SEARCH

For Resources and New Uses of Them

STATE OF MINNESOTA

Biennial Report on the Work of the Office of Iron Range Resources and Rehabilitation

1958–1960

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STATE OF MINNESOTA

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Published by the
OFFICE OF IRON RANGE RESOURCES
AND REHABILITATION
14 State Office Building
St. Paul 1, Minnesota

TABLE OF CONTENTS

STATE OF MINNESOTA

Office of

Iron Range Resources and Rehabilitation

14 State Office Building

St. Paul, Minn.

To the Governor and the Legislature of the State of Minnesota:

I am herewith submitting to you the biennial report of the Office of Iron Range Resources and Rehabilitation.

This is the report for the fiscal years ending June 30, 1959 and June 30, 1960.

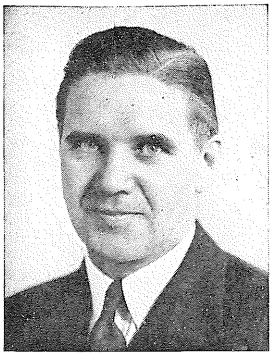
Respectfully submitted,

Kaarlo J. Otava,
Commissioner

STATE OF MINNESOTA

Iron Range Resources and Rehabilitation Commission

St. Paul, Minnesota



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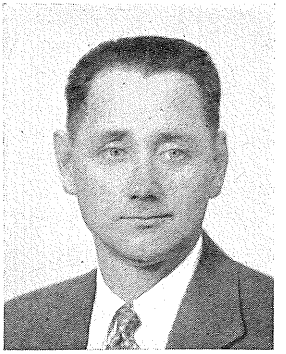

KAARLO J. OTAVA,
Commissioner, Office of Iron
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Rehabilitation
State Office Building
St. Paul

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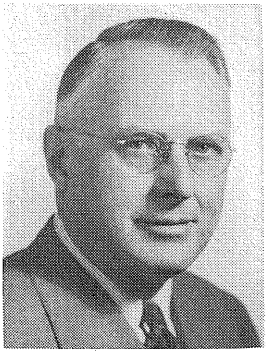

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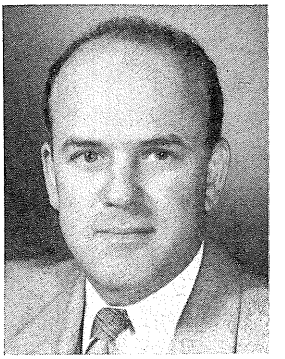

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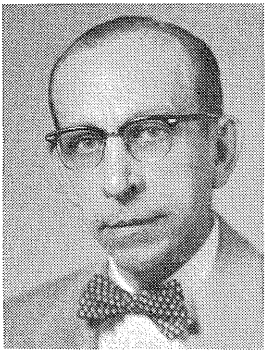

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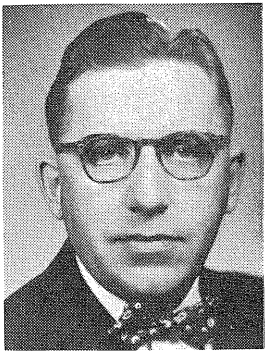

REP. WILLARD M. MUNGER,
Duluth, Minn.

1958 - 1960

Our Function

Minnesota is well known for its diversity of natural resources. Surveys conducted by the Office of Iron Range Resources and Rehabilitation have provided information of inestimable value to the public that is now being used for industrial planning and development, recreation and tourist promotion, agricultural development, and resource development and conservation. This basic information is imperative if full and proper utilization of Minnesota's great resources is to be obtained.

The Office of Iron Range Resources and Rehabilitation was set up by the Minnesota legislature in 1941 as a result of an acute unemployment situation that existed in the Iron Range area. Also, wholesale tax forfeitures plagued the northern section of our state and counties were faced with the problems of proper management and sale of these tax forfeited lands.

In 1943 the legislature established the Iron Range Resources and Rehabilitation Commission, an advisory body, to guide and assist the commissioner in his work. The commission approves or disapproves appropriations made by the commissioner. The basic Law (Minnesota Statutes 298.22) setting up the powers and duties of the commissioner provides that:

> "When the Commissioner shall determine that distress and unemployment exists or may exist in the future in any county by reason of the removal of natural resources or a possibly limited use thereof in the future and the decrease in employment resulting therefrom, now or hereafter, he may use such amounts of the appropriation made to him in this section as he may determine to be necessary and proper in the development of the remaining resources of said county and in the vocational training and rehabilitation of its residents."

When the legislature wrote the law it permitted a wide latitude of functions for the office of Iron Range Resources and Rehabilitation. However, attorney general opinions, since 1943, have pinpointed the type of projects this state agency may initiate.

A special assistant attorney general is assigned to this department to give legal advice to the commissioner. Many requests

for project consideration are turned down before a hearing is held by the commission because of legal requirements. Inasmuch as our projects are of an experimental nature, careful consideration is given to potentials to avoid failures.

In general, these projects must be something new or in the form of research in the development of Minnesota's resources. Development of low grade ore, forest surveys, and land management assistance to counties, were among some of the first projects started by this State agency. Many projects have since been added and some of the existing programs have been greatly expanded as outlined in this report.

Law Amended

A department bill passed in the last session of the legislature, and approved by the Governor, may be termed permissive legislation:

A bill for an act relating to the powers and duties of the Commissioner of Iron Range Resources and Rehabilitation Commission; Amending Minnesota Statutes 1957, Section 298.22, Subdivision 6, by Adding Some **New Language** Thereto. Be it enacted by the Legislature of the State of Minnesota:

Section 1, Minnesota Statutes 1957, Section 298.22, Subdivision 6, is amended to read: Subd. 6. In order to carry out the terms and provisions of this act, the commissioner of iron range resources and rehabilitation and the commissioner of administration may lease any real estate acquired hereunder for a term not to exceed twenty years upon such terms as they may determine. Such lease may provide that in the event the property is ever sold by the state to such lessee, the lessee may obtain a credit on the purchase price covering the rentals paid under his lease or any renewals thereof **and that said real estate can be conveyed by the commissioner of iron range resources and rehabilitation and the commissioner of administration and the said commissioners are hereby authorized to make such conveyances.**

Conveyance of title prior to this legislative act required specific enactment for each conveyance by the legislature. After the enactment of this bill, specific authorization by the legislature is no longer required but the conveyance may be accomplished administratively by the Commissioner of Iron Range Resources and Rehabilitation and the Commissioner of Administration.

