THE MINERAL INDUSTRIES OF VERMONT
CAN THEY MAKE AN ADDED CONTRIBUTION TO THE STATE'S ECONOMY

Thesis for the Degree of Ph. D.
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Fillmore Christy Earney
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This is to certify that the

thesis entitled

The Mineral Industries of Vermont:
Can They Make An Added Contribution
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Fillmore C. Earney

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Clarence L. Vinge
Major professor

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ABSTRACT

THE MINERAL INDUSTRIES OF VERMONT

CAN THEY MAKE AN ADDED CONTRIBUTION
TO THE STATE'S ECONOMY

By Fillmore Christy Earney

"Can the mineral industries of Vermont make an added contribution to the state's economy?" Answering this question represents the central research problem. The research focuses upon (1) Vermont's mineral mining and manufacturing (processing) industries--namely, sand and gravel, granite, marble, limestone, slate, talc, kaolin, and asbestos; (2) the identification of problems common to these industries that are retarding their development, their maximum production efficiency, and their ability to effectively compete with other regions producing the same minerals; and (3) the investigation of programs that might help to reduce the impact of these problems.

Tentative identification of problems common to these industries was undertaken through a familiarization with related literature (primarily federal publications such as those of the United States Bureau of Mines); then, through extensive field observations, interviews, and correspondence with Vermont's mineral producers and others these problems were carefully investigated. In the final stages of the research a general questionnaire was used to obtain supplementary data.

The results of the field observations, interviews, and correspondence show that: (1) The state's small mineral establishments have a relatively high turnover rate (closings and openings). (2) Vermont's

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mineral industries have not been experiencing any appreciable growth in sales and they suffer from pronounced cyclic fluctuations of demand for their products. (3) Production efficiency in several industries compares unfavorably with competing areas in other states. (4) Transportation problems are especially important because of the state's location, a failing railroad system, and the low-value high-weight commodities of the state's mineral industries, although Vermont's proximity to the large markets of the Northeastern United States helps to offset these disadvantages. (5) Vermont is losing a large number of its young male workers, a condition that in the long run could be detrimental to its labor pool of workers needed in the skilled mineral mining and processing occupations. In addition, producers presently have, with the exception of the granite industry, no training programs to assure replacements of skilled personnel or for meeting future worker needs that will likely arise with advancing production technology. (6) The tax burden in Vermont is high compared with many other states producing competing mineral commodities; and producers in at least one industry, granite, have been experiencing widespread assessment inequities. (7) Many producers have little knowledge of important management techniques including cost accounting and the maintenance of adequate personnel records. (8) Some mineral producers appear to have considerable difficulty acquiring investment capital, and a large number, especially in the granite industry, suffer from overextended credit. (9) Only limited amounts of raw materials are available to some of Vermont's mineral establishments. Although several mineral mining producers are actively engaged in proving new reserves, a state-supported effort of field investigation and laboratory research could be helpful toward ensuring Vermont's future status as a mine

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status as a mineral producer. (10) The state's mineral producers have opportunities available for greater efficiency and growth through increased efforts at promoting their products and updating production techniques. Other opportunities are available through cooperative efforts implemented by industrial associations functioning to maintain production standards, to support professional advisory personnel, and to pursue market research.

THE MINERAL INDUSTRIES OF VERMONT

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TO THE STATE'S ECONOMY?

By

Fillmore Christy Earney

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Social Science

1965

To Winnie Jo, who has these past ten years
so often reminded me that the panic of
error is the death of progress.

PREFACE

This study is in many respects the culmination of an interest developed through several years. The author's broad training in the social sciences and appreciation for the relationships of "economic man" to his physical and social environment have led to the development of an interest in mineral geography. The problems faced by "man" in mineral exploitation and the increasing opportunities for mineral utilization through advancement in technology and social organization illustrate especially well the melting pot of social-physical reality.

Statement of purpose

Vermont's mineral industries are in large part taken for granted by many of its residents. Few of the state's citizens really know how important these many industries are to Vermont's economy. Even fewer have given careful consideration to possibilities for their added contribution to the state's economy. It is the purpose of this paper (1) to investigate what problems reduce the efficiency, competitive position, and, consequently, the growth of Vermont's mineral industries, and (2) to explore possibilities for an added contribution to the state's economy by these industries.

Scope of the study

Only those industries which mine the solid economic minerals of Vermont and those industries which alter these extracted minerals through manufacturing processes are included within the scope of this study.

Method of procedure

The materials presented in this paper represent two years research and study. Initial work on the mineral industries of Vermont was begun in the fall, 1962, with a study of the slate industry. An intense interest in Vermont's mineral industries came from this work. This interest led to the selection of the dissertation topic in the summer of 1963.

Once selected, research on the topic was undertaken by:

(1) Establishing precisely what minerals are produced in Vermont and where.

(2) Becoming familiar with the terminology of the various industries through wide reading of available literature; at the same time determining common problems, weaknesses, and opportunities of the different industries for study in depth.

(3) Making field observations of over 50 mineral establishments and conducting over 70 personal interviews with mineral producers and others.

(4) Corresponding with other scholars in the United States and Canada, mineral producers in Vermont and other competing mineral regions, labor leaders, and officials of Vermont, other states, and the federal government.

(5) Compiling supplementary data obtained through questionnaires sent to each of the state's mineral producers.

Acknowledgments

I should like to express my appreciation to all those whose efforts and interest have made possible the pursuit of this research.

Without the willingness of correspondents to aid my work through answering my many letters and without the generous assistance and understanding of Vermont's mineral producers, this study would not have been possible. I am especially indebted to the director of this dissertation, Professor Clarence L. Vinge of Michigan State University, whose patient guidance and keen criticism have made possible the completion of this research.

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CHAPTER I

INTRODUCTION

Change has become the watchword of the American scene, and few, if any, of its social, political, or economic components have escaped the need for readjustment. Vermont is a part of this reorganization--this attempt to meet the demands of modern society. Extensive changes are underway in the state's educational institutions, there are innovations in its mental health programs, and there are redevelopment programs in its cities. Perhaps the atmosphere of change in Vermont is reflected best in the 1962 state election when Governor Philip H. Hoff, on a reform ticket, became the first Democrat to fill this office since 1855. But political-social awareness and change are not enough to assure Vermont's continued movement in the mainstream of American life. Vermont, to maintain its social advances, must move toward greater economic development and growth. To do this, Vermont should develop all of its economic resources to their fullest potential.

Vermont's economic base has many roots. Some of these have not received careful enough consideration by its businessmen, its educational institutions, or its governmental bodies. Vermont's mineral industries are one of its neglected economic activities. The mineral industries of Vermont have played an important part in the state's economy for nearly 200 years and should continue to play an important part. Vermont's mineral industries, however, can make a greater contribution to the state's economy because opportunities exist for increasing their efficiency and growth through intensive efforts in self-evaluation, research, cooperation, and imagination among the general public, state officials, and the state's mineral producers.

Definitions of Terms

Before an examination of Vermont's mineral industries is undertaken, definitions basic to the discussion in the remainder of the thesis should be set forth. Specific terminology is important because of the nature of the statistical data available and the dual industrial classifications under consideration--namely, mineral mining and mineral manufacturing (processing) industries.

A large part of the statistical information used in this study is based upon data contained in the United States Bureau of the Census publications *Census of Manufactures: 1958* and *Census of Mineral Industries: 1958* whose data are predicated upon industrial classifications contained in the Budget Bureau's publication *Standard Industrial Classification Manual* (1957 edition). Therefore, the following definitions of industrial classification used in this thesis are based primarily upon those contained in these three government publications.

An industrial establishment--a mappable unit of capital investment operated by a functional labor force.

An industry--a group of establishments producing a single product or more or less closely related group of products.

<u>Mineral industries</u>--in this thesis the term is used broadly to include all establishments primarily engaged in mining (including quarrying) the state's mineral raw materials from the earth and all establishments in the state manufacturing (processing) these raw materials into finished or semi-finished products. Definitions for these industries will be based upon the broad industrial division classifications included in the <u>Standard Industrial Classification Manual</u>--mining and manufacturing.

<u>I. Mining industries</u>--all establishments primarily engaged in mining naturally occurring mineral raw materials. The term mining is used broadly to apply to all quarrying and milling (crushing, screening, washing, flotation) and other rudimentary preparation needed to render the material marketable. It also includes those establishments active in the exploration or development of mineral property.

<u>Nonmetallic mineral industries</u> (except fuels)--include establishments active in extracting dimension stone, crushed and broken stone, sand and gravel, clay, talc, soapstone, and mineral fertilizer materials.

<u>Stone industries</u>--all establishments quarrying stone, an earthy material in contrast to metallic or carbonaceous materials. This grouping includes establishments producing dimension stone, or crushed and broken stone.

<u>Dimension stone industries</u>--all establishments primarily engaged in mining or quarrying and sawing rough blocks, sheets, and slabs of stone material that are used for structural, decorative, or monumental purposes. The

Census of Mineral Industries: 1958 includes data for both mining and some manufacturing establishments under the dimension stone classification but specifically differentiates between the two industrial groups. Data for establishments active only in mining or quarrying are classified under "quarries only." Data for establishments engaged in quarrying and with associated dressing plants that shape, polish, or otherwise finish rough blocks and slabs are classified as "quarries with dressing plants" and are considered to be manufactural if dressing activities are dominant.

Crushed and broken stone industries--all establishments primarily quarrying crushed and broken stone such as limestone, granite, marble, and slate. It does not include quarries which are parts of establishments primarily manufacturing quicklime, hydrated lime, ready-mixed concrete, or bituminous concrete.

II. Manufacturing industries--include establishments mechanically or chemically transforming raw materials into new products. These activities are usually carried on in plants, factories, or mills, which characteristically use power-driven machines and materials handling equipment.

Mineral manufacturing (processing) industries--include those establishments primarily engaged in transforming mineral raw material into new products and are classified under the major industrial grouping of stone, clay, and glass products.

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primarily (in Vermont) cut stone and stone products, structural clay products, concrete blocks and bricks, ready-mixed concrete, and lime products.

<u>Cut stone and stone products industries</u>--include establishments primarily engaged in dressing (shaping, polishing or otherwise finishing) rough blocks and slabs of stone such as slate, marble and granite.

<u>Structural clay products industries</u>--include establishments producing items such as bricks, tile, and sewer pipes.

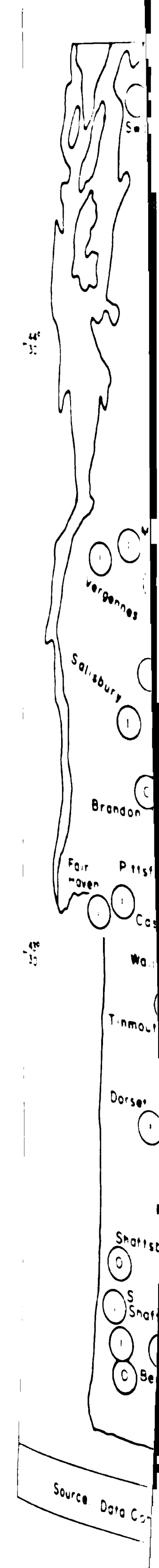
CHAPTER II

IMPORTANCE OF VERMONT'S MINERAL INDUSTRIES TO THE STATE'S ECONOMY--PAST AND PRESENT

When Vermont is characterized as a mineral producing state, interest is most often focused upon its famous marbles, granites, and slates. While these minerals are presently extracted and processed in the largest amounts, there have been periods in Vermont's history when other mineral industries received the greatest attention. The exploitation of these minerals, in a few cases, was sporadic, on a small scale, and tinged with considerable speculation; others were produced for longer periods of time, on a large scale, and with careful planning. Problems such as depletion, transportation, competition, changing market demands, finance, and business failure--recorded in the histories of the state's past mineral industries--are often the problems of Vermont's present day industries.

Past

A large number of Vermont's once flourishing mineral industries have vanished (Fig. 1). Although these industries are no longer functioning, evidence of their former activity exists in many parts of the state. Copper, iron ore, gold, ocher, lead, and garnet have all been extracted from the valleys and mountains of Vermont. Several mineral industries have played a very important part in the development of Vermont, and a few have contributed, if only in a small way, to the development



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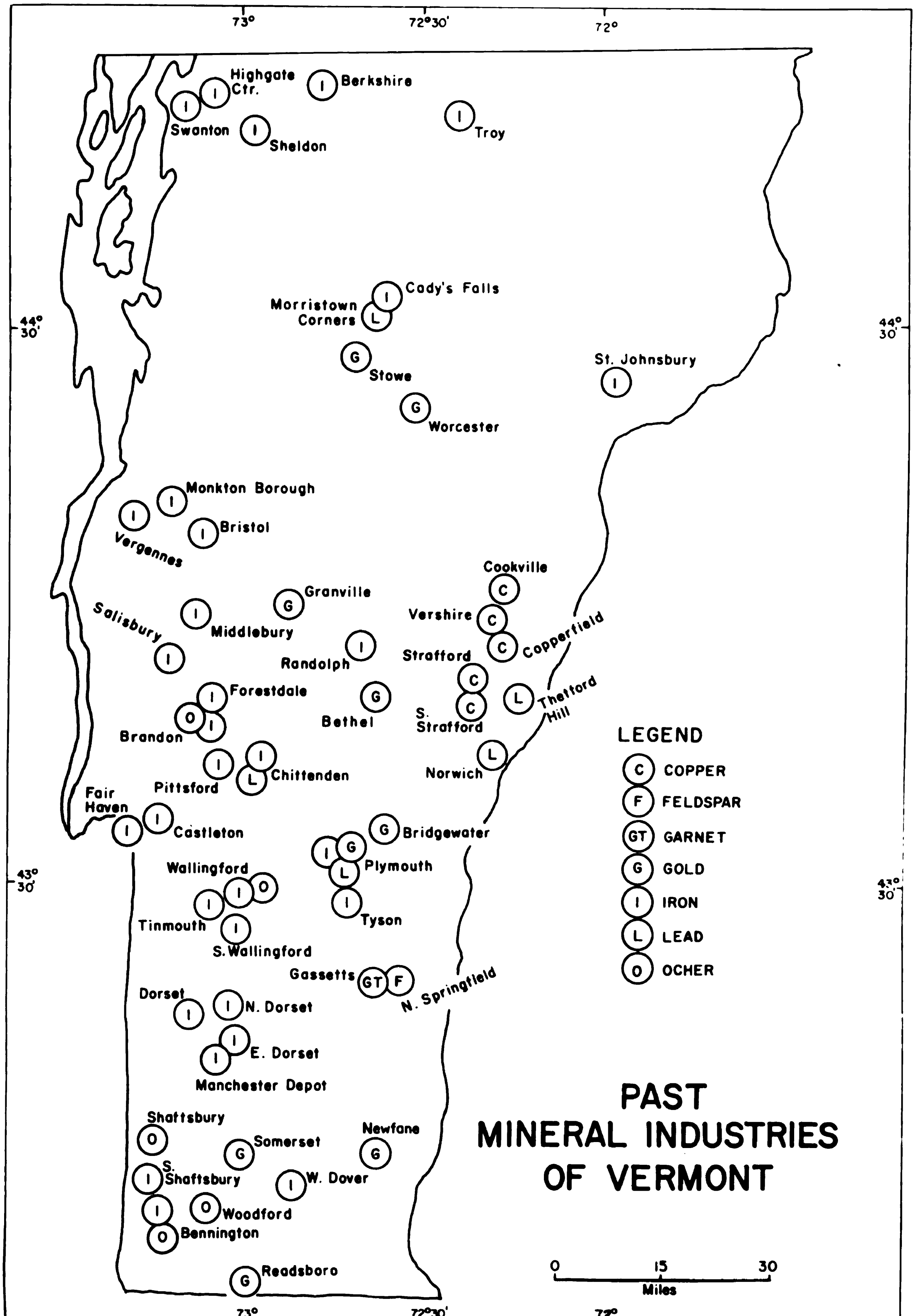

Source: Data Compiled from Vermont Geological Reports, 1848–1950.

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Copper

In 1793 in Orange County, Vermont, miners began producing copperas from pyrites--iron-sulphide ores. Copperas, a hydrated iron sulphate, was made by leaching pyrites, boiling the watery solution, and then allowing crystallization to occur. The crystals were used in the preparation of disinfectants, tanning agents, dyes, and inks. Thirty years later (1820) copper pyrites were discovered in the gangue of the iron-pyrite ores.[1] This discovery led to the development of the first copper mining and smelting of any economic importance in the United States. Mining soon extended for some 20 miles in a northeasterly direction between the village of South Strafford on the south and Cookville (Corinth) on the north, but most activity centered around the Elizabeth Mine at South Strafford and the Ely Mine at Copperfield. Early attempts at smelting proved so ineffective that the ores were first sent to England and later to the Boston area for processing.[2] Not until 1866 was local smelting of the region's copper ores finally accomplished; but once underway, production increased steadily until in 1880 output from only one mine and smelting establishment, the Ely, reached a peak of 3,200,000 pounds of refined copper. In the following years production declined, and only ephemeral attempts at copper extraction at this site

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[1]H. P. Hermance, G. L. Neumann, and McHenry Mosier, Investigation of Ely Mine Copper Deposit, Orange County, Vermont, U.S. Bureau of Mines Report of Investigations No. 4395 (Washington: U.S. Government Printing Office, January, 1949), p. 2.

[2]Edward Hitchcock, et al., Report on the Geology of Vermont, Vol. II: Descriptive, Theoretical, Economical, and Scenographical (Claremont, N. H.: The Claremont Manufacturing Company, 1861), p. 856.

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occurred (Fig. 2).[3] Production at the South Strafford site, the Elizabeth Mine, continued intermittently well into the twentieth century but gradually became entirely noncompetitive. Low-grade ores and the opening of newer and richer copper regions in the United States and in other areas of the world forced its closing. Only during times of war and national crisis, when copper commanded premium prices or when the federal government supported the reopening of the establishment, did activities of extraction and processing resume. The Elizabeth's last period of operation began in 1943, and its last closing occurred only in 1958.

Unless methods of extraction can be developed to utilize very low-quality ores, it is not likely that copper can be profitably produced in this region again. Even the small amounts of silver, gold, and pyrite, long produced as by-products of copper extraction in this region, do not allow a profitable continuance of the industry.

Iron

The mining and smelting of iron ores was one of Vermont's earliest industries. Iron mines and forges once operated from the northernmost border of the state to the village of Bennington in the south. Miners extracted bog ores and forged pig iron as early as the 1780's; ironmasters built the first forge in Fair Haven, Vermont, in 1785. By 1794, fourteen forges, three furnaces, and a slitting mill[4] were operated in Rutland County, and seven other forges were scattered over the state's western portion in Bennington, Addison, and Chittenden Counties.

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[3]Hermance, op. cit., pp. 1-3.

[4]Slitting mills cut flat sheets of pig iron into strips that could be further processed into nails.

Fig. 2.--The abandoned Ely copper mining and smelting site near Copperfield.

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In the early nineteenth century 20 bloomeries were producing near the village of Vergennes in Addison County.[5] A few years later the iron industry of Vergennes played an important part in the War of 1812. It was here that Master-Commandant Thomas Macdonough in 1813, while preparing to meet the British on Lake Champlain, obtained huge quantities of iron shot;[6] and it was from here that several ships, built and then fitted with Vergennes iron,[7] among which was the Saratoga, sailed forth to meet and defeat the British at Plattsburg Bay (1814).

Iron ore extraction and forging continued as an important industry in Vermont until just before the Civil War. In 1850 iron works at Bennington employed 150 to 200 men. As bog ores became depleted, as costs of production rose, and as competition from other areas with easier access to cheap transport and fuel increased, the mines and forges in Vermont closed one by one. By 1860 the Bennington forges and mines, so active in 1850, lay in decay.[8] The only reminders of this once important industry are the crumbling stacks of long abandoned forges (Fig. 3). As in the case of copper, ore depletion and competition from other major iron producing regions, as well as inaccessibility to cheap fuel supplies, preclude any revival of this industry in the state.

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[5]James M. Swank, History of the Manufacture of Iron in All Ages: And Particularly in the United States for Three Hundred Years from 1585 to 1885 (Philadelphia: By the author, 1884), pp. 98-99.

[6]Richard S. Allen, "Furnaces, Forges and Foundaries," Vermont Life, XI (Winter, 1956-1957), 5.

[7]Ralph N. Hill, Yankee Kingdom: Vermont and New Hampshire (New York: Harper & Brothers, 1960), p. 152.

[8]Allen, op. cit., p. 8.

Fig. 3.--Abandoned iron forge near Forestdale.

Gold

Vermont has had its own local gold rushes; each resulted in high hopes but little else. Gold discoveries near Newfane in 1826 and at Somerset in the early 1840's were dismissed by local residents as a hoax of land speculators--everyone knew that gold occurrences depended on a warm climate. This obviously excluded Vermont.[9] Other discoveries made by prospectors returning from California's gold fields in the early 1850's stimulated flurries of activity along the streams of the Green Mountains. Villages such as Plymouth, Readsboro, Bethel, and Stowe experienced the effects of "gold fever." Most efforts at milling lode ores and panning gold bearing stream gravels received little reward and lasted but briefly. Today the only evidence of interest in Vermont gold comes from amateur weekend prospectors.

Ocher

The Green Mountains' western margin was once the site of extensive ocher[10] extraction. Iron ore miners sometimes produced ocher as a by-product when washing iron ores. Production of this pigment material,[11] used in paints and ceramic clay, continued almost uninterrupted from 1820 until 1916. From 1889 until 1913 Vermont annually produced enough ocher to rank third in the United States. Since 1916 no ocher production

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[9]Charles B. Adams, First Annual Report on the Geology of the State of Vermont (Burlington, Vermont: Chauncey Goodrich, 1845), p. 32; and Hitchcock, op. cit., pp. 843-44.

[10]Hitchcock, op. cit., pp. 808-09.

[11]Iron oxides used for coloring: red from hematite, yellow from limonite.

of significance has occurred.[12]

At times throughout the state's history, Vermonters have produced many other minerals in small quantities, such as garnet, whetstone, lead, manganese, and lignite.[13] Although much more could be said of Vermont's picturesque and once important mineral industries, it would serve no purpose. A discussion of these early industries merely emphasizes that (1) Vermont's importance as a mineral producing state has long been established, and (2) the problems faced by producers in these past industries--among which were depletion, competition, transportation, and changing market demands--are often encountered by the mineral producers of today.

Present

What are Vermont's mineral extracting and manufacturing industries? How important are Vermont's mineral industries to the state's present economy? What part of the total work force is employed in extracting and manufacturing minerals?

Vermont's mineral mining and manufacturing industries are rather widely distributed (Fig. 4). Asbestos and granite are quarried in the state's north central portion, slate in its west central margin, and limestone along Lake Champlain's eastern shore. Just to the east of the slate area, in the vicinity of Rutland, workers remove marble from what

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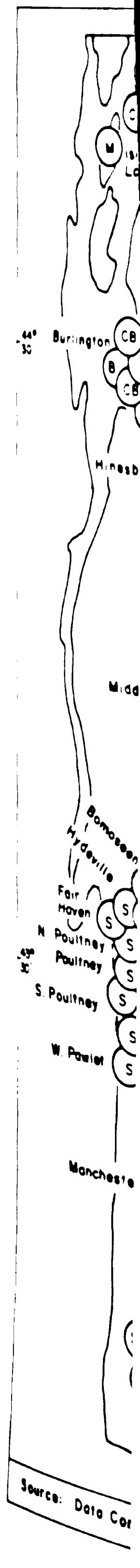
[12]Frederick A. Burt, "Location and Geologic Relations of Mineral Pigments in Vermont," Iron Oxide Mineral Pigments of the United States, ed. Hewitt Wilson, U.S. Bureau of Mines Bulletin 370 (Washington: U.S. Government Printing Office, 1933), p. 15.

[13]Alfred Traverse, Pollen Analysis of the Brandon Lignite of Vermont, U.S. Bureau of Mines Report of Investigations No. 5151 (Washington: U.S. Government Printing Office, December, 1955), pp. 1-5.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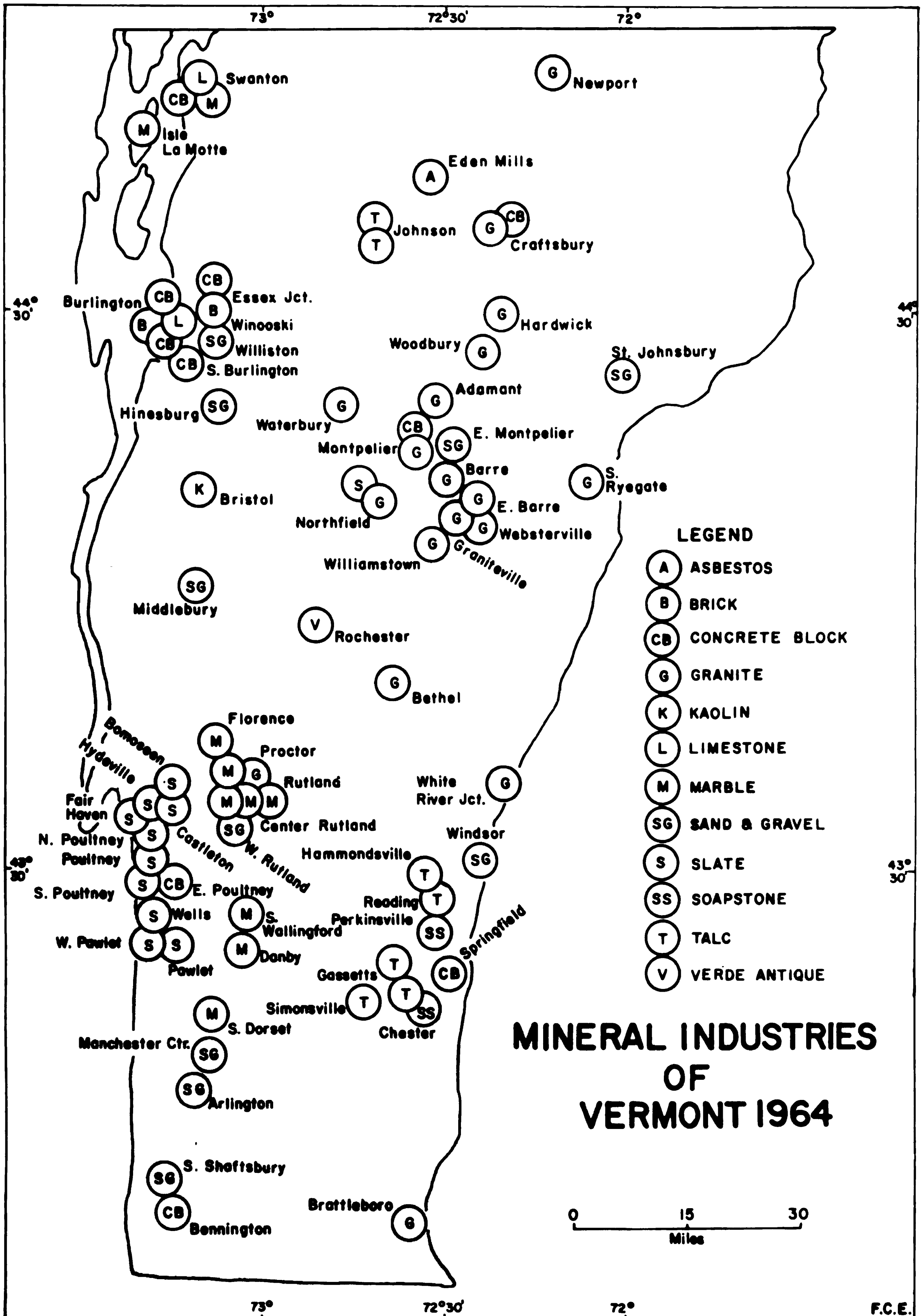

Source: Data Compiled from Vermont Directory of Manufactured Products (1964–1965).

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are locally called mine-quarries.[14] In addition to these minerals, quarriers extract soapstone at Chester, kaolin near Bristol, verde antique[15] near Rochester, and sand and gravel in various places; miners extract talc from drift mines[16] near Simonsville in the southern part of the state and at Johnson in the north. The output from these many mining establishments moves by truck or rail to nearby, but in a few instances rather distant, manufacturing establishments for processing.

Compared to other segments of Vermont's economy--as for example agriculture and general manufacture--minerals do not stand out as basic to the state's economic structure. The sales value of all minerals extracted, and prior to manufactural processing, of the Vermont mining industries in 1962 is estimated at $25 million. The gross income from all agricultural products for that year in Vermont was more than $125 million,[17] and the estimated gross value of all manufacturing was over

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[14]Quarrying refers to operations that remove stone, clay, sand and gravel or other rock material from its natural position by open-pit methods. In contrast, mine-quarries, as in the Rutland area, represent underground operations of drifts radiating from vertical-shaft entries.

[15]Soapstone is the compact and impure form of talc and occurs as a compound of magnesium, silicon, oxygen, and hydrogen. Kaolin is a hydrated aluminum silicate usually resulting from the decomposition of feldspar. Verde antique, a mixture of hydrous magnesium silicates and carbonate materials, can take a high polish and is sold as a marble. See William J. Miller, An Introduction to Physical Geology: With Special Reference to North America (5th ed.; New York: D. Van Nostrand Co., Inc., 1949), pp. 462, 465; and Richard M. Pearl, How to Know the Minerals and Rocks (New York: McGraw-Hill Book Co., Inc., 1957), p. 133.

[16]Drift mines are tunnels driven at an oblique or right angle to a hillside or parallel to the course of a vein or rock material.

[17]U.S., Bureau of the Census, Statistical Abstract of the United States, 1963 (84th annual ed.), p. 635.

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$300 million.[18] Such a comparison, however, must be put into perspective, for neither the economy of the United States in general nor many of the individual states has a major share of its income derived from the extraction and manufacture of minerals.

A comparison for the year 1962 of the total value of all minerals produced by the mining industries in Vermont and selected states illustrates the relative importance of minerals to Vermont's economy. In spite of Pennsylvania's large output of coal, cement, natural gas, petroleum, and stone commodities, that state produced minerals valued at only $9 more per capita than did Vermont. Michigan with its iron ore, cement, petroleum, and copper fell short by $7 in matching Vermont's figure; and New York's production value of important minerals such as cement, salt, iron ore, and stone accumulated a per capita production value of only $14--$50 less than Vermont's figure (Table 1).

A more appropriate way to view the impact of the mineral industries on Vermont's economy is through a per capita comparison with these same states for their production of competing stone products. Per capita comparisons of the total stone sold or used by producers[19] in Vermont and in competing states for 1962 shows that Vermont led over Georgia, New York, Maine, Pennsylvania, and Michigan (Table 2).

Detailed comparisons of several specific types of stone sold or used by producers also show Vermont leading. If we compare Pennsylvania, the largest slate producer in the United States, we find that in 1961,

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[18]Letter from Maxwell R. Conklin, Chief, Industry Division, Bureau of the Census, U.S. Dept. of Commerce, Washington, D. C., June 17, 1964.

[19]The term "sold or used" refers essentially to the value of sales by quarriers, quarrier-processors, and processors (of quarry minerals).

TABLE 1.--Comparative per capita values of all minerals sold or used in selected states in 1962

State	Population[a]	Value Sold or Used[b] (millions of dollars rounded)	Per Capita Value (dollars rounded)
VERMONT	389,881	25	64
Georgia	3,943,116	107	27
Pennsylvania	11,319,366	823	73
Maine	969,265	15	15
Michigan	7,823,194	447	57
New York	16,782,304	242	14

[a]Data obtained from: U.S., Bureau of the Census, Census of Population: 1960. United States Summary of Detailed Characteristics.

[b]U.S., Bureau of Mines, Minerals Yearbook: 1962, Vol. III.

TABLE 2.--Per capita value of all stone sold or used by producers in selected states in 1962

State	Population[a]	Value Sold or Used[b] (in dollars)	Per Capita Value (in dollars)
VERMONT	389,881	19,815,000	50.83
Georgia	3,943,116	42,037,000	10.66
Pennsylvania	11,319,366	82,087,000	7.23
Maine	969,265	4,249,000	4.39
Michigan	7,823,194	29,055,000	3.74
New York	16,782,304	47,256,000	2.82

[a]Data obtained from: U.S., Bureau of the Census, Census of Population: 1960. United States Summary of Detailed Characteristics.

[b]Data obtained from: Perry Cotter and Nan C. Jensen, Minerals Yearbook: 1962, Vol. I: Stone, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1963), p. 2.

on a per capita basis, it sold or used \$3.29, and Vermont during the same year sold or used \$4.73. With a total value of \$5,119,551, Vermont in 1961 led the nation in dimension granite sold or used. Vermont produced a per capita value of \$13.13; the second largest producer, Georgia, accrued a total per capita value of only \$1.09. Per capita, limestone producers in Vermont sold or used an amount over twice that of producers in states such as Michigan, Ohio, and New York--states usually considered large limestone producers (Table 3). Although one might argue that what

TABLE 3.--Per capita value of varied stone types sold or used by producers in Vermont and other states in 1961

Stone Type	Population[a]	Value Sold or Used[b] (in dollars)	Per Capita Value (in dollars)
Slate			
VERMONT	389,881	1,844,147	4.73
Pennsylvania	11,319,366	3,445,385[c]	3.29
Dimension Granite			
VERMONT	389,881	5,119,551	13.13
Georgia	3,943,116	4,292,474	1.09
Minnesota	3,413,864	3,090,098	.91
Crushed and Broken Limestone and Dolomite			
VERMONT	389,881	4,088,607	10.49
Ohio	9,706,397	47,923,866	4.95
Michigan	7,823,194	29,781,604	3.82
New York	16,782,304	36,312,711	2.16

[a]Data obtained from: U.S., Bureau of the Census, U.S. Census of Population: 1960. United States Summary of Detailed Characteristics.

[b]Data obtained from: Perry Cotter and Nan C. Jensen, Minerals Yearbook: 1961, Vol. I: Stone, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1962), pp. 6, 20.

[c]Data obtained by letter from Perry Cotter, Division of Minerals, U.S. Bureau of Mines, Washington, D. C., May 15, 1964.

really matters is the total production in a given state, this contention does not take into account the relative impact that these industries have on that state's economy. The $36,312,711 value of limestone sold or used in New York simply does not have the same importance to its economy as the $4,088,607 value sold or used in Vermont does to Vermont's economy. On a dollar basis these mineral industries have more influence on Vermont than do similar industries on the economies of many other states.

As of December 1964, slightly more than 4 percent of all employees (excluding agricultural workers) in Vermont were in the mineral mining and the mineral manufacturing (processing) industries. Manufactural employees, approximately 3,550, are engaged in processing mineral raw materials and make up nearly 10 percent of the state's manufacturing work force. Approximately 1,200 workers are active in establishments classified principally as mining or quarrying.[20]

Many areas and groups of cities benefit from these mineral mining and manufacturing industries through a stregthened economy because of the employment opportunities they create directly and indirectly (Fig. 5). Satellite industries such as those making equipment for mining, quarrying, and stone finishing give added employment opportunities. Eight separate firms in the state produce mining and processing equipment, and they employ approximately 250 men. Four other firms have part of their production line in these materials.[21] Although some areas benefit from mineral industries merely as a supplementary income source, other areas are heavily dependent on the jobs and income associated with them. The total employment in mineral mining and manufacturing industries on a county basis varies considerably (Fig. 6). The activities of the slate, marble, granite, and asbestos mining and manufacturing establishments exert a significant influence on local Vermont economies, primarily because of their concentration and size. Lamoille, Rutland, and Washington Counties have large numbers of employees active in mineral mining establishments (Fig. 7). Comparisons of workers employed in mineral

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[20]Vermont Department of Employment Security, The Vermont Labor Force, II (January, 1965), 3.

[21]Vermont Development Department, Directory of Vermont Manufactured Products (1964-1965 ed.; Montpelier: Industrial Division of the Vermont Development Department, 1964), pp. 34-35.

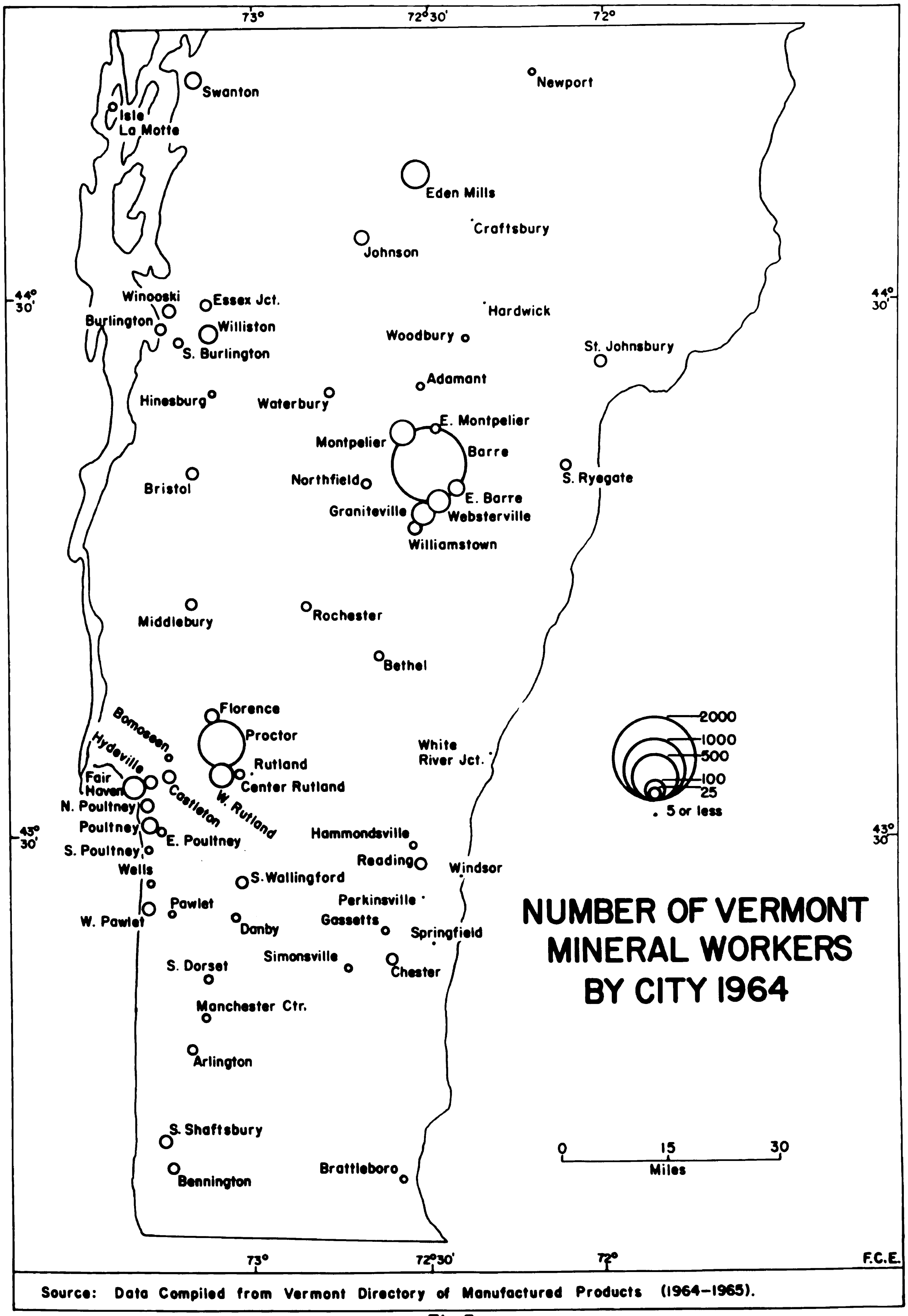

73°
72°30'
72°
Swanton
Isle La Motte
Newport
Eden Mills
Craftsbury
Johnson
44° 30'
Winooski
Essex Jct.
Burlington
Williston
S. Burlington
Hardwick
Woodbury
St. Johnsbury
Adamant
Hinesburg
Waterbury
E. Montpelier
Montpelier
Barre
S. Ryegate
Bristol
Northfield
E. Barre
Graniteville
Websterville
Williamstown
Middlebury
Rochester
Bethel
Florence
Bomoseen
Proctor
Hydeville
White River Jct.
Rutland
Fair Haven
Castleton
Center Rutland
W. Rutland
N. Poultney
Poultney
E. Poultney
S. Poultney
Hammondsville
43° 30'
Reading
Windsor
Wells
S. Wallingford
Perkinsville
Pawlet
W. Pawlet
Danby
Gassetts
Springfield
Simonsville
Chester
S. Dorset
Manchester Ctr.
Arlington
S. Shaftsbury
Bennington
Brattleboro
2000
1000
500
100
25
5 or less
NUMBER OF VERMONT MINERAL WORKERS BY CITY 1964
0
15
30
Miles
F.C.E.
Source: Data Compiled from Vermont Directory of Manufactured Products (1964-1965).

Fig. 5

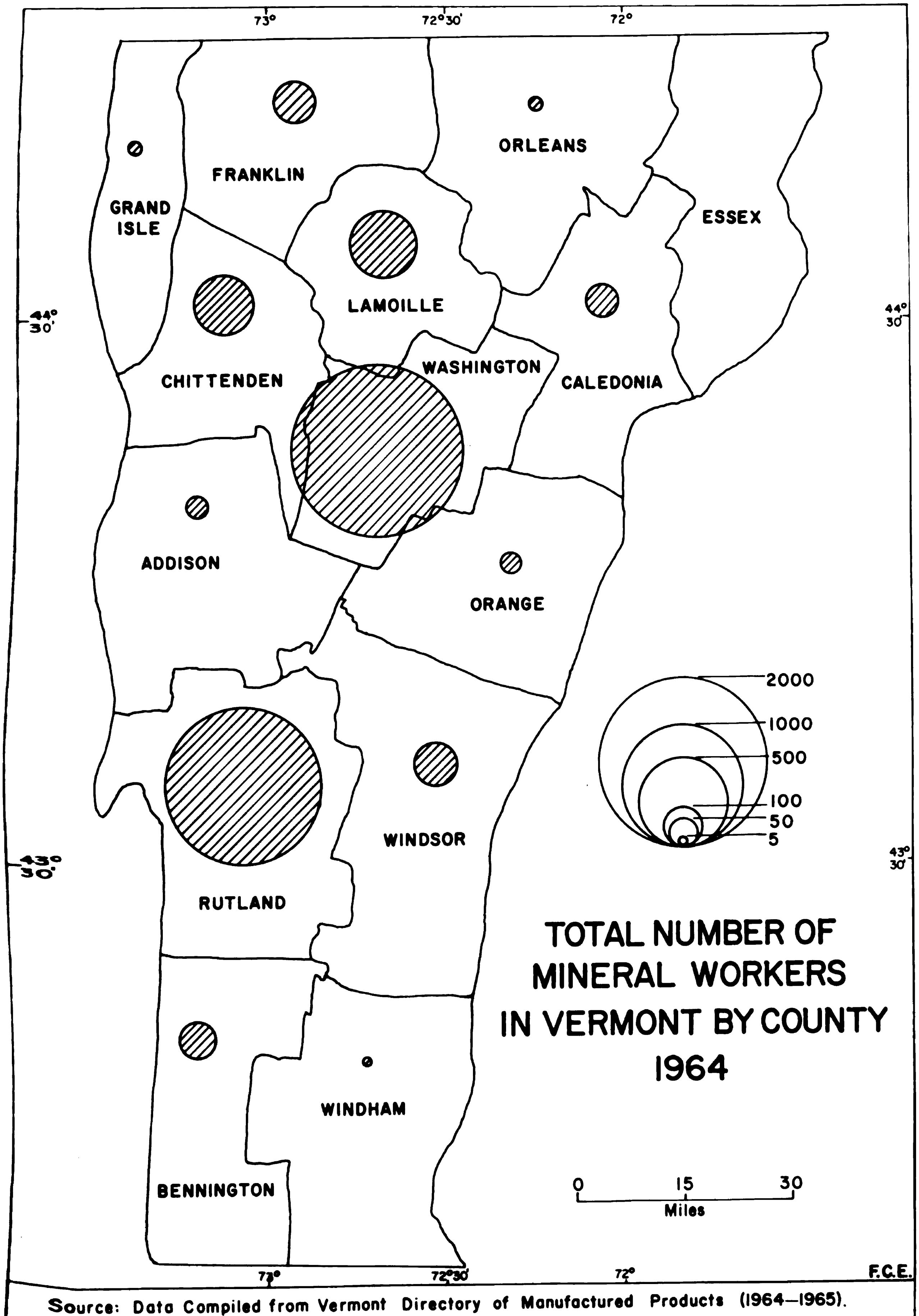
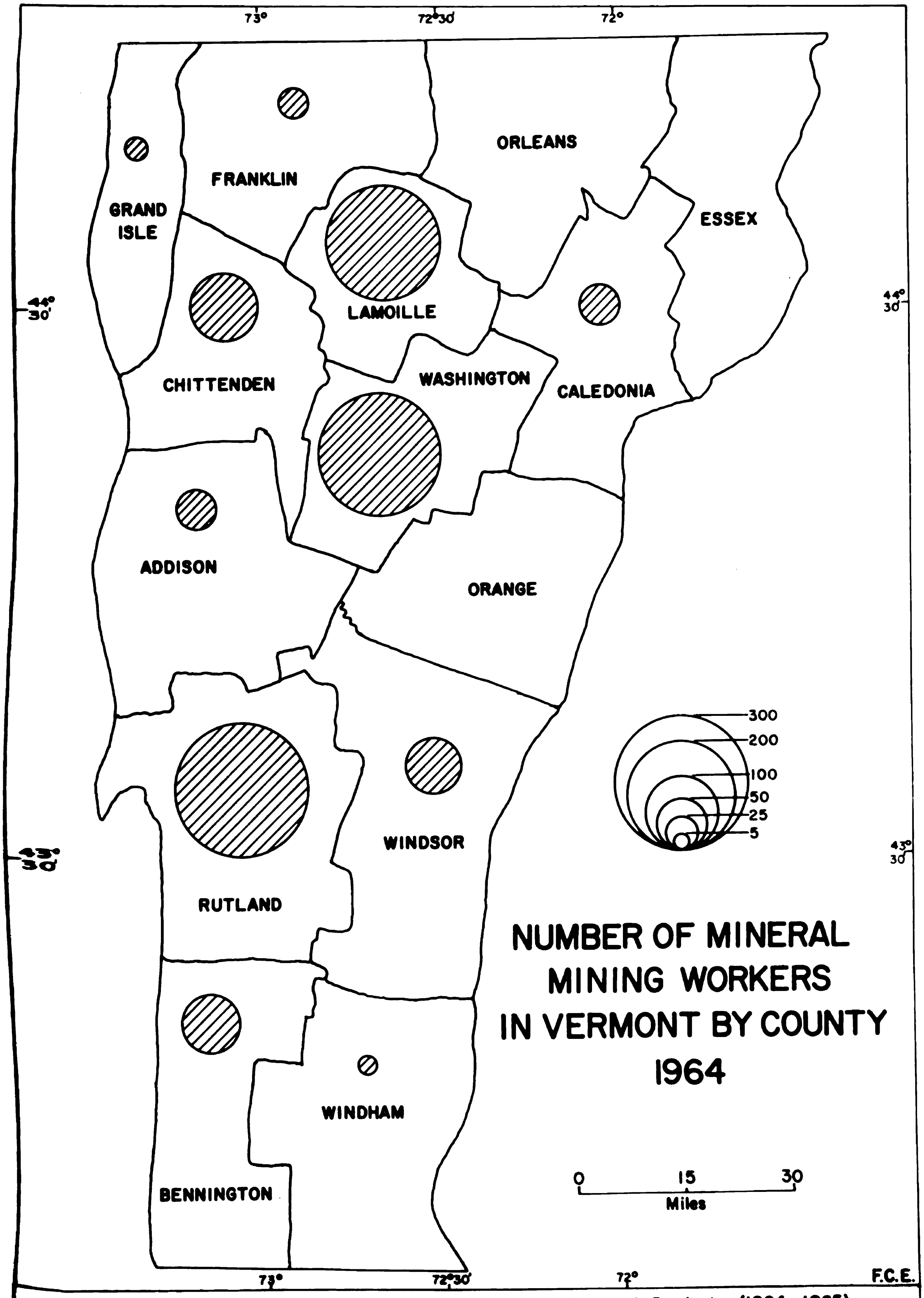

73°
72°30'
72°
44°
30'
43°
30'
GRAND
ISLE
FRANKLIN
ORLEANS
ESSEX
LAMOILLE
CHITTENDEN
WASHINGTON
CALEDONIA
ADDISON
ORANGE
RUTLAND
WINDSOR
WINDHAM
BENNINGTON
2000
1000
500
100
50
5
TOTAL NUMBER OF
MINERAL WORKERS
IN VERMONT BY COUNTY
1964
0
15
30
Miles
F.C.E.
Source: Data Compiled from Vermont Directory of Manufactured Products (1964–1965).

