

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

b. REPUBLIC MINE FUNDS

Each year it is recorded in the annual report of this department that the 1930 annual report carries a full statement of the Sick Benefit Relief and the Fatal Accident Funds of the closed Republic Mine.

As reported previously, the unused balances which remained in these funds have now been all expended. In our report for 1942 we carry an outline of the use which was made of the funds.

Dr. Van Riper, whose office and home are at Champion, continues to take care of our employees in the Champion-Republic area. The building formerly used as the Republic Hospital and now established as a health center for the district is maintained now by Republic Township. Dr. Van Riper holds an office hour at Republic daily and he serves the medical needs of the areas surrounding Champion, Humboldt, and Republic. Dr. Van Riper has not had any assistance in his work for some time. He has been unable to get any help. Dr. Van Riper is paid the \$1.25 per man per month which was our medical fee until the first of January, 1944, when the fee was raised to \$1.50 per man per month.

The Republic Hospital building which, as previously pointed out, is now a health center, is being maintained by Republic Township. The Township has asked for a transfer of the deed to the hospital which was given formerly to the Republic Improvement Association to the Township of Republic. This has been recommended but the actual transfer has not been completed.

The Township of Republic has turned over the residence portion of the hospital to a nurse. This nurse, a married person, lives in the building and is on call for any emergencies.

c. SUSPENSE FUNDS

The annual report for the year 1918 carries a complete statement of the payments made from the Suspense Funds from February 1, 1912, at which time the Michigan Compensation Law went into effect. Reference to these funds is made in the annual report each year so that it may always be convenient to determine where to look for the final report on the Suspense Funds.

23.

d. VISITING NURSES

During the year 1943 we have continued in the usual way the services of our visiting industrial nurses. The services of these nurses, particularly during these times when we have fewer doctors, has meant very much to many of our employees and their families. The monthly reports indicate that the nurses are very busy and as our payrolls increase, as they have during the past year, the nurses have had added responsibilities as well as opportunities for extending services. It is felt that the visiting industrial nurses do a type of work which is a very fine example of social medical service and we are fortunate in having the type of nurses who do everything possible at all hours of the day and often at night to extend their services. Their work has been commendable and it is our desire to commend them for their very excellent work.

The work of the visiting nurses was started in Ishpeming on May 1, 1908 and in Negaunee on September 8, 1912. These services were also available at Gwinn from September 1, 1910 until October 1, 1927 when the Gwinn mines were closed. At the present time we have a visiting industrial nurse in the Gwinn area since we have not been able to secure a doctor for Gwinn since Dr. Witters left last fall. We have combed the country over and contacted all the various agencies in an effort to secure some doctor for the Gwinn District, but to this date we have not succeeded in finding anyone. We have had contacts at two different times within the past few months and we hoped to fill the position, but in one case the doctor, after agreeing to come, decided to go elsewhere and in the second case the State Board of Registration in Medicine is holding up the registration of a Wisconsin applicant.

During the year 1943 the following nurses were employed:

Ishpeming	-	Miss Myrtle V. Welander
Negaunee	-	Miss Ina E. Atkin
Gwinn	-	Mrs. Margaret Kemp (employed since the fall of 1943)
Iron River	-	Miss Laura N. Fisk, (Miss Fisk is employed jointly with other companies)

Miss Welander, Miss Atkin, and Mrs. Kemp submit reports each week and we also receive monthly summaries of their work. Each month the monthly summaries of the nurses' services are made a part of the monthly report of this department. Some idea of the great extent of the services which these nurses render can be had by checking the monthly reports of this department. The excellent services which our industrial nurses have given for many years past is considered a very important part of the follow-up work in cases of illness amongst our employees and their families. It is also felt that the fine services rendered by the nurses have a considerable influence on the reduction of absenteeism among our employees.

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d. VISITING NURSES.

Following is the report of the Ishpeming Visiting Nurse for the year 1943:

Total number of patients cared for during year	834
Number of new cases cared for during year	455
Total number of visits to patients	4407
Number of families visited for the first time	110
Number of social calls	61
Number died	5

Classification of new cases for the year:

Number of adults	209	Male	18	Female	191
Number of children	246	Male	102	Female	144

Nationalities of new cases for the year:

American	299	Irish	3
English	34	Italian	35
Finnish	53	Norwegian	3
French	12	Swedish	16

Diseases and number of new cases:

Aenemia	2	Kidney Trouble	5
Appendicitis	1	Leukemia	1
Asthma	6	Measles	6
Baby Welfare	7	Miscarriage	2
Bowel Trouble	10	Obstetrical	4
Bronchitis	3	Paralysis	1
Burns	5	Phlebitis	3
Carcinoma	1	Pneumonia	3
Cold	47	Post-Natal	51
Convulsions	2	Post-Operative	21
Cystitis	1	Prenatal	24
Diabetes	4	Rheumatism	4
Dysentery	5	Rupture	2
Fracture	3	Scarlet Fever	2
Gall Bladder	5	Stomach Trouble	17
Heart Trouble	7	Tonsilitis	17
Hypertension	1	Unclassified	5
Infants, Newborn	75	Undiagnosed	12
Infections	26	Var. Ulcer	2
Influenza	29	Whooping Cough	15
Injury	17		

Visiting Nurse: Miss Myrtle Welander.

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d. VISITING NURSES (Continued)

Following is the report of the Negaunee visiting nurse for the year 1943:

Total number of patients cared for during year	1393
Number of new cases cared for during year	847
Total number of visits to patients	4827
Number of families visited for the first time	42
Number of social calls	779
Number died	4

Classification of new cases for the year:

Number of adults	329	Male	99	Female	230
Number of children	518	Male	251	Female	267

Nationalities of new cases for the year:

American	379	Italian	81
Finnish	359	Norwegian	16
French	12		

Diseases and number of new cases:

Aenemia	9	Injury	59
Appendicitis	14	Impetigo	3
Asthma	3	Kidney Trouble	2
Bowel Trouble	11	Mal-Nutrition	67
Bronchitis	6	Measles	128
Burns	4	Obstetrical	17
Carcinoma	2	Otitis Media	2
Catarrhal Fever	7	Paralysis	1
Chicken Pox	10	Pleurisy	2
Cholystitis	11	Pneumonia	12
Cold	44	Post Operative	40
Croup	3	Pregnancy	40
Diabetes	1	Pyelitis	3
Eczema	2	Pul. Tuberculosis	1
Enteritis	2	Rheumatism	7
Epileptic	1	Rupture	4
Fracture	1	Scabies	1
Gastritis	2	Scarlet Fever	16
Gen. Debility	5	Sore Eyes	4
Glycosuria	1	Sprains	5
Heart Trouble	7	Stomach Trouble	6
Herpes Zoster	1	Tonsillitis	34
Hives	3	Unclassified	12
Hypertension	1	Undiagnosed	2
Infants, Newborn	18	Var. Ulcer	1
Infections	33	Whooping Cough	2
Influenza	174		

Visiting Nurse: Miss Ina E. Atkin.

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d. VISITING NURSES (Continued)

Following is the report of the Gwinn visiting nurse for the months of September, October, November and December 1943:

Total number of patients cared for	277
Number of new cases	247
Total number of visits to patients	561
Number of families visited for the first time	159
Number of social calls	
Number died	

Classification of cases:

Number of adults	145	Male	77	Female	68
Number of children	102	Male	60	Female	42

Nationalities of new cases:

American	223	Italian	5
Finnish	14	Norwegian	1
French	2	Swedish	2

Diseases and number of new cases:

Aenemia	1	Malnutrition	1
Asthma	2	Measles	4
Bowel Trouble	6	Nephritis	1
Burns	2	Obstetrical	1
Cold	102	Pleurisy	1
Dermatitis	9	Rheumatism	3
Diabetes	2	Scarlet Fever	1
Eczema	1	Sore eyes	10
Gastritis	1	Sprains	3
Heart Trouble	3	Stomach Trouble	7
Infants, Newborn	7	Tonsillitis	6
Infection	23	Unclassified	21
Injury	17	Undiagnosed	2
Kidney Trouble	1	Whooping cough	9

Visiting Nurse: Margaret Kemp. R.N.

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d. VISITING NURSES (Continued)

NUMBER OF PATIENTS ATTENDED AND CALLS MADE.

	<u>No. of Patients</u>	<u>No. of New Cases</u>	<u>Male Adult</u>	<u>Female Adult</u>	<u>Male Children</u>	<u>Female Children</u>
Ishpeming	836	455	18	191	102	144
Negaunee	1393	847	99	230	251	267
Gwinn	277	247	77	68	60	42
	<u>2506</u>	<u>1549</u>	<u>194</u>	<u>489</u>	<u>413</u>	<u>453</u>

	<u>Total No. Visits.</u>	<u>Number Died</u>	<u>Social Calls</u>	<u>Families Visited for first time.</u>
Ishpeming	4407	6	59	110
Negaunee	4827	4	779	42
Gwinn	561	-	-	159
	<u>9795</u>	<u>10</u>	<u>838</u>	<u>311</u>

NATIONALITIES OF NEW CASES.

	<u>American</u>	<u>English</u>	<u>Finnish</u>	<u>French</u>
Ishpeming	299	34	52	13
Negaunee	379	-	359	12
Gwinn	223	-	14	2
	<u>901</u>	<u>34</u>	<u>425</u>	<u>27</u>

	<u>Irish</u>	<u>Italian</u>	<u>Norwegian</u>	<u>Swedish</u>
Ishpeming	3	35	3	16
Negaunee	-	81	16	-
Gwinn	-	5	1	2
	<u>3</u>	<u>121</u>	<u>20</u>	<u>18</u>

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f. NORTH LAKE CLUB

The clubhouse at the North Lake location has carried on its usual services and community activities throughout the year 1943. Mr. Dewey Urquhart continues in the position of director of the clubhouse. The Inland Steel Company cooperated throughout the year in the operation of the clubhouse and the building, which serves the community as a center for all kinds of activities, had a very successful year. Practically all types of community activities in the North Lake district center in the North Lake clubhouse.

Following is a statement showing receipts and expenditures for 1943:

	<u>TOTAL FOR YEAR</u>
<u>RECEIPTS:</u>	
Membership Fees	\$348.00
Bowling Alleys	122.32
Pool and Billiards	76.10
Telephone Tolls	45.50
TOTAL	<u>591.92</u>
<u>EXPENDITURES:</u>	
Building Maintenance	56.50
Equipment	39.00
Lighting	120.11
Heating	571.09
Water	60.00
Bowling Alleys	47.50
Pool Room	5.22
Office Expense - Telephone	104.96
Salaries and Wages	2,840.15
Reading Room	15.90
Miscellaneous	44.28
Personal Injury Expense	6.00
Unemployment Insurance Tax	37.14
Old Age Benefit Tax	28.53
Fire & Boiler Insurance	75.92
TOTAL	<u>\$4,052.35</u>
Deficit	\$3,460.43
Billed to Inland Steel Co.	960.00
Billed to Lloyd Mine	2,500.43

23.

g. GWINN ASSOCIATION.

The club house is maintained and administered by the Gwinn Association, at Gwinn. Mr. E. L. Miller has continued as director in charge of all work. The Company participates in the work at the Club House by matching the twenty-five cents monthly membership fee which is paid by our employees who are members of the club and who live in the Gwinn district. This is the Company's donation towards the up-keep and the program of the Gwinn Association and the Club House.

The club building serves the community in practically every capacity. All activities - community, governmental, and school- are centered in the building. The school district of Forsyth Township has contracted to use the club house as an athletic center and as a gymnasium and Mr. Miller acts as one of the athletic instructors. Practically all the organizations in the district hold their meetings and gatherings at the club house and the building is used as a center for all civilian defense programs and for Red Cross activities.

The annual report of the Gwinn Association is herewith submitted:

Membership

Number on roll January 1, 1943	307
Number on roll January 1, 1944	276
High membership month for year - January	311
Low membership month for year - November	275
Average monthly membership	283

ATTENDANCE:

The attendance at the building showed a decrease over the previous year and is due to the fact that many of the younger men who made use of the building, especially the gymnasium, are now in service.

Total estimated attendance at building during year	70550
Average monthly attendance	5880
High monthly attendance - January	8800
Low monthly attendance - August	3125

All outdoor activities were of a miscellaneous nature as it was impossible to organize leagues in the usual branches of sports. Equipment for softball and hardball were placed in the different locations for the use of the younger boys and girls. The small playground near the building was used for volleyball and horseshoes. The cottage at Bass Lake was used under the same arrangements as in other years. The following estimated attendance covers all outdoor activities 4600

Financial Information: (from December statement)

Total receipts, including 1942 balance	\$ 6301.83
Total expenditures for year	5415.85
Balance on hand Jan. 1, 1944	\$ 885.98

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g. GWINN ASSOCIATION (Continued)

Buffet, Billiards, and Bowling

Receipts for year	\$1398.00
Expenditures for year	934.28
Profit	\$ 463.72

Receipts from memberships and rental \$ 3961.00

General Activities and Organizations Using Building.

- 19 Committee meetings.
- 17 nights' play - Men's Cribbage.
- 15 sessions - Women's cards - Bridge and Cribbage.
- 14 meetings Women's Study Club.
- 15 meetings Federal Agencies.:
- 61 meetings Red Cross working groups.
- 4 meetings Girls Junior Study Club - annual dinner.
- 16 meetings Daughters of Isabelle - 1 Rummage Sale - 1 Annual Party.
- 10 meetings Town Club.
- 20 rehearsals by organizations for plays.
- 10 meetings Civilian Defense groups.
- 4 wedding and gift showers.
- 1 Annual card party to raise funds - Girl Scouts.
- 3 meetings - Mich. State Ex. workers - 1 canning demonstration.
- 1 dinner and meeting county Bankers Association.
- 10 different dances held - social dances by Highv School - Town Club- and local Fire Department.
- 2 Fun and Frolic nights for adults.
- 3 rehearsals by Band.
- 1 Card Party by Town Club for Polio Fund.
- 2 days - 45 Michigan State Troopers quartered in building.
- 1 Annual Community treat for Children.
- 1 Annual New Year's ball by Fire Department.
- 5 socials by different organizations.
- 19 meetings by circles of Methodist Church - 31 choir rehearsals - 5 meetings by Young People's Society - 1 rummage sale - 1 temperance lecture - 2 meetings Dorcas Society.
- 114 sessions school kindergarten.
- 91 lunches or dinners served by different organizations.
- 35 times - chairs, tables, dishes loaned for family or outside events.

Library and Reading Room.

With the addition of new books to the library, and the addition of new weekly and monthly magazines the Club is well supplied to take care of the requirements and demands of members - either in fiction or for material on current events.

Weekly magazines received	6	Daily newspapers	3
Monthly magazines received	22	Weekly newspapers	4

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Several new games have been added to the facilities of this department in an effort to keep the younger people occupied. dart games and carrom games are included. Other equipment in the room- pool and billiard tables, table tennis tables, etc., - were used extensively and were kept in good condition.

Bowling.

Although many of the younger men who had been members of bowling leagues are now in service a men's six-team league and a women's four-team league completed a successful season. 69 classes for High School students were held.

Physical Recreation and Athletic Department.

This includes all activities in the gymnasium whether under the High School or Club supervision and all outdoor recreations; such as, furnishing softball equipment for use at the different locations and school playground, hardball equipment and football equipment for miscellaneous use as there were no leagues organized for this sport.

SummarySupervised Gymnasium Activities.

	<u>Periods</u>	<u>Attendance</u>
High school classes (Girls)	129	3063
High School classes (Boys)	136	3115
High basketball practice	72	723
Grade & Kindergarten	15	680
Boys basketball leagues	25	1275
Girls basketball league	17	600
Senior basketball (Club)	21	170
Junior Boys	8	305
	<u>423</u>	<u>9931</u>

Basketball Games under High School or Club Supervision.

High School played 5 games at home and 7 away - playing in the tournament at Negaunee in class "C" .

Boys High League and tournament	-	89 games.
Girls High League	-	26 games
Junior Boys	-	19 games

Attendance at all homes games 5750.

The annual High School demonstration was held outdoors at the school playground.

Outdoor Activities

All outdoor activities were of a miscellaneous nature as there were no leagues organized for either softball or hard ball.

Softball games played at different playgrounds by adults, boys, or girls 81. Attendance 1800

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g. GWINN ASSOCIATION (Continued)

Basketball Games (Continued)

Playground near club: horseshoe pitching and volley ball attendance 1300.
(Tennis court was used for volley ball as there was a shortage in tennis equipment) Touch foot-ball participants 900.

BASS LAKE CAMP.

The season opened May 15th and closed October 31st.
Due to the gas situation the caretaker was unable to make as many trips as in other years but a close watch was kept on conditions by contacting persons who had made use of the cottage and grounds.

<u>Summary.</u>	<u>Attendance.</u>
600 used bathing facilities.	
83 basket picnics.	
6 picnics by school and church organizations.	
6 families or groups used cottage from 3 days to 1 week,	73
1 annual picnic - Negaunee City Band	40
1 annual picnic - Marquette County Road Employees	200
1 annual picnic - Princeton Mine employees and families	400
1 annual supper - Ex-Servicemen	20
Girl Scouts used cottage 4 days	12

Total estimated attendance at grounds- including basket picnics, those using cottage, bathers, fishermen, and visitors . . .1600.

Scout Activities - Girls.

Besides their regular class work the troop spent quite a lot of time assisting the Red Cross in delivering articles to be sewed and also sponsored the collection of waste fat. They also secured the Home Front pledge from families in Gwinn for the CDO.

- Summary.
- 44 meetings - 2 outdoors - attendance 643.
 - 4 hikes - 1 snowshoe trip- 1 skating party.
 - 3 social parties.
 - 1 annual card party to raise funds.
 - 1 annual ceremonial (held outdoors).
 - 1 annual program for parents.
 - 8 fat collections.
 - 1 canvass of all homes in Gwinn to secure Home Front pledge.

Troop observed Scout week, attended church services in uniform; attended Memorial Day service in a body; made articles for patients at Ishpeming Hospital for Easter; assisted with Community Christmas Treat for children; and made deliveries for local Red Cross chapter. Spent four days at Bass Lake camp on annual camping trip.

Building.

The Club House operates under the same financial arrangements as in previous years. The Cleveland-Cliffs Iron Company renders financial

23.

g. GWINN ASSOCIATION (Continued)Building. (Continued)

assistance and supervision, the Cliffs Power & Light Company grants free service, and the local Board of Education pays rental for use of building and equipment for their physical training program, and for their social activities, including dancing.

The school kindergarten which has used two rooms on the lower floor has been discontinued as room has been provided at the local school building for this purpose. The rooms are now being used for Red Cross working groups.

During the year rooms which needed re-decorating were given attention. Floors in recreation room, lobby and community meeting room were re-varnished and waxed. The gymnasium floor was given a coat of seal-o-san and put in good shape. Bowling alleys were sanded and walls were re-painted.

Additional games were provided for recreation room and pool tables put in good condition. Supplies for janitor service, fuel for heating building and gas for club kitchen were purchased and equipment for outdoor recreations activities were replenished.

Much time of the employees was devoted to activities connected with the war effort.

23. h. ISHPEMING Y.M.C.A. BUILDING

There is very little new information to submit on the Ishpeming Y.M.C.A. building. The building has been closed for several years and the windows are boarded up. It is not a very pleasant sight for those who have been interested in the building in the past and the activities which centered there. There has been discussion from time to time about the possibility of re-opening the building either as an annex to the City Hall or as a community center. I am of the opinion that some day the Ishpeming Industrial Association, which has just been re-organized, will be interested in working out some type of a program for use of the old Y.M.C.A. building. It has been estimated that it will cost within the neighborhood of \$10,000 to \$15,000 to put the building into usable condition.

Presently there seems to be no great need for the building. What the future will develop depends somewhat on the attitude of returning servicemen and the need of centers for them. There has also been some discussion of making the headquarters of the Boy Scouts of America for the fifteen Northern Peninsula counties here at Ishpeming. The committee in charge of this, however, was of the opinion that it would be possible to secure free office space in the Y.M.C.A. building.

It is felt that if the building is to be opened at some time in the near future that the Company should be interesting itself as to what the possibilities will be and what the costs may be. It would seem that it would be better for the Company to take over the building, manage it and outline the program if there does develop a need for the building. The opening of the building under public supervision may work out properly, but often community buildings are expensive when paid for with public tax monies. We have maintained our clubhouses at Gwinn and at North Lake with considerable success. The same thing could be done here in Ishpeming and some thought could be given to giving over a portion of the building to public agencies. At any rate, the future use of the Y.M.C.A. building in Ishpeming is something that should be carefully studied.

23.
i. SAFETY WORK

The Central Safety Committee held several meetings during the year under the direction of Mr. A. J. Stromquist. At each of these meetings a general discussion is had of all the accidents which have occurred and a study is made of the possibility of preventing accidents of like nature in the future. During 1943 meetings were held on the following dates:

- February 15, 1943
- May 19, 1943
- May 27, 1943
- August 23, 1943
- December 21, 1943

The meetings are held in the assembly room on the third floor of the main office building and they generally cover a two or three-hour discussion period and are sometimes attended by the captains of the various mines. The Safety Department prepares the minutes and considerable detail is gone into with respect to the accidents which are reported. It is felt that the meetings are very practical and helpful. The increase in production schedules and in the number of employees on the payrolls, of course, has created some new problems and an increase in the number of accidents and need is constantly seen for the efficient carrying out of the safety program. Constant stress is placed on the need for continuing good safety practices and for the prevention of accidents.

The following are the members of the committee:

- G. R. Jackson, Chairman
- C. J. Stakel
- C. W. Allen
- W. W. Graff
- H. O. Moulton
- Carl Brewer
- Walter F. Gries
- A. J. Stromquist
- W. E. Johnson
- H. F. Rogers
- J. D. Preston
- L. C. Moore
- E. D. Cory
- F. J. Haller
- Onnie Marjama
- S. W. Sundeen
- Ernest Keast
- W. R. Atkins
- John Trosvig
- H. W. Sundberg
- Dr. George McL. Waldie

The regular report of the Safety Department will be found in Mr. Stromquist's annual report.

23.

j. HOSPITALS AND MEDICAL SERVICE

The Welfare Department has daily contacts with the Ishpeming Hospital and the Negaunee Dispensary. Conferences and discussions in connection with the medical work are held regularly with the doctors and with the superintendent of the hospital. Periodic visits are made to the doctor's office and dispensary at Gwinn. During the year two or three visits are made to the Iron River District to confer with Dr. Irvine and with the Stambaugh Hospital. Occasionally we also have contact with the county health unit in Iron County.

During the year several discussions were had dealing with the advisability of raising the medical plan rates. We continued throughout the year at the rate of \$1.25 per employee, but effective January 1, 1944, the fee was raised to \$1.50.

Dr. Witters, who was a member of our medical staff at Gwinn, left our employ in the fall to accept employment at Las Vegas, Nevada. Every effort has been made to secure someone to fill the position at Gwinn but to date we have not been successful. The scarcity of doctors makes it almost impossible to secure someone to fill the place. As this report is being written, we also have notice that Dr. Sarven, who was assigned to the Negaunee District, is leaving for Henderson, Nevada to accept a position there. We now have only four doctors on our staff, three at Ishpeming and one at Negaunee. Dr. Burke is assigned to the Cambria-Jackson group, but the medical practice at present is too large for our doctors to take care of properly.

Several discussions and conferences have been held during recent months in an effort to reach some conclusions on the future of the Company's medical plan. To date there has been no definite program outlined, but the fact that our medical staff has been greatly reduced makes it imperative that we arrive at some definite conclusion soon.

ISHPEMING HOSPITAL

We have had another busy year at the Ishpeming Hospital. Our hospital not only serves our own employees and their families but it also extends service to the community at large and to other communities outside the district. We have succeeded throughout the year in maintaining our high standard and the hospital has continued as a member of the American Hospital Association and the American College of Surgeons. Miss Georgia Holmes, R.N. continues in the position of Superintendent. She has managed to do a very creditable job in spite of the fact that we have been very short on trained nurses and on regular hospital staff, such as orderlies, maids and helpers. Throughout the year Miss Holmes has found it necessary to call in girls of high school age to work a few hours each day so that the work of the hospital could go on.