Program for the Future

As a result of all of the previous surveys and the work being done presently, it is hoped that new forest product manufacturing plants can be located in the North Shore area, the Chippewa National Forest area, the Ely area, and the Cuyuna Range area, to use up the more than one million cords of surplus wood being wasted annually.

In addition to these large scale plants, it is hoped that numerous small wood processing and manufacturing plants can be located in various areas of northeastern Minnesota. To this end the department will devote its time and effort.

It is also hoped that additional iron ore processing plants, manganese plants, and direct reduction ore processing plants can be developed which will provide additional employment and a brighter economic future for northeastern Minnesota.

The topographic mapping program and the water survey program are to be continued because of the necessity of these programs to future industrial development.

Utilization research on forest products will be continued to provide new uses for our surplus wood. Increased management help to the counties and an ever increasing tree planting program are objectives of the department.

Additional research on peat bogs and definite information on the amount and type of peat in each bog is necessary for further utilization of peat. This, the department is pledged to do. Also, this department is pledged to bring the peat operators together in a unified effort to break down shipping barriers which face peat operators in the form of discriminatory freight rates.

The Office of Iron Range Resources and Rehabilitation pledges itself also to help any agency, both private and governmental, in the further promotion and expansion of the tourist and travel industry in northern Minnesota.

KAARLO J. OTAVA

Commissioner, Office of Iron Range Resources and Rehabilitation

Forest Progress

FOREST SURVEYS

The survey of Minnesota forests took on a new look in the biennium. A block sample system has been replaced by a more sensitive point sampling system. Previous survey efforts have whet the interests of other land managing agencies. A desire for data specific to their properties has brought several groups into active field sampling for survey purposes.

Our agency has become a coordinator factor in Forest Survey for Minnesota. By bringing together the new efforts of others we expect to save nearly $25,000 in the current survey of Minnesota's forest resources.

A new basis to measure and predict forest growth and mortality was established throughout Northern Minnesota's forest area during the biennium. This data will be developed from permanent plots located to sample all forest types and major land ownership groups. Several special studies designed to aid interpretation of survey results were accomplished. These include: stump and tree diameter relationship, stump age, plot allocation, standards of aerial photo interpretation, and many other tests of survey design.

COUNTY LAND-USE

The general program of county land management has been continued throughout the last two year period. In keeping with our program of technical aid, our staff has had a rather heavy schedule aiding new county personnel. An ever increasing interest in sound long-range land management practices by county board members greatly aids our efforts. Local interest and local responsibility in land management is slowly bringing new stability to many communities in the forested regions of Minnesota.

Considerable time has been required to assemble data and answer questions for two study groups. How much of the data collected will be used or how it will be employed is still in doubt as the land ownership book is not yet available and an interim committee report is now being assembled.

We have successfully proven the value of aerial photographs in land management. Ten years ago we provided photographs for several counties. These prints were deposited in local county offices and in some cases State Conservation Department offices. The wisdom of this effort is now demonstrated by new flights locally financed and the eagerness with which State and county offices seek copies of aerial photographs whenever they become available.

LAND DEVELOPMENT

Funds available for land development have been metered out to achieve two goals. One to teach land development techniques and to demonstrate their feasibility and, secondly, to improve Minnesota's forest land and make it more productive.

The most obvious of these efforts are the numerous plantings of forest trees now reaching above the brush and grass to reclaim and reforest formerly nonproductive areas. This is not achieved without a continued effort to find new and better methods of reforestation.

Planting machines, technical advice, and some financial aid provided by this office is now more being matched by county funds. Nearly two dollars of county monies for each dollar of State money now goes into reforestation programs. The largest wild land tree planter operating anywhere in the State of Minnesota was recently purchased by one of the counties at a cost of nearly $15,000.00.

We have developed a new planter plow combination that is showing much promise on many brushy upland areas. Work is continuing to improve planting success, and reduce cost of establishing plantings.

The restoration and replacement of section corners was initiated and received continuing support during this biennium. Inconspicuous and little seen by the public these restored corners are saving much time for foresters, appraisers, and woods workers. Much time once spent running lines or hunting for evidence of the long rotted wooden post set 60 to 70 years ago can now be gainfully employed managing and looking after the land and its resources. This section corner work has been carried on with county matching funds by joint agreement with the Commis-

sioner of Iron Range Resources and Rehabilitation and the respective county boards.

CO-OPERATIVE RESEARCH

Forestry, forest utilization, and land management are not without problems. Continuous study is necessary that they develop and improve. Much work done in public and private research laboratories is lost or not effectively used through lack of proper direction. Our staff has found many answers to today's problems hidden in old records. More often problems can be solved by piecing together knowledge from several sources and devising a proper application. This applied or administrative research is very effective in isolating most of our general research needs. When advantageous, we have been able to contract with other research agencies for their services. This has enabled our organization to have available the proper laboratories and scientists to solve Minnesota's forestry problems without the huge investments necessary to build, staff and maintain them ourselves.

In the past two years, we have had other groups doing work in the fields of forest genetics, forest entomology (economics), utilization and silvics. They have been working on such diverse problems as red pine flowering, charcoal production, application of herbicides, economics of insect defoliation, influence of fire, and several aspects of forest tree genetics.

CONSULTING SERVICE

Experience has shown the need for considerable promotional and developmental work among the smaller woods products manufactured in Minnesota. With some help they have had some success in convincing buyers Minnesota woods will serve their needs where western species had previously been specified.

Nearly two thousand sawmills in Minnesota are producing native lumber. Much of their product is marketed with difficulty. Most difficulties can be traced to poor manufacture or poor handling.

Information on availability of new equipment and more efficient plant layout has improved quality of lumber produced at a lower per unit cost in many instances. Contact of secondary wood

using industries and lumber distributors, primarily in the metropolitan areas of the Twin Cities and Chicago, has opened new avenues of market possibilities for many mills producing the lower grades of lumber.

Assistance on marketing, plant layout, and product development has been also given to a number of industries other than sawmills. Some of the industries concerned are a manufacturer of fish boxes; pallets of new design; new designs for charcoal kilns; architectural fencing; pole and timber treating for pole barn construction, cost analysis of portable pulp peelers for peeling aspen.