Fig. 6



Source: Data Compiled from Vermont Directory of Manufactured Products (1964–1965).

Fig. 7

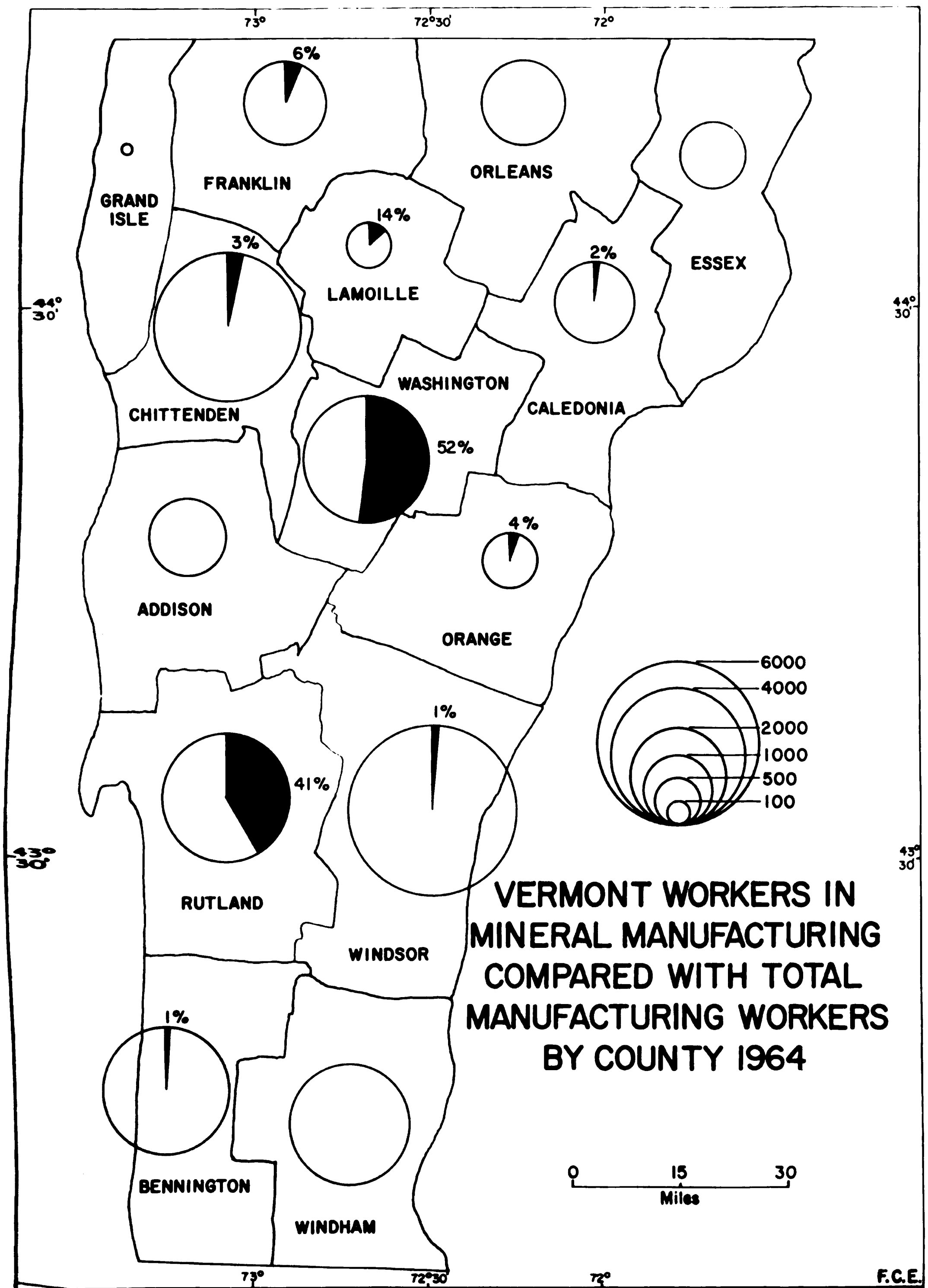
manufacturing industries with those employed in all manufacturing industries show that these same counties have a considerable dependence on mineral industries. Lamoille with 14 percent, Rutland with 41 percent, and Washington with 52 percent show the largest dependence (Fig. 8). On the other hand, counties such as Windsor and Chittenden actually have a large number of workers in mineral industries but do not depend primarily on these because of their large number of employees in other industries. Other counties whose economies are dominated by agricultural or forestry activities such as Essex and Orleans or by manufacturing such as Windham are not greatly concerned with any of Vermont's mineral industries.

Summary and Conclusions

Mineral industries have long been important to Vermont's economy. Because of depletion, competition, and changing market demands, many of those mineral industries once important to the state are no longer active, but the problems faced by these industries are frequently evident in Vermont's present mineral industries.

Although Vermont's mineral industries are not the largest contributors to the state's economy, they are an important part. In 1962 the estimated gross production value of mineral mining industries totaled approximately $25 million. Vermont leads the nation in the production of dimension granite with a per capita value of $13.13 in 1961, but Georgia (the country's second largest producer) had a per capita output of only $1.09. Even though some states annually produce larger quantities of stone than does Vermont, the income they receive from these sources is not as proportionately important.

Many areas of the state have large numbers of their workers



Source: Data Compiled from Vermont Directory of Manufactured Products (1964–1965), and County Business Patterns, First Quarter, 1962.

Fig. 8

active in mineral establishments. Approximately 4 percent of all the state's employees (excluding agricultural workers) are employed in mineral industries. These activities also help to support satellite industries such as those producing mining and processing equipment. Rutland, Washington, and Lamoille Counties are especially dependent on mineral industries, but some such as Essex, Orleans, and Windham are not concerned with mineral production to any great extent.

CHAPTER III

ESTABLISHMENT SIZE AND BUSINESS TURNOVER

Based upon number of workers employed, Vermont's mineral establishments are on the average small. These mineral establishments also have a high turnover rate. Although small size alone does not dictate business failure, management problems common to most businesses such as maintaining credit control and stock reserves, instituting capital improvements, and acquiring raw materials and markets may be accentuated among smaller producers. Unfortunately neither the internal functioning of businesses can be easily determined nor can the reasons for business turnover always be specifically identified. Business turnover may stem from poor management[1] and financial illiteracy,[2] lack of knowledge in a particular field of business, severely competitive market conditions, or from a combination of these. Whatever the reasons, the results are too often the same--financial waste and inefficient use of human resources.

Establishment Size

In workers employed, the size of Vermont's individual mineral establishments is, as a whole, below the national average. As of 1958,

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[1]See for example: William N. Kinnard and Zenon S. Malinowski, Small Plant Turnover and Failure, Management Research Summary No. 4 (Washington, D. C.: Small Business Administration, 1961), p. 1.

[2]Salomon J. Flink, Equity Financing for Small Business (New York: Simmons-Boardman Publishing Corporation, 1962), pp. 2-4.

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the average number of workers employed in all stone, clay, and glass manufacturing establishments in the United States was 37.[3] The total number of mineral establishments presently active in Vermont is 232, plus or minus 2. There are 190 mineral manufacturing establishments that on the average employ 18 workers each. Mining establishments number 42 and have an average work force of 29 each.[4]

Slate establishments average approximately 12 employees; but of a total 28 establishments controlled by 18 firms,[5] four have less than 5 workers each. Although there are 8 separate firms processing marble and marble pigment products in the Proctor-West Rutland area, 6 of these producers together employ only 25 to 30 men. The other 2 firms--the Green Mountain Marble Company and the Vermont Marble Company--employ approximately 1,300 men, and most of these (1,080) work for Vermont Marble.

The granite industry best illustrates the small size of the state's mineral establishments. About 140 establishments under the control of 125 different firms employ 1,850 workers. Together, these 140 establishments average between 13 and 14 workers each, but individually 21 average only 7 employees each, and 43 have a worker employment average of only 2. A large portion of these small units are manufacturing

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[3]U.S., Bureau of the Census, Statistical Abstract of the United States: 1963 (84th annual ed.), p. 778.

[4]Calculated on the basis of personal interviews; estimates made from data contained in Vermont Development Dept., Vermont Directory of Manufactured Products (1964-1965 ed.; Montpelier: Industrial Division of the Vermont Development Dept., 1964); and data obtained by letter from Gordon H. Ladd, Chief, Research and Statistics, Dept. of Employment Security, Montpelier, Vt., Oct. 25, 1963.

[5]One firm may have several establishments.

establishments operated as proprietorships or partnerships. These granite manufacturers do little else except finish or letter monuments; they must purchase every piece of stone from one of the three quarry operators in the region. When prices fluctuate radically, these firms suffer first and to the greatest degree. It is these firms that are responsible for a large share of business mortality in Vermont's mineral industries.

Business Turnover

New firms may open during periods of economic prosperity with only small amounts of capital; but as professor Kurt Mayer of Brown University has said, "The question is not how much money it takes to go into business but how much it takes to stay there."[6]

The high turnover rate among Vermont's small establishments reflects the ease of entry into some of these mineral industries such as granite, slate, and marble. One or two men can, with some knowledge of the work in addition to a few hundred dollars, set up a small slate mill which turns out tile and flagging or a marble shop which finishes monuments. Because production of most structural slate or marble requires access to large amounts of raw material, stockpiling of finished products, and a large capital outlay for milling equipment, there are few producers. Only four of the eight marble producers in Vermont make structural items of any kind, and two of these are confined almost exclusively to producing a material called "splitface" marble--a product used as facing on buildings. Producers make most splitface marble from pieces too defective

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[6]"Small Business as a Social Institution," Social Research, XIV (September, 1947), 338.

for use in monuments or for high-quality interior and exterior panels.[7] The lack of diversification of products makes many of these small producers especially susceptible to market fluctuations and declines in the general economy.

Although reasons for business difficulties and mortality in any one establishment are hard to determine, a major portion likely stem from poor management. Whatever the reason, Vermont's mineral industries are no exception to the problem. One study shows that from 1955 to 1957 stone, clay, and glass manufacturing and mining establishments in Vermont had a total turnover rate of 31 percent. In 1955 there were 199 establishments and in 1957, 197--a minor net change; but 30 openings and 32 discontinuances occurred for a total turnover of 62. Most of this turnover occurred among the smaller establishments (Table 4).

A comparison of granite firms listed in the 1961 and 1964 editions of the Vermont Development Department's Directory of Manufactured Products indicates the size of establishment (same as the firm in most cases) most affected by turnover. The Directory for 1961 lists 127 separate firms. From 1961 to the beginning of 1964 nine openings and 11 discontinuances occurred. These figures--a total of 20--give a turnover rate of nearly 16 percent. Of those discontinuing operation, 6 averaged 7 employees, and 5 averaged only 2 employees. No discontinuances occurred among firms with more than 9 employees. Each of the 9 firms

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[7] Field observations at Green Mountain Marble Co., W. Rutland, Vt., Sept. 23, 1963; J. P. Gawet & Sons, Center Rutland, Vt., Dec. 13, 1963; Bowker & Son, W. Rutland, Vt., Dec. 2, 1963; White Marble Shop, W. Rutland, Vt., Oct. 4, 1964; Vermont Cut Slate Co., Fair Haven, Vt., Jan. 29, 1964; Baker Slate Tile Co., Poultney, Vt., Jan. 2, 1964.

opening during this period employed, on the average, only 2 workers.[8] The large concentration of business turnover in this group indicates a considerable financial waste in this industry. To put it bluntly, a plethora of small and undiversified establishments are competing for what almost every granite producer interviewed has described as a stable market demand for monuments.[9]

TABLE 4.--Turnover in Vermont mineral mining and manufacturing establishments, 1955-1957[a]

Size of Establishment by Number of Employees	Total Turnover Number
0-4	42
5-15	14
16-25	4
26-50	0
51-75	1
76-100	1
101-200	0
201-300	0
301-500	0
501-	0
Total	62

[a]Compiled from data contained in: Vermont Development Commission, Changes in Manufacturing and Mining Establishments, 1955-1957, Economic Research Series No. 2 (Montpelier: Vermont Development Commission, 1958), pp. 16-17.

From 1961 to 1964 the slate industry experienced an even higher establishment turnover rate than did the granite industry during the same period. The slate industry in 1961 had 28 establishments under the

[8]Vermont Development Dept., Directory of Vermont Manufactured Products (1961-1963 and 1964-1965 eds.; Montpelier: Industrial Division of the Vermont Development Dept., 1961 and 1964).

[9]It should be noted that this rate may be slightly lower than the true turnover rate because some firms might have opened and shut their doors at some point of time between the two publication dates.

ntrol of 19 firms. From 1961 to 1964 this industry had 6 openings and closings for a total establishment turnover of 12; this resulted in an tablishment turnover rate of nearly 43 percent! There was a net change minus 1 in the number of firms. Three of the 6 establishments opening ring this period averaged only 2 employees, 2 averaged 7 employees, d 1 averaged 15. Two of those discontinuing operations averaged only employees, 3 averaged 7 employees, and 1 averaged 33.[10]

Summary and Conclusions

Vermont's mineral establishments are smaller than the national erage. These small establishments have relatively high turnover rates en compared with larger ones. The granite and slate industries illus-ate especially well the small size and the high turnover rate among rmont's mineral establishments.

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[10]Vermont Development Dept. (1961-1963 and 1964-1965 eds.), _. cit._

CHAPTER IV

GROWTH AND PRODUCTION FLUCTUATIONS

What has been the growth pattern of Vermont's mineral industries? Do they prosper only during periods of relative economic prosperity? What elements in the general economy influence the health of the many mineral industries in Vermont?

Growth

A study of New England and New York's natural resources, released in the middle 1950's, claims that the nonmetallic[1] mineral industries in these areas are shrinking (declining). This opinion is based upon the failure of these industries to recover after each succeeding period of overall economic decline nationally.[2] Although this statement may be valid for the New England-New York area collectively, a detailed analysis does not show this to be true of Vermont's nonmetallic mineral industries. The mineral mining industries of Vermont have not been declining but neither have they been showing any significant growth. From 1927 to 1962 the state's mineral mining industries as a whole experienced an average annual growth in sales of only .37 percent (Table 5). The stone

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[1]Includes such minerals as limestone, slate, marble, granite, clay, talc, soapstone, asbestos, and sand and gravel.

[2]New England-New York Inter-Agency Committee, The Resources of the New England-New York Region (Special Subjects Regional, Mineral Commodities, Part Two, Chapter XXXIX), Vol. III [1954], p. XXXId-13. (Mimeographed.)

TABLE 5.--Annual growth rate over previous year of all Vermont mineral mining industries, 1927-1962 (in millions of dollars)

Year	Total Production Value for All Minerals[a]	Value Adjusted to 1947-1949 Dollars[b]	Percent Growth over Previous Year (Based on Constant Dollars)
1962	25.0	18.8	+ 6.8
1961	24.3	17.6	+ 1.7
1960	22.9	17.3	- 1.7
1959	23.4	17.6	+ 6.0
1958	21.4	16.6	+ 1.8
1957	21.9	16.3	-12.4
1956	23.1	18.6	- 3.1
1955	23.9	19.2	+13.0
1954	20.5	17.0	- 1.2
1953	20.3	17.2	+16.2
1952	17.9	14.8	- 9.2
1951	18.5	16.3	- 6.3
1950	18.6	17.4	+ 4.8
1949	17.4	16.6	+ 5.7
1948	16.0	15.7	0.0
1947	14.7	15.7	+ 9.0
1946	12.1	14.4	+38.5
1945	8.2	10.4	+ 3.0
1944	7.7	10.1	+17.4
1943	6.4	8.6	-14.0
1942	7.3	10.0	-12.3
1941	8.1	11.4	+14.0
1940	7.0	10.0	0.0
1939	7.0	10.0	+11.1
1938	6.4	9.0	- 5.3
1937	7.0	9.5	+10.5
1936	6.2	8.6	+21.1
1935	5.1	7.1	+ 4.4
1934	4.9	6.8	-22.7
1933	5.8	8.8	-12.9
1932	6.4	10.1	-18.5
1931	8.4	12.4	-22.5
1930	11.6	16.0	-29.9
1929	14.6	20.1	+ 1.5
1928	14.6	19.8	- 3.9
1927	14.7	20.6	+ 2.4
		Average Annual Growth Rate	.37

[a]Compiled from: U.S., Dept. of the Interior, Mineral Resources of the United States: 1927-1931, Part II: Non-Metals; and U.S., Bureau of Mines, Minerals Yearbook: 1932-1951, Vol. I and 1952-1962, Vol. III.

[b]Calculated from wholesale price indexes for nonmetallic minerals, structural, contained in: U.S., Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1957 (1960), p. 117; and data obtained by letter from Maxwell R. Conklin, Chief of Industry Division, Bureau of the Census, Washington, D. C., Feb. 20, 1964.

industries, including establishments quarrying dimension stone, crushed and broken stone, and some establishments with their dominant activity being the dressing of stone (normally included in manufactures)[3] have, however, during the years 1927 to 1962 experienced more growth--1.06 percent (Table 6).

Perhaps the most obvious feature concerning the growth pattern shown in Table 5 is its irregularity. The decline in production value of almost 30 percent from 1929 to 1930 is certainly impressive but perhaps expected as is the advance of over 38 percent from 1945 to 1946. These variations are explained with relative ease as the beginning of the Great Depression and the end of World War II. But harder to explain are the many variations of growth and decline alternating annually. Actually, short term periods of growth and decline are not vitally important. Of more importance are the answers to these questions: (1) Why has the overall growth not been greater? (2) What influences help create the more prolonged periods of growth and decline? The answer to the first question must wait until later chapters because within the answer lies the central focus of this thesis. The answer to the second question illustrates one of the many difficult problems facing most of Vermont's mineral industries.

Production Fluctuations

Few, if any, industries are independent of others. Some industries are affected by fluctuations occurring in one closely related

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[3]A large portion of Vermont's mineral manufacturing establishments are included within the cut stone and stone products industry.

TABLE 6.--Annual growth rate over previous year of Vermont stone industries, 1927-1962 (in thousands of dollars)

Year	Total Production Value of Stone[a]	Value Adjusted to 1947-1949 Dollars[b]	Percent Growth over Previous Year (Based on Constant Dollars)
1962	19,815	14,987	+ 5.9
1961	18,715	14,156	+ 7.9
1960	17,444	13,120	+ .5
1959	17,372	13,061	+11.3
1958	15,789	11,730	+38.4
1957	11,404	8,473	- 5.9
1956	11,622	8,969	- .7
1955	11,061	8,906	+31.8
1954	8,178	6,756	- 9.4
1953	8,860	7,496	+30.7
1952	6,017	5,736	-10.0
1951	7,254	6,372	-47.2
1950	12,910	12,076	+ 3.2
1949	12,201	11,704	- .7
1948	11,990	11,781	- 4.1
1947	11,539	12,288	+ 7.4
1946	9,630	11,437	+40.1
1945	6,456	8,162	+ 3.7
1944	5,976	7,872	+17.0
1943	5,064	6,728	- 7.6
1942	5,491	7,275	-14.0
1941	6,112	8,572	+14.1
1940	5,237	7,514	- 2.6
1939	5,360	7,713	+11.0
1938	4,879	6,862	-10.8
1937	5,648	7,695	+10.1
1936	4,903	6,893	+21.8
1935	4,019	5,613	+ 3.0
1934	3,902	5,449	-27.1
1933	5,002	7,475	-16.3
1932	5,664	8,933	-20.1
1931	7,560	11,183	-22.5
1930	10,446	14,428	-20.3
1929	13,141	18,100	- .5
1928	13,421	18,184	- 2.7
1927	13,325	18,662	+ 2.9
		Average Annual Growth Rate	1.06

[a]Compiled from: U.S., Dept. of the Interior, Mineral Resources of the United States: 1927-1931, Part II: Non-Metals; and U.S., Bureau of Mines, Minerals Yearbook: 1932-1951, Vol. I and 1952-1962, Vol. III.

[b]Calculated from wholesale price indexes for nonmetallic minerals, structural, contained in: U.S., Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1957 (1960), p. 117; and data obtained by letter from Maxwell R. Conklin, Chief of Industry Division, Bureau of the Census, Washington, D. C., Feb. 20, 1964.

industry--related as producers and suppliers. Both the stone mining (primarily dimension stone)[4] and processing (primarily cut stone and stone products) industries illustrate especially well the problem of one industry's dependence upon another. A large part of the stone sold by the quarriers is purchased by cut-stone producers.

The building industry purchases a large part of the material cut-stone producers sell. As a result, this industry's immediate condition tends to influence the stone quarrying and processing industries' economy. The stone industries during the years 1927 to 1962 experienced much more pronounced cycles of growth and decline than did the mineral industries of the state collectively, because, together, the state's mineral industries have a wider market base. The stone producers' dependence on the building construction industry is illustrated in Fig. 9. In 1926 slightly over $18 million of stone was sold or used by Vermont producers; over $18 billion was spent in building construction. Then, a steady decline occurred in construction until 1933 when builders spent only a little over $3 billion for construction. Stone sold or used in Vermont also showed, until 1934, a constant decline; during that year slightly less than $5,500,000 was sold or used. The late 1930's saw a slight recovery in the building industry with a somewhat concomitant rise in stone sales; but during World War II, building activities were so restricted that the marble industry converted to processing metals, wood, and mica. Eighty percent of the Vermont Marble Company's sales

[4]Dimension stone is a classification used to denote materials cut or otherwise worked to fairly accurate measurements (rather than crushed or cast).

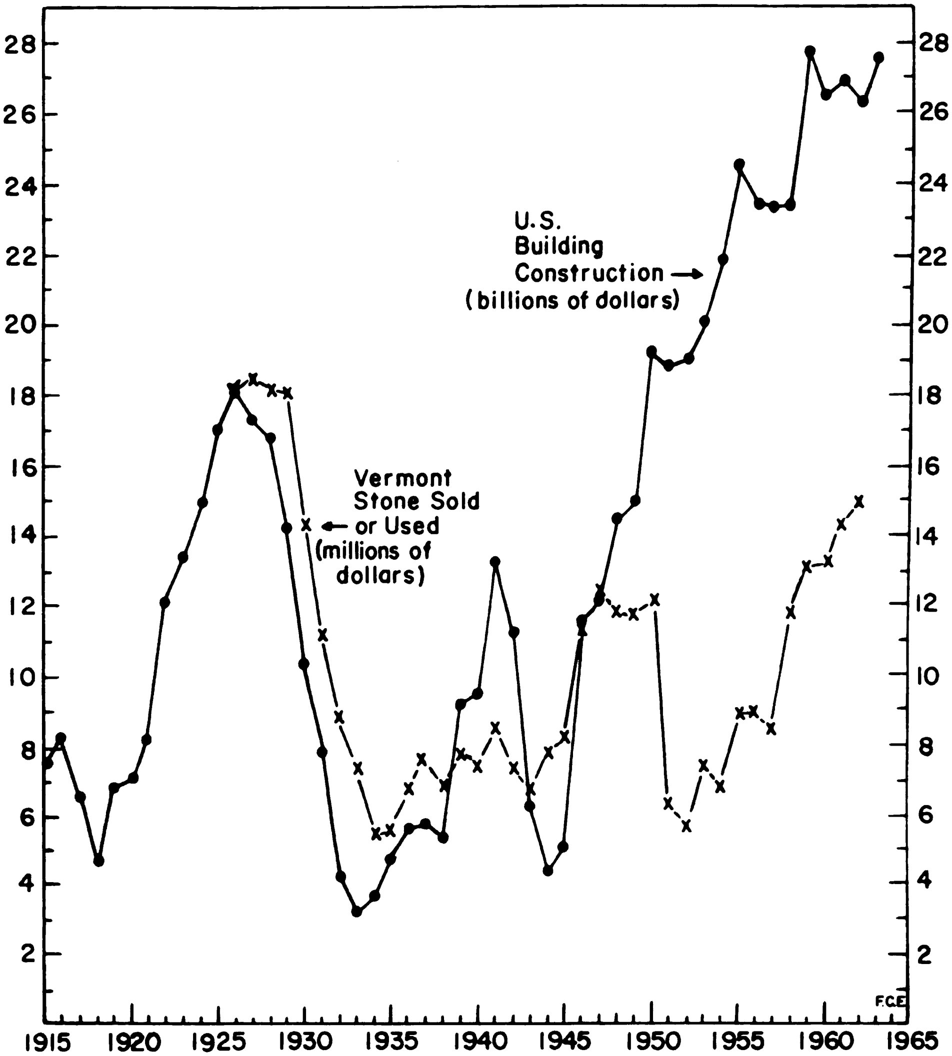

Fig. 9.--Total value of United States residential and nonresidential buildings constructed compared to total value of stone sold or used by Vermont producers, 1915-1963, in 1947-1949 prices. (Construction figures calculated from data contained in U.S., Dept. of Commerce, Construction Volume and Costs: A Statistical Supplement to Construction Review, 1915-1956, pp. 40-42 and Construction Review, Sept., 1962, pp. 12-14 and June, 1964, pp. 13-15; and from data obtained by letter from L. N. Blugerman, Director, Building Materials, Construction Division, U.S. Dept. of Commerce, Aug. 13, 1964. Data for stone obtained from U.S., Dept. of the Interior, Mineral Resources of the United States: 1926-1931, Part II: Nonmetals; U.S., Bureau of Mines, Minerals Yearbook: 1932-1951, Vol. I and 1952-1962, Vol. III. Adjustment data obtained by letter from Maxwell R. Conklin, Chief of Industry Division, Bureau of the Census, Feb. 20, 1964; and from wholesale indexes for nonmetallic minerals, structural, contained in U.S., Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1957, p. 117.)

were in these products.[5] What occurred during the post-war period will be discussed shortly.

Nondisclosure rules deter a precise analysis of the relationships between the building and stone industries, but the slate industry which had until 1961 an adequate statistical coverage for the annual value of stone sold can be used for purposes of comparison. Even here data for total volume (tonnage) are not available. In spite of this limitation, because it has long produced for the structural stone market, the slate industry, considered nationally, effectively illustrates the dependence of a Vermont stone industry on the building industry (Fig. 10).

Building restrictions during World War II reduced drastically the demand for slate shingles and granules, and for millstock,[6] a material used primarily in nonresidential buildings. Recovery followed when construction resumed after the war's end. From 1948 to 1955 slate millstock showed a steady sales volume increase. A slight drop in sales occurred from 1955 to 1956, but advanced again in 1957. From 1950 to 1957 a sharp decline in sales of roofing shingles occurred. Although Bureau of Mines' data are not available for verification, there has been, during the past two years, according to every producer of millstock and roofing shingles interviewed, an increase in demand for both of these

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[5]Elbridge C. Jacobs, Report of the State Geologist on the Geology and Mineral Industries of Vermont, 1945-1946 (Burlington, Vermont: Free Press Printing Co., 1947), p. 94.

[6]Millstock includes manufactured slate items such as blackboards, walls, steps, sills, and wainscoting. For detailed descriptions of various classifications of stone commodities see: L. W. Currier, Geologic Appraisal of Dimension-Stone Deposits, U.S. Geological Survey Bulletin 1109 (Washington: U.S. Government Printing Office, 1960).

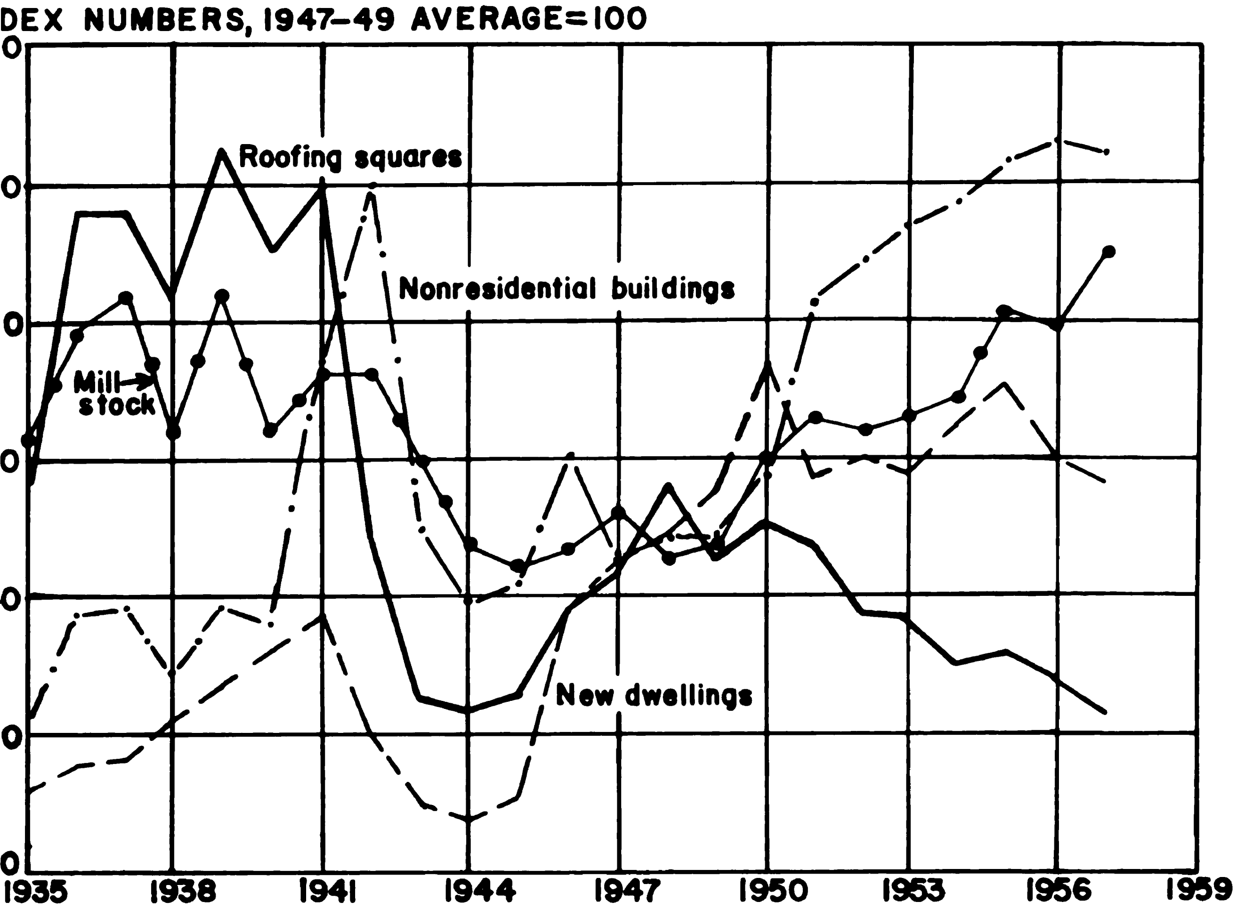

Fig. 10.--United States sales of roofing slate and millstock ompared to number of new dwelling units, and value of certain new non-esidential construction, adjusted to 1947-1949 prices, 1935-1957. Redrawn from: D. O. Kennedy and Nan C. Jensen, <u>Minerals Yearbook: 957</u>, Vol. I: <u>Slate</u>, p. 4.)

slate products, especially roofing shingles.[7]

If the trends in building construction and the sales of all stone and sales of roofing slate are observed carefully as illustrated in Figs. 9 and 10, a rather odd pattern is noted. In spite of an expanding building industry during the years 1947 to 1957 the total sales value of slate and other stone decreased. Why should this divergence of the ratio occur? The inverse relationship stems primarily from two factors--namely, competition from substitute materials and the type of buildings constructed. Along with the building boom of the post-war years, many new structural materials came on the market that could easily substitute for stone. New kinds of roofing replaced slate shingles, and concrete substituted for other types of dimension stone. Glass, metal, and synthetic materials went to build structures that would have formerly been made of stone. The result was a declining market for stone products. The second reason for the divergence is that, initially, the major portion of new construction was concentrated in residential building (Fig. 11); and a major portion of dimension stone sold is used in nonresidential building. The small amount of nonresidential building, along with the decline in demand for roofing shingles in residential building, accounted for a major portion of this inverse relationship--an advancing volume of total building construction but a declining volume of stone sold.

Although the Inter-Agency Report contends that the stone industry

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[7]Interviews with Frank Graziano, Co-owner, Fair Haven Slate Co., Hydeville, Vt., April 17, 1964; William Mahar, Gen. Supt., Vermont Structural Slate Co., Fair Haven, Vt., March 28, 1964; A. B. Potter, Owner, AB Potter Slate Co., Poultney, Vt., Jan. 22, 1964; William Prehoda, Co-owner, Prehoda Brothers Slate Corp., Granville, N. Y., Jan. 16, 1964.

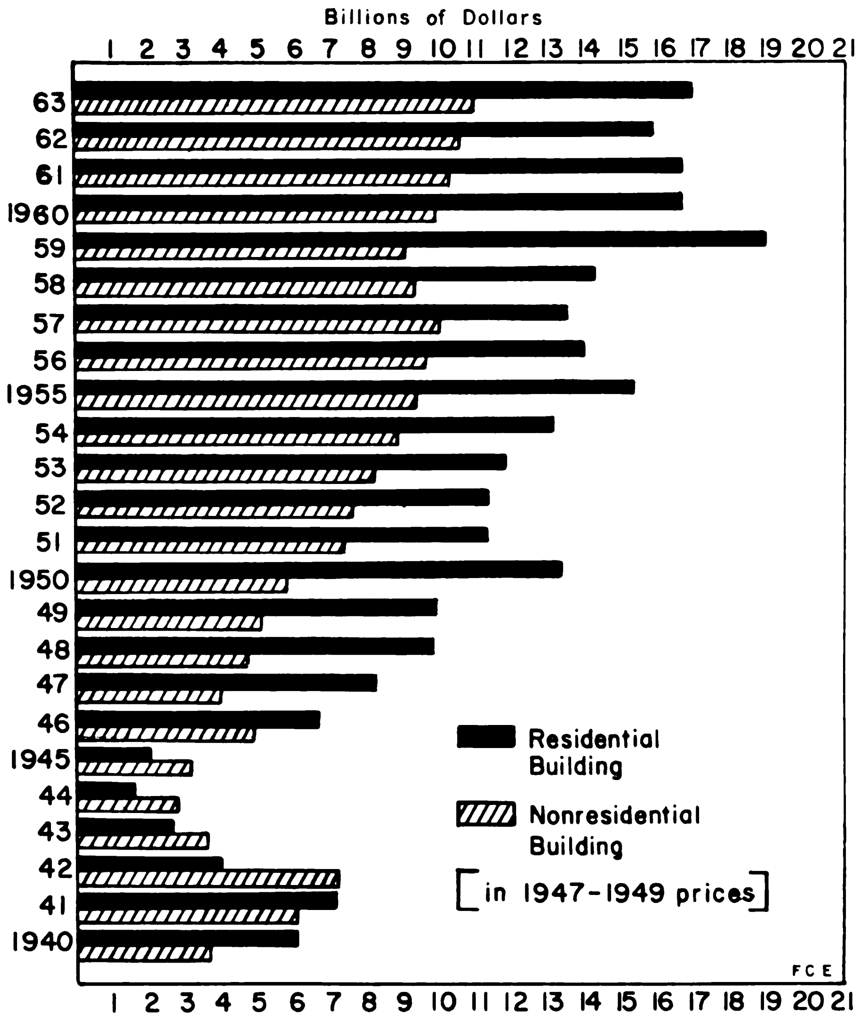

Fig. 11.--United States total value of residential and nonresidential building construction compared for years 1940-1963, in billions of dollars. (Calculated from data contained in U.S., Dept. of Commerce, Construction Volume and Costs: A Statistical Supplement to Construction Review, 1915-1956, pp. 40-42 and Construction Review, Sept., 1962, pp. 12-14 and June, 1964, pp. 13-15; and from data obtained by letter from L. N. Blugerman, Director, Building Materials, Construction Division, U.S. Dept. of Commerce, Aug. 13, 1964.)

of New England is "shrinking," present indications are that Vermont's stone industry is holding its own, and since 1957 has, in fact, been steadily increasing its value of sales. Much of this increase is due to added residential building construction; its total value has advanced from $13.5 billion in 1957 to nearly $16.7 billion in 1963. If there is a continued increase in the value of nonresidential buildings constructed, the demand for certain stone products, such as shingles, should, in the future, be maintained if not increased. Architects are returning to the use of stone in nonresidential building, and recently developed production techniques in the slate and marble industries should help increase their sales of millstock to this market and perhaps even help them penetrate residential building markets. New cutting techniques enable producers to cut marble into thinner sections for use as interior and exterior veneer. These thinner pieces allow more surface coverage with the same volume of marble; consequently, the actual volume of stone needed is less and transportation costs are reduced. Slate producers have developed prepackaged units of thinly cut floor tile that are handy for the tile setter. Materials formerly discarded as useless are now used in these small floor tile.

Such developments and trends are very important. In fact, if Vermont's stone and other mineral industries are to maintain their position in very competitive markets, they must continue to explore new uses for their products and to develop modifications of old products. This challenge is so important that the entire subject of opportunities open to the mineral industries of Vermont is considered under a separate chapter.

Summary and Conclusions

Vermont's stone industries have been subject to pronounced variations in growth and decline in annual sales because of their dependence upon the building industry. The slate industry illustrates this dependence especially well.

What will the future growth rate be like in the state's mineral industries? Are they to continue prospering and declining in cyclic fluctuations along with the general economy or particular industries such as occurs in the stone industries in conjunction with the building industry? It is difficult to predict future conditions; and yet considering past experience and the continuing dependence of many of these industries on one or two markets, the answer is yes. But through increased efforts at product diversification, the development of new uses for products, and penetration into established markets, Vermont's mineral industries can ease the cycles of prosperity and depression that they have so long experienced. With added efforts in these directions and with careful consideration of topics discussed in later chapters, they can surpass their present growth rate.

CHAPTER V

PRODUCTION EFFICIENCY

Efforts to minimize costs and to maximize profits are the primary tasks of businessmen in all industries. The primary tasks of Vermont's mineral producers should be no exception to this rule. A failure of the state's mineral producers to recognize and practice this principle could lead to a decreasing importance of mineral industries to Vermont's economy. Of course, most of Vermont's mineral producers recognize this principle in its broadest form, but many may not know how to most effectively implement it. The high rates of business turnover among Vermont's mineral establishments as discussed in Chapter III may reflect this lack of knowledge.

The task of minimizing costs and maximizing profits requires that Vermont's mineral producers be familiar with and recognize the importance of implementing good techniques of personnel management, collective bargaining, record keeping, and cost control. A knowledge of how to most effectively utilize available transport systems, capital, technology, and research for growth and expansion is also important. Although expertness in every area of business management may be out of reach of many of Vermont's small mineral producers, a familiarization in each of these parts of business management is imperative for the most efficient utilization of Vermont's mineral and human resources.

Value Added

Optimum utilization of human and capital resources through intelligent organization and application of technology to industrial activity is in effect production efficiency. Measuring production efficiency, however, is a difficult and involved area of research.[1]

One approach that can give a rough indication of the production efficiency of the state's mineral industries is to make comparisons of value added per man-hour of labor in Vermont and for competing industries in other states. Value added is defined as what is left to the producer after "the cost of supplies, minerals received for preparation, purchased fuels and electric energy, contract work, and purchased machinery" are subtracted "from the value of shipments and receipts plus capital expenditures."[2] Caution must be exercised in using this statistical measure for purposes of comparing efficiency because it was not really designed for this purpose, but was intended for use in measuring the location and intensity of industrial activity. Although value added does not actually measure production efficiency, it does indicate "how efficiently depreciation on capital invested in assets, management, and overhead costs are utilized in conjunction with the labor input to

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[1] See for example: Margaret Hall and Christopher B. Winsten, "The Ambiguous Notion of Efficiency," The Economic Journal, LXIX (March, 1959), pp. 71-86 where the many variables within management and technical efficiency are discussed; and T. R. Saving, "Estimation of Optimum Size of Plant by the Survivor Technique," Quarterly Journal of Economics, LXXV (November, 1961), pp. 596-607 where efficiency is discussed in terms of ability in predicting future demand, introducing new products, and weathering recessions.

[2] U.S., Bureau of the Census, U.S. Census of the Mineral Industries: 1958, Vermont area report (1961), pp. VII-VIII.

produce the value added to the product by the manufacturing process."[3]

An analysis of data for specific mineral industries sheds some light upon how Vermont's value-added figures compare with those of other states (Table 7).[4] The sand and gravel industry in Vermont has a lower value-added figure than do those in Pennsylvania, Minnesota, and Georgia. Vermont's crushed and broken limestone industry compared with the same industry in other states also shows up unfavorably. Dimension stone stands out as a relatively low value-added industry in all of the states compared. Dimension stone (excluding granite) in Vermont has an average value added per man-hour of $2.86 compared with $2.88 for Georgia, $2.96 for Pennsylvania, $3.47 for New York, and $3.64 for Minnesota. Only North Carolina has a lower ratio than does Vermont. What could account for the relatively low value-added position of Vermont's dimension stone industries? Production of these commodities is accomplished through methods of quarrying and processing that demand a large amount of highly skilled and highly paid labor input. Since this labor input contributes to the value-added figure, and in spite of this the value-added figure remains low, it is likely that the "other elements" associated with production efficiency are inadequately handled: credit and financial

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[3]Sally B. Maybury and David A. LeSourd, "Labor," Small Business Operations in Selected Areas in Vermont, Vermont Development Dept. (Montpelier: Vermont Development Dept., 1961), pp. 54-55. The problems associated with equating value added with production efficiency were also discussed during an interview with Mr. Roger Brown, Instructor in Economics, Green Mountain College, Poultney, Vt., Nov. 26, 1964.

[4]Nondisclosure rules and the practice of the U.S. Bureau of Mines of grouping different industries into broad classifications make extremely difficult an investigation into specific mineral types.

TABLE 7.--Value added per man-hour in mineral industries of Vermont and those in other states for 1958[a]

State	Total Value Added ($1,000)	Total Man-Hours (1,000)	Value Added Per Man-Hour (dollars)
VERMONT			
Dimension Stone (except granite)	9,754	3,414	2.86
Mining only	868	322	2.70
Included in Manufactures	8,886	3,092	2.87
Granite[b]	4,908	1,033	4.75
Talc[c]	126	26	4.85
Crushed and Broken Limestone	308	127	2.43
Sand and Gravel	670	138	4.86
PENNSYLVANIA			
Dimension Stone	4,237	1,430	2.96
Mining only	1,088	318	3.42
Included in Manufactures	3,149	1,112	2.84
Crushed and Broken Limestone	36,114	5,895	6.13
Sand and Gravel	13,590	2,438	5.57
MINNESOTA			
Dimension Stone (except granite)	6,708	1,841	3.64
Mining only	402	130	3.09
Included in Manufactures	6,306	1,711	3.69
Granite	5,606	1,534	3.65
Crushed and Broken Limestone	4,053	958	4.23
Sand and Gravel	15,784	2,457	6.42
GEORGIA			
Dimension Stone (except granite)	4,751	1,855	2.88
Mining only	1,147	429	2.68
Included in Manufactures	3,604	1,426	2.60
Granite	2,868	998	2.87
Talc	310	166	1.87
Sand and Gravel	3,776	436	8.92
NEW YORK			
Dimension Stone[d]	822	237	3.47
NORTH CAROLINA			
Dimension Stone (except granite)	2,182	800	2.73
Crushed and Broken Limestone	2,212	340	6.51
Talc	1,778	391	4.55
Sand and Gravel	4,324	909	4.76

[a]Calculated from data contained in: U.S., Bureau of the Census, U.S. Census of Mineral Industries: 1958, Area reports for the various states (1961). Note that some establishments where manufactural activity is dominant are included in manufactures.

[b]Data calculated for approximate values by elimination of all other materials listed under the heading "All Mineral Producers." Vermont, Unemployment Compensation Commission, Estimated Hours and Earnings in Manufacturing, 1960 (Montpelier: Vermont Unemployment Compensation Commission, [n.d.]).

[c]Data available for Windsor County, Vermont, only.

[d]Washington County, New York, only (slate district).

arrangements, accounting procedures, and, in some instances, a poorly developed level and use of production technology. Field observations of dimension stone establishments and interviews with producers tend to support this statement.

Unless many of Vermont's mineral producers take remedial action toward increasing their efficiency through better management and greater use of labor-saving techniques and mechanization, they will not remain competitive.

Unfortunately many producers interviewed appear to have little concept of the principles involved and the methods used to determine their actual value-added figures, nor do they realize the advantages of modern cost accounting. Only 25 of 42 mineral producers answering a general questionnaire designed for this study said that they utilize this approach to ascertain costs.[5] The following paragraph illustrates the producers' relative lack of awareness of value added and cost accounting.

For example, when the general superintendent of one of Vermont's larger slate firms was asked to give an approximate value-added figure for their slate shingle production, he calculated entirely by "estimations." He estimated the average value added for each square at $3.59.[6] Estimations were necessary because they have never made a cost analysis for producing a square of roofing shingles. In fact, the firm does not

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[5]The general questionnaire was sent to each of the state's approximately 175 mineral firms. (See the appendix for the questionnaire's complete text.)

[6]A square of roofing slate is 100 square feet of shingles with a three inch overlap.

maintain a file on costs incurred in any of its operations. The superintendent indicated that they once attempted to utilize cost accounting through their regular accounting agents, but the problems encountered in assigning costs to a particular process or operation proved so difficult that the effort was abandoned. Although the company maintains no formal system of cost accounting, he claimed that they have some idea of those production processes that are least efficient. Their greatest problem, he maintained, centers on the operation of the company's quarries.[7] Several interviews and field observations over a period of two years show no efforts by the management of this firm to determine specifically their least efficient production activities. Neither have they developed methods for increasing production efficiency.

Summary and Conclusions

Although the relative production efficiency for Vermont's mineral industries is difficult to determine, the use of value added per man-hour of labor for specific industries gives a rough indication of it. That value added really measures efficiency only in terms of how effectively capital, raw materials, machinery, and overhead costs are handled along with the labor input must, however, be kept in mind. Thus considered, only a few of the state's mineral industries such as granite compare favorably with competing regions.