The medical staff and the nursing staff, including the visiting nurses, have had a very busy year. With a reduced staff, the doctors have had much more work

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

to do and with increased payrolls we have more people to take care of. As pointed out before, the war has taken so many doctors that it is impossible to secure replacements at the rates we now pay our doctors.

It is sometimes felt that the people in this community do not fully appreciate the real value of the Ishpeming Hospital. The hospital is administered and maintained entirely by the Company and the community does not contribute in any way. We have many reactions regarding the services of the hospital and for the most part they are friendly and complimentary. It is felt by most people that the Cleveland-Cliffs Iron Company is making a very fine contribution to the general welfare and health of the entire community through the maintenance of and the service rendered by the Ishpeming Hospital and our medical staff and nurses. It is recognized that the general health of the community, which, of course, includes all of our own employees, is one of the greatest assets which the Company has. The value of the hospital is also reflected in a public relations manner and it is felt that the continuance of the hospital is an asset to the Company as well as to the community.

During the year 1943 Mr. G. R. Jackson, General Superintendent, and Mr. E. E. Riedinger, Chief Clerk, have served with the Superintendent of the Welfare Department, who acts as Business Manager of the Ishpeming Hospital, as an Administrative Advisory Committee. This committee meets once every month and discusses the problems that arise in the administration of a hospital. The committee has been diligent in its study of hospital problems and their assistance is highly appreciated by the Welfare Department, and it is desired to express in this report a sincere appreciation for the cooperation which has been given. The committee has been functioning now for three years and they have become familiar with many of the details which are bound to arise in the administration of a hospital.

The staff of the Ishpeming Hospital during the year 1943 was made up of the following:

- Dr. A. W. Erickson, Chief of Staff
- Dr. P. P. Hartt
- Dr. W. A. Corcoran

At one time we had five doctors at the Ishpeming Hospital, but since the advent of the war it has been practically impossible to replace the two doctors who have left our employ since the war started.

The staff at the Negaunee Dispensary is made up of the following:

- Dr. W. A. Mudge
 - Dr. J. D. Sarven
- (Dr. Sarven is leaving our employ as of February 12th and we will have only Dr. Mudge in the Negaunee District)

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

As pointed out before, Dr. Burke has a contract to take care of the medical needs of Cambria-Jackson employees. He was the doctor for the Republic Steel Corporation when they managed the Cambria-Jackson property and he has been carried over to our staff. Presently, however, he takes care of only the Cambria-Jackson employees.

At the present time there is no doctor at Gwinn since we have been unable to find one to fill the vacancy there.

A special report, giving information regarding the operations of the Ishpeming Hospital for 1943, is submitted herewith. This annual report is made up mostly from the regular monthly reports and from such additional material as is of interest and should be placed on record.

The Ishpeming Hospital was opened to the public in 1918. It is owned and operated by the Cleveland-Cliffs Iron Company. It has always been the purpose of the Ishpeming Hospital to give the employees of the Cleveland-Cliffs Iron Company and their families and to the participating companies in the district the best possible hospital and medical service. The Ishpeming Hospital is operated as a separate unit and most of the business, as far as the Company is concerned, is carried on through the Welfare Department. The Administrative Advisory Committee, previously mentioned, assists in the carrying on of the business of the hospital. The regular monthly meetings of this committee are attended by Dr. A. W. Erickson, Chief of Staff, and by Miss Georgia Holmes, R.N., the Superintendent of the hospital.

It was considered in 1918, when the hospital was first opened, that it was of ample size to take care of the future needs for a good many years to come. The hospital did care for the needs of the community and is still doing so, but in recent years it has been found that at times the hospital does not have ample facilities to take care of our hospital needs. We make every effort to take care of our own people first and two beds are always reserved for possible mine injuries. At the present time we are listing the hospital as having a capacity of 52 beds and 12 bassinets.

A check of the annual report of the hospital which follows will give some idea of the service which the hospital is rendering.

The hospital is approved by the American College of Surgeons and it is a member of the American Hospital Association. There is a closed medical staff and a complete nursing staff made up of only graduate nurses. A training school is not conducted in connection with the hospital and the hospital does not employ anyone who is not fully qualified and registered.

An effort has been made throughout 1943 to continue the program of improvement on the building and grounds. A few new pieces of equipment were added and a study is now being made of the advisability of correcting the bad condition of

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

the ceilings on the second floor. It is felt that the installation of some type of pressed board, such as Celotex, will be the proper solution. The hospital is well equipped with x-ray apparatus, laboratory facilities, and excellent equipment for diathermy treatments and for injuries. The emergency treatment room on the first floor of the hospital is a very busy place. All minor injuries and ordinary treatments are taken care of in this room.

The admissions and enrollment statistics of 1943 show that the hospital is being quite fully used. As has been pointed out in annual reports of the past few years, the future hospital needs of the community probably cannot be taken care of at the Ishpeming Hospital unless additional space is provided. There have been times when it has been necessary to care for as many as sixty people at one time. The fact that we have a larger payroll than we have had in a long time and also because of the fact that many organizations take advantage of the group hospitalization plans we undoubtedly have more people using hospital facilities than formerly was the case.

Two years ago the building was weatherstripped and for the past two winters we have not found it necessary to hang storm windows. We find that the weatherstripping has resulted in a saving of fuel and we save considerable expense since the storm windows do not have to be put up and taken down every year.

It is desired to record here the appreciation of this department to the participating companies in the district for the support they have given the Ishpeming Hospital. At all times we have found the participating companies cooperative.

In last year's report we listed the Hospital Accounts Receivable for 1938 to 1942, inclusive. In 1938 the Accounts Receivable amounted to \$35,546.11. In 1942 they had dropped to \$19,918.93. For 1943 the Accounts Receivable amounted to \$18,096.45.

The operating revenue for the twelve months of 1943 amounted to \$52,637.15. The uncollectible accounts for 1943 amounted to \$441.75. During the year the hospital collected 99.161 cents out of every \$1.00 of work done.

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)GOVERNING BOARD

E. B. Greene, President
 C. J. Stakel, Manager
 G. R. Jackson, General Superintendent

ADVISORY COMMITTEE

G. R. Jackson
 E. E. Riedinger
 W. F. Gries, Secretary and Chairman

ACTIVE MEDICAL STAFF

A. W. Erickson, M.D., President	W. A. Corcoran, M.D.
P. P. Hartt, M.D.	George McL. Waldie, M.D.
W. A. Mudge, M.D.	J. D. Sarven, M.D.

COURTESY STAFF

V. H. Vandeventer, M.D.
 Paul Van Riper, M.D.
 I. Sicotte, M.D.

CONSULTING STAFF

A. W. Erickson, M.D.

DEPARTMENTLaboratory and Roentgenology

A. W. Erickson, M.D.

Anesthesia

F. P. Hartt, M.D.

Gwinn DispensaryHistories

A. W. Erickson, M.D.

Negaunee Dispensary

W. A. Mudge, M.D.
 J. D. Sarven, M.D.

Industrial Hygiene Department

George McL. Waldie, M.D.

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

ISHPEMING HOSPITAL
STATISTICAL REPORT FOR THE YEAR 1943

Number of patients remaining in the hospital at beginning of year		38
Number of adult patients admitted	964	
Number of child patients admitted	80	
Number of births	<u>403</u>	
Total new patients for year 1943		1447
Total of all patients for year 1943		1485
Number of deaths	66	
Number discharged during year	<u>1383</u>	
Total number leaving hospital		1449
Number of patients remaining at the end of the year 1943		36
Classification of new cases:		
Newborn	403	
Surgical	337	
Medical	272	
Obstetrical	<u>435</u>	
Total		1447
Number of operations		342
Number of emergency room operations		399
Number of patient days:		
Baby days	3586	
Others	<u>12651</u>	
Total		16237
Average number of patients per day		44.41

NUMBER OF FRACTURE CASES DURING 1943

Cleveland-Cliffs Iron Company	95	
Inland Steel Company	14	
Oliver Iron Mining Company	5	
North Range Mining Company	1	
Outside Parties	<u>91</u>	
Total		206

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

DEATHS FOR 1943 CLASSIFIED BY DISEASE

Accidental Absorption Carbon Monoxide Gas.....	1
Anacephalic Monster.....	1
Apoplexy with Hemiplegia.....	1
Arteriosclerosis.....	2
Bronchial Asthma.....	1
Burns.....	1
Carcinoma.....	6
Cerebral Abscess.....	1
Cerebral Embolism.....	1
Cerebral Hemorrhage.....	2
Cerebral Tumor.....	1
Cholecystitis and Cholelithiasis.....	1
Cirrhosis of the Liver.....	1
Concussion of Brain.....	1
Coronary Thrombosis.....	1
Diabetes Mellitus.....	4
Gall Bladder Abscess.....	1
Hypothyroidism.....	1
Intestinal Obstruction.....	3
Lymphatic Leukemia.....	1
Myocarditis.....	5
Patent Foramen Ovale.....	2
Penetrating Wound Through Left Occiput.....	1
Peritonitis.....	1
Pernicious Anemia.....	1
Pneumonia.....	1
Premature Birth.....	3
Punctured Lung.....	1
Purpura Hemorrhagica.....	1
Spina Bifida.....	1
Stillborn.....	12
Strangulated Hernia.....	1
Subarachnoid Hemorrhage.....	1
Uremic Coma.....	1
Visceral Lues.....	1
Total	
65	

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

DEATHS DURING THE YEAR 1943

Surgical.....	3
Medical.....	39
Traumatic Injuries.....	5
Newborn.....	6
Stillborn.....	<u>12</u>
Total	65

Deaths within 12 hours.....	9
Deaths under 48 hours.....	11
Deaths over 48 hours.....	33
Stillborn.....	<u>12</u>
Total	65

TRAUMATIC DEATHS

<u>Case No.</u>	<u>Patient</u>	<u>Age</u>	<u>Diagnosis</u>
22568	Mrs. Ellen Lafreniere	60	Concussion
22818	Mrs. Lucy Collucio	59	Fracture of tibia and fibula, right ankle joint. Cerebral embolism.
23272	Crescenzo Sauro	49	Fractured ribs. Funtured lung. Emphysema of chest wall. Shock.
23300	John Solka	28	Penetrating wound through left occiput with foreign body in central brain.
23683	George Luoma	37	Bronchial pneumonia. Extensive third degree burns.

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

LABORATORY REPORT FOR 1943

Urinalysis.....	4154
Hemoglobin.....	1031
Red Cell Counts.....	998
White Cell Counts.....	1430
Differential.....	360
Sedimentation Rate.....	48
Blood Sugar.....	83
Coagulation Time.....	120
Feces.....	21
Gastric Analyses.....	14
Smear.....	34
Sputum.....	4
Blood Typing.....	61
Blood Matching.....	24
Phenolsulphonephthalein Test.....	2
Pregnancy Test.....	2
Kahns (vena puncture).....	633
Friedman Test.....	4
Glucose Tolerance.....	12
Blood Chemistry.....	73
Blood Culture.....	4
Pertussis Agglutination.....	4
Hematocrite.....	13
Potassium Thiocyanate.....	41
Undulant Fever (vena puncture).....	2
Spinal Fluid.....	2
Sulfa Determinations.....	12
E.K.G.'s.....	72
	<u>9258</u>

Pathological Specimens to Ann Arbor.....	187
	<u>9445</u>

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

PHYSIO-THERAPY REPORT FOR 1943

Metabolisms.....	87
Ultra-Violet Ray.....	194
Infra-Red.....	288
Diathermy.....	<u>1705</u>

2274

DEPARTMENT OF INDUSTRIAL HYGIENE

January 1943 -- December 1943

Urinalysis.....	2866
Hemoglobin.....	2564
Red Cell Counts.....	116
White Cell Counts.....	2575
Differential.....	189
Sedimentation Rate.....	2587
Blood Sugar.....	5
Vena Puncture for Kahns.....	2825
Blood Chemistry.....	15
Glucose Tolerance.....	<u>21</u>
	13,763

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

X-RAY REPORT FOR 1943

Extremities.....	892
Shoulder.....	84
Spine.....	105
Skull.....	50
Ribs.....	78
Kidney.....	24
Stomach.....	51
Fluoroscopy.....	20
Barium Enema.....	6
Chest.....	196
Fetus.....	50
Gall Bladder.....	38
Mastoid.....	1
Jaw.....	7
Sternum.....	1
Abdomen.....	20
Pelvis.....	69
Foreign Body.....	<u>9</u>

Total 1701

Number of Out Patients.....	1099
Number of In Patients.....	<u>461</u>

Total 1560

SARANAC INVESTIGATION

Chests.....	2950
Miscellaneous.....	<u>14</u>

Total 2964

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

DIETARY REPORT--ISHPEMING HOSPITAL--YEAR 1943

Patients' Meals.....	47317
Doctors, Nurses, Employees, Visitors.....	27871
Total Meals for the Year.....	75188
Formulas.....	385

Special Diet--Patient Days:

Diabetic.....	363
Special Soft.....	581
High Vitamin.....	12
Fat Free.....	97
Low Salt.....	110
Ulcer.....	127
Bland.....	40
Selective.....	35
Nephritic.....	70
Allergy.....	5
Low Protein Salt Poor.....	8
Special Soft High Protein.....	11
High Protein.....	33
Post-Operative Gastric Ulcer.....	12
Salt Free.....	97
Milk Diet.....	9
Low Fat.....	31
Asthma.....	15
Dry Salt Free.....	14
Sippy.....	3
Low Residue.....	2
Reduction.....	19

Total Special Diet Patient Days.....	1694
Total Special Diet Meals.....	5082

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

Equipment Purchases:

1 Infant Incubator (A. S. Aloe Company, St. Louis, Mo.)	\$ 42.50
5 Chairs and Rockers (Quaal and Quaal, Ishpeming)	196.25
12 Beds and Mattresses (J. L. Hudson)	653.40
Dishwasher	175.00
	\$ 1067.15

Repairs:

Repairs to Heating Plant	\$ 756.85
Repairs to Heating Plant	1178.67
Repairs to Refrigerator	115.81
Repairs to Heating Plant	288.15
	\$ 3406.63

Surgical Instruments Purchased:

2 Laryngeal Mirrors	\$ 1.80
1 Angular Ear Forceps	.85
1 Retractor #1	4.75
1 Needle Holder	8.50
4 Straight Pean Forceps	30.00
2 Curved Forceps (Griles)	11.50
Mueller - 1 Straight Microscopic Scissors	.85
" - 1 Curved Microscopic Scissors	.85
" - 1 Regular Splinter Forceps 4 $\frac{1}{2}$ "	2.70
" - 2 Russian Tissue Forceps 6"	10.00
" - 1 Pool Abdominal Suction Tube	3.75
1 Light Condenser	2.75
1 Condenser	4.00
2 Babcock Forceps, Chrome	15.60
2 Regular Hirsch Adams Valves	6.00
2 Boston Sponge Forceps	3.00
1 Dissecting Scissors, Straight, 5 $\frac{1}{2}$ "	6.00
2 Dissecting Scissors, Curved, 5 $\frac{1}{2}$ "	13.00
Mueller - 2 Pennington Hemorrhoidal Forceps	15.00
1 Uterine Packer 5/16"	3.00
1 Ewald Evacuator	4.00
2 Elroy Loops	17.00
2 Bozeman Uterine Forceps	17.00
2 Allis Forceps, Stille	15.00
	\$ 196.90

Fracture Material:

Zimmer - 3 doz. Finger Protectors	6.00
" - 1 set Buckle Slings 4913	3.25
" - 1 set Buckle Slings 49A	3.25
" - 2 Buck Ext. Hooks	10.00
Depuy 6 Walking Iron Stirrups, R.	7.50
2 Metal Loops	12.00
2 Steinman Pins	2.00
3 doz. Metal Finger Splints	6.00
Depuy 12 Granberry Wired with Oil Driller Points	6.00
1 Key's Kirschner Bow	17.50
1 Peterson Os Calcis Bow	5.00
Depuy 2 No. 124 Speed Hand Splints	4.00
1 No. 126 " " "	1.75
	\$ 84.25

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.
j. HOSPITALS AND MEDICAL SERVICE (Continued)

Herewith are submitted the comments of Miss Georgia Holmes, R.N., Superintendent of the Ishpeming Hospital:

I have the honor to submit herewith the report of the Ishpeming Hospital for twelve months, ending December 31, 1943.

The Hospital has continued to maintain the same high type of service despite the many curtailments, due to rationing, lack of adequate personnel, priorities, and other requirements incident to the National Emergency.

Looking back over the year, we must admit that we have had many difficulties in the way of lack of personnel and other problems. However, with the assistance of co-workers, and with the loyal support of the doctors and personnel of the Hospital, we have been able to maintain the Hospital in good operating condition and have cooperated in every way during the National Emergency.

To the personnel of the Hospital, we wish to acknowledge and thank them for their very loyal support.

We also wish to thank the heads of departments of the Cleveland-Cliffs Iron Company for their splendid assistance during the year.

To the Advisory Committee, we are most grateful for advice and council throughout the year.

Respectfully submitted,

(Sgd.) Georgia Holmes, R.N.

J. HOSPITALS AND MEDICAL SERVICE (Continued)

WELFARE DEPT. ANNUAL REPORT YEAR 1943

	<u>JAN.</u>	<u>FEB.</u>	<u>MAR.</u>	<u>APR.</u>	<u>MAY</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUG.</u>	<u>SEPT.</u>	<u>OCT.</u>	<u>NOV.</u>	<u>DEC.</u>	<u>TOTAL</u>
Patients Admitted	146	118	135	109	116	132	134	119	106	114	102	116	1447
Patients Discharged	133	120	128	119	123	127	141	121	102	111	106	118	1449
No. of Men	29	21	26	20	22	21	21	21	18	22	22	20	263
No. of Women	70	63	65	55	55	65	63	54	53	53	48	57	701
No. of Children	2		4	3	4	15	16	12	7	8	1	8	80
Newborn	45	34	40	31	35	31	34	32	28	31	31	31	403
Classified as:													
Newborn	45	34	40	31	35	31	34	32	28	31	31	31	403
Obstetrical	47	35	44	33	40	35	40	32	30	31	32	36	435
Medical	28	26	21	20	21	17	17	27	21	28	20	27	272
Surgical	26	23	30	25	20	49	43	28	28	24	19	22	337
Highest Daily Count	68	60	59	56	50	55	52	55	50	48	50	55	658
Lowest Daily Count	36	38	46	41	31	33	29	23	23	27	37	31	395
Daily Average	50.14	50.60	53.50	51.90	41.14	46.10	42.50	38.25	37.28	37.28	43.80	41.12	
Newborn Days	393	357	401	318	373	262	271	172	222	245	284	288	3586
Patient Days	1171	1049	1257	1221	912	1119	1036	1031	916	930	1014	995	12651
Total Patient Days	1564	1406	1658	1539	1285	1381	1307	1203	1138	1175	1298	1283	16237
Operations:													
Emergency Room	27	24	27	27	35	32	40	42	38	48	31	28	399
Major	15	8	9	11	5	13	9	6	9	8	10	1	106
Minor	5	16	17	14	22	27	32	18	13	10	6	6	236
General Anesthetic	14	12	10	15	11	25	33	22	17	8	13	6	186
Local Anesthetic	6	6	7	4	7	7	2	1	3	5	1	0	49
Ambulance Calls	16	10	12	11	6	13	10	5	11	15	7	10	122

Note: 66 deaths included in discharges.

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

NEGAUNEE DISPENSARY

The Negaunee Dispensary continues to serve as the medical center for our employees in the Negaunee District. It was formerly known as the Negaunee Hospital and is used by our doctors and nurses for district offices in the Negaunee District. At the present time there are approximately 1400 employees in the Negaunee District and most of them have their medical needs served through the Negaunee Dispensary. Regular visits are made to the Negaunee Dispensary two or three times a week. As pointed out previously, Dr. Mudge is the only doctor we now have in the Negaunee area. Dr. Sarven, who joined our staff a little over a year ago, has left for Henderson, Nevada.

The Negaunee Dispensary acts as a kind of emergency center for slight injuries. No hospital cases are taken care of in the Negaunee Dispensary. They are all taken to the Ishpeming Hospital.

GWINN HOSPITAL

Presently we have no medical representative in Gwinn. Mrs. Margaret Kemp, R.N. is acting as the visiting nurse in the district and she is called upon to take care of a great many cases of ordinary injuries and home calls. An effort is being made to secure a doctor for Gwinn.

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)REPUBLIC HOSPITAL

The building formerly used as a hospital at Republic and known as the Republic Hospital is now under the control of the Republic Township Board. Dr. Van Riper who cares for our medical needs in the area uses the Republic Hospital as an office and a health center. He makes daily trips to Republic and holds office hours there for the convenience of the Republic Township people.

We have had a request from the Township Board, through the Supervisor, Mr. Joseph Labold, to turn over the building to the Township Board--that is, to lease the building to them or to turn over the title to them. Some years ago the building was turned over to the Republic Improvement Association. This association never did function and at the present time the building is still in the name of the Republic Improvement Association, but Mr. Bell, our attorney, has been requested to give an opinion on the possibility of transfer to Republic Township. I believe it is best that the building be transferred to Republic Township.

The Republic Township Board now engages a nurse who is a married person and she makes her home in the hospital building. This trained nurse is on duty to assist the doctor and to take care of emergency cases. The arrangement seems to have been a good one as far as Republic Township is concerned.

IRON RIVER HOSPITAL

During the year 1943 three visits were made to the hospital at Stambaugh. This hospital sends us a monthly report and cares for the medical and hospital needs of our employees at the Spies-Virgil Mine at Iron River. This year the annual meeting was attended by Mr. Jackson and Mr. Haller since the Superintendent of the Welfare Department was in Southern Michigan at the time of the meeting of the Iron River General Hospital.

Dr. L. E. Irvine continues to provide medical attention for our Spies-Virgil employees.

PAYMENTS TO PHYSICIANS

For reference purposes the following statement is made in each annual report:

On August 1, 1927, a new rate of payment for the Cleveland-Cliffs Iron Company went into effect. The employees pay \$1.25 for medical services for themselves and the dependent members of their families and the Company pays 50¢ per man per month to cover medical and hospital services for cases coming under the Compensation Act.

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

PAYMENTS TO PHYSICIANS (Continued)

The rate of \$1.25 per man per month was continued through December, 1943. Commencing January 1, 1944 the new rate of \$1.50 per employee went into effect. The Company also increased its contribution for accident and injury cases coming under the Compensation Law from 50¢ per man per month to 75¢ per man per month.

PHYSICAL EXAMINATION OF EMPLOYEES

The contract with the Trudeau Foundation of Saranac, New York was in force throughout 1943 with the usual satisfactory results. The contract runs from November 1st to October 31st. The Employment Department makes regular schedules for physical examinations of employees for each working day and an effort is made to schedule at least twelve men for each working day.

Mr. Sidney Hodson continues in the position of technician for the Trudeau Foundation at the Ishpeming Hospital.

INDUSTRIAL HYGIENE DEPARTMENT

The Industrial Hygiene Department began to function on April 1, 1939. Dr. Waldie became the director on that date. Reference has been made in previous reports with respect to his background, training and experience. Dr. Waldie does a very fine type of work and he seems to get along very well with our employees. He has been with us long enough so that he has a rather intimate knowledge of the various types of special cases which come to his attention.

Special attention is given to special cases which require follow-up work. Dr. Waldie generally refers these cases to the regular family physician and a checkup is made from time to time to determine what progress is being made. Up to this time we have tried to arrange our program of examinations so that there will be as little loss of time as possible. In some cases where men are day shift all the time, it is necessary to examine and give some allowance of time as far as their work is concerned.

