

WELFARE DEPT. ANNUAL REPORT YEAR 1946

11. a. WORKMEN'S COMPENSATION (Continued)

Following is a list of the more serious cases other than fatalities which occurred in 1946:

<u>Mine and Report No.</u>	<u>Name</u>	<u>Nature of Injury</u>	<u>Compensation Paid to 12-31-46</u>
Athens 482	Clarence Emanuelson	Fracture, body of 1st lumbar vertebra.	210.00 *
Athens 483	Andrew Harbacek	Amputation, middle finger, left hand.	189.00 *
Cliffs-Shaft 1179	Victor Ollikainen	Complete fracture of femur, right leg.	1,092.00 *
Cliffs-Shaft 1180	Gordon Paulson	Perforating injury to right eye.	420.00
Cliffs-Shaft 1191	Urho Konster	Amputation, half of 3rd finger, left hand.	210.00
Gen. Storehouse 64	George Magnuson	Amputation, half of 3rd finger, right hand.	210.00
Princeton 234	John O. Anderson	Amputation, half of right index finger.	367.50
Maas 644	Joseph Barabe	Surface area, palm of right hand lacerated by power planer.	388.50
Maas 645	Matt Hahka	Muscle damage, left thigh.	416.50
Maas 646	Nicholas Tambling	Brachial paralysis, left shoulder.	448.00
Lloyd 865	William H. Williams	Contusion, back and shoulder. Fracture, right arm.	409.50
Negaunee 794	Paul Holappa	Fracture, head of humerus. Bruised back and chest.	315.00
Negaunee 796	Gabriel Fosco	Sprained structure of neck.	441.00 *
Negaunee 800A	Albert Hendrickson	Back injury - operation for same.	567.00 *
Mather 12	George E. Butler	Fractured pelvis.	350.00

WELFARE DEPT. ANNUAL REPORT YEAR 1946

11.
a. WORKMEN'S COMPENSATION (Continued)

<u>Mine and Report No.</u>	<u>Name</u>	<u>Nature of Injury</u>	<u>Compensation Paid to 12-31-46</u>
Mather 19	Edwin C. Koski	Amputation, half of right middle finger.	315.00
Cambria-Jackson 40	John Hill	Amputation, middle and ring fingers, left hand.	294.00 *
Cambria-Jackson 42	August E. Tynismaa	Fracture, right scapula. Fistula. Eye condition.	273.00 *
Holman-Cliffs 46	Charles Hecomovich	Amputation, portion of right foot. Crushed right shoulder.	144.00 *
Holman-Cliffs 47	James A. Ondrasek	Fractured pelvis.	48.00 *

* Payments still being made.

ANNUAL REPORT - 1946
 STATEMENT OF COMPENSATION PAYMENTS FROM
 JANUARY 1, 1946 TO DECEMBER 31, 1946

	Average No. of Employees	No. of Fatal Accs.	No. of Non-fatal Accidents			Actual Comp Paid in 1 9 4 6	1 9 3 7	1 9 3 8	1 9 4 0	1 9 4 1	1 9 4 2	1 9 4 3	1 9 4 4	1 9 4 5	1 9 4 6	Estimated Compensation Still Pending	Medical & Special Expense	Fatal Cases Pending	Accident Cases Pending	O. D. Cases Pending
Cambrria-Jackson	210		9	12	18	4,974.92						1,460.92		2,285.50	1,228.50	1,804.28	2,555.33		6	
Cliffs-Shaft	420		17	17	48	12,362.77		468.00				3,168.78	3,422.47	2,247.00	3,056.52	9,327.00	6,146.48	1	6	3
General Storehouse and Shops	143		2		17	416.50								416.50	105.00	1,460.80		1		
Isppening Office	198						2,556.00									1,320.75				
Lloyd	190		10	9	46	18,462.23			1,120.32	1,023.84	5,832.00	5,150.50	1,396.07	1,382.50	17,786.11	2,418.90		3	9	1
Maas	378		12	23	73	13,565.86		936.00	2,936.00			2,009.00	4,742.36	2,474.50	15,961.00	3,848.90	1	6	1	
Princeton	83		1	5	10	9,122.64				224.64	4,019.00	588.00	3,881.50	409.50	8,434.08	2,958.00		5	2	
Spies-Virgil	90		2	3	24	2,143.00					988.00	1,092.00		63.00	4,407.00	539.00	1	3		
Tilden	19			1	1										170.25					
Miscellaneous	17		1		11										156.75					
Cleveland Roll	22														201.00					
Cliffs Power & Light Company	66			1	3	936.00				936.00					396.00	592.50	1			
Negaunee	291		11	16	39	14,857.52		3,520.00	544.32	1,000.80	2,808.00	1,706.40	3,514.00	1,764.00	9,879.84	3,523.29	2	8	2	
Mather	271		15	13	68	3,903.19						1,092.00	773.50	2,037.69	5,334.00	2,659.20	1			
E&A #9, Sec. 1, Hole 141						448.00							448.00							
Athens	341		11	13	54	2,297.88			120.52	917.36	535.50		94.50	630.00	13,911.66	3,075.75		3	2	
Total - Michigan Mines	2,739	0	91	113	412	83,490.51	2,556.00	1,404.00	4,108.52	5,536.64	3,166.64	18,812.20	15,061.37	19,382.43	13,462.71	87,345.97	31,626.90	10	47	11
Hibbing Office	32															190.00				
Canisteo	154		2		36	260.34									260.34	925.00				
Hill-Trumbull	169		3	2	33	766.40								638.40	128.00	1,218.25				
Holman-Cliffs	216		8	2	39	2,530.71						1,955.71			575.00	11,052.29	1	3		
Atkins	60		1	1	15	24.00									24.00	72.00		1		
Total - Minnesota Mines	631	0	14	5	123	3,581.45						1,955.71	638.40	987.34	11,124.29	5,471.42	1	4	0	
Total - All Mines	3,370	0	105	118	535	87,071.96	2,556.00	1,404.00	4,108.52	5,536.64	3,166.64	18,812.20	17,017.08	20,020.83	14,450.05	98,470.26	37,098.32	11	51	11

