high quality.

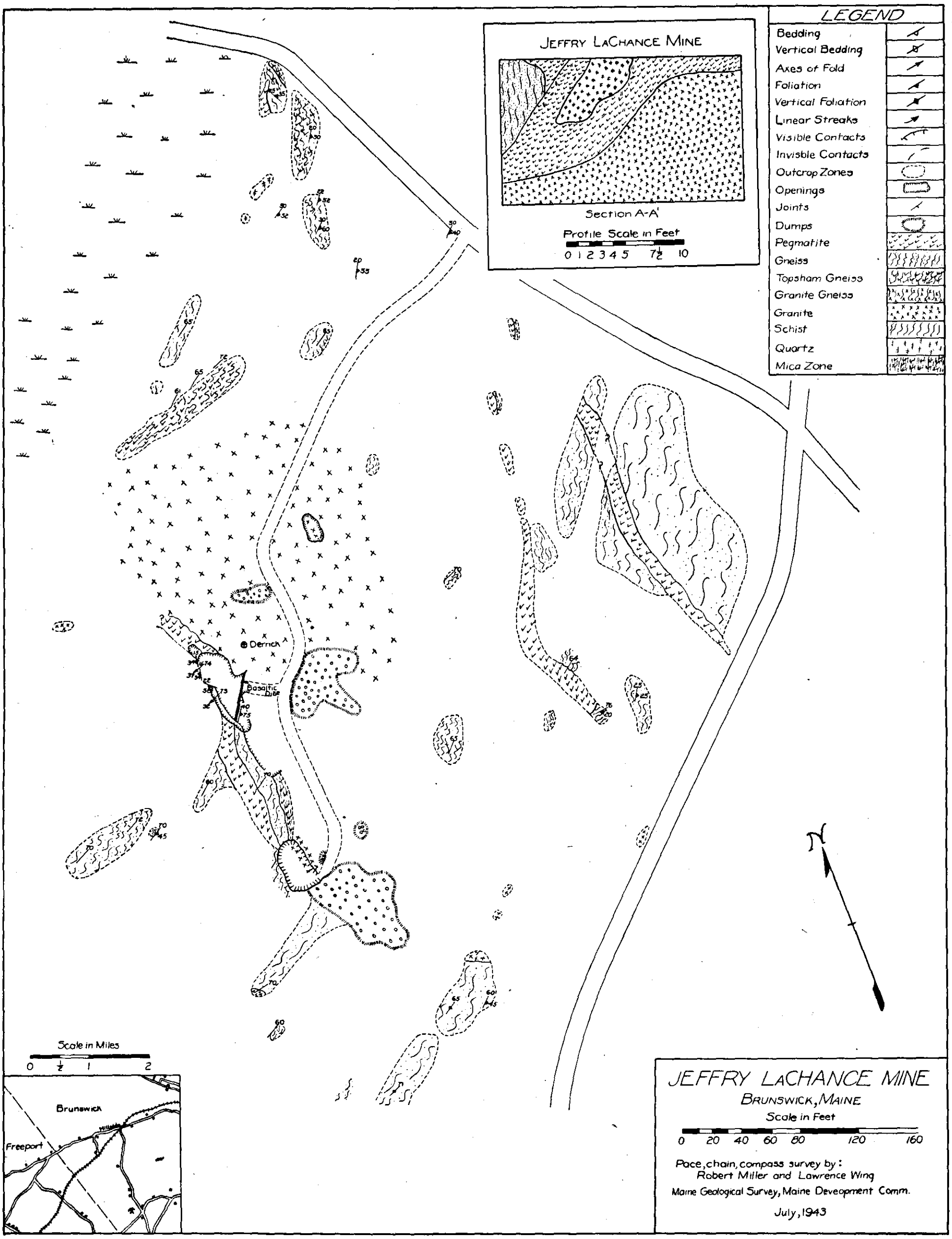
Augusta, Maine
July 14, 1943

JEFFRY LACHANCE MINE, BRUNSWICK

(Map IX)

The mine is located in the town of Brunswick, Cumberland County, Maine. It is about 1½ miles south of Hillside Station on the Freeport-Brunswick Road. This mine is owned by Jeffrey LaChance, who is also the operator for the Douglass Mining

MAP IX


JEFFRY LACHANCE MINE
Section A-A'
Profile Scale in Feet
0 1 2 3 4 5 7½ 10
LEGEND
Bedding
Vertical Bedding
Axes of Fold
Foliation
Vertical Foliation
Linear Streaks
Visible Contacts
Invisible Contacts
Outcrop Zones
Openings
Joints
Dumps
Pegmatite
Gneiss
Topsham Gneiss
Granite Gneiss
Granite
Schist
Quartz
Mica Zone
Derrick
Basaltic Dike
Scale in Miles
0 ½ 1 2
Brunswick
Freeport
JEFFRY LACHANCE MINE
BRUNSWICK, MAINE
Scale in Feet
0 20 40 60 80 120 160
Pace, chain, compass survey by:
Robert Miller and Lawrence Wing
Maine Geological Survey, Maine Deveopment Comm.
July, 1943

Corporation of Portland, Maine, lease holder. The development consists of two open pits, the more northerly of which is being operated at present.

The mica occurs in a pegmatite which has been intruded into the surrounding rock, gneiss on the west and granite on the east. The strike of the pegmatite is about N. 20° W. The body is in the form of irregular lenses, but seems to dip steeply to the west. Potash feldspar is the predominant mineral. Large bodies of quartz lie in the core of the dike. The mica seems to be somewhat concentrated in the feldspathic zone bordering the quartz masses. Some books up to 10 inches by 12 inches have been found, but the average is nearer 2 inches by 3 inches. The mica is of good color, firm and hard, with a good portion of strategic quality. Other minerals present are black tourmaline, garnet. In the past some of the quartz has been sold to the General Electric Corporation. According to U. S. G. S. Bulletin 445 by Bastin, the pegmatite is gradational from the east wall of the granite, but the field evidence at the time of this report establishes the mica bearing pegmatite as of a later period, intrusive into both gneiss and granite. There are several other pegmatite dikes in this vicinity, but none seem to have mica in quality or quantity to justify operation.

Recommendations

It is recommended that operation follow northerly along the dike as long as it is profitable. Depth can be subsequently increased. Before operations cease, it would be advisable to clean up the thin layer of pegmatite between the two present openings, as it seems to have a fair concentration of mica.

Augusta, Maine
July 5, 1943

MRS. CHARLES TAYLOR MINE, FREEPORT

The owner is Mrs. Charles Taylor. This mine has been operated for feldspar some years in the past, leaving two small openings partly filled with rock waste. The pegmatites here are large; the contacts were not located. The strike of the country rock (gneiss) near the Taylor house is N. 30° E. and dips 50° northwesterly.

Muscovite mica is scattered rather thickly throughout the pegmatite in several places but it lacks any zone of definite concentration. Some books up to 4 inches across and 2 inches thick were observed but staining and ruling are prevalent imperfections. Feldspar is the predominant mineral, followed by quartz, muscovite, and biotite. Black tourmaline is also present. The quartz occurs in masses up to 3 feet in diameter, and mica is found surrounding these masses.

Recommendations

From what can be seen at the time of this report, it is doubtful if this prospect would yield much strategic mica. If it is reopened it might be advisable to work the northeast and southwest sides of the openings in an attempt to locate the walls of the dike with the hope of finding better mica concentrations along these walls.

The mine is easily reached, being only four or five hundred feet south of the Taylor house. There is a road from the house to the mine which would require very little repair to make it usable.

Augusta, Maine
July 14, 1943

PEAKED HILL MICA PROSPECT, GILEAD

This property is located in Oxford County about 2 miles west of the West Bethel Station on the Grand Trunk Railroad.