Tours have been made of a number of wood-using industries. Some of these industries include manufacturers of plywood, water skis, solid flush doors and a lumber concentration yard. Much interest has been shown in possibilities of plant relocation and purchase of materials from Northern Minnesota producers.

Encouragement and information has been supplied to various civic groups in Northern Minnesota communities for the purpose of attracting industries. Community facilities have been reviewed, development corporations have been formed, and progress in community planning is being made.

PRICE QUOTATIONS

Minnesota's timber industry is very important in the economy of the State. Our forest survey information points to several major opportunities for this industry to expand and grow. Surplus trees must be converted to lumber, pulpwood, or other products before they can become a factor in developing Minnesota's resources. The price at which these products are available has been a frequent question.

These economic facts no longer need to be poorly answered. During the past two years, market price quotations of rough timber products have been collected and made available to the public. Comparisons with prices collected in other states, places Minnesota in a very competitive position. Our industries should be able to continue their expanded use of Minnesota wood.

The price report includes green lumber, logs, posts, poles, and pulpwood both peeled and rough.

SUPERWOOD PLANT

In August, 1948, the Superwood Corporation of Duluth entered into an agreement with the State of Minnesota through the Office of Iron Range Resources and Rehabilitation. This agreement was made to establish a pilot plant operation using Minnesota's weed tree (aspen) in the manufacture of a commercial hardboard. The sum of $367,500 was appropriated for buildings and equipment necessary to prove the feasibility of this process.

Lease rental payments over a period of 10 years have been made and the State now has received the total amount of its investment in this plant.

The new industry provided a market for our surplus forest product (aspen pulpwood) and also created new jobs. At the time the pilot plant went into operation, it employed 35 and used about 40 cords of aspen wood a day. Its production of commercial hardboard in a 24-hour day was approximately 40,000 square feet. As the research work on this process was completed and the economics of the operation improved, plant expansion was necessary to meet the growing market for this new product. Never before had aspen wood fiber been used successfully in the manufacture of hardboard.

One of Largest

The Superwood Corporation has now expanded this operation to the point where it is one of the largest of its kind in the United States. More than 300 are now employed in this plant and operations are on a 24-hour day basis, seven days a week.

This plant is now capable of producing a top quality commercial hardboard of thicknesses and characteristics demanded by the present day markets. The plant now produces an average of 600,000 square feet per day and operates for about 360 days out of the year.

The aspen wood is purchased by weight from farmers and small timber operators, and plant consumption of aspen pulpwood runs more than 50,000 cords a year.

Pilot Plant Purchase

On December 30, 1959, Superwood Corporation exercised the option to purchase the pilot plant and equipment described in the

1948 Department of Administration contract agreement between the State of Minnesota, acting by and through the Commissioner of Iron Range Resources and Rehabilitation and Superwood Corporation.

The pilot plant and equipment were then put up for sale on competitive bids and the Superwood Corporation was awarded the bid on March 29, 1960.

The success of this plant has not only created employment and a market for our forest products, but it has added greatly to the knowledge of industry to expand into more uses for this surplus forest product.

VIRGINIA DIVISION

Multiply is a new flakeboard currently being manufactured in a new wood processing plant at Virginia by the Multiply Division of the Superwood Corporation. Multiply, a fiber-clad flakeboard will be available as 4′ x 8′ panels in thickness ranging from ½″ to ¾″. This pilot plant built with the assistance of the State of Minnesota through the IRRRC is developing a new use for a portion of Minnesota's surplus timber.

Present plant facilities will require approximately 11,000 cords of aspen per year. This raw material is abundant and can very easily be obtained within a few miles of the plant.

The manufacturing process is simplified greatly by specialized machinery, much of which was designed for this application and fabricated on the site or at the Superwood Corporation plant at Duluth.

Process Explained

Fresh aspen pulpwood is cut to 15-inch lengths and conveyed by water and a belt to the feed box of a chipper which produces a uniform flake .020 thick. Cut parallel to the natural grain of the tree this flake produces a strong board. The flakes are then mixed, dried and combined with a soya flour binder.

At the forming box the flakes are distributed over a wet fiber mat. It is then covered by another mat of fiber before being cut to size prior to entering the pressing and curing cycle. The fiber mats are each prepared on a single cylindrical drum.

The mat material is brought into the plant where it is blended and prepared for this application. These fiber faces give the board a uniform surface and add to its stability, quality and rigidity. The Multiply board has an average density of 40 and is designed for application in building such as in sheathing and underlayment.

Mineral Resources

SURVEYS AND DRILLING

Geophysical work done by our mineral survey in the years 1958 and 1959 (fiscals) involved 33,050 feet of line surveyed, brushed and resistivity readings taken. Maps and sections were drawn locating and recording this work. Magnetic work was done on 21,050 feet of lines surveyed, brushed and readings taken. Maps and sections of this were drawn, locating and recording these magnetic readings.

A drilling program was carried on for the purpose of determining mineral values under proposed highway right-of-way. Three holes were drilled totalling 1,343 feet with one hole down to a total depth of 606 feet. The holes were of great value in determining the analysis and depth of the taconite in the Eveleth area, and were of great interest to geologists and mining companies as well as the State of Minnesota.

Topographic maps showing the location of these holes together with magnetic contours were drawn. The analysis was compared to resistivity and magnetic values in the area. This work was carried on through the winter months of 1958 and encountered problems of bad access road in the fall and spring as well as a long period of extreme low temperatures.

Drill Transferred

The drill was transferred to the Coons mine area where two holes were drilled on state property. These holes were located on areas of probable iron ore deposits. Two holes were drilled totalling 297 feet. Very hard taconite was found, creating some very difficult drilling problems. Information gained should prove of value in eventual taconite mining as well as to settle the question of ore reserves on the property.

A state mine was the next target of our drill crew. The Forsyth mine at Kinney had some areas in need of exploration to fully determine the extent and value of the reserves. One hole was drilled using a chopping bit and recovering the cuttings. This was of value in determining the analysis. However, no concentration tests could be made of this fine material. It was de-

cided that an effort would be made to recover a core using a larger bit and mud as a circulating medium. Equipment was reconstructed, new bits, core barrel and rod purchased to accomplish this. This venture proved a success with a good core recovery and solution of the many problems that were encountered.