The following number of examinations have been made to December 31, 1943:

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

Cleveland-Cliffs Iron Company	15,610
Inland Steel Company	2,691
Republic Steel Company	1,653
Pickands Mather Company	144
M. A. Hanna Company	197
North Range Mining Company	1,232
Oliver Iron Mining Company	606
Calumet & Hecla Company	29
Marquette County Road Commission	10
Hercules Powder Company	139
	<hr/> 22,311

The manpower shortage has created quite a problem with respect to pre-employment examinations. Every new applicant who is being considered for employment is subjected to a rather thorough examination. We have reduced our standards somewhat during the past year. Thus far we have had no serious difficulties arise. The findings of the Industrial Hygiene Department are reported to the Welfare Department. In special cases, a conference is held with Dr. Waldie and sometimes with the superintendent or the head of the department concerned.

It is reported again that the establishment of the Industrial Hygiene Department was a very important step. We hear very little complaint on the part of employees regarding the Industrial Hygiene Department. Most of the employees recognize that this is a special service and they seem to be pleased to have this special service. Any employee is privileged to discuss with Dr. Waldie anything regarding his health and physical fitness. We do not, however, make it a point to make written reports following our examinations to our employees. If the examination is average and normal, no particular point is made of reporting to the individual. If, however, some defect is found, arrangements are made for follow-up with the regular family physician.

23.

k. COMMUNITY HEALTH

General health conditions in Marquette County during the past year have been above the average. There have been no serious epidemics nor has there been any great loss of time because of prolonged illnesses of any kind. During the winter we have had some evidence of influenza but it did not reach proportions which were alarming. Common colds still seem to be the greatest reason for loss of time. The granting of higher wages within the past few years, of course, shows up sometimes in what we term the after-payday influence.

Each city in the County of Marquette has a health officer and a full time school nurse. The county also employs a full time nurse who spends most of her time in the township districts. The city health officers in Marquette County are:

Ishpeming	-	Dr. N. J. McCann
Marquette	-	Dr. C. P. Drury
Negaunee	-	Dr. N. J. Robbins

The Michigan Children's Fund, which is financed by funds provided by the late Senator Couzens, carried on its dental clinic during the summer months and attention was given to many children, particularly in the rural districts.

The Bay Cliff Health Camp was in session for the ninth year during the past summer. All counties in the Northern Peninsula of Michigan are privileged to send a number of children for a six to seven weeks' camping period at Bay Cliff Health Camp at Big Bay in Marquette County. I have continued to serve as Chairman of the Board of Directors of the Bay Cliff Health Camp during the past year. Mr. Moulton formerly served in this capacity also. During the past summer approximately 175 children were cared for, including a number of poliomyelitis convalescent cases. During the past summer special attention was given to other groups, such as diabetic children, cardiac cases, and children with speech defects. The results of the program carried out at Bay Cliff Health Camp have been very gratifying.

WELFARE DEPARTMENT ANNUAL REPORT YEAR 1943.

23.

1. RED CROSS (Continued)

Report of Nurse
Marquette County Chapter
American Red Cross.

1.	Service to or in behalf of individuals:	
	A. Maternity Service:	
	1. Antepartum	37
	2. Postpartum	21
	B. Morbidity Service:	
	1. Acute communicable	98
	2. Other communicable	167
	C. Crippled Children's Service	54
	D. Health Service:	
	1. Newborn	8
	2. Infant	165
	3. Preschool	83
	4. School	247
	5. Adult	17
	E. Social Service	9
	F. Red Cross	9
	G. Unclassified	8
II.	Children given inspection by nurse	81
III.	Number of children excluded because of communicable diseases	82
IV.	Children completely immunized:	
	Diphtheria	241
	Smallpox	193
V.	Nurse Conference at school with	
	1. Parents	30
	2. Teachers	157
	3. Pupils	30
VI.	Demonstration to instruct teachers in	
	1. Class room inspection	27
	2. Vision Tests	11
VII.	Teachers assisted in planning school health program for year	20
VIII.	Children given special attention:	
	1. Examined at N.M. Children's Clinic	76
	2. Eyes examined	14
	3. Glasses repaired by Children's Fund	13
	4. Feeble Minded	3
	5. Dental care at Graveraet	2

WELFARE DEPARTMENT ANNUAL REPORT YEAR 1943

23.

1. RED CROSS (Continued)

6.	Hard of hearing	9
7.	Speech	4
8.	Psychometric exam	1
9.	Children conveyed to U. of M. Hospital at Ann Arbor	6
10.	Children brought back from U. of M. Hospital	2
11.	Hospitalized at St. Luke's Hospital	14
12.	Attended Bay Cliff Health Camp	9
	1. Rheumatic Heart	1
	2. Hard of Hearing	2
	3. Speech defect	1
	4. Undernourished	3
	5. Diabetic	2

IX. Clinics and Conferences:

1.	Immunization - 8 sessions.	
	a. <u>Diphtheria</u>	
	1st toxoid	217
	2nd toxoid	241
	b. <u>Smallpox</u>	193
2.	Physical Examinations:	
	a. Chocolay Tnsp Schools	106
	b. West Branch " "	32
	c. Skandia " "	23
	(Of these 8 had tonsils and adenoids removed during summer)	
3.	Orthopedic Clinic	13

X. Meetings attended:

Joint social agencies	2
County Red Cross	2
Health Education Conference at College	1
County Nutrition	1
Regional Public Health Conference, Iron Mountain	1
Home Nursing	2
Marquette District Nurses Association	8
Business & Professional Women's Club	9

XI. Interviews:

Physicians	22
Dentists	1
Nurses	12
Officials from Michigan Dept. of Health	5
Officials from " Crippled Children's Comm.	4
Officials from " Dept. of Special Education	2
Officials from Child Guidance Institute	2
Officials from Red Cross Office, St. Louis	1
County Red Cross members	10

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

1. RED CROSS (CONTINUED)

Interviews, (Continued)

Instructors in psychology and speech, College	2
Township Supervisors	4
School Board members	12
Lay helpers	31
Daily Mining Journal	5

XII. Special Projects:

Assisted with the examination of 4-H Club members at Camp Shaw.

Assisted with one Home Nursing class.

Taught one First Aid Class

Brought two nurses to our County High Schools in connection with student nursing recruitment program.

Made four trips to Bay Cliffs health camp; bringing children to camp and back home.

Brought two adults to Morgan Heights for chest X-rays.

XIII. Talks:

To class room children 15

XIV. Miscellaneous:

The physical examinations were conducted by Dr. Bottum. Materials used at the immunization clinics were furnished by the following:

- Smallpox vaccine and toxoid through the City Health Department.
- Syringes, sterilizer, sterile towels, and gauze by the Northern Michigan Children's Clinic.
- Needles, alcohol, and acetone by Marquette County chapter, American Red Cross.

Red Cross car was used by Mr. A. Bishop, Miss E. Knight for First Aid classes at Turin.

Marquette County Chapter, American Red Cross, has purchased four new tires and a new battery.

Due to dentists entering the armed forces no dental clinic was held this year.

Hours spent in office: 357.

Mileage: 16,683.

Respectfully submitted,

Emma C. Anderson, R.N.

County Health Nurse.

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

m. RELIEF WORK

We carried out our usual policy during 1943 in the extension of assistance to certain families who have shown special need either through illness, death, or some particular type of disability. During the year 1943 24 families were assisted, compared with 29 families in 1942.

The following is a statement of the assistance rendered:

	<u>Ishpeming</u>	<u>Negaunee</u>	<u>Republic</u>	<u>Gwinn</u>	<u>Marquette</u>	<u>Total</u>
January	\$ 142.92	10.83	23.45	95.27	10.30	282.77
February	132.05	40.53	14.13	25.75	10.30	222.76
March	151.78	3.72	54.97	50.20	10.30	270.97
April	142.96	15.46	23.45	71.50	9.55	262.92
May	132.87	45.05	23.45	75.75	10.30	287.42
June	124.08	7.73	23.45	45.75	10.30	211.31
July	121.30	11.45	26.25	40.75	10.30	210.05
August	88.56	61.45	38.90	80.75	10.30	279.96
September	125.58	20.00	----	35.00	----	180.58
October	112.47	59.53	97.37	60.75	20.60	350.72
November	190.89	153.33	23.45	101.50	10.30	479.47
December	<u>98.82</u>	<u>71.45</u>	<u>32.29</u>	<u>60.75</u>	<u>10.30</u>	<u>273.61</u>
	\$1564.28	500.53	381.16	743.72	122.85	3312.54
Number of families assisted	12	6	2	3	1	24
Average amount of relief per family						\$ 138.02

n. EMPLOYMENT

An effort is made to keep in daily touch with the Employment Office, in charge of Mr. H. W. Sundberg. Occasionally special cases have to be discussed and an effort is made to coordinate the activities of the Welfare Department with the Employment Department.

WELFARE DEPT. ANNUAL REPORT YEAR 1943.

23.

o. INCAPACITATED EMPLOYEES.

During the year payments have continued to certain men and certain families who originally did not have sufficient service to bring them within the provisions of the pension system. Donations were granted to those people. Some of those men had suffered some disability through accident, or through injuries at the mines, and there are some with large families who have become incapacitated.

Following is the list of families and the amount of the donations paid to them during the year:

	<u>Monthly Rate For 1943</u>	<u>Total Amount Paid During 1943</u>	
Fred Fredette	20.00	240.00	
Sam Metherell	14.40	172.80	
John Aho	14.40	172.80	
Andrew Niemi	16.60	199.20	
Edmund Durante	20.00	240.00	
Edward Van Langenhoven	20.00	240.00	
Donato Valenzio	20.00	240.00	
Fred Carlson	16.00	192.00	
Joseph Thomas	75.00	900.00	
William Ryan	25.00	300.00	
R. J. Chenneour	50.00 Jan-Feb.		
	55.00 Mar-Dec.	650.00	
W. H. Moulton	150.00	1800.00	
John Maki	25.00	300.00	
Charles Vincent	30.00	360.00	
Jacob Bietila	25.00	25.00	Died 1/21/43
Hilmer Lerlie	25.00	300.00	
John Scoble	30.00	30.00	Died 1/16/43
John Iskola	30.00	360.00	
John Eskel Carlson	30.00	390.00	Began 2/1/43
Mark Dixon	40.00	160.00	Began 9/1/43
		<u>\$ 7271.80</u>	

Payment to R. J. Chenneour was increased \$5.00 per month, beginning in March, 1943, to take care of his rent.

The first check to John Eskel Carlson was retroactive to December 1942.

HOLMES MINE DONATIONS.

Peter Lesage	20.00	240.00
Carl Jarvinen	16.99	203.88
Bernt Wiggen	20.00	240.00
Martin Trondson	20.00	240.00
		<u>\$ 923.88</u>

WELFARE DEPT. ANNUAL REPORT YEAR 1943

23.

o. INCAPACITATED EMPLOYEES. (Continued)

Donations to Widows.

	<u>Monthly Rate for 1943</u>	<u>Total Amount Paid during 1943</u>
Mrs. J. H. Tregoning	25.00	300.00
Mrs. Fiina Kampinen	25.00	300.00
		\$ 600.00

FURNACE DEPARTMENT DONATIONS.

These donations, after being granted, were paid by the Furnace Department itself, and later on by the Cliffs Dow Chemical Company. By directions from Cleveland on September 1, 1937, the donations have been paid from this office and the following payments have been made during the year:

John Schrandt	25.00	300.00
Mrs. George Cameron	20.00	240.00
Jacob Hill	20.00	240.00
Julius Olson	25.00	300.00
		<u>\$1080.00</u>

Amount of Donations paid to Incapacitated Employees	7271.80
Amount of Donations paid to Incapacitated Holmes Mine Employees	923.88
Amount of Donations paid to Widows	600.00
Amount of Donations paid to Furnace Department cases	<u>1080.00</u>
	\$ 9875.68

WELFARE DEPT. ANNUAL REPORT YEAR 1943.

23. o. INCAPACITATED EMPLOYEES (Continued)

Retirement Roll.

Fourteen new names were added to the Retirement Roll during 1943. Each case is carefully studied with the Superintendent of the mine and is finally referred to the Manager, and if the case is approved the name is added to the Retirement Roll. It has been the Company policy for a long time to give consideration to old and faithful employees. From time to time conferences are held with the employees and they are always encouraged to come in with their problems.

We find, in many of these cases, the Social Security benefits are still quite low. The Company supplements the Social Security benefits and also permits the employee to carry a portion of his group insurance. This privilege of carrying group insurance on the part of the older and retired employees means a good deal. Practically every individual who accepted retirement has also continued to carry the life insurance feature of his group insurance. This privilege is very highly appreciated.

Following is a list of men on the Retirement Roll during 1943, showing the monthly rate and the total amount paid:

	<u>Present Monthly Rate</u>	<u>Amount Paid During 1943</u>	
John Mattson	21.32	255.84	
Mrs. Anna Simo	40.00	480.00	
John Chiri	31.00	372.00	
James Christian	39.00	468.00	
Matt Hemmila	27.00	324.00	
Esten Peterson	33.50	402.00	
William J. Phillips	49.50	594.00	
Swen Lahti	12.31	147.72	
Anthony Mengorie	32.50	390.00	Died 12/27/43
David Reed	30.00	120.00	Died 5/ 1/43
Sam Roberts, Sr.	33.00	396.00	
Sam Sims	39.00	468.00	
Charles Abramson	46.50	558.00	
Thomas Berryman	35.00	420.00	
Victor Carlson	39.00	468.00	Died 3/11/43
Charles Larson	32.00	384.00	
Albin Lyman	47.50	570.00	
John H. Maki	39.00	468.00	
Lars Olson	36.20	434.40	
Hemming Silas	35.00	420.00	
Dave Spencer	32.00	384.00	
Joseph Villeneuve	31.00	372.00	
Henry Beale *	50.00	500.00	
John Hennessey	35.00	420.00	
Erick Soyrinki	13.81	165.72	
William T. Waters	20.00	240.00	
Fred L. Prudom	50.00	600.00	

23.

o. INCAPACITATED EMPLOYEES. (Continued)

Retirement Roll (Continued)

Charles Stevens	\$ 40.00	480.00	
Matt Mattson	10.00	120.00	
Henry Hendrickson	10.00	120.00	
William Kennaugh	10.00	120.00	
Anton Seagren	10.00	120.00	
John Bjerne, Sr.	10.00	120.00	
John Bergeson	10.00	120.00	
Herman Johnson	10.00	120.00	
John Johnson	10.00	120.00	
Rasmus Christenson	10.00	120.00	
August Wigg	10.00	120.00	
Otto Lindstrom	10.00	120.00	
John Chirio	10.00	120.00	
Simon Maki	10.00	120.00	
Abram Lahtinen	10.00	120.00	
Frank Martin	10.00	120.00	
Gust Palomaki	10.00	120.00	
C. A. Steede	10.00	120.00	
John Walimaa, Sr.	10.00	120.00	
Herman Aho	10.00	120.00	
Alex Boz	10.00	120.00	
Peter E. Nelson	10.00	120.00	
John Cox	10.00	120.00	
Joseph Grevious	10.00	120.00	
Gust Holmgren	10.00	120.00	
Chris Stone	10.00	120.00	
Otto Franson	10.00	120.00	
Michael McNemara	10.00	120.00	
Otto Schadt	10.00	120.00	
Arsene Tousignant	10.00	120.00	
Edwin Harper	10.00	120.00	
William F. Worth	10.00	120.00	
William C. Mitchell	10.00	110.00	Died 11/14/43
Peter Coron	10.00	120.00	
George Young	10.00	120.00	
Thomas Atwell	10.00	120.00	
Joseph Bollero, Sr.	10.00	120.00	
Swan Anderson	10.00	120.00	
Henry Hyvonen	10.00	120.00	
Henry Knudsen	10.00	120.00	
Anthony Lavelle	10.00	120.00	
Noah Morin	10.00	120.00	
Godfrey Larson *	10.00	100.00	
Antti Pasonen	10.00	120.00	
Helmer Solem	10.00	120.00	
Frank Velin	10.00	120.00	
Herman Alanko	10.00	120.00	

23. o. INCAPACITATED EMPLOYEES (Continued)

Retirement Roll (Continued)

Thomas Graham	10.00	120.00	
Charles Roseveare	10.00	120.00	
Thomas Welsh	10.00	120.00	
Emanuel Stephens	10.00	120.00	
Henry Heiser	10.00	120.00	
Joseph Menzer	10.00	120.00	
Noah Hares	10.00	120.00	Died 12/28/43
William J. Pascoe	10.00	120.00	
Fred Holm	10.00	120.00	
John Karhi	10.00	120.00	Began 1/ 1/43
Joseph Yopic	10.00	120.00	" "
Victor Lindberg	10.00	110.00	" 2/ 1/43
Andy Nelson	10.00	130.00	" "
William J. Hill	10.00	100.00	" 3/ 1/43
John Freethy	10.00	90.00	" 4/ 1/43
Richard C. Carlyon	10.00	90.00	" "
William Pearce	10.00	90.00	" "
Samuel Roberts	10.00	80.00	" 5/ 1/43
Jonas Koskela	10.00	60.00	" 7/ 1/43
A. H. Tillson	10.00	40.00	" 9/ 1/43
Querino Biziali	10.00	40.00	" "
Charles Pascoe	10.00	30.00	" 10/ 1/43
John P. Treloar	10.00	30.00	" "

\$ 18650.68

Minus refund of check
John K. Johnson-
issued 12/1942-died 12/1942

8.62

\$ 18642.06

* Henry Beale and Godfrey Larson worked at the Ishpeming Hospital during the months of September and October 1943 and therefore were off the Retirement Roll for these two months.

23.

p. COST OF LIVING

A study of living costs during the year 1943 indicates that there has been an increase. Occasionally prices are checked locally and comparisons are made with other parts of the state and with the charts which are provided by the Federal Department of Agriculture and the State Department of Social Welfare. Using an index number of 100 as the basis for costs in early 1939, we estimate that on that basis living costs have advanced as follows: Food (on the basis of index No. 100), 145; shelter, 110; clothing, 125; fuel, 120; light, 100; house furnishings, 125.

A recent report issued by the Michigan Department of Labor and Industry uses Marquette City as one of seven industrial cities in Michigan and compares costs. I quote from that report: "The index used in September of 1941 was on the basis of 100. This is for general purposes. In December of 1942 this general index had increased to 113.1. In September, 1943 it had increased to 116.4 and in December, 1943 it had increased to 117.2". On the basis of 100 as the index in September of 1941 this report lists the food index of December, 1943 in Marquette as 130.6; the clothing as 117.2; rent as 100; fuel, electricity and ice, 106.2; home furnishings, 109.5. There is evidence that the cost of living has not increased as much between September, 1943 and December, 1943 as it did between the same months in 1942.

Occasionally we make inquiries among local merchants regarding general business conditions. It has been interesting to note in the City of Ishpeming during the past few years that three of the real old established mercantile businesses in the city have gone out of business. They are the A. W. Meyers Mercantile Company, the Koski Store Company, and the E. A. Johnson Company. These establishments were in business in Ishpeming for over forty years. It is also interesting to note that within recent years the chain stores have had considerable effect on the older institutions. There is now in Ishpeming an A&P Super Market and a National Food Store. There is also a J. C. Penney store which occupies the best business location in the city. In Negaunee the Cashway and A&P stores have come into the picture. At Gwinn we have a Cashway store in one of the store spaces in the Gwinn Hotel building. There seems to be no question that the establishment of the chain stores have made it difficult for some of the old established businesses to continue. In fact, as pointed out, three of them have gone out of the field entirely.

Merchants have reported from time to time that general conditions are good. It appears that people, because of their new earning power, have also acquired new tastes. Several merchants have informed me that people are looking for the better qualities of goods and they are willing to pay the price. It is very evident that good grades of food are being purchased and home furnishings are also being purchased. Automobiles, of course, cannot be purchased at this time. Undoubtedly some of this money is going into other channels. It is also noticeable here that the general liquor business is a very thriving one.

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23. p. COST OF LIVING (Continued)

Bank Deposits

During the year 1943 bank deposits increased approximately 15%. A check was made with the Miners' First National Bank in Ishpeming and Mr. Jeffery, the cashier, reports that this is the situation with respect to that institution. It is also reported that bond buying has increased in rate. The increase in deposits and bond buying is evidently the result of the higher wages which are now paid. It is also true that certain commodities which normally would be purchased are not now available, such as refrigerators, washing machines, electrical equipment, and automobiles. The money that would normally be used to purchase these commodities is undoubtedly being placed in savings accounts and in war bonds.

A summary of bank debits, released by the Federal Reserve Bank of Minnesota, shows that in the Upper Peninsula February, 1944 debits were 28% above February, 1943. Bank debits represents money drawn by depositors from their checking accounts to purchase goods and to pay for services, debts, etc. The figures for eighteen Northern Peninsula cities are as follows:

	<u>February 1944</u>	<u>February 1943</u>
Bessemer	\$ 750,000	545,000
Calumet	2,469,000	1,313,000
Crystal Falls	494,000	388,000
Escanaba	5,671,000	4,469,000
Hancock	2,437,000	1,478,000
Houghton	2,249,000	1,576,000
Iron Mountain	3,901,000	2,815,000
Iron River, Stambaugh	1,661,000	1,565,000
Ironwood	2,526,000	2,139,000
Ishpeming	1,546,000	1,664,000
L'Anse	872,000	530,000
Manistique (1 bank)	620,000	405,000
Marquette	5,616,000	3,886,000
Menominee	4,209,000	2,909,000
Negaunee	1,767,000	1,334,000
Norway	383,000	366,000
Sault Ste. Marie	3,757,000	4,751,000
South Range	415,000	235,000
Total	\$41,343,000	\$32,368,000

23. p. COST OF LIVING (Continued)

Housing

There is practically no change in the housing situation in Ishpeming and Negaunee. Good average homes are scarce and during the past year there has been practically no building. Conditions have changed somewhat in the City of Marquette where a number of homes and apartments are available. Presently, both in Ishpeming and Negaunee, it is very difficult to secure living quarters.

Relief Situation

During the past year Marquette County has had a very low relief case load. The average for the year is about 110 cases per month and this indicates very little change from the previous year. The low case load is the result of the fact that more people are employed today than have been employed regularly for a great many years. The people on public relief rolls today are either not employable at all, or employable only during the summer months. The average age is about 60 years, which indicates that most of these people are too old for any kind of employment.

The number of aged persons in Marquette County receiving Old Age Assistance from the State Social Welfare Commission increased from 655 in 1942 to 718 in 1943. The average Old Age Assistance grant in Marquette County during 1943 amounted to \$26.38 per month. The number of cases of Aid to Dependent Children, formerly called Mothers' Pensions, dropped from 131 cases in 1942 to 124 cases in 1943. The average grant per case in Marquette County for the year amounted to \$50.18. During the year, 11 persons in Marquette County were recipients of Aid to the Blind and the average grant amounted to \$28.95.

General conditions in the community, I believe, are above the average and the great majority of employees of the Cleveland-Cliffs Iron Company appreciate the fact that working conditions and living conditions are above the average. While there has been some increase in absenteeism during the year, this problem has not become a real serious one. It appears that most of our employees are eager to work regularly and to take advantage of the higher wages now being paid. Visits are made at various times during the year at various meetings throughout the district and to the schools, and there is practically no evidence of under-nourishment or lack of proper clothing. In some of the schools milk is provided at a small price and in certain cases where children are not able to purchase the milk, it is provided by the boards of education. Some schools also provide vitamin capsules free of charge.

A good many people who contact this department throughout the year mention the fact that they are impressed by the appearance of the towns and by the atmosphere which surrounds the industry as far as the employees are concerned.