Most of Vermont's mineral producers would likely agree that efforts to minimize costs and to maximize profits are their basic concern; but too many of these businessmen neither understand nor use

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[7]Name withheld to protect interviewee.

techniques such as cost accounting that can, if properly utilized, help increase profits and growth by detecting business operations least efficient.

The following chapters are devoted to (1) exploring the adequacy and intensity of effort in minimizing costs and maximizing profits by Vermont's mineral producers and (2) exploring some of the major problems hindering these producers in reaching optimum production efficiency.

CHAPTER VI

LOCATION, MARKET ACCESSIBILITY AND ASSOCIATED TRANSPORT PROBLEMS

Most industries are vitally concerned with transportation costs and market accessibility. Both mineral extracting and manufacturing industries are concerned, but especially the latter. Minerals of suitable quality are usually limited in their distribution over the earth's surface. Many of these materials are heavy and bulky and also of low value in proportion to weight. High weight and low value many times necessitate that mineral manufacturing industries become "rooted" to their raw material supply. If large amounts of bulk are lost in processing, it is usually cheaper to remain near the needed raw material. Proximity to markets is important too. As distance from markets increases, accessibility decreases, because shipment costs may become so great that the relatively high-weight low-value item becomes uneconomic. Accessibility or inaccessibility based upon distance to large urban markets--such as "megalopolis" of the Northeastern United States--can be crucial to an industry's success or failure. International borders and their associated tariffs may also create difficulties for an industry by placing added financial burdens on the marketing of commodities in areas that, if the political borders were not present, could be reached as a natural hinterland.

Producers in Vermont's mineral industries have long been and are still vitally aware of the problems associated with transportation. The development of transport systems in Vermont has been similar to that in other areas of the United States. Toll roads, canals, and railroads penetrated the state. Some of the systems prospered; some speculative ventures failed. The problems and network pattern of these past transport systems, as well as those of the present, reflect somewhat the state's location and terrain. Today, the state is faced with the problems of failing railroads and an antiquated highway system. Future availability of transport facilities and the reduction of transportation costs could prove the keys to the continuance and added development of Vermont's mineral industries.

Market Accessibility

Market accessibility for Vermont's mineral producers involves several important problems--namely, location, an increasing distance from the United States' center of population, and an adjacent international border. None of these problems are crucial to a continuance of the state's mineral industries; but if these problems are not crucial to the continuance of Vermont's mineral industries, neither are they, to any degree, amenable to change. Each increases costs of marketing mineral commodities--thus reducing the maximum contribution of these industries to the state's economy.

Location

Vermont's location in the United States has an important impact on the ability of the state's mineral producers to reach large population and market areas. The state's proximity to large urban areas of the Northeastern United States is an advantage, but its distance from growing Western markets is a disadvantage. Distance can be compensated for only through cheap but speedy methods of transport; and though it is true that transport systems have become somewhat faster and, in a sense, more efficient, the transport requirements of Vermont's mineral industries have not changed appreciably.

Although Vermont's physical position is fixed, market accessibility is not. The United States' center of population is slowly but steadily shifting to the westward. In 1900 the center of population was in southeastern Indiana; in 1960, south-central Illinois. In 1930 roughly 33 percent of the total United States' population was within a 500-mile radius of Vermont. By 1960 the total population within this radius was barely 30 percent. The absolute number of accessible population within this radius has not declined, but the relative accessibility to total population has diminished. The westward shift of population will not have had the same effect on competing areas of mineral production nearer to the center of population. For example, the slate region of eastern Pennsylvania is 150 miles nearer to this center than is Vermont's slate region. Its businessmen can reach with less expense a larger number of the total United States' population than can their counterparts in Vermont.

The westward shift of population should not, however, receive too much emphasis. More important is the state's proximity to very large urban areas. If Vermont's slate region is considered in this context, it is again at a disadvantage when compared with the slate region of eastern Pennsylvania. A circle scribed with a 100-mile radius around each of these two competing areas brings out clearly this disadvantage. For Vermont's slate producers, metropolitan areas--such as New York, Philadelphia, and Trenton--are more expensive to reach than they are for producers in Pennsylvania (Fig. 12). Georgia's marble and granite districts, on the other hand, are farther from the large urban areas of the Northeast than are Vermont's regions. The marbles of Missouri and Tennessee and the granites of Minnesota and Wisconsin also have a locational disadvantage for accessibility to very large urban markets of the Northeastern United States.

Proximity to Canada

The United States imports from various countries considerable quantities of minerals like those produced in Vermont. Vermont's granite and marble producers are themselves significant importers. Canada is one of the leading suppliers of granite and several other mineral commodities. Granite enters Vermont primarily from Canada, but it is also imported from Finland, Norway, Sweden, France, Belgium, Italy, and Brazil. Marble imports come from Italy, Greece, Morocco, Spain, and France, but only small amounts come from Canada. Small amounts of slate are imported from Italy, Portugal, France, West Germany, Norway, and Japan; very small amounts come from Canada. Talc enters from India, Japan, Taiwan, France, Italy, the Netherlands, the United Kingdom, and a small quantity enters from Canada. Most United States' imports of limestone enter from Canada; and Canada, along with the Republic of South Africa, accounts for a major portion of the asbestos imported into the United States.[1] The United States also exports many of these commodities

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[1]U.S., Bureau of the Census, United States Imports of Merchandise for Consumption: 1962, Foreign Trade Report No. FT 110.

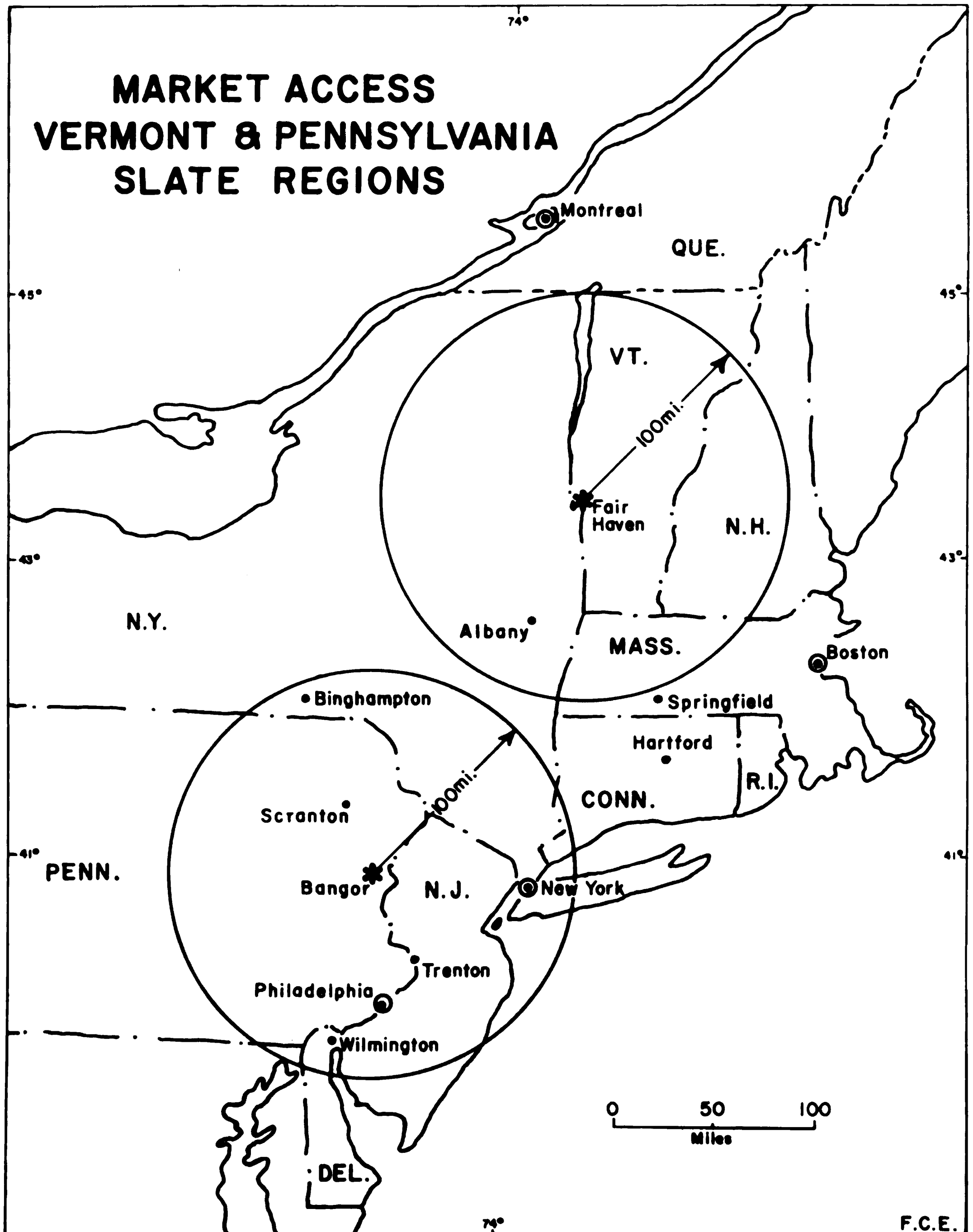
MARKET ACCESS
VERMONT & PENNSYLVANIA
SLATE REGIONS
74°
45°
43°
41°
Montreal
QUE.
VT.
100mi.
Fair Haven
N.H.
Albany
MASS.
Boston
N.Y.
Binghampton
Springfield
Hartford
R.I.
CONN.
Scranton
PENN.
Bangor
N.J.
New York
Trenton
Philadelphia
Wilmington
DEL.
0
50
100
Miles
F.C.E.

Fig. 12

to Canada. The large exchange of mineral commodities between Canada and the United States would probably be even greater if the high tariffs were lowered or removed.

And the boundary works in reverse: the northern and northwestern hinterland of Vermont's mineral producers is severely restricted. Only 50 to 100 miles to the north the barrier of tariffs adds to the costs of getting marble, granite, slate, and talc to metropolitan areas such as Ottawa and Montreal. Besides increasing marketing costs these tariffs influence the types of goods moving across the border. Duties maintained by both the United States and Canada are considerably higher on finished stone products or other fully processed mineral items than they are on unfinished or semi-finished materials. Therefore, most of the commodities moving across the border are unfinished or semi-finished.

Although both countries have high duties, Canada's are higher. Canada's import duties on finished slate, granite, and marble average almost 16 percent higher than the rates on the same commodities entering the United States. This, along with lower Canadian labor costs, places the Vermont mineral producers at a relative disadvantage when they attempt to compete for Canadian markets (Table 8).

But the Canadian relation is not all to the detriment of Vermont producers. The Vermont Marble Company takes advantage of Canada's cheaper labor and a free entry for rough marble into that country. They ship a large volume of rough stone to cities such as Peterborough and Toronto, Ontario, where it is processed into finished products and then sold on Canadian markets. This practice avoids a duty of 25 percent ad valorem.

The reverse arrangement is characteristic of granite shipments,

TABLE 8.--Import duties on selected mineral commodities entering Canada and the United States[a]

Commodity	Entering Tariff Rates: United States	Entering Tariff Rates: Canada
Marble		
Rough--not hammered or chiseled	5.5% ad val.	free
Sawed--not polished	5.5% ad val.	5% ad val.
Finished	7.0% ad val.	25% ad val.[b]
Limestone		
Crude	20¢ per short ton	free
Slate		
Roofing	25% ad val.	70¢ per sq.[c]
Blackboards	25% ad val.	10% ad val.
Mantels or other manufactures	10.5% ad val.	27½% ad val.
Granite		
Rough--not hammered or chiseled	1¢ per cu. ft.	12½% ad val.
Sawed	12.5% ad val.	15% ad val.
Finished	12.5% ad val.	25% ad val.
Talc		
Crude	.05¢ per lb.	15% ad val.
Ground	12% ad val.	--

[a]Compiled from data received by letters from: Donn N. Bent, Secy., U.S. Tariff Commission, Washington, D. C., April 27, 1964 (based on revised Tariff Schedules of the United States, pp. 226-28, 234); W. Keith Buck, Chief, Mineral Resources Division, Dept. of Mines and Technical Surveys, Ottawa, Canada, Feb. 11, 1964 and May 21, 1964.

[b]Except when purchased for use in the interior of churches.

[c]Equal to 100 square feet with a three inch overlap.

probably in response to the tariff rates (Table 8). Granite producers in Vermont bring rough stone from southern Quebec to Barre, Vermont, where it is processed into finished commodities. The total volume of granite brought into the Vermont customs district has been increasing in recent years. In 1960 only 24,332 cubic feet entered Vermont; but 77,450 cubic feet came into Vermont in 1963. This figure represents nearly 80 percent[2] of the United States' total rough granite imports

[2]Computed from data received by letter from L. N. Blugerman, Director, Building Materials Construction Division, U.S. Dept. of Commerce, April 3, 1964.

for that year.[3] Duties on finished granite entering Canada are very high--25 percent ad valorem. To circumvent this cost Rock of Ages is now setting up granite manufacturing establishments near newly purchased Canadian quarries.[4]

The United States is Canada's largest supplier of slate commodities in spite of the advantages enjoyed by slate products from Wales entering Canada under the British preferential tariff. Canada produces only small quantities of slate--primarily roofing granules in British Columbia and road fill in Quebec;[5] only small quantities of slate enter the United States from Canada.[6] No roofing shingles entered the United States from Canada during the period 1960 to 1963, but the United States exported 751 roofing squares to Canada in 1962 and 353 squares in 1963. Unfortunately, information showing the customs district from which this material entered Canada is not available. Canada in 1963 also imported $102,929 of slate manufactures (all items except roofing materials); but more would likely enter if such a high tariff rate did not exist--27½ percent ad valorem. According to Vermont slate producers, fairly large amounts of rough stone are purchased in Vermont for processing in

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[3]What percentage of Vermont's production this figure represents cannot be determined precisely because of nondisclosure rules, but by calculating the number of tons that the cubic footage equals (about 1 to 11) and comparing this (8,674 short tons) with Vermont's 78,455 short tons produced in 1961, it would have equaled slightly more than 11 percent of Vermont's production for that year.

[4]Interview with Milton V. Lyndes, Gen. Mgr., Barre Granite Assoc., Barre, Vt., July 2, 1964.

[5]Letter from W. Keith Buck, Chief, Mineral Resources Division, Dept. of Mines and Technical Surveys, Ottawa, Canada, May 21, 1964.

[6]U.S., Bureau of the Census, United States Imports of Merchandise for Consumption: 1960, Foreign Trade Report No. FT 110.

Canada.[7] Perhaps the larger slate producers should follow the lead of the Vermont Marble Company and the Rock of Ages Corporation and explore the possibilities for establishing finishing mills in Canada.

Although not all mineral producers in Vermont suffer to the same degree from high Canadian duties on finished products, undoubtedly a lowering of these rates could help increase sales of Vermont minerals in the very accessible marketing area of southeastern Canada.

Vermont Transport Systems and Transport Problems

Throughout the economic development of the United States the major avenues of trade and human movement have developed an east-west orientation. Thus, as was pointed out in previous discussion, Vermont's location in the northeastern corner of the United States has been somewhat of a disadvantage to the state in its ability to compete with areas nearer the mainstream of commerce and communication. Even during its colonial development and early statehood, Vermont lay to the north of the main foci of activity.

In addition to a somewhat disadvantageous location, Vermont's physical terrain does not lend itself to east-west movement. Although communication and commercial activities can be carried on without much difficulty in north and south directions, east and west movements are hindered. The Connecticut River bounded on the east by the White Mountains of New Hampshire and on the west by the Green Mountains of Vermont encourages a north and south movement of goods and men. Lake Champlain

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[7] Interview with Frank Graziano, Co-owner, Fair Haven Slate Co., Hydeville, Vt., April 17, 1964; Edward S. Carpenter, Pres., Vermont Structural Slate Co., Fair Haven, Vt., May 20, 1964.

and its associated valley lying along the state's western margin and hemmed in by the Green Mountains and the Adirondacks of New York also has its axis directed toward the north and south. Transportation systems have long depended upon these lowland routes, and the location of railroad and highway systems of today continue to reflect the state's physiographic pattern.

The remainder of this chapter is devoted to a closer look at some of the present problems Vermont mineral producers face that are associated with traffic patterns, freight rates, and available transport systems. Prospects for future water transport are also briefly considered.

Early transport systems

As early as 1792, only a few years after the opening of the first marble quarries in Rutland County, residents of western Vermont talked about the possibilities of a canal that would connect Lake Champlain on the north with the Hudson River on the south. In 1837, several years after the actual completion of the Champlain Canal, marble producers in the Dorset area carted blocks of stone to Whitehall, New York. The blocks were sent down the Champlain Canal to the Erie Canal for transshipment to Buffalo and then onward to their final destination at Erie, Pennsylvania.[8]

During the early 1800's, producers in the Middlebury area shipped marble down Otter Creek to Lake Champlain, then down the Richelieu and St. Lawrence Rivers, and on by sea to Boston and other New England cities. This circuitous and slow trip was undertaken to avoid the many hazards

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[8]Edmund Fuller, Vermont: A History of the Green Mountain State (Brattleboro, Vermont: Vermont Printing Co., 1952), p. 232.

and difficulties of an overland trip of only 50 miles to the Connecticut River.[9]

In spite of the Champlain Canal's completion and the possibilities of water transport by way of Lake Champlain, Vermont's early stone quarrying and processing industries produced primarily for the local market. The lack of markets may have been responsible for the marble producers' long delay in utilizing the Champlain Canal. Not until the coming of the railroads did mineral producers seek and acquire markets considerably removed from Vermont, and only then did they begin to expand their production at a rapid pace.

Between 1848 and 1853 railroads connected all of the state's major mineral producing areas--with the exception of the granite region--to points east, west, north, and south of Vermont. The Rutland and Burlington Railroad connected Rutland and Burlington in 1849, and the Delaware and Hudson Canal Company during 1850 and 1851 built connecting rail lines from points in eastern New York to Rutland, Vermont, by way of Fair Haven. The completion of these lines gave the West Rutland-Proctor marble region and the Poultney-Fair Haven slate region outlets in three directions. By 1853 connections in the south enabled these districts to ship in any direction. Talc producing areas of Windsor County were joined with the Boston and Maine system by way of the Rutland and Burlington Railroad in 1849. During that same year the Barre granite region, to the residents' chagrin, was by-passed when the Vermont Central Railroad built a link from the Champlain Valley to the Connecticut River.

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[9]Earle Newton, The Vermont Story: A History of the People of the Green Mountain State, The Vermont Historical Society, Montpelier (Burlington: The Lane Press, 1949), p. 160.

The line pushed up the Green Mountains' western side following the valleys of the Winooski and Dog Rivers. It then descended on the eastern side into the Third Branch of the White River, and, hence, down the White River to the Connecticut.[10] The granite interests in 1875 finally obtained a branch line into the Barre-Williamstown area, and in 1885-1887 the Clarendon & Pittsford Railroad joined West Rutland to Proctor for the specific purpose of servicing the area's marble establishments.
The completion of these railroads gave each of the major mineral producing regions direct access to rail service, but the maximum (approximately 1100 miles)[11] in track mileage in Vermont was not reached until the turn of the century (Fig. 13).

Railroads of today

The total railroad route and track mileage is now considerably reduced (Fig. 14). The volume of traffic originating in Vermont was never really large; and at times it was not enough to sustain several competing lines. The Vermont Central Railroad, now the Central Vermont Railway, Inc., was not even built for the primary purpose of attracting Vermont traffic. Its main function was and is to serve as a bridge line between railways--its parent, the Canadian National, and railways in southeastern New England.[12] A large part of Vermont's trackage either still serves this kind of original function or has, through necessity, taken on this function. An excellent example of the bridge line is the

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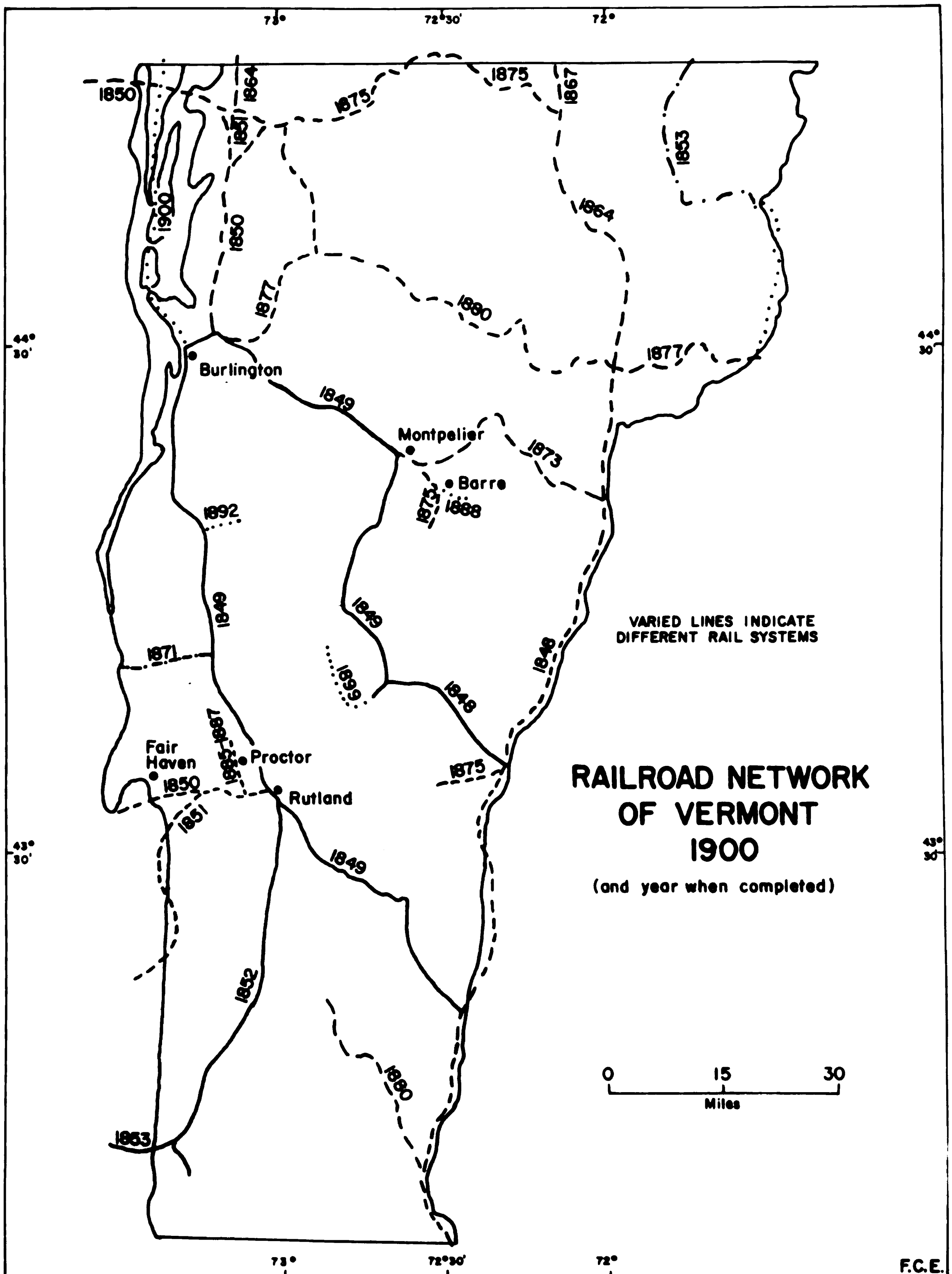
[10]William J. Wilgus, The Role of Transportation in the Development of Vermont (Montpelier: The Vermont Historical Society, 1945), pp. 63-78.

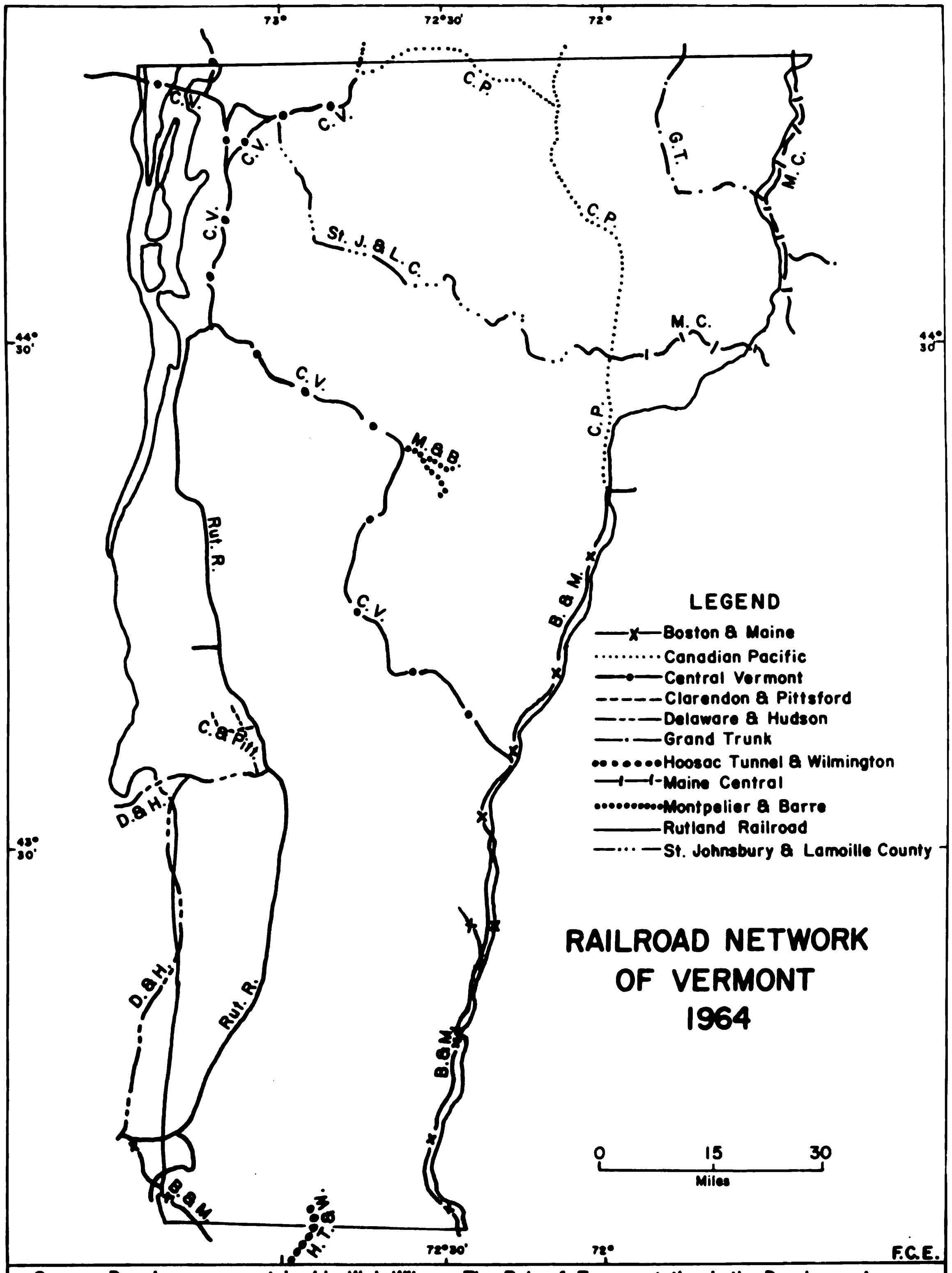
[11]Ibid., p. 80.

[12]Interview with Thomas L. Kennan, Freight Rates Officer, Central Vermont Ry., Inc., St. Albans, Vt., Feb. 26, 1964.



Source: Based on map contained in W.J. Wilgus, The Role of Transportation in the Development of Vermont.

Fig. 13



Source: Based on map contained in W.J. Wilgus, The Role of Transportation in the Development of Vermont.

Fig. 14

newly reopened Rutland Railroad.[13] Tied in with the Canadian National and the Delaware and Hudson systems on the north and with the Boston & Maine on the south, but not actually associated with any of these, the Rutland Railroad has long starved for traffic. As William H. Wallace, a transportation geographer at the University of New Hampshire, points out, the bridge-line railroad, such as the Rutland, has a difficult time without a parent system that acts as a "feeder."[14]

The plight of the Rutland Railroad, in a sense, epitomizes the problems faced by the mineral shipper and the mineral carrier in Vermont. The problems they both face are interdependent but also antithetical. Shippers are concerned with dependable and frequent service. The bridge-line carrier is more concerned with total volume of goods obtained from and delivered to the rail systems it connects since this is the main source of traffic. It is not so concerned with service at points in between because multiple stops and switching costs may be more than the revenue received from relatively small amounts of traffic originated.

Wallace points out that all of Vermont's north-south railroads are bridge lines--each competing for traffic moving from Canadian lines and those of southern New England. Competition for this traffic is fierce.[15] The Rutland, reopened in January 1964 by new owners, but still without a parent system, will very likely have a difficult time remaining out of the red. Some shippers interviewed in the fall of 1963, who had

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[13]The Rutland Railroad was closed in September 1961 but was reopened in January 1964.

[14]"Freight Traffic Functions of Anglo-American Railroads," Annals of the Association of American Geographers, LIII (September, 1963), 327-28.

[15]Ibid., p. 327.

once used the Rutland, indicated that they would probably not go back to using this carrier if it were reopened. The reasons given for their attitude were: (1) previous service was poor, and (2) the use of trucks is much more functional. Trucks are more functional because they can deliver on the job, are not as dependent on regular schedules, and are faster.[16]

Other shippers have expressed a desire to see the Rutland reopened, and the sooner the better. Several producers suffered severely when the line closed in the fall of 1961. The Vermont Kaolin Corporation near Bristol, Vermont, was completely shut off from any feasible rail transport. The company has special dockage facilities in the village of New Haven Junction, but their processing plant's location still requires a truck haul of ten miles. The cost of loading, moving, and transshipping their kaolin materials was high even before the Rutland stopped running. At the time this firm's representatives were interviewed, they were forced to rely on trucks for all shipments.
Mr. Allen C. Moore, Treasurer of Vermont Kaolin, illustrated the added transport cost of trucks with the following example. By rail they shipped a ton of kaolin to Rhode Island for $6, but by truck the cost was approximately $12 a ton. A few customers come to their plant and haul the kaolin in their own trucks; this helps cut costs. The real solution, he felt, was the reopening of the Rutland Railroad.[17] Recent

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[16]Interviews with John Weinreiver, Co-partner in Bowker & Son, W. Rutland, Vt., Dec. 2, 1963; Clyde Barton, Co-owner, Vermont Soapstone Co., Perkinsville, Vt., Nov. 8, 1963.

[17]Interview with Allen C. Moore, Treas., Vermont Kaolin Corp., Bristol, Vt., Sept. 18, 1963.

correspondence with Mr. Moore, however, indicates that the Rutland's reopening has not had the effect they desired--a return to rail shipments. Although the Rutland reopened in January of 1964, Vermont Kaolin did not ship one carload of kaolin by rail until May 25. Most of their customers have not shown a desire to return to the use of rail shipments.
Mr. Moore feels that customers have become accustomed to overnight trucking services. Although rail rates are lower, it takes the rail carrier four or five days to deliver kaolin to customers in Massachusetts and Rhode Island![18]

Another example of the difficulties encountered by different firms with the Rutland's closing is well illustrated by the Vermont Associated Lime Industries, Inc., at Winooski. The firm has two plants--one in Winooski and another in New Haven. With the abandonment of the Rutland, the New Haven plant, burdened with added transportation costs, closed[19] and it has remained so; but management has made a very recent decision to reopen the plant.[20]

In the Windsor County talc region the problems created by the Rutland's closing and transport difficulties in general are especially well illustrated. This portion of the Rutland Railroad has not yet reopened. Two talc firms operate in the region--the Vermont Talc Company at Chester and the Eastern Magnesia Talc Company at Gassetts. Both firms have very high transportation costs. Each firm has its processing mill

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[18]Letter from Allen C. Moore, Treas., Vermont Kaolin Corp., Bristol, Vt., June 1, 1964.

[19]Interview with James Ticehurst, Office Mgr., The Vermont Associated Lime Industries, Inc., Winooski, Vt., Sept. 6, 1963.

[20]Letter from Howard N. Stark, Vice President, The Vermont Associated Lime Industries, Inc., Winooski, Vt., March 5, 1965.

located beside the tracks of the abandoned Rutland Railroad. The mills, once situated at the mining sites, were moved to the railroad soon after it was completed. Originally, Vermont Talc mined its raw material in Chester, not far from the railroad, but depletion of these high-grade talc deposits has, for many years, necessitated hauling the raw talc a long distance. Presently Vermont Talc hauls its raw material to Chester from south of Simonsville--a distance of nearly 12 miles.[21] Eastern Magnesia is at still a greater disadvantage; it has a haul of 16 miles from its mine in Hammondsville to its mill at Gassetts.

After processing, the talc of both firms must be loaded onto trucks for shipment to Springfield, the nearest railhead. The Gassetts plant has a haul of 10 miles to Springfield, and the Chester plant, hauling to the same point, must move their product 9 miles. Eastern Magnesia is now opening a new processing plant near Reading. This will eventually end the need for their establishment in Gassetts, but the problem of moving raw materials and finished products long distances will remain. Their mine is located 3 miles from the new mill, and the haul from the new milling establishment to Springfield is 13 miles (Fig. 15).[22]

The importance of rail service to the Windsor County talc producers was especially emphasized when the Vermont Public Service Board, in January 1964, held hearings in Bellows Falls, Vermont. Their purpose was to determine the transportation problems created for shippers by the

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[21]Interview and field observations with Theron A. Yager, Pres., Vermont Talc Co., Chester, Vt., Sept. 27, 1963.

[22]Interview and field observations with W. A. Dezaine, Plant Supt., Eastern Magnesia Talc Co., Gassetts, Vt., Oct. 25, 1963.

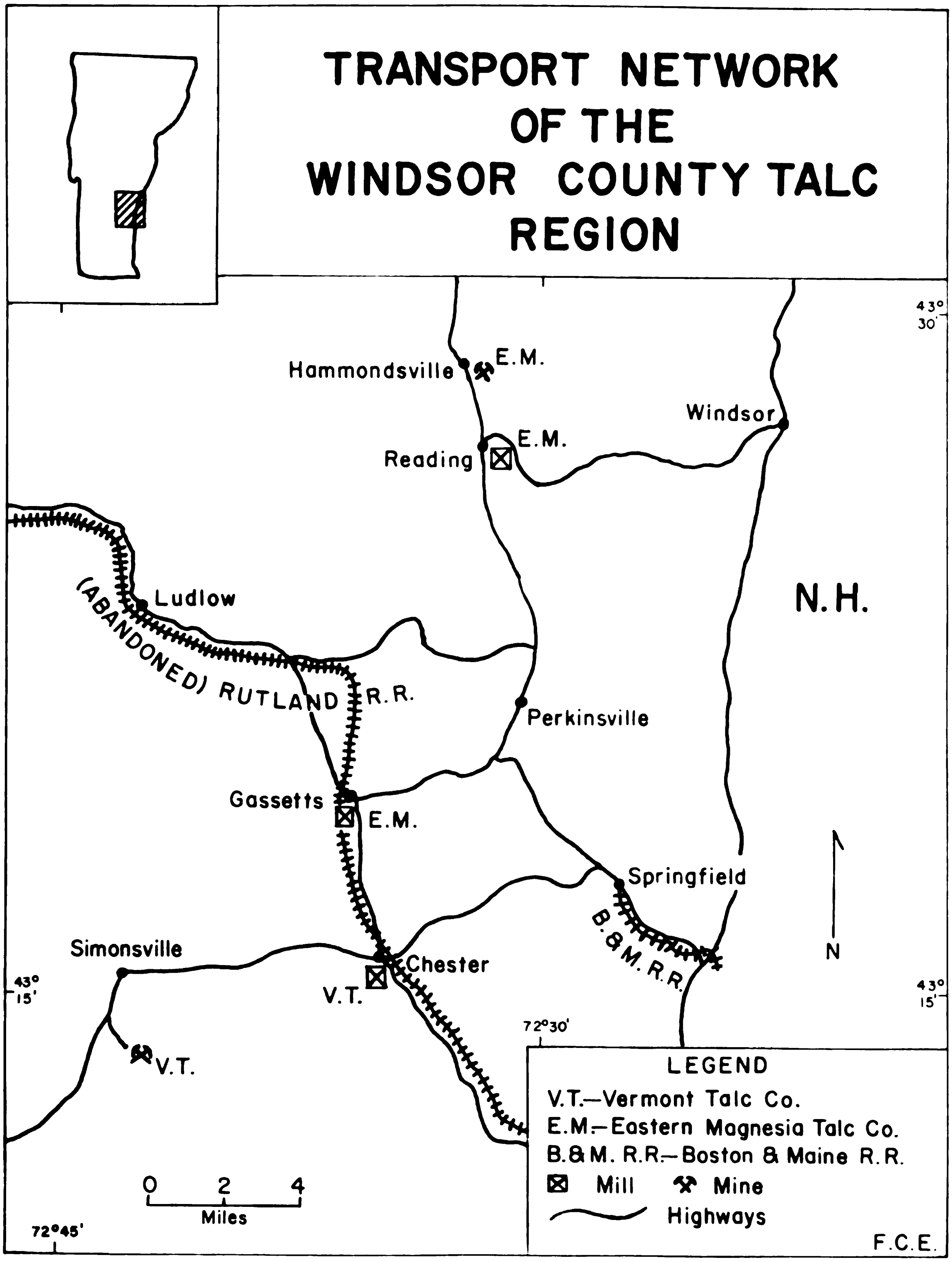
TRANSPORT NETWORK
OF THE
WINDSOR COUNTY TALC
REGION
Hammondsville
E.M.
Windsor
Reading
E.M.
N.H.
Ludlow
(ABANDONED) RUTLAND R.R.
Perkinsville
Gassetts
E.M.
Springfield
Simonsville
Chester
V.T.
B.&M. R.R.
N
43°
30'
43°
15'
43°
15'
72°30'
V.T.
LEGEND
V.T.—Vermont Talc Co.
E.M.—Eastern Magnesia Talc Co.
B.&M. R.R.—Boston & Maine R.R.
Mill
Mine
Highways
0 2 4
Miles
72°45'
F.C.E.

Fig. 15

Rutland's closing and also to determine the desire of shippers in the area for reopening the Rutland to Bellows Falls branch of the railroad, a branch still not open. All witnesses indicated a desire to see rail service reestablished. Mr. Theron Yager, President of the Vermont Talc Company in Chester, testified that his company had lost approximately $20,000 since the closing of the line in the fall of 1961, and this, he said, was a "conservative estimate." He pointed out that this loss was due to the great differential of rail and truck rates. The difference is enough that he has little ability to compete with a firm having rail service.[23] Comparisons of present truck and past rail rates paid by Mr. Yager are impressive (Table 9).

TABLE 9.--Comparative freight rates for truck and rail shipments from Chester-Springfield, Vermont[a]

	Rates per Ton	
Points of Destination	Rail	Truck
Buffalo, New York	$ 9.00	$22.50
Akron, Ohio	10.80	28.20
St. Louis, Missouri	14.10	39.20

[a]Compiled from: Rutland Daily Herald, January 24, 1964, p. 1.

Although representatives of the Eastern Magnesia Talc Company did not testify at the hearings, Mr. W. A. Dezaine, Plant Superintendent at their Gassetts plant, in the fall of 1963 indicated that with the demise of the Rutland their transportation costs increased from an average of $5.25 to $7 a ton.[24]

[23] Rutland Daily Herald, January 24, 1964, p. 1.

[24] Interview with W. A. Dezaine.

Vermont's talc producers are certainly not unique among the state's mineral producers in their transport problems and expenses. Northern Vermont has one of the few areas in the United States producing asbestos. The Ruberoid Company operates a large quarrying and milling establishment 3 miles north of the small village, Eden Mills. Company trucks haul large quantities of asbestos fiber to Morrisville, a distance of 16 miles. At Morrisville the asbestos is transshipped to distant points by way of the St. Johnsbury & Lamoille County Railroad.[25] Transshipment, road maintenance in winter, and handling costs reduce Ruberoid's profits and their ability to compete most effectively with Canadian producers who have excellent asbestos fiber and whose establishments are immediately accessible to rail transport.

One instance of a shipper not affected to any degree by rail shipment problems is the Vermont Marble Company. Their rail transportation costs are favorable to a good competitive position. Vermont Marble owns the Clarendon & Pittsford Railroad; the line carries all marble moving by rail out of Proctor. The Clarendon & Pittsford connects with the Delaware and Hudson system at West Rutland. As the originating railroad, the Clarendon & Pittsford receives a certain part of the shipping charges, depending on the distance of shipment. The relative advantage held by the Vermont Marble Company in rail shipments can be illustrated with the following example. A shipment of 80,640 pounds of ground marble in 50-pound bags sent to Salem, New Jersey, sustains a charge of $230.23. The Clarendon & Pittsford receives, as the

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[25]Interview and field observations with Louis Jordan, Geologist for the Ruberoid Co., three miles north of Eden Mills, Vt., Oct. 28, 1963.

originating railroad, $27.64 or 12 percent of the total shipping charge.[26] With an advantage of this proportion it is not likely that Vermont Marble suffers severely from rail freight costs. An added advantage they enjoy is that all bills of lading and other book work are done by the Delaware and Hudson, a task and expense usually borne by the originating railroad![27]

Highway systems present and planned

Vermont's highway network is inadequate for the state's needs. A large portion of the state's highways are classified as poor.[28] The volume of traffic is steadily increasing and will likely continue to do so. During the decade 1953 to 1963, traffic on Vermont's main highways increased 49 percent, and from 1960 to 1963 it increased 13 percent; this means an increase in volume of nearly 5 percent annually.[29] The development of better roads is important to the future growth of Vermont's mineral industries. If plans of the federal and the state government are realized, this need should be met.

Within the next 14 years federally supported interstate and other highway construction will add to or modernize a total of 574 miles of Vermont's roadway network. Three hundred twenty-four miles of this total

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[26]Letter from James Neiles, Freight Agent, Delaware and Hudson R.R. Corp., W. Rutland, Vt., Nov. 17, 1964.

[27]Interviews with James Neiles, Freight Agent, Delaware and Hudson R.R. Corp., W. Rutland, Vt., March 3, 1964; John D. Foley, Freight Agent, Delaware and Hudson R.R. Corp., Fair Haven, Vt., Feb. 19, 1964.

[28]Highway Planning Division, Vermont Department of Highways, Vermont's 14-Year Planning Program on the Federal Aid Highway Systems [Montpelier, Vermont], 1963.

[29]Letter from H. F. Farrington, Highway Planning Engineer, Vermont Dept. of Highways, Montpelier, Vt., Dec. 21, 1964.

will be interstate[30] with the remainder devoted to primary and some secondary roads. Some sections of Vermont's interstate system are under construction or have been completed (Fig. 16). The Montpelier-Barre granite region has access to a completed section, but unfortunately this has not yet been tied in with other parts of the national network. Talc producers in Windsor County have fairly good accessibility to a finished section of the interstate system that penetrates into Massachusetts to the south. Future construction will tie in the Champlain Valley limestone and marble regions with the rest of the interstate network. Other federally supported construction will give the Fair Haven-Poultney slate and the Proctor-West Rutland marble regions good accessibility to the New York interstate system. During the past two years, state planning engineers have been conducting hearings in communities along the proposed route.[31] The advantages offered to Vermont's mineral producers with the completion of the interstate and other road systems should be considerable.

Rail Freight Rates

Market accessibility depends upon distance, transportation systems available, and the types of commodities to be shipped. Each of these in turn functions to determine shipment costs. Mineral commodities, high-weight low-value products, are very sensitive to freight rates. An investigation of rail freight rates paid by Vermont's different mineral producers and those paid by competitors in other areas shows the state's

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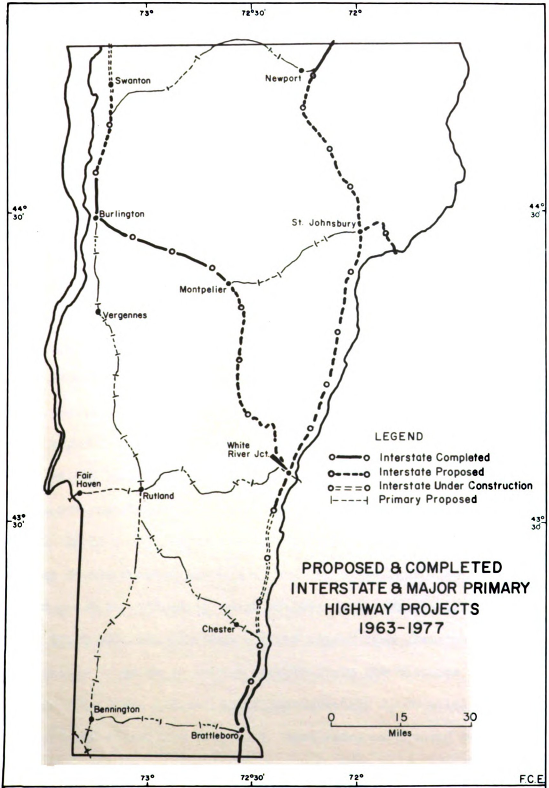
[30]Highway Planning Division, op. cit.

[31]Personal attendance at Castleton-Fair Haven Four-Lane Highway Project Hearing in Fair Haven, Vermont, November 4, 1964.



Source: Data compiled and redrawn from Vermont Department of Highways. Vermont's 14-Year Planning Program on the Federal Aid Highway Systems.

Fig. 16

transport costs as fairly competitive. Some rate anomalies do occur that place Vermont at an advantage in some cases and at a disadvantage in others. Only a few examples of comparative disadvantages and advantages and a few of the rate anomalies can be discussed within the scope of this paper.

Rail freight rate comparisons, based upon distance and specific commodities, show Barre granite shippers have disadvantages and advantages when compared with competing granite regions. In general, Barre's granite shippers have the advantage of proximity to the large urban centers of the Northeast, as do the several other mineral producers in Vermont, but they have a disadvantage in their ability to reach Midwestern and Western markets.

The distance to Chicago from Barre, Vermont, and from Elberton, Georgia, is the same--approximately 830 miles. Yet, the rates paid by the two regions are not comparable. For a carload (CL) minimum shipment of 50,000 pounds of rough granite blocks, Barre producers pay 93 cents per hundred pounds (cwt) and Elberton producers pay 82 cents per cwt. An 11 cents difference in Elberton's rates is obviously an advantage to the Georgia producers. On the other hand, the cost for a 50,000 pound CL minimum of rough granite to San Francisco from Barre is only $2.28 per cwt; the same minimum weight from Elberton is $2.61. The advantage to Barre is indeed notable since the distance to San Francisco from these two points is approximately 2,600 miles from Barre and only 2,200 miles from Elberton! When rates on dressed blocks for a 50,000 pound CL minimum from the same two points of origin--Barre and Elberton--to San Francisco are compared, the advantage is reversed. Elberton becomes the favored point of origin. Barre producers pay

$2.68 per cwt and those in Elberton pay only $2.24. Barre is also at an advantage compared with Quincy, Massachusetts, for rates to the West Coast. For shipments to San Francisco, California, and Seattle, Washington, Quincy producers pay a rate of $2.68 per cwt for a 50,000 pound CL minimum of rough blocks. Barre shippers pay only $2.28. The distance from Quincy to San Francisco is not enough greater to account for the 40-cent cost difference per cwt. The discrepancy cannot be accounted for merely on the basis of a lower cost on differential[32] routes available to Barre because they are also available to Quincy. Another rate anomaly occurs for shipments from Quincy, Massachusetts, to New York City. For a 36,000 pound CL minimum of polished granite, producers in Quincy pay 77 cents per cwt--a rate $28\frac{1}{2}$ cents more than the $48\frac{1}{2}$ cents paid by Barre granite shippers (Table 10). Here, Barre's granite shippers certainly profit because the distance from Barre to New York City is approximately 260 miles; from Quincy to New York City it is only 180 miles. One reason for these rate anomalies is that Barre granites move under lower commodity rates than do Quincy's.[33] According to a representative of the Montpelier and Barre Railroad Company, an application to adjust commodity rates on stone from Eastern and Southern Territories to the West Coast is before the General Traffic Committee of the Interstate Commerce Commission. If the application is approved, the

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[32]The differential shipment originates in New England and then travels over routes through Ontario, Canada. These shipments travel at a rate of one cent less per cwt than do those shipments on standard routes--one which travels uninterrupted through the United States.