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11.
a. WORKMEN'S COMPENSATION (Continued)

ANNUAL STATEMENT OF COMPENSATION PAYMENTS
FROM JANUARY 1st, 1946 to DECEMBER 31st, 1946

Compensation paid on 1946 cases	\$	14,450.05
Estimated compensation still pending		98,470.26
Cost of medical and hospital service, also special expense		<u>37,098.32</u>
		150,018.63
Less pending for years 1937 to 1945 inclusive		75,256.76
Less medical and special expense on accidents occurring prior to January 1, 1946		<u>5,924.64</u>
		<u>81,181.40</u>
		68,837.23
Less compensation paid on 1946 occupational disease cases		1,456.00
Estimated compensation still pending on 1946 occupational disease cases		<u>12,819.00</u>
		<u>14,275.00</u>
Estimated cost of 1946 accidents		54,562.23
Percentage of payrolls		.00742
Percentage of payrolls including Occ. Dis. cases		.00936
Number of fatal accidents		0
Number of compensable accidents		105
Number of lost-time accidents - non-compensable		118
Number of slight accidents		535

The following occupational disease cases occurred during 1946. The cost of these cases is included in the regular compensation costs, but for statistical purposes they are not included in the accident table.

Number of deaths		0
Number of disability cases		8

During 1946 a total of \$11,592.12 was paid on occupational disease cases and it is estimated that it will cost \$28,088.28 to complete payments on the twelve cases still active on December 31, 1946. Of these, four originated in 1944, three in 1945, and five in 1946.

11. a. WORKMEN'S COMPENSATION (Continued)

Compensation Payments including Medical and Special Expense

Year	C. C. I. Co.	Negaunee Mine Co.	Athens Ir. Mng. Co.	Cliffs Pr. & Light Co.	Mesaba-Cl. Mng. Co.	CCI Co, Opt Agt, Atkins	Miscellaneous Companies	TOTAL
1912 to 1936	1,199,727.22	156,309.12	100,676.09	12,496.45	71,927.99		10,282.71	1,551,419.58
1937	32,509.48	8,695.66	7,235.96	615.72	3,647.16			52,703.98
1938	35,644.38	11,236.47	6,174.30	526.75	3,465.08			57,046.98
1939	39,532.53	7,183.99	6,838.49	855.50	4,110.34			58,520.85
1940	38,659.10	9,720.57	6,754.69	642.50	5,281.16			61,058.02
1941	37,451.05	12,085.67	12,376.95	1,238.50	5,501.05			68,553.22
1942	38,471.33	19,984.64	10,755.90	1,575.25	6,820.97			77,708.09
1943	53,607.70	17,270.60	8,993.40	1,715.25	9,337.43			90,924.38
1944	66,219.66	21,147.85	11,489.34	1,594.75	6,325.95			106,777.55
1945	85,558.58	32,400.22	7,152.70	1,468.50	5,630.00			132,210.00
1946	<u>84,009.42</u>	<u>25,391.20</u>	<u>5,373.63</u>	<u>1,528.50</u>	<u>7,693.03</u>	<u>174.50</u>		<u>124,170.28</u>
	1,711,390.45	321,425.99	183,821.45	24,257.67	129,740.16	174.50	10,282.71	2,381,092.93

Detail of Miscellaneous Companies:

Holman-Cliffs Mining Company	2,131.39
Canisteo-Cliffs Mining Company	2,768.69
Alexandria Mine	<u>5,382.63</u>
	10,282.71

WELFARE DEPT. ANNUAL REPORT YEAR 1946

11.
c. GROUP INSURANCE

The group insurance plan, which became effective on October 1, 1936 at all of our properties, has continued in force during the year.