23.

p. COST OF LIVING (Continued)

During the past few years, of course, the influence of organized labor has had a very definite effect upon the thinking and actions of some individual employees. This, I presume, is to be anticipated and expected because of the definite effort on the part of organized labor to spread information and propaganda.

q. IMPROVEMENT WORK

Mr. Julien Payen has continued throughout the year to be in charge of the improvement work and the care of all grounds and properties in the district. All the buildings and the grounds surrounding our property, including the mines, the offices, the hospital, and the shops, present a neat and tidy appearance. It is felt that this has a good influence upon morale in general.

r. WELL KEPT PREMISES

During the year 1943 the Best Kept Premises and Vegetable Gardens Contest was held as in previous years. This contest was established by Mr. Mather a good many years ago and it has been continued with slight interruption throughout the years. We had 136 entries in the contest this year. The visits to the various homes of our employees who entered the contest were made during the second and third weeks of August and we were assisted in the judging of the premises and the gardens by Mr. Payen, who usually acts as chairman, and Mrs. E. E. Bjork of Gwinn. Cash prizes to well over \$500.00 were distributed.

We always see many fine gardens and well kept homes and premises in all parts of the district. Gwinn continues to have the outstanding gardens, although this year we had a number of very excellent gardens in the city of Negaunee. The Italians seem to be the best gardeners. At any rate, they enjoy the greatest returns from their garden activities. We are making our plans for the conducting of the best kept premises and garden contest for the coming year, 1944.

s. COMMUNITY SERVICE WORK

The American Legion building in Ishpeming, formerly the old hospital, continues to serve as the center for all Legion activities and for various other

23. s. COMMUNITY SERVICE WORK (Continued)

community activities. The Legion rents the building, maintains it and keeps it in good condition. My attention has been called to the fact, however, that if this building is to be continued in use, some attention will have to be given to the foundation since it appears the walls of the foundation are breaking due to the fact that the building is in what was formerly a swamp area.

The American Legion Club in Negaunee has been continued for the usual purposes. This year the Negaunee Legion has had a larger membership and they seem to be getting along a little better. The building is being given better care than it formerly was given and since the repairs made in 1942 by the Company, the Legionnaires have kept the building in good condition.

Mention is made in a previous paragraph in this report regarding the Ishpeming Y.M.C.A. We should also mention in this connection that the recreation area which has been started by the City of Ishpeming has had no additional development during 1943. There is some thought that additional development of the recreation area can again be undertaken after the duration of the war.

A number of fraternal organizations in the cities of Ishpeming and Negaunee maintain their own club rooms. Because of the number of organizations maintaining club rooms the social life, as far as the contribution made by fraternal organizations in the two cities, is amply provided for.

t. SATURDAY NOON LUNCHEON CLUB

Our Saturday Noon Luncheon Club has had fewer meetings in 1943. Previous to his retirement, Mr. S. R. Elliott called the Executive Club together occasionally in the assembly room on the third floor of the office building for discussion of mutual problems. Mr. Stakel has continued this practice. It should be pointed out that it is rather difficult to meet at the Mather Inn in the usual way because of the fact that there has been a shortage of labor at the Inn and it is not always convenient for the management to serve a meal.

u. OUTDOOR ACTIVITIES

The usual winter activities, particularly winter sports such as skiing, skating, snowshoeing, and hiking, have been less evident this winter due to the fact that we have not had the normal amount of snow. The Ishpeming Winter Sports Club continues as a center for sport enthusiasts for the district and from time to time special programs are provided on the ski hills and trails in connection with the Winter Sports Club. The lack of snow has had a considerable effect upon the usual winter sports activities.

23. u. OUTDOOR ACTIVITIES (Continued)

The annual ski tournament, which is generally held on February 22nd and which is one of the outstanding events of its kind in the region, was held again during 1943. The ski tournament has been an attraction for over fifty years and every year on Washington's Birthday thousands of people are attracted to Ishpeming for this outstanding ski jumping event.

Four years ago the City Council of Ishpeming selected a recreation commission. This commission is continuing its work in connection with the recreation problems of the community. An effort is being made to outline a program and a plan which will look forward to the recreation needs over a period of years. The commission has in mind the planning of an Ishpeming recreation area which will be a complete unit, providing for all types of recreation, both summer and winter.

The Mather Inn

The Mather Inn continues to be the most popular hotel in the Northern Peninsula of Michigan. The hotel has enjoyed good patronage throughout the year and extended use has been made of the facilities of the Inn for various types of conventions and meetings.

w. VARIOUS DEPARTMENTS AND ACTIVITIES

I wish to place in my annual report a statement regarding special activities throughout the year. I have again acted as Chairman of the State Social Welfare Commission which meets monthly in Lansing and which is the governing and policy-making board for all matters dealing with direct relief, Old Age Assistance, Aid to Dependent Children, Aid to the Blind, homes for transients and homeless people, child welfare services, and matters dealing with waywardness and delinquency of juveniles. I have served as Chairman three years out of the past five.

Other activities during the year are the following: Chairman, Bay Cliff Health Camp which is a summer camp for children at Big Bay, Michigan; Chairman of the Preparedness Relief and Disaster Committee of the American Red Cross; member of the Michigan Child Guidance Institute; Director, Marquette County Branch of the Michigan Tuberculosis Association and Vice Chairman; Director of the Michigan Welfare League; member, Michigan Delinquency Prevention Council; Director of the Michigan Society for Crippled Children, Inc.; member, Upper Peninsula Law Enforcement Association; Chairman of the Health and Welfare Committee of the Office of Civilian Defense of the State of Michigan. These activities work in very well with the average work of a welfare department.

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23. w. VARIOUS DEPARTMENTS.

LAND DEPARTMENT.

COMPARATIVE STATEMENT OF GENERAL WELFARE EXPENSES

FOR YEARS 1940,-1943 INCLUSIVE.

<u>General Welfare Acct. No. 11.</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>
A-2 Prop. charged by Treas.	300.00	300.00	300.00	300.00
11-F Miscellaneous Expenses	240.00	230.00	150.00	240.00
	\$ 540.00	530.00	450.00	540.00

Donations

Munising Fire Department	10.00	10.00		
U. P. Development Bureau	500.00	500.00	500.00	500.00
Munising Hospital Benefit Dance	2.00			
Mather High School- Munising				20.00
American Red Cross				550.00
	\$ 512.00	510.00	500.00	1070.00

Compensation.

a. Funeral expense				
d. Legal Expense				
g. Medical Expense.				
l. Monthly payments to doctors	406.62	465.52	421.35	407.77
h. Compensation				

Compensation - Logging Operations.

Medical and Hospital	1185.29	16.50	17.02	91.50
Compensation payments	3759.29	5680.12	3836.56	4800.55
Percentage of payroll	5.2	5.5	3.3	4.7

WELFARE DEPT. ANNUAL REPORT YEAR 1943.

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w. VARIOUS DEPARTMENTS (Continued)

LAKE SUPERIOR & ISHPEMING RAILROAD COMPANY

COMPARATIVE STATEMENT OF GENERAL WELFARE EXPENSE

YEARS 1940 to 1943, INCLUSIVE.

<u>Donations:</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>
Fire Department	25.00	19.90	--	5.00
Community Chest Fund-				
Marquette, Negaunee & Ishpeming	287.50	400.00	300.00	575.00
American National Red Cross	<u> </u>	<u> </u>	<u> </u>	<u>200.00</u>
	\$312.50	419.90	300.00	780.00
Pensions	<u>2889.69</u>	<u>2420.00</u>	<u>5255.00</u>	<u>5700.00</u>
	3202.19	2839.90	5555.00	6480.00
<u>Compensation:</u>				
Compensation paid	493.20	2402.41	3590.26	2386.48
Medical Expense	857.02	2240.76	931.86	1180.34
Percentage of payrolls				
acct. compensation payments	.0007	.0029	.0039	.0025

23.

x. POLICE DEPARTMENT

The Police Department is in charge of Chief Robert J. Veale. This department comes under the supervision of the Welfare Department and conferences are held with Chief Veale almost daily. Mr. Veale is in direct charge of the patrolmen and their activities. He submits a monthly report and gives attention to the various requests which are made from this office.

As pointed out last year, our Police Department is now a uniformed unit and we have tried to place special emphasis on the selection of men for their capacity as police officers and we have tried to get away from the old policy of using older men in their declining years as members of the Police Department. It is felt that we now have a very good industrial police force.

y. APPRECIATION

The work of the Welfare Department during 1943 has gone along very smoothly in spite of the fact that there have been a good many additional things to consider. I wish to record in this report my appreciation for the cooperation and the understanding which have always been evident on the part of Mr. S. R. Elliott, retired Manager, and Mr. C. J. Stakel, Manager. It is also my desire to record my appreciation for the cooperation which has been received from Mr. Stromquist, Safety Director, and Captain Rogers, his assistant. The Welfare Department is eager to cooperate with the Safety Department and we have had excellent cooperation throughout the year.

I wish also to include in my annual report a word of appreciation for the splendid help and assistance of Mr. W. E. Johnson, our Compensation Agent, and his assistant, Mrs. Mabel Quayle. New demands this year have made it necessary for me to place more and more responsibility upon Miss Mary Ryan, our office receptionist, and Miss Emily Nicholas, my secretary. The cooperation of Miss Ryan and Miss Nicholas throughout the year has made it possible for the work to go on without interruption and a separate word of appreciation is entered here in behalf of Miss Ryan and Miss Nicholas.

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ATHENS MINE

On December 2nd considerable difficulty was encountered when the field piece of the 900 H.P. direct current skip hoist motor slipped on its base plates and forced the armature against the brushholders. Hoisting was continued until Sunday by loosening the brushholders and grinding the tips of several holders to clear the commutator. When, on Sunday morning December 5th, the field piece was jacked off its base it was discovered that the cast iron base plates had broken around the dowell pin holes. New dowell pin holes were drilled in the heavier casting and the motor properly shimmed for correct clearance.

After a pump cable failure which caused considerable delay when it opened the main substation switch, separate protection for these cables was provided. This protection consisted of a 300 ampere circuit breaker, with the necessary transformers and relays. Installation of this protective equipment was completed on February 15, 1943.

While cleaning up slip rings and brushes on the #2 400 H.P. Prescott pump motor, a bad bearing was discovered. The motor was taken apart, completely cleaned and the bearings sent to the general shops for repairs. This work was done during March.

On May 30th part of the reversing and contactor control in the skip hoist controller was changed from cylinder and finger to cam operation. This was done by W. A. Baxter of the General Electric Company.

An automatic water level control was installed on the #2 surface well pump during the month of June.

The pole line carrying the pump cables and signal cables from engine house to the shaft was rebuilt during the month of September.

On account of the poor condition of wood runners in the circular portion of skip road the rope speed of the skip hoist has been reduced during the past several months. This rope speed is now set at 1285 feet per minute or 51 RPM drum speed. The last change was made on November 10, 1943.

CAMBRIA-JACKSON MINE

The 40 H.P. centrifugal pump motor on the 5th level of this mine was in bad condition when the mine was taken over by our company. The motor finally burned out, was completely rewound in the shops and returned to the mine June 23rd.

The locomotives in this mine were in very poor condition. It was, therefore, decided to take them out one at a time to be sent to the shops for repairs. One Goodman locomotive was taken out and sent to the shops on July 5th. After experiencing much difficulty in obtaining parts for this work, one locomotive was rebuilt and taken to the 7th level and the second is now in the shops.

After considerable trouble and some delay in the haulage set up at the mine, caused by poor bearings and motor coil burnouts on the motor generator set, plans were made to rebuild the old spare M.G. set installed in the large building formerly used as the main engine house. This spare set consisted of a 150 K.W. General Electric 250 V.D.C. generator and a Crocker-Wheeler 150 H.P. alternating current induction motor. The motor was too small for the load and was replaced by a 250 H.P. 600 R.P.M. General Electric motor formerly used on the Stephenson mine Prescott pump. This set is now running and known as the #2 haulage set.

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CAMBRIA-JACKSON MINE (Cont'd.)

A complete set of coils were ordered for the #1 haulage set motor which will be rewound in our shops.

CLIFFS SHAFT MINE

The hoisting was interrupted on February 1st when a connection on the rotor circuit of the hoist motor of the B shaft hoist burned off. Repairs were made from 6:15 P.M. to 4:20 A.M.

Ammeters were placed on the engineers operating platforms for A and B shaft hoists in an attempt to better control the current peaks and seems to be quite effective.

On May 5th the shaft limit switch cable broke down, causing a break in the Lilly hoist control latch coil circuit. This was repaired during the night without any serious delay.

The lower tram controls in the crusher house were changed to a new location in the southeast corner of the building. Open wiring on lighting and controls was also changed to rigid conduit.

A pump cable failure occurred in the #1 cable in A shaft on February 6th. The cable was burned near the collar of the shaft and approximately 30 feet of this cable was replaced with new 2/0 size. This work did not cause any delay as the #2 cable carried the load while repairs were made.

Several breakdowns in the winding of the motor on the 100 K.W. haulage motor-generator set have occurred during the year. Five coils have been cut out of the motor winding and a new winding has been ordered.

The magnetic brake on the crusher tram hoist was out of order on April 26th due to burnout of coils. Laminated core and brake bands were adjusted and repaired. Two coils were ordered and a spare brake band made.

The 250 H.P. Westinghouse motor and across the line starter for the new centrifugal pump was installed and given a trial run in the month of July.

LLOYD MINE

After experiencing trouble with commutator on the 15 H.P. direct current motor on ventilating fan on the 4th level it was found that the commutator insulation had broken down. A scraper machine motor was revamped to do this job while the regular motor was repaired during January. There was no delay in production since changes were made on Sundays.

The #2 compressor motor at this mine was taken to the shops for repairs to the rotor bars and bearings. At the same time a new tie ring was made and all stator coils properly tied. This job was done in January with no delay to operations.

When ropes were lengthened on the skip hoist it was learned that the dial set up and travel of the Lilly hoist controller did not have the proper range for the added depth of the shaft. It was therefore decided to purchase new type D Lilly controllers for skip and cage hoists. These controllers were received and installed before August 1st.

The cage hoist primary contactor panel stripped a keyway, breaking the shafting which supports the laminations and movable contacts. This caused a delay to hoisting operations of 3 hours on August 13th while repairs were being made.

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LLOYD MINE (Cont'd.)

The burning of the low voltage contactor and coil on the cage hoist panel caused a delay from 8:20 A.M. to 1:30 P.M. on September 14th. A similar coil, with some relay contacts, was found in the old Lake Mine storage which served until replacement parts were received and permanent repairs made.

One of the General Electric LM-2T6-LL locomotives was sent to the general shops for repairs in October and is now in the blacksmith shop.

MAAS MINE

During a lightning storm on the night of May 5th a portion of the winding was burned out on the #2 compressor motor. This necessitated stopping the motor from 10 P.M. to 7 A.M. in order to temporarily repair the stator winding. One coil had been cut out of this winding previously and this motor is now running with five coils out.

For a period of several months trouble was experienced due to breaking of coils on the 350 H.P. General Electric centrifugal pump motor. It was finally decided to send this motor to the General Electric Co. shops to be rewound and shipment was made on June 30th. While this motor was out the mechanical department decided to take the centrifugal pump out of service due to its worn condition. When the rebuilt motor arrived it was installed at Negaunee Mine 3rd level pump house to replace an identical motor which had not been giving satisfactory service at that point. The 350 H.P. centrifugal pump motor which was taken out of service is now in fair condition and stored in Negaunee storage buildings.

The cooling coils in the liquid rheostat for the skip hoist control sprung a leak on November 11th which required the installation of a drain pipe to keep the tank from overflowing. The dilution of the liquid in the tank necessitated replenishing of the solution to keep the hoist running until the following Saturday night and Sunday, when new piping was put in and the copper coils repaired. There was no delay in hoisting operations.

MATHER MINE

Due to a partly open valve on the slip regulator of the cage hoist motor-generator set its solution was drained too low, causing a flashover, burning some of the electrodes. This burning was not serious and repairs were made in about 4 hours the afternoon of January 18th. The drain valve on this tank has been so arranged that this difficulty is not likely to occur again.

While hoisting operations are comparatively light it was decided to leave the cage hoist motor-generator set stopped and run both skip and cage hoists at a lower voltage and slower speed, powered by only the skip hoist M.G. set. This arrangement has prevailed since March 8th.

Installation of photo electric relays in each skip way at the 1750 foot level loading chute in position to signal to the skip tender when skip is properly spotted was completed and tested November 28th. This equipment consists of 4 photo electric relays, each mounted in an enclosure with removable front door, also small transformers and reflector units with 6 volt lamps mounted in separate enclosures. This equipment is working out very well and other than cleaning, the only attention required over a two months period was the change of one burned out lamp.

During the month of April four 6 ton locomotives, complete with batteries and two extra batteries, were taken underground, two on the 1600 foot level and two on the 1750 foot level. The motor-generator sets for charging these batteries were also set up at this time.

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MATHER MINE (Cont'd.)

On April 8th the permanent mine signal cables were extended to the 1750 foot level. One power cable was extended to the 1900 foot level April 26th and another to 1900 feet on April 28th. Cable #1 supplies the power at 2300 volts for substations underground, plus the main pumping equipment. Cable #2 is connected to 150 K.V.A. transformers in the engine house basement and supplies power at 440 volts for opening the 2050 foot level and 440 volt skip pit pump. These cables are 3 conductor, 350,000 circular mills with 5000 volt insulation and ultimately will carry electric power into the mine at 2300 volts A.C.

A breakdown occurred and was followed by a flashover that burned the D.C. breaker and parts of the panel for the 150 K.W. direct current generator in the engine house. This breaker and switch set up is completely enclosed with insulating board and steel. The complete unit was manufactured by the Westinghouse Elec. & Mfg. Company and was installed to furnish power for the surface D.C. equipment, including the top tram Larry cars. The Westinghouse Company are now preparing the necessary equipment to prevent further difficulty with this panel and breaker.

After several interruptions caused by poor contacts in the cylinder and finger construction of the main controllers of the skip and cage hoists, the matter was brought to the attention of the General Electric Company. During the month of May the necessary material was shipped to the mine to revamp these controls for cam operated contacts. This work was completed on May 29th and 30th by Mr. Baxter of the General Electric Company.

Mr. Baxter has also made several changes in amplidyne control panels, contacts, resistors, condensers, etc. largely in an effort to accomplish a better coordination of electric power and mechanical braking under all emergencies created by overwind, overspeed or power failure.

NEGAUNEE MINE

The rewinding of the spare armature for the 500 H.P. skip hoist motor which was started in December 1942 was completed on February 21st. This work was done by a Westinghouse service man and two of our shop men during the period December 18, 1942 to February 21, 1943.

The #2 haulage set was taken apart on May 31st after considerable difficulty with the D.C. field coils of the 220 H.P. synchronous motor. The tests on two of the field coils after being taken out revealed shorted turns. These coils were repaired in the general shops and the motor put in condition after about one week shutdown. This job did not delay mining operations.

The shaft house and trestle lighting was rebuilt during the summer. All lighting circuits, including flood and all other lighting purposes, are now 115 volts.

Difficulty was encountered which caused considerable delay in the hoisting when one of the contactor coils opened intermittently on the skip hoist panel. The first stoppage occurred on September 31st for about 2 hours. After several interruptions the coils were shifted from one contactor to another in an effort to find the open circuit. Several coils were finally replaced with new ones from the Westinghouse Elec. & Mfg. Co. Spare coils of this type are now kept on hand in the engine house.

PRINCETON MINE

The haulage system at this mine has not been entirely satisfactory during the past year. One of the principal causes of trouble can be attributed to the small copper conductors used for the necessary long distance transmission of power at 250 volts.

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PRINCETON MINE (Cont'd.)

In an attempt to carry on under these conditions, the 100 K.W. motor-generator set was used almost continuously instead of the synchronous convertor. The voltage at the machine was raised to 280 volts with the overload circuit breaker set at 700 amperes. This arrangement worked without interrupting the service for some time until a high resistance short near the end of the 7th level built the load up to a point just below the protective setting of the D. C. breaker. This caused an overheating of the 215 H.P. synchronous motor and burned out the winding. The motor has been rewound and is now running.

Work is now under way to double the copper capacity from the feeder panel in the engine room to #3 shaft. Another 4/0 cable will also be installed in #3 shaft with further extension of double trolley feeders about 1800 feet on the 6th level, a feeder bus for parallel operation of generator and convertor, with the installation of a circuit breaker on the mine load which will trip without interfering with the parallel operation of these machines.

A completely rebuilt set of resistors were sent to the Princeton Mine #2 engine house to replace the grids now used on the control of this skip hoist. The present resistor bank developed a number of hot spots and open connections during the summer. The new set of grids are now on the engine house floor at the mine waiting for an opportune time to make this change.

SPIES-VIRGIL MINE

The installation of the cage hoist at this mine was completed and given a trial run on November 30th. Many difficulties and delays were encountered in this work on account of slowness of deliveries of materials. The primary and secondary contactor panels with oil circuit breaker and panel were taken from the Republic Mine from the 1000 H.P. hoist formerly used at this mine. The equipment needed some parts and repairs, some of which were taken from various mines using similar equipment, other parts were ordered from the General Electric Co. The resistors for the controls, backing out switch and the master controller were ordered for this job from the General Electric Co. on April 29th, received November 18th.

A rebuilt Lilly hoist controller, formerly used on the Lloyd Mine cage hoist, was also installed on this job, was tested and approved on January 10, 1944.

Due to a break in the rotor circuit of the 400 H.P. skip hoist motor at this mine about 9 P.M. June 29th, the hoisting operations were stopped from that time to 6:30 A.M. of June 30th. The men in the mine at this time came out by way of the ladder road. The motor was repaired on the job. New insulating tubes and washers have since been made and installed in slip ring assembly.

Some difficulty was also encountered in the movement of cables in the shaft while the shaft repairs were in progress. Two breaks occurred in the #4 3-conductor pump cable. This cable is now connected to subway box in new concrete enclosure near shaft house and has two splices in the shaft. This is a 2300 volt circuit and is used on transformers and pumps for the upper levels.

The main 2/0 2300 volt 3-conductor cable is also connected in this subway box near the shaft. This cable seems to be in good condition and is the power cable for the main pumps at the 1200 foot level. An overload circuit breaker of 300 amperes, 5000 volts, with panel was taken from Republic Mine and installed in the engine house for the protection of these pump cables. A new cable of 2/0 size, 3-conductor, 2500 volts, was also installed in a conduit from the engine house to the shaft.

Work on cleaning up and repairing pump motors and switches at this mine is now progressing satisfactorily.

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SPIES-VIRGIL MINE (Cont'd.)

Several new junction boxes for the signal system have been sent to the mine and also several hundred feet of second hand signal cable in good condition from the General Storehouse. Rebuilding this signal system will be under way as soon as possible.

During September 800 feet of 4/0 concentric haulage cable was shipped to the mine to reinforce the present shaft cable which is also 4/0 concentric. In anticipation of the requirements on the new drifting operations, combination feeder and trolley clamps have also been ordered for the proposed double 4/0 feeder in this drift.

22. REPORT OF GEOLOGIST FOR THE YEAR ENDING DECEMBER 31, 1943

A. STAFF

The staff of the Geological Department for the year 1943 is shown in Table I below.

TABLE I.

<u>Name</u>	<u>Occupation</u>	<u>Hours Lost</u>		<u>Hours Overtime</u>	<u>Net % Hours Worked</u>
		<u>Sickness</u>	<u>Absence</u>		
E. L. Derby, Jr.	Chief Geologist	14½	54½	145½	103.8
Burton H. Boyum	Asst. Geologist	7¼	79½	--	95.7
Maxwell H. Madsen	Asst. Geologist	(See Annual Report of Eng'g. Dept.)			
Archie Minnear	Draftsman	25¼	79½	--	94.9
E. A. Allen	Sampler	--	32¼	--	98.4

Mr. Maxwell H. Madsen joined the Engineering and Geological Departments on September 8, 1943. Before joining the Company, he was employed by the War Department as a Junior Mechanical Engineer for a period of six months. He was graduated from the University of Minnesota in 1942 as a Mining Engineer. He has been engaged for the express purpose of training him to do both the engineering and geological work at the Cliffs-Shaft Mine. Because the major part of his training, for the time being will be in the engineering field, his time and activities to-date will be found in the Annual Report of the Engineering Department.