[33]Letter from G. N. Sabin, Assistant Vice President--Freight Rates, The New York, New Haven and Hartford R.R. Co., New Haven, Conn., Dec. 10, 1964.

TABLE 10.--Railroad freight rates for granite commodities in cents per cwt[a]

Points of Destination		Rough Blocks not Further Finished than Sawed on Four Sides					Dressed Blocks Chiseled, Hammered, or Sand Rubbed--Not Carved, Hand Lettered, or Polished					Carved Blocks, Pieces or Slabs, Honed, Carved, Lettered, Polished, or Traced				
		Barre Vt.[b]	Elberton Ga.	Redgranite Wisc.	Quincy Mass.	Cold Spring Minn.	Barre Vt.[b]	Elberton Ga.	Redgranite Wisc.	Quincy Mass.	Cold Spring Minn.	Barre Vt.[b]	Elberton Ga.	Redgranite Wisc.	Quincy Mass.	Cold Spring Minn.
Philadelphia Penn.	A					112		89	112	67	140		113	159	86	
	B		74	96	53		65½					65½				
	C	51½	65½													
Chicago Ill.	A							100		119			131		154	
	B	93	82		95											60½
	C	79	76													
St. Louis Mo.	A							93		113			118		172	
	B	104	75		106											68
	C	89			161											
New Orleans La.	A						168	90	131	161		208	112	161	200	
	B	135	72	104	129	114										
	C	115	60½	89	110			62½	92							
Lansing Mich.	A					70	103	101	69	105	88	128	132	89	136	114
	B	82	86	55	84											
	C	70	77													
New York N. Y.	A	48½				112	48½	97	112	59	140	48½	122	159	77	
	B		85	98½	47											
	C	43½					43½					43½				
Seattle Wash.	A					171		261			214					278
	B	228	261		268		268	224		268		268				
	C	224	224												268	
Denver Colo.	A						186	159		188		231	197		245	
	B	149	127	58½	151	93			84		93					
	C	127	108					112								
San Francisco Calif.	A					180		261			225					293
	B	228	261	190	268		268	224	190	268		268		190		
	C	224	224												268	
Albuquerque N. Mex.	A					113	208	166		208	141	258	206		258	184
	B	167	133		167										268	
	C	117	113		142			117								

A = 36,000 lb. min.; B = 50,000 lb. min.; C = 80,000 lb. min.

[a]Compiled from data obtained from the Montpelier and Barre R.R. Co.; Southern Ry. System; Chicago and Northwestern Ry. Co.; New York, New Haven, and Hartford R.R. Co.; Great Northern Ry.; and Seaboard Air Line R.R. Co. (See letters in bibliography: V. P. Brown, Brooks, Coxon, Richardson, Sabin, and Schroeder.)

[b]All rates from Barre to Chicago, St. Louis, Lansing, Seattle, Denver, San Francisco, and Albuquerque are for differential routes.

advantages and disadvantages of the various regions will be adjusted and rates set up "on a more corresponding basis."[34]

It seems unlikely that rate manipulation could ever be extreme enough to erase the advantages of Barre's position for servicing the needs of the large urban areas of the Northeastern United States. For example, a 36,000 pound CL shipment of polished granite commodities moves from Barre to New York City for 48½ cents per cwt. The same commodity and weight shipped from Elberton to New York City costs $1.22 per cwt, and from Redgranite, Wisconsin, $1.59.

Slate producers in Vermont when compared with producers in Pennsylvania are generally at a freight cost disadvantage (Table 11). Rates from Pen Argyl, Pennsylvania, as shown in Table 11, are lower to every point of destination except Boston, Massachusetts. The cost advantage held by Pennsylvania producers is not large, but it is enough that Vermont producers feel the added burden. But rates from Guilford, Maine, the point of origin for shipments of slate produced at Monson (a few miles to the north), are much higher than those paid from Fair Haven, Vermont. If they are to reach the same large urban markets, as do Vermont producers, Monson shippers must pay 15 to 20 cents more per cwt for nearly every type of slate commodity. Shipment costs make even Boston less accessible to Maine's slate firms than it is to Vermont's.

Vermont talc producers in the southeast near Springfield and in the north at Johnson can compete quite well with producers in other major United States' talc regions. Their ability to reach some of the

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[34]Letters from R. H. Coxon, Asst. Gen. Freight Agent, Montpelier and Barre R.R. Co., Barre, Vt., April 22, 1964, and July 27, 1964.

TABLE 11.--Railroad freight rates for slate commodities in cents per cwt[a]

Points of Destination	Scrap, Carload Minimum 50,000 lbs.: Fair Haven Vt.	Scrap, 50,000: Pen Argyl Penn.	Scrap, 50,000: Guilford Maine	Quarry-Cleft, 50,000: Fair Haven Vt.	Quarry-Cleft, 50,000: Pen Argyl Penn.	Quarry-Cleft, 50,000: Guilford Maine	Sand Rubbed, 36,000: Fair Haven Vt.	Sand Rubbed, 36,000: Pen Argyl Penn.	Sand Rubbed, 36,000: Guilford Maine		Roofing[d]: Fair Haven Vt.	Roofing[d]: Pen Argyl Penn.	Roofing[d]: Guilford Maine
Birmingham Ala.	95	84	110	118½	108	141	150	133	172	A	85	78	97¼
										B	81	72	96
										C	77	66	92
Phoenix Ariz.	145.6[b]		192	224[c]		246	224[c]		301	A	250		
										B			298
										C			
Denver Colo.	127	125	146	163	160	188	199	196	229	A	181	178	208
										B			
										C			
Boston Mass.	34	45	43	44	58	55	54	71	68	A	33½	45½	43½
										B	27½	38½	37½
										C	24½	32½	31½
Chicago Ill.	78	76	96	101	97	124	123	119	151	A	84	82	110
										B	75	73	101
										C	67	64½	93
Washington D. C.	54	40	71	69	51	91	85	62	111	A	54½	39½	74
										B	46½	33½	64½
										C	38½	27½	55½
Los Angeles Calif.	145.6[b]		200	224[c]		257	224[c]		314	A	285		
										B			298
										C			
Lansing Mich.	67	64	87	87	82	111	106	100	135	A	70	65½	96
										B	60½	56½	87
										C	52½	47½	79
Davenport Iowa	86	83	103	110	107	133	134	130	162	A	95	91	121
										B	86	82	112
										C	78	74	104

[a]Compiled from data obtained from interview with John D. Foley, Freight Agent, Delaware and Hudson R.R. Corp., Fair Haven, Vt., Feb. 19, 1964; and letters from Arch McClay, Division Sales Mgr., Erie-Lackawanna R.R. Co., Nazareth, Penn., Feb. 27, 1964; L. W. Wentworth, Gen. Freight Traffic Mgr., Bangor and Aroostook R. R. Co., Bangor, Maine, April 6, 1964.

[b]Carload minimum 100,000 lbs. [c]Carload minimum 80,000 lbs.

[d]A = 40,000 lb. min.; B = 60,000 lb. min.; C = 80,000 lb. min.

largest paper milling regions in Maine and southern New England is better than competitors in New York's Gouverneur region in the western Adirondacks. Montreal as a point of destination is, for example, $5\frac{1}{2}$ cents cheaper on a 60,000 pound CL minimum from Johnson than it is from Gouverneur. Considering the difference in distance from Vermont and New York talc regions to points such as Chicago and Detroit, Vermont producers are not at an overly large disadvantage. Rates from the talc region of Allamoore, Texas, southeast of El Paso, to Northeastern markets are so high that its competition from eastern producers must be very severe. St. Louis is approximately the easternmost point of any rate advantage held by the Allamoore region (Table 12).

Vermont's marble producers when compared with Tennessee's producers are at a disadvantage for Midwestern markets such as Chicago; but Vermont producers shipping to Detroit are at a definite advantage when compared with Carthage shippers (Table 13). Rates for a shipment of slabs, sand rubbed, from Proctor and Knoxville to the West Coast illustrate one anomaly. The rate for an 80,000 pound CL minimum is the same for both points, although Knoxville is approximately 250 miles nearer the point of destination. The most notable relationship of freight shipment costs for the three points of origin shown in Table 13 is Proctor's advantage for Eastern markets, such as Boston and Washington, D. C.

Comparative Freight Rates and Utility of Truck and Rail Carriers

The utilization of truck transport has, so far, been discussed primarily for short hauls in moving raw materials from the mine or quarry site to the mill. Although a lengthy discussion of the trucking

TABLE 12.--Railroad freight rates for talc commodities in cents per cwt[a]

Points of Destination		Talc Ground--in Bags or in Bulk				
		Springfield Vt.	Johnson Vt.	Gouverneur N. Y.	Chatsworth Ga.	Allamoore Tex.
Boston Mass.	A	32	45	56	83½	133½
	B	25	36	45	71½	108½[c]
New York N. Y.	A	45	53	53	74½	
	B	36	44	44	62	
Portland Maine	A	41	38	53	88½	134½
	B	32	32	44	72½	109½[c]
Chicago Ill.	A	77½[b]	78½[b]	73½	70½	78½[c]
	B	62[b]	62[b]	60	56	
Detroit Mich.	A	69½[b]	69½[b]	60	70½	106½
	B	55[b]	55[b]	47	56	
St. Louis Mo.	A	85½[b]	87½[b]	79½	63	73½[c]
	B	70½[b]	71½[b]	64	54	
Denver Colo.	A	120½[b]	116½[b]	109½	98½	61[c]
	B					
New Orleans La.	A	103½	108½	100½	62	70[c]
	B	83½	88½	82½	62	
San Francisco Calif.	A	179½	179½	179½	179½	
	B	139	139	139	139½	106
Montreal Quebec	A		63	68½		174[b]
	B					

A = 60,000 lb. min.; B = 100,000 lb. min.

[a]Compiled from data obtained from: B. V. Reynolds, Gen. Freight Agent, The Texas and Pacific Ry. Co., Dallas, Tex., April 10, 1964; J. F. Mayette, Chief of Tariff Bureau, St. Johnsbury & Lamoille County R.R., Morrisville, Vt., April 7, 1964; D. P. Felt, Mgr.--Freight Rates, Boston and Maine R.R., Boston, Mass., April 9, 1964; William D. Broeman, Mgr.--Freight Rates, Louisville and Nashville R.R. Co., Louisville, Ky., July 16, 1964.

[b]Rates via Canada--the differential route which is one cent per cwt less than on a standard route.

[c]70,000 lb. minimum.

TABLE 13.--Railroad freight rates for marble commodities in cents per cwt[a]

Points of Destination		Splitface Rough or Broken			Sawed Four Sides or Less			Slabs--Sand Rubbed			Polished		
		Proctor Vt.	Knoxville Tenn.	Carthage Mo.	Proctor Vt.	Knoxville Tenn.	Carthage Mo.	Proctor Vt.	Knoxville Tenn.	Carthage Mo.	Proctor Vt.	Knoxville Tenn.	Carthage Mo.
El Paso Tex.	A						117		159	117	270	197	152
	B		127	93		127			91				
	C								127			158	
	D		108			108			112				
Los Angeles Calif.	A						214			214			278
	B			171					228		268	228	
	C	231	203			203							
	D							224	224		224		
Detroit Mich.	A				90		106	90	84	106	90	104	131
	B		56½		72	67	85						
	C	51½	46½	58½				72	67	85	72	83	105
	D				60½	56½							
Boston Mass.	A				36½		155	36½	84			104	191
	B		82			96							
	C	20½		88	29½	82		29½	67	125		83	155
	D												
Denver Colo.	A							184	151				
	B		121			121							
	C								121				
	D		103			103			106				
Seattle Wash.	A						214						278
	B			171	259			268	228		268	228	
	C		203			203							
	D				224			224	224		224		
Chicago Ill.	A								86		139	107	
	B					69							
	C	61½	48½		112			112	69		111	86	
	D				90	58½		90					
Washington D. C.	A						134		80			99	165
	B					63½							
	C		44½	75	55½		107	55½	63½	107	55½	79	132
	D				48½			48½			48½		
New Orleans La.	A						101		91			113	132
	B		73			73							
	C			81					73			91	
	D		61½			61½			63½				

A = 36,000 lb. min.; B = 50,000 lb. min.; C = 60,000 lb. min.; D = 80,000 lb. min.

[a]Compiled from data obtained from: The Delaware and Hudson R.R. Corp.; St. Louis-San Francisco Ry. Co.; Louisville & Nashville R.R. Co. (See interview in bibliography--Neiles; and letters--Broeman; Thompson.)

industry's impact upon railroads is not germane, it should be emphasized that railroads originating traffic in Vermont have experienced severe competition from trucks. Why should trucks give railroads such severe competition in hauling stone products?

Many variables enter into what is the most economical transport system. Easier accessibility, greater speed, and less breakage often influence the final decision to ship by truck rather than by rail. For some producers the multiple handling of goods merely to use a rail carrier is more expensive than the cost for truck shipments. Loaded on a truck at the mill site, the merchandise moves directly to the point of destination. A representative of Vermont Marble pointed out, for example, that they can ship 100 pounds (cwt) of stone to Chicago by truck at $1.54; by rail the charge is $1.10. Even with a charge of 44 cents less per cwt, any savings by rail is likely gone by the time the materials reach Chicago, are unloaded, put on a truck for transshipment to the destination, and again unloaded at the job site.[35] Evidently in this case the advantage of Vermont Marble's originating rail traffic fails to offset the greater utility of trucks. Shippers often mention the time element when explaining their preference for trucks. Time becomes the deciding criterion in closing many sales. That less breakage occurs in truck transport is still another advantage given for their use. The president of the Clarendon & Pittsford Railroad was an unexpected source of support for this contention.[36] An author, writing

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[35]Interview with A. T. Howe, Vice Pres., Vermont Marble Co., Proctor, Vt., Dec. 6, 1963.

[36]Interview with E. W. Olson, Pres., Clarendon & Pittsford R.R. Co., Proctor, Vt., Jan. 14, 1964.

for the Small Business Administration, has duscussed an idea related to breakage. The surest method of shipment with the least breakage may not be the cheapest method because expensive packaging or crating of a product may prove much more costly than occasional replacement of broken or damaged goods.[37] Whether shippers expressing a preference for trucks on the basis of breakage have made actual analyses of long-run shipping costs for different transport methods and systems was not determined.

Future truck transport is not likely to become any less important.[38] Every mineral producer interviewed said that he presently uses trucks; none felt that trucks would become less important in the future; and all producers expected to continue using them for delivery of a large portion of their products, even though the relative cost of truck transport on a mileage-poundage basis is usually higher than by rail. Their many advantages, they feel, outweigh the disadvantage of cost.

The conveniences of greater speed, accessibility, and less breakage may help to balance out the greater cost of truck shipments; but as distance increases, the relative advantages of truck shipments decrease somewhat. Producers in Barre, for example, can ship 30,000 pounds of granite by truck to New York City for 64 cents per cwt; by rail it costs 48½ cents per cwt for 36,000 pounds. For the convenience and speed the difference of 15½ cents per cwt may be quite economic. When the cost of a truckload shipment of 30,000 pounds of granite to

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[37] Robert E. Williams, Reduce Waste--Increase Profit, Technical Aids for Small Manufacturers No. 50 (Washington, D. C.: Small Business Administration, April, 1957), p. 3.

[38] Calculations based upon data obtained from the general questionnaire show that approximately 80 percent of the respondents' shipments move by truck.

New Orleans is compared with the cost incurred by rail for a carload of 36,000 pounds, a greater differential appears. To New Orleans the rate is, per cwt, \$2.22 by truck; by rail, \$1.68.[39] But even here it is not likely that the difference in rates is enough to prevent trucks capturing further mineral traffic.

A similar pattern of freight costs exists in the carload and truckload shipments of other mineral commodities from Vermont. The costs of truck shipments largely curtail their utilization for most points of destination west of the Mississippi River, and, as a result, many trucking firms carrying Vermont's mineral traffic do not maintain rates for points in the Far Western United States. So far, only carload and truckload shipments have been compared. Granite commodities in less than truckload (LTL) lots can move to states such as Nebraska and Iowa at a lower rate than when carried by rail in less than carload (LCL) lots (Table 14). With competition like this it is not hard to see why the railroads are having such difficulties.

What the future holds for Vermont's mineral producers in their rail and truck transport costs is difficult to forecast. Railroads may develop better methods of moving stone materials subject to breakage. This may encourage shippers to use more rail traction. Highway systems will, however, continue to improve thereby increasing the ability of trucks to move greater distances in less time. This may offset any improvements railroads make. Railroads serving the Midwest must adjust their LCL rates if they hope to forestall further traffic captures by the

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[39]Data received by letters from Ve Barquin, Mgr., Williams Transfer, Inc., Barre, Vt., May [21], 1964; Ray Churchill's Truck Terminal, Barre, Vt., May [21], 1964.

trucking industry. In view of the basic assets and liabilities that these two systems have and the mineral industries' continuing transport requirements, there is little likelihood that significant changes will occur in the near future for truck and rail movements of Vermont's mineral traffic.

TABLE 14.--Comparative LCL and LTL freight rates on granite from Barre, Vermont, per cwt[a]

Points of Destination	Carrier	0-5,000 lbs.	5,001-10,000 lbs.
Des Moines, Iowa	Rail[b]	$2.89	$2.89
	Truck	2.75	2.45
Omaha, Nebraska	Rail[b]	3.09	3.09
	Truck	2.98	2.66

[a]Source: Theodore A. Rossi, "Geography and Transportation in the Barre Granite Industry" (Paper done for Professor Albert S. Carlson, Geography Dept., Dartmouth College, Hanover, New Hampshire, November, 1962), p. 60. (Mimeographed.)

[b]Including a 12-cent pick-up charge.

It is possible, however, for the state's mineral producers to ship their commodities more efficiently. Shippers should, for example, make every effort to move all traffic in carload or truckload lots. (Less than truckload or carload traffic is subject to much higher rates.) Several producers, especially the smaller ones, could establish a system of collective dispatching where less than carload or truckload orders could be sent to the same point of destination. With this shipment method, freight costs could be considerably reduced.

Consolidating shipments is presently one of the important functions of the Barre Granite Association (BGA). Members are eligible to utilize a "Consolidation Service" that collects monuments destined for rail shipment to the same city. The Association makes arrangements with

trucking firms to deliver monuments from the point of rail destination. Members of the BGA pay a 12-cent pick-up plus a 5-cent cwt consolidation fee.[40]

Prospects for Future Transport

Since Vermont's mineral transport needs are not likely to change, what possibilities are there for more efficient (cheaper) methods becoming available? The only major form of transport available or potentially available to Vermont's mineral producers not yet discussed is water. Mineral producers in Vermont are only now beginning to rediscover water transport.

Sea-land carriers

Some shippers are beginning to use the services of "sea-land" carriers (fishyback). Two stone producers in the slate and marble regions are enthusiastic about this method. Because of the state's inland position, utilization of water carriers must be made in combination with land vehicles--"sea-truck" and "sea-train." A Vermont trucking firm tows special trailers from New Jersey to the marble mills at Proctor or to the slate mills in the Fair Haven-Hydeville area, loads the trailers, and then returns to the New Jersey docks where the trailers are hoisted aboard a ship especially designed to carry them. Unfortunately, no "sea-truck" facilities are available through Boston, or costs for this service might be less.[41] Although the "sea-truck" carrier is not as fast

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[40]Theodore A. Rossi, "Geography and Transportation in the Barre Granite Industry" (Paper done for Professor Albert S. Carlson, Geography Dept., Dartmouth College, Hanover, New Hampshire, November, 1962), p. 45. (Mimeographed.)

[41]Letter from E. W. Olson, President, Clarendon & Pittsford R.R. Co., Proctor, Vt., Nov. 27, 1964.

as other transport systems, the reduced costs make it possible for Vermont marbles to reach markets in Florida--a market area once completely dominated by Georgia producers. Shipments to the Gulf Coast made by "sea-truck" cost less than the same shipment sent by rail. Using this method, the marble and slate producers are also beginning to send shipments to the West Coast.[42] The "sea-train" carrier is used by producers to a small extent but does not receive as much attention as the "sea-truck" method.

Some mineral producers might question the utility of these methods. What about the small shipper--the one who ships in small amounts of less than a carload or truckload? To illustrate, a representative of the third largest slate producer in the region and a user of the "sea-truck" carrier, the Fair Haven Slate Company, says that their firm owns and maintains its own trucks because the major share of shipments are in less than truckload lots. They have to ship this way because of the required promptness of delivery and the small size of the orders. As many as five or six orders may be on one truck; therefore, their ability to use the "sea-truck" carrier is somewhat limited.[43]

Obviously, limitations exist in using "sea-land" systems for short-haul or for very small shipments; but there are major opportunities in their use for distant markets. Although it is rather early to interpret the future impact of ocean carriers on the transport methods of Vermont's mineral producers, there is little doubt that businessmen with an eye for opportunity should investigate carefully the utility of

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[42]Interviews with A. T. Howe and F. Graziano.

[43]Interview with F. Graziano.

water transport. Part of the mineral shippers' task in the future may be to inform customers of the advantages of water transport, because it is the customer who often indicates the method of shipment to be used.

Champlain Waterway

Another, but less immediate, prospect for future water transport is a proposed Champlain Waterway or, failing this, an "improved" barge canal. Both systems, by way of Lake Champlain and existing canals, would connect the St. Lawrence River with the Hudson River and the New York State Barge Canal. A Waterways Study Commission has for the past year been investigating the merits of the proposal. Assuredly, much debate has arisen over the proposed project. The basic issues are clouded by state politics; but the arguments focus upon two ideas.

Proponents favor the Waterway for its possible economic advantages, and opponents fear that a large number of ocean-going vessels will pollute Lake Champlain. Vermont's senior senator, George D. Aiken, is among those in favor of the Waterway. Senator Aiken maintains that the Waterway's completion would be a boon to the state's industry because the availability of cheap water transport would tend to reduce existing rail rates and open up new market areas.[44] State Senator James L. Oakes, Chairman of the Waterways Study Commission, along with other members such as State Senators John J. O'Brien and Daniel B. Ruggles, favors only an "improved" barge canal.[45] One vociferous group, the Lake

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[44] Rutland Daily Herald, September 11, 1963, p. 1 and January 8, 1964, p. 1.

[45] Vermont Champlain Waterway Commission, Report to the International Joint Commission (Burlington, Vermont, September 17, 1963), p. 6. See also James L. Oakes, "The Champlain Waterway," Public Utilities Fortnightly, LXXII (November 21, 1963), 3-19.

Champlain Committee, opposes any form of waterway or "improved" barge canal. The Committee, chaired by Mr. C. E. Dunton, a one-time tugboat captain, claims that the only effect such a waterway would have is to destroy Lake Champlain as a recreational center.[46]

Public opinion in New York and Vermont has been aired at extensive hearings held by the Waterways Study Commission. At one hearing Mr. Keith Wallace, President of the Vermont State Farm Bureau, corroborated Senator George Aiken's contention that the proposed Waterway could mean lower rail rates. Mr. Wallace claims that railroads in the Southern states have because of barge competition actually requested the Interstate Commerce Commission for rate reductions on certain commodities such as grain.[47] The concern of the railroads regarding competition is presented in the hearings by Mr. F. R. Stevenson, President of the Vermont Marble Company. (The Company owns the Clarendon & Pittsford Railroad.) He maintains that even if the proposed Waterway were completed:

> There is no assurance that the freight would be less. It would obviously take longer to reach us and also it would take business away from the rail connection which we have a substantial interest in preserving. . . . Any shipment over this proposed waterway which adversely affects the rail service could result in impairing the present rail service we enjoy to our consumers throughout the United States and Canada, which in turn would result in a loss of volume and a lower rate of employment in all of our operations.[48]

Mr. L. J. Ettinger, President of the Vermont Light Aggregate Company, a slate processing firm just south of Castleton, Vermont, does

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[46]Rutland Daily Herald, September 18, 1963, p. 1.

[47]Based on the author's personal attendance at Champlain Waterway Commission Hearings in Middlebury, Vermont, September 4, 1963.

[48]Champlain Waterway Study Commission, "Hearings" (Rutland, Vermont, August 30, 1963), p. 21. (Mimeographed.)

not agree with Stevenson's statement. He feels that his aggregate producing establishment could possibly benefit from the proposed Waterway because it might result in cheaper rail freight rates to New York City where they hope to sell a large part of their product.[49] Mr. Roland Vautour, recently resigned Director of the Vermont Development Commission, has pointed out an important possibility of the proposed Waterway. Vast amounts of granite rubble could be used for breakwater material, pilings, and as crushed stone if only a very cheap means of transport were available.[50] To determine the general opinion of men in different kinds of business in Vermont toward the proposed Waterway, one witness, Mr. Harley Chatterton, sent questionnaires to the state's major business firms. Of 28 questionnaires returned, 6 were from mineral producers. One granite producer felt the proposed Waterway would help his business; 2 other mineral producers--1 in granite and 1 in slate--felt that it might aid them; the 3 remaining producers--2 in the granite industry and 1 in the marble industry--expressed the belief that such a transport system would be of no value to their operations.[51] Of 42 mineral producers answering the general questionnaire designed for the present study, 10 said that they believe the proposed Waterway would benefit them, 4 felt that it might be helpful, 16 said it would be of no value, and 12 made no response.

What the possibilities are for the debated Waterway project are difficult to determine, but they should be given the fullest attention by Vermonters and especially by the state's mineral producers. So far,

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[49] _Ibid._, p. 3. [50] _Ibid._, August 27, 1963, pp. 4-6.

[51] _Ibid._, August 30, 1963, p. 32.

no thorough investigation has been undertaken to determine the contribution such a waterway could make to the state's economy.
Mr. Roland Vautour recommends a detailed study of the part the proposed Waterway could play in the development of Vermont's economy. In view of the transport needs of the many mineral industries in Vermont, a study of greater depth and scope than is possible here should be made to determine its potential use to them.

Summary and Conclusions

Transportation problems faced by Vermont's past and present mineral producers are in many ways similar. They continue to need transport systems capable of moving high-weight low-value items relatively long distances at rates that allow them to remain competitive with other regions.

The increasing distance of Vermont from the United States' center of population is a disadvantage but should not be overemphasized because the absolute amount of population within a given distance of the state is not decreasing. A distinct advantage of Vermont's location is its nearness to large urbanized areas of the Northeastern United States. Competing mineral regions located in areas such as Texas, Georgia, Minnesota, and Wisconsin must pay higher transport costs if they are to reach large urban market areas in the East. But some mineral areas--such as the slate district in eastern Pennsylvania--are even more advantageously situated for access to urban areas than their Vermont counterparts.

Vermont's location has advantages and disadvantages. Its position adjacent to an international border limits, to some extent, its access to a nearby marketing hinterland--the urbanized areas of Canada. High tariffs on goods entering Canada tend to increase the costs of placing finished mineral commodities on the Canadian market. There are, on the other hand, a few instances where the lack of tariffs and Canada's cheaper labor are utilized to the advantage of Vermont's mineral producers, as in the case of the Vermont Marble Company that ships rough stone to Canadian plants where it is milled and then sold on Canadian markets.

Although Vermont's present highway system is not good, the state's long-range plans for highway building should increase, to some extent, the ability of Vermont's mineral producers in reaching markets.

Vermont's long dependence upon bridge-line railroads has at times, when these systems have failed, placed its mineral producers under an added financial burden through increased transportation costs. The reopening of only segments of the Rutland Railroad still leaves some mineral producers without adequate accessibility to rail transport; and some producers who formerly used rail traction, in spite of their location near reopened segments of the Rutland, are now faced with the problem of customers not wanting to return to rail shipments.

Rail freight rates are difficult to interpret, but Vermont mineral producers have both advantages and disadvantages when compared with their competitors. Georgia granite producers can reach Midwestern markets more economically, but Vermont producers can send some commodities to Western states with less cost, even though they are at a greater distance from these markets. Future rate adjustments may tend to equalize any advantages or disadvantages that Vermont mineral producers presently have, but a firm prediction of the overall effects of these adjustments is difficult to make.

That trucks will continue to play an important part in transporting Vermont's mineral commodities is assured because of their (1) greater speed, (2) usefulness in making short hauls and in carrying small shipments, (3) realiability for safe transit of goods, and (4) avoidance of transsshipment costs. Shipments carried to the West Coast though are likely to continue a major function of the railroads because of their lower rates.

If Vermont's mineral producers are to continue competitive with other regions, they must explore every possible method of reducing shipment costs. Small shippers should explore the possibilities of centralized dispatching where several small orders could be sent in carload or truckload lots.

Some producers use "sea-land" carriers to ship traffic to the Gulf and Pacific Coasts, but the potentials of "sea-land" carriers should receive more attention even by small producers. Water transport could become very important to the state's mineral producers in the future if the proposed Champlain Waterway becomes a reality. Its completion might mean added access to new markets and a greater utilization of waste stone, such as granite and slate rubble--materials too heavy and valueless to move any distance with presently available transport systems. Transportation may well prove the deciding issue in the future growth of Vermont's mineral industries.

CHAPTER VII

LABOR

The labor force, in quantity but especially in quality, has an important influence on an industry's success or failure. An industry needs a stable, well-educated, and skilled labor force if it is to advance its position in the market place. To maintain an efficient work force, management, labor, and society as a whole must recognize the necessity for and endeavor to maintain good labor-management relations, general education, and training programs.

Both labor and management should view the function of production efficiency as a primary means by which an industry remains competitive, advances, or contracts; they must also recognize that competition must be met regardless of its source, whether it arises from other producers of the same commodity or whether it comes from substitute materials. Management's failure to understand the need for adequate training programs, adequate pay scales, maintenance of records (such as labor turnover rates and absenteeism), and effective methods of personnel selection results in inefficient utilization of its labor force. Labor must be ready to aid employers through a responsible attitude toward these several elements of personnel management that can help increase production efficiency. Society must accept its responsibility to both management and labor through the maintenance of educational and social opportunities for its potential labor pool.

Age Structure of the Labor Force

The age structure of Vermont's labor force is not optimal for meeting the needs of the state's industries. A large proportion of the state's population, 16 percent, lies in the 60 year plus group. This same age group for the United States encompasses less than 14 percent of the total population. Vermont's age group 20-59, which normally includes the most productive workers, is proportionally smaller than is this group for the entire United States: 45.8 as against 49.6 percent. The age structure of Vermont's labor force, therefore, is not as favorable as the United States' (Fig. 17).

Vermont's mineral industries employ an almost exclusively male labor force. According to the 1960 United States Census, the median age for all employed males in the state 14 years or older is 41.1 years. For workers in the state's stone, clay, and glass manufacturing industries, the median age is 43.8 years; for miners and quarrymen it is 41.4. Employers in the mineral industries claim that the primary reason for the age differential of workers in quarrying compared to mineral manufacturing establishments is that working conditions are neither as pleasant nor as safe in the quarries as in the processing plants. Therefore, as vacancies occur, workers quit the quarries and transfer to the manufacturing establishments. Thus, workers in the manufacturing establishments have gradually come to represent a more permanent and older labor force.

The median age (43.8) is 3.2 years greater for Vermont's mineral manufacturing workers than is the median (40.6) for all manufacturing workers in the state. When asked through the general questionnaire whether they felt that this age differential was a liability to their

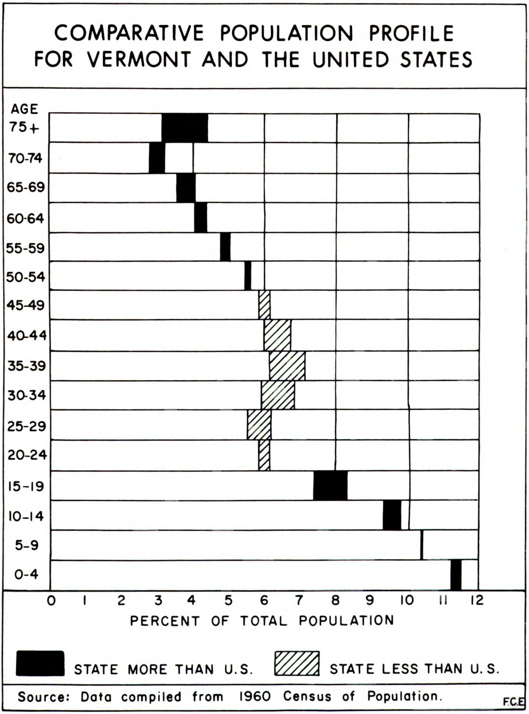
COMPARATIVE POPULATION PROFILE
FOR VERMONT AND THE UNITED STATES
AGE
75+
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
0 1 2 3 4 5 6 7 8 9 10 11 12
PERCENT OF TOTAL POPULATION
STATE MORE THAN U.S.
STATE LESS THAN U.S.
Source: Data compiled from 1960 Census of Population.
F.C.E.

Fig. 17

production efficiency, 17 of the 42 producers responding answered no. The primary reasons given for this opinion were that the older worker is more highly skilled and more reliable than the younger worker. But 16 producers said age was a liability because training the older worker is harder.

Many mineral producers interviewed complained of a lack of available young male workers who can enter their establishments. To determine the merit of the mineral producers' complaint, a cohort of males 10-24 years of age at the 1950 census was compared to the same cohort 20-34 years of age at the 1960 census. Upon comparing the two totals, a pronounced contrast appears. In 1950 Vermont had a total of 42,831 males between the ages of 10-24, but in 1960 Vermont had only 32,609 males in the 20-34 age group (Table 15). Mortality cannot account for this

TABLE 15.--Net out-migration of Vermont males in the decade 1950-1960 who were 10 to 24 years of age in 1950[a] (adjusted for mortality)

Male Population 1950 10-24 Years		Male Population 1960 20-34 Years		Out-Migration 1950-1960
	(000)		(000)	(000)
10-14	15,127	20-24	11,063	4,064
15-19	14,122	25-29	10,369	3,753
20-24	13,582	30-34	11,177	2,405
Totals	42,831		32,609	10,222
		Deaths		450[b]
		Net Out-Migration		9,772

[a]Calculated from data contained in: U.S., Bureau of the Census, Census of the Population: 1960, Vol. I: Characteristics of the Population, Part 47: Vermont.

[b]Estimated from data contained in: Vermont, Department of Health, Annual Bulletin of Vital Statistics, for the years 1950-1960 (annual issues; Burlington, Vermont: Queen City Printers, Inc.).

decrease. The only explanation for this decrease is that a large out-migration of young males occurred during this decade. This loss of potential workers can be, in the long run, detrimental to the mineral industries--especially if they are expanding. In the short run, however, if these industries are not expanding rapidly and the rate of retirement of older workers is not too great, the loss is not likely to hamper their operations to any extent.

Although the problem of out-migration of Vermont's work force is not unique among states, it is of a greater magnitude than what other states containing competing mineral regions are experiencing. The number of males 20-34 years of age residing in Vermont in 1960 was 22.8 percent less than it would have been if no net out-migration had occurred. Only Tennessee with a loss of 19.2 percent came near matching Vermont's loss of males by out-migration during the decade 1950-1960 (Table 16).

An exhaustive pursuit of the reasons for such a large out-migration of Vermont's male youth is not within the scope of this study. It is possible, however, that a considerable number of the migrants entered military service and remained there. Lack of economic incentive probably encourages this exodus of Vermont's youth. The state of Vermont, as well as its mineral producers, should examine the reasons for this loss of human resources, for it is quite likely, although difficult to prove, that it is the most capable members of its population who are migrating in the largest number.[1]

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[1]See for example: Amos H. Hawley, Human Ecology: A Theory of Community Structure (New York: The Ronald Press Co., 1950), pp. 344-45; Warren S. Thompson, Population Problems (4th ed.; New York: McGraw-Hill Book Co., Inc., 1953), pp. 303-05.

TABLE 16.--Net migration of and percent of males migrating from or to selected states during the decade 1950-1960 who were 10 to 24 years of age in 1950[a]

State	Male Population 10-24 Years in 1950	Male Population 20-34 Years in 1960	Deaths	Net Migration In	Net Migration Out	Percent of Males Migrating Who Were 10-24 Years in 1950
VERMONT	42,831[b]	32,609[b]	450[c]		9,772	-22.8
Tennessee	406,885	323,173	6,400		77,312	-19.2
Maine	103,971	87,309	1,529		15,133	-14.6
Pennsylvania	1,119,852	967,842	15,791		136,219	-12.2
Georgia	437,937	381,505	8,316		48,116	-11.0
Minnesota	320,364	288,972	4,443		26,949	- 8.4
Wisconsin	368,955	342,337	5,711		20,807	- 5.6
Michigan	693,013	705,130	11,507	23,624		+ 3.4
New York	1,410,193	1,489,458	20,507	99,772		+ 7.1

[a]Calculated from data obtained by letters from: Dale E. Welch, Statistician II, Maine State Dept. of Health and Welfare, Augusta, Maine, Dec. 1, 1964; Elwood G. Brown, Assoc. Biostatistician, New York State Dept. of Health, Albany, N. Y., Dec. 1, 1964; R. D. Nashold, Director Statistical Services, Wisconsin State Board of Health, Madison, Wis., Nov. 25, 1964; Raja R. Indra, Demographer, Michigan Dept. of Health, Lansing, Mich., Dec. 2, 1964; Emerson W. Storey, Research Analyst, Minnesota State Dept. of Health, Saint Paul, Minn., Dec. 2, 1964; Willie K. Boss, Statistical Supervisor, Georgia Dept. of Public Health, Atlanta, Ga., Dec. 1, 1964; William R. Dixon, Division of Data Processing, Pennsylvania Dept. of Health, Harrisburg, Penn., Dec. 7, 1964; Ann Dillon, Director of Statistical Service, Tennessee Dept. of Public Health, Nashville, Tenn., Dec. 10, 1964.

[b]Calculated from data contained in: U.S., Bureau of the Census, Census of the Population: 1960, Vol. I: Characteristics of the Population, Part 47: Vermont.

[c]Estimated from data contained in: Vermont, Department of Health, Annual Bulletin of Vital Statistics, for the years 1950-1960 (annual issues; Burlington, Vermont: Queen City Printers, Inc.).

Wages

Wages act as a strong attractive force to available labor. If Vermont's mineral establishments are to continue acquiring a good labor force, they must maintain a wage base comparable to other industries within and outside of the state.

Average weekly earnings in the mineral manufacturing (stone, clay, and glass) industries of Vermont compare favorably with most other manufacturing industries in the state.[2] In the durable goods classification only machinery ($96.63) and electrical machinery industries ($92.69) pay higher weekly wages than do the stone, clay, and glass industries ($91.52), and only one of the non-durable goods industries, paper, with a rate of $93.13, offers average weekly earnings higher than the stone, clay, and glass group (Table 17). On the basis of weekly wages,

Table 17.--Average weekly and hourly earnings in Vermont manufacturing industries, 1963[a]

Industries	Average Weekly Earnings (dollars)	Average Hourly Earnings (dollars)
Durable Goods		
All Durable Goods	86.78	2.05
Machinery (excluding electrical)	96.63	2.33
Electrical Machinery	92.69	2.30
STONE, CLAY, AND GLASS	91.52	2.18
Furniture and Fixtures	87.24	1.89
Lumber and Wood Products	65.83	1.56
Non-Durable Goods		
All Non-Durable Goods	75.92	1.91
Paper	93.13	2.12
Printing and Publishing	89.82	2.24
Food	83.85	1.98
Textiles	62.24	1.73
Apparel	50.58	1.46

[a]Calculated from data contained in: Vermont, Dept. of Employment Security, The Vermont Labor Market Newsletter, XVIII (January-December, 1963); and Vermont, Dept. of Employment Security, The Vermont Labor Market, I (January, 1964).

Vermont's mineral manufacturing industries appear to be competitive with

[2]Mining industries will be discussed later.

most other industries in the state.

Hourly wages are higher in the machinery ($2.33) and electrical machinery ($2.30) classifications than they are in mineral manufactures ($2.18). One non-durable goods industry, printing and publishing ($2.24), has an hourly rate higher than do mineral manufactures. The paper industry ($2.12) pays only a slightly lower rate. The stone, clay, and glass industries, however, compare favorably to the overall average hourly rate paid by all durable goods manufactures ($2.05), and they compare very well to all non-durable goods producers ($1.91). As is the case in the weekly wage rate, the attractive force for labor based on hourly wages appears to be substantial.

An important feature of the wage structure not yet discussed is the difference in wage rates paid in mines and quarries and in manufacturing establishments. For 1963 slate and marble quarrying establishments paid an average wage of $97.47 a week. This is 6.5 percent higher than the rate paid by the state's mineral manufacturing establishments. According to producers, the higher wages paid in quarrying is due to the difficulty of keeping workers in jobs that are dangerous and relatively unpleasant compared to the manufacturing establishments. The granite industry is an important exception to the general rule of wage differentials. Exceptionally high skill levels required in granite manufacturing demand higher wages. Granite sawyers, polishers, and carvers average $3.40 an hour compared with $2.30 an hour for quarrymen.[3]

How difficult is it for Vermont to compete effectively with other

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[3]Interview with Maurille J. Fournier, Bus. Agent, Granite Cutters' International Assoc., Barre, Vt., July 2, 1964.

regions in wages paid to its mineral workers? Will their competitive position improve in the future? This last question is especially pertinent because some scholars claim that past predictions of a gradual diminution in regional wage differentials in the United States have not proved true;[4] therefore, Vermont's mineral producers cannot depend on their competitive position improving through a relative increase in wages paid in the South. An industry burdened with wage scales disproportionately above other regions is placed at a disadvantage in its profit margin unless worker efficiency offsets this liability. This does not mean that Vermont labor should work for a pittance and sacrifice its own well being for the sake of profits, but it does imply that labor must recognize the necessity for increased production through maximum worker efficiency. Although wage data are exceptionally difficult to obtain for specific mineral industries, some idea of Vermont's relatively high wages is presented in Table 18.

Education, Labor Needs, and Training Programs

Educational background and level of attainment are important when considering the qualities of labor. According to Mr. James S. Welch, Director of the Industrial Division of the Vermont Development Department, this subject always arises when his office is attempting to persuade industrialists to locate in Vermont. In fact, educational attainment is, he claims, the second most important item to them in a list of 15.[5]

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[4] See for example: E. Willard Miller, A Geography of Manufacturing (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962), p. 7.

[5] Interview with J. S. Welch, Director, Industrial Division, Vermont Development Dept., Nov. 18, 1963, Montpelier, Vt.

TABLE 18.--Comparative Wage Rates for mineral industries in Vermont and other states with competing regions

State	Average Hourly Wage (in dollars)
VERMONT	
Granite (sheds and quarries).	2.85[a]
Marble (mills and quarries)	1.75[b]
Georgia	
Marble (quarries only).	1.64[c]
Tennessee	
Marble (mills and quarries)	1.56[c]
Maine	
Granite, Slate, and Limestone (all workers)	2.02[d]

[a]Calculated from data contained in: Agreement between Granite Manufacturers and United Stone and Allied Products Workers of America, May 1, 1962-May 1, 1965 ([n.p.] : Printing Union and Pressing Label Association [n.d.]); and Interview with Maurille J. Fournier, Business Agent, Granite Cutters' International Assoc., Barre, Vt., July 2, 1964.

[b]Calculated from data contained in: Agreement between Vermont Marble Company and United Stone and Allied Products Workers of America, May 6, 1963-May 1, 1966 ([n.p.] : Printing Union and Pressing Label Assoc. [n.d.]).

[c]Data obtained by letter from William Peitler, Gen. Pres., International Assoc. of Marble, Slate and Stone Polishers, Rubbers, and Sawyers . . ., Washington, D. C., Aug. 5, 1964. (Figure for Georgia represents the average maximum hourly wage.)

[d]Data obtained by letter from Joseph E. A. Cote, Commissioner, Employment Security Commission, Augusta, Maine, Aug. 5, 1964.

An educated work force is only part of Vermont's industrial labor needs. Also important is an increased skill level in the labor force. The pace of technological change and automation grows each year. For every 100 skilled workers in 1955 the nation must have 122 in 1965 and it must have 145 in 1975.[6] *Time* magazine recently made clear trends in

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[6]"Shortage of Skills," *American Vocational Journal*, XXXVI (May, 1961), 30.

education and skill needs at all levels of the work force when it stated, "Virtually all jobs now being created are for the skilled and the educated; of the 1,500,000 jobs gained in the past year, 1963, only about 400,000 went to blue collar workers." These trends make it obvious that the skills of the lower segments in the work force must be upgraded.[7] The necessity for upgrading also applies to workers in the mineral industries. Future mechanization, as it occurs, will make new demands on the worker's ability. Although some scholars of mechanization, such as Arnold W. Green, would argue that automation decreases the need for skilled workers,[8] the introduction of machinery and even some automation has not decreased the need for high skill levels among workers active in quarrying and in finishing granite, marble, and slate.

Educational level

How does Vermont's male population compare with males for the United States as a whole and for other areas in its level of educational attainment? This question is important because in an age of changing technology workers need a good foundation upon which the development of competent skills can be built.

When the median years of school completed for Vermont and United States males 25 years of age or more are compared, Vermont gives a fair showing. In 1960 the median number of school years completed in Vermont by all males 25 or over was 9.8; the national median for this group was 10.3. More germane to our problem, however, is a comparison of Vermont's

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[7]"Employment: Room above the Bottom," Time, May 1, 1964, p. 87.

[8]"Technology and Utopia," Chapter XXVI, Sociology: An Analysis of Life in Modern Society (4th ed.; New York: McGraw-Hill Book Co., 1964), pp. 643-68.

status with areas containing competing mineral industries. Comparisons based upon county units in states containing major competing mineral industries show Vermont favorably, and this should be an advantage to the state's mineral producers (Table 19).

TABLE 19.--Median number of years in school completed by males 25 years or older by major mineral producing counties in Vermont and other states in 1960[a]

State and County	Median Years Completed
VERMONT	
Rutland	10.3
Washington	10.1
Lamoille	9.5
Chittenden	11.1
Windsor	10.8
Wisconsin	
Marathon	8.7
Waushara	8.6
Minnesota	
Stearns	8.8
North Carolina	
Cherokee	7.5
Texas	
Hudspeth	9.1
Pennsylvania	
Northampton	9.6
Georgia	
Elbert	8.2
Murray	7.2
Pickens	7.4
Tennessee	
Knox	9.7
Michigan	
Presque Isle	8.8
Missouri	
Jasper	9.6
Jefferson	8.8
New York	
St. Lawrence	9.6
Washington	9.6

[a]Compiled from data contained in: U.S., Bureau of the Census, Census of Population: 1960, Vol. I: Characteristics of the Population.