One medium grained pegmatite is located on the northern slope near the top of the hill. This pegmatite strikes north-south in a biotite schist which is striking N. 45° E. and dipping 70° S. E. The mica is small and scattered throughout the dike, which is about 15 feet wide. The only other minerals present besides the muscovite, feldspar (microcline), and quartz are biotite mica in occasional thin plates and small garnets.

The more important pegmatites lie on the top of the hill. There are two large dikes parallel to each other and striking N. 30° E. in a biotite schist (strike N. 45° E., dip vertical). The most southerly of the two varies from 20 to 50 feet in width and is at least 400 feet long. A small pit (20′ x 20′) is located on the northeastern end of the dike. In about 3 feet from what appears to be the footwall, there is a scanty mica concentration running the entire length of the dike. No books over 5 or 6 inches are visible.

The northern dike is similar in appearance to the southern with the exception that it is smaller (7 ft. wide and 250 feet long). The mica zone occupies a similar position and the books are about the same size and concentration. A few garnets and some biotite mica is visible.

Recommendations

The prospect does not show enough mica of strategic quality to warrant any extensive development. It is however worth a few test blasts to determine the qualities and size of the mica after the top has been removed. A few blasts placed near the walls of the dikes should prove whether or not the prospect is worthy of further consideration.

The property is divided, part belonging to Dr. W. Twaddle of Bethel, Maine, and part to Mrs. Hulda E. Mason, Bethel, Maine.

Augusta, Maine
October, 1943

NOYES MOUNTAIN MINE, GREENWOOD

The Noyes Mountain mine, also known as the Harvard mine, is located 4 miles south of the village of Greenwood, Oxford County, Maine. It is high on the southwest end of Noyes Mountain. Harvard University of Cambridge, Massachusetts, owns the mineral rights.

It is operated only intermittently on a small scale for mineral specimens. The opening is about 35 feet long and 12 to 15 feet across. Excavation has made a shelf on the side of the mountain at the opening of the mine. The pegmatite dike follows irregularly along a N. 75° E. course and dips 70° westerly across the gneissic structure. This country rock is a greenish gneiss of sedimentary origin. Along the contacts with the pegmatite dike is a garnet zone several inches wide. The dike is margined along both walls with a zone of fine grained microcline feldspar and smoky quartz. In this zone occurs most of the mica. The hanging wall zone is 1 to 1½ feet thick. The footwall is similar, but the mica books are smaller and have some biotite. Adjacent to these mica zones is quartz varying from 2 to 4 feet in thickness; it shades from rose and white to smoky. The zone nearer the hanging wall is the wider of the two and contains pockets of quartz crystals and gemmy tourmaline. The core of the dike is nearly all cleavelandite with small scattered pockets of quartz.

This core is 3 or 4 feet wide and carries green tourmaline. In general, throughout the dike, the most abundant minerals are quartz, cleavelandite, microcline and muscovite, in that order. Less abundant are black tourmaline, green apatite, green tourmaline, biotite, and a variety of the rarer minerals. Lepidolite is present in the dump. Mica books up to 8 inches by 12 inches occur in the hanging wall zone, but are generally badly ruled and wedged. The percentage of strategic mica is small, although some fair sized sheets can be obtained. The mica is hard, and of deep amber color. There is only a small amount of staining.

Recommendations

Mica prospects warrant consideration. Operation along the strike of the dike eastward is recommended if the deposit is worked for mica.

Augusta, Maine
July 29, 1943

NORTHWEST FLANK OF NOYES MOUNTAIN, GREENWOOD, OXFORD COUNTY

Noyes Mountain is located about two miles south of Greenwood village and east of Hicks Pond. The area was investigated by following nearly parallel compass traverses in a north-south direction along the northwest side of the mountain.

There are four large pegmatites in the area covered, and many smaller ones. The most northerly of these covers an area, roughly, 50 feet in diameter, and no contacts are exposed. The body grades from medium to coarse grain. Feldspar offers the only commercial possibility. The other three pegmatites occur in close proximity; all strike about N. 45° W. The two westerly bodies dip east 60° and occur as sills. The country rock is a lime silicate gneiss. The most easterly dike dips 60° west and there is considerable deformation along the contacts. These pegmatites vary in width from 15 to 20 feet; the length is undetermined. The eastern dike is the most promising of the four, as it is coarser grained and shows fairly large feldspar blocks (1′ x 1′); black tourmaline is abundant.

Recommendations

It is doubtful if any of these dikes merit operation. Feldspar is the only commercial mineral. The location is high on the mountain, and at this point is steep, making the region not easily accessible.

Augusta, Maine
August, 1943

ALTON HIBBS MINE, HEBRON

(Map X)

The Alton Hibbs mine is located 1.3 miles north of Hebron village, Oxford County, Maine. It is said to have been bought recently by Philadelphia parties; formerly owned by Alton Hibbs of Bath, Maine.

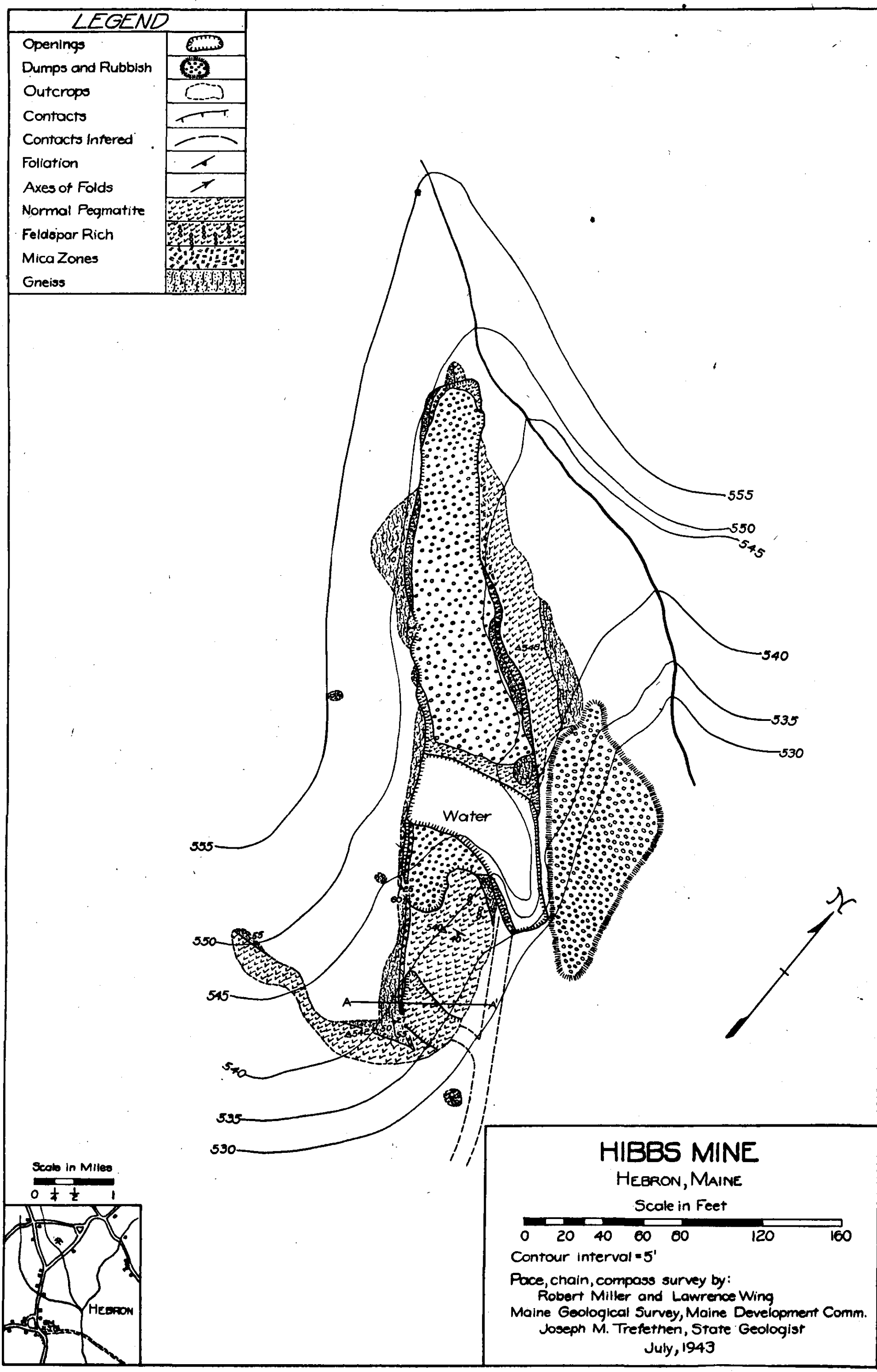
This mine has not been recently operated. The openings are now growing up to bushes. The development consists of one large pit and two smaller ones. The larger of these is about 280 feet long and averages 40 feet wide. Near the center is a deep hole, now full of water, which is reported to be about 25 feet deep. The country rock is a lime silicate gneiss and quartzite, and in general strikes N. 45° W. dipping 25° to 45° east. The pegmatite nearly follows the strike of the rock, but dips about 55° west. The order in abundance of the minerals is feldspar, quartz, and muscovite. Less abundant are biotite, black tourmaline, garnet, and beryl. Most of the feldspar is microcline and shades from buff to blue-grey. Minor amounts of plagioclase are present. Masses of feldspar as large as 2 by 3 feet are seen at the north end of the mine, but the average masses are under 6 inches. The mica appears concentrated along the hanging wall at the west side of the pit. Some books are 6 inches by 8 inches, but the average are 3 inches by 4 inches. The mica is a deep rum color, and has some staining. The majority of the books are ruled and wedge shaped, but there is a fair percentage of punch, and some strategic mica.