The year was divided into the factors shown in Table II, below:-

TABLE II.

Total Working Days	281½ days (2034¼ hours)
Sundays	52 "
Full days resulting from Saturday afternoons	26 "
Holidays	5½ "
Total	365 days

Table III, below, shows the average number of men regularly employed on a full time basis on the staff of the Geological Department during the past five years:-

TABLE III.

<u>Year</u>	<u>Average Number of Men</u>
1939	4.0
1940	3.9
1941	4.5
1942	4.0
1943	4.2

In the above table, only one-half of Mr. Madsen's time from September 8, 1943 to December 31, 1943, inclusive, has been included. The balance was taken up in the Engineering Department.

Acceleration, due to the War effort, has directly affected every phase of the work of the Geological Department. As seen from the table above, the average men employed has changed very little in the past five years. As a result, the work of the Department is considerably behind schedule. We are trying to correct this by adding to the personnel but so far have been unable to find suitable prospects.

B. GENERAL CLASSIFICATION OF THE WORK OF THE DEPARTMENT

The work of the Geological Department was divided between the various mines, explorations and miscellaneous items shown in Table IV, below:-

TABLE IV.

<u>ITEMS</u>	<u>HOURS WORKED</u>	<u>PERCENT</u>
<u>MINES</u>		
Athens.....	45	.6
Barnes-Hecker.....	34 $\frac{1}{4}$	.5
Book.....	23	.3
Cambria-Jackson.....	129 $\frac{3}{4}$	1.6
Canisteco.....	71 $\frac{3}{4}$	.9
Cliffs-Shaft.....	782 $\frac{1}{4}$	9.8
Hill-Trumbull.....	130	1.6
Holman-Cliffs.....	146 $\frac{1}{4}$	1.8
Lloyd.....	109 $\frac{1}{4}$	1.4
Maas.....	127 $\frac{3}{4}$	1.6
Mather.....	347	4.3
Morris Lease.....	134 $\frac{3}{4}$	1.7
Negaunee.....	115	1.4
Pontiac.....	104 $\frac{1}{2}$	1.3
Princeton.....	264 $\frac{1}{4}$	3.3
Ravenna-Prickett Lease.....	28 $\frac{3}{4}$	.4
Schley.....	3 $\frac{1}{2}$	-
Spies-Virgil.....	271 $\frac{3}{4}$	3.4
Tilden.....	23 $\frac{1}{2}$	.3
Total Mines	2,892 $\frac{1}{4}$	36.2
<u>EXPLORATIONS</u>		
Athens Mine.....	5 $\frac{1}{4}$	.1
Cambria-Jackson Mine.....	59 $\frac{3}{4}$	.7
Cliffs-Shaft Mine.....	330 $\frac{3}{4}$	4.1
Lloyd Mine.....	205	2.6
Maas Mine.....	69 $\frac{3}{4}$	.9
Mather Mine.....	72 $\frac{1}{4}$	.9
Negaunee Mine.....	30 $\frac{3}{4}$	.4
Princeton Mine.....	18 $\frac{1}{4}$	.2
Section 1, 47-27 (Mather Mine Surface).....	140 $\frac{3}{4}$	1.8
Section 2, 47-27 " " ".....	85	1.1
Section 3, 47-27.....	664	8.3
Section 5, 47-27.....	329 $\frac{3}{4}$	4.1
Section 9, 47-27.....	114 $\frac{1}{2}$	1.4
Section 19, 43-34) Spies-Virgil Mine.....		
Section 24, 43-35) Surface.....	338 $\frac{1}{4}$	4.2
Total Explorations	2,463 $\frac{3}{4}$	30.8
<u>MISCELLANEOUS</u>		
Annual Report.....	106 $\frac{1}{2}$	1.3
Beneficiation of Iron Ores.....	97 $\frac{3}{4}$	1.2
Engineering Department.....	123 $\frac{3}{4}$	1.5
Geological Surveys on Company's Mineral Estate.....	752	9.4
Investigating Mineral Land Offers.....	405	5.2
Investigating Outside Explorations.....	72	.9
Michigan Mineral Land Company.....	22 $\frac{1}{4}$	.3
Miscellaneous Geological Expense.....	1,049 $\frac{1}{2}$	13.1
Munising Silica Sand.....	5 $\frac{1}{4}$	.1
Total Miscellaneous	2,633 $\frac{3}{4}$	33.0
 GRAND TOTAL	 7,989 $\frac{3}{4}$	 100.0

B-1. DESCRIPTION OF WORK BY THE STAFF MEMBERS

In JANUARY, I conferred with Messrs. Hazen and Pat Butler, of Butler Brothers, on the question of possible concentration of Pontiac ore in the Butler Brothers' Cuyuna Range Mill. I visited a sintering test at the Mines Experiment Station in Minneapolis, made on a carload sample of Princeton Mine Plastic Ore. I also attended the annual meeting of the Minnesota Section of the American Institute of Mining and Metallurgical Engineers held on Tuesday, January 12th, in the Engineering Building of the University of Minnesota, Minneapolis. I spent two days in Hibbing with Messrs. Walter Sterling and Grover Holt, going over a new estimate for the operation of the Dean Mine in connection with our negotiations with the Inland Steel Company. I also spent four days at our Cleveland office in conference with Messrs. Geffine, Sadler and Kneip of the Company and Mr. W. C. Gordan, Engineer of the Internal Revenue Department of the Government, at which time we settled most of the questions of depreciation at the Company's active mines which had arisen.

While in Cleveland, I conferred with Mr. Geo. A. Smainis relative to the possible leasing by the Company of the Cambria-Hartford Mine of the Republic Steel Corporation. Mr. Smainis is a mining engineer who represents the fee owners of these properties. Later, I went over in detail the maps, cross-sections and exploration data of these properties, with Messrs. Butcher, Christianson and Hovell of the Republic staff at the mine office. I spent one day at the Michigan College of Mining and Technology consulting with Professor Fisher of the Physics Department on the question of geophysical exploring technique and instruments, particularly in connection with using some one of the geophysical methods as an aid in exploring wildcat iron ore leads in South-central Wisconsin.

In FEBRUARY, I spent three days at the Cleveland office going over Federal tax matters of the Hill-Trumbull and Holman-Cliffs Mines with Mr. W. C. Gordan, engineer for the Internal Revenue Department. Following this conference, Mr. Holt joined me and, in company with Mr. H. B. Hatch of Detroit, we journeyed to Highland Grove, Ontario, some 180 miles Northeast of Toronto, where we spent a day examining a molybdenum property, - Land Offer No. 2247. On returning, I stopped in Cleveland and had a second conference on the possible Cambria-Hartford lease with Mr. Smainis, representing the fee owners. I spent one day in Kansas City, Missouri, in conference with Messrs. Wm. O'Gara and Ed Crane. Mr. O'Gara is the owner of a wildcat iron property in South-central Wisconsin which I had examined in December 1942, (Offer No. 2240). An attempt to obtain a satisfactory option for lease on this property to allow us to explore, was a failure. Mr. Crane, of Chicago, was the party who brought Mr. O'Gara and me together.

In MARCH, I spent a day in New York City, conferring with Mr. D. F. Haley, Vice-President of the Climax Molybdenum Company, in charge of mining and concentrating. I obtained from him valuable information, both general and specific, relative to the mining and milling of Molybdenum, in connection with Land Offer No. 2247, which was examined by Mr. Holt and me in February. Messrs. Barber, Walter Sterling and I had a conference with the Tax Commission Department of the State of Minnesota in St. Paul on the tax reviews of the Canisteo and Holman-Cliffs Mines, by the engineers of the Commission, which were anticipated. As a result of this conference, we were able to have a review of the Canisteo property deferred for at least one more year. I went to the Mesaba Range and while there, Mr. Walter Sterling and I held a conference with Mr. W. R. VanSlyke of Eveleth, Dr. Peterson and Messrs. Bergland and Engman of Virginia, relative to Land Offer No. 2248 located in the central part of the Vermillion Range. I held several conferences in my office with Mr. F. G. Pardee, State Mine Appraiser, for Michigan, relative to preparing an estimate of the

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ore reserves in the Mather Mine. We also discussed numerous phases of the problems of appraisal of some of our other mines. This conference was especially important in obtaining later a substantial reduction in the first tentative valuation placed on this mine by the Tax Commission.

In APRIL, Walter Sterling and I, joined by Messrs. VanSlyke and Bergland, examined the iron property on the Vermilion Range, Land Offer No. 2248, referred to above. We advised them that the Company does not care to option nor explore this property. I conferred in Minneapolis with Professors Lambert and Heilig, Minnesota State Mine appraisers, relative to their review of the reserves of the Holman-Cliffs Mine. I also talked to Mr. Hazen Butler in St. Paul, relative to Butler Brothers' proposed contract for mining the balance of the Hill Mine ore adjacent to their Barbara Pit. I accompanied Messrs. Geffine, Stakel, Jackson and Choquette on a trip to Lansing for our annual conference with Mr. Pardee, State Mine Appraiser, and went over with him his estimates of our various Michigan Mines. I arranged for and procured, the signatures on a lease of the SW $\frac{1}{4}$ of Section 19, 43-34, Iron County, lying immediately to the East of our exploration on the Spies Mine surface, from the six (6) Johnson brothers and their wives, owners of the fee.

In MAY, I spent one day at the Cleveland office, in conference with Messrs. Brown, S. L. Mather, Barber, Raymond and Green on matters relating both to our mining operations and mineral land offers. At home, I joined with Messrs. Elliott, Syverson and Day in showing Messrs. Charles, Fleming, Beyers and Bartley, the ore docks in Marquette, both the Lake Superior & Ishpeming and the South Shore docks, and our mining operations on the Marquette Range. These men came here in the interests of a proposed dock construction, in Port Arthur or Fort William, to be used for the shipment of ore from the new Steep Rock Iron Mine near Atikokan, Ontario. I joined Messrs. Walter Sterling and Donovan in attendance at the annual Public Occupational Tax hearing in the State Office Building at St. Paul and went from there to the Mesaba Range. While on the Range, I went over all of the current exploring at the Canisteo, Hill-Trumbull and Holman-Cliffs Mines. I consulted with Mr. Tartaron, Resident Manager of the Minerals Separation North American Corporation, relative to the possible construction by them, of a pilot plant near one of our washing plants at which to conduct large scale tests to recover by flotation, high grade iron from the tailings now being wasted. I visited and inspected the Book Mine stripping with Messrs. Barber, Stakel and Archibald.

In JUNE, I spent three days on the Mesaba Range going over the current explorations at all of our Minnesota properties, including the Pontiac Mine on the Cuyuna Range. I also visited the drilling at the latter property on my way to Minneapolis and St. Paul, where I conferred with engineers in the Tax Commissioner's office and with Mr. Hazen Butler of Butler Brothers. I also conferred with Messrs. Lambert and Heilig, State Mine Appraisers, and handed to them the maps, cross-sections and all data supporting our revised estimate of the reserves of the Holman-Cliffs Mine. I spent considerable time going over these figures with Mr. Lambert. I assisted in entertaining Messrs. Merryweather and Steffensen of the Bethlehem Steel Corporation during their visit to the Marquette Range.

In JULY, Company Directors, Messrs. W. G. Mather, Greene, Williamson, Brainerd and Newberry visited the Marquette Range. I addressed the group on the possible and probable future shipments of iron ore from the Lake Superior District over the next 25 to 30 years, paying special attention to the resulting exhaustion of the direct shipping and present concentrating grades of ore on the Mesaba Range. I also summarized the current explorations on the Company's mineral estate, bringing the Directors up-to-date with what has gone on since their visit here a year ago. Mr. Dexter A. Tutein of the Iron Ore De-

partment of the O.P.A., Washington, D. C., and Mr. Pardee, State Appraiser of Mines, came here with Mr. Geffine. I conducted Messrs. Tutein and Pardee on underground inspections in the Maas and Mather Mines. I spent three days on the Mesaba Range going over the operating and exploring programs at our several Minnesota properties and inspecting the Schley Mine. I conferred with Messrs. Lambert and Heilig in Minneapolis on the estimate they were making of the reserves in the Holman-Cliffs Mine and with Mr. Wade at the Mines Experiment Station on our concentrating problems. I spent four days at our Cleveland office going over a 15 year estimate of production schedules, particularly of the mines and mineral properties which we anticipate opening and exploring during that period.

In AUGUST, Messrs. S. J. Kidder and Dr. J. O. McCartney of the Mining Department of the Algoma Steel Corporation, spent several days in Ishpeming and we, with Mr. Holt, went over their possible concentrating problems for treating Helen Mine ore. Messrs. W. S. Cumings and D. M. Fraser of the Bethlehem Steel Company, also visited the Marquette Range. I conducted them and Messrs. Kidder and McCartney underground in the Mather Mine. I attended a conference at Battelle Memorial Institute in Columbus, Ohio, with representatives of the larger mining companies of the Lake Superior District relative to a study to be made by the Staff at Battelle for the discovery and development of ways and means to make a commercial concentrate from taconite, jasper and lean ores of the several Lake Superior Iron Ranges for use in the future. I was appointed a member of the Sampling Committee to provide Battelle with several samples of Mesaba taconite on which their work is to start. I examined a property in Northern New Hampshire called to the attention of Mr. Lawrence, Manager of our Coal Department, from which it was reported iron ore was mined many years ago and that it contained potential reserves. This is Land Offer No. 2245. I stopped over at our Cleveland office on my return and went over our current exploration problems with Mr. Barber.

In SEPTEMBER, I made two trips to Minnesota visiting our operations on Mesaba Range and having conferences with Mr. Heilig on his estimate of the reserves in the Holman-Cliffs Mine, and with Mr. Frank E. Downing, Chief Engineer of the Tax Commission, relative to the ad valorem valuation of this property. While on the Range, I met with the four other members of the Special Sampling Committee mentioned in connection with my trip to the Battelle Memorial Institute in August, and we laid out the several localities across the Range where these samples were to be taken and shipped to Battelle. I conferred with Mr. M. L. Jacobs, Vice-President of the Bethlehem Steel Company, and with Messrs. Greene and Barber while they were in Ishpeming, and went over with them all of the current explorations and developments on the Mather Mine. Also, accompanied by Mr. Holt, I examined several descriptions of mineral lands on the North side of the Menominee Range in the Iron Mountain District with Mr. J. T. Spencer, Jr. who was trying to negotiate the sale of these lands to the Company. We also inspected the open pit at the old Cornell property, being operated by the Globe Iron Company, near Iron Mountain, and the Book Mine open pit at Alpha on the same trip.

In OCTOBER, I attended the public hearing before the Tax Commissioner of Minnesota in St. Paul at which time the ad valorem values of the Minnesota properties were reviewed. I went to the Mesaba Range from this hearing, visiting the Pontiac drilling enroute. In addition to going over our current exploration work on the Range, I went over in some detail with Mr. Walter Sterling, two Minnesota land offers, Nos. 2269 and 2271, and prepared reports on them. These offers covered property on both the Mesaba and Cuyuna Ranges, and both were declined. Mr. Stakel and I conferred with Mr. Harlow Clark at his office in Marquette relative to the possible leasing by the Company of the old New York Mine property. With Mr. Nicolson, of the North Range Mining Company,

I went over in some detail the proposed exploring and stripping programs at the Book Mine property in preparation for the 1944 ore operation.

In NOVEMBER, I made one trip to the Mesaba Range and, returning, visited the structural drilling at the Pontiac Mine. I conferred with Mr. Pat Butler of Butler Brothers at his office in St. Paul. At this conference, we discussed the possibility of acquiring Butler Brothers' Merritt concentrating plant on the Cuyuna Range in which to treat Pontiac ore in case the latter property is to be opened. Butler Brothers anticipated an early cessation of all their operations on the Cuyuna Range and either sell or move away their Merritt plant.

I accompanied Mr. Barber on a short visit of inspection to the Clifton Mine and concentrator of the Hanna Company, and the Benson Mine and concentrator of the Jones and Laughlin Steel Corporation, both located in Northern New York State and operating on the lean magnetite ores of the Adirondack region. I spent several days at the Cleveland office, both going to and coming from this inspection. In Chicago, I conferred with Mr. George A. Smainis, representative of the fee interest in the Hartford-Cambria Mine, relative to research work being done under his supervision, privately, on a new and revolutionary process for the direct conversion of iron oxide in lean ores and jaspers to metallic iron by the so-called "quick reduction catalytic method". I went over in considerable detail, with Mr. Archibald, the D. M. & M. Company lands being offered for sale in relation to their possible value if acquired by the Michigan Mineral Land Company.

In DECEMBER, Mr. Archibald and I prepared a rather complete report on the D. M. & M. Company lands, mentioned above, and their relationship to the property of the Michigan Mineral Land Company. I went to Lebanon and Bethlehem, Pa. where I conferred with Messrs. Steffensen and W. S. Cumings, together with other officials of the Bethlehem Steel Company on several matters common to the Bethlehem and the Cleveland-Cliffs Companies. I made one trip to the Mesaba Range and, in returning, visited the Pontiac Mine exploration. While on the Range, I attended a conference called by Mr. Sterling and attended by all of his operating men and augmented by Messrs. Holt and Moore. The entire operating program for the 1944 season was gone over and a coordination of all repair work, new installations, for both operating and concentrating, as well as exploration work, was arranged. Messrs. Sterling, Holt and I visited both the Schley pit and the Embarrass Lake stripping operations.

BURTON H. BOYUM. Mr. Boyum continued as Assistant Geologist throughout the year. He spent 40% of his time on the geological surveys and maps of our operating mines; 17% on the drilling explorations and 43% on miscellaneous duties included in the routine work of the Department. Although he made periodic underground geological surveys, and posted this information on the geological maps, of the development work in all our operating mines, the Cliffs-Shaft Mine continued to take the largest share of his time for this work, - a total of 19%. With the continued rapid underground development on the 2nd and 3rd Levels of the Mather Mine (1600' and 1750' Levels), this property accounted for 9% of his time.

In addition to the geological surveys, Mr. Boyum has classified all the drill core from current explorations and has had direct charge of the drilling, under my supervision. He made specific gravity tests on all of the diamond drill carbon submitted for purchase by the Department during the year, as an aid in our final selection. He has continued to have direct charge of all mechan-

ically set Bortz bits being used in our drilling program. In this connection, it should be noted that mechanically set Bortz bits are being used in increasing numbers. With the steady improvement in these bits, it is likely that they will replace the ordinary hand-set carbon bits in all drill work except in the most difficult and broken-up jasper iron formation.

GROVER J. HOLT. Mr. Holt is not classified as a member of the Geological Department. His headquarters have continued to be with us during the past year, however, and he has assisted me frequently in many of the problems presented to the Geological Department, especially of a metallurgical nature. Also, I have made generous use of his ability in connection with the examination of and reporting on several mineral properties offered to the Company.

MAXWELL H. MADSEN. As mentioned above, Mr. Madsen joined the combined Engineering and Geological Departments on Sept. 8, 1943. He is being trained to do the mining engineering and the geological work in the Cliffs-Shaft Mine. Mr. Boyum, so far, has directed him in the Geological work but it was anticipated he will be able to carry this on by himself, presently, and thus allow Mr. Boyum more time for other important duties. Because a larger part of Mr. Madsen's time has been spent in engineering work, and probably will be in the future, a detailed record of his activities will be found in the Annual Report of the Chief Engineer, Mr. Brewer.

ARCHIE MINNEAR. Mr. Minnear continued as a Draftsman and Office Assistant with the Department throughout the year. During the year, however, he spent 5% of his time assisting in the Engineering Department, due to the shortage of help and the emergencies that arose. Approximately 53% of his time was spent in drafting work associated with the Geological surveys and maps of our operating mines; 9% on similar work for the drilling explorations and 33% on miscellaneous duties included in the routine work of the Department. Much of his time credited to explorations was spent doing Mr. Allen's work in the core room whenever the latter was engaged outside of the office surveying drill holes, inspecting the drilling operations, etc.

E. A. ALLEN. Mr. Allen spent about 95% of his time during the year collecting, labelling, sampling and filing diamond drill core and sludge samples from the current explorations and in making tests for the dip and bearing of all current drill holes with the Maas Compass, wherever this data was required. He made thin sections of rock samples and drill cores whenever necessary for microscopic study by Mr. Boyum and me. About 2% of his time was charged to the Engineering Department for the weekly observation of water levels in the various deep well holes from the surface of the Maas and Negaunee Mines which he made during the year. These wells were drilled for the purpose of observing and plating the fluctuations and drainage of surface water over the ore bodies in these mines. The rest of his time was spent on routine office duties.

C. SURFACE GEOLOGICAL SURVEYS

No important surface geological surveys were made during the year. All of the work done under this heading was confined to mapping and gathering samples from a number of outcrops on the surface of the old Republic Mine, - the Cambria-Lillie property; the South Jackson area in Section 1, 47-37; and the Summit Mountain area at the Tilden. All this work was done to get material on which laboratory tests were made as a preliminary study of the concentration

of the lean ores and jaspers of the Marquette Range.

On account of the segregation of the iron oxide particles into relatively rich bands separated by bands relatively lean, the material from the Republic and Tilden areas showed the most promise. In the Republic area, it is believed that a considerable tonnage can be mined by surface operations which will lend itself to concentration at relatively coarse sizes. That is, much of the concentration could be accomplished in sizes amenable to either jigging or the sink-float method.

D. MINE GEOLOGICAL SURVEYS AND OPERATIONS

Underground geological surveys of the current mine extensions and development work were made during the year in all of our operating mines. The main level developments and the more important areas in the mine workings of our soft ore mines were surveyed and mapped by Mr. Boyum. Geological data in the balance of the mine workings was obtained by the engineers at the several properties and turned over to the Geological Department for mapping. Detailed geological surveys were made in all the workings of the Cliffs-Shaft Mine by Mr. Boyum, assisted by Mr. Max Madsen. All geological data was posted on the geological maps and cross-sections of each property.

From January 1st to January 31st, the Maas, Negaunee, Athens and Lloyd mines operated six days per week on the basis of three 8 hour shifts for five days and two 8 hour shifts on Saturdays. The Cliffs-Shaft and Princeton mines operated six days per week, two 8 hour shifts per day. The Spies-Virgil Mine operated six days per week, two 8 hour shifts for five days and one 8 hour shift on Saturdays. Effective February 1st, the Maas, Negaunee, Athens and Lloyd mines operated three 8 hour shifts for five days per week and one 8 hour shift on Saturdays. The Princeton Mine operated two 8 hour shifts for five days per week and one 8 hour shift on Saturdays. The Cliffs-Shaft and Spies-Virgil Mines remained on the basis of six days per week, two 8 hour shifts for five days and one 8 hour shift on Saturdays.

The Tilden Mine open pit operations began on May 18th and continued quite steadily to and including Oct. 28th. Operations, as in the past, were geared to the schedule of boat shipments.

E. OPTIONS AND LEASES

Three new mining leases were acquired by the Company during the year as follows:

Section 10 Lease

This lease, from the Oliver Iron Mining Company, covers only the hard ore in the Northern part of the S $\frac{1}{2}$ of the NW $\frac{1}{4}$ of Section 10, 47-27, adjacent to the Cliffs-Shaft Mine on the South. The lease is dated Dec. 1, 1942 and expires Dec. 1, 1992.

Johnson Lease

This lease from six Johnson Brothers, their wives and a daughter, covers the SW $\frac{1}{4}$ of Section 19, 43-34, and is adjacent to the Spies Mine property in the Iron River District. The lease is dated May 1, 1943 and expires on May 1, 1993.

Cambria Mine

This lease, from the Teal Lake Iron Company, covers the fractional SE $\frac{1}{4}$ of Section 35 and the fractional S $\frac{1}{2}$ (except Lot 8) of Section 36, both in 48-27. The property is the Hartford-Cambria and Lillie Mines, formerly operated by the Republic Steel Corporation. The lease is dated May 1, 1943 and expires April 30, 1993.