Locations Mapped

Maps showing drill hole locations and topography of both the Coons mine and Forsyth mine were drawn and placed on file. Our engineer and crew did the field work involved in locating the holes, establishing their elevation and bringing the maps up-to-date.

Land ownership investigations were made in connection with these surveys which involved several trips to county offices in Duluth. A file of township land ownership maps has been started which will be available and valuable in the work of the department.

A drill hole has been located northeast of Virginia between the main iron formation and an outcrop eastward to determine if they are connected. This would be a valuable increase in state-owned taconite. This proposed hole is in an almost roadless area and required a lot of preliminary investigation in connection with the work in the field. This drilling is planned for the winter of 1960-61.

Kettle River Request

Requests from Kettle river led to magnetic investigations and locating a drill hole near an excavation exposing sulphides, graphite and quartz. This drilling was planned for late 1960. Benefits derived will be additions to geologic data in the area as well as determining the existence or non-existence of an ore deposit.

Investigation was made of iron ore stockpiles on Minnesota's iron range both in the field and in maps and lists available. This work indicated over 500 million tons of ore, lean ore, tailing already mined and in piles and tailings basins.

From these piles it was estimated that over 200 million tons of ore containing 40% iron could be graded without beneficiation. This is claimed to be a suitable feed for some direct reduction processes.

Contacts with firms owning and promoting some of the direct reduction processes indicated that electric power at a low rate would make at least one of them possible, profitable and very attractive to our sagging iron ranges.

Three samples of iron ore sent to Strategic-Udy at Niagara Falls (IRRRC sponsored through University of Minnesota Mines Experiment Station) indicated that this process was feasible even with the high electric power costs on the ranges. Investigation, discussion and promotion of this industry consumed considerable amount of the department's time and effort.

Pig Iron Studies

Studies of the market for pig iron showed about 500,000 tons of pig iron consumed in Minnesota, North and South Dakota, with the price over $60.00 per short ton. Also there is a large market for steel products in industry and construction that could be produced at a small direct reduction steel plant. A list of world direct reduction processes of 1957 is enlightening.

There are commercial Strategic-Udy plants now in the design and construction stages. Direct reduction appears to be a very promising industry for Minnesota and it is felt that every effort should be made to promote its establishment in Minnesota.

Sketches of the many direct reduction processes, together with maps showing favorable locations (in Minnesota) for direct reduction plants and their raw materials sources were drawn and prints made.

Ely Stone Deposits

Investigation of serpentine deposits at Ely showed extensive outcrops that might one day be the basis for a building stone or tile industry in the area. Further work was left for future time, money and men as they become available.

Peat Sampling

Large-scale sampling of peat deposits in Minnesota have been started in cooperation with the University of Minnesota, Duluth, which will analyze and file the samples. A muskeg tractor, a truck and other equipment have been purchased. Maps of areas are being obtained and drawn and many samples have already been taken.

There have been lease negotiations going on for a large area of peat deposists near Toivola. This area is being sampled first.

Among the mineral maps and drawings available now are:

Coons Mine Area

Marl Deposits of Aitkin County

Marl Deposits of Crow Wing County

Titaniferous Magnetites—Lake County

Titaniferous Magnetites—Cook County

USA and Canadian Iron Ore

Favorable Pig Iron and Steel Production Centers

Iron Ore Production Districts of USA

Troy Mine Area

Cuyuna Range

Also various maps made for the "Cuyuna Range Industrial Survey" and the "Ely Area Industrial Survey"

STRATEGIC-UDY ORE STUDY

Our office continued to be active in studies aimed at use of Minnesota off-grade iron ores, including research in the direct reduction of iron ore. One large scale project was undertaken by contract through the University of Minnesota, with funds provided by the IRRRC by legislative direction.

In this project research was conducted by Strategic-Udy Processes, Inc., Niagara Falls, New York, under supervision of the University of Minnesota. This investigation included studies in the suitability of our ores in a smelting and refining process called Strategic-Udy. The investigators are engineers in industrial research and development.

Murray C. Udy, director of research for the corporation, submitted a report on the studies to our office in May, 1960. He noted that:

"These demonstrations have effectively shown that Minnesota off-grade ores can be successfully smelted by the Stratetic-Udy process without excessive power or raw material consumption.

"As you realize, such a conclusion has important implications for the State of Minnesota, since it now allows serious consideration to be given to the local Minnesota development of integrated steel plants. The immensity of off-grade ore reserves, along with local processing of these ores all the way to finished steel products, assures Minnesota of a continuing dominant role in America's iron and steel industry."

Next Step Noted

As a next step in furthering that objective, Mr. Udy recommended large scale smelting demonstrations to develop data required for plant design and for a complete economic valuation of the process. "We are confident," he added, "that these economics will be most attractive and will provide the necessary incentive for building a local steel industry."

Three typical low-grade ores from waste dumps on the Minnesota iron ranges were taken for smelting to marketable grades of iron by the process. These included a Mesabi cherty ore containing about 21 per cent silica, a Mesabi paint rock and a Cuyuna manganiferous ore.

A successful beneficiation process has not yet been developed for those ores, and they are accumulating at an enormous rate as wastage from current mining operations.

Test Held Success

Purpose of the Strategic-Udy demonstration was to show that marketable products such as pig iron, foundry grade cast iron or semi-steel could be made from materials using that process.

The report held that the production of useful iron products from the three off-grade Mesabi and Cuyuna ores was successfully demonstrated on a 100 KVA pilot plant scale; that the method of treatment may be one practical solution for the nonmagnetic taconites; that the economical smelting of those off-grade ores appears to be a possibility and that additional experiments in their prototype plant would be necessary to obtain adequate data for an accurate cost analysis and plant design.

SOURCE BOOK ON MARL

A new source book on marl deposits in Minnesota and their commercial possibilities was published by the Iron Range Resources and Rehabilitation Commission.

The book, a cooperative project of the IRRRC and the Minnesota Geological Survey of the University of Minnesota, is a report of studies made of areas where marl is found in Minnesota and of experiments to determine its profitable application in agriculture and industry.

Marl is largely composed of calcium carbonate in a soft earthy form and is found in lake basins and bogs or in areas once covered with water.

Minnesota has large marl deposits, but because its watery nature requires extensive drying, commercial applications have largely been unprofitable. It is being used in some areas as a liming agent for treating soil, and commercial investigations have been made of marl for its use in manufacturing Portland cement.