Recommendations

Very little of the hanging wall mica zone remains above the floor of the pit, but the deposit is probably worthy of operation. Stopes could be driven down along the hanging wall. Probably the linear extent of the pegmatite is greater than exposed at present. Access is easy, and operation could be carried on the year around. The feldspar is of good quality.

Augusta, Maine
July 31, 1943

MAP X (Assumed datum plane)



GEORGE HIBBS MICA PROSPECT, HEBRON

This prospect is located on the Alton Hibbs farm, 1½ miles north of Hebron village, and owned by Dr. George Hibbs, Bath.

The pegmatite strikes east-west and dips from 40° to 50° north, probably lying as a sill in the country rock, which is a biotite gneiss (strike N. 85° W., dip 45° N.).

Feldspar of the microcline variety is the most abundant mineral occurring in crystals up to 5 inches in diameter but mostly smaller. The feldspar is followed in abundance by quartz, muscovite, biotite, and black tourmaline, in the order given.

The muscovite is quite abundant but tends to be less than 3 inches in size. A few books measure 5 or 6 inches but they are not abundant and tend to be thin. The mica is scattered throughout the mass with a slight concentration on the hanging or northern wall.

Recommendations

This prospect does not appear to be worthy of operation. If, however, further action is to be taken, a test blast near the hanging wall should prove the value of the dike.

Augusta, Maine
October 2, 1943

ALTON MAXIM PROSPECT, LOVELL

This prospect is located at Kezar Falls in the town of Lovell. The property is controlled by Alton Maxim of Portland. The pegmatite consists of a fine grained mass, which extends on both sides of the falls. On the west side, it is bordered by a biotite gneiss and on the east by a granitic gneiss. Cutting through this fine grained pegmatite are pegmatites of a much coarser texture. In general these strike N. 70° E. Their width varies irregularly from a few inches to 10 feet. Only these coarser grained dikes contain any feldspar or mica worthy of consideration. The quartz and microcline are about equal in amount with rare masses 1 x 2 feet. The mica is concentrated about the quartz in books up to 2 x 3 inches, but is mostly fish-boned and ruled; a very little is punch.

Recommendations

There is not enough feldspar or mica of suitable size to consider mining operations.

Augusta, Maine
August 6, 1943

MOUNT MICA, PARIS HILL

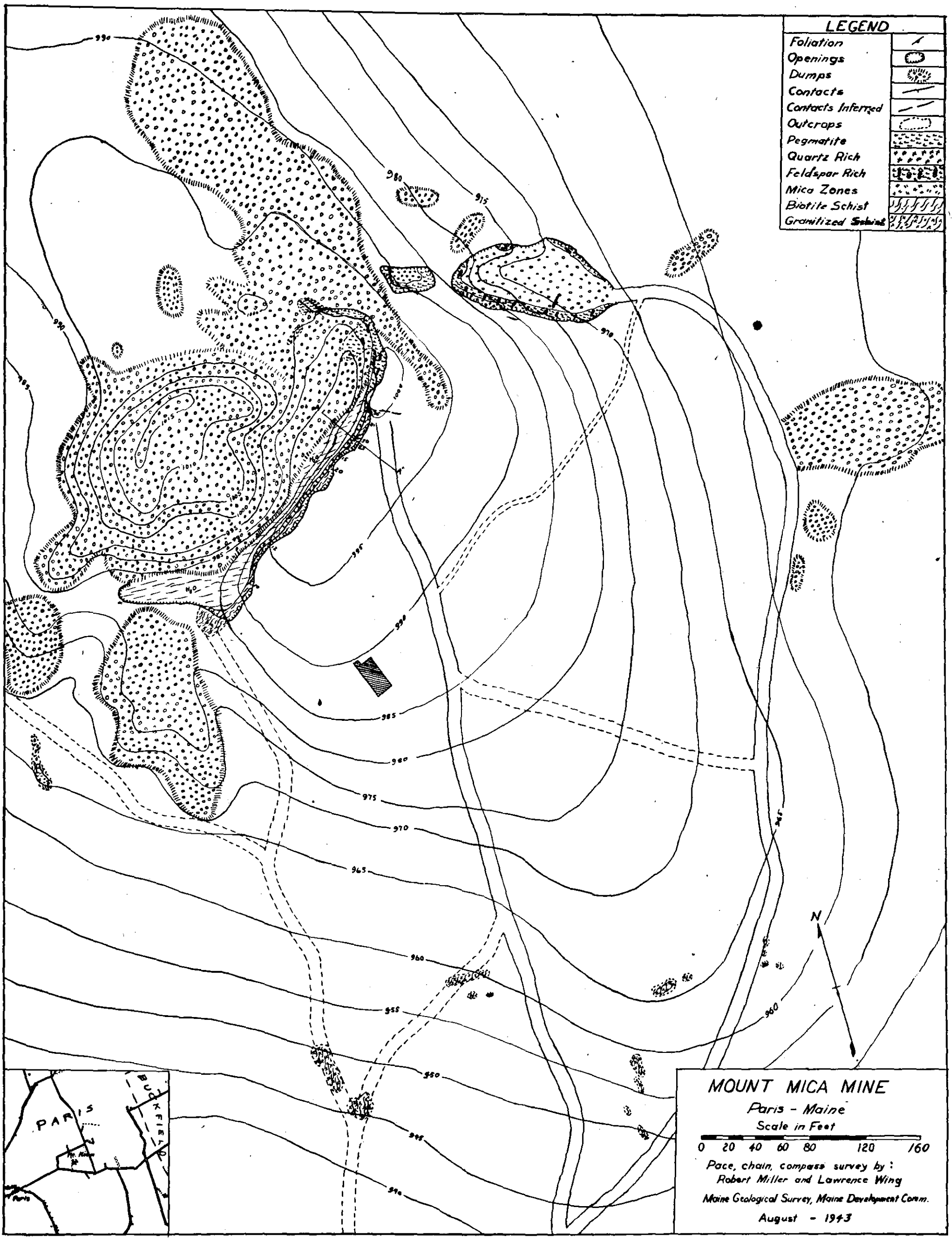
(Map XI)

Mt. Mica mine in Oxford County is located one and one-half miles east of Paris Hill. The property and mineral rights are held by Howard Irish of Buckfield. The mine is easily accessible by road, but has not been operated for many years. No equipment is present.