The following mining leases were surrendered during the past year:

Ravenna Lease

This lease, which comprised the S $\frac{1}{2}$ of the N $\frac{1}{2}$, the SW $\frac{1}{4}$ and the W $\frac{1}{2}$ of the SE $\frac{1}{4}$, all in Section 19, 43-32, in the Crystal Falls District, Iron County, was surrendered by the Company to the fee owners, as of Dec. 31, 1943. These lands originally were leased to the M. A. Hanna Company, dated Feb. 23, 1911. Subsequently, the lease was transferred to the Company under date of Dec. 31, 1932. On Oct. 15, 1936 the property was subleased, together with the Prickett lands, to the Inland Steel Company. Inland, under date of Dec. 31, 1943, surrendered the lease to the Company.

Jackson Lease

This lease which comprises the N.660' of the N $\frac{1}{2}$ of the NW $\frac{1}{4}$ of Section 1 and the N.660' of the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 2, both in 47-27, was leased to the Republic Steel Corporation on April 15, 1936. Republic surrendered the lease as of July 1, 1943 and it became a part of the Cambria-Jackson Mine now being operated by the Company.

F. EXPLORATIONS AND COSTS

Drilling explorations were carried on in 1943 in the following Districts and Mines:

F-1. - FROM SURFACE

<u>DISTRICT</u>	<u>RANGE</u>	<u>PROPERTY</u>
Coleraine	Mesaba	Canisteo Mine
Marble	"	Hill-Trumbull Mine
Taconite	"	Holman-Cliffs Mine
Crosby	Cuyuna	Pontiac Mine
Ishpeming	Marquette	Cliffs-Shaft Mine
Ishpeming	"	Mather Mine
Ishpeming	"	Section 3 Exploration
Negaunee	"	Mather Mine
North Lake	"	Section 5 Exploration
Iron River	Menominee	Spies Exploration

F-2. - FROM UNDERGROUND

<u>DISTRICT</u>	<u>RANGE</u>	<u>PROPERTY</u>
Ishpeming	Marquette	Cliffs-Shaft Mine
Ishpeming	"	Mather Mine
Negaunee	"	Cambria-Jackson
Negaunee	"	Maas Mine
"	"	Negaunee Mine
"	"	Athens Mine
North Lake	"	Lloyd Mine
Gwinn	Swanzy	Princeton Mine

Table V, which follows, gives the footage drilled, the ore encountered and the cost per foot of drilling for both surface and underground explorations. It will be noted that the average cost of surface drilling was \$5.93 per foot, excluding certain overhead items in actual drilling expense which customarily are charged to the explorations. By including these items, the average cost of surface drilling was \$6.77 per foot. The cost of underground drilling, in the same way, was \$2.91 per foot and \$3.20 per foot, respectively.

By comparison with 1942, the cost of drilling from surface in 1943 increased by \$.95. This was due chiefly to three conditions. In the first place, the cost of both labor and supplies advanced materially; in the second place, all surface drilling and much of the underground drilling was carried on a 6 day basis with time and a-half for the 6th day; in the third place, a considerably larger percentage of the total footage drilled was in holes much deeper than those drilled during 1942. This was particularly true in the Section 3 Exploration.

In comparison with 1942, the cost of underground drilling during 1943 showed a decrease of exactly \$1.00 per foot. In the first place, there was nearly 50% more footage drilled in 1943 which helped to absorb the overhead charged against actual drilling. Also we have been able to improve our cost per foot considerably by the use of mechanically set Bortz bits in ground found suitable for their operation.

Drilling costs, as a whole, in 1943, showed an increase of only \$.26 per foot.

Table No. VI, also shown below, gives a comparative cost of total drilling for the past five years:

F-3. - DIAMOND DRILL CARBON AND BORTZ

The following table shows the amount and inventory value of the diamond drill carbon and Bortz on hand at the beginning of the year, the amount purchased during the year, the amount used during the year, and the balance on hand at the end of the year:

	<u>CARBON</u>		<u>BORTZ</u>	
	<u>Carats</u>	<u>Amount</u>	<u>Carats</u>	<u>Amount</u>
On Hand Jan. 1, 1943	1,204.67	\$ 89,642.23	50.40	\$ 138.60
Purchased during 1943	<u>47.57</u>	<u>3,640.92</u>	<u>199.18</u>	<u>1,620.21</u>
Total	1,252.24	\$ 93,283.15	249.58	\$1,758.81
Used during 1943	<u>221.16</u>	<u>16,490.05</u>	<u>109.93</u>	<u>659.30</u>
On Hand Dec. 31, 1943	<u>1,031.08</u>	<u>\$ 76,793.10</u>	<u>139.65</u>	<u>\$1,099.51</u>

In addition to the above carbon and Bortz which is hand set by our own organization, we are using an increasingly larger number of mechanically set Bortz bits which we purchase ready for use. We receive credit, after the bits have ceased to cut, for all the Bortz remaining that can be used again.

F-4. - DRILL SECTIONS

Cross-section tracings of all drilling, showing the analyses and classifications of the material encountered during the year, have been made up. Photographic copies of these, which show the work done during the year on the Marquette and Menominee Ranges, in colors, will be found in the Annual Report books that are submitted as a part of the Annual Report of the Engineering and Geological Departments.

G. DESCRIPTION OF EXPLORATIONS

G-1. - EXPLORATIONS ON CLIFFS-SHAFT SURFACE, SECTION 9, 47-27, MICHIGAN

Hole No. 57, which was drilled vertically on the 25000 W. meridian and 8000 S. in the East part of the NW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 9, was drilling in hangingwall quartzite at a depth of 865' on the first of the year. The object of this hole was to explore for hard ore in the hard ore horizon just below the quartzite. The first attempt to reach this contact was in hole No. 56 during 1942 which was located about 800' to the South. That hole deviated so much that it finally paralleled the bedding of the quartzite and had to be stopped without reaching the objective horizon. Hole No. 57 was drilled with a larger diameter which kept it straighter. The hole reached the contact zone at a depth of 1698'. This was followed by a relatively great thickness of conglomerate mixed with seams of dike and lean ore to 1919'. This lean ore represents the enrichment of the conglomerate by iron oxide. From 1919' to 1958', the enrichment of conglomerate resulted in a second-class hard ore averaging 53.12% iron and .107% phosphorous. At 1958', the drill cut into a run of first-class hard ore which extended a distance of 31' to a depth of 1989'. This ore averaged 58.82% iron and .114% phos. In the continuation of the hole, drilling encountered hard ore jasper extending from 1989' to 2012' followed by unoxidized sideritic chert with an occasional seam of dike. At 2268', the footwall greenstone was cut and the hole was bottomed in it at 2310' on August 10th.

This area never had been explored before hole No. 56 was drilled in 1942. It is encouraging, therefore, to have found hard ore to exist at the contact of the hanging quartzite with the hard ore formation. Its depth, however is considerably below the elevation of the 10th "B" Shaft, which is the nearest underground opening. Now that the Section 10 Parcel has been leased from the Oliver Iron Mining Company to augment the immediate reserves of the Cliffs-Shaft Mine, it will not be necessary to press further the development of the ore encountered in hole No. 57 for the time being. For this reason, and because the drill crew was needed badly elsewhere, it was decided to discontinue further drilling at this exploration until a later date.

G-2. - EXPLORATIONS IN SECTION 3, 47-27, MICHIGAN

The exploring during 1943 in Section 3 may be divided into two parts; namely, the drilling in the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ and the drilling in the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$. Both of these descriptions are leased from the Oliver Iron Mining Company for a period of 50 years from July 1, 1924. The lease, therefore, expires on July 1, 1974, leaving a little over 30 years to go.

Exploring on the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ is for the purpose of developing a possible ore body down the dip from the old Detroit Mine property which is the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$. It will be remembered the old Detroit Mine was operated between 1882 and 1900 and produced 141,000 tons of ore in two ore bodies which were relatively shallow. Negotiations are underway for a lease of this property to the Company on favorable terms.

Two vertical holes, Nos. 34 and 35, were completed and a third, No. 38, is being drilled on the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$. They are all located on the 16000 W. meridian. Hole No. 34, the Northern-most hole, and located approximately 250' South of the Detroit property line, was drilled through to the Siamo slate footwall to a depth of 2022'. It encountered no enrichment or high grade ore in the vicinity of the footwall but it did cut 22' of high grade ore from 183' to 205'. The top 7' of this ore was Bessemer and averaged 64.00% iron and .036% phos. The bottom 15' averaged 62.89% iron and .070% phos. This ore rests on top of the 2nd member of the main greenstone intrusive sill. It is our opinion this ore is a small local bunch formed along a water course in a zone of shearing or faulting. To confirm this, however, or explore for a downward continuation along the dip, hole No. 35 was located and drilled from a point 200' South from hole No. 34. After passing through the ore horizon and into the greenstone beneath, it was bottomed at a depth of 440' without finding an extension of this high grade ore.

In order to test again the entire thickness of the iron formation along the 16000 W. meridian, hole No. 38 is being drilled 400' South of hole No. 34. It had reached a depth of 941' and was drilling in the lower member of the main greenstone intrusive sill at the end of the year. The only enrichment encountered so far was at the upper contact of this lower member of the sill. Fifteen feet of high grade ore, from 615' to 630', averaged 63.79% iron and .112% phos. Here again it is our opinion this does not represent an important ore body but is a relatively local bunch in a water course. The main objective of the hole is the lower part of the jasper iron formation lying immediately above the Siamo slate footwall.

Drilling in the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$ has as its immediate objective the exploration for a Westerly or Northwesterly continuation, onto this lease, of the ore in the so-called deep Section 3 ore body. It will be remembered this ore was discovered in three drill holes, Nos. 24, 29 and 32, which were drilled vertically to the slate footwall in 1920 and 1921 on Company fee lands immediately East. Each of these holes encountered a thickness of approximately 135' of high grade ore just above the slate and demonstrated an ore body of some 1100' in length and probably containing several million tons.

The first hole to be drilled on the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$, No. 33, was started in November 1942. It was located on the 19800 W. meridian some 260' North of the South line and 230' West of the East line of the property. This places the hole approximately 400' due West of hole No. 24 mentioned above. Hole No. 33 encountered 13' of high grade ore close to the slate footwall, (from 2078' to 2091'), which averaged 60.80% iron and .136% phos. It was bottomed in slate at a depth of 2167'. This ore may be a thin edge of the main ore body. Judging from the elevation at which the slate was encountered, however, it is possible this hole passed from the fault block containing the main Section 3 deep ore body into a separate block. If such is the case, this ore probably has no connection with the main ore body. In order to test this possibility, hole No. 36 was drilled on the same meridian from a point 300' North of hole No. 33. It drilled through to the footwall slate and was bottomed in it at a depth of 1333' without encountering any high grade ore enrichment. In the slate near the contact, bands of quartzose material were interbedded with the slate which is a condition prevailing usually at some distance below the normal contact. This indicates to us, that this contact probably is not the normal upper surface of the Siamo formation but a faulted contact at some distance below the upper surface. It now appears this may be the Southerly dipping normal fault encountered in the drilling to the East done in 1920 and 1921. Although hole No. 36 did not encounter ore, it gives us valuable information for the future study of the complicated fault structure which, undoubtedly, has controlled the ore concentrating solutions in this area.

It was decided next to drill a vertical hole 400' due West of No. 33 to try and determine more definitely the relationship of hole No. 33 to the fault block in which the Westerly continuation of the deep ore body might be expected. The hole, No. 37, was carried down to the footwall slate and bottomed in it at a depth of 2135' on December 8th. It encountered no high grade ore enrichment.

After completing hole No. 37, it seemed apparent that the only possibility of encountering a Westerly extension of the deep ore body was to the South of hole No. 33. Evidently the fault block containing the ore is relatively narrow. Since it is deep, it is difficult to so locate a hole that it will not deviate enough to pass out of the block before reaching the footwall. Hole No. 39, has been located and is being drilled approximately 250' South of hole No. 33 on the 19800 W. meridian. This places it only a few feet North of the South line of the property. The hole was standpiping in surface boulders and gravel at a depth of 35' at the end of the year.

G-3. - EXPLORATIONS IN SECTION 5, 47-27, MICHIGAN

Drilling in the N $\frac{1}{2}$ of the S $\frac{1}{2}$ of Section 5, which was commenced in March 1941, continued throughout the year 1943. Until the end of September,

two drill rigs were employed on this work. Since that time, only one drill rig has been used. The drilling done during 1942 developed an area of intricate faulting with one fault striking Northwest-Southeast, and at least three faults striking Northeast-Southwest. The fault pattern appears to be very similar to that in the Lloyd Mine but of a much smaller magnitude. Holes Nos. 16 and 17, both of which were drilled with a steep dip to the South, were drilling at the beginning of the year. Six additional holes were completed during the year and a 7th hole, No. 32, was drilling at the end of the year. In addition to these holes, a series of eight standpipes were sunk to ledge about 50' apart on the 7800 E. meridian. The purpose of these standpipes was to determine more definitely the relative positions of the three Northeast-Southwest faults. They were drilled into ledge only far enough to determine the character of material. In addition to marking the position of these three faults, they found the slate footwall displaced to the South to such an extent that another fault farther East was indicated. The strike of such a fault is likely Northwest-Southeast and I will refer to it in more detail below.

Hole No. 16, which was drilled with a dip of -65° due South on the 7000 E. meridian in December 1942, had encountered 55' of high grade ore from 135' to 190', which averaged 63.16% iron and .209% phos. Subsequent drilling in 1943 failed to find an extension of this ore so we must assume it is of relatively small dimensions, both in strike and in dip. Hole No. 25, drilled vertically on the same meridian, encountered 21' of high grade ore from 469' to 490', averaging 58.66% iron and .067% phos. This ore, however, has no connection with that encountered in hole No. 16 and is a separate fault crotch. It lies close to a dike which probably controls its location. These two occurrences constitute the only ore encountered during the year in this series of fault blocks. It is possible that the ore in hole No. 25 may develop in its dimensions in a Southwesterly direction but chances seem to be remote. The iron formation is standing practically vertical and exploring for this ore to the Southwest would entail drilling to a considerable depth. If mineable ore is not discovered in the East part of the section where we are now drilling, one more attempt may be made to follow it down a pitch to the Southwest.

As mentioned above, standpiping on the 7800 E. meridian indicated another major fault to the East of the fault complex in which the previous drilling had been centralized. Three holes, Nos. 29, 30 and 31, accordingly have been drilled in the probable crotch close to the intersection between this fault and the footwall slate in order to determine the position of the intersection. Hole No. 30 encountered 18' of high grade ore at ledge, from 32' to 50', which averaged 61.41% iron and .070% phos. Hole No. 31, located 100' West of hole No. 30, encountered no ore nor did hole No. 29, 100' to the South of hole No. 30. It must be presumed, therefore, that this ore is a local residual concentration on the ledge and of no important extent. Hole No. 31 was bot-tomed in footwall slate at a depth of 238' at the end of the year. From the data obtained in these three holes, hole No. 32 will be located to the Southeast where it will be able to reach a greater depth into this fault crotch with the hope of discovering a merchantable body of ore.

G-4. SPIES EXPLORATION, SECTION 24, 43-34, MICHIGAN.

Diamond drill on the East side of Section 24, which was started on April 25, 1942, with a single drill rig under contract from the E. J. Longyear Company of Minneapolis, Minnesota, was continued into 1943. The original plan was to drill holes dipping from 65° to 70° due North on a meridian approximately 175' West of the East boundary of Section 24 and approximately 1000' apart. The holes were carried down sufficiently so that a complete cross-section of the steeply dipping banded slates and iron formation would be accomplished. The 3rd such hole, No. 62, which was drilled with a dip of -70° due North about on the East-West center line of the SE¹/₄ of the NE¹/₄, was drilling in black slate and cherty iron carbonate at a depth of 1109' on the first of the year. It was bottomed at a depth of 1518' and still in the same material without having encountered iron formation or enrichment of any kind. Hole No. 63 was then drilled on the same meridian and with the same dip from a point 1000' to the South of hole No. 62. At a depth of 240', it encountered typical Iron River District cherty iron formation, the first found in this drilling campaign up to that time. At a depth of 365', high grade ore was encountered and it was continuous to a depth of 875'. The first 32' of this ore, from 365' to 397', averaged 57.79% iron, .242% phos. and .165% sul. which is considered a high sulphur ore. Below 397' and to the bottom of the hole at 875', this 478' of ore averaged 60.80% iron, .206% phos. and .060% sul. which is considered a standard Iron River District ore, except lower than the average in phosphorous. The hole encountered black slate at 875' and was bottomed in it at 910'. Unfortunately, the bedding in much of this ore showed that the hole was drilling along with the dip of the ore formation and, therefore, did not give us any idea of its thickness.

As soon as the ore was encountered in hole No. 63, a second drill, also under contract from the E. J. Longyear Company, was added to the exploration. The general trend of the rock formations in this area has been in a general East-West direction and it was thought possibly that an overturned fold had taken place which would explain hole No. 63 following the bedding. Consequently, hole No. 64 was located on the same meridian but at a point 500' North of hole No. 63 and drilled with a dip of -63° to the South to try and crosscut the ore in hole No. 63. Several runs of good ore were encountered but, much to our surprise, this hole also followed the bedding of the formation. The ore of mineable width in this hole was as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
745'	835'	90'	58.86	.310	.105
870'	990'	120'	61.49	.171	.095

There were several other runs of ore in this hole but they are narrow and of no economic importance. The hole was bottomed in cherty iron formation at a depth of 1065'. It was our intention to carry this hole farther, or until it encountered a definite slate contact which would measure the limit of the iron formation and possible ore. Unfortunately, however, the bit became stuck in the hole and the rods broke in attempting to recover it. After numerous attempts had been made to ream the hole and remove this steel, such disappointing progress was made that it was decided to abandon it.

In order to determine just what the structure is in this vicinity, - since both holes Nos. 63 and 64 had followed parallel with the bedding of the formation, - three holes were drilled on a meridian 200' to the West of hole Nos. 63 and 64. Hole No. 65 was drilled due South with a dip of -70° and 200'

West of hole No. 64; hole No. 66 was drilled vertically from a point 200' West of hole No. 63; and hole No. 67 was drilled vertically 200' North of hole No. 66. All three holes were in slate and cherty iron carbonate, and encountered no iron formation or enrichment of any kind. Likewise, they found the bedding to be parallel with them and proved conclusively that the strike of the formations, which had been generally East-West, had suddenly folded approximately 90° making the strike North and South and the dip practically vertical. It then became apparent that the next holes drilled in this area to crosscut the ore and determine its width would have to be drilled inclined to the East or to the West. Drilling then was commenced on the NW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 19, 43-34, described below.

G-5. - SPIES EXPLORATION, SECTION 19, 43-34, MICHIGAN

During the spring, after the encouraging results of hole No. 63 in Section 24, negotiations were carried on with the owners of the SW $\frac{1}{4}$ of Section 19, 43-34, for a lease. The owners comprise the six Johnson Brothers, their wives and a daughter of one family, all residents of the Iron River-Crystal Falls District.

The first hole, hole No. 1, to be drilled on Section 19 (Johnson Lease) was planned to intersect the ore encountered in hole Nos. 63 and 64 on Section 24 at about its center. It was located approximately 160' South and 180' East of the Northwest corner of the Lease and drilled on a dip of -68° due West. Rich cherty iron formation was encountered at ledge (132') and continued to a depth of 265'. At this point, high grade ore was encountered extending for 80' to a depth of 345'. This ore averaged 58.17% iron, .264% phos. and .064% sul. The hole passed from ore into black slate and continued in it to a depth of 698'. At this point, the main body of ore cut in holes 63 and 64 in Section 24, was encountered. It extended to a depth of 835' with the exception of a 5' seam of 47% lean ore from 715' to 720'. From 698' to 715', the ore averaged 55.94% iron, .450% phos. and .044% sul. From 720' to 835', the ore averaged 59.01% iron, .241% phos. and .118% sul. The hole was bot-tomed in cherty gray slate at a depth of 1029'. The upper ore, from 265' to 345', undoubtedly represents a second ore body having a horizontal width of some 30' and located on the Johnson Lease. The hole crossed the boundary between Sections 19 and 24 at a depth of approximately 355'. The lower ore body has an indicated horizontal thickness of approximately 63'.

In drilling a hole to the North of hole No. 1 to explore for the con-tinuation of both the upper and the lower ore, it was advantageous to drill the next hole on the NW $\frac{1}{4}$ of Section 19 which is Bates Mine property. This mine is operated by the M. A. Hanna Company. Negotiations were carried on with Hanna to the end that we located hole No. 2, 300' North of No. 1 and approx-imately 140' North of the Johnson Lease boundary, on Bates Mine property. It is being drilled with a dip of -65° due West. An agreement was made with the Hanna Company to pay one-half of the cost of this hole to the point where it crosses the boundary between Sections 19 and 24 and, of course, they are to get all of the results of the hole. By crosscutting this upper ore again in hole No. 2, it not only will be beneficial to Hanna but to ourselves as well be-cause its position in hole No. 1 is only approximately 160' South of the Bates property on the Johnson Lease. Hole No. 2 was standpiping in surface material at a depth of 113' at the end of the year.

The second drill rig is drilling hole No. 3 with a dip of -65° due West from a point 300' South of hole No. 1 in order to extend, if possible, the ore bodies to the South as well as to the North. This hole encountered dark gray slate at ledge, depth 151', and was still drilling in it at a depth of 405' at the end of the year.

Drilling is being continued with two drills and will be pushed with all possible speed. We have been unable, however, to drill more than two shifts per day, 6 days per week, on each drill.

G-6. - PONTIAC MINE EXPLORATION, SECTION 34, 47-29, MINNESOTA

Early in April, a campaign of structural drilling from surface at the Pontiac Mine was started to drill a series of holes in the West ore body in order to get samples sufficient in size and coarseness from which to make a series of sink and float tests. The results of these tests will give us an idea of the treatability of the ore and whether or not it can be concentrated to a high grade Spiegel product that should command a premium in the ore market. The holes are only being drilled only to an approximate depth of 155' (about 90' below ledge) to the elevation of the bottom of the proposed open pit, by which it is planned to mine the upper part of the wider portion of this West ore body. Only one drill rig is being used and the work is being done under contract by J. S. Schultze and Sons of Grand Rapids, Minn.

On account of excessively high water during the Spring months, the area being drilled was flooded to such an extent that work was discontinued for several months. During that time, a ditch was dug and the area drained into low swampy ground to the South. We hope this will prevent any future surface water accumulation. A total of 8 holes, Nos. 370 to 377, inclusive, had been drilled up to the end of the year. Metallurgical tests are being made on the samples as fast as they are available. There are 8 more holes to be drilled in this program but only five of them within the proposed pit area. As soon as the latter are completed, the metallurgical results will be studied and a decision made as to the advisability of opening this mine for early production.

G-7. - CAMBRIA-JACKSON MINE

The Company took over the Cambria-Jackson Mine from the Republic Steel Corporation and assumed operation on June 1, 1943. Early in July, it seemed advisable to drill several short holes from the +300' Sub-level on the Jackson Strip, Section 1, in order to locate the ore limits more definitely and also the relationship between the ore controlling dikes and the ore at this elevation. Three holes were drilled on this Sub-level, Nos. 154, 155 and 156, and all of them were horizontal. Hole No. 154 was drilled $S.82^{\circ}E.$ for 100'; No. 155, $N.74^{\circ}E.$ for 147'; and No. 156, $S.9^{\circ}W.$ for 87'. The ore encountered in these holes was as follows:

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Amt.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
154	0'	16'	16'	63.50	.030	.020
155	0'	11'	11'	63.27	.040	.030
	25'	55'	30'	60.51	.040	.026
	96'	147'	51'	58.25	.044	.011
156	0'	80'	80'	63.14	.065	.012

Two additional holes, Nos. 157 and 158, were drilled horizontally from the +200' Sub-level. Hole No. 157 was drilled S.10°E. to a depth of 246' and hole No. 158 was drilled S.45°W. to a depth of 12'. These holes, likewise, were planned to determine the ore limits. Although some enrichment was encountered and second-class ore, averaging as high as 55% iron, no high grade ore was found in either hole. Hole No. 158 was stopped at a depth of only 12' because caving ground was experienced which made drilling very difficult, even after reaming and casing. It was decided that the area could be reached with perhaps less difficulty from another point. Just this time, however, the drill runner died very suddenly, -Oct. 31st. Because the drill site for the next hole had not been prepared, it was decided to defer drilling for the time being. No further work was done for the balance of 1943 but additional drilling is being planned for 1944.