The study concludes that marl will have a slow but steady growth as a lime conditioner for soils and suggests that further developments may increase its attractiveness to the cement industry.

Included as a major supplement to the report is a re-print of an exhaustive study of the "Marls of Minnesota" originally published in 1933 by the University. Considered as an authoritative report on the location of marl deposits in each Minnesota county, the bulletin has been long out of print and, until now, unobtainable.

Copies of the marl source book are available from the IRRRC or the Geological Survey.

Topographic Maps

In 1949 at a meeting in Grand Rapids, the Office of Iron Range Resources and Rehabilitation accepted responsibility for a cooperative program of topographic mapping with the United States Geological Survey. The program has been carried on continuously since that time except for the period October, 1959, to June, 1960, when retrenchment was necessary.

This program has resulted in high class topographic maps of a large part of northeastern Minnesota and continuation for another decade will assure completion of the entire area.

The maps are prepared on two scales depending on the nature of the area, although in future programs all will be prepared on the large scale and later the standard 15 minute sheet will be published by the U.S. Geological Survey in accordance with the law. The scales are: 1 to 62,500 or approximately one inch to one mile and 1 to 24,000 or one inch to 2,000 feet.

Work Summarized

Following is a summary of the work carried on during the period July 1, 1958 to June 30, 1960. The work as shown was in three projects involving 53 7½ minute sheets or about 2,500 square miles. In addition 10 sheets were published.

It should be noted that the cost of the final stage of actual printing of the maps is paid exclusively by Federal funds so that Minnesota's share of the total cost is appreciably less than fifty per cent.

In addition to the list of map sheets shown on the summary, work has been authorized on six quadrangles in northern St. Louis county along the Canadian border and southward.

COOPERATIVE PROGRAM

(July 1, 1958, through June 30, 1960)

Expenditures

State appropriation	$ 72,520.52
Federal allotment	72,520.52
	$145,041.04

Mapping Program

Cross Lake Project

Quadrangles in Project:

Cross Lake NE	Cross Lake SW	Pine River SE
Cross Lake NW	Pine River NE	Pine River SW
Cross Lake SE	Pine River NW	

Summary of work performed:

Supplemental control.

Stereocompilation.

Cartography, exclusively by Federal funds—60% completed.

Elephant Lake Project

Quadrangles in Project:

Devils Track Lake NE	Hovland NE
Devils Track Lake NW	Hovland NW
Devils Track Lake SE	Hovland SW
Devils Track Lake SW	Mule Lake SE
Elephant Lake NE	Mule Lake SW
Elephant Lake NW	Pine Lake SE
Elephant Lake SE	Pine Lake SW
Elephant Lake SW	South Fowl Lake SE
Grand Portage NE	South Fowl Lake SW
Grand Portage NW	

Summary of work performed:

Planimetric bases prepared for use in advance field completion.

Advance field completion—72% completed.

Grand Marais Project

Quadrangles in Project:

Grand Marais NE	Lutsen NE
Grand Marais NW	Lutsen NW

Summary of work performed:

Field completion.

Cartography (Lutsen NW exclusively by Federal funds).

Wind Lake Project

Quadrangles in Project:

Brule Lake NE	Gunflint Lake SE	Lake Alice SE
Brule Lake NW	Gunflint Lake SW	Lake Alice SW
Brule Lake SE	Knife Lake NE	Wind Lake NE
Brule Lake SW	Knife Lake NW	Wind Lake NW
Gull Lake NE	Knife Lake SE	Wind Lake SE
Gull Lake NW	Knife Lake SW	Wind Lake SW
Gull Lake SE	Lake Alice NE	
Gull Lake SW	Lake Alice NW	

Summary of work performed:

Basic control completed.

Planimetric bases prepared for use in advance field completion.

Advance field completion—25% completed.

Quadrangles Published in Period from July 1, 1958, to June 30, 1960

(Parentheses show name of published map where different from administrative name).

Map Name	*Series*
Hibbing	7½
Lake Markham (Markham)	15
Lutsen NE (Deer Yard Lake)	7½
Basswood Lake	15
Ensign Lake	15
Snowbank Lake (Forest Center)	15
Fall Lake (Gabbro Lake)	15
Brimson	15
Grand Marais NE)	
Grand Marais NW) combined for (Good Harbor Bay)	7½

Water Resources

Surface Water—Seventeen gaging stations (shown in list 1) were continued in full operation until Sept. 30, 1959, and on a reduced basis until Dec. 31, 1959, when operation under a cooperative agreement was suspended because of lack of funds. The stations were continued in operation for the remainder of the fiscal year on a reduced scale by cooperation with the Minnesota department of conservation, division of waters.

Periodic discharge measurements were made on East Two rivers and Elbow creek in connection with ground water studies, and on Little Fork, South Branch Little Fork (formerly called Rice river) and Sand rivers near Cook, to evaluate the potential supply in these streams for paper and pulp industries.

Ground Water—Information in response to requests for information on test drilling, maps and water levels was furnished to:

Municipal utilities officials from Chisholm, Cloquet, Hibbing, Virginia, Buhl, Town of Stuntz and Soudan; Range Realtors; Walter Butler Engineering Co., consulting engineers for Gilbert; Oliver Iron Mining Division; B. H. Stewart and Associates, Grand Rapids, in connection with engineering consulting work for the Village of Warba; A. F. Meyer, hydraulic engineer, in connection with consulting work for Reserve Mining Co.,

Records of water levels were obtained from the observation wells, equipped with continuous recording gages, near Hibbing, Virginia and Chisholm.

Two pumping tests were conducted; one near Mud lake, west of Virginia, and another at Chisholm. An unsuccessful attempt was made to pump a well south of Aurora.

Records of rural domestic wells were collected in the following quadrangles: Biwabik N.W., Embarrass, Keewatin, Riley, and Silica.

The IRRRC auger was used to put down several holes near the Embarrass school and at the Nett Lake Indian Reservation. The operation of the auger was improved by installing screw jacks to support the rear end while drilling.

Rotary test drilling was continued on the eastern end of the Range and 129 holes were completed. Most of this drilling was done to extend our knowledge of aquifers located by previous drilling.

Cooperation for this program was cut off as of October 1, 1959. No further funds were expended with the exception of a small amount set aside for the completion of the testing at Aurora.

A memorandum on test drilling in the Mountain Iron-Virginia area was released to the open file on May 31, 1960.