Of several openings, the largest and most famous is near the top of the hill. It is approximately 275 feet long. The width is undetermined as the area is mostly covered with dump. A pegmatite sheet dips gently from 8° to 25° east under a biotite schist. Its thickness is undetermined but probably is at least 40 feet thick. The schist strikes variably N. 45° to N. 55° E. with a few small folds.

Feldspar and quartz are the most abundant minerals. The quartz is generally milky, but is present in rose, smoky, and citrine forms; the latter being closely associated with the black tourmaline. The feldspar is principally perthite, but both microcline and cleavelandite are abundant. Muscovite is found in books up to 6 x 8 inches in diameter, and from ½ to 3 inches in thickness. It averages about 3 inches in diameter. A concentration is reported to be a hanging wall 5 or 6 feet below the schist, but this could not be seen at the time of this visit. When the mine was operated for gems, some of the select mica was separated from the waste rock, but most of it was thrown onto the dump, where it now remains. Over 5% of this is better than punch and a considerable amount is strategic. The principal defects are "A" structures, wedge mica, and some ruling. A little lath biotite appears disseminated throughout the body. Black tourmaline is concentrated along the hanging wall contact, but is also scattered throughout. Some crystals measure up to 6 inches in diameter. Blue, pink, and green tourmalines are scattered in the pegmatite although these are not of gem quality.

MAP XI (Assumed datum plane)



The gems were found in pockets that lay as a zone which follows the hanging wall to a depth of 5 or 6 feet. It is the gems that have made this mine so famous. Less common minerals are beryl, lepidolite and garnet. A considerable list of rarer minerals is reported.

Recommendations

It does not seem advisable to open mining operations for mica from the pegmatite as there is too great a rock overload. If, however, the mine were to be operated for gems, the mica as well as the feldspar would be valuable by-products. If mica mining operations are considered, the dump should first be worked over before operating the rock in place.

Augusta, Maine
July 22, 1943

McKAY FARM PROSPECT, PHIPPSBURG

This mine is located in Sagadahoc County, 2 miles northwest of Parker Head, Phippsburg, Maine. The property and mining rights are now held by Charles Beech and Alton Whittier of Brunswick, Maine.

The mine was operated for feldspar, but it has not been worked for several years. The derrick and pumps still remain. There are two openings. The dike trends N-S across a gneissic granite, and dips west 55°. It is mostly graphic granite, but contains a considerable amount of perthite masses up to 2 or 3 feet in size. Muscovite and biotite mica appear in about equal quantities. The muscovite is scrap. Less abundant are black tourmaline and garnet. Beryl is reported to have been found, but none was seen at the time of this visit.

Recommendations

It is a fair feldspar prospect, but the mica is not of strategic quality. If this mine is to be operated in the future for feldspar, it is suggested that mining continue south along the dike.

Augusta, Maine
July 12, 1943

RUSSELL BROTHERS MINE, TOPSHAM

This mine is owned by the Russell Brothers of Topsham. At the time of this report, it was not in operation. The present lease holder is Earl Williams of Brunswick.

The prospect consists of three openings, one of which bears mica. This is the most westerly of the pits. The strike of this dike is N. 15° W. It dips 75° or 80° to the west. This dike is not over 20 feet wide. The pegmatite has been mined to its entire width. This opening is about 10 feet deep and the floor is covered with from 2 to 3 feet of mine rejects. The feldspar (microcline) is the most common mineral, followed in abundance by quartz and biotite. The feldspar is present in masses up to 6 inches by 12 inches and well distributed. Some biotite books measure up to 6 inches by 12 inches but the average is less than 2 inches by 4 inches. Both garnet and black tourmaline occur sporadically. No muscovite was seen in place but a considerable amount is scattered on the floor and dumps. It appears probable, therefore, that mica exists in the unexposed lower part of the opening. The mica is of good size, some up to 5 inches by 6 inches. It shows very little stain, but ruling and "A" structure are abundant.

Recommendations

This pit will first have to be cleaned before the judgment can be passed. At the present time it looks as if operations might be able to go further along the north and south ends as well as deeper over the entire dike. The feldspar is of fair quality.

Augusta, Maine
July 4, 1943

UNION LIMESTONE BED, UNION

This deposit is located in the outer part of the village of Union, one-half mile northwest of the Post Office.

The rock is a calcium marble which is being operated at the present time for the Great Northern Paper Company. The bed has been quarried for the past fifteen or twenty years for this purpose.

The only good exposures are at the quarry sites where the bed strikes about N. 15° E. and dips 45° to 60° east. The eastern side of the bed is bordered by lime silicate gneiss, and this in turn by a biotite schist. All of the other outcrops in the vicinity are either biotite schist or andalusite schist. The structure of the limestone cannot be determined accurately due to the scarcity of outcrops. The most apparent solution seems to be a tight syncline similar to those mapped by Edson Bastin, U. S. Geological Survey, in the adjoining Rockland quadrangle.

The extent of the bed is uncertain but is known to go southerly at least one-half mile from the present quarry at the roadside, toward Round Pond. In the northerly direction it cannot be traced from the quarry more than one-quarter of a mile where it becomes covered with glacial till. The width of exposure at the quarry is about 150 feet.

At the present rate of operation there is enough limestone easily available to keep the quarry in operation for many years to come. Working from the present quarry toward the main road should yield at least one-quarter of a million tons of limestone.

Augusta, Maine
September, 1943

MERTON BENNER MICA PROSPECT, WALDOBORO

This prospect is located on the farm of Merton Benner in the town of Waldoboro. The farm is on a point of land referred to as Dutch Neck, about 3 miles south of Waldoboro.

The pegmatite is 8 feet wide and strikes N. 80° E. dipping 70° N. The mica is small (1½ inches x 1 inch) and occurs around quartz masses. The feldspar (microcline) is the most abundant mineral.

Recommendations

The mica is not worthy of consideration, being both small in size and quantity. The feldspar appears to be fairly good, the dike is small, and at a considerable distance from a mill.