Future labor needs and training programs

What is the outlook for future labor needs in Vermont's mineral industries? A recent study made by the Vermont Department of Employment Security that included a large number of the state's mineral producers shows that several of these industries do not expect to add a large number of workers to their payrolls during the next five years (Table 20).

TABLE 20.--Future labor needs in Vermont's mineral industries[a]

Industry[b]	Total Employment[c] as of June 1963	Total Employment Expected in Five Years	Percent Increase
Granite	1,853	1,875	1.2
Marble	1,306	1,306	0
Slate	319	348	9.1
Talc and Asbestos	351	389[d]	10.8
Sand and Gravel	16	16	0

[a]Compiled from data obtained by letter from Gordon H. Ladd, Chief, Research and Statistics, Dept. of Employment Security, Montpelier, Vt., Oct. 25, 1963.

[b]Includes 75 employers in granite, 4 in marble, 13 in slate, 3 in asbestos and talc, and 2 in sand and gravel. (Does not include all firms.)

[c]Includes those in training and present vacancies.

[d]Personal interviews determined that over half of this increase will occur in the talc industry. A new plant for processing talc has recently been constructed near the village of Reading.

Why should producers expect to add so few new workers? This question was explored through numerous interviews and the general questionnaire. Some small producers claim to have little desire to expand. They want only to earn a living from the business and, if possible, to remain the same. A large number of granite producers and the two major marble manufacturers expect that the market for monuments will remain rather stable and that mechanization will reduce their requirements for unskilled labor.[9]

The rate of mechanization and automation in mineral industries is at times relatively slow when compared to most other industries. In Vermont's mineral industries the process of mechanization and automation is underway, but the rate of progress in some is indeed slow.[10] Although progress is being made, mineral producers, nevertheless, should look to the future, for it will increasingly demand greater mechanization, and with this demand will come, as many scholars predict, a concomitant advance in the demand for increased skills and specialized training.[11] The worker will continue to need an intimate knowledge of his raw material, but he will, also, likely be required to operate new and more complicated machinery where decisions must be made that will maintain a steady flow of production--decisions that may often mean the loss or saving of thousands of dollars in equipment or raw materials. Therefore, the future requirements for a skilled labor pool is a crucial issue for consideration

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[9]Interviews with Lorenzo Chiodi, Co-owner, Modern Granite Co., Barre, Vt., Dec. 19, 1963; Roe McKenzie, Vice Pres. of Personnel, Rock of Ages Corp., Graniteville, Vt., Dec. 7, 1963; William Roy, Gen. Mgr., Wells-Lamson Quarry Co., Inc., Websterville, Vt., Nov. 1, 1963; Ernest Hennis, Office Mgr., Adams Granite Co., Barre, Vt., July 2, 1964; A. T. Howe, Vice Pres., Vermont Marble Co., Proctor, Vt., Dec. 6, 1963; Erling O. Olmland, Asst. Secy., Green Mountain Marble Co., W. Rutland, Vt., July 1, 1964.

[10]Extensive observation in slate mills and quarries, in the talc mines and processing plants, and in the granite sheds of Vermont verify this contention.

[11]See for example: J. Roland Ingraham, "Education and Unemployment," American Vocational Journal, XXXVII (May, 1962), 9-10, 31; Harold H. Punke, "Implications of Automation," American Vocational Journal, XXXIV (December, 1959), 26-28, 31; Howard L. Hurwitz, "What Shall We Teach about Automation?" Social Education, XXVII (October, 1963), 301-04; Seymour L. Wolfbein, "Automation and Skill," The Annals of the American Academy of Political and Social Science, CCCXL (March, 1962), 53-59.

by Vermont's industries if they hope to remain competitive and to grow. To be adequately prepared for the future, these industries need active training programs based upon a concept of replacing workers who retire from the labor force and upon filling new positions created through technological advancement.

A study made by the Vermont Department of Employment Security shows that producers in the various mineral industries have many positions they consider "hard-to-fill" (Table 21). With their obvious awareness of these many positions, it is indeed strange that so little provision is made by most of the mineral producers and the industries, as a whole, to provide for trained personnel in the future.

Of the major mineral producing industries in the state only the granite industry is making a concerted effort to train skilled workers. In February 1964 the Barre Granite Association had 25 men in apprenticeship programs, training for positions as draftsmen, stonecutters, polishers, sawyers, and sandblasters.[12] The United States Department of Labor in March 1964 gave the Barre Granite Association a federal grant of $65,000. These funds made available under the Manpower Development and Training Act have provided for the training of 20 stonecutters.[13] The public school system maintains an extensive training program under what is known as the Barre School of Memorial Art. The main emphasis of instruction is on training draftsmen. Barre granite establishments work with the public school system in training granite workers. Students work in the

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[12]Letters from Milton V. Lyndes, Gen. Mgr., Barre Granite Assoc., Barre, Vt., Feb. 19, 1964; Albert A. Fraser, Secy., Vermont Apprenticeship Council, Montpelier, Vt., Feb. 21, 1964.

[13]Rutland Daily Herald, March 5, 1964, p. 3.

TABLE 21.--Current vacancies, hard-to-fill positions, and number of men in training in Vermont's dimension stone industries as of June, 1963[a]

Industry	Current Vacancies	Hard-to-Fill Positions[c]	Men In Training
Granite			
Draftsmen	0	9	3
Foremen	0	5	0
Stonecutters	1[b]	26	16
Polishers	0	13	2
Sandblasters	0	11	2
Sawyers	0	9	2
Derrickmen	0	4	0
Maintenance	0	61	0
Managers	0	9	0
Marble			
Channel and Drill Operators	0	27	0
Quarrymen	0	30	0
Finishers	3	?	0
Slate			
Rockmen	0	21	0
Splitters	4	14	0
Sawyers	1	5	0
Cutters	0	3	0
Trimmers	4	9	0
Hoist Operator	1	?	0
Maintenance	0	1	0
Foremen	1	5	0

[a]Compiled from data obtained by letter from Gordon H. Ladd, Chief of Research and Statistics, Dept. of Employment Security, Montpelier, Vt., Oct. 25, 1963.

[b]Personal observation, July 2, 1964, at the GCIA union office, Barre, Vt., showed six positions open for stonecutters.

[c]The hard-to-fill column has no direct relationship to the other data; the figures given represent the number of persons employed in occupations that employers consider as hard to fill.

sheds or offices when not attending their regular school classes, and upon graduation they are nearly ready for a position as a journeyman. Depending upon the skill requirements of a particular job and union regulations, these apprenticeship programs take from three to five years to complete.

Other mineral industries have used little foresight in meeting potential labor needs. The marble industry, with 57 positions listed as hard to fill has no training program. Slate producers list 58 positions as hard to fill but do not maintain any training program. Yet, some of these same producers claim that one of their greatest difficulties is obtaining trained personnel.[14]

An added argument can be given for the establishment of training programs if the overall skill levels of workers in the different mineral industries are considered. In the granite industry, which has a rather large training program, almost 30 percent of the workers are considered skilled and another 26 percent semiskilled. The slate industry has over 35 percent in the skilled category and 43 percent in the semiskilled category; the marble industry has 16.5 percent and 26 percent in these categories respectively. The asbestos and talc industries, grouped together, have nearly 23 percent in the skilled classification and 24.5 percent in the semiskilled grouping (Table 22). When these workers retire, replacements cannot be trained overnight! Yet, public officials responsible for training programs in Vermont contend that it is difficult to obtain an adequate participation of employers.[15] In fact, the Secretary of the Vermont Apprenticeship Council, Albert A. Fraser, states that they (the Council) have never been "approached to be of assistance" in setting up programs for training skilled craftsmen by any of the members of the

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[14]Interviews with Clement J. Perfetti, Gen. Supt., Green Mountain Marble Co., W. Rutland, Vt., Sept. 23, 1963; A. B. Potter, AB Potter Slate Co., Poultney, Vt., Jan., 1964; William Prehoda, Pres., Prehoda Brothers Slate Corp., Granville, N. Y., Jan. 16, 1964 (all of Prehoda's establishments are in Vermont).

[15]Letters from Fraser; and John A. Conway, State Supervisor, Bureau of Apprenticeship and Training, U.S. Dept. of Labor, Burlington, Vt., March 20, 1964.

TABLE 22.--Percentage distribution of employment in the various mineral industries of Vermont by occupation and skill level as of June 1963[a]

Occupation Group	Percent Distribution				
	Granite	Marble	Slate	Talc and Asbestos	Sand and Gravel
Professional and Managerial	9.6	3.6	2.6	11.4	
Clerical and Sales	8.2	9.0	3.9	5.7	18.8
Service				2.6	
Craft and Manual Occupations	82.2	87.4	93.5	80.3	81.2
Skilled	29.9	16.5	35.3	22.8	--
Semiskilled	26.2	26.1	43.1	24.5	81.2
Unskilled	7.9	2.8	10.1	14.5	--
Skill Level Unknown	17.0	41.9	4.9	18.5	--
Apprentices	1.2	--	--	--	--
Total	100.0	100.0	100.0	100.0	100.0

[a]Compiled from data obtained by letter from Gordon H. Ladd, Chief of Research and Statistics, Dept. of Employment Security, Montpelier, Vt., Feb. 24, 1964. This data is based upon replies by employers to an occupational survey of June 1963.

marble, slate, talc, or asbestos industries. He believes, however, that there are many opportunities for developing skilled training programs in some of these industries--especially for mechanics.[16] His belief is surely justified because as added mechanization and automation occur in the future, needs for mechanics will also increase. Although the Council has never been approached for aid, it has, nevertheless, attempted several times to set up training programs in cooperation with Vermont's largest marble producer, the Vermont Marble Company. All attempts have failed.[17]

Various reasons are offered to explain the lack of programs for

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[16]See for example: Arnold R. Weber, "The Rich and the Poor: Employment in an Age of Automation," Social Service Review, XXXVII (September, 1963), 252.

[17]Letter from Fraser.

training men in these industries. The workers' lack of desire to participate in an extended training period is an example. One manager in the granite industry pointed this out as especially true in training carvers. Training a carver requires 5 to 12 years. Also, because of the time and cost involved in training carvers, management hesitates to make an investment in a worker who may leave for another position. The result is that most carvers are brought from foreign countries.[18] Other reasons given for the lack of training programs are: (1) older employees are suspicious of training programs, and employers fear these suspicions may cause a disruption in harmony, (2) employers are fearful that such programs will mean more government interference in handling their business, and (3) employers fear meddling by labor unions desiring to have a say in the type of training program to be established.[19]

Are these reasons enough? An emphatic "no" is the answer. With such large proportions of their workers in the skilled classification, the slate, marble, talc, and asbestos industries should give careful consideration to the practicability of training programs through apprenticeship. This is especially true since a large number of job types are listed by the employers themselves as hard to fill. If management expects to update production methods through mechanization and automation, if management expects to maintain its present position in the market

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[18]Interview with Roe McKenzie, Vice Pres. of Personnel, Rock of Ages Corp., Barre, Vt., Dec. 7, 1963.

[19]Letter from A. A. Fraser, March 6, 1964. One writer, Felician Foltman, in a review of Kate Liepman's book on apprenticeship brings out one of her main points that management and labor view apprenticeship training from a different standpoint--labor as a means of controlling the labor supply and management as a source of labor. Felician Foltman, Review of <u>Apprenticeship: An Enquiry into Its Adequacy under Modern Conditions</u> by Kate Liepman, <u>Industrial and Labor Review</u>, XIV (July, 1961), 645-47.

place or to have any added growth with the greatest efficiency, it should take steps to maximize the fulfillment of these expectations.

Labor Turnover Rates

Labor turnover rates[20] are to some extent indicators of worker satisfaction, labor-management relations, efficiency of worker selection, or as stated in an article appearing in the International Labor Review, the age (maturity) of an industry--older industries usually have less labor turnover.[21] Excessively high labor turnover rates can decrease plant efficiency and lower worker morale. It is also expensive for employers to train men only to have them quit shortly thereafter.

The average national labor turnover rate for all manufacturing workers during the period 1955-1962 was annually 8.22 percent;[22] national labor turnover rates for stone, clay, and glass manufacturing from 1958-1963 annually averaged 7.63 percent.[23] Vermont's turnover rate in manufacturing mineral industries for the period 1958-1963 was only 6.17 percent. Compared to the national average, Vermont's labor turnover rate is low (Table 23). Unfortunately Vermont's rate cannot be compared to specific mineral industries in competing areas in other states because of nondisclosure rules and lack of data. In fact, only a few states can

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[20]Refers to the percent of worker accessions (new hires and recalls) and separations (quits, layoffs, and discharges) made by employers as compared to the average annual total employment.

[21]"Labour Turnover--Meaning and Measurement," International Labor Review, LXXXI (July, 1961), 520.

[22]The Conference Board, The Economic Almanac, 1964 (New York: The National Industrial Conference Board, 1964), p. 39.

[23]Calculated from data obtained by letter from Robert O. Dorman, Chief, Division of Industry Employment Statistics, U.S. Dept. of Labor, Washington, D. C., July 13, 1964.

TABLE 23.--Average annual labor turnover rates in the mineral manufacturing industries in Vermont, 1958-1963[a]

Types of Turnover	Annual Average (in percent) 1958	1959	1960	1961	1962	1963	Average for 1958-1963
Total Turnover	4.9	7.5	6.2	5.6	6.3	6.5	6.17
Total Accessions (hires and recalls)	2.5	3.4	2.9	2.9	3.1	3.4	3.03
New Hires	1.6	2.3	2.0	2.2	2.3	2.4	2.13
Total Separations	2.4	4.1	3.3	2.7	3.2	3.1	3.13
Quits	.9	1.4	1.3	.7	1.2	1.3	1.13
Layoffs	.8	1.3	.7	.8	.7	.6	.82
Discharges	.7	1.4	1.3	1.2	1.3	1.2	1.18

[a]Calculated from data obtained by letter from Gordon H. Ladd, Chief of Research and Statistics, Dept. of Employment Security, Montpelier, Vt., Feb. 24, 1964, and June 29, 1964. These are average annual rates per 100 employed workers. Rates for the quarrying segment of the mineral industries are not available.

be compared at all. But for those two states that can be compared--Georgia and Massachusetts--Vermont's rate is high (Table 24).

TABLE 24.--Comparative total labor turnover rates for mineral manufacturing workers in Vermont and other states[a]

State	Annual Average (in percent)
VERMONT	6.17
Georgia	5.85
Massachusetts	4.71

[a]Calculated from data obtained by letter from Robert O. Dorman, Chief, Division of Industry Employment Statistics, U.S. Dept. of Labor, Washington, D. C., July 13, 1964.

The quit rate, a direct measure of worker satisfaction, is also below the national average in Vermont. According to John Perry, a labor-management consultant to the Small Business Administration, quit rates of more than 3 percent a month require remedial action.[24] Vermont's rate for 1958-1963 averaged 1.13 percent; the national average for the period 1955-1962 was 1.46 percent. Even though this comparison is favorable to Vermont, the small number of quits may actually reflect a lack of alternative opportunity and not worker satisfaction.[25]

Since quits and layoffs do not account for total separations, the remainder stems from company requests--discharges. Perry says that monthly labor discharge rates should be well below one-half of 1 percent (6 percent annually). If they are more, remedial action in hiring procedures is needed. At the same time, he points out that an annual rate of 2 percent can be considered very low.[26] On this basis, Vermont's mineral manufacturing establishments have a very unfavorable discharge rate--an annual average of 1.18 percent (14.16 annual rate) during 1958-1963. This rate is well above the national average of .56 percent (6.72 annual rate) for the period 1955-1962.[27]

According to several mineral producers, the labor turnover rate in quarries is considerably higher than in manufacturing plants. Mr. Ralph E. Williams, President of the Vermont Labor Council, estimates that the turnover rate in the state's marble quarries is as high as 20 percent annually; but a representative of one of the major marble

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[24]John Perry, Human Relations in Small Industry, Small Business Management Series No. 3 (2nd ed.; Washington: U.S. Government Printing Office, 1954), p. 26.

[25]See for example: Charles A. Myers, Labor Mobility and Economic Opportunity (New York: John Wiley & Sons, Inc., 1954).

[26]Perry, loc. cit.

[27]The Conference Board, loc. cit.

companies cites their annual rate at 120 percent![28] Mr. John C. Lawson, National Executive Director of the United Stone & Allied Products Workers of America concurs in the opinion that turnover in the marble quarries is high, but he claims the rate is low in the state's granite quarries.[29] The higher turnover in marble quarries may be due partly to the greater hazards and unpleasantness of underground work. Because of the opinions expressed by members of management and labor that turnover rates are especially high in some quarrying establishments--with one firm's documented at 10 percent monthly--more intensive study is needed to determine the reasons for this condition.

Although maintenance of labor turnover records can be helpful in determining reasons for quitting and can aid in detecting inadequacies in pay scales,[30] only 3 of the 42 firms responding to the general questionnaire designed for this study said that they keep such records. Even though discharge rates in Vermont's mineral establishments are not high, many producers could likely benefit by setting up more systematic programs for obtaining workers or for moving workers to more suitable positions within their firm.

Extensive interviews, as well as answers received to the general questionnaire, indicate that few, if any, personnel records are kept by most firms. This failure is evident in the lack of records covering absenteeism, accidents, and personnel in general. Many establishment owners

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[28]Interview with Ralph E. Williams, Pres., Vermont Labor Council, Rutland, Vt., March 13, 1964; and answers on confidential questionnaire.

[29]Interview, Barre, Vt., July 2, 1964.

[30]"Labour Turnover . . .," op. cit., p. 517.

and operators have only the vaguest notion of what these rates are. Such records, if properly used, can lead to better personnel management, a more efficient utilization of human resources, and, consequently, greater profits (Table 25).

TABLE 25.--Number of Vermont mineral producing firms maintaining personnel records based on 42 firms responding to the general questionnaire

Type of Record	No	Yes	No Response
Labor Turnover	34	3	5
Accident Rates	19	18	5
Absenteeism	21	17	4

Unionization and Labor-Management Relations

Mutual understanding by management and labor of the problems confronting the other is necessary for harmonious relations. When either fails to respond to the need for compromise, the consequences are often strife, hostility, and financial waste.

Labor and management in Vermont's mineral industries have not always held to the principle of compromise. Strikes have occurred at one time or another in most of the major mineral industries, such as copper, marble, granite, and slate. Neither management nor labor could claim complete victory in settling these disorders for in the long run each stood to lose either in profits or wages. The task here though is not to discuss the entire groundswell of the Vermont labor movement nor management's attempts to stem its onrush, but rather it is to view present conditions of labor-management relations and their implications for the future.

Unionization

Nearly 70 percent of the approximately 175 mineral firms in the state are unionized (Table 26). Although Vermont's mineral industries

TABLE 26.--Number of firms unionized in Vermont mineral industries as of July, 1964[a]

Mineral Industry	Number of Firms Unionized	Total Number of Firms
Granite	115	125
Marble	2	8
Slate	3	18
Talc	1	2
Asbestos	1	1
Sand and Gravel	0	11
Brick	0	2
Concrete Block	0	9
Limestone	0	2

[a]Data compiled from personal interview with John C. Lawson, Executive Secretary of the United Stone and Allied Products Workers of America, Barre, Vt., July 20, 1964; and letter from Maurille J. Fournier, Bus. Agent, Granite Cutters' International Assoc. of America, Barre, Vt., July 7, 1964.

cannot be considered strongly unionized in total firms organized, approximately 78 percent of the state's 4,750 mineral employees work for unionized firms.

Vermont's granite and marble industries are largely unionized, but most of the remainder are only partially organized and some not at all. The granite industry is the most unionized of all Vermont's mineral industries. With one exception, only the very smallest firms remain unorganized. The granite industry has two unions. Shed workers, including cutters, polishers, draftsmen, and tool sharpeners, are members of the Granite Cutters' International Association of America (GCIA). Quarrymen, boxers, and derrickmen belong to the United Stone and Allied Products Workers of America (SAPW). Both unions are affiliated with the AFL-CIO.

The SAPW also represents all classes of workers in the unionized slate and marble establishments. Unionization in the marble and slate industries is not nearly so strong as it is in the granite industry. Of the 5 major slate producers, only 3 are unionized. None of the 13 remaining smaller firms is organized. Among the 8 marble producers, only 2 are unionized--the Vermont Marble and Green Mountain Marble Companies. This, in effect, encompasses most workers in the industry--1,270 of a total 1,300; but in spite of this numerical strength, union officers do not consider their position in the industry strong (to be discussed in greater detail later).

Labor-management relations

The topic of labor-management relations, although very important to an analysis of Vermont's mineral industries, is also an exceptionally difficult research area. The strong sentiments involved make hazardous the task of determining fact from emotional exaggeration. Consequently, the subject of labor-management relations was handled as much as possible through a non-directive approach. Its application to management was fairly successful but was difficult with labor because questions could not be brought out indirectly. In spite of this limitation, a concerted effort was made: (1) to detect the general rapport and appreciation of the necessity for cooperative effort by labor and management in Vermont's mineral industries and (2) to ascertain both labor and management's attitudes toward increasing the competitive position of the various industries through automation and increased efficiency, on the one hand, and incentives, on the other.

Attitudes of management. The many different mineral producers interviewed expressed a wide range of opinion regarding labor, labor unions, and labor-management relations. Some producers are outwardly hostile toward any efforts at organizing labor, and they feel that labor little appreciates management's problems. Others feel that labor, whether unionized or not, is making an honest effort in helping management meet competition and in maintaining a cooperative relationship.

The most violent encounter with anti-unionism occurred in a granite establishment. Each time the topic of unions arose the interviewee went into a tirade. At one point the employer called an employee away from his work and demanded of him, "Tell this man what you think of unions. . . ." The employee dutifully proceeded to reprove the labor unions. According to these two men, attempts out of Barre had been made to organize them, and when mild persuasive tactics failed, the unions had resorted to threats of violence.[31] Mr. Ralph E. Williams, President of the Vermont Labor Council (VLC), described another case of overt hostility. When six employees of Tatko Brothers Slate Company in Poultney, Vermont, attempted to organize the company's workers, management discharged all six.[32] This firm is now unionized and the six men have been re-employed.

Others are less openly hostile to unions and union efforts at organization, but they are attempting to avoid unionization through offering benefits comparable to those received under the unions. Many offer paid vacations, insurance, and other fringe benefits. Management of one slate firm, to obviate any efforts at unionization, purposely

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[31]Interview with Fred Garand, Owner, Garand-Teed Quarries, Inc., Adamant, Vt., Dec. 19, 1963.

[32]Interview with R. E. Williams.

pays its employees an average of 11 cents an hour above the union's minimum wage and also maintains, for each worker, a company sponsored $5,000 life insurance policy.[33]

In most firms unionized there seems to be mutual respect between labor and management with only a few instances of underlying hostility. What might be termed "tolerance," rather than acceptance of labor unions, was detected in several of the establishments of the Vermont Marble Company. Vermont Marble has experienced several strikes during its history and was not effectively unionized until 1935. Mr. Williams, VLC President, claims that Vermont Marble has a standard policy of attempting to siphon off into management positions capable shop stewards.[34] The author observed an instance of this practice not at Vermont Marble but during a joint labor-management interview at Rock of Ages Corporation. Labor's representative, Mr. George Quillia, Secretary-Treasurer of the Graniteville Branch of the GCIA and a plant worker for Rock of Ages, was to be promoted in the near future to a junior executive position in the corporation.[35] Citing this example is not meant to serve as an indictment of management's motives. This practice could often have a positive effect in maintaining cordial labor-management relations and in helping

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[33]Interview with Ryan T. Oakes, Plant Mgr., Vermont Light Aggregate Co., Castleton, Vt., March 3, 1964. Similar situations were encountered during interviews with A. B. Potter, Owner, AB Potter Slate Co., Poultney, Vt., Jan. 22, 1964; Gaylord Baker, Owner, Baker Slate Tile Co., Poultney, Vt., Jan. 2, 1964; James Ticehurst, Office Mgr., The Vermont Associated Lime Industries, Inc., Winooski, Vt., Sept. 6, 1963.

[34]Interview with R. E. Williams.

[35]Joint interview with George Quillia, Secy., Graniteville Branch of the GCIA, and Roe McKenzie, Vice Pres. of Personnel, Graniteville, Vt., Dec. 7, 1963.

a firm stregthen its management staff.

Another case of management's "tolerance" of labor rather than acceptance is evidenced in the slate region. The president of one of the larger slate firms, during two separate interviews, commented that "The biggest mistake we ever made was to let the unions in." This establishment was not unionized until 1961.[36]

Attitudes of labor. One limitation in the scope of data collected on attitudes present in labor must be noted. Every attempt to meet with labor leaders at the "local" level of organization, with the exception of one union officer in the granite industry, resulted in failure. The presidents of the various labor locals either failed to answer requests for interviews or referred the request to Ralph E. Williams, President of the Vermont Labor Council. When this was brought to the attention of the VLC President, he expressed the opinion that the reason for the local labor leaders' reluctance to see outsiders was that many of the minor union officers neither really know how their union functions, nor are they acquainted with the contents of their immediate contracts. Yet, when requested to aid the author in seeing members of "grass roots" labor, the President of the VLC made no effort to help.[37] Every labor leader interviewed, including Mr. Williams, however, was quite cooperative and willing to discuss freely any questions raised.

Labor leaders' foremost complaint about management is its indifference to what they feel are legitimate on-the-job grievances. Unsettled grievances have several times resulted in "wildcat" strikes.

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[36]Name withheld to protect interviewee.

[37]Interview with R. E. Williams.

Recently this problem arose in the granite industry. A foreman made repeated derogatory comments about his men's work; the workers informed management they would no longer work under him. Management would not remove the foreman, and the workers walked out in an unauthorized strike. Short-sightedness on the part of both management and labor resulted in losses to both parties, especially since this was the rush season. According to Mr. Maurille J. Fournier, Business Agent for the Barre Local of the GCIA, misunderstandings like this are his greatest problem.[38] Mr. John C. Lawson of the SAPW described similar cases attributable to what might be called a lack of "preventive maintenance" in labor-management relations.[39]

In spite of minor difficulties no major strife has occurred in the granite industry since 1952 when there was a five-month strike. No strikes have occurred in the marble industry since 1935-1936 and none in the slate industry since 1962. Most labor-management difficulties are settled through grievance committees.

As stated before, care must be used in making generalizations about attitudes, but one important point must be brought out in conjunction with labor's attitude toward production efficiency. Field observations in several granite establishments show that certain union regulations and worker practices retard production efficiency. For example, when a granite cutter, as a member of the GCIA, finishes with a piece of stone, he is not allowed to move it, regardless of its size. The smallest base piece must be moved either by a lumper (general laborer) or a

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[38]Interview, Barre, Vt., July 2, 1964.

[39]Interview with J. C. Lawson.

derrick operator--both of whom belong to the SAPW. This problem is especially emphasized when the overhead crane is occupied for a long time. When the crane is needed to change large stone blocks at the wire saw tables, the cutters are supposed to indicate whether they will need a new stone during this period. They do not always do this, and the result is that they may be idle 20 minutes or more.[40] Because a cutter is prohibited from having more than one piece of stone at hand, the crane operator cannot "bank" stones so as to reduce idle time. Also, workers start a few minutes late and quit a few minutes early.[41]

To put it bluntly, these practices exemplify featherbedding and cannot but reduce the competitive position of Vermont's granite establishments. Such a statement has added justification when one notes that labor in the granite industry has for the past two years received an annual 5-cent hourly pay increase. If negotiations are not reopened for a new contract in 1965, the union members will receive 5-cent an hour increases in 1965, 1966, and 1967. Although granite producers have a vested interest in not emphasizing a large profit margin, some credence should be given to the opinions expressed by several producers that they have had to absorb recent wage increments because they have not

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[40] Field observations at the Valz Granite Co., Barre Vt., July 20, 1964; Jones Brothers Granite Co., Barre, Vt., Nov. 1, 1963; Alexander Milne Granite Co., Barre, Vt., July 20, 1964; Giudici Brothers Co., Inc., Barre, Vt., July 20, 1964.

[41] Field observations at Associated Granite Co., Barre, Vt., July 20, 1964; Valz Granite Co. Interviews with Aldo Vanetti, Co-owner, Valz Granite Co., July 20, 1964; Steven Juda, Plant Mgr., Ulse & Perojo Granite Co., Barre, Vt., July 20, 1964.

been able to increase prices for monuments.[42] When questioned about this problem, Mr. Lawson of the SAPW scoffed at the idea of the producers' having to absorb the costs. That labor in the granite industry does not produce at its maximum was, however, indirectly admitted by Lawson. He discussed how some employers, to increase production, lease certain machines in their sheds to individuals who set up what is actually a small but independent firm under the same roof. After changing to this status, the men are paid by the piece and the output usually goes up by one-third.[43]

Automation and mechanization

Vermont's mineral industries in the past have been slow to adopt new production techniques and have failed to maintain adequate plant facilities and equipment.[44] Why should this be true? Perhaps management may have felt little need to implement labor saving devices because of a docile and weakly organized labor force, but, on the other hand, employers may have delayed displacing workers through fear of creating labor tensions. Perhaps the lag in change was due to labor unions effectively fighting attempts of management at mechanization and innovation. This last argument is probably the least plausible explanation because it is the unionized establishments that show the greatest acceptance of

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[42]Interviews with S. Juda; A. Vanetti; Clarence Ross, Plant Mgr., Alexander Milne Granite Co., Barre, Vt., July 20, 1964; Hugo C. Giudici, Co-owner, Giudici Brothers, Inc., Barre, Vt., July 20, 1964; Wilfred J. Fisher, Owner, Apex Memorial Co., Barre, Vt., July 20, 1964; Wendelin J. Beck, Pres., Beck & Beck Granite Co., Barre, Vt., July 20, 1964; Henri Vaillancourt, Co-owner, Colonial Granite Co., Barre, Vt., July 20, 1964; Louis C. Simoneau, Plant Mgr., Associated Granite Co., Barre, Vt., July 20, 1964.

[43]Interview with J. C. Lawson, July 20, 1964.

[44]This claim will be developed more fully in a later chapter.

new methods and machinery. During several interviews, management pointed out that unionization and its associated wage increases made it imperative that they increase their plant productivity and efficiency if they hoped to remain competitive. Although change has been slow in Vermont's mineral industries, it shows evidence of increasing its pace, but the pace of change must quicken. Both labor leaders and management for the most part now recognize the necessity for increased mechanization and automation in the state's mineral industries. Only a few within their ranks would likely discredit the truth in a statement made by Dr. Norton E. Long of Northwestern University where he says, "The cruelty of change is [in reality] a kindness that enables survival."[45]

Each of the four labor leaders interviewed said that most union members recognize the need for advances in production efficiency, but they resent sudden and unexpected changes. Although most members of labor and management recognize the need for increased efficiency, resistance to mechanization, automation, and change in general is, however, always present to some degree among both groups. For example, Mr. Elgo Zorzi, Superintendent at a granite firm employing 15 workers, claimed that when he told a long-time employee of his plans to set up an automatic lift that would eliminate his manual handling of stone, the worker informed him that the day the machinery was installed, he was leaving.[46] When Rock of Ages installed two huge automatic polishers in its shed, some workers complained but soon accepted the change. According

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[45]"The Corporation and the Local Community," The Annals of the American Academy of Political and Social Science, CCCXLIII (September, 1962), 124.

[46]Interview with Elgo Zorzi, Supt., Adams Granite Co., Inc., Barre, Vt., July 2, 1964.

to Mr. Roe McKenzie, Vice President of Personnel for the corporation, some members of management also resisted the installation of these machines.[47] These two brief illustrations show that the problem of automation and change exists among both small and large establishments, and that resistance to them arises even among management. Future needs for increased automation can be implemented with greater ease if effective means of communication are established to inform both labor and management of automation's implications for their establishment.[48]

It is hardly necessary to pursue in detail the reasons for resistance to automation. It is well known, from the mass of literature available on the subject, that the basic fear is displacement of the individual worker. Nearly all scholars of automation agree that considerable temporary unemployment occurs from most advances in mechanical technology, but they do not agree on how much permanent unemployment it will create, if at all.[49] Although not comparable with other industries, the impact of automation and mechanization on manpower needs in the mineral industries has been considerable. In 1901 approximately 3,000 granite workers produced 152,000 short tons of stone; in 1961 only 1,800 workers produced

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[47]Interview with R. McKenzie.

[48]See for example: A. M. Sullivan, "Management's Fight Against Technophobia," Dun's Review and Modern Industry, LXXVII (April, 1961), 63-64.

[49]See for example: Arthur J. Goldberg, George Meany, and John I. Snyder, "Is Automation a Boon or a Menance?" Mill and Factory, LXX (February, 1963), 65-70; Joseph A. Beirne, "Facing up to the Problems of Automation," Chapter III, New Horizons for American Labor (Washington: Public Affairs Press, 1962); Edward B. Shils, Automation and Industrial Relations (New York: Holt, Rinehart and Winston, 1963); Walter Buckingham, "The Great Unemployment Controversy," The Annals of the American Academy of Political and Social Science, CCCXL (March, 1962), 46-52.

78,000 short tons.[50] If this does not seem impressive, it should be remembered that the work period is now considerably shortened from the 55-hour work week prevalent at the turn of the century.

Many of the mechanical devices now being introduced into the mineral industries only partially change their labor requirements because most machines continue to need supervision. This is illustrated in the granite industry where an automatic sandblasting machine was recently installed in a very up-to-date establishment. The machine's operation requires a man in attendance to see that a mechanical or rubber matting failure does not occur.[51] A fear of labor associated with automation is illustrated in this particular example of technological change. Because this automatic sandblast machine's operation does not demand the worker's constant attention, the employer feels that, during spare moments, the operator should be cutting out designs in rubber matting for use on the next monument. The GCIA is presently attempting to change this practice under the pretext that the worker is responsible for the stone in the machine but cannot give his full attention to it.[52] According to Mr. Craig White of the Barre Granite Association, management does not hold the worker responsible for damage to the stone while he is busy cutting patterns. Mr. White claims that what really bothers labor here

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[50]Tonnage data obtained by letter from Perry Cotter, Commodity Specialist, U.S. Bureau of Mines, Washington, D. C., July 17, 1964; and Perry Cotter and Nan C. Jensen, Minerals Yearbook: 1961, Vol. I: Stone, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1962), p. 2.

[51]Rubber matting containing cut-out designs is cemented to the monument. The sand cuts into the monument only in the unprotected area.

[52]Interview with M. J. Fournier.

is a supposed speed up in the work expected.[53] Edward Shils in his book Automation and Industrial Relations claims that this kind of problem is usually limited to the introductory stages of new methods and machinery use.[54]

Some changes in production methods and machinery replacement were noted during nearly every field observation. New plant facilities are also under construction in several of the industries. These activities are encouraging, but a much greater effort is needed if Vermont's mineral industries are to remain competitive. Both management and labor must do their best to implement these changes in an atmosphere of harmony.

Summary and Conclusions

The qualities of a labor force are important to the success of an industry. A favorable age structure and a good education are especially important. Vermont's educational level compared with competing areas on a county basis is favorable. The labor force in Vermont is older than the national average. This, in conjunction with a large out-migration of young males, could be detrimental to Vermont's future labor pool. Some producers feel that age is an asset because of the older worker's high-skill level. Other producers view age as a liability because the older worker is harder to train. With technological changes now underway and the likelihood that some retraining of production workers will be needed, this argument has considerable merit.

Vermont's mineral manufacturing industries have a relatively high

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[53]Interview with Craig C. White, Mgr., Member Services, Barre Granite Assoc., Barre, Vt., July 2, 1964.

[54]Shils, op. cit., p. 244.

wage rate when compared to other industries in the state. Only machinery and paper industries pay higher weekly rates, and only machinery and publishing and printing industries pay higher hourly rates. Although high wages should enable the mineral industries to compete effectively for the state's labor force, these same high wages make it imperative that their competitive position be maintained through greater labor efficiency.

A study of the mineral industries' future labor requirements, based on opinions of the state's mineral producers, shows that only a small increased need is expected. Advances in automation and mechanization account for part of the small increase anticipated, but in the granite industry the producers' expectation of a stable market for monuments is of major importance. Although most of Vermont's mineral industries expect only a small increase in their labor requirements, efforts at maintaining and upgrading the skill level of the state's workers must continue. This is necessary because all of the major mineral industries have a large portion of their personnel classified as skilled. Mechanization and automation will not likely replace to any degree the highly skilled worker; therefore, their numbers must be maintained. By their own admission the mineral producers have many positions that are described as hard to fill; yet, only the granite industry maintains an organized apprenticeship program. In spite of the Vermont Apprenticeship Council's efforts, none of the other mineral industries maintain training programs. This situation indicates a lack of foresight among Vermont's mineral producers. If effective plans for mechanization in the mineral industries are to be implemented, producers must place an increased emphasis on training mechanics and electronics technicians and retraining present workers to handle jobs created by these technological changes.

Labor turnover rates are to some extent indicators of general worker satisfaction and the efficiency of personnel management. Here, Vermont's mineral industries compare well to the national average, both in total turnover rates and in quit rates. It is possible, however, that these low rates reflect a lack of alternative opportunity. Adequate records of any kind--such as accidents and absenteeism--are too seldom maintained. If properly kept and used, these aids to good personnel management could add to many producers' efficiency.

The granite, marble, and slate industries are the most highly unionized mineral industries, but little unionization exists in several other industries, such as sand and gravel, brick, and limestone. Approximately 70 percent of the total mineral firms are unionized. These organized firms account for approximately 78 percent of Vermont's mineral industry workers.

Emotional overtones make difficult any investigation of labor-management relations; but through the use of non-directive interviews, a general impression of labor and management's attitudes toward one another was obtained. The greatest resentment toward unions appears in non-unionized firms, but some cases of hostility exist in unionized firms. Labor and management must accept mutual responsibility for seeking positions of compromise and methods of increasing production efficiency. Although much more intensive investigation is needed, field observations and interviews give evidence of labor regulations and attitudes in the granite industry that must decrease production output and efficiency. If labor does not want to damage the position of Vermont's mineral industries, it should take steps to eliminate restrictive work

rules and other practices reducing worker efficiency.

Overall both labor and management show an acceptance of the necessity for further automation and mechanization, but friction does occur when these changes are implemented without warning and when it seems that work output is being speeded up at the employee's expense. If Vermont's mineral industries and their associated jobs are to survive, continued effort must be directed toward increasing efficiency through automation and mechanization. Management and labor leaders must recognize the psychological problems associated with technological change and worker displacement. In spite of the occasional hardships created through loss of jobs and the difficulties arising from inadequate plant facilities, the processes of modernization must accelerate. A continuation of the present atmosphere of resonably hormonious labor-management relations can help meet this need.

CHAPTER VIII

MAJOR PROBLEMS ASSOCIATED WITH FINANCE

What problems related to finance are of the greatest concern to Vermont's mineral producers and how do these problems affect their ability to carry on business functions most effectively? Are they able to acquire capital? Do they suffer from overextended credit? Are they able to maintain stock and raw material reserves at an adequate level?

Capital Acquisition

The need to acquire capital for purposes of stregthening one's business position through improvements in plant facilities, purchases of new machinery, or for implementing up-to-date production techniques is sometimes necessary and at times absolutely essential. Changing market demands, advancing technology, and constant business competition make it imperative that Vermont's mineral producers have access to lending capital for maintaining their present and for enhancing their future position in the market place.

Do Vermont's mineral producers have adequate access to capital sources, and do they have as ready an access as producers in states with competing mineral regions? One approach to answering these questions is to look at Vermont bank loan distributions and to compare these distributions in other states.

In proportion to the total funds lent by the state's commercial banks only a small portion is made available to industrial establishments.

This is true in spite of a high ratio of commercial assets to the state's population.[1] The major portion of loans by Vermont banks are put into real estate mortgages (Table 27). In comparison with other states the

TABLE 27.--Comparative bank loan distributions as a percentage of total loans in Vermont and selected states[a]

State	Real Estate	Commercial and Industrial
United States	43%	28%
VERMONT	51	17
Georgia	23	31
Maine	36	30
Massachusetts	16	47
Michigan	40	21
Minnesota	29	24
Missouri	27	28
New York	14	46
North Carolina	17	35
Pennsylvania	29	35
Tennessee	19	33
Wisconsin	39	24

[a]Calculated from data contained in: Federal Deposit Insurance Corporation, Assets, Liabilities, and Capital Accounts, Commercial and Mutual Savings Banks, December 20, 1963, Report of Call No. 66 (Washington, D. C.: Federal Deposit Insurance Corporation, 1964).

proportion of funds tied up in real estate is high, and this practice, according to Xavier H. Verbeck, an instructor in economics at Middlebury College, is not in line with long accepted banking principles; banks usually practice short-term lending and avoid putting too much of their funds in "long-term illiquid assets."[2] The result of this policy is that the banks' monies are tied up in real estate, and the small

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[1]Rutland Daily Herald, March 31, 1964, p. 4.

[2]"Finances," Small Business Operations in Selected Areas in Vermont, Vermont Development Dept. (Montpelier: Vermont Development Dept., 1961), pp. 35-36. See also: David K. Smith, "The Financial Environment of Vermont" (Middlebury, Vermont [1962]), p. 12. (Mimeographed.)

mineral producer probably has difficulty obtaining funds. Tabulations of the 42 general questionnaires returned for use in this study show that 24 producers do not have difficulty acquiring loans from Vermont banks; 10 do have difficulty; and 8 made no response. Of those answering that they have no difficulty obtaining loans, 18 are granite producers. Long established practices of extended credit may account for the positive response to the question among producers in this industry. This opinion would seem justified because officers of one bank in the granite region claim that 85 to 90 percent of loan applications from granite producers are approved.[3] Conversely, 4 of the 6 respondents active in the slate industry said that they do have difficulty obtaining loans. Although over half of those answering the general questionnaire indicated they have no difficulty acquiring loans, a large proportion of those mineral producers interviewed complained of their inability to obtain loan funds from Vermont banks.

Why should it be difficult for a significant number of these establishments to acquire capital? Discussions with producers in Vermont's mineral industries emphasize that the problem is based primarily on the small size of an owner's firm and associated limited collateral. Failure to acquire capital restricts his ability to expand production capacity, to diversify, and to update production methods. The relatively few commodities he produces further increases his dependence on sales to one or two markets. This makes him subject to strong financial stress when these markets decline, and because of his continued use of archaic

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[3]Names of all bank officials giving specific information cannot be cited, but letter and interview entries are included in the bibliography.

machinery and production methods, his ability to compete with the more technologically advanced firms in his own and other regions declines. The result is in part shown by the high turnover rates among Vermont's small mineral firms as discussed in Chapter III. Banks simply do not want to risk capital in a firm that may fail with but a slight downturn in the economy.

Correspondence and interviews with officials of several Vermont banks give support to the preceding statements. Several bank officials claim that lack of collateral is one of the major reasons for loan refusals to mineral producers. Others mentioned the lack of capital reserves, antiquated equipment, poor accounting practices, and over-extended credit as primary reasons for loan refusals.

If some of Vermont's mineral producers have only limited capital available through direct banking channels, what other recourse do they have? And do they take advantage of those sources available?

One possible avenue of financing is through the Small Business Administration (SBA) of the federal government. When funds are not available through normal banking channels, a businessman may, if his firm qualifies as a small business, apply to the SBA.[4] Mineral producers have, since 1955, attempted to utilize the resources of the SBA only ten times.[5] From 1955 to April 21, 1964 the Vermont Branch of the SBA had granted six loans to mineral producers for a total of $368,000. The

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[4]On the basis of SBA eligibility requirements, few Vermont mineral producers are excluded from possible participation in SBA loans. For detailed size qualifications see: Small Business Administration, SBA Business Loans for Small Firms (Washington: U.S. Government Printing Office, May, 1963), p. 6.

[5]Letter from Gordon W. Morris, Branch Mgr., SBA, Montpelier, Vt., April 21, 1964.

SBA granted to one company, a limestone producer, four loans which totaled $303,000. The other two loans went to a slate firm ($25,000) and to a granite firm ($40,000).[6]

Is the small number of loans made by the SBA due only to decisions of their office? Is it that the small businessman does not know about the SBA or that he distrusts or fears outside assistance? According to a sample study of 73 firms in the Hartford, Connecticut area, a large portion of small businessmen actually do not know about the functions of the SBA. Of the executives interviewed for the Connecticut study, only 56 percent indicated that they knew of the SBA's available financial assistance, and only 31 percent knew of its varied technical and advisory programs.[7] Twenty-one of the total 42 respondents to this study's general questionnaire indicated that they are unaware of the SBA technical and advisory programs. Are Vermont's mineral producers merely uninformed or are they perhaps uninterested in the SBA programs? Again, this may indicate that a large portion of Vermont's mineral producers do have lending capital available. It may, also, reflect an attitude encountered several times that might be described as "pay as you go." Whatever the answer, the state's mineral producers make little use of SBA programs.

One other local source of lending capital is available to Vermont's mineral firms. Funds can be obtained through the Vermont

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[6]Letter from Thomas J. Noonan, Regional Director, SBA, Boston, Mass., June 11, 1964.

[7]Zenon S. Malinowski and William N. Kinnard, Use Of External Assistance by Small Manufacturers (Washington: U.S. Government Printing Office, 1961), pp. 1-2.

Development Credit Corporation (VDCC). This corporation, composed primarily of bankers and insurance companies, lends funds to qualified applicants at an interest rate of approximately 6 percent. The VDCC is presently a small but growing agency. In 1962 its total assets were $265,146;[8] as of January 1, 1964, its assets had increased to $374,079.[9] Twenty-two mineral producers indicated in the general questionnaire that they were not familiar with the VDCC. Mr. Donald H. Tetzlaff, Director of the VDCC, says their policy of not soliciting loans accounts for the lack of knowledge about their organization.[10] This source of funds could, however, become more important to mineral producers who cannot obtain loans through regular banking channels.

Overextended Credit

Overextended credit is a malady of many small businesses and is widespread among the mineral producers of Vermont. The granite industry illustrates the problem especially well. Inadequate working capital and extended credit plague the Vermont granite industry. In the jargon of the industry extended credit is known as "June Billing."

The monument manufacturer, especially the small one, faces increased competition from the larger firms that have been able to mechanize and innovate at a more rapid pace, and he has been forced to compete for a rather stable monument market. Efforts of monument manufacturers

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[8] Vermont Development Credit Corp., Fifth Annual Report, 1962 (Montpelier, Vermont [1963]).

[9] Vermont Development Credit Corp., Vermont Development Credit Corporation Statement of Condition, December 21, 1963 (Montpelier, Vermont, 1964).

[10] Letter from Donald H. Tetzlaff, Director and Clerk, VDCC, Montpelier, Vt., June 22, 1964.

to make sales to retailers have led to the practice of allowing the buyer to place orders for monuments during the fall and winter seasons for delivery in April through June with Memorial Day as the peak sale period. The dealer pays nothing for 30 to 90 days after delivery, without interest. Some firms have, during the last few years, also attempted to attract orders by giving a 5 percent discount to buyers ordering in the fall months. Retail dealers also extend credit--which they can't always collect--on monument sales. The result is that the manufacturer does not always receive his money at the designated time.