Quality of Water—Studies of the chemical quality of surface-water resources of the Mesabi Range were continued. Basic data were obtained regularly from July to September 30 (for the streams listed in List 2). In addition, data representing the quality of water during low flow periods were obtained at selected sites in the Rainey, Vermillion, Kawishiwi, and Upper Mississippi river basins. All chemical-quality of surface water studies were suspended September 30, 1959 due to lack of funds.

Prior to September 30, 1959, some progress was made in preparation of the chemical-quality part of the report describing water resources in the vicinity of municipalities in the Mesabi Range area. In this part of the report, water-quality information obtained during the 1956 to 1959 fiscal years will be presented, and the suitability of the water for industrial, domestic, and agricultural use will be evaluated.

List 1. Gaging stations in the Mesabi Range area:

Bear Island River near Ely
Dark River near Chisholm
Dunka River near Babbitt
Embarrass River at Embarrass
Embarrass River near McKinley
Isabella River near Isabella
Partridge River near Aurora
Pike River near Embarrass
Poplar River at Lutsen
St. Louis River near Aurora
So. Kawishiwi River near Ely
Stoney River near Isabella
Sturgeon River near Chisholm

Swan River near Toivola
East Swan River near Toivola
Swan River near Warba
West Two River near Iron Junction

List 2. **Quality of surface water stations in the Mesabi Range Area Stations where water-quality studies continued:**

St. Louis River near Aurora
St. Louis River near Scanlon
Partridge River near Aurora
Second Creek near Aurora
Embarrass River near McKinley
Embarrass River at Embarrass
Sturgeon River near Chisholm
Swan River near Toivola
West Two River near Iron Junction
East Two River near Iron Junction
South Branch Little Fork River near Cook (Formerly called Rice River near Cook)

Stations where water-quality studies were started:

Elbow Creek near Iron Junction
Little Fork River at Cook
Rice River near Angora
Sand River near Britt

Farm Management

A farm management program, first of its kind in northeast Minnesota, was started in 1956 for 10 northeast counties. Later the area was increased to include 12 counties. In 1958, 101 farm participants completed records for the analysis work; in 1959, there were 79 completed records in a reduced program.

This reduction followed the death of our agricultural field man, August Neubauer, in October, 1959, and therefore the additional load had to be carried on by participating county agents, veterans agricultural instructors and vocational agricultural instructors in the area.

Also a drastic reduction in Iron Range Resources and Rehabilitation receipts was anticipated because of the steel strike in 1959 and it was, therefore, necessary to discontinue several projects including the farm management program.

Reports Published

Published reports of the analysis work are available at our office for the years 1956, 1957, 1958 and 1959.

The main purposes of the program are: (1) to give assistance to instructors and county agents in the mechanics of farm management record supervision; (2) to assist instructors, county agents and farm participants in farm accounting techniques; (3) to aid individual farmers in the study of their farm business through analysis reports; (4) to provide case study materials that can be used by farmers or farm groups to study farm management problems.

The farm analysis reports are used as a barometer to make comparisons between individual farm operations and farming areas. This report has been used effectively by farmers in northeast Minnesota to determine their ability to compete economically with other areas of the state and nation.

This program was sponsored by the Iron Range Resources and Rehabilitation in cooperation with vocational agricultural schools, county agents, instructors of veteran agricultural programs and county rural development agents.

Outside Income

Numerous northeast Minnesota farmers earn additional income by employment in full or part time work not related to farming. It is interesting to note that the records submitted for the 1959 report show that 30 farmers of the 79 farm records submitted show outside income in addition to farm labor earnings ranging from a low of $8 to a high of $4,567 per farm involved.

For those comparisons who showed non-farm income the average non-farm income per farm (30 farms) was $926 or 10% of the total income received by this group. This non-farm income is not included in the report as farm labor earnings.

A portion of the farm income in northeast Minnesota is obtained from the sale of forestry products. Farm records for the year of 1959 show that 16 farms out of the 79 covered in the report indicate some form of forest income ranging from a low of $110 to a high of $3,891 per farm. The average forestry income per farm (average of 79 farms) amounted to $232 or 2.6% of the total farm income received. Forestry income is included as farm income in the analysis report.

Survey Projects

EVELETH FARM STUDY

At the request of the Eveleth Civic Association, a farm survey was conducted cooperatively by the Office of Iron Range Resources and Rehabilitation and the Department of Agriculture, Dairy and Food. Information obtained in the survey is intended to provide insight into problems in the economic development of Eveleth and its adjacent areas.

A report on the survey was published in April, 1960, and this pointed out that its information showed agriculture in the Eveleth area was following a national trend. Like other sections of the state and nation, the existing farms will be combined into larger and more efficient operations. The rate of this development will be affected by the general economic picture of both agriculture and industry in the area.

The report also noted that new developments through industrial expansion will attract farm labor unless effective community-wide participation can create reliable local markets for farm products.

Farmers Interviewed

Principal townships (all in St. Louis county) covered by the survey were Biwabik, Cherry, Clinton, Cotton, Embarrass, Fayal, Kelsey, McDavitt, Nichols and several unorganized townships. Sixty-one farmers were interviewed. An effort was made to interview only those actively engaged in farming. Although no accurate account was made, it was felt that no more than one out of six farm residents are now commercial farmers.

Three of the people interviewed in the survey area were no longer engaged in farming but were still living on the land. It seemed to be a common practice in the area that many former farmsteads are no longer commercial farms but merely residences.

Other points noted in the survey:

Only four out of the 61 farmers interviewed were in the age group 20-35. This was taken as a definite indication that few young men are being attracted to agriculture.

A large number (22) were over 50 years of age and it can be expected that many of these farm operators will have retired within the next 10 years.

Farm Use Slowed

Two-thirds of the farmers indicated interest in expansion, although some said this would depend upon the existence of suitable markets. All felt that the capacity of their farms was not fully exploited.

Farmers west and south of Eveleth reported they were no longer raising potatoes because of heavy soils and potato blight. Areas north and east of Eveleth are interested in increasing production but have had difficulty marketing their potatoes locally.

The primary soil type in the Eveleth rural area was reported as sandy loam and a large number reported the heavier clay loam soil type. These soils are regarded as well adapted to all types of roughage production and the most important crop in the area is hay.