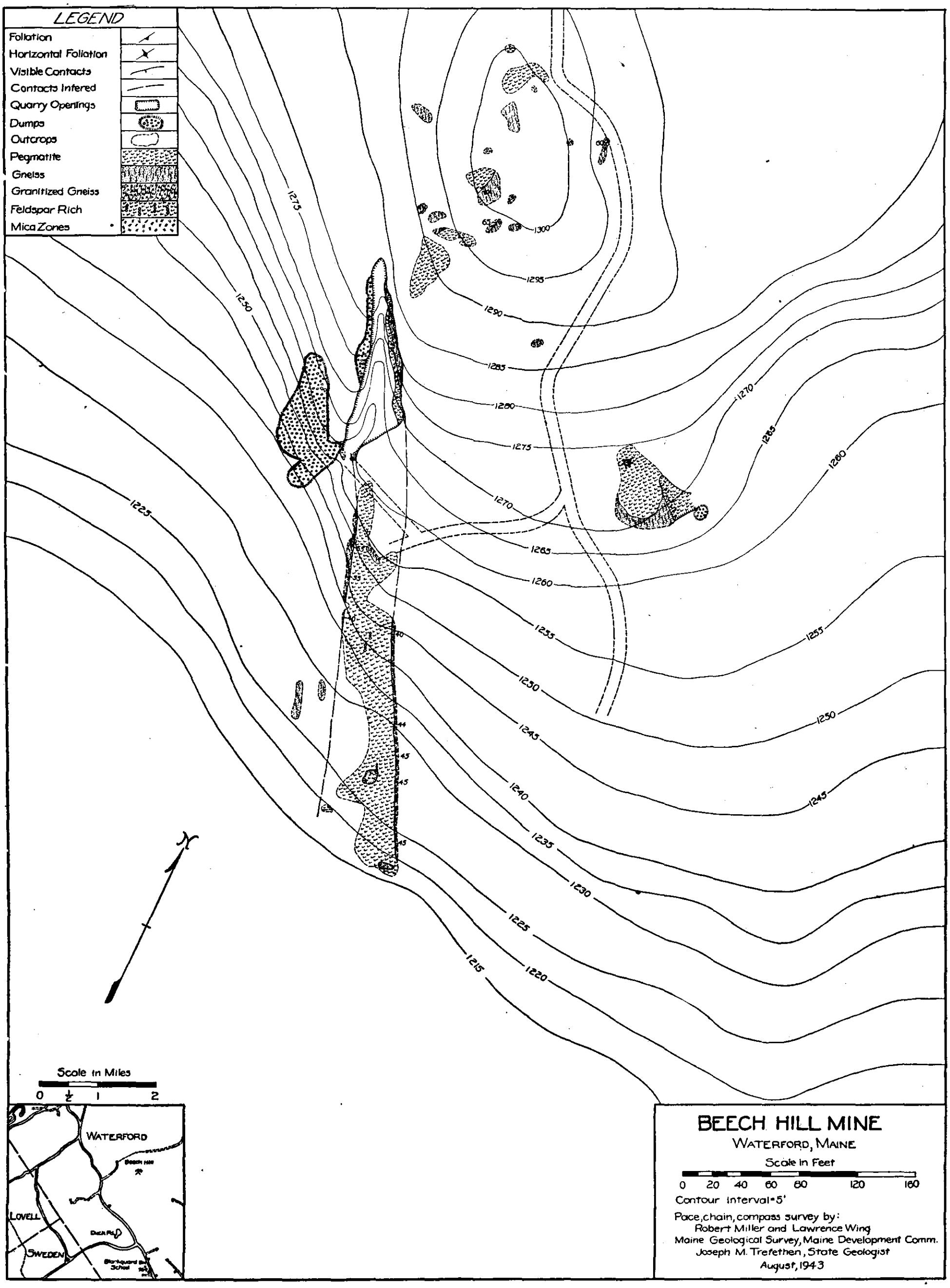
Augusta, Maine
August 10, 1943

BEECH HILL MINE, WATERFORD

(Map XII)

The Beech Hill mine is located four miles south of North Waterford about one-third mile southeast of the George L. Kimball farm. The mine is owned by D. R. Kimball and George Packard of South Waterford. Mining rights are held by the Douglass Mining Corporation of Portland, Maine.

MAP XII (Assumed datum plane)



The old pit which is now partially grown in with trees is at the northwesterly end of the pegmatite. The entire body extends approximately 300 feet as a ridge along a N. 25° W. strike. It dips irregularly from 30° to 55° easterly and varies in width from 6 feet to 45 feet. Besides the main pit, there are two small test pits near the southeast end of the dike. The wall rock about the mine opening is nearly horizontal biotite gneiss with aplitic sills, while the wall rock more southerly along the pegmatite dips 40° to 50°, easterly, and is concordant with the pegmatite itself.

Perthite, microcline, and quartz are the principal minerals; muscovite, biotite, and garnet are less abundant. Little mica is exposed although considerable tonnage is reported removed. According to Bastin (U. S. G. S. Bulletin No. 445) there was a concentration near the footwall. None of this zone is at present exposed. There is some mica 2 inches or 3 inches in diameter along the hanging wall, but this is mostly wedge-shaped or ruled. Very little is of punch or strategic quality.

Recommendations

On the basis of mica exposed there is no reason to believe this worthy of operation. If tests are made in the future to determine the presence of mica, it is suggested that both foot and hanging wall be prospected.

Augusta, Maine
August 3, 1943

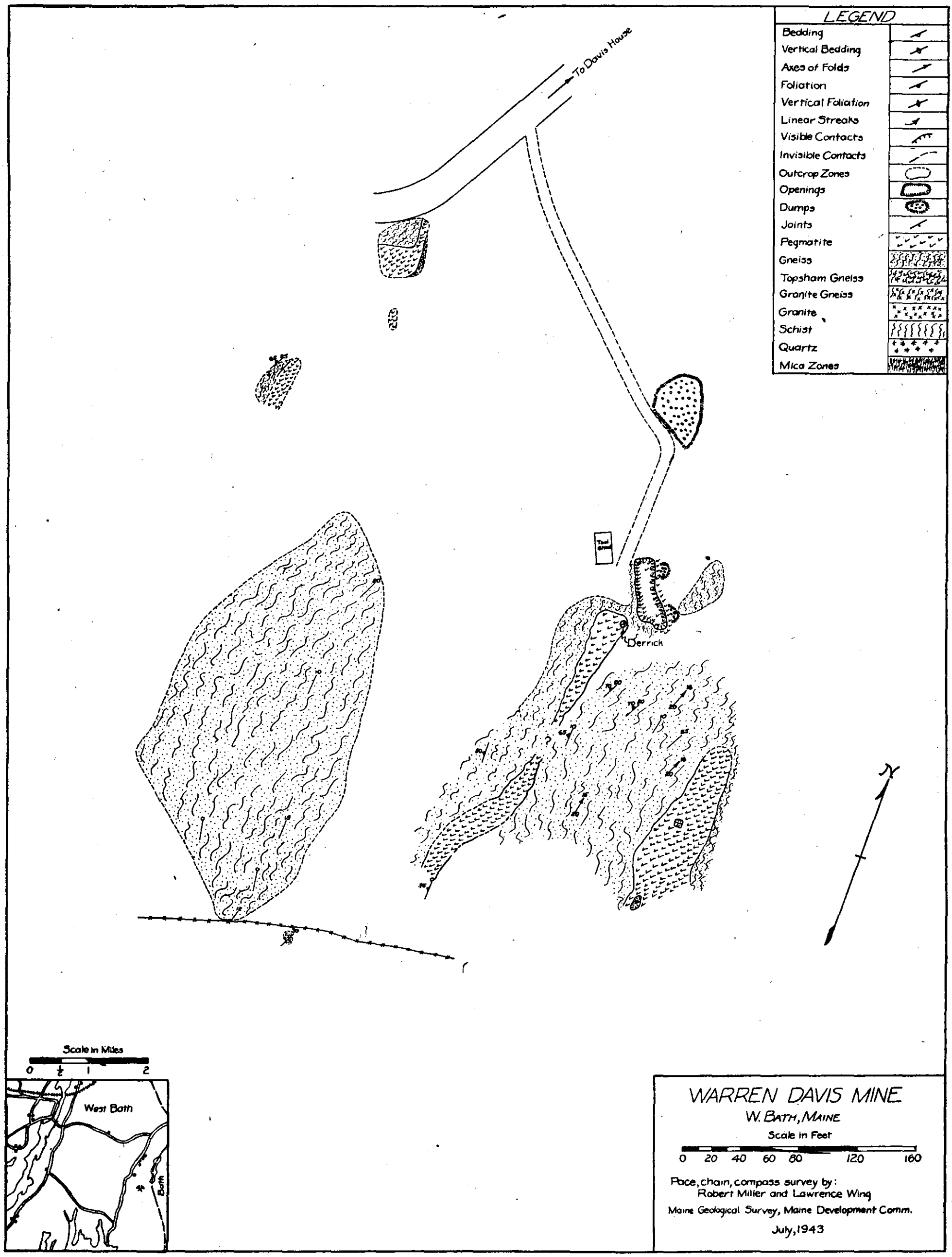
WARREN DAVIS MINE, WEST BATH

(Map XIII)