G-8. - CLIFFS-SHAFT MINE

Two diamond drills operated continuously in the Cliffs-Shaft Mine throughout the year. During this time, 20 holes were completed and the 21st started, for a total of 6884'. One of these holes, No. 209, was an old hole which was reopened and deepened. The remaining holes were numbered from 515 to 534, inclusive. This drilling developed a total of 405' of high grade ore (above 57% iron); 176' of second-class ore (from 50% to 57% iron); and 173' of lean ore (45% to 50% iron). A considerable portion of the second-class ore, where adjacent to high grade ore, will be mined along with the latter and graded with the richer material for shipment.

In reviewing the drilling for the past year, the holes will be considered by levels instead of their chronological order.

On 1st Level "B" Shaft, 4 holes were drilled, Nos. 516, 517, 519 and 521. Hole No. 516 was drilled with a dip of -37° S. 14° W. from the South side of the level close to the Northwest corner of the Section 10 Parcel, now under lease to the Company but not at the time of the drilling. It was started from the South side of an ore stope to explore for the downward continuation of ore beneath the Southerly dipping hangingwall to facilitate planning a tramming level at some lower elevation. The hole started in high grade ore which, except for a 3' dike, continued to a depth of 57'. It was bottomed in hangingwall slate at a depth of 132'. The ore, from 0' to 45', averaged 65.36% iron and .154% phos., and from 48' to 56', it averaged 59.52% iron and .234% phos. The dike separated these two ore runs. Hole No. 517 was drilled from the same location and approximately on the same course but with a dip of -50° in order to more completely explore the downward extension of this ore and determine its cross-section. Good ore was cut from 0' to 43' which averaged 66.00% iron and .120% phos. After passing through dike to 90', an additional run of ore was cut to 112' which averaged 59.49% iron and .100% phos. The hangingwall slate was encountered at 112' and the hole bottomed in it at 131'. From the

relationship of the slate contact in these two holes, the slate apparently has been folded steeply. Hole No. 519 was drilled with a dip of -38° due North from the West end of the drift in which holes 516 and 517 were drilled. It was located approximately 240' West of the latter holes and was drilled to explore a block of iron formation North of the drift. This block has been down-folded or faulted from the block to the South. The first 6' was in good ore averaging 60.05% iron and .156% phos. Footwall dike, jasper and sideritic chert were encountered below the ore and the hole was bottomed without further change at a depth of 169'. Hole No. 521 was also drilled from the same general location as No. 519 but with a horizontal dip and a course of N.75°W. The drift from which these holes were drilled was headed for an area of possible ore but the breast was in dike. The object of this hole was to determine the thickness of the dike and whether ore actually exists beyond it. The dike proved to be 99' thick. This was followed by a 5' seam of high grade ore from 99' to 104', averaging 59.81% iron and .110% phos. After passing through a 1' seam of dike, good ore again was encountered from 105' to 118' which averaged 62.34% iron and .109% phos. The hole passed from this ore through hard ore jasper and into dike where it was bottomed at a depth of 211'.

On the 2nd Level, "A" Shaft, three holes were drilled, Nos. 523, 524 and 526. Hole No. 523 was drilled horizontal and N.26°E. from the Northeast side of the level to crosscut a synclinal fold in the slate hangingwall and to explore the North limb of this fold. It finally was bottomed at a depth of 352', all in hangingwall slate and quartzite, without reaching the North limb of the fold. Hole No. 524 was drilled horizontally and due North from a point on the level within a short distance of the bottom of hole No. 523 to continue crosscutting the synclinal fold in the hangingwall and thus reach the prospective ore horizon at a much shallower depth of drilling. It had several runs of high grade ore on the limb of the fold beyond the hanging contact which had the following analyses:

<u>From</u>	<u>To</u>	<u>Amt.</u>	<u>Iron</u>	<u>Phos.</u>
69'	85'	16'	63.70	.096
120'	135'	15'	58.45	.135
171'	192'	21'	59.76	.166
205'	220'	15'	58.76	.255
225'	280'	55'	59.64	.296
283'	295'	12'	58.67	.118

The hole bottomed in footwall dike material at a depth of 372'. These results are extremely encouraging because the ore encountered is in a heretofore undeveloped area. Hole No. 526 was drilled horizontally and N.15°W. from the same general locality as hole No. 524. The object was to explore for a Westerly extension of the ore encountered in the latter hole. Only two narrow runs of ore were encountered; the first from 17' to 26', averaging 60.89% iron and .080% phos.; the second from 157' to 165', averaging 57.73% iron and .099% phos. Both between these two runs, and below the bottom run of high grade ore, however, there were several runs of second-class ore averaging between 55.00% and 56.00% iron. Very likely much of this material will be mined and graded out with the high grade ore and become a part of the same stope. The hole was bottomed in footwall dike at a depth of 401'.

On the 3rd Level, "A" Shaft, there were two horizontal holes drilled, Nos. 528 and 533. Hole 528 was drilled due South from the South side of the level on Cliffs-Shaft fee property but passed onto the Section 10 Parcel at approximately 42'. The Parcel, by this time, had been leased to the Company

from the Oliver Iron Mining Company. The object of the hole was to explore the hard ore horizon all the way to the hangingwall slate contact which is dipping gradually to the South along this meridian. After passing through dike and hard ore jasper to a depth of 120', the hole apparently crossed a fault with the South side up, which has brought the lower soft ore jasper series of rocks into contact with the hard ore formation. The hole was carried to an ultimate depth of 527' without encountering ore and very likely it was in the footwall soft ore horizon the entire distance beyond the fault. Although negative information, the results of the hole are well worth its cost as a guide in the future study of the structure in the Section 10 Parcel. Hole No. 533 was drilled S.10°W., also from the South side of the level but about 170' West of No. 528. This was a second attempt to explore under the hangingwall on the Section 10 Parcel. The first 49' drilled was in high grade ore, averaging 61.99% iron and .117% phos. This was followed by dike with some magnetic sideritic chert to a depth of 569' where the hard ore horizon was encountered. The hole was drilling in this hard ore jasper at a depth of 578' at the end of the year.

On the 3rd Level, "B" Shaft, hole No. 531 was drilled vertically from the floor of an old stope about 100' Southwest of the shaft in order to determine the depth to which the ore in the stope extended below the floor elevation. The hole started in hard ore jasper and was bottomed in footwall sideritic chert at a depth of 46' without encountering any ore.

On the 8th Level, "A" Shaft, hole No. 515 was drilled horizontally and due South from the Southeast side of the level and heading toward the old Moro mine property. It was started in December 1942 and was drilling in hard ore jasper at a depth of 119' on the first of the year. It passed from the hard ore horizon into footwall dike at 135' and was bottomed in this material at a depth of 211'.

On the 8th Level, "B" Shaft, three holes were drilled, Nos. 529, 530 and 532. Hole 529 was drilled vertically from the floor of an old stope at the East end of the level to test the ground below this elevation. The first 7' was second-class ore averaging 56.48% iron and .151% phos. Several seams of leaner ore were cut, separated by dike, but no high grade ore. The hole bottomed in dike at a depth of 211'. Hole No. 530 was drilled with a dip of -68° S.19°W. from approximately the same location as No. 529, to further explore the ground below the old stope. It was drilled largely at the request of Capt. Olds whose "nose for ore", in certain localities of the Cliffs-Shaft Mine "has paid dividends". The ground encountered, however, was much the same as in hole No. 529 and the hole was bottomed in dike at a depth of 82'. Hole No. 532 was drilled horizontally and S.60°E. from the East side of the level to explore the ground below a stope being mined on the 7th Level and determine if the ore extends to the elevation of the 8th Level. This was done to avoid going to the expense of drifting under this ore without first knowing its vertical extent. The hole was in footwall material its entire depth, cutting dike to 233' and being bottomed in sideritic chert at 283'.

On the 10th Level, "A" Shaft, hole No. 520 was drilled horizontally and S.73°W. from the West end of the level on the Bancroft Lease in order to explore for a possible downward continuation to this elevation of ore recently encountered in a raise put up from this level to the 8th Level. Enrichment to lean and second-class ore was cut between 92' and 119'. Except for this, the hole was in jasper, sideritic chert and footwall dike and was bottomed in the latter material at 218'.

On the 10th Level "B" Shaft, four new horizontal holes were drilled, Nos. 518, 522, 525 and 527, and old hole No. 299 was reopened and deepened. No. 299, which was drilled to a depth of 307' on a course N.45°W. from the North side of the level in 1919, was reopened in Dec. 1942 in an attempt to reach the North limb of a synclinal fold, and deepened to 502'. It was in hangingwall quartzite. After continuing to a depth of 763', early in 1943, however, and still in hanging quartzite, the hole was discontinued because a Maas Compass test showed it had turned upward to a marked degree. It had an inclination of +18° at 700'. Hole No. 518 was drilled due North on the 2530 W. meridian from the long Westerly drift leading to the so-called Section 9 ore body. There is a long stretch of Virgin territory extending Westerly from the main syncline outlined at this elevation. Our first attempt to cut the ore horizon in this area was in deepening old hole No. 299 which had to be abandoned. When No. 518 reached the contact between hangingwall slate and footwall dike, the drill encountered 5' of high grade ore, from 47' to 52', which averaged 61.05% iron and .024% phos. There was no hard ore jasper present. It is possible that an East-West fault of some magnitude was crossed at this point with the footwall raised on the North side. The drill continued in footwall dike to a depth of 430' and there encountered 14' of high grade ore which averaged 58.15% iron and .111% phos. Hangingwall slate followed the ore and the hole was bottomed in it at a depth of 478'. Hole No. 522 was drilled N.22°E. from a drill station cut on North side of the same drift leading to the Section 9 deposit about 600' West of hole 518. This course was planned so that the hole would reach the North limb of the syncline at a point approximately 400' West of No. 518. After passing through 176' of footwall dike, the drill encountered the hangingwall contact. The pitch of the syncline has depressed this hangingwall so much that the drill continued in it until finally it had to be stopped at a depth of 715'. The capacity of the drill had been reached and a Maas Compass survey of the hole showed it had curved upward to such an extent that its dip was +16° instead of horizontal. Hole No. 525 was drilled N.35°W. from the same location as No. 518, the difference in courses between the two holes being 35°. The object here was to again cut the South limb of this synclinal fold at the hangingwall contact. The hole started in footwall dike and encountered the hangingwall contact at 290'. No commercial ore was found and the hole was bottomed in hangingwall slate at a depth of 401'. Hole No. 527 was drilled N.22°W. from the same location as Nos. 518 and 525, to explore for a Westerly extension and widening of the ore encountered in hole 518 and again cut the hangingwall contact on the South limb of the fold. Our persistent efforts in drilling this area were met with some success because we encountered high grade ore in No. 527, from 40' to 64', which averaged 59.78% iron and .078% phos. The drill then passed into footwall dike which continued to the hangingwall contact at 530'. No iron formation nor ore were found here and the hole was bottomed in slate and graywacke at 564'.

On the 11th Level, "A" Shaft, hole No. 534 was drilled on a dip of -3° S.15°W. from the South wall of a stope at the West end of the level in order to crosscut a pillar between this stope and a drift in ore to the South of it. A knowledge of the width of the ore beyond the drift will facilitate planning raises to mine it from the 15th Level below. Only one narrow seam of high grade ore was cut, - from 26' to 30'. This ore averaged 58.40% iron and .039% phos. 54% second-class ore, however, was cut from 82' to 107' which probably can be mined and graded out with high grade ore. The hole was carried beyond this horizon into footwall dike to cross-section the area for a possible faulted structure to the South. It passed into soft ore jasper at 527' and was bottomed in it at 555' at the end of the year.

G-9. - LLOYD MINE

A regular diamond drill was employed continuously in the Lloyd Mine until Sept. 23rd and a one man "Gopher" drill until Aug. 13th. The large drill was used entirely for drilling holes for the study of the complicated faulted structure in an attempt to discover and develop new ore bodies, whereas the small drill was used to define the limits of the ore being mined and thus assist in its development and stoping.

On the 7th Level, 5 holes were drilled with the large machine, Nos. 137, 141, 149, 154 and 157. Hole No. 137 was drilled with a dip of -70° approximately due South on the 300 E. meridian to explore the main fault crotch on this meridian at a depth below that reached by hole No. 135 drilled in late 1942. Hole No. 137 was started in Dec. 1942 and had reached a depth of 347' on the first of the year. It had passed through soft ore jasper and encountered the faulted footwall slate at 289'. The hole was bottomed in this slate without further change at 657' and without encountering high grade ore. A long delay in the progress of this hole was occasioned by breaking one of the drill rods. An attempt to remove the remaining rods and bit failed and the hole had to be reamed out before recovery was possible. Hole No. 141 was drilled with a dip of -45° due South on the 1720 E. meridian with the small machine to locate the fault dike and possible faulted iron formation below the level. It cut the dike from 40' to 72', but the balance of the hole was in footwall slate and was bottomed at a depth of 250'. Since it appeared that hole No. 137 had passed beneath the main fault crotch, it was decided to drill one more hole on this same meridian with a dip between that of holes 137 and 135. Hole No. 149, therefore, was drilled due South with a dip of -55°. It passed through two fault crotches formed by two faulted segments of the footwall slate. In the second crotch, it encountered high grade ore, from 460' to 534'. From 460' to 502', the ore averaged 58.69% iron, .108% phos. and .011% sul. and from 502' to 534', the ore was high in sulphur. It averaged 58.87% iron, .121% phos. and 1.093% sul. It was bottomed in jasper at a depth of 672' after passing through the fault dike from 534' to 559'. Although some enrichment was found in the first crotch, there was no high grade ore. The enrichment varied from 47% iron up to 55%, - just too lean for a shipping grade ore. The ore that was encountered may be an upward continuation on an Easterly rising pitch of the new ore body encountered on the 8th Level of the Morris Mine by the Inland Steel Company. In an attempt to follow up this possibility, hole No. 154 was drilled horizontally and S.30°E. from the same location as hole No. 149 to see if this ore cut the elevation of the 7th Level. The hole was carried to the main diabase fault dike, which it encountered at 549' and was bottomed in it at 562'. Unfortunately, although some lean and second-class ore was encountered, the hole found no high grade ore. One final attempt to encounter the upward extension of this ore to the elevation of the 7th Level was made in hole No. 157. It also started from the same location as hole nos. 137, 149 and 154, but was drilled horizontally on a course of S.59°E. Although, as in hole 154, some enrichment was encountered, no high grade ore was found in the hole. The main diabase fault dike was cut between 652' and 710' and the hole was bottomed in soft ore jasper at a depth of 723' on Sept. 23rd. This proved to us, quite conclusively, that the new ore body encountered by the Inland Steel Company on the 8th Level, Morris Mine, does not extend up the pitch to this elevation. This hole completed the drilling for the year with the large machine and it was moved to the Maas Mine for a drilling campaign there.

On the +515' Sub-level, one hole, No. 140, was drilled horizontally and due North to test the wall rock of the main ore body for possible ore extensions in the pillar. The hole was started in December 1942 and was drill-

ing at a depth of 20' on the first of the year. Except for two narrow seams of second-class ore, no enrichment was encountered and the hole was stopped in soft ore jasper at 71'.

On the +375' Sub-level, 14 short horizontal holes were drilled North and South from the main ore body to locate the limits of ore and thus facilitate its development and mining. This Sub-level is the main timber transfer Sub-level above the 7th Level. The holes, their ultimate depths and the analyses of the ore encountered are listed below:

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Amt.</u>	<u>Iron</u>	<u>Phos.</u>	<u>Ultimate Depth</u>
142	45'	65'	20'	52.95	.102	103'
143	0'	32'	32'	64.40	.045	147'
144	0'	65'	65'	61.90	.122	90'
145	0'	50'	50'	62.45	.100	85'
146	0'	39'	39'	63.60	.208	65'
147	0'	15'	15'	59.98	.186	69'
148	0'	40'	40'	62.65	.172	72'
150	0'	15'	15'	60.30	.138	
	17'	22'	5'	58.07	.135	58'
151	0'	47'	47'	63.11	.131	64'
152						60'
153	0'	7'	7'	61.60	.795	
	13'	46'	33'	62.00	.215	66'
155	0'	5'	5'	57.10	.230	
	65'	96'	31'	53.80	.100	104'
156	0'	5'	5'	57.10	.230	150'
158	0'	13'	13'	60.22	.133	59'

G-10. - MAAS MINE

A total of 10 holes were drilled in the Maas Mine during the year for a total of 1813'. Eight of these holes were drilled with a small machine and were relatively shallow. The other two were drilled with a larger machine. On the +100' Sub-level, hole No. 43 was drilled horizontally and practically due South in the North ore body to determine the South limb of the ore. It was started in November 1942 and was drilling in high grade ore at a depth of 80' on the first of the year. This ore extended from 60' to 110' and averaged 62.25% iron and .035% phos. It was followed by narrow seams of lean and second-class ore until unenriched soft ore jasper was encountered at 135' in which the hole was bottomed at 140'.

On the 4th Main Level, two short horizontal holes, Nos. 46 and 47, were drilled to drain off the water which had collected in an old mined out area. Both were in jasper and encountered the mine workings. Hole No. 46 was drilled to a depth of 16' and No. 47 to a depth of 28'.

On the 5th Level, five horizontal holes, Nos. 48 - 52, inclusive, were drilled, also with the small machine, and to determine the ore limits. They are described as follows:

In driving West on the 5th main Level in the North footwall drift, dike was encountered which contaminated the ore that had been followed for

some distance. To explore beyond this dike and better determine the plan for future drifting, two holes were drilled from the breast of this drift. The first of these holes, No. 48, was drilled on a course of approximately N.47°W. The first 60' was in the dike. At this point the drill encountered footwall slate and was bottomed in it at a depth of 70'. Hole No. 49 was drilled on a course of S.60°W. and ran through the dike at 10'. From 10' to 20', low sulphur ore was encountered with an average of 62.48% iron, .160% phos. and .018% sul. This was followed by 5' of high sulphur ore averaging 57.55% iron, .055% phos. and .882% sul. After passing through 5' of lean ore, high sulphur ore again was encountered at 30' which extended to 135'. This ore averaged 62.84% iron, .148% phos. and .170% sul. Low sulphur ore was cut from 155' to 200' and averaged 58.98% iron, .157% phos. and .022% sul; and again from 205' to 215', which averaged 57.02% iron, .185% phos. and .021% sul. Seams of lean and second-class ore separated these runs. The hole was bottomed in hangingwall soft ore jasper at a depth of 225'.

Hole No. 50 was drilled S.3°W. from the South side of the North drift on approximately the 1967 W. meridian in order to determine the width of the North ore body on this meridian and assist in outlining the ore for the planning of development drifts to mine it. The hole encountered high sulphur ore from 0' to 225' which averaged 63.37% iron, .113% phos. and .340% sul. The next 15' was mixed ore and jasper, but at 240', clean ore again was encountered and the hole bottomed in it at a depth of 275' when the drill machine had reached its capacity. The ground in the bottom of the hole, however, began to look leaner and there were seams of jasper in the core which indicates that the main jasper formation was close by. This last run of ore averaged 62.64% iron, .088% phos. and .447% sul. Hole No. 51 was drilled N.48°W. from the North end of the West crosscut to explore the ground between this crosscut and hole No. 50. The hole was stopped at a depth of 65' without encountering ore but demonstrated to Mr. Moulton, Superintendent, that the ore in hole No. 50 should be developed through raises from the 6th Level rather than by a drift in this rock. Hole No. 52 was drilled S.46°W. from the Southwest end of the level, parallel to and approximately 145' Northwest of the boundary between the Maas and Negaunee Mines, and toward the Southwest boundary of the Maas Mine property. This course is on the line of the drift extended. The breast of the drift was in dike and the object of the hole was to determine if there was ore beyond it in sufficient amount to warrant extending the drift. After drilling 15' of dike, the hole encountered 20' of high grade ore, from 15' to 35', which averaged 57.51% iron, .117% phos. and .026% sul. Alternating seams of lean and second-class ore followed the good ore to a depth of 95' where soft ore jasper was encountered. Except for two narrow seams of lean and second-class ore, the drill continued in jasper until the hole was bottomed at a depth of 127'.

Hole No. 53 was drilled with a dip of -30° and approximately due South from the South end of the 1800' drift on the 5th Level with a large machine. The object of the hole was to explore the South limb of the main Maas-Negaunee syncline along its Westerly strike on Pioneer and Arctic land lying South and West of the Maas and Negaunee Mines. The hole encountered ore from its beginning to a depth of 195'. It averaged 63.19% iron, .059% phos. and .438% sul. At 195', transition slate and jasper was cut and finally, at 234', the main footwall slate. The hole was bottomed in this at a depth of 262'. Hole No. 54 was then drilled with the same machine and from the same setup, also due South but horizontally, to determine the limit of ore in hole No. 53 as it rises to the 5th Level elevation, and to continue to cross-section the Pioneer and Arctic property for general exploration information. We were surprised to encounter only 10' of ore, and that, at the very start of the hole. This ore averaged 60.24% iron, .042% phos. and .472%

sul. After passing through a 6' seam of jasper, however, 50' of 51% second-class ore were cut from 16' to 66'. Jasper again was cut beyond this enrichment and the footwall slate contact was encountered at 289'. The drill passed through this slate, however, into jasper on the South side at a depth of 316' and was still drilling in typical soft ore jasper at a depth of 685' on the last of the year. Evidently, the slate has been cut by a fault which has dropped the South limb of this basin down on the South side. The hole is extremely valuable in the interpretation of this structure for future exploration of the area.

G-11. - PRINCETON MINE

Three holes were drilled in the Princeton Mine during the year with a small one-man drill for a total of 614'. The estimated ore areas (two principal areas) at the elevation of the new 7th Level, No. 2 Shaft, as constructed from their limits above, together with information from old holes drilled from surface, indicated a barren area or a possible anticlinal roll between them. To explore this area and assist in laying out crosscuts on the level, hole No. 3 was drilled horizontally and S.45°W. from the footwall drift. It started in arkose and was drilled to a depth of 298' where it was bottomed in the same material without change. On account of the softness of the arkose, the hole dipped below the horizontal considerably, having an inclination of -9° at a depth of 260'. Had it remained horizontal or turned upward, it probably would have cut the arkose contact and reached the objective of the hole. It was stopped because of this downward inclination.

Hole No. 4 was drilled horizontally and S.20°W. from the 6th Level, No. 3 Shaft, to cut a pillar between the main drift and a crosscut to the South. From all previous information, ore had been assumed to extend through the pillar. The hole cut 74' of soft ore jasper and a 1' seam of ore and then entered the footwall arkose at 75'. It was bottomed in the arkose at a depth of 124'. As a result of this hole, the outlines of the ore previously used have had to be revised. Hole No. 5 was drilled horizontally and S.45°W. from the 7th Level, No. 2 Shaft, at the end of the crosscut directly Southwest of the shaft to determine the width of the ore at this point. It started in footwall arkose but encountered ore at 120'. There were three runs of ore between 120' and 185' as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>
120'	140'	20'	57.91	.233
150'	160'	10'	63.75	.052
170'	185'	15'	60.65	.096

Lean ore and jasper separated these runs and the hole was bottomed in jasper at a depth of 192' at the end of the year. This completed the drilling in the Princeton mine for the present.