Markets Inadequate

Nearly all farmers interviewed who had farm woodlots stressed the inadequacy of available markets for forest products. This was true of all species but principally aspen. Many farmers indicated that the market price was so low that they could not afford to haul forest products any distance. This was not only true of the Eveleth area and St. Louis county but of the 12 northeastern counties.

One of the industries that is efficiently processing and marketing local farm products is a modern dairy plant located in Cherry township. This firm actively promotes consumption of locally produced dairy products.

Industries of that type are needed for other agricultural commodities to encourage expansion.

The general attitude of the residents in the survey area should be helpful to any group or organization attempting to set up a processing and marketing operation to utilize locally produced farm commodities.

VACATION-TRAVEL

The economic significance and potential of the vacation and travel industry of northern Minnesota was investigated in a 1958 survey sponsored by the IRRRC and the Minnesota Arrowhead Association. The data and findings were later published in book form, and this is available through the IRRRC which provided funds for the survey.

Included in the study were the counties of Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mahnomen, Mille Lacs, Pine, Roseau, St. Louis and Wadena. The study consisted of a comprehensive inventory of all resorts, motels, hotels and trailer and camping courts, and a survey of a large random sample of travelers in the area.

Among the recommendations of the report were:

Private and public associations should strengthen programs to encourage the improvement and rebuilding of resorts, hotels, motels and camping and trailer courts, and their recreational facilities in the area.

Study of how more capital can safely be loaned to or invested in resorts; training program in resort operation; continued research and assembling of basic information on a systematic schedule as necessary tools of good management.

Vacation-travel establishments should more completely support associations which have well-organized joint advertising programs; promotion of the industry should be the subject of continuous study by an area college or university.

An area-wide or Minnesota-wide organization, public or private, should seek to coordinate all resource improvement and to make long range plans for development.

ELY AND ITS RESOURCES

In September, 1959, the IRRRC published a report on an industrial survey in the Ely area. This information helped develop a valuable prospectus to promote further development of a "definite" location in a "definite" area of surplus resources in northeastern Minnesota.

The prospectus provides encouraging inducements in the way of information for business interests contemplating expansion, relocation or establishment of a new wood-using industry.

It also suggests that deposits of copper and nickel sulfides should attract further investigation.

In summary, the report noted that:

Ely has timber and mineral resources at its back door in quantities to warrant investigation leading to investment.

Skilled labor and pure water are plentiful.

Ely is definitely and vitally desirous of industrial development.

Public and civic agencies are eager to provide assistance and facilities for interested industries.

The area is well situated in respect to midwest, eastern and world markets.

HEADWATERS AREA STUDY

A comprehensive source of industrial information for another northern Minnesota area was provided in a publication called "Opportunity for Wood-Using Industries in the Mississippi Headwaters Area." This included Beltrami, Itasca, Hubbard and Cass counties, and was prepared to meet requests for information on forest resources available there.

The report included summaries of forest resources previously published as well as recent investigations regarding present uses of wood and existing facilities within the area.

The report noted that:

The Headwaters area, with four million acres of commercial forest land, has a total of 19 million cords of standing merchantable timber. Most of this timber is on public land.

Over a quarter of a million cords of this wood are available annually for new and expanded industrial expansion, in addition to timber presently used by existing industries.

Communities are eager to cooperate in providing industrial sites and facilities for any industry that can help utilize the area's wood surplus.

Water supplies of good quality are available in abundance. Sufficient electric power is available.

CUYUNA RANGE STUDY

The great industrial potential of the Cuyuna iron range area was promoted and emphasized in another survey and report prepared by the Office of Iron Range Resources and Rehabilitation. The area included Crow Wing, Aitkin, Morrison, Mille Lacs and Kanabec counties. Main points of the mineral and forest potential were covered.

Among the points noted:

Presently productive mines of the Cuyuna are confined to areas adjacent to Crosby-Ironton in the east-central part of Crow Wing county.

There are large deposits of iron and manganiferous iron together with large reserves of manganese in the area.

Timber, marl, gravel, peat and water are abundantly present. Excess timber alone amounts to over 100,000 cords of aspen and other hardwoods annually.

Local groups are anxious to cooperate in the utilization of those resources and will help obtain industrial sites, community facilities and trained labor.

Miscellaneous

ARROWHEAD CANNING

This project has had a history of financial difficulties since 1947. Many commission meetings during this administration and previous administrations have proven fruitless to improve the economic status of this operation.

In June of 1959 the creditors of Arrowhead Canning Co. entered into a voting trust agreement and a new company was formed known as the Arrowhead Canning Co., Inc. The management was then in the hands of the creditors.

In the best judgment of the Commission, to protect the state's interest, it was decided to purchase the adjoining warehouse and adjacent lots because:

1. If this property reverted to someone other than the original owner the state would not have had ingress or egress from its property. In addition the state-owned building had orginally been built with a party wall connecting it to the adjacent warehouse.

2. The new contract entered into by the state with the new corporation provided a 20-year repayment time instead of a 43-year repayment plan as provided for in the original contract.

3. It was felt that the new corporation was in a better position to obtain operating capital than was experienced by the former leasee.

McGREGOR PLANT

The McGregor Manufacturing Corp. began operation in April, 1957, manufacturing snow skis from ash lumber found in abundance in Aitkin county and surrounding area. In addition to the regular skis, the corporation later started manufacturing water skis, also using ash lumber.

However, skis made from ash lumber were not a favorable market item and it took considerable selling to get these new skis on the market. As in the case with any new manufacturing proc-

ess, the corporation had production difficulties in the production of laminated skis.

There were many technical problems involved and the corporation was forced to invest additional funds in trying to solve these production difficulties. However, when those funds became exhausted and the firm was still having production difficulties, the majority of the stockholders decided to close the plant. In the meantime, the plant had to discontinue operations for several months in order to repair damage caused by a fire.

During its operation for approximately a year and a half, the plant employed from six to 20 persons depending on the time of the year. It provided a market for ash lumber and was a definite boost to the economy of the McGregor area, and soon after its establishment several new business firms located in McGregor.

The local development corporation at McGregor is still intact, the state still owns the machinery in the plant and we are hopeful of getting the plant back into operation. This plant is well equipped with the most modern machinery, there is an ample labor force available in the McGregor area and also raw materials available.

The McGregor Development Corp. will cooperate with any reliable firm willing to take over the plant.

Any new operator that takes over the plant will have the advantage of all of the experience and information gathered on processes used during the operation of the plant. Our own wood technicians also will cooperate with any new leasee.