The owner is Mrs. Warren Davis, West Bath. The present lease holder is Herman Sappola. He operated this property last winter with a crew of from 3 to 8 men. He stopped work early this spring. (1943)

The quarry is at present partially filled with water. There is set up a derrick, tool house, and compressor. The dike has an average width of 6 feet and extends an unknown distance beyond the ends of the present mine. This dike strikes N. 20° W. and dips about 30° southwesterly under a biotite gneiss. Within the mapped area, 3 other dikes or sills were noted. These, in general, follow the strike of the gneiss. All are finer textured

MAP XIII


LEGEND
Bedding
Vertical Bedding
Axes of Folds
Foliation
Vertical Foliation
Linear Streaks
Visible Contacts
Invisible Contacts
Outcrop Zones
Openings
Dumps
Joints
Pegmatite
Gneiss
Topsham Gneiss
Granite Gneiss
Granite
Schist
Quartz
Mica Zones
To Davis House
Derrick
N
Scale in Miles
0 ½ 1 2
West Bath
Bath
WARREN DAVIS MINE
W. BATH, MAINE
Scale in Feet
0 20 40 60 80 120 160
Pace, chain, compass survey by:
Robert Miller and Lawrence Wing
Maine Geological Survey, Maine Development Comm.
July, 1943

and barren of commercial mica. Quartz and microcline feldspar are about equal in abundance; followed by mica and less common minerals as black tourmaline, beryl, and garnet. Almost all of the feldspar measures less than 3 inches. Quartz masses are present up to 1 by 1½ feet; however, the average is much smaller. The mica zones appear distinctly concentrated on the hanging wall, while there are lesser concentrations on the footwall and about the larger masses of quartz, which are scattered throughout the center of the dike. Muscovite books are found up to 6 inches in diameter, but the average is smaller. Many books show considerable ruling and distortion. No staining on the mica shows at present.

Recommendations

The mica is of good quality. It is suggested that the east end of the mine be opened in order that the mine be self draining. Further operation should drift both ends of the dike. It should be possible also to work down the dip of the hanging wall mica zone.

The mine is easily accessible by a good trucking road that runs south from the Warren Davis farm about a thousand feet.

Augusta, Maine
July 3, 1943

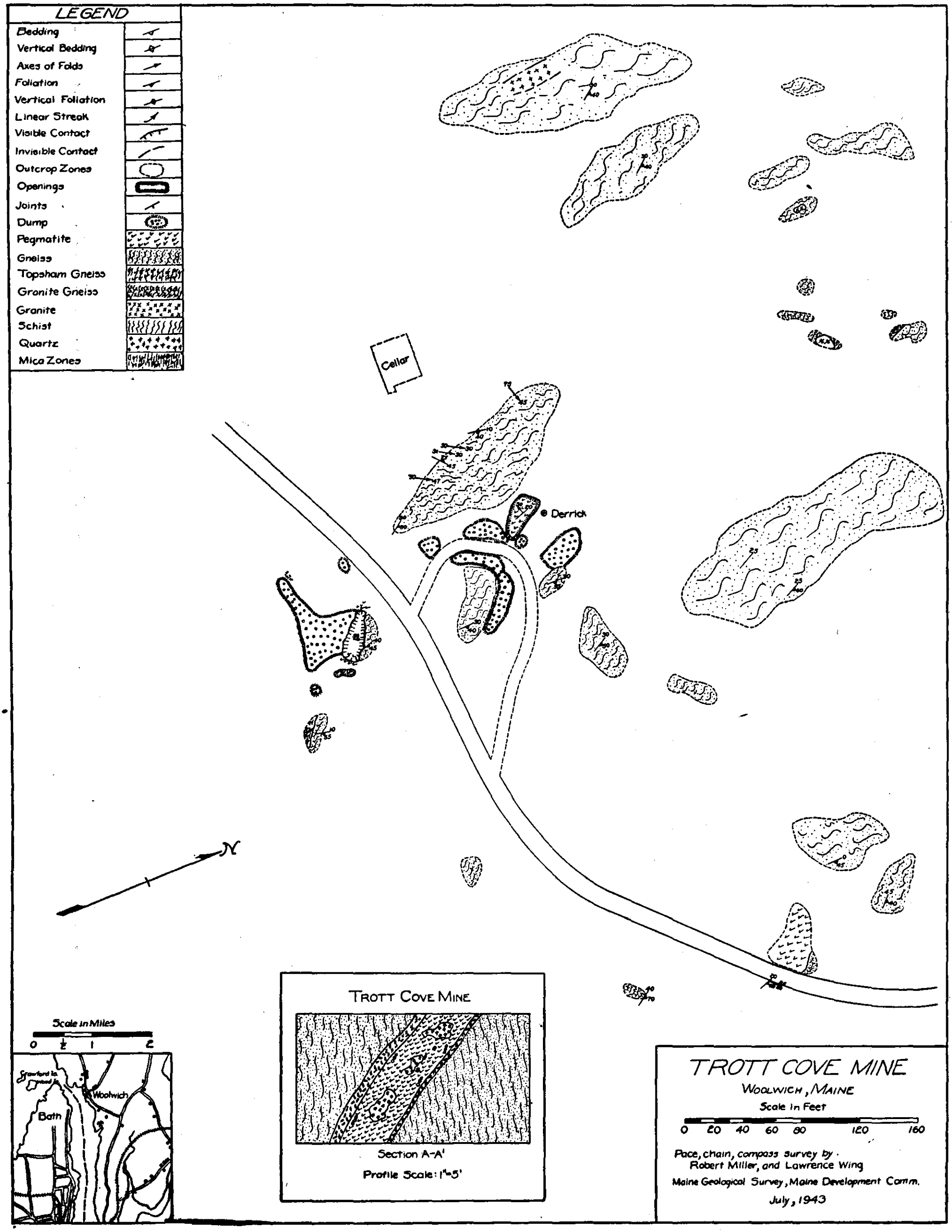
TROTT COVE MINE, WOOLWICH

(Map XIV)

The owner is Sam Guptill of Woolwich. This mine is operated under lease by Earl Williams of Brunswick. The mine is on the point on the north side of Trott Cove. There are two openings. The lower and more southerly of these was opened and operated in the winter of 1942-43. In April, 1943, the more northerly mine was opened.

For the most part the country rock is a biotite gneiss shot through with pegmatite sills and lenses, from a few inches to 10 or 12 feet in width. These intrusions follow the structure of the gneiss. The pegmatite dikes at Trott Cove that are of economic value nearly follow the strike of the gneiss, as do the sills, but in section cut it. The gneiss dips easterly 40° or 50°; the commercial pegmatites cutting across the gneiss dip 50° southwesterly.

MAP XIV (Assumed datum plane)



The upper (northern) dike is about 5 feet thick and extends back northwesterly into the hill an undetermined distance under considerable cover of soil. In the dike, quartz and feldspar appear in about equal distribution. White quartz bodies up to 2 by 4 feet tend to occur in the central part of the dike. The feldspar bodies are smaller, but more abundant, and in many cases are associated with slightly smoky quartz. Some feldspar masses measure up to a foot or more in size. Both microcline and plagioclase feldspar are present in about equal abundance. The mica appears in heavy concentrations along the hanging wall. This zone produces books as large as a foot square with the average being 3 or 4 inches. The footwall contains less mica concentration with comparatively smaller sheets and much fine tangle sheet mica. No biotite shows at present. In general the mica as a whole is not badly ruled. It is dark and heavily stained with magnetite and limonite. So far about 40 to 60 pounds of strategic mica have been obtained per ton mined. The staining does not appear in all layers of the books, but the problem of rifting stained layers from the others has proved somewhat expensive to the operator. Beryl is sparsely present, especially along the footwall zone. The crystals are seldom over one inch in diameter, but are unusually long. Other minerals are black tourmaline, garnet, and green apatite.