Although the fall months are usually busy with last minute orders, the winter months are slow because retail dealers do not want to build up large inventories of monuments until orders are confirmed, usually in the spring. If credit funds from dealers do not return at a sufficient rate, some producers by spring do not have enough money available to purchase stone from the quarriers. Rock of Ages delivers stone on credit for 30 days at a 5 percent discount if the bill is paid during that time. If at the end of 30 days the monument manufacturer has not paid for the first credit delivery, his stone supply is immediately cut off. To avoid this, the manufacturer negotiates a loan from a local Barre Bank at 6 percent interest to carry him over into the summer when he expects to receive money from sales to the monument dealers. In short, the Barre monument manufacturer is paying 6 percent interest on a loan that is in effect carrying the monument dealer who pays no interest to the manufacturer! Officials of one bank in Vermont's granite region estimate that this kind of financing amounts to over $2,000,000 annually.

Every monument manufacturer interviewed mentioned this financial predicament, overextended credit. He knows it is sapping the strength of his business but finds that he must continue extending credit if he hopes to receive orders; so, the vicious cycle continues. One small producer, employing six men, in discussing this problem, said that a few years ago he felt fairly secure if he had only $5,000 to $6,000 credit extended. Now he does well to keep his credit extension somewhere near $20,000. At the time of the interview he lamented that he was just that day attempting to secure funds to pay his men for the coming vacation week[11] and that even the abrasive his polishers were then using was available only because credit had been extended to him.[12]

Stock Reserves

Associated with the lack of capital reserves and overextended credit is the inability of a large portion of Vermont's mineral producers to maintain adequate stock and raw material supplies. Large amounts of money, needed for everyday operation, cannot be tied up for long periods in stock reserves and raw materials. The lack of stock and raw material reserves can mean the loss of sales when large orders are placed with a demand for quick filling.[13] Thirty-three percent of the respondents to the general questionnaire indicated that they cannot maintain stock reserves at a level that allows them to fill hurry-up orders. Part of the difficulty in maintaining adequate stock supplies is the wide variety of commodities in demand and also the wide variety of colors in stone.

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[11]The entire industry shuts down for one to two weeks immediately after the Memorial Day rush. After Christmas the industry also shuts down almost entirely for one to two months.

[12]Interview with Ernest E. Colgan, Owner, Williamson Polishing Co., Barre, Vt., July 2, 1964.

[13]Edgar M. Hoover, <u>The Location of Economic Activity</u> (New York: McGraw-Hill Book Co., Inc., 1948), p. 80.

A result of the smaller establishment's inability to maintain a wide variety of stock and raw materials is reflected in widespread production specialization. This tendency is most prevalent in the slate industry where 4 of the total 18 firms produce only tile or flagging. The failure of adequate stockpiling is found even in the state's largest slate firm--the Vermont Structural Slate Company. This firm quarries red roofing slate in adjacent Washington County, New York, but does so only when an order comes in although sales of this slate bring a premium price. The cost of producing red slate and its relatively slow turnover rate make it an expensive inventory item. Listers (assessors) tend to levy local taxes on inventories without giving consideration to stock turnover rates, and this may partially account for the low inventories maintained by some mineral producers.[14] The topic of assessment is more fully developed in the following chapter on taxes and related problems.

Summary and Conclusions

Only the major problems associated with finance such as capital acquisition, overextended credit, and the inability of some producers to maintain adequate raw material and stock reserves have been discussed in this chapter. The availability of capital for the state's mineral producers is difficult to determine precisely, but a comparison of bank loan distributions for Vermont and other states shows that Vermont banks have a disproportionately large percentage of their loans in real estate and not in commercial and industrial loans.

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[14]Interview with William Mahar, Supt., Vermont Structural Slate Co., Fair Haven, Vt., June 29, 1964.

Of those responding to the general questionnaire, slightly more than half said that they did not have difficulty in obtaining loans; but nearly one quarter said that they did. Several respondents did not answer questions concerning loans. Personal interviews with Vermont's mineral producers, however, give strong evidence that the proportion of those having difficulty in acquiring capital may be higher than the questionnaire indicates. Bankers claim that the major reasons for not lending money to mineral producers is their lack of collateral and capital reserves, old plant equipment, overextended credit, and poor accounting practices. Their mention of poor accounting practices certainly seems justified because, as was pointed out in Chapter V, "Production Efficiency," too few of the state's mineral producers utilize adequate accounting techniques. Delayed billing, "June Billing," the epitome of overextended accounts receivable is a severe problem among granite manufacturers; and unless steps are taken to curtail this practice, the entire industry will continue suffering from a constant drain on its financial reserves which are lost in the form of interest payments on loans that are not really adding to their capital investment.

The problems discussed in this chapter give rise to several questions needing further investigation but which are beyond the scope of this study. Why should Vermont's mineral producers seek so few loans from the Small Business Administration and why are so many of Vermont's mineral producers unaware of the technical and advisory programs of the SBA? What can be done to ameliorate the financial problems of the state's mineral producers?

CHAPTER IX

TAXES AND RELATED PROBLEMS

Taxes are the constant but usually unwanted partner of the businessman. Nevertheless, the tax burden must be borne. The weight of this burden can mean the difference between maintaining a reasonably competitive position and not doing so. Gross tax inequities among producers in the same industry can at times have an adverse effect on individual producers. For a state hoping to persuade new industries to locate within it, an overly large tax burden may be detrimental to its promotional success. Each of the previous statements has direct bearing upon the present and potential position of Vermont's mineral producers and the state's attraction to businessmen seeking new industrial locations.

Taxes

An examination of Vermont's tax structure shows both favorable and unfavorable aspects based on comparisons with other states.

Because of its ubiquity and its variability in application, the real estate property tax will be considered first. Comparisons of tax assessment ratios and tax rates on all real estate property[1] for cities in competing mineral regions give some idea of the relative tax load of Vermont's mineral producers. The selection of a hypothetical fair

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[1]Nearly all of those cities included for comparison do not have separate assessment ratios or tax rates for commercial and industrial properties.

market value[2] to which the various assessment ratios and tax rates can be applied makes the task of comparison easier. For purposes of illustration a fair market value of $20,000 was arbitrarily selected. Care must be used in making absolute judgments about relative tax loads, however, because published tax ratios and the actual ratios used by assessors may not agree. As Dr. J. S. Floyd so strongly emphasizes in his book Effects of Taxation on Industrial Location, they may be "influenced by political considerations or by inefficiencies of local officials."[3]

Based upon the criteria as set forth above, Georgia's slate producers have a relatively small tax burden compared with Vermont's, Pennsylvania's producers have a comparable property tax burden, but Maine's slate producers have considerably higher taxes than Vermont's slate producers. Wisconsin and Minnesota granite producers average approximately $100 less taxes than Vermont's do, but Quincy producers must carry an amount nearly $300 greater than the average for those active in the Barre-Montpelier region. Vermont talc producers have relatively high tax bills when compared with competitors in Georgia and North Carolina. A similar situation faces Vermont's marble producers when compared with competing producers in Tennessee and Missouri (Table 28).

The corporate income tax is 5 percent in Vermont, but it is as

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[2]Fair market value is defined as "the price which a willing buyer will pay and at which a willing seller will sell, both being well infomed and neither acting under duress." See: Vermont Dept. of Taxes, "A Report of Equalization" ([Montpelier, Vermont], 1963), p. 9. (Mimeographed.)

[3](Chapel Hill: The University of North Carolina Press, 1952), p. 48.

TABLE 28.--Comparative assessment ratios and tax rates for real property in cities located in mineral regions of Vermont and other states for 1964[a]

Type of Mineral	State and Competing Regions	Assessment Ratio (percent of fair market value)	Tax Rate (per $100)	Hypothetical Taxation on Real Property with a Fair Market Value of $20,000
SLATE	Vermont			
	Fair Haven	25	$13.13	$656.50
	Poultney	25	10.35	517.50
	Georgia			
	Chatsworth	100	.70	140.00
	Pennsylvania			
	Pen Argyl	60	4.40	528.00
	Maine			
	Monson	40	10.00	800.00
GRANITE	Vermont			
	Barre	33 1/3	9.72	647.35
	Montpelier	60	5.05	606.00
	South Dakota			
	Milbank or Big Stone	50[b]	6.11	611.00
	Wisconsin			
	Redgranite	67	3.80	509.20
	Wausau	66	4.00	528.00
	Minnesota			
	Cold Spring	100	2.62	524.00
	Massachusetts			
	Quincy	55	8.35	918.50
TALC	Vermont			
	Chester	40	8.25	660.00
	Reading	33 1/3	8.95	596.07
	Johnson	33 1/3	8.66	576.76
	Georgia			
	Chatsworth	100	.70	140.00
	North Carolina			
	Cherokee (County)	50	2.10	210.00
MARBLE	Vermont			
	Proctor	20	12.95	518.00
	West Rutland	20	7.48	309.20
	Tennessee			
	Knoxville	30	3.54	212.40
	Missouri			
	Carthage	100	1.48	296.00

Table 28--Continued

Type of Mineral	State and Competing Regions	Assessment Ratio (percent of fair market value)	Tax Rate (per $100)	Hypothetical Taxation on Real Property with a Fair Market Value of $20,000
LIME-STONE	Vermont			
	Winooski	60	$ 6.83	$ 819.60
	Swanton	30	9.05	543.00
	New York			
	Glens Falls	48	11.06	1,061.76
	Ohio			
	Findlay	100	3.56	712.00

[a]Calculated from data contained in: Charles T. Shea, Biennial Report of the Commissioner of Taxes of the State of Vermont for the Term Ending June 30, 1964 Vermont Dept. of Taxes, Montpelier, Vt., [1964]. Wisconsin Dept. of Taxation, Village and City Taxes, 1963, Bulletin Nos. 263 and 363 combined ([Madison, Wisconsin], March, 1964). And letters from--Birkenwald; Board of Assessors, Glens Falls, N. Y.; Board of Assessors, Quincy, Mass.; Burbank; Chamber of Commerce, Quincy, Mass.; City Collector, Carthage, Mo.; Deccareau; Ede; Gudger; Hallberg; Olliver; Ramler; H. H. Smith; Stansbury; Town Clerk and Treas., Swanton, Vt.; Town Office and Village, Proctor, Vt.; Town Office, Monson, Maine; Town Offices, Fair Haven, Vt.; Town Treasurer, W. Rutland, Vt. (For complete entries see bibliography.)

[b]Sixty percent is the legal ratio, but the actual ratio in practice is 50 percent.

much as 10.23 in Minnesota, 6.77 in Massachusetts, 6 in Pennsylvania, and 5.5 percent in New York and California. Georgia with 4 percent, Tennessee with 3.75, and Wisconsin and Missouri each with 2 percent are considerably lower than Vermont (Table 29).

Vermont's only excise taxes are on restaurant food sales, cigarettes, and gasoline. The tax on gasoline in Vermont is not much different from many other states with competing mineral regions (Table 30). There is no tax on Diesel fuel.[4]

[4]The Council of State Governments, The Book of States, 1962-1963, XIV (Chicago: The Council of the State Governments, 1963), 232-33.

TABLE 29.--Corporate income tax rates for selected states as of 1963[a]

State	Tax Rate (percent)
VERMONT	5.0
California	5.5
Georgia	4.0
Maine	None
Massachusetts	6.77
Michigan	None
Minnesota	10.23
Missouri	2.0
New York	5.5
North Carolina	6.0
Pennsylvania	6.0
South Dakota	None
Tennessee	3.75
Texas	None
Wisconsin	2.0

[a]Compiled from data contained in: "Rough and Tumble of Site Location," Dun's Review and Modern Industry, LXXXI (March, 1963), S98.

TABLE 30.--Comparative state gasoline taxes for selected states[a]

State	Tax per Gallon (cents per gal.)
VERMONT	6.5
Georgia	6.5
Maine	7.0
Massachusetts	5.5
Michigan	6.0
New York	6.0
North Carolina	7.0

[a]Compiled from data contained in: Sunocograms (Pamphlet published for Sun Oil Company, Philadelphia, Pennsylvania, December, 1964).

Vermont state personal income taxes are appreciably higher than those in other states with competing mineral producing regions. Care must be used, however, in making exact comparisons because most states have a graduated tax that applies to different income brackets. The average range of state personal income taxes presented in Table 31 shows

TABLE 31.--State personal income tax--ranges and averages[a]

State	Range in Percent	Average
VERMONT	2.0 to 7.5	4.75
Georgia	1.0 to 6.0	3.50
Maine[b]	none	
Massachusetts	3.08	3.08
Minnesota	1.0 to 10.5	5.75
Missouri	1.0 to 4.0	2.50
New York	2.0 to 10.0	6.00
North Carolina	3.0 to 7.0	5.00
Pennsylvania[b]	none	
Tennessee[b]	none	
Wisconsin	2.3 to 10.0	6.15

[a]Compiled from data contained in: The Council of State Governments, The Book of the States, 1964-1965, XV (Chicago: The Council of the State Governments, 1964), 235.

[b]Letters from: Joe G. Fields, Director, Tax Division, Dept. of Revenue, Nashville, Tenn., Aug. 4, 1964; Ernest H. Johnson, State Tax Assessor, Bureau of Taxation, Augusta, Maine, Aug. 3, 1964; and State Tax Office, Harrisburg, Penn., Aug. [4], 1964.

Vermont 1.33 percent higher than the overall average of 3.33 percent. Nationally Vermont also ranks near the top; only ten states have a higher personal income tax rate.[5]

At the beginning of this chapter a question was raised as to whether or not taxes affect Vermont's ability to attract new mineral enterprises into the state. The answer to this question could become

[5]Rutland Daily Herald, March 16, 1964, p. 8.

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Minnesota	1.0 to 10.5	5.75
Missouri	1.0 to 4.0	2.50
New York	2.0 to 10.0	6.00
North Carolina	3.0 to 7.0	5.00
Pennsylvania[b]	none	
Tennessee[b]	none	
Wisconsin	2.3 to 10.0	6.15

[a]Compiled from data contained in: The Council of State Governments, The Book of the States, 1964-1965, XV (Chicago: The Council of the State Governments, 1964), 235.

[b]Letters from: Joe G. Fields, Director, Tax Division, Dept. of Revenue, Nashville, Tenn., Aug. 4, 1964; Ernest H. Johnson, State Tax Assessor, Bureau of Taxation, Augusta, Maine, Aug. 3, 1964; and State Tax Office, Harrisburg, Penn., Aug. [4], 1964.

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[5]Rutland Daily Herald, March 16, 1964, p. 8.

rather nebulous unless some guidelines are set up. Therefore, the following discussion will be limited to a brief consideration of only two basic points. Are taxes of major importance in guiding the decisions of industrialists in their selection of new plant sites? Which taxes are most important to industrialists seeking new plant sites?

Although no research has been pursued to determine the relevance of taxes to Vermont's problems in attracting new industries into the state, a study made by the University of Michigan sheds some light on the subject. The findings of this study show that taxes in that state are not of major importance in plant location and are seldom ever as important as labor costs, availability of materials, and transportation.[6] According to James S. Welch, Director of the Industrial Division of the Vermont Development Department, taxes are the thirteenth item on a list of 15 points industrialists consider when investigating Vermont as a possible area for locating new plants.[7] A Department of Commerce publication, Basic Industrial Location Factors, lists the relative importance of taxes as twelfth among 13 different items for study in locating industries.[8] Dr. Howard G. Roepke, Professor of Geography at the University of Illinois, feels that local taxes, as a whole, are of minor significance

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[6]John A. Larson, Taxes and Plant Location (Ann Arbor: University of Michigan Press, 1957), pp. 2-3. See also Henry L. Hunker and Alfred J. Wright, Factors of Industrial Location in Ohio (Ohio Economic Geography Studies, Research Monograph No. 119. Columbus: The Ohio State University Press, 1963), pp. 91-92.

[7]Interview, Montpelier, Vt., Nov. 18, 1963.

[8]U.S., Dept. of Commerce, Basic Industrial Location Factors (revised ed.; Washington: U.S. Government Printing Office, 1947), p. 1. See also: Seymour E. Harris, The Economics of New England: Case Study of an Older Area (Cambridge, Massachusetts: Harvard University Press, 1952), p. 201.

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in industrial location, but only close scrutiny of each site seeker's thinking could "really determine the importance of taxes in locational decisions."[9] The consensus of those involved with taxes as a factor in plant location would seem to be that taxes are of subordinate importance as a determining criterion for plant location. It is not likely, then, that taxes alone would deter financiers interested in developing new mineral establishments in Vermont.

Several industrial-location specialists were consulted about the kinds of taxes that are most important in locational decisions. Professor Roepke indicated that inventory taxes or so called "personal property" taxes are often considered objectionable by businessmen, but personal income taxes are not likely an important consideration in industrial location.[10] Dr. Robert M. Sparks of the Maryland Department of Economic Development, who has had considerable experience in taxes as a locational factor, claims that local real estate and property taxes are usually much more important to industrialists than are state corporate and personal income taxes because the latter are generally lower.[11] According to Lewis H. Kimmel in his book Taxes and Economic Incentives, businessmen are, however, strongly influenced by whether or not federal income taxes are deductible from the state corporate income tax.[12]

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[9]Letter, Urbana, Illinois, Dec. 2, 1964. See also Richard Goode, "Income, Consumption, and Property as Bases of Taxation," American Economic Review (Papers and Proceedings of the 74th Meeting, 1961. LII, May, 1962), pp. 327-34; and Floyd, op. cit., pp. 3-25.

[10]Letter from H. G. Roepke.

[11]Letter from Robert M. Sparks, Chief, Business and Industrial Development, Maryland Dept. of Economic Development, Annapolis, Md., Dec. 9, 1964.

[12](Washington, D. C.: The Brookings Institution, 1950), p. 44.

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Vermont once allowed this practice, but a few years ago the state stopped it.

Although individual taxes may be important, Kimmel contends that in the final analysis most industrialists are more concerned about the total tax burden.[13] Thus considered, Vermont's appeal, compared with many other states, may not be good. Vermont has the second highest total per capita tax burden of 14 states containing competing mineral regions. Only California is higher than Vermont, but states such as New York, Michigan, and Wisconsin are only slightly lower than Vermont (Table 32).

TABLE 32.--Total per capita tax burden for selected states as of 1963[a]

State	Total Tax Burden (in dollars)
VERMONT	125.75
California	135.83
Georgia	101.05
Maine	94.14
Massachusetts	105.03
Michigan	121.85
Minnesota	110.37
Missouri	90.29
New York	122.52
North Carolina	116.85
Pennsylvania	115.24
South Dakota	82.00
Tennessee	87.67
Texas	113.02
Wisconsin	118.00

[a]Compiled from data contained in: "Rough and Tumble of Site Location," Dun's Review and Modern Industry, LXXXI (March, 1963), S99.

Related Tax Problems

A tax problem important to Vermont's mineral producers, although

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[13]Ibid., p. 45.

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not unique to them, is a possible widespread discrimination in mineral property assessment. One writer, Granville S. Borden, in an article, "Taxation of Mineral Properties," contained in a symposium publication, Economics of the Mineral Industries, points out that mineral mining industries are hampered in their development because they are subject to assessment discrimination through a lack of standard appraisal criteria and a lack of assessors and tax commissioners trained in the assessment of mineral mining properties.[14] Former municipal tax consultant for Vermont, Laurence W. Gauthier, claims that not one lister in Vermont is fully qualified to assess mine and quarry property. One town recently had to obtain the services of a Massachusetts appraiser when the appraised value of a quarry was appealed by a taxpayer.[15]

The extent of inequities occurring in Vermont's mineral mining and manufacturing property assessments is difficult to determine, but it has been severe enough among granite producers that, during the past year, a special Tax Study Committee composed of Barre Granite Association members, at the invitation of the city's listers, studied the entire system and structure of assessment for their industry in the Barre region. After completing their study, the Committee met with the town's listers to discuss their findings and to make recommendations for more equitable assessments.[16]

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[14]Edited by Edward H. Robie (New York: American Institute of Mining, Metallurgical and Petroleum Engineers, 1959), p. 482.

[15]Letter, Dept. of Taxes, Montpelier, Vt., July 2, 1964.

[16]Barre Granite Assoc., Inc., "Annual Report, 1963-1964" Barre, Vermont, [1964], p. 2. (Mimeographed.) And interviews with Hugo C. Giudici, member of the Tax Assessment Study Committee, Barre, Vt., July 20, 1964; Craig C. White, Mgr., Member Services, Barre Granite Assoc., Barre, Vt., Dec. 18, 1964.

The Tax Study Committee discovered gross inequities in assessments and also determined that both land and plant assessments were in many instances too high; Table 33 illustrates sample cases of assessment

TABLE 33.--Comparative granite firm appraisals based upon 1963 actual and 1964 recommended plant and land appraisals[a]

Firms	Plant Area Sq. Ft.	Plant Appraisal 1963 (in dollars)	Recommended Plant Appraisal 1964 (in dollars)	Land Area Sq. Ft.	Land Appraisal 1963 (in dollars)	Recommended Land Appraisal 1964 (in dollars)
A	18,900	45,570	40,020	71,297	9,780	8,230
B	18,233	49,750	29,822	238,596	19,680	11,335
C	17,942	73,100	38,147	170,000	16,890	9,858
D	31,224	72,550	57,884	71,800	27,390	8,277

[a]Source: Data obtained during personal interview with Craig C. White, Mgr., Member Services, Barre Granite Assoc., Barre, Vt., Dec. 18, 1964. Names of individual firms withheld.

inequities. Firms A and B with nearly the same plant area were in 1963 given comparable assessments. The Committee found that although the two firms' plant areas were similar, the capital equipment and buildings of Firm B were not nearly as valuable as those of Firm A. Where Firm B's original assessment was over $4,000 more than A's, the Committee's recommended plant appraisal for 1964 was over $10,000 less than that recommended for Plant A. This example shows a total assessment difference of $14,278 between the actual 1963 and the recommended 1964 assessments. Firms C and D also illustrate the problem of unequal plant assessments. Firms A and D illustrate especially well the inequities found in land assessments. Both have approximately the same land area, but Firm D has an appraised value nearly three times greater than Firm A. The advantages of location and utility of the land owned by the two firms do not differ appreciably, and the Tax Study Committee's recommended land assessments reflect this similarity.

In recent years granite producers have made a large number of assessment appeals to the Washington County Board of Tax Appeals. The large number of appeals helped to bring about the listers' request for the study of assessments in the granite industry. The findings of the Tax Study Committee represent recommendations, and the listers' 1964 assessments have not followed precisely these recommendations in all cases. But according to Mr. Craig C. White, Manager of Member Services of the Barre Granite Association, they are not too far from those supported by the Tax Study Committee. The Barre Granite Association, to lend support to the present efforts of the listers, early in 1964 requested its members not to appeal their appraisal this year.[17] An only appeal was ruled against by the County Board of Tax Appeals on the basis of a 1962 United States' Supreme Court decision that set forth the position that assessments are just if all property owners are treated alike even though their assessments are not related to fair market value.[18] The use of the term fair market value in this instance raises a perplexing issue. According to Mr. Craig C. White of the BGA, one of the greatest difficulties of the Tax Study Committee was in establishing what the fair market value was of granite firms and establishments in the Barre granite region.[19]

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[17]Interview, Barre, Vt., Dec. 18, 1964.

[18]Burlington Free Press, December 17, 1964, p. 6. A note of interest here may be in order: The author in December, 1963, had the good fortune to be interviewing an official of this firm at the time that the listers came to make an appraisal of their plant.

[19]Interview with C. C. White.

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Interviews with listers indicate that there are few, if any, standard criteria for appraising quarrying and manufacturing properties in Vermont's slate region. Such a condition could even in the relatively small area encompassed in the slate region, which includes several different towns, lead to financial inequities among the various slate producers, such as have occurred in the Barre granite region. According to listers for the Town of Fair Haven, they make every attempt at leniency for slate producers. Both listers, separately interviewed, maintained that in the Town of Poultney the listers are very hard on the slate producers.[20] Further research is needed to determine the importance of assessment inequities in the slate industry.

State equalization study

An effort at standardizing assessments on Vermont properties has been made during the past year. According to a report released by the state tax office, their personnel during 1963 conducted a six-month tax equalization study for the purpose of setting more uniform assessment ratios on all properties in Vermont. Monies available for the study were limited; therefore, the findings were rather general in scope.

The equalization study, by sampling assessed ratios and comparing these to authenticated sales prices for properties sold, determined that large variations occur in the assessment ratios used in the same town. It also found that the assessment ratio used often failed to reflect actual fair market values. In short, they found that many listers are not obeying Vermont laws that direct listers to tax real

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[20]Interviews with E. Olive Pelkey, Lister, Town of Fair Haven, Fair Haven, Vt., June 23, 1964; and Lawrence M. Welchko, Lister, Town of Fair Haven, Fair Haven, Vt., June 25, 1964.

and personal property at fair market value and then list the appraised value in the town's grand list book (tax roster) at a locally agreed upon ratio of the fair market value.[21]

On the basis of the discrepancies discovered in the various towns' assessment listings and actual fair market values, the Department of Taxes recommended ratio adjustments for a given town's various kinds of property. Unfortunately the lack of funds prevented any serious checking for tax assessment inequities or assessment problems specifically involving the state's mineral industries.[22] Because its findings are not binding and because of its recent completion, the study's effect on the assessment of mineral mining and manufacturing properties cannot be determined for several years.

Summary and Conclusions

Vermont's tax structure has both favorable and unfavorable characteristics. Property taxes in Vermont's mineral regions are, on the average, higher than those in most competing regions in other states. Vermont's corporate income tax is not overly high compared with many states, but some states such as Maine, Michigan, South Dakota, and Texas do not have a corporate income tax. State personal income tax rates in Vermont are so high that they place the state near the top nationally.

Vermont's attractions as a possible area for the location of

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[21]Vermont Dept. of Taxes, loc. cit.

[22]Letter from Laurence W. Gauthier, Chief of Property Taxes, Vermont Department of Taxes, Montpelier, Vt., Dec. 2, 1964. This view is his own personal opinion and does not reflect in any way the Department of Taxes or the state of Vermont.

new or additional mineral enterprises cannot be equated on the basis of taxes alone. Many scholars who have considered the importance of taxes to industrialists making decisions about plant locations have found them to be of only minor significance.

Individual taxes vary in their bearing upon locational decisions. Opinions of those who work with the problems of industrial location indicate that local property taxes are more important to businessmen than are corporate and personal income taxes. According to Kimmel, however, industrialists are often concerned whether or not federal income taxes are deductible from the state corporate income tax. Kimmel also claims that the total tax burden is usually more important than any single tax.

Associated with property taxes in Vermont is the important problem of possible widespread assessment inequities among competing mineral producers. Inequities are evident in the Barre granite region, but the town's listers and the Barre Granite Association's Tax Study Committee have made efforts toward reducing these. Interviews with listers indicate that a similar problem may be present in the Poultney-Fair Haven slate region.

A statewide equalization study, conducted by the Vermont Tax Department in 1963, found abuse in the application of assessment ratios and taxes as they are applied to fair market values, and the Tax Department made recommendations for equalized assessment ratios in the state's various towns and for their different types of property. The study's effects cannot be immediately evaluated because of its recent completion and because its recommendations are not binding.

Considering the findings of the Tax Study Committee of the Barre

Granite Association, the Vermont Tax Department's equalization study, and the author's personal interviews with listers, a more detailed investigation beyond the scope of this study is needed to determine the relevance of assessment discriminations in the economic problems of Vermont's mineral industries.

CHAPTER X

FUEL AND ELECTRIC ENERGY CONSUMPTION AND COSTS

Nearly all modern industrial establishments utilize fuels and electric energy for lighting, heating, or operating power-driven machinery. Fuel and electric energy costs, therefore, usually constitute a steady and important item of overhead expense; but, because of varying fuel and electric energy needs, not all industries are burdened by power costs to the same degree. Some industries, because of special requirements of their production processes, may have higher power costs than do others.

Different areas of the United States have considerable differences in their fuel and electric energy costs. Cheaper costs for coal, fuel oil, electric energy or other power sources in one locale can give industries in that region somewhat of a competitive advantage over their counterparts in other areas of the United States.

Relative Power Needs

According to Seymour Harris, economics professor at the University of California at La Jolla, the stone, clay, and glass industries, as a whole, have relatively high power costs when compared with some of the other major industrial groups. Harris illustrates the relative power costs of certain industries such as textiles and chemicals by finding

what percentage their power costs are of their value added.[1] A similar analysis done for this study based upon data available from the 1958 and 1963 Census of Manufactures and the 1958 Census of Mineral Industries resulted in findings similar to those of Harris. Data calculated for this study show that nationally in 1958 textile industries had a total fuel and electric energy cost of 4.1 percent of their value added, chemical industries had a total cost of 6.4 percent, and stone, clay, and glass manufacturing industries had a total fuel and electric energy cost of 8.5 percent of their value added (Table 34). Vermont's mineral

TABLE 34.--Fuel and electric energy costs as a percentage of value added for selected manufacturing industries on a national basis in 1958

Industry	Value Added[a] (millions)	Total Cost of Purchased Fuels and Electric Energy[b] (thousands)	Purchased Fuel and Electric Energy Costs as a Percentage of Value Added
STONE, CLAY, AND GLASS	$ 5,528	$468,974	8.5
Chemicals	12,270	788,152	6.4
Textiles	4,857	201,175	4.1
Food and Kindred Products	17,532	518,207	2.9
Leather and Leather Products	1,897	28,594	1.5

[a]U.S., Bureau of the Census, U.S. Census of Manufactures: 1958. General Summary.

[b]U.S., Bureau of the Census, Census of Manufactures: 1963. Fuels and Electric Energy Consumed in Manufacturing Industries, 1962 (1958 data are included in this volume).

industries, including both mining and manufacturing establishments, had

[1]The Economics of New England: A Case Study of an Older Area (Cambridge: Harvard University Press, 1952), p. 235.

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a total fuel and electric energy cost in 1958 of 5.4 percent of their value added.[2]

Fuel and electric energy costs incurred by stone, clay, and glass manufacturing industries nationally and also by the mineral industries in Vermont indicate that power purchases constitute an important part of overhead in these industries. Therefore, the remainder of this chapter is devoted to a closer look at the kinds of power Vermont's mineral industries use and the cost of this power to them.

Purchases and Costs of Fuels and Electric Energy

The latest available power consumption data for Vermont's mineral mining establishments is 1958. During 1958 mineral mining establishments purchased a total $841,000 of fuel and electric energy. These establishments spent $400,000 for 30 million kilowatt-hours of electric energy, $21,000 for 5,000 barrels of fuel oil, and $25,000 for 2,000 short tons of coal. The remainder cannot be accounted for except as it is classified by the Census of Mineral Industries as "other or undistributed fuels."[3]

More up-to-date figures are available for Vermont's mineral manufacturing establishments. In 1962 they purchased a total of $1,283,000 of fuel and electric energy. Of the $1,283,000 total, electric energy purchases accounted for $740,000 (35 million kilowatt-hours). Total

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[2]U.S., Bureau of the Census, U.S. Census of the Mineral Industries: 1958, Vermont Area Report, pp. 42-4, 42-5; and Vol. I: Fuels; Electric Energy and Selected Supplies Used, pp. 6-12, 6-13.

[3]U.S., Bureau of the Census, U.S. Census of Mineral Industries: 1958, Vol. I: Fuels; Electric Energy and Selected Supplies Used, pp. 6-12, 6-13. The Census does not make clear what undistributed fuels means, but it is likely a reference to their inability to place the fuel purchased in a particular category.

fuel purchases were $543,000 of which gasoline and wood accounted for $122,000 and $376,000 went to buy 85,000 barrels of fuel oil. The remainder is not classified.[4]

The above figures show that a large portion of the power used and paid for by Vermont's mineral producers is for electric energy, with mineral fuels being of lesser importance as power sources. In 1958 electric energy purchases accounted for nearly 48 percent of Vermont's mining establishments' total cost for purchased power; in 1962 electric energy purchases made up approximately 58 percent of Vermont's mineral manufacturing establishments' total cost for purchased power.

Fuel costs

The relative lack of mineral fuel resources in New England in general and in Vermont specifically and the high cost of getting fuels to Vermont may account in part for their relatively small use in the state. All mineral fuels used in Vermont must first be transported considerable distances. Transportation costs help to make the price of mineral fuels high. Comparisons for Vermont and other states with competing mineral regions show, for example, that in 1962 Vermont stone, clay, and glass manufacturing industries paid $4.42 for each barrel of fuel oil purchased; producers in the same industrial group in Pennsylvania paid $3.57, in Michigan they paid $3.74, and in Georgia they paid only $2.85 (Table 35). Other than oil, few adequate cost comparisons can be made for mineral fuels used in Vermont and in other states. Their small use in Vermont probably accounts for the paucity of data on their

[4]U.S., Bureau of the Census, Census of Manufactures: 1963. Fuels and Electric Energy Consumed in Manufacturing Industries, 1962, pp. 48-49.

TABLE 35.--Comparative costs of fuel oil for stone, clay, and glass manufacturing industries in Vermont and selected other states for 1962[a]

State	Cost Per Barrel (dollars)
VERMONT	4.42
Michigan	3.74
Georgia	2.85
Pennsylvania	3.57
North Carolina	4.60
New York	3.18
Minnesota	4.42
California	3.06
Indiana	4.33

[a]Calculated from data contained in: U.S., Bureau of the Census, U.S. Census of Manufactures: 1963. Fuels and Electric Energy Consumed in Manufacturing Industries, 1962.

consumption in the state. One study, however, has compared fuel costs in various states and does give data for the cost of coal in Vermont and other states. Among the various states containing mineral regions that compete with Vermont's, only Maine has a higher cost for coal than does Vermont (Table 36).

Although most mineral fuels are not used in large amounts at the present time and their costs are relatively high, there is some room for speculation about the future use of one mineral fuel in Vermont. During the past year exploration for natural gas has been underway in the northern portion of Lake Champlain, especially in the vicinity of Grand Isle County. The presence of natural gas there has been known for some time, but the question is if it exists in enough quantity to make it commercially exploitable.[5] If natural gas should be discovered in

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[5]Rutland Daily Herald, March 24, 1964, p. 4.

commercial quantities, it could prove helpful in lowering fuel costs in the state.

TABLE 36.--Comparative fuel costs per million British Thermal Units for selected states as of 1963[a] (in cents)

State	Type of Fuel	
	Coal	Gas
VERMONT	40.0	NU
California	NU	35.2
Georgia	28.7	25.4
Maine	41.1	NU
Massachusetts	35.8	36.3
Michigan	30.8	35.1
Minnesota	29.9	24.4
Missouri	22.4	22.0
New York	34.8	41.0
North Carolina	26.9	NA
Pennsylvania	25.4	32.2
South Dakota	30.0	26.0
Tennessee	19.1	NA
Texas	NU	17.8
Wisconsin	31.6	28.3

[a]Compiled from data contained in: "Rough and Tumble of Site Location," Dun's Review and Modern Industry, LXXXI (March, 1963), S99.

NU--fuel not used or only in inconsequential amounts; NA--not available.

Electric energy costs

Writers in the past have claimed that electric rates are higher in the New England states than they are in most other areas of the United States. An analysis of data contained in the publication Typical Electric Bills, released by the Federal Power Commission for 1963, shows this condition remains true for New England as a whole but not true for Vermont. Vermont's position, based upon a hypothetical demand billing and power usage, compared with the other New England states and the entire United States is favorable. It has an average rate of .3 of a cent less per kilowatt-hour (kwh) than that for New England and .1 of a cent less than the national average (Table 37). Professor Seymour Harris

TABLE 37.--Average electric energy rates of Vermont compared with New England States and the United States[a]

States	Electric Rate[b] (rates in cents per kwh)
New England	1.8
VERMONT	1.5
Connecticut	1.9
Maine	1.8
Massachusetts	1.9
New Hampshire	1.5
Rhode Island.	1.8
All other States[c] (except Vermont).	1.6

[a]Calculated from data contained in: U.S., Federal Power Cimmission, Typical Electric Bills, 1963 (Washington: U.S. Government Printing Office, 1963).

[b]Based upon a demand billing of 75 kw and a 30,000 kwh usage.

[c]Excludes Alaska and Hawaii.

contends that high electric energy rates in New England are due primarily to antiquated plant facilities and the distance from fuel supplies of oil and coal.[6] At least one Vermont power company is, however, now little dependent on mineral fuel supplies. According to Mr. Robert E. Schill of the Central Vermont Public Service Corporation, their firm, one of the largest in Vermont, in 1963 purchased 69.5 percent of its current from St. Lawrence and Niagara power sources. They generated 20 percent of their current by company-owned water power facilities and only .5 percent was generated with fuels! Mr. Schill also indicated that they are now involved in atomic power projects, and, as a result, Vermont should

[6]Harris, op. cit., pp. 225-39.

in the future experience a decline in power costs.[7]

Although Vermont's power costs are favorable compared with New England and the United States as a whole, what is more important is how the state and its mineral regions compare with other states containing competing mineral regions. Of states with major competing mineral regions only Tennessee, North Carolina, and California have rates below Vermont's (Table 38). Michigan, Minnesota, and Wisconsin are well above

TABLE 38.--Average electric energy rates of Vermont compared with selected states with competing areas of mineral production[a]

States	Electric Rate[b] (in cents per kwh)
VERMONT	1.5
Tennessee	1.0
North Carolina	1.1
California	1.4
Georgia	1.6
Pennsylvania	1.6
Texas	1.6
Indiana	1.7
New York	1.7
Michigan	2.0
Minnesota	2.1
Wisconsin	2.1

[a]Calculated from data contained in: U.S., Federal Power Commission, Typical Electric Bills, 1963 (Washington: U.S. Government Printing Office, 1963).

[b]Based upon a demand billing of 75 kw and a 30,000 kwh usage.

Vermont's power rate. But most specific areas in other states that contain

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[7]Letter from Robert E. Schill, Vice Pres. and Asst. to the Pres. of the Central Vermont Public Service Corp., Rutland, Vt., March 26, 1964. The source for the other 10 percent of their current was not mentioned, but calculations based upon figures contained in the Corporation's 1963 Annual Report show that an error of 10 percent was made in the figure given for purchased power.

competing mineral regions are at an advantage over Vermont. Vermont's talc, marble, and slate regions pay a higher energy rate than do competing regions in other states. Only the state's granite region is favored over all competing regions (Table 39). Yet, it would seem that

TABLE 39.--Average electric energy rates paid by Vermont's mineral producing regions compared with major competing regions in other states[a]

Type of Mineral	State and Competing Regions	Electric Rate[b] (rates in cents per kwh)
Slate	VERMONT: Fair Haven-Poultney	1.6
	Georgia: Polk, Gordon, Chatsworth, and Murray Counties	1.3
	Pennsylvania: Pen Argyl	1.3
	Maine: Monson	1.2
Granite	VERMONT: Barre-Montpelier	1.6
	Georgia: Elberton	1.7
	South Dakota: Milbank or Big Stone	2.0
	Wisconsin: Redgranite, Wausau	2.1
	Minnesota: St. Cloud-Cold Spring	2.4
	Massachusetts: Quincy	2.7
Talc	VERMONT: Chester-Reading, Johnson	1.6
	New York: Gouverneur	.5
	Georgia: Chatsworth	1.3
Marble	VERMONT: Proctor	Vermont Marble Co. owns all of own power. Sells at 2.0.
	West Rutland	1.6
	Tennessee: Knoxville	.7
	Missouri: Carthage	1.2
	Georgia: Tate	1.3
Limestone	VERMONT: Winooski, Swanton	1.6
	New York: Glens Falls	.5
	Ohio: Findlay	1.5
	Michigan: Calcite-Rogers City	3.0

[a]Calculated from data contained in: U.S., Federal Power Commission, National Electric Rate Book, 1963 (for each state) (Washington: U.S. Government Printing Office, 1963).

[b]Based upon a 30,000 kwh usage.

electric energy costs are not overly high for Vermont's mineral producers, because of the 42 respondents to the general questionnaire used in this

study, 25 said that electric energy rates are not a burdensome overhead expense.

Summary and Conclusions

If power costs are calculated as a percentage of value added, stone, clay, and glass manufacturing industries for the entire United States have higher fuel and electric energy costs than do many other major industrial groups. Vermont's mineral industries also follow the national pattern.

A major portion of the power consumption and costs of Vermont's mineral industries is based in electric energy. Mineral fuels are of lesser importance in the total energy usage and costs.

Fuel oil and coal cost more in Vermont than they do in many other states with competing mineral regions. Comparisons of electric energy rates for Vermont, other states, and the United States as a whole show Vermont's costs are not high. Yet, most of the state's major mineral regions--including marble, slate, talc, and limestone--pay rates slightly higher than those paid in many competing regions. Vermont's granite region is the only mineral region with any appreciable energy rate advantage. Although Vermont mineral regions' electric energy rates are higher than those of many competing regions, they are not so high that the costs incurred in power usage should hamper, to any degree, the competitive position of these industries.

What the future prospects are for fuel and energy costs in Vermont is difficult to predict. The development of atomic power projects and the possibility of natural gas becoming more immediately available could be important in bringing about a reduction in electric energy and fuel costs. If the debated Champlain Waterway were constructed, larger volumes of coal and fuel oil at cheaper rates might become available. Whether any of these possibilities will become reality and what the actual effects, if any, these possibilities would have on power costs in Vermont can only be speculative at the present time.

CHAPTER XI

RAW MATERIAL AVAILABILITY AND PROBLEMS OF EXTRACTION AND MANUFACTURE

Vermont's mineral industries have varied and difficult problems associated with acquiring and extracting raw materials and in processing these raw materials into finished products. Although the problems of Vermont's mineral industries are not unique to them, they are in some instances more pronounced than those faced by competing industries in other states.

To maintain an adequate production output and to plan effectively for the future, producers in Vermont's mineral industries need a raw material supply that is constant in quantity and quality. To circumvent any disruption in raw material supply, some of Vermont's mineral mining firms pursue extensive exploration programs, but others have been slow to see the benefits of long-range planning of this type.

Producers face difficulties in extracting stone materials that are very hard, heavy, and cumbersome; and they must by slow and expensive processing methods convert the quarried materials into unique and varied items. Lack of capital (discussed in Chapter VIII), lack of space, and antiquated plant facilities add to the burden of instituting up-to-date machinery and production techniques. The problems of waste and severe climatic conditions add to the difficulties of Vermont's mineral producers. Silicosis is still a problem among workers in the state's

granite industry.

Raw Material Availability

The raw-material supply in mineral industries is one of the most precarious production variables. Economic solvency of small establishments may well depend upon a steady raw-material supply. As was mentioned earlier, the history of failures in mineral industries is emphasized by depletion of ores or stone material--such as occurred in Vermont's iron, copper, and gold enterprises. Only recently depletion's effects were experienced by a large mineral producer in Vermont. What are the prospects of depletion for present industries? Are there adequate supplies of stone and other materials at hand to assure a continued production in those industries now active? Unfortunately, too little information is available that shows the volume and the quality of the state's different mineral materials.

Marble producers have problems of raw-material supply. The Vermont Marble Company recently felt the impact of raw material depletion at one of its pigment producing establishments located at Florence, Vermont. Until recently the pigments made at the establishment were processed from stone quarried just adjacent to the site of the milling and flotation plant.[1] The stone's white color gradually became too impure to meet the requirements of paint and paper producers. Rather than close the plant, they now haul the raw stone from a quarry in

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[1]This plant is a beneficiating establishment (one which processes raw materials by means of crushing, washing, and flotation). The stone is crushed and then mixed with fluid chemicals in such a way that the desired pigment materials are captured in a froth through flotation processes.

South Wallingford, a distance of 23 miles.[2] Such transportation costs could be burdensome to absorb even for a firm the size of the Vermont Marble Company. On the other hand, because little waste occurs in processing, nearly all of the raw material received by the establishment is marketed.

One of the most persistent problems of the several small manufacturers of finished marble pieces is their lack of available raw material. Every producer interviewed said that he could sell more marble commodities if only he had stone to process. The small manufacturer of marble products is completely dependent upon a stone supply available only from two large quarriers--the Vermont Marble Company at Proctor and the Green Mountain Marble Company of Tate, Georgia. The larger part of the small manufacturers' supply comes from the Vermont Marble Company. The lack of land containing marble deposits and the lack of funds keep the small manufacturer from developing his own quarries. When questioned about the possibility of small manufacturing establishment operators making a united effort toward opening a quarry, each producer indicated either that he would not be interested in such a project or that it just wouldn't work.[3]

Since only two large firms control the entire raw-material supply and do much of the processing, the question should be asked: Why do they supply these small competitors at all? Professor Joseph D. Phillips

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[2]Interview and field observations with H. S. Humphreys, Plant Supt., White Pigment Corp., Florence, Vt., Oct. 14, 1963.

[3]Interviews with Thomas J. McGann, Owner, White Marble Shop, W. Rutland, Vt., Oct. 4, 1963; John Weinreiver, Partner, Bowker & Son, W. Rutland, Vt., Dec. 2, 1963; Wayne McQuate, Asst. Mgr., Splitface Marble Corp., Center Rutland, Dec. 13, 1963; Stanley J. Gawet, Co-owner, J. P. Gawet & Sons, Center Rutland, Vt., Sept. 30, 1963.

in his book Little Business in the American Economy expresses the view that it is often an advantage for a few large firms to tolerate the presence of many small firms since these firms do not affect pricing much and they can claim that the industry is competitive.[4] Whether this is the attitude of Vermont's two large marble producers is difficult to determine; but that real competition exists in quarrying or manufacturing is not likely.

As stated before, Vermont Marble and Green Mountain Marble are the only producers who have quarries or the financial resources to develop new quarry sites. Both firms are now opening new quarries. According to the second largest producer in the marble region, the Green Mountain Marble Company, the major deposits of good stone are controlled by the Vermont Marble Company. Nevertheless, the Green Mountain Marble Company has been doing extensive core drilling[5] for several years on what land they do own. One recent quarry project upon which the firm had placed much hope failed miserably and proved very costly because initial testing of the marble beds was not thorough enough. They are presently opening a new mine-quarry site in the village of West Rutland near their finishing plant. Their West Rutland mine-quarry now used will be depleted within a few years.[6] Extensive core drilling carried on by this same firm near the village of South Dorset has proved a large volume of marble reserves. An opening is presently being made for a

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[4](Urbana, Illinois: The University of Illinois Press, 1958), pp. 41, 63-64.

[5]A drilling technique by which cylinders or cores of rock can be brought to the surface.

[6]Vermont Era, November 21, 1963, p. 6.

projected marble mine-quarry. When questioned about why they are planning to open this new site as an underground operation, a method usually much more expensive, the management said that the desired beds are very deep and the terrain is such that open quarry operations would be even more difficult than those expected underground.[7] From field observations and discussions with quarriers it does not seem likely that substantially easier or cheaper methods of marble extraction will become available in the near future. Because the two large producers own most property containing marble deposits and because quarrying is so expensive, small producers will be forced to continue dependent on materials the two large producers can either spare or desire to sell under what could easily be considered a duopolistic condition. This presents pricing and other problems that deserve further study.

Producers in other mineral industries are also faced with the difficulty of raw material availability. Most of the larger firms with mines or quarries are now using core drilling to determine the types and the amounts of reserves they have available for future use, but this practice was not always followed.

The Vermont Talc Company exemplifies a firm that suffered heavy and possibly unnecessary costs because it failed to use core drilling. The company needed a new talc supply and a search for new deposits was undertaken on land owned by the company. Upon discovering several promising outcroppings, workers opened a new mine without obtaining test cores. The lens of talc soon pinched out and they abandoned this shaft.

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[7]Field observation and interview with Clement J. Perfetti, Gen. Supt., Green Mountain Marble Co., at their South Dorset quarry, South Dorset, Vt., Sept. 23, 1963.