VIRGINIA SKI RESORT

Now firmly established, after early cooperation and assistance of the IRRRC, is a new ultra-modern Minnesota ski resort on the Mesabi range near Virginia.

Appropriately called the Lookout Mountain ski area, the development is just two and one-half miles north of Virginia in the Superior National Forest. The project gained momentum during the winter and spring of 1958 when local residents in the Virginia area raised approximately $320,000 to start the ski area plan.

After calling for bids on buildings and equipment, the local group found additional funds were needed. The IRRRC stepped in with finances by purchasing some equipment and ski tows, and the project was successfully launched during the winter of 1958-59.

The new tourist venture has proved successful beyond expectation, and holds promise of continued economic and recreation benefits to the area.

RESOURCES CONFERENCE

A third conference on the development of Minnesota resources was called by Governor Orville L. Freeman. It was held on June 20, 1960 at the Memorial Building at Hibbing. This conference was attended by several hundred persons.

Speakers and leaders at the conference included distinguished representatives in resource fields of concern to Minnesota. The conference was sponsored by the Range Municipalities and Civic Association with the cooperation of the Iron Range Resources and Rehabilitation and the State Departments of Business Development, Highway and Conservation.

James W. Clark, Commissioner of the Department of Business Development, was chairman of the Section A panel with the following papers given: "Northeast Minnesota and World Trade" by Robert Smith, Director of Duluth Port Authority; "Vacation Travel in the Arrowhead" by Al Rossman, President of Minnesota Arrowhead Association; and "Highway Development in Northeast Minnesota" by L. P. Zimmerman, Commissioner of the State Highway Department.

Section B panel chairman was George A. Selke, Commissioner of the Conservation Department. Papers presented were "Utilization of Wood and Fiber in Northeast Minnesota", by Bernard M. Granum, Forest Project Supervisor of the Iron Range Resources and Rehabilitation; "The New Outlook on Minnesota's Mineral Resources" by Ray D. Nolan, Director of Lands and Minerals Conservation Department; "Community and Area

Planning", by Guy J. Kelnhofer, Community Planning Advisor, Department of Business Development.

Governor Freeman addressed the evening banquet.

A complete report on the conference is being published by the department.

Receipts and Outlays

RECEIPTS

	1958-1959	1959-1960
Unobligated balance brought forward July 1	$1,543,018.24	$ 274,903.83
Note: Of these balances, $1,314,442.06 was received from 5% of occupational tax on iron ore on June 30, 1958 for expenditures during fiscal year 1958-59; $648,369.29 was received June 30, 1959 for expenditures during fiscal year 1959-60.		
Occupational taxes due for years 1956 to 1959 See Attorney General's Opinion 6/20/60.	.....	697,139.29
Transfers In:		
Recovery of unobligated balances of transfers out in prior years:		
Dept. of Administration	.....	2,140.00
Dept. of Agriculture	23.48	.....
Dept. of Conservation, Div. of Forestry	1,840.86	7,621.21
Dept. of Conservation, Div. of Lands & Minerals	3,612.30	11,750.57
Dept. of Health	.....	4,070.36
Restore transfer out made in error to Div. of Forestry and Lands & Minerals in 1957-58 & 1958-59.	.....	49,660.50
Miscellaneous refunds	17.95	32.26
TOTAL RECEIPTS	$1,548,512.83	$1,047,318.02

(5% Occupational Tax received June 30, 1960 in the sum of $693,726.33 is not shown during fiscal year 1959-60 as it is not available for expenditure until fiscal year 1960-61.)

EXPENDITURES

	1958-1959	1959-1960
Transfers Out (By Legislative Action):		
Dept. of Administration	$ 1,470.00	$ .....
Dept. of Agriculture	7,500.00	7,500.00
Dept. of Conservation, Div. of Forestry	419,107.00	.....
Dept. of Conservation, Div. of Lands & Minerals	124,370.02	.....
Dept. of Health	20,000.00	15,000.00
Interim Com. on Taxation of Iron Ore	.....	15,000.00
Mapping Advisory Board	14,000.00	.....
University of Minnesota — Beneficiation of Low Grade Ore	100,000.00	150,000.00
University of Minnesota — Legume Seed Research	30,000.00	.....
Total Transfers Out	$ 716,447.02	$187,500.00
Projects:		
Administration	$ 61,036.61	$ 60,234.00
Agriculture	9,294.83	3,505.42
Arrowhead Canning Co., Grand Rapids, Minn.	67,000.00	.....
Chemical Products from Peat Research (Univ. of Minn.)	53,715.00	.....
Deer River Woodprocessing Plant	6,049.86	13,264.90
Forestry Development	286,741.10	274,092.42
Governor's Conferences	3,027.17	558.51
Lookout Mt. Ski Lodge, Virginia, Minn.	33,589.77	.....
Marl Survey	3,000.00	.....
Mineral Survey	49,113.84	48,759.27
Multiply of Virginia, Virginia, Minn.	599,558.16	.....
Topographic Mapping (U.S. Geological Survey)	50,000.00	25,502.37
Water Survey (U.S. Geological Survey)	66,000.00	17,781.80
Total Project Expenditures	$1,288,126.34	$443,698.69
TOTAL TRANSFERS OUT AND PROJECT EXPENDITURES	$2,004,573.36	$631,198.69

Receipts from IRRR Projects Credited to General Revenue Fund

Project	1958-1959	1959-1960
Equipment rentals	$ 40.50	$ 51.50
Sale of Floodwood peat plant	1,841.71	1,700.04
Arrowhead Canning Co., Grand Rapids, Minn.	1,600.00	3,150.00
Arrowhead Seed Growers Coop., Cook, Minn.	1,000.00	1,000.00
Cedar Products, Inc., Deer River, Minn.	2,100.00	.....
Highway Department (Mineral Survey)	.....	19,841.97
Lookout Mt. Ski Lodge, Inc., Virginia, Minn.	6,717.96	1,800.00
McGregor Mfg. Corp., McGregor, Minn.	.....	165.65
McLeod, Inc., Grand Rapids, Minn.	1,650.00	600.00
Nu-Ply Corporation, Bemidji, Minn.	23,333.36	35,000.04
Superwood Corporation, Duluth, Minn.	39,812.50	36,850.00
TOTALS	$ 78,096.03	$100,159.20