The lower pit resembles the upper in its structure except that the hanging wall and the greater part of the dike have been eroded.

Recommendations

Operation should continue along the dike towards the northwest as long as the mica continues abundant, before attempting to go deeper down the dip because of the expense of removing a heavy overburden, or going underground. The lower mine could again be opened. Drifting northwesterly from this opening should yield some strategic mica.

Augusta, Maine
July 10, 1943

APPENDIX B

LIST OF INDIVIDUAL PROPERTIES VISITED, 1943-44

Albany
- Walter Conwell
- E. O. Donahue
- Preston Flint
- Chester Holt
- Fred Scribner
- Ernest Wentworth

Anson
- Mrs. L. R. Young

Argyle
- Alton Bog

Ashland
- George Reed

Auburn
- Dennis & Sons

Augusta
- George Robichaud

Bath
- Davis Mine

Bemis
- Bemis Mt.

Bowdoin
- Benjamin Coombs
- Wallace Trufant

Bowdoinham
- Chester Jack

Brunswick
- J. LaChance

Bryant Pond
- Leon Kimball
- McAlister Farm

Buckfield
- Mrs. Morton Clark

Canton
- Reynolds Mine

Casco
- Howard Shane

Castine
- Edgar Jones

Castle Hill
- Milton Dudley

Centerville
- Peat Bog

Clinton
- Norman Richardson

Cumberland
- Joseph Blair, Jr.

Cushing
- Far Meadows Bog

Danville
- Morin Brick Co.

Deblois
- Peat Bog

Denmark
- F. Sanborn
- Charles Pingree

Dover-Foxcroft
- C. H. Gray
- Longley Farm
- Dover-Foxcroft Bog

Durham
- R. Sawyer

LIST OF INDIVIDUAL PROPERTIES VISITED, 1943-44—Continued

East Livermore
- Arthur H. Brooks

Eliot
- Eliot Brick Co.

Farmington
- Craig's Ledge

Flagstaff
- A. P. Wing

Franklin
- Peat Bog

Freeport
- Bean & Stetson
- Mrs. Charles Taylor
- Stanley W. Wood

Fryeburg
- Alton Maxim

Ft. Fairfield
- Bishop Pond Bog

Greenwood
- Bill Bryant
- Ice Caves
- E. L. Lowe
- H. L. Lowe
- Noyes Mt.
- Uncle Tom Mt.
- Matti Waisenan

Guilford
- Bennett Mine

Harrison
- Norman Mills

Hebron
- H. C. Henderson
- G. Hibbs
- No. 4 Hill
- Singepole Mt.

Hiram
- F. Putnan

Houlton
- Harry Thwaites

Howland
- Old Pond Farm
- E. Sawyer

Jonesport
- Peat Bog

Katahdin Iron Works

Lewiston
- Bergeron Brick Co.
- Arthur H. Brooks

Leeds
- Leeds Bog
- Quaker Hill Bog

Letter E
- School Lot

Lovell
- Kezar Falls Prospect
- Alton Maxim

Madison
- Guy Savage

Milton
- Mt. Glines

Minot
- Maheux Property

Newcastle
- H. L. Merry

New Limerick
- Drew's Mountain
- Eben Lake

LIST OF INDIVIDUAL PROPERTIES VISITED, 1943-44—Continued

New Sweden
- Hemberg Farm

N. New Portland
- Percy Luce

Norridgewock
- E. S. Miller & Shorey

North Alfred
- John Hall

Northport
- Herrick's Bog

Oakfield
- Nelson Property

Old Town
- Pushaw Lake Bog

Orono
- Pushaw Lake Bog

Otisfield
- Nutting Farm

Owl's Head
- F. L. Weeks

Oxford
- John Ottaway

Paris
- Mrs. L. Brown

Perham
- Salmon Lake Bog

Phillips
- Althea Jenney
- Guy Stevens

Phippsburg
- Colby Property
- McKay Farm

Pittston
- Dalmer Brook
- F. Peasley

Portland
- Lucas Brick Co.
- S. L. McDermott
- Rigby Bog
- Winslow & Co.

Pownal
- Fred S. Liberty

Presque Isle
- Jerry Glidden

Randolph
- E. E. Fayle

Rangeley
- Ora Haley
- Orgone Institute
- Lea Wilcox

Richmond
- Ernest Rice

Ripley
- Bear Mt.

Rockland
- Rockland Bog

Roque Bluffs
- W. & B. Wotts

Rumford Point
- George Eliot

Saco
- Saco Brick Co.

Salisbury Cove
- Keith Bog
- Morrison Bog

LIST OF INDIVIDUAL PROPERTIES VISITED, 1943-44—Concluded

Sanford
- W. Clark & H. D. Thornburg

Sangerville
- Dover-Foxcroft Bog

Sidney
- Sidney Bog

Skowhegan
- W. K. Dickenson
- Brooks Savage

Smithfield
- Leon & Witham

Stoneham
- Willis Warren

Stowe
- National Forest

Sumner
- Black Mt.

Thomaston
- K. Kallock

Turner
- Adrian Roy

Union
- Great Northern Paper Co.

Vanceboro
- Sunrise Farm

Vassalboro
- Wallace Berry

Waldoboro
- Merton Benner
- John Miller
- Stanley Poland
- Town Quarry

Warren
- Andrew Juuar
- Porcupine Hill, etc.
- H. G. Starrett

Waterboro
- Morris Dixon

Waterford
- Melvin Kimball & Packard

Waterville
- Colby College (Clay Pit)