They then selected another likely site determined from a few shallow test drills. Not long after this new shaft was opened, the miners encountered an area of severe fracturing that forced its abandonment; it was too unsafe. Finally, after the expenditure of several thousands of dollars and the passage of several months, the owner sought the assistance of a firm specializing in core drilling. Extensive drilling determined the location of the best talc deposits and also the most favorable position for the new shaft. The long desired mine is now producing.[8]

Representatives of Vermont's other talc firm, the Eastern Magnesia Talc Company, contend that at the present rate of production their Reading mine site has at least a 20-year supply of talc. Presently, they are not attempting to find new reserves.[9]

Perhaps the most extensive exploration activity in Vermont's mineral industries is carried on at the Ruberoid Company's asbestos establishment north of Eden Mills. The firm employs a full-time geologist who directs a staff of several men who work round-the-clock core drilling. During the past few years they have obtained mineral rights to property on a line between Eden Mills and the Canadian border, and have pursued a program of core drilling for asbestos deposits. According to Mr. Louis Jordan, their geologist, they have so far found no encouraging deposits. From continuous core drilling on 3,000 acres of company-owned land adjacent to the present quarry site, however, the company has

[8]Field observation and interviews with Mr. Theron A. Yager, Pres., Vermont Talc Co., at his mine site three miles south of Simonsville, Sept. 27, 1963, and at Castleton, Vt., June 8, 1964.

[9]Interview and field observation with W. A. Dezaine, Supt., Eastern Magnesia Talc Co., Hammondsville, Vt., Oct. 25, 1963.

determined large reserves. In fact, the core drillers have proved enough reserves that the firm has, during the past year, actually slowed down the pace of test drilling. Mr. Jordan would not divulge the extent of the reserves, nor would he say how long they were expected to last. He did say, however, that there are adequate raw materials available for "the foreseeable future."[10]

The Vermont Kaolin Corporation near Bristol, Vermont, serves as another example of a mineral establishment's successfully using core drilling. Drillers have discovered enough kaolin to give their milling establishment an adequate supply for many years. The proved reserves are well over 6,000,000 tons, and probable reserves are likely more than twice this figure. Mr. Allen C. Moore, Treasurer of the firm, would not divulge the actual figure, but he implied that it was much greater than the 6,000,000 tons discussed.[11]

Slate producers do not have a core-drilling program at the present time although the region's largest producer has used it in the past for short periods to determine the best sites for new quarries. Others have never attempted its use. One of the reasons given for not using core drilling in the slate industry is that the beds of stone may have knots and other defects only a few inches away from where the core samples are taken. Some knowledge, though, would be better than none because slate beds are too unreliable in their quality and location to

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[10]Field observation and interview with Louis Jordan, Geologist for the Ruberoid Co., at their quarry sites and core drilling operations three miles north of Eden Mills, Vt., Oct. 28, 1963.

[11]Interview and field observations with Allen C. Moore, Treas., Vermont Kaolin Corp., five miles north of Bristol, Vt., Sept. 18, 1963.

depend on mere chance and the experienced guess of the rock boss. If these producers are to avoid production delays and unnecessary expense, they must make greater use of the opportunities afforded through the technique of core drilling.

Problems of Extraction and Manufacture

If depletion and exploration problems are important, quarrying and processing problems are of major importance. Advances in mechanization have helped to speed up production, but the overall extracting and manufacturing processes remain slow. Some methods have changed little from those used during the last century. Inadequate plant space and antiquated facilities, however, make difficult the introduction of new methods and machinery. Accompanying the entire costly process of extraction and manufacturing is the problem of waste. One can observe the evidence of its importance in the many piles of accumulated stone and tailing debris near the quarrying and milling sites. A problem common to most of the state's mineral producers is the severity of climatic conditions. Ice accumulation and the costs of heating and of snow removal are the constant companions of the mineral producer who seeks to continue operations throughout the winter months.

Quarrying and processing

In the granite quarries southeast of Barre on "Millstone Hill"--a name coined from the millstones it has so long sent to the villages of New England and adjacent states--quarriers laboriously cut huge blocks from the floor or wall of the stone mass. Only a few decades ago each block was freed through slow processes of pneumatic drilling and plugging. Holes, drilled a few inches apart on each side of the prospective block, were plugged in such a way that tremendous pressure was exerted against two or three free sides with the result that the block split away from the rock mass. Channelling later speeded up the operation; and although some channelling is still used on cuts in the quarry wall, quarriers now free most stone through the use of a jet burner that operates by forcing a mixture of burning kerosene and liquid oxygen through a nozzle. The jet burner cuts not by burning but by setting up thermal stresses in the granite which results in crumbling or flaking along the narrow zone of high temperature. With this device a day's work once requiring several men is now accomplished by one.[12]

At times, quarrymen reach good stone only through first extracting undesirable pieces. If the stone contains large quantities of pyrite or garnet, materials that tend to decompose and cause discoloration, it may have to be scrapped or used in commodities such as curbing, paving, or concrete. Once freed, heavy boom-derricks capable of lifting 100 tons hoist the stone from the quarry. Workers must constantly maintain these derricks. Because their mobility is limited, several derricks must be used in a single large quarry (Fig. 18). Quarries in the Barre area are very large and deep because of their long use; their great depth (300-500 feet) helps to increase costs considerably. With the depth of the quarries and the heavy loads that must be lifted, it is not likely that any great modification in the use of boom-derricks will occur in the near future. According to Mr. Cyrus Y. Ferris, Chief

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[12]Interview and field observations with William Roy, Gen. Mgr., Wells-Lamson Quarry Co., Websterville, Vt., Nov. 1, 1963. Letter from Cyrus Y. Ferris, Chief Engineer, Rock of Ages Corp., Barre, Vt., Dec. 2, 1964.

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Fig. 18.--Multiple boom-derricks used in a Rock of Ages Corporation granite quarry in Graniteville.

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Engineer for the Rock of Ages Corporation, conveyor belts could be used for the removal of grout (waste) but the sharp edges of broken granite cut the belting so rapidly that replacement becomes very difficult.[13]

The problems of extraction are also well illustrated in the marble industry. Producers presently obtain all of their stone from mine-quarries; the costs incurred with this extraction method are high. An excellent example of underground quarrying is found in West Rutland immediately under much of the village! Quarrymen reach the working areas by a vertical-shaft entry (Fig. 19) that has a depth of approximately 130 feet. From this point the shaft slopes downward toward the south to reach a depth of about 180 feet and a position underneath the village where several drifts radiate toward the east, southeast, and southwest. The drifts slope gradually downward reaching depths nearly 300 feet below the surface.

In addition to location, the depth of the marble beds largely precludes an open-pit quarry because the expense of the overburden removal would be prohibitive. Inability to use overhead derricks when moving drilling equipment and channelbars in mine-quarries makes extraction costs high. Channelbars weigh three to five tons and must be moved into position by jacking and blocking. (An example of a channelbar is shown in Fig. 20.) The marble beds do not lie in a horizontal position, and this condition has made it difficult to maintain the regularity of the drift floors. Irregularity in the floor surfaces and the long distance from the drift working areas to the entry shaft make removal of the quarried marble blocks difficult and costly. Large

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[13]Letter from C. Y. Ferris.

Fig. 19.--Vertical-shaft entry of marble mine-quarry at West Rutland.

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Fig. 20.--Channelbar being used in new marble mine-quarry at South Dorset.

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amounts of muck and rock fragments accumulate during quarrying. This debris must be hand shovelled several times before it can be hoisted aboveground with an overhead boom-derrick (Fig. 21). When asked if the removal of muck and other debris from the drifts to the entry shaft in the West Rutland quarry could be facilitated to some extent by using belting or other mechanical means, Mr. H. M. Kupferer, Vice President of the firm operating this establishment, stated that such methods are impractical because working locations change constantly, and the manpower used in this work allows a utilization of inexperienced and inexpensive labor.[14]

Processing operations in the marble finishing mills and granite sheds are also costly and laborious. Most granite quarried in the "Millstone Hill" area moves by truck to Barre where it is finished. The Rock of Ages Corporation has a new and large shed (finishing plant) outside of Barre only one mile from their main quarries. Granite sheds were once built in a circular pattern because the stationary derricks, to move the pieces of stone, had to be centrally located (Fig. 22),[15] but with the advent of overhead cranes the sheds became long and rectangular. Moving stone in the sheds is difficult and slow. Almost without exception, any piece of stone moved must be lifted by an overhead crane. Marble producers are faced with the same problem (Fig. 23). The result is that men frequently cannot continue working until the crane lifts the stone on to its next processing station or shifts it into a

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[14]Letter, Green Mountain Marble Co., W. Rutland, Vt., Dec. 16, 1964.

[15]George H. Perkins, Report of the State Geologist on the Mineral Industries and Geology of Certain Areas of Vermont, 1903-1904 (Montpelier: Argus and Patriot Printing House, 1904), p. 40.

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Fig. 21.--Boom-derrick in operation at West Rutland marble mine-quarry.

Fig. 22.--Circular granite shed built to accommodate stationary derricks.

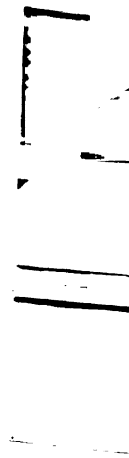

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Fig. 23.--Overhead crane at Green Mountain Marble Company's finishing mill in West Rutland.

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new working position. Considerable time is wasted in this fashion. In the Green Mountain Marble Company's mill electrically operated vacuum cup lifters move relatively light marble slabs.

Sawing and finishing granite are slow and expensive processes. According to management at the Jones Brothers Company in Barre, without methods of making multiple cuts when manufacturing monuments they could not afford to produce them. They have developed a method of sawing several monuments simultaneously by carefully aligning the blocks so that the wire saws[16] can follow a preconstructed pattern. Implementing mass production is especially difficult in the granite industry because the type of product, primarily monuments, necessitates uniqueness of design in each unit. Each monument must receive careful attention in detailed lettering or carving.[17]

Antiquated plant structures are widespread in each of the state's mineral industries. The term "shed" applied to granite manufacturing establishments is in most cases appropriate (Fig. 24). Similar conditions of antiquated plant structures exist in the slate industry (Fig. 25). The restricted size and shape of many of these structures frequently make it difficult, and at times impossible, to introduce large

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[16]These wire saws vary in size and length, but all function in the same way. An endless steel wire looped around two separate and grooved fly wheels is passed along the stone surface to be cut. Sawyers maintain a constant flow of water over the stone that carries along with it a steel-shot abrasive which works its way under the moving wire. The wire gouges the abrasive into the stone and gradually forms a groove that cuts the block into the desired shape.

[17]Field observations and interviews with David Pinkham, Plant Mgr., Jones Brothers Co., Inc., Barre, Vt., Nov. 1, 1963; Lorenzo Chiodi, Pres., Modern Granite Co., Barre, Vt., Dec. 19, 1963; Clement J. Perfetti, Gen. Supt., Green Mountain Marble Co., W. Rutland, Vt., Sept. 23, 1963.

Fig. 24.--Antiquated granite shed in Barre.

Fig. 25.--Antiquated slate mill in Poultney.

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machinery. For example, one granite producer claimed that before a new automatic polisher and a conveyor belt could be installed, he was forced to spend $20,000 to increase his plant space.[18]

Waste

Most of Vermont's mineral industries are plagued with the problem of waste.[19] It is a persistent and costly problem in nearly every phase of extracting and processing.

Slate establishments illustrate particularly well the problem of waste with its consequent costs of removal and lost raw material. Producers in the Vermont slate region estimate that from 70 to 80 percent of the slate quarried fails to reach a market; a Bureau of Mines report, however, indicates a waste occurrence of up to 90 percent.[20] Producers use explosives to break slate beds loose from the quarry face, and this practice results in much waste (Fig. 26). Attempts to use wire saws have been made, but no producer interviewed now utilizes this technique. Quarriers say that the method is not practical in Vermont's slate beds because it fails to take advantage of natural seams. Oliver Bowles, writing for the Bureau of Mines, claims that explosives are justified at times but should be limited primarily to digging sumps, opening new benches, or making floor breaks.[21] From all indications

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[18]Interview with Elgo Zorzi, Supt., Adams Granite Co., Inc., Barre, Vt., July 2, 1964.

[19]Waste as used in this paper refers to any stone debris or residue created during extraction and manufacture that cannot be economically used for processing into a saleable product.

[20]Oliver Bowles, Slate, U.S. Bureau of Mines Information Circular No. 7719 (Washington: U.S. Government Printing Office, June, 1955), p. 10.

[21]Oliver Bowles, The Technology of Slate, U.S. Bureau of Mines Bulletin 218 (Washington: U.S. Government Printing Office, June, 1955), p. 85.

Fig. 26.--Blasting slate beds loose from the quarry face near North Poultney.

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these producers have not given the method enough consideration. Pennsylvania workers use this method, and, reportedly, waste has been reduced by as much as 50 percent.[22]

Work in the quarries cannot be effectively carried on with accumulated slate debris; therefore, it must be removed. The present method of waste removal is the same as that used during the late nineteenth century. Workers hand shovel the waste into an iron bucket that is hoisted out of the quarry on cables operated from a hoist house near the quarry's edge. As evidence of the large amount of waste, huge mounds of debris stand just outside the quarry openings (Fig. 27). Too frequently these waste piles are allowed to accumulate immediately adjacent to the quarry opening. A bulldozer must then regularly push the rubble back to keep it from sliding into the quarry. Also, these waste materials often lie over good beds of stone, and the expense of moving them may be almost as much as opening a new quarry.

Waste also accumulates in large amounts during slate milling operations. Planer cuttings, ends, and other debris must be moved from the milling site. Numerous milling operations are slowed down because accumulated waste must be removed by hand. In fact, one establishment's system for removing waste from shingle-making requires two separate handlings before its final removal from the building. Management claims an awareness of this double handling of the waste material and its consequent costs, but they have not thought out any method to end the practice. The method is still unchanged.[23]

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[22]Bowles, Slate, loc. cit.

[23]Interview and field observation with William Mahar, Gen. Supt., Vermont Structural Slate Co., Fair Haven, Vt., Sept. 18, 1962 and March 28, 1964.

Fig. 27.--Slate debris beside quarry openings near North Poultney.

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Nearly every kind of mineral establishment visited evidenced the problem of waste and the problem of finding a convenient and inexpensive means for its disposal. The asbestos establishment in northern Vermont loses 95 percent of all raw material quarried![24] Because of impurities, talc producers must discard large portions of their raw material. Where wet processes are used in talc manufacture, a large volume of tailings must be drained off. The difficulty in removing tailings has become acute because of a state anti-pollution program. Rivers will soon be unavailable as waste disposal systems for Vermont's mineral producers. The Eastern Magnesia Talc Company, now building a new plant near Reading, has been forced to construct huge and expensive sedimentation reservoirs adjacent to the plant site.[25] At Johnson this firm has another processing establishment that has always dumped its tailings into the Lamoille River which, within five years, is to be classified for pollution control.[26] Preliminary studies by the Vermont Department of Water Resources appear to indicate that the mill tailings create pollution by destroying insect habitat in the stream and by causing extreme siltation that seriously affects fish.[27] The operators said

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[24]Interview with L. Jordan.

[25]Field observation at the new plant site of Eastern Magnesia Talc Co., Inc., Reading, Vt., Oct. 25, 1963.

[26]"'Pollution' means the placing in the waters of the state by whatever means any noxious or deleterious substance which is likely to create a nuisance, or renders such waters harmful to animal or aquatic life, or to use for domestic, commercial or industrial purposes or for recreation."--Vermont Dept. of Water Resources, Vermont Laws Relating to Water Resources, 1964 (Montpelier: [Dept. of Water Resources], 1964), p. 36. Stream classification refers to the placing of streams in certain categories which demands a particular level of non-pollution so that the waters are suitable for designated purposes.--*Ibid.*, p. 37.

[27]Letter from A. William Albert, Director, Water Pollution Control Division, Vermont Dept. of Water Resources, Montpelier, Vt., Dec. 10, 1964.

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that they have for several years been attempting to solve their tailing disposal problem but without success. They yet do not know how they will dispose of their waste when the stream is classified.[28] The Barre granite industry faces a similar problem. Abrasives from polishing and cutting operations are presently dumped into several small streams. Streams in the area will be classified for pollution control on July 1, 1965. A study group composed of granite producers is now working with the problem, but so far has had little success in finding a means of disposal that is economically practical. Thus far, settling basins seem the only possible method for getting rid of the waste, but cleaning the basins will be expensive.[29] One advantage to their installation is that any equipment installed for the clean up of stream pollution will be exempt from the property tax.[30] The location of most sheds is an added problem because they are clustered together between streams and roads where they have little room to construct settling basins. Rock of Ages Corporation has pioneered the way in using settling basins for waste disposal by constructing a large one near their main finishing plant. The basin has a secondary but important use. Water, previously lost down the local brook, is now available for reuse in manufacturing operations.[31]

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[28]Interview and field observation with Roger W. Perkins, Plant Mgr., Eastern Magnesia Talc Co., Inc., Johnson, Vt., Oct. 28, 1963.

[29]Barre Granite Assoc., Inc., "Annual Report, 1963-1964" [Barre, Vermont, 1964]. (Mimeographed.)

[30]Barre Granite Association, Inc., "Report, September 1964" ([Barre, Vermont], September 21, 1964). (Mimeographed.)

[31]Rock of Ages Corp., "The Whistle," VIII (Barre, Vermont, May, 1964), 8. (Mimeographed.)

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Sand and gravel producers also face expensive waste removal costs. Washing operations result in large volumes of watery sludge. One producer has solved his problem by draining waste materials into old gravel pits nearby. The solution is not so simple for many others.[32]

Vermont's marble producers have the smallest amount of waste occurrence of any of the state's mineral producers. Almost 100 percent of the marble quarried is transformed into a saleable product. Off-color stone or waste from regular manufacturing processes can be used as raw material for many different fillers, such as in paint, asbestos tile, paper, plastics, rubber, putty, and even chewing gum.[33]

Problems of climate

Mineral producers in Vermont face a persistent problem that many other competing areas do not suffer to the same extent--severe winter temperatures and heavy snowfall.[34] Snow removal and heating costs are major overhead items. Not all parts of Vermont are subject to the same severity, nor are producers in different industries affected to the same extent. But all must face the required costs of heating and snow removal if production is to continue; and, in some industries it is not economically possible to continue producing during the winter months.

Sand and gravel establishments are forced to discontinue operations during the winter months. By late fall washing screens and conveyors

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[32]Interview and field observation with Horace Lawrence, Plant Mgr., Calendonia Sand and Gravel Co., Inc., E. Montpelier, Vt., Nov. 13, 1963.

[33]Interviews and field observations with H. S. Humphreys; and John H. Curtis, Mgr., Vermarco Plant of Vermont Marble Co., W. Rutland, Sept. 16, 1963.

[34]For the importance of weather to industries see for example: James K. McGuire, "Weather Patterns in the Northeast," The Weather: A Factor in Plant Location, U.S. Weather Bureau (Washington: U.S. Government Printing Office, 1961).

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freeze solid with coatings of ice. Because of such conditions, operators must stockpile large quantities of sand and gravel to meet winter demands.[35] Concrete block companies are subject to similar limitations in their seasonal operation. Their dependence upon large supplies of sand, not easily available in winter, discourages operation during these months. Otherwise, they too would be forced to store vast quantities of sand.[36]

Cold winters make heating costs a major part of overhead for Vermont's mineral establishments. These costs help reduce profit margins and working capital. A comparison of annual degree days[37] for Vermont and for states with competing mineral producing areas shows Vermont's relatively severe winter temperatures (Table 40). Based upon degree days, granite producers in Minnesota, Wisconsin, and Maine should have similar heating costs; granite producers in Georgia and Massachusetts must have less expense. Neither the Georgia and Tennessee marble regions nor the Pennsylvania slate district experience the same severity of cool season temperatures as do the Vermont marble and slate regions.

Vermont annually receives a rather heavy snowfall. Average amounts range downward from nearly 100 inches in the asbestos and talc regions of the north to approximately 60 to 70 inches in the slate and marble regions in the west and in the talc region of the southeast.[38]

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[35]Interview with H. Lawrence; and Ernest Boulé, Boulé Sand & Gravel Co., Timmouth, Vt., Oct. 11, 1963.

[36]Interview with Charles Blair, Plant Supt., C & B Morse Block Co., Poultney, Vt., Oct. 2, 1963.

[37]A degree day is the number of degrees below 65° accummulated in the daily average temperature. For example, a daily average of 45° gives a degree day figure of 20.

[38]U.S., Weather Bureau, Climates of the United States: Vermont (1959), p. 3.

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TABLE 40.--Average annual degree days for selected cities in Vermont and other states[a]

State	Degree Days
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Burlington	7739
Cavendish	7953
Northfield	8171
Rutland	7286
Georgia	
Athens	2711
Rome	2865
Maine	
Greenville	9274
Bar Harbor	7280
Massachusetts	
Boston	5634
Minnesota	
St. Cloud	8879
Pennsylvania	
Allentown	5731
Stroudsburg	6059
Tennessee	
Knoxville	3551
Wisconsin	
Oshkosh	7606
Wausau	7954

[a]U.S., Weather Bureau, Decennial Census of United States Climate-Heating Degree Day Normals, Climatography of the United States No. 83--for the various states (1963).

Consequently, snow removal is a large and expensive task. Roads and storage yards must be kept open and the snow removed from stored materials before deliveries can be made (Fig. 28). According to an official of the Ruberoid Company, the asbestos producer in northern Vermont, they maintain a road crew on almost a 24-hour basis during winter months. The costs of keeping the roads and the quarries open are very high.[39]

Silicosis

Once the scourge of the granite industry, silicosis has been

39Interview with L. Jordan.

Fig. 28.--Snow covered storage yards and roads at Vermont Structural Slate Company mill in Fair Haven.

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largely eliminated as a work hazard. It was not a major problem at all until pneumatic drilling and finishing equipment was introduced into the industry during the early twentieth century. But as mechanization increased, so did silicosis. At one time (1937), just prior to union demands for dust-control equipment, over 45 percent of the men X-rayed in the Vermont granite industry had the disease. By 1956 the rate had dropped to 15 percent.[40] Of course, this rate has been reduced from both a decrease in silica dust and retirement of affected workers. At the present time, 240 (13.5 percent) of the men working in the industry are known to have the disease.[41] With continued retirement the problem of silicosis should disappear completely.

Summary and Conclusions

Raw material supplies of adequate quantity and quality are of vital importance to uninterrupted production and the maintenance of maximum production efficiency. Although several of Vermont's mineral producers recognize the need for determining adequate reserves for the future, too many do not. Many producers in the slate industry are not adequately planning for their future raw material needs.

The nature of the raw materials, the conditions under which they must be extracted, the lack of space, antiquated facilities, and the requirements for uniqueness in design that demand large amounts of skilled

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[40] Andrew D. Hosey, Victoria M. Trasko, and Harry B. Ashe, Control of Silicosis in the Vermont Granite Industry, Public Health Service Publication No. 557 (Washington: U.S. Government Printing Office, 1957), pp. 51-52.

[41] Interview with Maurille J. Fournier, Bus. Agent, Granite Cutters' International Assoc. of America, Barre, Vt., July 2, 1964.

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hand labor make manpower costs high and automation and mechanization difficult. Field observations and interviews have shown, however, that some producers are not making maximum efforts toward solving these problems.

If Vermont is to continue an important mineral producer and if it is to expand its mineral economy, the state's mineral producers must make every effort possible to utilize up-to-date production techniques that can help to increase production efficiency. Producers must, also, begin to make intensive efforts toward solving their problems associated with waste disposal. If they delay action much longer, the state's program of stream classification will perhaps force them into very expensive methods for handling waste.

Mineral producers in Vermont will continue to be subject to severe winter conditions and therefore must somehow compensate for their associated costs. Although some granite workers have silicosis, the disease is becoming less of a problem and should disappear almost entirely in the future.

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CHAPTER XII

OPPORTUNITIES

Previous chapters have been devoted to a discussion of some of the major problems facing Vermont's mineral producers and how these affect their efficiency, their competitive position, and growth. These problems have been discussed in the context of business turnover, fluctuations in market demands, production efficiency, location and transportation, labor, finance, taxes, power consumption and costs, and difficulties associated with extraction and manufacture. Although previous chapters may have, at times, outlined a rather drab picture of the potential of Vermont's mineral industries, some bright spots also appeared. Even though some of the problems investigated do not lend themselves to ready change, the state's mineral producers do have the opportunity to ameliorate others through decisive remedial action and a strong commitment to self-evaluation.

Opportunities do exist for future development and growth of Vermont's mineral industries. Technological advances in the fields of engineering, chemistry, and physics have opened new horizons for mineral utilization. Vermont has a wide variety of known mineral materials, such as low-grade copper deposits, iron pyrite, and dolomitic limestone, none of which are presently under development. Too little is known of the quality and quantity of these materials. Vermont has the opportunity to explore possibilities for their utilization.

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The unfortunate truth is, however, that neither the state government nor the state's mineral producers have done enough to determine the scope of mineral availability in Vermont, to find new markets, to develop new production techniques, or to develop new uses for minerals now produced in the state. Also, too little has been done among the state's mineral producers for cooperative action.

The purpose of this chapter is to show through examples how imaginative study of these opportunities could help the mineral industries make an added contribution to the state's economy. The results of research of this kind will not always lead to success. And yet, the only means to success is through the chance of failure.

State Efforts at Development

Vermont's State Development Department spends approximately $350,000 annually for development in all segments of the state's economy. This expenditure is certainly not large. The Industrial Division within the Development Department is responsible for aiding all industries in the state; its budget is indeed small. The 1963 budget for industrial development was $37,286; for 1964 it was $46,274. Salary expenditures for the Division's workers use up a large part of the budget each year. Because of the addition of an assistant director to the staff, the money available for promotion and development actually decreased from 1963 to 1964, although the budget figure was higher. This staff addition in 1964 brought the annual salary consumption to over $20,000. In spite of the budget's new salary load, the original appropriation for 1965

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($44,834) was less than the amount appropriated for 1964.[1] A special session of the State Legislature later added $34,922 to the 1965 budget for a total of $79,756.[2]

Mr. James S. Welch, Director of the Industrial Division, claims the appropriation for 1965 is inadequate although repeated correspondence has failed to obtain a commitment from him as to what amount would be adequate. His claim, however, would seem justified because his personnel must work with all the state's industries, and only a small portion of their monies are available for work with the mineral industries. The Industrial Division's inability to effectively aid the state's mineral industries is borne out by complaints of mineral producers interviewed and questioned. Several producers say that they have asked for help but have never received any.[3] The inability of the Industrial Division to effectively attract new industries into the state, to adequately aid all Vermont industry generally, and to help the mineral industries specifically is emphasized when one considers its funds available for promotional purposes in 1964--$3,000![4] If more funds and personnel were available for work with Vermont's mineral industries, greater effort could

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[1]Figures obtained from a thermofaxed copy of the 1964-1965 budgets for the Vermont Development Dept. sent by letter from Ruth L. Stillings, Secy. to Roland R. Vautour, Commissioner of the Vermont Development Dept., Montpelier, Vt., Nov. 27, 1963.

[2]Vermont, General Assembly, Acts and Resolves Passed by the General Assembly of the State of Vermont at the Special Session, 1964 (Montpelier, 1964), p. 42.

[3]Interviews with Allen C. Moore, Treas., Vermont Kaolin Corp., Bristol, Vt., Sept. 18, 1963; Theron A. Yager, Pres., Vermont Talc Co., Chester, Vt., Sept. 27, 1963; and also responses from questionnaires.

[4]Interview with James S. Welch, Industrial Director, Vermont Development Dept., Montpelier, Vt., Nov. 18, 1963.

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be made toward finding new markets for the state's mineral products through market analysis. Increased promotional activities directed toward acquiring investment capital and new mineral industries could be other important functions.

Minerals Experiment Station or Laboratory

Granted, Vermont is a small state and has little money available for promotion of the state and direct aid to its industries, but are there not other ways to assist the state's mineral industries? Discussion in Chapter II pointed out that sales, per capita, made by Vermont's mineral industries (other than mineral fuels) are much more important to its economy than are the same industries to states such as Pennsylvania or New York. Yet, Pennsylvania supports an extensive minerals research program at The Pennsylvania State University, the results of which are available to the interested public.[5] New York has its Alfred University where extensive research is carried on in the field of ceramics. Researchers there have also done intensive study on using slate as a lightweight aggregate material. The results of this research are now being applied near Castleton, Vermont.

In the 1940's Dr. Charles Doll, Vermont's State Geologist, requested, along with the support of the Development Department, that a minerals experiment station or laboratory be established in Vermont. The State Legislature turned down the proposal. In the fall of 1963

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[5]See for example: C. W. Berry, Y. S. Kim, and D. R. Mitchell, Progress Report: Slate and Other Nonmetallics Project (University Park, Pennsylvania: The Mineral Industries Experiment Station of The Pennsylvania State University, January, 1964).

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Dr. Doll renewed his request.[6] So far, nothing has come from his renewed request. Mr. Roland Vautour, just prior to his recent resignation as Commissioner of the Vermont Development Department, expressed a recognition of the need for such a research center and said that he would support any attempt to establish one. The problem is to gain the support of the legislative leaders and to find the funds for its establishment.[7] Seventy-nine percent of the mineral producers answering the general questionnaire feel that a minerals experiment station would benefit the state's mineral producers. The State Legislature should investigate carefully the need for and the feasibility of such a laboratory in Vermont. Pennies invested now could accrue dollars in the future!

Field Study

Along with the establishment of an experimental laboratory, an intensive field study and laboratory survey of the state's available mineral resources should be made. No adequate data showing the state's undeveloped mineral resources is presently available. The state's dimension-stone producers need to know specifically the quality and quantity of materials they have available. Some individual producers are pursuing exploratory work for their own requirements, but Vermont needs a coordinated statewide program. This opinion recently received support from Dr. Charles Doll in a newspaper release where he said that little or nothing is known about Vermont's mineral deposits as a whole, but if

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[6]Interview with Dr. Charles Doll, State Geologist, Burlington, Vt., Jan. 25, 1964.

[7]Letter from Roland R. Vautour, Commissioner, Vermont Development Dept., Montpelier, Vt., Feb. 11, 1964.

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more were known, some of them could become industrially important if only there were a comprehensive program of exploration.[8] If building industry markets, which need large volumes of relatively homogeneous material, are to continue increasing in importance to Vermont's mineral producers, adequate reserves of stone suitable for structural purposes must be proved and plans instituted for their development. Such a study would be expensive and time consuming, but it is necessary for the largest return possible on present and future capital investments in Vermont's mineral industries. Field studies in conjunction with a minerals laboratory could perhaps help attract new mineral industries into the state.

Imaginative Investigation

A minerals experiment station, along with an intensive field study, plus imaginative investigation could take advantage of possible opportunities for exploring Vermont's known mineral deposits. An example of the type of opportunities open to imaginative exploration is currently in the planning stage under "private" development. According to Mr. W. A. Dezaine of the Eastern Magnesia Talc Company, they plan to produce an abrasive material from garnet contained in schist deposits near their present talc plant at Gassetts. This planned development is dependent, however, upon the results of raw material tests presently underway.[9]

There are other opportunities open to intensive investigation through public supported research in the laboratory and field, plus

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[8] Burlington Free Press, December 1, 1964, p. 3.

[9] Interview with W. A. Dezaine, Plant Supt., Eastern Magnesia Talc Co., Gassetts, Vt., Oct. 25, 1963.

imagination. For example, Vermont has large deposits of dolomitic limestone that could possibly be utilized for magnesium. As early as 1944, David E. Dunklee and A. R. Midgley in a publication "Our Fertilizers Need Magnesium" mentioned this possibility.[10] The prospect is certainly not out of the question. In fact, a plant in North Carolina presently extracts magnesium sulfate, and another in Alabama produces metallic magnesium, from dolomitic limestone.[11]

According to Dr. Doll, kaolin deposits with 30 to 40 percent alumina content are scattered around the state. Some deposits at Bennington and Brandon have an alumina content sufficient that they could possibly serve as a raw material for aluminum, but nothing has been done to determine if they are amenable to commercial use.[12]

Dr. Doll claims that extensive deposits of limestone in the Champlain Valley could have potential value as raw material for cement plants, but, unfortunately, not enough analysis has been done on the many deposits to make any precise statement about their utility, but he adds that the lack of an adequately cheap transport system might preclude the development of such an industry here.[13] Although Dr. Doll's statements give some hope of possible cement-plant developments, it is likely that such establishments in the Champlain Valley area would experience severe

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[10] Better Crops with Plant Food, XXVIII (June-July, 1944), 23.

[11] Letters from Philip N. Sales, Chemical Engineer, Minerals Research Laboratory, North Carolina State College of the University of North Carolina, Asheville, N. C., March 6, 1964; Thomas A. Simpson, Chief, Economic Geology Division, Geological Survey of Alabama, University, Alabama, May 4, 1964.

[12] Champlain Waterway Study Commission, "Hearings" (Burlington, Vermont, August 27, 1963), p. 18. (Mimeographed.)

[13] Ibid., pp. 17-18.

competition from a well-established and large cement producer in Glens Falls, New York, a town lying just south of Lake Champlain's upper end. Still, the possibility merits further investigation because entrepreneurs initially entering the business could have the advantage of constructing a modern plant with the most up-to-date equipment, which might help give them a competitive advantage.

Waste Utilization

Perhaps one of the most pressing needs and best opportunities for advancing Vermont's mineral economy is through greater exploration of possibilities for using mineral wastes. Through the many years of mineral extraction in Vermont, large amounts of waste material have accumulated. Debris from quarrying and milling operations marks the countryside. Grotesque rubble piles stand as testimony to the high amounts of waste--and its consequent costs--in most of Vermont's mineral industries. Although attempts at waste utilization have been made, some of which have been successful, much more research needs to be done. Rapid advances in technology should encourage Vermont's mineral producers to explore new possibilities for mineral waste utilization; and with the establishment of a minerals experiment station, some of these "possibilities" for waste utilization might be proved out on a pilot-plant stage.

Granite

Huge accumulations of granite grout (waste) are available in the Barre-Montpelier area. What possibilities exist for using this material? Only a few years ago pulverized granite had a rather large market as poultry grit. In 1961 approximately 200,000 tons of granite were marketed for this purpose in the United States. It sold for an average price of

\$9 a ton.[14] In the 1950's two poultry grit establishments operated in the Barre, Vermont, area--a branch of the Wells-Lamson Corporation and the Stone Mountain Grit Company, a firm controlled from Georgia. Neither of these establishments now operates. The Wells-Lamson establishment discontinued poultry grit production in 1957, and the Stone Mountain Grit Company closed in 1961.

According to a representative of the Wells-Lamson Corporation, they once distributed granite poultry grit throughout New England, New York, New Jersey, and nearby Canada. In the early 1950's, Georgia producers became competitive in New Jersey, and in 1953-1954 a large and modern plant began producing at West Chelmsford, Massachusetts. Trucks hauling from the West Chelmsford plant penetrated the Maine and Connecticut markets, and Wells-Lamson could no longer remain competitive. By 1956 they were left with little more than the Canadian market, which was not large enough to warrant their remaining in operation. Transportation rates were the primary factor making them noncompetitive, but difficulties in operating crushers and screens during severe weather in the winter and spring months--the main periods of demand for grit--added to production costs. They were finally forced to discontinue operations in 1957.[15]

What prospects exist for future utilization of granite as poultry grit? An investigation was made of the trends in poultry production in New England and in the North Atlantic States, and several feed dealers

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[14]Perry G. Cotter and Nan C. Jensen, Minerals Yearbook: 1962, Vol. I: Stone, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1963), p. 15.

[15]Letter from Frank Wall, Vice Pres., Kelley Construction, Inc., Barre, Vt., writing for Maurice Kelley, Feb. 24, 1964.

were contacted to determine if they handled this material or if they had calls for it. Of six feed companies contacted, two indicated that they still sell this material, two continue to have calls for granite grit but do not sell it, and two said that they have never sold it.[16] One feed dealer expressed the view that the poultry industry "in Vermont is about finished."[17] His statement has considerable validity not only for Vermont but for New England and even the North Atlantic States as a whole. For example, since 1950 the total number of turkeys produced annually in New England dropped from 1,182,000 to only 754,000 in 1963--a reduction of over 36 percent. The downward trend in the production of chickens in New England is even more pronounced. A slight upward trend occurred in 1962, but 1963 saw a decrease in production. From a peak year of 29,430,000 chickens raised in 1953, annual production for New England fell to a low of 16,658,000 in 1961. Production in the North Atlantic States dropped from 93,800,000 in 1951 to a low of 46,270,000 in 1963 (Table 41). These figures represent a 43 percent decrease in New England and a decline of over 49 percent in the North Atlantic States. High freight rates, severe competition of granite grit producers in Massachusetts, and declining numbers of poultry in the Northeastern United States make very dim the prospects for future use of Vermont granite as poultry grit.

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[16]Letters from Goodwin E. Crosby of E. C. Crosby & Sons, Danby, Vt., Feb. 4, 1964; Richard E. Ide of E. T. & H. K. Ide, Inc., St. Johnsbury, Vt., Feb. 4, 1964; C. W. Landry, Mgr., Crosby Milling Co., Brattleboro, Vt., Feb. 18, 1964; Glenn C. Mix, Pres., E. W. Bailey & Co., Inc., Montpelier, Vt., Feb. 13, 1964; L. M. Weyker of Old Fox Agricultural Sales, Inc., E. Providence, R. I., Feb. 11, 1964; C. W. Hedrick of the Ralston Purina Co., St. Johnsbury, Vt., Feb. 5, 1964.

[17]Letter from G. E. Crosby.

TABLE 41.--Trends in poultry production in the North Atlantic and New England States[a]

Total Farm Chickens (except Broilers) and Turkeys Raised Annually in North Atlantic and New England States, 1950-1963				
	Total Chickens Raised[b] (Thousands)		Total Turkeys Raised[c] (Thousands)	
Year	North Atlantic	New England	North Atlantic	New England
1950	90,648	27,571	4,074	1,182
1951	93,800	28,429	4,631	1,261
1952	80,546	28,777	5,835	1,824
1953	90,417	29,430	5,259	1,617
1954	83,612	28,714	5,645	1,745
1955	77,424	28,212	5,086	1,481
1956	74,213	23,685	4,567	1,252
1957	63,018	21,353	4,148	1,194
1958	65,118	21,219	3,645	1,012
1959	58,275	19,684	3,531	945
1960	49,723	18,265	3,330	837
1961	47,912	16,658	3,601	995
1962	47,085	17,145	2,871	744
1963	46,270	16,986	2,788	754

[a]North Atlantic States includes the New England States plus Pennsylvania, New Jersey, and New York.

[b]Calculated from: U.S., Dept. of Agriculture, Chickens and Eggs: Farm Production Disposition, Cash Receipts, Gross Income by States: Revised Estimates 1950-1959, Statistical Bulletins No. 183 and 287 (Washington: U.S. Government Printing Office, 1956, 1961, and annual Reports 1960-1964).

[c]Calculated from: U.S., Dept. of Agriculture, Turkeys: Farm Production, Disposition, Cash Receipts, Gross Income by States: Revised Estimates 1950-1959, Statistical Bulletins No. 182 and 286 (Washington: U.S. Government Printing Office, 1956, 1961; and Annual Reports 1960-1964).

Other possibilities investigated were the potential uses of granite dust as a fertilizer and as a soil conditioner. Granite contains materials such as potassium that could be used as a plant food. Professor Edward Higbee in his book American Agriculture says that granite dust has been used successfully in the tobacco fields of the Connecticut

River Valley,[18] but one of the largest granite producers in the region claims that to his knowledge there are no tobacco growers still using this material.[19]

Investigators at the University of Vermont and at several colleges and universities in other granite producing states have done research on granite dust to determine if it could be used as a soil conditioner or as a fertilizer. The Director of the College Experiment Station at The University of Georgia described in detail their experiments carried on over a period of several years to determine the potential of granite dust as a fertilizer. Although four and five tons of dust were applied per acre, they have never been able to show "any significant response from the use of the material."[20] The Institute of Agriculture at the University of Minnesota has not even attempted such experiments "due to the lack of minor elements."[21] Others indicated that they have never attempted such experiments because they felt granite would have little value when used for this purpose.[22]

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[18] American Agriculture: Geography, Resources, Conservation (New York: John Wiley & Sons, Inc., 1958), p. 360.

[19] Letter from R. Andrew Fletcher, Treas., H. E. Fletcher Co. W. Chelmsford, Mass., May 11, 1964.

[20] Letter from E. Broadus Browne, Director, College Experiment Station, The University of Georgia, Athens, Ga., Feb. 6, 1964.

[21] Letter from William P. Martin, Head, Dept. of Soil Science, University of Minnesota, St. Paul, Minn., Feb. 10, 1964.

[22] Letters from A. B. Prince, Soil Chemist, Dept. of Agronomy, University of New Hampshire, Durham, N. H., Feb. 7, 1964; M. K. Sadik, Research Asst., Dept. of Soil and Crop Sciences, Texas A & M University, College Station, Tex., March 10, 1964; B. A. Krantz, Extension Soils Specialist, Agricultural Extension Service, University of California at Davis, Calif., April 16, 1964.

According to Professor B. A. Krantz of the University of California at Davis, there is a growing market in California for granite aggregate as a landscape medium. Landscapers stock various diameters and colors for use in their natural form or in concrete that give varied effects to home and garden.[23] Ornamental horticulturist, Harrison L. Flint of the University of Vermont, expresses doubt as to whether crushed granite can be used in the Northeast in the same way as it is used in California because of the difference in architectural styles, but he does feel that crushed granite provides excellent cover for driveways, for eave lines to catch roof-water drip, and for cover in places hard to maintain or to keep in vegetation.[24] A Rock of Ages Corporation representative expressed the view that the market for this kind of material probably would not be large enough to warrant large-scale production. To obtain different colors--Barre granites are a very consistent color of grey--Rock of Ages has attempted to produce artifically colored granite. They have found that production methods giving artifically colored granites unaffected by ultraviolet light are too expensive.[25]

Still other possibilities exist for the utilization of granite grout. Georgia producers, for example, market granite for use as a filtration material,[26] and crushed granite screenings have been produced in

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[23]Letter from B. A. Kranz.

[24]Letter from Harrison L. Flint, Extension Service, University of Vermont, Burlington, Vt., April 27, 1964.

[25]Letter from Cyrus Y. Ferris, Chief Engineer, Rock of Ages Corp., Barre, Vt., April 28, 1964.

[26]James L. Vallely and Garland Peyton, Minerals Yearbook: 1962, Vol. III: The Mineral Industry of Georgia, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1963), p. 8.

South Carolina for use in glass manufacture.[27] Vermont has no glass-making establishment. An investigation of the possibilities of such an establishment would certainly be worthwhile. Further exploration of these and other possibilities should be undertaken by Vermont's granite producers.

Talc

Possibilities for utilizing talc tailings (waste) were also investigated. Talc, a hydrous magnesium silicate, could act as a soil nutrient if only it decomposed rapidly enough. The release of the magnesium in the talcose form, however, is very slow because it is only slightly soluble in water.[28] Researchers in North Carolina, New York, and Texas, all large talc producing states, say that they are not aware of any study in their state directed toward using talc waste as a magnesium source, but all gave the opinion that obtaining magnesium from talc is, at the present time, not practicable.[29]

Management at the Eastern Magnesia Talc Company's Johnson establishment claims that they once had a buyer for their tailings. A Canadian refractory company planned to produce bricks from these tailings, but

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[27]Wallace W. Key, George H. Holmes, and Nan C. Jensen, Minerals Yearbook: 1959, Vol. I: Stone, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1960), p. 20.

[28]Dunklee and Midgley, loc. cit.; and William H. Longstaff and E. R. Graham, "Release of Mineral Magnesium and Its Effect on Growth and Composition of Soybeans," Soil Science, LXXI (March, 1951), 173.

[29]Letters from P. N. Sales; M. K. Sadik; Murray H. Milford, Asst. Professor, Dept. of Agronomy, Cornell University, Ithaca, N. Y., March 2, 1964; John M. Parker, Professor-in-Charge, Geological Engineering, North Carolina State of the University of North Carolina, Raleigh, N. C., March 3, 1964.

freight rates proved too high, and the two firms abandoned their plans.[30] Couldn't a pilot plant be set up to determine possibilities for producing magnesite bricks at this establishment or at other talc operations in the state?

Slate

Waste slate has several uses whose potentials have not been fully explored. Three dealers in art supplies say that slate is used as a sculpture medium, but the present market is not large.[31] According to Mr. Robert Robinson, an instructor in art at Castleton State College, Vermont, block prints have been made of slate with a very attractive effect.[32] The market for slate as an art and sculpture medium should be investigated thoroughly by producers.

Ground slate makes a good surfacing material for tennis courts. It can function as a filler in road asphalt, roofing mastics, oil cloth, linoleum, and paints.[33] Researchers, as early as 1924, found it useful as a filler in rubber shoe heels and automobile tires.[34] With a rapidly advancing technology and the growing number of synthetic mixtures and compounds, there should be increased possibilities for using slate as

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[30]Interview with Roger W. Perkins, Plant Mgr., Eastern Magnesia Talc Co., Inc., Johnson, Vt., Oct. 28, 1963.

[31]Letters from Frank C. Gaylord, Sculptor, Barre, Vt., Feb. 16, 1964; Sculpture House, New York, N. Y., March 2, 1964; Jack D. Wolfe, Pres., Jack D. Wolfe, Inc., Brooklyn, N. Y., April 28, 1964; Ettl Studios, Inc., Ettl Art Center, Glenville, Conn., March [5], 1964.

[32]Observed at the Brooklyn Art Show, Brooklyn, N. Y., April [15], 1964.

[33]Fillmore C. Earney, "The Slate Industry of Western Vermont," Journal of Geography, LXII (October, 1963), 309.

[34]"New Ways to Use Slate," Scientific American, CXXX (March, 1924), 167.

filler material, but much more research is needed in this direction.

According to Robert L. Bates in his book Geology of the Industrial Rocks and Minerals, crushed slate can be fused with steel-mill slag and injected into a jet of steam or air to form an insulating material known as rock wool or mineral wool. It can also be used in acoustical tile, amber glass, and slate-lime brick.[35] Few of these possibilities for using and marketing Vermont's slate waste has yet been adequately explored.

Evidence of the application of technology is already at hand in the Vermont slate region. One producer in West Pawlet uses large quantities of slate waste. Workers add resins to crushed slate that is pressed into slabs, baked, and then sanded. The result is an excellent chemical-resistant table-top material.[36]

Experiments directed toward using slate as an aggregate have been underway for several years.[37] Alfred University in New York, during the early 1960's, carried on extensive research for a New York firm to determine the possibility of using Vermont slates as a lightweight aggregate material. The tests proved favorable and in the summer of 1962 construction began on a plant just south of Castleton. The original plans called for using extensive acreages of "fines," residue from a former establishment that made granules for roofing shingles. These

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[35](New York: Harper & Brothers, 1960), p. 61.

[36]Interview and field observation with Patrick Mulhair, Gen. Mgr., Durock Corp., W. Pawlet, Vt., Oct. 5, 1962.

[37]See for example: J. E. Conley, "Waste Slate as a Raw-materials Source of Lightweight Aggregate," Transactions of the American Institute of Mining Engineers, CXLVIII (1942), 161-66; J. E. Conley, et al., Production of Lightweight Aggregate from Clays, Shales, Slates and Other Materials, U.S. Bureau of Mines Report of Investigations 4401 (Washington: U.S. Government Printing Office, 1948).