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THE ATHENS IRON MINING COMPANY

G-12. - ATHENS MINE

In June, it was decided to drill one short horizontal hole due South from the -290' Sub-level on Athens Lot No. 12 to locate the position of the South footwall contact with the slate. Hole No. 12 was drilled and encountered this contact at a depth of 80'. It was bottomed in the slate footwall at 105' without encountering ore. No further drilling was done in the Athens mine during the balance of the year. The total cost of this work was \$352.75 or \$3.36 per foot.

THE NEGAUNEE MINE COMPANY

G-13. - MATHER MINE SURFACE, SECTION 1, 47-27, EXPLORATION

Hole No. 136, which is located close to the center of Section 1, was drilled vertically to a depth of 2163' during 1937. It was discontinued in soft ore jasper on August 31, 1937 when ore was encountered in hole No. 16, Section 2, 47-27. It was decided at that time to concentrate all immediate efforts on developing a merchantable ore body in Section 2. After discontinuing drilling from surface on Section 2, at the end of March 1943, it was decided to reopen hole No. 136 and continue it to the footwall slate. Drilling began at 2163' on April 29th. High grade ore was encountered at a depth of 2601'. The ore continued to be high grade, and with a remarkably uniform analysis, to a depth of 2805'. This 204' averaged 63.84% iron, .072% phos. and .013% sul. The next 14', to 2819', continued to carry a high percentage of iron but the phosphorous and sulphur increased somewhat. The ore averaged 63.20% iron and .122% phos. Pieces of core in this run ran from .200% to .361% in sulphur. The core recovery, however, was very small. The drill water was sampled for soluble sulphur but the results still have not been completely calculated. It is to be presumed, however, that the sulphur in this short run will average in the neighborhood of .200%.

When drilling had reached a depth of 2819', porous ground was encountered and the water was lost. The drill bit accidentally ran a little too long under this condition with the result that it swelled sufficiently so that it could not be withdrawn through the casing. In attempting to remove the casing, bit, etc., the casing broke in several places. A great deal of difficulty was experienced following this and the hole had to be abandoned after recovering most of the casing and drill rods. When the hole was abandoned, the bit, core barrel and a few lengths of rods, together with 400' of AX casing had to be left in the hole. The bit, however, was an inexpensive Bortz bit. It was felt that the footwall slate was so close below the bottom of the hole, as evidenced by the change of character in the ore itself in the last few feet of drilling, that no serious loss was experienced either materially or in failing actually to reach the footwall slate.

Hole No. 137 is being drilled vertically on the 7800 E. meridian at a point approximately 1200' due North of hole No. 136, and 400' South of the South line of the Jackson Strip, now a part of the Cambria-Jackson mine. The object here was to drill another vertical hole to the footwall slate on this meridian to extend the sectioning of the structure across the property and to disclose high grade ore, if possible. The hole had reached a depth of 957' at the end of the year and was drilling in hard blue jasper below the main greenstone sill. No enrichment of the iron formation to this depth had been

expected, nor was it encountered.

In November, it was decided to add a second drill to this exploration and get much needed information on other meridians across the property. Drilling generally in Section 1 is deep and each hole takes several months to complete. We already know that the geologic structure is complicated by numerous generally East-West faults, and also at least some faulting in a generally North-South direction. These faults form structural troughs in which high grade ore bodies are formed. Hole No. 138 is being drilled vertically and is located on the 6400 E. meridian (1400' E. of the meridian through holes Nos. 136 and 137), and approximately 750' S. of the North line of the Section. Drilling commenced on Dec. 1st and the hole was drilling in hard blue jasper at a depth of 175' at the end of the year.

A total of 1788' was drilled during the year at an overall cost of \$18,133.66, or \$10.14 per foot. This was abnormally high because of the accident in hole No. 136, as explained above.

G-14. - MATHER MINE SURFACE, SECTION 2, 47-27, EXPLORATION.

Hole No. 52, which was drilled vertically, was located on the 13600 W. meridian in the Golf Club area and was approximately 800' W. of the point where the deep ore body was cut in drilling hole No. 38. Drilling commenced on July 6, 1942 and the hole had reached a depth of 1635' at the beginning of 1943. The ore horizon in the soft ore jasper formation was encountered at approximately 2100'. From 2230' to 2250', there was a slight enrichment with seams of lean and second-class ore having an iron content from 47% to 51%, but no high grade ore. The footwall Siamo slate was reached at a depth of 2262' and the hole was finally bottomed in it without further change at a depth of 2383' on March 27th. Naturally, we were disappointed that this hole did not encounter high grade ore and in amount comparable to that in hole No. 38. Either the ore encountered in the latter hole does not continue as far West as hole No. 52, or else it swings to one side of it, - possibly to the South. It was decided to discontinue drilling from surface with the completion of this hole and wait for underground development to reach the general vicinity of the area before additional exploration. This completed the drilling campaign from surface on Section 2 for the time being.

A total of 748' was drilled during the year at an overall cost of \$6,052.64, or \$8.09 per foot.

G-15. - MATHER MINE

A campaign of drilling was started underground in the Mather Mine on August 24th. Six holes were completed during the balance of the year for a total of 1766' and at a cost of \$4939.95, or \$2.80 per foot. This cost included all overhead, sampling and analysis expense. All holes, Nos. 1 - 6, inclusive, were drilled approximately due South from the breasts of the first and third crosscuts on the 3rd or -1750' Main Level. Holes 1 and 2 were drilled horizontally and S.8°E. from the first crosscut. After hole No. 1 had encountered ore just above the slate contact, the crosscut was extended

ahead through this ore to the interbedded ferruginous slate complex. Hole No. 2 was drilled from the breast of the crosscut as extended through this interbedded slate and into the main body of soft ore formation above it. Holes 4, 5 and 6 were drilled on the same course (S.8°E.) but at an inclination of -50°, -57° and -32°, respectively. They were drilled in an attempt to follow the ore down the dip and find out if the sulphur content diminished materially as depth was attained. Unfortunately, the dip was irregular and the holes ran into wall rock before they had reached the elevation of the next proposed Main level. They did demonstrate, however, that the sulphur content dropped down materially at approximately 60' below the 3rd Level on the angle of the dip. Hole No. 3 was drilled horizontally and S.8°E. from the breast of the 3rd crosscut to test the ground adjacent to the slate footwall contact.

The footage of high grade ore encountered in all of the holes, its analysis and the ultimate depths of the holes, are as follows:

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>	<u>Ultimate Depth</u>
1	72'	80'	8'	58.25	.158	1.171	
	92'	96'	4'	57.50	.172	1.197	96'
2	200'	263'	63'	59.76	.099	.980	
	322'	332'	10'	57.77	.055	2.801	
	350'	365'	15'	57.48	.059	1.421	400'
3	11'	27'	16'	61.00	.107	.134	321'
4	0'	78'	78'	63.39	.216	.494	226'
5	0'	61'	61'	62.76	.226	.583	286'
6	0'	82'	82'	62.76	.166	.667	295'

Hole No. 6 was completed at the end of the year. As will be noted, all of the ore encountered may be classed as high sulphur. With the exception of the ore in hole No. 2, which was geologically above the interbedded slate-complex, all the ore encountered was interbedded between the main slate footwall and this interbedded slate complex. In the Annual Report Book of Maps will be found detailed cross-sections of these holes recording the material encountered and also the separate analysis of each 5' ore run. Underground drilling will be continued as development work progresses.

G-16. - NEGAUNEE MINE

A campaign of drilling a series of short underground holes with a small or one-man (Gopher) drill, was started February 1st. Ten holes were drilled, Nos. 38-47, inclusive, for a total footage of 909', and at an overall cost of \$1,652.09, or \$1.82 per foot. All holes were drilled to assist in outlining the ore limits within the mining areas. Holes 38 to 42, inclusive, were drilled horizontally from the +160' Sub-level; hole No. 43 was drilled with a dip of -37° N.7°E. from a crosscut on the 13th Main level; holes 44, 45 and 46 were drilled horizontally from the +150' Sub-level, and hole No. 47 horizontally from the +170' Sub-level. No. 47 was still drilling and it was in ore at a depth of 30' on the last of the year. The high grade ore encountered in all of these holes, its analysis and the ultimate depths of the holes are as follows:

<u>Hole No.</u>	<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Ultimate Depth</u>
38	10'	14'	4'	62.25	.139	
	65'	75'	10'	65.72	.218	160'
39	0'	30'	30'	58.56	.198	
	35'	45'	10'	62.00	.362	
	65'	70'	5'	62.75	.076	120'
40	0'	10'	10'	59.02	.073	
	30'	50'	20'	63.16	.036	78'
41	0'	6'	6'	62.85	.032	6'
42	0'	65'	65'	61.68	.027	
	75'	105'	30'	63.52	.025	
	115'	145'	30'	61.78	.041	145'
43	0'	25'	25'	58.35	.025	60'
44	0'	25'	25'	60.99	.040	105'
45	35'	45'	10'	61.81	.044	110'
46	0'	10'	10'	60.08	.027	
	22'	45'	33'	57.99	.145	
	55'	58'	3'	58.36	.098	105'
47	0'	30'	30'	57.51	.142	30'

THE CANISTEO MINING COMPANY

G-17. - CANISTEO MINE, SECTIONS 29, 30, 31 and 32, 56-24, MINNESOTA.

The Cleveland-Cliffs Iron Company continued to operate the Canisteco Mine, as agents for the Canisteco Mining Company of Duluth. A total of 24 structural holes were drilled in the Canisteco pit and around its perimeter during 1943. Nine of these holes were drilled on the South Bovey leases, -8 of them on the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 31, and one on the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 32. Nine holes were drilled on the East Snyder Lease, the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 30. Six holes were drilled on the Hemmens, the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 29. A total of 3906' was drilled which included 681' of stand-piping through surface material. Of this footage, 2316' was drilled under contract by J. S. Schultze of Grand Rapids, Minnesota, and the balance, or 1590', by Company rigs. The total cost was \$18,734.72, or \$4.80 per foot, including all overhead, sampling and analysis expense. The cost of drilling alone was \$13,922.01, or \$3.56 per foot. All of this drilling was in connection with current mining operations, and to determine the outline of ore under the present pit banks in order to direct the stripping operations preparatory to the ore season of 1944. A total of 1505' of crude wash ore was encountered in this drilling.

THE MESABA-CLIFFS MINING COMPANY

G-18. - HILL-TRUMBULL MINE, SECTION 17, 56-23, MINNESOTA.

A total of 11 structural holes were drilled in the Hill-Trumbull pit and around its perimeter in 1943. All holes were drilled under contract by J. S. Schultze of Grand Rapids, Minnesota. One hole was located on the Trumbull Lease and the remaining ten on the Hill Lease. The ten holes were

drilled from surface along the North bank of the pit to complete the outline of a small extension of ore from the pit extending under the bank, and to determine the limits of stripping to make this ore available for open pit mining. The total footage drilled was 1601' which included 689' of standpiping through surface material. The total cost, including all overhead, sampling and analysis expense was \$9,050.70, or \$5.65 per foot. The cost of drilling alone amounted to \$5,789.35, or \$3.62 per foot. A total of 200' of crude wash ore and jig material was encountered in this drilling.

G-19. - HOLMAN-CLIFFS MINE, SECTIONS 21 AND 22, 56-24, MINNESOTA.

A total of 28 structural holes was drilled at the Holman-Cliffs pit and around its perimeter in 1943. All but one hole were drilled under contract by J. S. Schultze of Grand Rapids, Minnesota. Nine holes were drilled on the Bingham Lease, -the NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 21; 6 holes on the North Star Lease, -the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 21, and 13 holes on the Brown No. 2 Lease, -the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 22. The total footage drilled was 5480', of which 884' was standpiping through surface material. The total cost of this work, including all overhead, sampling and analysis expense was \$29,917.12, or \$5.46 per foot. The cost of drilling alone amounted to \$23,710.58, or \$4.33 per foot.

The nine Bingham holes were located between holes that were drilled some years ago, in order to more closely sample the ore body. The holes on the North Star Lease explored for a Northeasterly extension of the open pit ore underneath the pit bank. The holes on the Brown No. 2 Lease were drilled both within the pit area and from the East bank of the pit to explore for an extension of the ore, both in depth and laterally, and to determine the limits of stripping. A total of 15' of direct shipping ore and 2120' of crude wash ore and jig material were encountered in this drilling.

H. - EXAMINATION OF MINERAL LAND OFFERS

A total of 38 land offers was received by this office during the year 1943. Thirty-four were mineral land offers and the remaining 4 were offers of real estate in the City of Negaunee. The offers and their numbers are as follows:

<u>Offer No.</u>	<u>Description</u>	<u>Remarks</u>
2241	Iron Ore Property - Venango County, Penn.	Declined
2242	The Iron Chief Mine, Riverside County, Calif.	"
2243	NW $\frac{1}{4}$ of the SE $\frac{1}{4}$, Sec. 18, 56-23, Itasco Co., Minn.	"
2244	Hartford, Cambria & Lillie Mines, Marq. Co. Mich.	Leased
2245	Magnetite properties - Grafton Co., New Hampshire	Declined
2246	Lot 7, Block 33, Pioneer Iron Company Plat, Neg.	Pending
2247	Molybdenum property, Ontario, Canada	Declined
2248	Lots 2 and 3, Section 4, 62-14, Vermilion Range, Minnesota	"
2249	NE $\frac{1}{4}$ of the SE $\frac{1}{4}$, Section 10, 47-29, Marquette Co.	"

<u>Offer No.</u>	<u>Description</u>	<u>Remarks</u>
2250	Ajax Mine, Mesaba Range, Minnesota.	Declined
2251	218 acres surrounding Globe Iron Company's Clifford-Cornell Pit, Iron Mountain, Mich.	"
2252	125 acres magnetite ore lands 15 miles from Reading, Pa.	"
2253	E $\frac{1}{2}$ of SE $\frac{1}{4}$, Sec. 24, 57-22, Bennett Reserve, Mesaba Range, Minnesota.	"
2254	South Agnew Mine, Mesaba Range, Minnesota	Withdrawn
2255	Graham Mine, No. 1 Pit, Mesaba Range, Minn.	Declined
2256	Hennepin property, Ontario, Canada.	"
2257	N $\frac{1}{2}$ of SW $\frac{1}{4}$ and SE $\frac{1}{4}$ of SW $\frac{1}{4}$, Section 27, 43-34, Iron County, Michigan.	"
2258	Same property as Offer No. 2243.	"
2259	Various descriptions in 59-15 and 58-20, St. Louis County, Mesaba Range, Minnesota.	Pending
2260	E $\frac{1}{2}$ of SW $\frac{1}{4}$ and S $\frac{1}{2}$ of SE $\frac{1}{4}$, Section 9, 47-26, Marquette County, Michigan.	Declined
2261	S $\frac{1}{2}$ of SE $\frac{1}{4}$ of Section 23 and SE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Section 24, 48-30, Baraga County, Michigan.	"
2262	Hard iron ore property 20 miles from Sault Ste. Marie, Ontario, Canada.	"
2263	Iron ore property, New York State. Location not submitted.	"
2264	Mineral property in Trigg County, Kentucky.	"
2265	Iron ore property in Uvalde County, Texas.	"
2266	Caledonia Hematite Mine, St. Lawrence Co., N.Y.	"
2267	Minerals and 7/8 surface, Lot 7, Pineville town-site, St. Louis County, Minnesota.	"
2268	Cuff Mine, Dickinson County, Michigan.	"
2269	Various descriptions in Section 24, 58-20, Mesaba Range, Minnesota.	"
2270	Two houses and Lot 11, Block 24, Pioneer Iron Company's Plat, Negaunee, Michigan.	Purchased
2271	SW $\frac{1}{4}$ of the SW $\frac{1}{4}$, Section 17, 46-29, Cuyuna Range, Minnesota	Declined
2272	Lands and minerals in various counties in Upper Michigan owned by D.M.&M. Land Company.	"
2273	New York Mine, Marquette Range, Michigan.	"
2274	Lands of the Escanaba River Land & Iron Company, Marquette County, Michigan.	"
2275	House and N.55', Lot 3, Block 5, Pioneer Iron Company Plat, Negaunee, Michigan.	"
2276	Various mineral rights in Iron and Dickinson Counties, Michigan.	"
2277	Iron ore in North Carolina,- location not submitted.	"
2278	House and Lot 5, Block 2, Corbit's First Addition, Negaunee, Michigan.	Pending

I. - RESEARCH & EXPERIMENTS

Sintering and Briquetting Tests:-

In October 1942, a carload of Princeton Mine plastic "Cambridge" ore was sent to the Mines Experiment Station at the University of Minnesota, Minneapolis, Minn. to see what could be done in agglomerating by sintering. The sintering tests were made in January 1943. A satisfactory sinter was made but at an estimated cost, including the depreciation of a plant, too high for the relatively small reserves of such ore to be treated. During the spring, Mr. Holt made a large number of tests in briquetting this ore. Here again, satisfactory results were obtained with the ore itself but the estimated cost was prohibitive under present market conditions. Much valuable information was obtained, however, which may be used in the future on ores other than from the Princeton mine.

Sink and Float Tests:-

Sink and float tests have become a routine operation at our test laboratory on the Mesaba Range, on samples from structure drilling in so-called jig ore material. Also, these tests were made on structure drill samples from the Pontiac mine, and on outcrop samples from the old Republic mine. In addition, sink and float tests were made in our Mesaba test laboratory on samples from the Helen Mine of the Algoma Steel Company, the Ball mine of the Missouri-Cliffs Mining Company, and on structure drill hole samples from the Schley Mine.

Oil Flotation Tests:-

The Minerals Separation North American Corporation continued to make a large number of ore flotation tests in their laboratory at Hibbing on tailings deposited in the tailings basins at the Canisteo, Hill-Trumbull and Holman Plants. They found the best results were obtained on Canisteo tailings. An agreement is being negotiated to allow them to build a pilot plant and operate it during the coming season at the site of the Canisteo washing plant to continue their tests on a large scale.

The American Cyanamid Company, in their laboratory at Stamford, Conn., also has made a large number of oil flotation tests on waste material from our Mesaba Range operations. These may be summarized as follows:

1. Hill-Trumbull taconite was ground to 3.6% plus 100 mesh yielding 53.23% minus 325 mesh. The feed was deslimed and the balance floated in two stages,- a rougher and a cleaner stage. The head feed sample ran 22.28% iron, and the cleaner concentrates showed a weight recovery of 29.95% with a product averaging 58.26% iron and 12.90% silica.

2. A similar test was made of Hill-Trumbull classifier over-flow. The feed averaged 19.82% iron. The concentrates showed a 32.53% weight recovery averaging 58.99% iron and 9.91% silica.

3. Flotation tests on Holman classifier over-flow, using water from a local source, gave a concentrate of 32.06% weight recovery with 56.60% iron and 12.52% phos. Using water shipped from the Holman property, which would have to be used in case the plant was located there, a concentrate was made yielding 36.75% recovery, averaging 54.51% iron and 16.11% silica.

*probably
silica
3.2%*

Gravity Concentration Tests:-

At the Mines Experiment Station, Minneapolis, several tests were made on crude ore material from the Hill-Trumbull and Holman properties and on a sample from outcrops at the old Republic mine, using a modern designed so-called Dorr Hydrosizer. This machine is an improved Fahrenwald Multiple Cell Classifier.

Two lots of Hill-Trumbull crude ore, both crushed to pass 1/4" screen yielded the following results:

	<u>Lot</u>	<u>% of Total Weight</u>	<u>%Iron</u>	<u>% Silica</u>
Feed	1	100.00	46.06	-
Concentrates	1	58.30	57.70	9 - 10 (Est.)
Feed	2	100.00	53.46	-
Concentrates	2	77.75	57.43	9 - 10 (Est.)

On material from the Holman tailings basin, and using only four spigots of the machine, a 57.96% weight recovery was made having an average of 60.4% iron and 10% silica. Using five spigots, the product resulted in a 65.00% weight recovery with iron averaging 58.7% and silica 12%.

The sample taken from outcrops at the Republic mine came from within 100' of the mined and caved area. It was crushed to pass 48 mesh and yielded a product with a weight recovery of 21.26%, averaging 66.96% iron. The feed averaged 39.79% iron. A flotation test was made on the tailings from these tests and yielded a product averaging 67.26% iron. This, however, was on a weight recovery, based on the total feed, of 13.4%. Combining the Hydrosizer and flotation products, the total weight recovery was 34.7%.

The Stearns-Roger Company of Denver, Colorado, is developing a so-called Centrifugal concentrator which it believes will be applicable to iron ores and particularly in the -1/4" to zero size range. This is the size range that has bothered us so much in our heavy density flow-sheet at the Hill-Trumbull mine. The cone, which operates on the coarse sizes down to 1/4", makes a beautiful separation but the double classification process, using two Akins classifiers in series, on the -1/4" material, has not come up to expectations. We are making changes and improvements, however, that we expect will give us satisfactory results during the coming season. A laboratory test made by the Stearns-Roger Company in their laboratory on -1/4" jig material from the Hill-Trumbull pit, which averaged 32.4% iron in the crude, made a 26.5% weight recovery averaging 59.10% iron and 6.20% silica. This does not include the material left in the machine as a bed, which, in a clean-up, would augment the other concentrates and thus improve the recovery. The feed in this test averaged only 32.4% iron which is considerably lower than the average jig material in the properties. Naturally, with a higher grade feed, we would expect a higher percentage of recovery. A semi-commercial size machine is being designed and will be used at our Hill-Trumbull plant during the coming season for test purposes.

General:-

Mr. George H. Beasley has continued to have charge of our laboratory tests on the Mesaba Range. Mr. Grover Holt, however, has acted in an advisory and supervision capacity. A new modern test laboratory is being constructed by the Company near the Holman-Cliffs mine office which we hope will

be in operation about July 1944. This will be equipped with the very latest and modern machinery and concentrating devices for treating all types of iron ores. All of our Minnesota test work will be centralized in this laboratory, both from the open pits and the structural drilling. It will aid us materially in watching the results of the several concentrating plants at our Mesaba Range properties and, we hope, mean a material improvement in all of our flow-sheets as time goes on.

J. - EXPENSE STATEMENTS

Tables VII and VIII which follow, show a detailed statement of charges to Geological Expense for the year 1943, and a comparative statement of these charges for the last three years. They are self-explanatory.

TABLE VII

STATEMENT OF CHARGES TO GEOLOGICAL EXPENSE FOR THE YEAR 1943

Salaries	\$ 16,089.88
Travel and Entertainment	3,740.22
Operating Automobiles	993.95
Supplies and Office Expense	2,884.98
Personal Injury	2.00
Unemployment Insurance Tax	140.21
Old Age Benefit Tax	112.46
Unclassified	<u>375.05</u>
TOTAL	\$ <u>24,338.75</u>

TABLE VIII

COMPARATIVE STATEMENT OF CHARGES TO GEOLOGICAL DEPARTMENT FOR LAST THREE YEARS

	<u>1943</u>	<u>1942</u>	<u>1941</u>
Salaries	\$ 16,089.88	\$ 14,212.05	\$ 14,439.59
Travel and Entertainment	3,740.22	2,448.74	1,911.11
Operating Automobiles	993.95	980.24	691.00
Supplies and Office Expense	2,884.98	1,537.17	1,749.11
Personal Injury	2.00	2.00	22.50
Unemployment Insurance Tax	140.21	153.11	357.85
Old Age Benefit Tax	112.46	95.68	108.44
Unclassified	<u>375.05</u>	<u>113.06</u>	<u>163.60</u>
TOTALS	\$ <u>24,338.75</u>	\$ <u>19,542.05</u>	\$ <u>19,443.20</u>

Respectfully submitted,

E. L. Derby, Jr.
Geologist

ELD:el
4/7/44