West Bethel
- Mrs. Hilda Mason
- Peaked Hill
- Dr. W. Twaddle

West Farmington
- Thomas Talbot

West Peru
- R. M. Brown
- Lobikis Mine

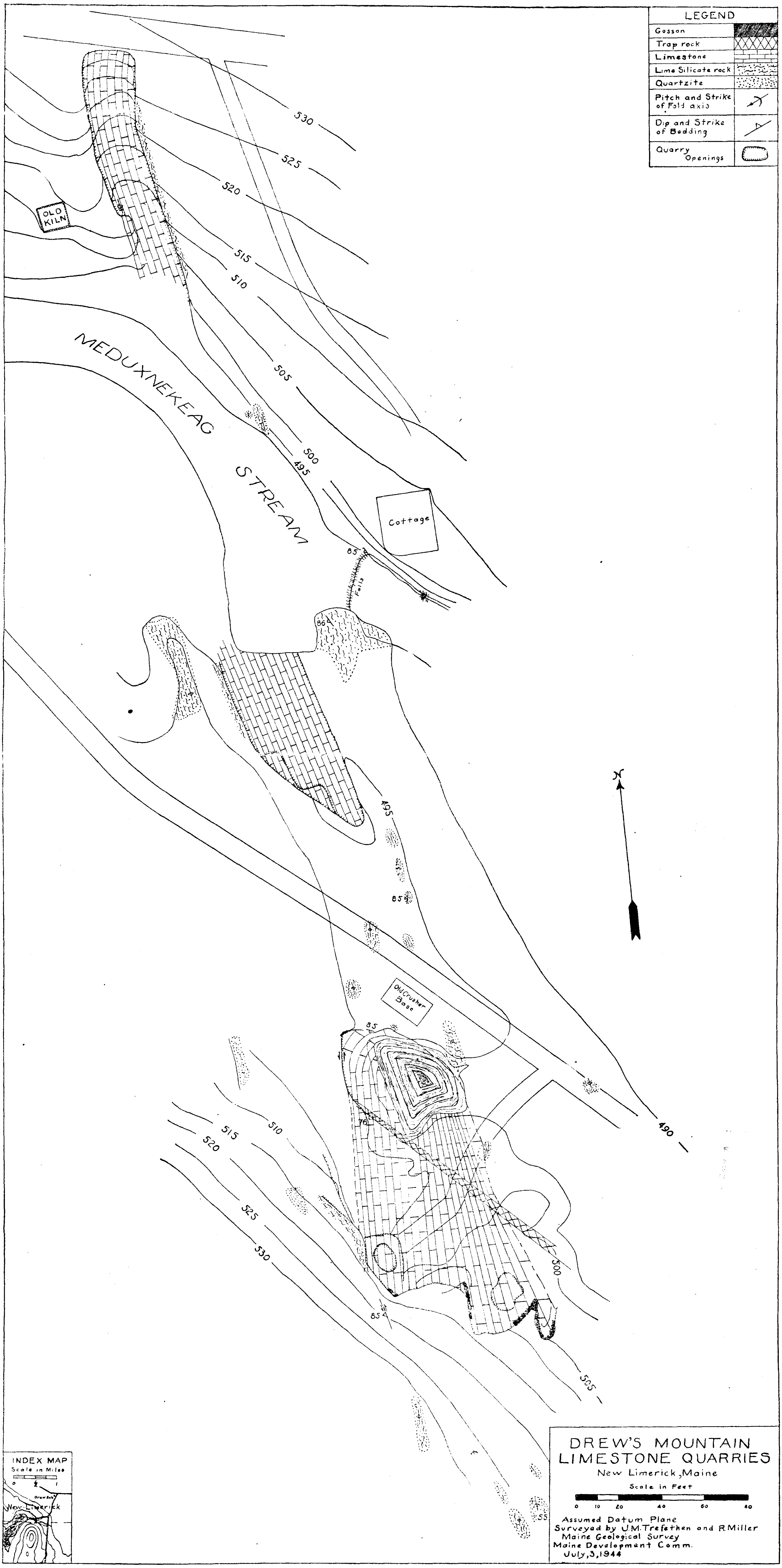
Windham
- C. R. Gould
- Windham Bog

Windsor
- Clay Deposit

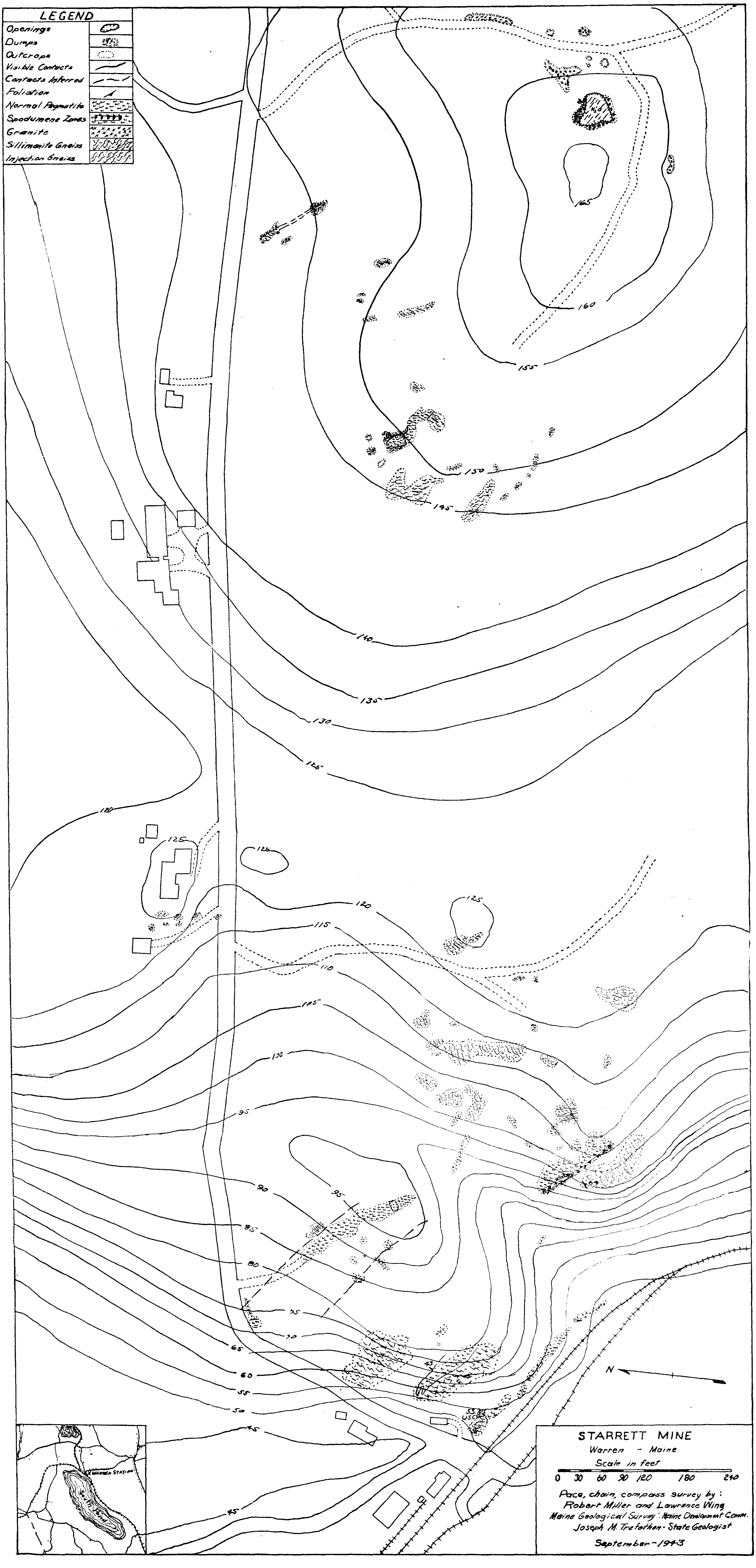
Woodstock
- Moll Ockett Mt.

Woolwich
- Samuel Guptil Mine
- W. H. Soule

Yarmouth
- Salt Marsh


LEGEND
Gosson
Trap rock
Limestone
Lime Silicate rock
Quartzite
Pitch and Strike of Fold axis
Dip and Strike of Bedding
Quarry Openings
OLD KILN
MEDUXNEKEAG STREAM
Cottage
Falls
Old Crusher Base
530
525
520
515
510
505
500
495
490
DREW'S MOUNTAIN
LIMESTONE QUARRIES
New Limerick, Maine
Scale in Feet
0 10 20 40 60 80
Assumed Datum Plane
Surveyed by U.M. Trefethen and R. Miller
Maine Geological Survey
Maine Development Comm.
July, 3, 1944
INDEX MAP
Scale in Miles
New Limerick

MAP XV



MAP XVI (Assumed datum plane)

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"First Annual Report on the Geology of the State of Maine"
by Lucius H. Merrill, State Geologist, and
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"State Geologist's Report on the Geology of Maine 1930-32"
by Joseph C. Twinem, State Geologist, and
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"Preliminary Geological Map of Maine"
by Arthur Keith and Edward H. Perkins, 1933.

"Report of the State Geologist, 1942-43"
by Joseph M. Trefethen, State Geologist.

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by Joseph M. Trefethen, State Geologist.

Bulletins

"Domestic Fuel Possibilities of Maine Peat"
by Joseph M. Trefethen and Robert B. Bradford, 1944.

"Katahdin Iron Works Pyrrhotite Deposit, Piscataquis County, Maine"
by Ralph L. Miller (In Preparation).

Copies obtainable on request to the Maine Development Commission, Augusta, Maine.