"fines" were to be screened, mixed with chemicals, pelletized, bloated in a rotary kiln, crushed, sorted into various sizes, and then marketed to block and structural cement companies. Although early experiments in using these "fines" proved successful, recent attempts in using them have not worked, and the firm has been forced into a more expensive operation. To obtain raw material, they have reopened an adjacent quarry and have installed a crusher to prepare the slate. This alteration of plans has increased production costs approximately $1 a ton. When the difficulties of using the "fines" are worked out, the producers hope to return to their original plans. This same firm is now developing the final stages of plans for building an aggregate plant in Albany, New York, that will receive its raw materials from their Castleton quarry.[38]

In Chapter VI proposed Vermont highway systems were discussed. A total of 574 miles of federally supported interstate and primary roads are to be built during the next 14 years.[39] According to Mr. H. F. Farrington, a Highway Planning Engineer in the Vermont Department of Highways, there will be a large demand for stone as sub-base material.[40] Granite producers have already supplied large quantities of grout for the construction of the interstate system between Montpelier and Burlington. A forward-looking slate producer, with large accumulations

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[38]Interviews and field observations with Ryan T. Oakes, Plant Mgr., Vermont Light Aggregate Co., Castleton, Vt., Oct. 4, 1962, March 3, 1964, and July 17, 1964.

[39]Highway Planning Division, Vermont Dept. of Highways, <u>Vermont's 14-Year Planning Program on the Federal Aid Highway Systems</u> ([Montpelier, Vt.], 1963); and U.S., Bureau of Public Roads, <u>Quarterly Report on the Federal-Aid Highway Program</u> (September 30, 1964).

[40]Letter from H. F. Farrington, Highway Planning Engineer, Vermont Dept. of Highways, Montpelier, Vt., Nov. 27, 1964.

of waste, might profitably investigate this prospect. A new primary highway is to be constructed from Whitehall, New York, eastward to Rutland, Vermont. The road must pass directly through the slate producing region, and the region's central location along the construction route is an added bonus. Once production is established, a producer should have a continued, but perhaps limited, market for crushed slate as surfacing material for unpaved secondary roads in the area. Mr. Edward S. Carpenter, President of the largest slate firm in the region, thinks the idea has some merit. But he doubts its practicality after the major road project is completed because too many of the secondary roads are already paved.[41]

Diversification and Promotion

During 1962 a significant development occurred in the stone industries of Vermont. The total tonnage for all stone decreased by 37 percent, but the value of production increased by 6 percent. This situation is the result of an increased output of slate, marble, and especially granite as dimension stone. Although a decrease in tonnage with an increase in value would seem to be contradictory, dimension stone produced for use in architectural structures demands higher prices than does crushed and broken stone. Production of dimension granite for architectural purposes in 1962 increased fourfold over 1961.[42] Because Vermont's granite manufacturing (cut stone) establishments have been for many

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[41]Interview, Vermont Structural Slate Co., Fair Haven, Vt., May 20, 1964.

[42]James R. Kerr, Minerals Yearbook: 1962, Vol. III: The Mineral Industry of Vermont, U.S. Bureau of Mines (Washington: U.S. Government Printing Office, 1963), p. 3.

decades much too restricted in the types of commodities they produce, this production trend is especially encouraging. As early as 1931 Oliver Bowles and Paul Hatmaker of the U.S. Bureau of Mines pointed out the folly of producing only monuments, which at that time formed 96 percent of the granite industry's total production.[43] The industry's almost exclusive occupation with monument and marker production stems primarily from a long period of competition from marble. Marble is cheaper to process, and this gradually forced the granite producers out of the structural market. Also, dimension granite (for architectural use) has long been produced in Maine. The Maine producers' established name in the field and their better access to cheap water transport have had a strong deterrence on Vermont producers re-entering the market. But now the Rock of Ages Corporation has reopened two of its old quarries that once produced excellent architectural stone. A quarry at Bethel produces a white granite, and one at Woodbury furnishes a blue granite. Producers are also making a strong bid for the architectural market by increasing their use of Canadian granites. These granites give architects and designers varied colors to choose from--such as pink, red, and black.[44]

Many cut-stone producers express the view that their ability to produce architectural material is highly dependent upon the current trends and whims within the field of architectural design. Twenty-one

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[43]Trends in the Production and Uses of Granite as Dimension Stone, U.S. Bureau of Mines Report of Investigations 3065 (Washington: U.S. Government Printing Office, March, 1931), p. 15.

[44]Interview with Milton V. Lyndes, Gen. Mgr., Barre Granite Assoc., Barre, Vt., July 2, 1964.

architectural firms were questioned about this problem. They were asked what they felt the future holds for granite, marble, and slate as architectural materials and also what advantages or disadvantages they believe tend to favor or disfavor their use of stone. The answers from the 13 different responding firms varied but some responses were noticeably alike. Most respondents felt that the permanence, ease of maintenance, the aesthetic value, and the adaptability of stone were positive qualities. Eight of the respondents said that cost was the major deterrent in using stone, four indicated that freight rates were prohibitive, and two specifically mentioned that Vermont marble tended to stain when used on exteriors. Other negative points mentioned were: (1) samples of stone material are not always available for their consideration, (2) the architects find that they cannot obtain technical advice on the use of different stone products, and (3) the cut-stone producers are failing to develop new ways that their products can be adapted to building.[45]

It is evident from these complaints that some architects feel it is the responsibility of the stone industries to promote, to advise upon the use of, and to develop their products to suit the needs of builders and architects. These responses emphasize once again the need for a minerals laboratory in Vermont. It also makes clear the necessity for greater promotion and research activity by Vermont's mineral producers.

Personal interviews and discussion with stone and other mineral producers in Vermont show that there is indeed a lack of promotional

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[45]Letters from the following architects: Ralph B. Haver, Arthur Feitel, Harold D. Steward, Robert C. Dean, Edward C. Bassett, Warren H. Ashley, Walter G. Andersen, Grant W. Voorhees, Edward B. Doucette, Leon Brown, Joseph Angell, J. R. Wilkinson, M. Dwight Brown. (For complete entry see bibliography.)

activity and a lack of marketing sophistication in general. Firms with as many as 20 to 30 men do not employ salesmen. Most small producers depend entirely upon buyer-initiated orders. Two large mineral producers, however, are planning to hire a full-time salesman.[46] Few firms returning questionnaires indicated that they had salesmen. Industries such as slate, granite, and marble could benefit from a program of greater industry-wide advertisement and education of the public, for, as Time magazine recently pointed out, there is a tremendous competition in the building products industry because "the technological advances of recent years have produced such an array of building materials that both home buyer and home builder are often confused in making a choice."[47] This statement has a direct bearing upon the complaints of architects. Scholars of the mineral industries have long been aware of the promotional needs in some of Vermont's stone industries. Bowles, as early as 1922, wrote that slate producers were losing out on the roofing shingle market because of the lack of advertisement, and in 1931 he, along with Hatmaker, expressed the view that the granite industry very much needed cooperative advertisement.[48] The Barre Granite Association does advertise and promote the use of monuments, but its functions do not include promotion of architectural stone.

A good example of the necessity for promotional activity is presented in the recent public reaction to the costly commercialization of

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[46] Interviews with T. A. Yager; and James Ticehurst, Vermont Associated Lime Industries, Inc., Sept. 6, 1963.

[47] "Building: Fight for the Home," Time, May 1, 1964, p. 87.

[48] Oliver Bowles, The Technology of Slate, U.S. Bureau of Mines Bulletin 218 (Washington: U.S. Government Printing Office, 1922), p. 22; and Bowles and Hatmaker, op. cit., p. 20.

death and burial. This reaction has created a major challenge to the monument industry. Opinion among producers in Vermont and in other areas of the United States varies as to the impact that monumentless cemeteries (memorial parks) and memorial associations, groups which usually conduct their own funerals and burial, are having on the monument business.[49]

Mr. F. E. Foster, Executive Vice President of the American Monument Association, and Mr. Milton V. Lyndes, General Manager of the Barre Granite Association, say that memorial associations have, so far, had little impact on the monument trade. Both Foster and Lyndes claim, however, that the memorial parks have indeed had a depressing effect on the monument business. According to Foster, the impact on Vermont producers is not yet as great as it could be because most memorial parks are in the Far West, a market area difficult to reach anyway.[50] Georgia producers, on the other hand, have felt enough pressure from memorial parks that they have instituted large promotional measures to induce them to use stone slabs in place of the traditional upright marker.[51]

From several interviews with granite monument producers in the Barre district, it seems that there is indeed pressure from memorial parks and associations, but it has not reached a critical stage. Some

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[49]Letters from James D. Horne, Sect., Atlas Granite Co., Inc., Elberton, Ga., March 13, 1964; E. L. Stockinger, The Stockinger Co., St. Cloud, Minn., March 24, 1964; William H. Kelly, The Leonard Granite Co., Chambersburg, Penn., March 25, 1964; Irene A. Podskalny, Owner, Adams Granite Co., Barre, Vt., May 27, 1964.

[50]Letters from F. E. Foster, Executive Vice Pres., American Monument Assoc., Inc., Olean, N. Y., March 25, 1964; Milton V. Lyndes, Gen. Mgr., Barre Granite Assoc., Barre, Vt., June 1, 1964.

[51]Letter from Walton Y. Harris, Promotion Specialist, Elberton Granite Assoc., Inc., Elberton, Ga., March 19, 1964.

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producers said that in some areas of the United States memorial parks have failed to implement their promises of adequate park upkeep; the result has been a return to the use of traditional markers and cemeteries.[52] Nevertheless, the effects of the memorial parks and, to a lesser degree, of the memorial associations should encourage monument producers in the granite and marble regions to investigate methods for assuring a continued market for their monuments. The monument producer who expects to meet this challenge passively is likely to find he has a decreasing market for his products.

Market Analysis

Opportunity exists for the development of long-range production plans and marketing forecasts through research. Janet W. Miller of the Arthur D. Little Corporation, a research firm, recently pointed out how market analysts can--through the use of statistical techniques and careful study of the "historical relationships among the appropriate economic activities"--make scientific predictions of future demands for certain products on a regional or national basis. Miller illustrates how sales forecasts, for the period up to 1970, were made for gypsum board in seven western states and the metropolitan areas of San Francisco and Los Angeles.[53] Similar studies could be used to advantage by the state's larger mineral producers or groups of producers.

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[52]Interviews with Walter Caroll, Officer Mgr., L. Z. Hotte Granite Co., Inc., Barre, Vt., July 2, 1964; Ernest Hennis, Office Mgr., Adams Granite Co., Inc., Barre, Vt., July 2, 1964; Ernest E. Colgan, Owner, Williamson Polishing Co., Barre, Vt., July 2, 1964; Leon Trombley, Co-owner, Colonial Granite Co., Barre, Vt., July 20, 1964.

[53]"Forecasting Economic Activity," The Professional Geographer, XVI (May, 1964), 19.

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One mineral producer in Vermont, the Vermont Kaolin Corporation, has already used the services of the Little Corporation for analyzing potential markets for their product. The work of the Corporation showed that Vermont Kaolin should attempt to increase its sales by producing more for the paper market. They now have a wet-processing pilot plant in operation to work out any difficulties that might arise in producing for the paper market.[54] The change-over involves major alterations because former operations used only dry processing methods. If increases in paper production continue as they have during the past decade, their decision should prove profitable. Production of all paper in the United States for 1952 was only 10,898,000 short tons; in 1962, 16,459,000 short tons were produced.[55] The Corporation hopes also to penetrate the Canadian paper market; there is no tariff on the entry of kaolins into Canada. Georgia's excellent kaolins may find the competition from Vermont severe.

Cooperation and Organization

The traditional ethos of small business in the United States is its independence, where the individual entrepreneur takes pride in his capacity for hard work and self-reliance. If only a man puts forth enough effort, he can carve out a niche in the market-place frontier. Unfortunately, as the high rate of business mortality illustrates, this dream is often difficult to fulfill. Problems of finance, aggravated by fluctuations in the general economy and an inability to acquire capital, sap

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[54]Interview with A. C. Moore; and letter from Allen C. Moore, Treas., Vermont Kaolin Corp., Bristol, Vt., Aug. 18, 1964.

[55]The Conference Board, The Economic Almanac, 1964 (New York: The National Industrial Conference Board, 1964), p. 378.

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the strength of the small business establishment. Transportation costs, market fluctuations, and competition from technologically superior producers encourage cut-throat competition and increase his susceptibility to business failure. Although every business faces, in varying degrees, these same problems, they are especially pronounced in the small enterprise. Not all of these problems can be eliminated, but some could be reduced through cooperative effort. With thoughtful planning the opportunities offered through planned organization can be as positive in their effect as technological innovation. The opportunities offered through cooperation and organization should also be carefully explored by the state's mineral producers.

Barre Granite Association: an example

The Barre Granite Association's (BGA) activities demonstrate what an industry can do through cooperation. Several of the Association's activities have already been mentioned--such as its consolidating shipment service, its cooperative apprenticeship programs, and its maintenance of credit ratings on monument dealers throughout the United States.[56] The BGA has several other important functions. It controls the quality of members' production through Barre Guild inspectors. If producers' monuments fail to meet rigid standards, they do not receive the Barre Guild mark, a symbol of outstanding quality. To promote monument sales for all of the Granite Association's members, advertisement is done under this label. Unfortunately, some misuse of the Barre Guild mark occurs. Some smaller non-members of the Granite Association may finish a stone except for the lettering. They then persuade an Association member,

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[56]This is done through the American Monument Association.

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specializing in lettering, to complete the monument and to place the Barre Guild mark on the stone! Although the Manager of the BGA, Milton V. Lyndes, claims that the extent of this practice is negligible, several producers maintain it is fairly common.[57] One producer readily admitted that he regularly sends his monuments to Association members to receive the Barre Guild mark.[58]

Although the BGA is very important to Vermont's granite industry, only 52 of the total 125 producers are members. This weakens the entire industry's competitive position because inferior stone may be, at times, passed off as Barre Guild granite, and the restraints on cutthroat competition are not as strong. Although this organization is functional and fairly well supported by granite producers, it has possibilities for development into a much stronger organization, especially through increased membership and extended functions for promoting granite as a building stone. Another function could possibly be instituted--that is, the establishment of its own lending fund. When this idea was discussed with Mr. Lyndes, the Association's Manager, he expressed the view that such a plan could be implemented, but he feels it would be difficult because: (1) the funds necessary for successful operation would require approximately $1,000,000, and this would entail an increase in the membership fee which is now 1 percent of the annual gross receipts, and (2) the organization would, upon entering this field of activity,

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[57]Interviews with Elgo Zorzi, Supt., Adams Granite Co., Inc., Barre, Vt., July 2, 1964; John Leppanen, Co-owner, North Barre Granite, Inc., Barre, Vt., July 2, 1964; Walter Caroll, Office Mgr., L. Z. Hotte Granite Co., Inc., Barre, Vt., July 2, 1964; Milton V. Lyndes, Gen. Mgr., Barre Granite Assoc., Barre, Vt., July 2, 1964.

[58]Name withheld upon the request of the interviewee.

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Vermont's slate producers should consider the merits of an organization similar to the BGA. They could also look to a competing slate region--the Pennsylvania slate district. This region has a strong association called the Pennsylvania Slate Producers Guild. The large number of establishments in the Vermont slate industry and conditions within the industry are such that a central organization could be very beneficial. The large number of establishments, however, would make difficult the organization and functioning of such a body, but with proper planning it could be done.

Some producers in the region have long been aware of the need for such an organization. In the early 1900's and during the 1950's attempts were made to establish a slate association, but the efforts collapsed after a short while. The difficulties in establishing and maintaining such an organization arise from: (1) the ease with which small producers can enter the industry during periods of prosperity, (2) the tendency toward complacency when there is a large demand for slate, and (3) a constant threat of cut-throat competition even during periods when the slate market is not depressed. This last condition, of course, would be one of the main advantages of a slate association. The regulation of cut-throat competition could, to some degree, help stabilize profits.[60]

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[59]Interview with M. V. Lyndes.

[60]Caution would be necessary to avoid violation of federal legislation such as the Clayton and Sherman Anti-trust Acts. The Barre Granite Association was recently fined $75,000 under the Sherman Anti-Trust Act for alleged price fixing.

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The Vermont slate industry, at the present time, is experiencing cut-throat competition in its tile and shingle commodities, whose effects have been felt even in the Pennsylvania slate district.[61] That these should be the commodities subject to the greatest price cutting is not surprising because it is this material that a man can make with the greatest ease when entering the industry with little capital. Investigating the extent of cut-throat competition is a difficult task because the producer who is cutting prices is not eager to make it public knowledge. But some pertinent data have become available--enough at least to establish that the problem does exist.

The first slate producer in the region to market pre-packaged slate tile initially sold his product for 57 cents a square foot. Soon some of the other larger producers saw its possibilities, and they too entered the market. Within three years all of the major producers were turning out these packaged units, and several small firms began to produce only for this market. Before long the several producers were cutting prices. As of June 1964, slate tile prices ranged from 47 cents to 35 cents a square foot. One wonders if perhaps some of these producers are not selling at less than cost![62] Such practices must hurt the entire industry. A slate association might be able to reduce this kind of business activity.

Another problem that would be amenable to some control through a slate association would be the practice of selling slate to "gypsies."

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[61]Letter from W. F. Mullen, Executive Director, Pennsylvania Slate Producers Guild, Pen Argyl, Penn., Feb. 12, 1964.

[62]Data based on interviews with several slate producers who asked not to be identified.

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Independent truckers travel through the slate district and buy up defective or poor quality stone and then truck it to markets in southern New England. This material is sometimes sold as quality stone, or, as occurs in shingle sales, a trucker may short sell a load of slate shingles. He may have purchased only 12 squares but sells them as 15. If this practice continues, the reputation of Vermont slates could be damaged considerably. Cooperative efforts at educating builders and contractors in what constitutes quality stone and in the techniques for determining the volume of various slate commodities could be an important function of a slate association.

Better enforcement of quality and color standards for various slate commodities, cooperative advertisement, and collective shipping of small orders to a given point of destination could also be important functions of a slate association. An especially important function could be the administration of apprenticeship programs designed to train men in the many hard-to-fill positions listed by slate producers. Shingle splitters are so difficult to obtain that the larger firms constantly "poach" workers from smaller firms and from one another.[63]

The assistance of a geologist-mineralogist could aid most slate producers, but few can afford the cost. Collectively, through an association, a geologist-mineralogist could be supported. Plant sites and waste piles have in the past been located over good beds of slate; raw material has been wasted through insufficient knowledge of its characteristics; and quarry costs have been higher than necessary because of

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[63]Interview with A. B. Potter, Pres., AB Potter Slate Co., Poultney, Vt., Jan. 22, 1964.

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the producers' inability to calculate methods for most efficiently extracting slate beds. Such difficulties could frequently be obviated with professional assistance.

Amalgamation

Still another but perhaps even more difficult approach to organization is through amalgamation. This process has actually been occurring in some of Vermont's mineral industries, although it might be argued that in one, the marble industry, the process has gone too far. The gradual decline in the number of mineral firms in Vermont since the turn of the century can be assumed to be partially due to amalgamation (Table 42).

TABLE 42.--Number of firms in the major mineral industries of Vermont, 1900-1964[a]

Year	Mineral Industries				
	Marble	Talc	Limestone	Granite	Slate
1900	16	--	--	---	--
1910	10	6	7	256	54
1920	7	5	5	210	31
1930	--	5	8	---	--
1940	6	3	1	---	44
1950	--	3	1	---	21
1964	8	2	2	125	18

[a]Compiled from: George Perkins, Report of the State Geologist . . . for the years 1901-1902. 1911-1912, 1921-1922. (For complete entries see bibliography.) U.S., Dept. of the Interior, Mineral Resources of the United States: 1930, Part II, Non-metals. U.S., Bureau of Mines, Minerals Yearbook: 1940 and 1950. Vermont Development Dept., Directory of Vermont Manufactured Products (1964-1965 ed.; Montpelier: Industrial Division of the Vermont Development Dept., 1964).

Anyone proposing a consolidation of firms will certainly be challenged as to its utility by the question: Would it really solve anything? Not necessarily. The advantages of greater size offered through ana

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through amalgamation would not solve every problem of business nor would it lessen the need for adept financial and personnel management.

Increased size, however, could give the larger firm a wider production and human resource base. Production activities and worker skills and knowledge could be more efficiently organized through the development of specialization. The larger firm could perhaps organize its personnel and old individual establishments into specialized production units. For example, one establishment having a limited physical plant and an inconvenient layout for large machinery could produce products such as monuments while another with better and larger plant facilities might concentrate on producing architectural stone. Still another establishment might be best utilized only in sawing or polishing because its location allows a cheaper method of waste disposal. If production and labor skills could be shifted around in such a way that the advantages of each establishment could be maximized, then the entire organization might become more efficient and profitable.

Increased financial reserves would be another probable advantage of larger firms. Some markets, such as the architectural field, are almost entirely out of reach of most small producers because they cannot afford the expense of purchasing the necessary equipment to produce for them.[64] The problem of inadequate financial reserves confronts the small producer even when he merely wants to acquire up-to-date machinery that could help him to remain competitive with larger firms such as the Rock of Ages Corporation, the Vermont Marble Company, and other large producers

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[64]Interview with Louis C. Simoneau, Plant Manager, Associated Granite Co., Barre, Vt., July 20, 1964.

who have begun to speed up production processes in polishing and in cutting monuments and architectural materials. Small producers are finding it increasingly difficult to compete with them. Such circumstances have led to price cutting in the slate and granite industries. Greater financial strength that might become possible through amalgamation could help alleviate the tendency to resort to such practices.

With effort, increased amalgamation in the granite industry might be possible, but unfortunately the traditions of pride, self-reliance, and, in many cases, family ownership through several generations are strong deterrents to any consideration of relinquishing control of the business in part or in its entirety. Only 27 percent of the granite producers answering the questionnaire said that they had ever considered or would consider amalgamation. Of the eight slate producers answering the questionnaire, four said that they had considered such a possibility.

Summary and Conclusions

Not enough is being done to identify opportunities for Vermont's present mineral industries, nor are there any state-supported efforts directed toward the development of new mineral industries.

Insufficient knowledge of the state's mineral resources demands a detailed, state-wide field exploration of the minerals in the state. A minerals field survey and experiment station could serve as an appropriate research unit. Both the field study and the minerals laboratory could give a great boost to the development of present industries and might even attract new mineral industries into the state.

Producers themselves should explore every possibility for waste utilization. With imagination and research the problem is not hopeless as some slate producers have already shown.

An encouraging feature of Vermont's granite industry is its increased production of architectural stone. Granite producers have too long depended almost exclusively on the monument trade. Vermont's structural stone producers should make added efforts to promote their products. Those active in the field of architectural design claim that sample materials are not always available, nor do they always know all of the technical qualities of stone they might like to use. Responses received from the sampling of architectural firms indicate that the structural stone producers need to advise architects and builders on the qualities and uses of their products. The problem of promoting their products among architects and builders is important enough that Vermont's mineral producers should investigate it in much greater depth than what has been presented here.

Monument manufacturers should be alert to the need for reacting wisely to the effects of memorial parks and memorial associations even though their impact has been somewhat less pronounced on Vermont producers than in other areas such as Georgia.

The use of private research firms to make market analyses has much to offer many individual producers. This type of work could also be carried out effectively under the sponsorship of the Vermont Development Department and industrial associations such as the Barre Granite Association or others if only they were organized.

The many small mineral producers in Vermont's mineral industries could benefit greatly from closer cooperation and industry-wide organization. This is especially true of the slate and granite industries.

Although the granite industry already has an association, it could be stregthened through increased membership, expanded functions, and more intensive policing of its members. The slate industry with its many small firms should study the merits of the Barre Granite Association. A slate association or producers guild could help to control business practices detrimental to the entire industry and could help producers with technical and promotional problems.

Amalgamation could offer some producers hope for increased financial strength and production efficiency through specialization of establishments within a firm. The possibilities offered through this form of organization need much more detailed investigation than has been presented here.

CHAPTER XIII

SUMMARY AND CONCLUSIONS

Vermont's mineral industries face many problems that reduce their production efficiency. These problems, in effect, retard their growth and their ability to make a maximum contribution to the state's economy.

Mineral establishments in Vermont are smaller than the national average. Vermont's small one-establishment mineral firms that employ only a few workers experience high turnover rates when compared to the state's larger mineral producing firms. The granite and slate industries have especially high turnover rates. Although specific reasons for the high turnover among Vermont's mineral establishments is difficult to determine, this condition, for the most part, cannot be considered a maximum utilization of the state's financial and human resources.

Producers in several of Vermont's mineral industries face a major problem in their dependence on one or two restricted markets such as building construction and monuments. If these industries decline, the mineral industries dependent on them founder. Although the dangers of cyclic fluctuations in the demand for the mineral industries' products cannot be eliminated entirely, these variations could be reduced through greater product diversification. Expansion into new markets through market capture or developing new uses for present products could also help.

Production efficiency is an important part of business success. Effectively measuring production efficiency, however, can be difficult. But by comparing annual value-added figures and man-hours of labor, a fair picture of relative efficiency in a given industry can be obtained because value added reflects how efficiently capital assets, overhead costs, and management techniques are utilized along with the labor input. Vermont's mineral industries compared in this context do not give an impressive showing. Low value-added figures in several of Vermont's mineral industries indicate that many mineral producers need to improve their management skills and to develop methods of systematic cost analysis such as are available through cost accounting.

Vermont's location accentuates its transportation problems. Its position adjacent to an international border with its restrictive tariffs makes Canadian markets less accessible and reduces the marketing hinterland available to mineral producers. Although the United States' center of population is shifting westward, Vermont's location near the large urbanized areas of the Northeastern United States is and will continue an important advantage. Producers must not, however, view this advantage as assuring them an unchallenged position in marketing. As Western markets grow, Vermont's competition from regions nearer to these areas will make it imperative that the state's mineral producers seek more efficient transport methods. Mineral shippers should give careful attention to opportunities offered by consolidating shipments and by an increased use of water transport.

The age of workers in Vermont's mineral industries is above the average for Vermont's other employed male workers. Although this structure has some disadvantages, the advantage of accumulated skills among older workers tends to offset the negative features of age. Mineral producers have expressed the view, through a state-sponsored study, that their need for workers will, during the next five years, remain relatively stable. The reasons given to explain this opinion are (1) expectations to mechanize and (2) in the case of the granite industry, a stable market demand for monuments.

Mineral producers claim to have many hard-to-fill positions in their establishments but, at the same time, are doing little to assure that vacated positions will have qualified workers to fill them. The necessity for long-range planning is especially important to the state's mineral producers because of their intentions to become increasingly mechanized. This will require retraining many workers. Because the median number of years in school completed by males 25 years or older in Vermont's mineral producing counties is favorable compared with workers in competing regions of other states, the producers' task in training and retraining workers should be easier than that experienced by their competing counterparts.

Labor-management relations, although not studied in great depth, appear to be fairly harmonious. Stronger efforts should be made by labor leaders to decrease irresponsibility among rank-and-file members such as is illustrated in "wild-cat strikes" and on-the-job featherbedding. Management must begin to explore more carefully the social and psychological problems that will arise as they implement their plans to mechanize and automate.

A comparative analysis of bank loan distributions for Vermont banks shows that a disproportionately large percentage of their loans are in real estate and not in commercial and industrial loans. Although the results of the general questionnaire do not show that mineral producers have a pronounced difficulty in obtaining loans, extensive personal interviews with many small producers give strong evidence that they do. Overextended credit and interest payments on accounts-receivable loans are a persistent and severe problem among granite producers.

Real property taxes are higher than those in many areas with competing mineral industries. The state's corporate income tax is not overly high, but Vermont's personal income tax rate places it near the top nationally. Vermont's high per capita tax burden probably gives the state's mineral producers a heavy tax bill. Taxes may deter prospective industrialists seeking to locate new mineral industries in Vermont, but most scholars of the subject find taxes of secondary importance in making locational decisions.

Tax assessment inequities are sometimes an important problem to mineral producers. This problem exists in Vermont's granite industry, and attempts have been made by listers and granite producers in Barre to adjust plant and land assessments in the Town.

Considered as a percentage of value added, power costs are an important overhead item of Vermont's mineral industries. Electric energy purchases account for a large part of the total power cost in the state's mining and manufacturing mineral establishments; mineral fuel purchases are of lesser importance. Mineral fuels cost more in Vermont than they do in many states with competing mineral regions. The state's mineral producers' electric energy costs are not too dissimilar from those paid by competitors in other regions.

The activities of extracting minerals and manufacturing mineral commodities in Vermont have many difficult problems associated with them.

The characteristics of raw materials and their location, and the climatic elements are not subject to change and will continue as major obstacles to the mineral industries. Field observations and interviews show, however, that management frequently does not give enough attention to conditions that are amenable to change through man's technological and organizational abilities. Multiple handling and inefficient waste removal especially need remedial attention.

Opportunities for expanding production volume and sales and for entering new markets do exist for Vermont's mineral industries. These opportunities could be better realized if only state officials and mineral producers had a better knowledge of what mineral resources Vermont has and how much. An intensive field study should be made for this purpose. A minerals experiment station could have a positive effect in aiding the many mineral industries of Vermont in finding uses for their wastes, in developing new uses for present materials, and in giving producers technical advice.

The state's mineral producers should more actively sell their products through both individual and industry-wide advertisement and education of potential users. This is especially true for those whose sales are greatly influenced by decisions made by builders and architects. Likewise, monument producers, although not yet critically affected by the memorial parks and memorial associations, must take steps to reduce their impact. The sacred aura associated with death does not always include the sale of a monument!

The establishment of industrial organizations could aid some industries considerably. This is especially true in the slate industry. Maintenance of quality standards, industry-wide advertisement, market research, consolidated shipping services, and control of cut-throat competition are some of the many functions such organizations could have. Possibilities for and the advantages of amalgamation should be studied by many of the state's mineral producers, especially among those active in the slate and granite industries.

Perhaps the most essential but elusive ingredient that comes within the recipe for opportunity is "imagination." To find solutions to problems retarding maximum production efficiency, to discover new uses for mineral products, and to develop better promotional programs for selling their mineral products will require an energetic imagination implemented through self-criticism and research. If these challenges are approached with the attitude that success is possible through persistent and intelligent effort, then, the mineral industries of Vermont can make an added contribution to the state's economy.

The ideas explored in this paper require more detailed investigation. Some problems discussed here should be studied in greater depth so that the general public, state officials, and the mineral producers themselves can more readily understand the importance Vermont's mineral industries could have for Vermont's future economy. With this purpose in mind, the following recommendations are made for further study:

(1) To develop methods for helping the state's mineral producers accept, understand, and implement methods of cost accounting, record keeping, and other business management techniques.

(2) To explore possibilities for setting up mineral manufacturing establishments in Canada that would use raw materials produced in Vermont.

(3) To find ways whereby tariff duties can be lowered on finished mineral commodities entering Canada from the United States.

(4) To find methods whereby small shippers in an industry could establish and maintain services for consolidating rail, truck, and water traffic.

(5) To establish the potential value of a Champlain Waterway to the state's mineral producers.

(6) To seek methods of setting up more training programs for hard-to-fill positions in the state's mineral industries.

(7) To find the best means for establishing retraining programs to meet labor needs created by new technological changes in mineral establishments.

(8) To seek specific reasons for high labor turnover rates in quarries and methods for reducing them.

(9) To explore every means whereby labor can eliminate restrictive work rules and on-the-job featherbedding.

(10) To determine the effects of the state's real property, and personal and corporate income taxes on its mineral establishments and on its ability to attract new mineral industries.

(11) To establish the extent of assessment inequities and the problems associated with nonuniform criteria in assessing Vermont's mineral property.

(12) To find ways to aid mineral producers in their problems of waste disposal.

(13) To establish a plan for a comprehensive and detailed field study of Vermont's mineral resources so that new industries might be attracted to the state and so that present producers can plan more effectively for the future.

(14) To explore the opportunities a minerals experiment station could offer toward developing uses for mineral wastes, finding new uses for present products, and giving aid to producers' technical problems associated with their production activities.

(15) To determine those geographical areas where greater promotion is needed for Vermont's mineral products.

(16) To explore what markets for mineral products can be most easily penetrated.

(17) To seek ways to establish and maintain an industrial association in Vermont's slate industry.

APPENDIX

QUESTIONNAIRE

1. Do you feel that your business could be benefited by an industry-wide advertisement program?

2. How many full-time salesmen does your firm employ? Part time?

3. Do you use any type of program for exploring market opportunities?

4. Have you ever requested promotional aid from the Vermont Industrial Development Commission? Did you receive the aid you requested?

5. According to a recent study made by the Vermont Department of Employment Security, producers in your industry expect to add only a very small number of workers in the next few years? How could you account for this? Is it a stable market demand, an expectation to mechanize operations, or some other factor?

6. Do you have a regular recruitment program which has as its purpose the placement of workers in hard-to-fill positions in your establishments? What methods of recruitment do you use?

7. Do you have a training program in your plant to fill skilled positions that are new or which are to be vacated due to retirement?

8. The age of workers in the mineral industries of Vermont is slightly above the average for all manufacturing workers in the state. Do you think that this is a disadvantage for the mineral industries? Why?

9. What is the average age of your employees?

10. How could you account for the lower/above average age of your workers?

11. Do you feel that the level of education completed is an important factor in the productivity and efficiency of your workers? Why?

12. What is the average educational level of your workers as a whole?

13. Do you maintain labor turnover rates for your firm? If so, what is your monthly rate?

14. Are your labor turnover rates in your quarries or mines greater than they are in your manufacturing establishments? Why?

15. Do you keep records of accident rates in your processing plants and in your quarries?

16. Do you maintain absenteeism records of employees?

17. According to all the data I have found, mine and quarry workers in a given industry average a higher weekly rate of pay than do workers in mineral manufacturing establishments. Please give me your opinion as to why this is true.

18. Do you make periodic use of cost accounting for your different products and for your different processing operations?

19. Do you find that your firm cannot export its products into Canada as cheaply as the Canadians can ship a competing product into the United States? If so, why is this true?

20. Do you find utility rates a major burden in your overhead expenses?

21. Do you find taxes a major burden? If so, which taxes are the heaviest burden for you?

22. Do you plan to institute in the future any type of process or machinery which will speed up your output or reduce your costs of production?

23. What factors tend to make it difficult to institute new methods or new machinery into your extraction and processing establishments? (For example, finance, reluctance of labor, etc.)

24. What percentage of your product or products is/are shipped by railroad? How far do you normally ship by truck? Have you ever considered using fishy-back transport to the Gulf Coast or West Coast of the United States? Do you already use this method? Would a Champlain Waterway reduce your shipment costs and open up new markets to you?

25. Do you presently have a program of core drilling and exploration for new raw material reserves for future use?

26. Do you have difficulty obtaining loans from Vermont banks?

27. Would you be willing to borrow capital in order to expand your business plant or to increase your production capacity?

28. Would you be willing to obtain equity capital by incorporating and selling stocks?

29. Have you ever considered amalgamating with other producers in your industry so that you might have a greater amount of working capital and flexibility?

30. Are you familiar with the activities of the Vermont Development Credit Corp.?

31. Have you ever applied for a loan from the Small Business Administration?

32. Are you familiar with the technical and advisory program of the Small Business Administration?

33. Are you able to maintain stock reserves at a level which allows you to cover sales when customers are in a hurry?

34. Do you feel that a minerals experiment station or laboratory could be beneficial to Vermont's mineral producers if it had as its purpose the development of new uses for the state's various minerals and the development of techniques for waste utilization? If not, why?

35. What other topics and problems not mentioned in this questionnaire do you feel are worth giving attention to?

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Cote, Joseph E. A., Commissioner, Employment Security Commission, Augusta, Maine. August 5, 1964.

Cotter, Perry G., Division of Minerals, U.S. Bureau of Mines, Washington, D. C. May 15, 1964; July 17, 1964.

Coxon, R. H., Assistant General Freight Agent, Montpelier and Barre Railroad Company, Barre, Vermont. April 9, 1964; April 22, 1964; July 27, 1964.

Crosby, Goodwin E., E. C. Crosby & Sons, Danby, Vermont. February 4, 1964.

Dean, Robert C., Perry, Shaw, Hepburn and Dean, Boston, Massachusetts. March 9, 1964.

Deccereau, Leo P., City Clerk and Treasurer, Winooski, Vermont. November 30, 1964.

Department of Finance, Knoxville, Tennessee. November 30, 1964.

Dickey, S. W., Vice President, First National Bank, North Bennington, Vermont. December 4, 1964.

Dillon, Ann, Director of Statistical Service, Tennessee Department of Public Health, Nashville, Tennessee. December 10, 1964.

Dixon, William R., Division of Data Processing, Pennsylvania Department of Health, Harrisburg, Pennsylvania. December 7, 1964.

Dorman, Robert O., Chief, Division of Employment Statistics, U.S. Department of Labor, Washington, D. C. July 13, 1964.

Doucette, Edward B., Alonzo J. Harriman Associates, Inc., Auburn, Maine. March 2, 1964.

Douglass, M. A., Treasurer, Sterling Trust Company, Johnson, Vermont. November 25, 1964.

Ede, Francis H. S., Chamber of Commerce, Pen Argyl, Pennsylvania. December 14, 1964.

Ettl Studios, Inc., Ettl Art Center, Glenville, Connecticut. March [5], 1964.

Farrington, H. F., Highway Planning Engineer, Vermont Department of Highways, Montpelier, Vermont. December 21, 1964; November 27, 1964.

Feitel, Arthur, Andry & Feitel, New Orleans, Louisiana. February [27], 1964.

Felt, D. P., Manager--Freight Rates, Boston and Maine Railroad, Boston, Massachusetts. April 9, 1964.

Ferris, Cyrus Y., Chief Engineer, Rock of Ages Corporation, Barre, Vermont. April 28, 1964; December 2, 1964.

Fields, Joe G., Director, Tax Division, Department of Revenue, Nashville, Tennessee. August 4, 1964.

Fletcher, R. Andrew, Treasurer, H. E. Fletcher Co., West Chelmsford, Massachusetts. May 11, 1964.

Flint, Harrison L., Extension Service, University of Vermont, Burlington, Vermont. April 27, 1964.

Foster, F. E., Executive Vice President, American Monument Association, Inc., Olean, New York. March 25, 1964.

Fournier, Maurille J., Business Agent, Granite Cutters' International Association of America, Barre, Vermont. July 7, 1964.

Fraser, Albert A., Secretary of the Vermont Apprenticeship Council, Montpelier, Vermont. February 21, 1964; March 6, 1964.

Gauthier, Laurence W., Municipal Tax Consultant, Department of Taxes, Montpelier, Vermont. July 2, 1964. Chief of Property Taxes, Department of Taxes, Montpelier, Vermont. December 2, 1964.

Gaylord, Frank C., Sculptor, Barre, Vermont. February 16, 1964.

Gudger, Bonnie, City Clerk, Chatsworth, Georgia. December 1, 1964.

Hallberg, Curtis A., Director of Equalization, Milbank, South Dakota. December 1, 1964.

Harding, A., Treasurer, Northfield Trust Company, Northfield, Vermont. November 26, 1964.

Harris, Walton Y., Promotion Specialist, Elberton Granite Association, Inc., Elberton, Georgia. March 19, 1964.

Haver, Ralph B., Haver, Nunn and Jensen, Architects, Phoenix, Arizona. February 19, 1964.

Hedrick, C. W., Ralston Purina Company, St. Johnsbury, Vermont, February 5, 1964.

Horne, James D., Secretary, Atlas Granite Company, Inc., Elberton, Georgia. March 13, 1964.

Ide, Richard E., E.T. & H.K. Ide, Inc., St. Johnsbury, Vermont. February 4, 1964.

Indra, Raja R., Demographer, Michigan Department of Health, Lansing, Michigan. December 2, 1964.

Johnson, Ernest H., State Tax Assessor, Bureau of Taxation, Augusta, Maine. August 3, 1964.

Jones, R. R., Assistant Treasurer and Manager, Proctor Trust Company, Poultney, Vermont. December 4, 1964.

Kelly, William H., The Leonard Granite Company, Chambersburg, Pennsylvania. March 25, 1964.

Krantz, B. A., Extension Soils Specialist, Agricultural Extension Service, University of California at Davis, California. April 16, 1964.

Kupferer, H. M., Vice President, Green Mountain Marble Company, West Rutland, Vermont. December 16, 1964.

Ladd, Gordon H., Chief Research & Statistics Department of Employment Security, Montpelier, Vermont. October 25, 1963; February 24, 1964; June 29, 1964.

Landry, C. W., Manager, Crosby Milling Company, Brattleboro, Vermont. February 18, 1964.

Lyndes, Milton V., General Manager, The Barre Granite Association, Barre, Vermont. February 19, 1964; June 1, 1964.

McClay, Arch, Division Sales Manager, Erie Lackawanna Railroad Company, Nazareth, Pennsylvania. February 27, 1964.

Martin, William P., Head, Department of Soil Science, University of Minnesota, St. Paul, Minnesota. February 10, 1964.

Mayette, J. F., Chief of Tariff Bureau, St. Johnsbury & Lamoille County Railroad, Morrisville, Vermont. April 7, 1964.

Milford, Murry H., Assistant Professor, Department of Agronomy, Cornell University, Ithaca, New York. March 2, 1964.

Mix, Glenn C., President, E. W. Bailey & Company, Inc., Montpelier, Vermont. February 13, 1964.

Moore, Allen C., Treasurer, Vermont Kaolin Corporation, Bristol, Vermont. June 1, 1964; August 18, 1964.

Morris, Gordon W., Branch Manager, Small Business Administration, Montpelier, Vermont. April 21, 1964.

Mullen, W. F., Executive Director, Pennsylvania Slate Producers Guild, Pen Argyl, Pennsylvania. February 12, 1964.

Nashold, R. D., Director, Statistical Services, Wisconsin State Board of Health, Madison, Wisconsin. November 25, 1964.

Neiles, James, Freight Agent, Delaware and Hudson Railroad Corporation, West Rutland, Vermont. November 17, 1964.

Noonan, Thomas J., Regional Director, Small Business Administration, Boston, Massachusetts. June 11, 1964.

Olliver, Ralph, City Treasurer, Barre, Vermont. November 30, 1964.

Olson, Edward, President, Clarendon & Pittsford Railroad Company, Proctor, Vermont. November 27, 1964.

Parker, John M., Professor-in-Charge, Geological Engineering, North Carolina State of the University of North Carolina, Raleigh, North Carolina. March 3, 1964.

Peitler, William, General President, International Association of Marble, Slate, and Stone Polishers, Rubbers and Sawyers, Tile and Marble Setters Helpers, Marble Mosaic and Terrazzo Workers Helpers, Washington, D. C. August 5, 1964.

Podskalny, Irene A., Adams Granite Company, Inc., Barre, Vermont. May 27, 1964.

Prince, A. B., Soil Chemist, Department of Agronomy, University of New Hampshire, Durham, New Hampshire. February 7, 1964.

Ramler, Frank, Auditor of Stearns County, St. Cloud, Minnesota. November 30, 1964.

Ray Churchill's Truck Terminal, Barre, Vermont. May [21], 1964.

Reynolds, B. V., General Freight Traffic Manager, The Texas and Pacific Railway Company, Dallas, Texas. April 10, 1964.

Richardson, William C., Freight Traffic Manager, Southern Railway System, Washington, D. C. April 15, 1964.

Roepke, Howard G., Professor of Geography, Department of Geography, University of Illinois, Urbana, Illinois. December 2, 1964.

Rowen, Mason V., Assistant Vice President, Citizens Savings Bank & Trust Company, St. Johnsbury, Vermont. December 4, 1964.

Sabin, G. N., Assistant Vice President--Freight Rates, The New York, New Haven, and Hartford Railroad Company, New Haven, Connecticut. April 6, 1964; December 10, 1964.

Sadik, M. K., Research Assistant, Department of Soil and Crop Sciences, Texas A & M University, College Station, Texas. March 10, 1964.

Sales, Phillip N., Chemical Engineer, Minerals Research Laboratory, North Carolina State College of the University of North Carolina, Asheville, North Carolina. March 6, 1964.

Schill, Robert E., Vice President and Assistant to the President of the Central Vermont Public Service Corporation, Rutland, Vermont. March 26, 1964.

Schroeder, Henry J., Assistant Vice President, Rates and Divisions, Chicago and North Western Railway Company, Chicago, Illinois. April 14, 1964.

Sculpture House, New York, New York. March 2, 1964.

Simpson, Thomas A., Chief, Economic Geology Division, Geological Survey of Alabama, University, Alabama. May 4, 1964.

Smith, Frederick P., President, Burlington Savings Bank, Burlington, Vermont. November 25, 1964.

Smith, Harold H., City Auditor, Findlay, Ohio. December 17, 1964.

Sparks, Robert M., Chief, Business and Industrial Development, Maryland Department of Economic Development, Annapolis, Maryland. December 9, 1964.

Stannard, George, President, First National Bank, Fair Haven, Vermont. December 15, 1964.

Stansbury, H. C., Director, Department of Tax Research, Raleigh, North Carolina. December 15, 1964.

Stark, Howard N., Vice President, The Vermont Associated Lime Industries, Inc., Winooski, Vermont. March 5, 1965.

State Tax Office, Harrisburg, Pennsylvania. August [4], 1964.

Steward, Harold D., Steward-Skinner Associates, Miami, Florida. March 9, 1964.

Stillings, Ruth L., Secretary to Roland R. Vautour, Commissioner of the Vermont Development Department, Montpelier, Vermont. November 27, 1963.

Stockinger, E. L., The Stockinger Company, St. Cloud, Minnesota. March 24, 1964.

Storey, Emerson W., Research Analyst, Minnesota State Department of Health, Saint Paul, Minnesota. December 2, 1964.

Tetzlaff, Donald H., Director and Clerk, Vermont Development Credit Corporation, Montpelier, Vermont. June 22, 1964.

Thompson, R. E., Assistant Manager--Freight Rates, St. Louis-San Francisco Railway Company, St. Louis, Missouri. April 15, 1964.

Town Clerk and Treasurer, Swanton, Vermont. November 28, 1964.

Town Office, Monson, Maine. November 30, 1964.

Town Office and Village, Proctor, Vermont. November 30, 1964.

Town Offices, Fair Haven, Vermont. November 30, 1964.

Town Treasurer, West Rutland, Vermont. November 30, 1964.

Vautour, Roland R., Commissioner, Vermont Development Department, Montpelier, Vermont. February 11, 1964.

Voorhees, Grant W., Architects Associated, Des Moines, Iowa. February 28, 1964.

Wall, Frank, Vice President, Kelley Construction, Inc., Barre, Vermont. February 24, 1964.

Weber, Christopher A., President, The Rutland County Bank, Rutland, Vermont. December 1, 1964.

Welch, Dale E., Statistican II, Maine State Department of Health and Welfare, Augusta, Maine. December 1, 1964.

Wentworth, L. W., General Freight Traffic Manager, Bangor and Aroostook Railroad Company, Bangor, Maine. April 6, 1964.

Weyker, L. M., Old Fox Agricultural Sales, Inc., East Providence, Rhode Island. February 11, 1964.

Wilkinson, J. R., Stevens & Wilkinson, Atlanta, Georgia. March 6, 1964.

Wolfe, Jack D., President, Jack D. Wolfe, Inc., Brooklyn, New York. April 28, 1964.

Wright, Earl S., President, The Vermont Marble Savings Bank, Rutland, Vermont, December 1, 1964.