The following statement shows the total cost for the policy year ending September 30, 1946. It includes all cases in which disability began prior to September 30, 1946.

	<u>Death Claims</u>		<u>Health & Accident</u>		<u>Total</u>	
	<u>No. of Cases</u>	<u>Amount Paid</u>	<u>No. of Cases</u>	<u>Amount Paid</u>	<u>No. of Cases</u>	<u>Amount Paid</u>
Cambria-Jackson			14	1,118.00	14	1,118.00
Cliffs-Shaft	2	3,750.00	49	4,306.84	50	8,056.84
General Roll	1	1,875.00	8	559.13	9	2,434.13
General Storehouse & Shops	1	1,250.00	11	770.85	11	2,020.85
Ishpeming Hospital			7	460.29	7	460.29
Lloyd			31	3,021.71	31	3,021.71
Maas	1	1,875.00	40	3,455.42	41	5,330.42
Princeton			16	1,013.15	16	1,013.15
Spies-Virgil	1	1,250.00	6	324.00	7	1,574.00
Tilden			1	156.00	1	156.00
Retirement Roll	6	5,125.00			6	5,125.00
Total - C. C. I. Co.	12	15,125.00	183	15,185.39	193	30,310.39
Negaunee	2	3,750.00	34	3,024.56	36	6,774.56
Mather	1	1,875.00	23	858.86	24	2,733.86
Total - Neg Mine Co.	3	5,625.00	57	3,883.42	60	9,508.42
Athens Iron Mining Co.			32	1,864.28	32	1,864.28
Cliffs Power & Light Co.			2	246.00	2	246.00
Total - All Companies	15	20,750.00	274	21,179.09	287	41,929.09

Two of the fifteen death claims shown above were paid disability benefits in addition to the death benefit which accounts for the discrepancy in the number of cases shown.

11.
c. GROUP INSURANCE (Continued)

The following deaths occurred during the policy year ending September 30, 1946:

<u>Name</u>	<u>Mine</u>	<u>Date of Death</u>	<u>Amount of Insurance</u>
Gust Carlstrom	Cliffs-Shaft	11-3-45	1,875.00
Alex Witkela	"	5-16-46	1,875.00
John W. Harris	General Roll	5-7-46	1,875.00
Samuel L. Nirva	General Storehouse	1-18-46	1,250.00
Matt Sahi	Maas Mine	2-19-46	1,875.00
William Langlois	Negaunee	12-10-45	1,875.00
Arne Jylha	"	5-17-46	1,875.00
August Morelli	Spies-Virgil	8-30-46	1,250.00
Mark Dixon	Retirement Roll	9-26-45	1,875.00
Joseph Greivous	"	10-16-45	500.00
Godfred Larson	"	10-15-45	500.00
John P. Treloar	"	2-24-46	750.00
Charles J. Gyles	"	8-22-46	750.00
William Denney	"	8-31-46	750.00

Crescenzo Sauro was accidentally killed at the Cliffs-Shaft Mine on July 20, 1943, and payment of the proceeds of his policy was held up due to war-time restrictions, his widow living in Italy. On September 9, 1946 we were advised by the Aetna Life Insurance Company that they had received papers authorizing them to transfer \$1,875.00 to the First National Bank and Trust Company of Tuckahoe at Tuckahoe, New York, for deposit to the blocked account of Michelina Sauro, a national of Italy.

Ivar J. Mantynen, Cliffs-Shaft Mine. Died May 26, 1945. On November 22, 1946 we were advised by the insurance company that to date they had been unable to obtain the required papers for settlement and added that the case is being handled through the Consulate General of Finland.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

a. PENSION SYSTEM

The pension system which went into effect on January 1, 1909 completed the thirty-eighth year of its operation in 1946.

No changes in the rates of pensions were made during the year 1946. On January 1, 1933 the pension payments were reduced fifty per cent; those under \$20.00 remaining the same and those over \$20.00 having a minimum rate of \$20.00. There have been no additions to the pension rolls since January 1, 1932.

The following Mining Department pensioners passed away during 1946:

<u>No.</u>	<u>Name</u>	<u>Pension Began</u>	<u>Date of Death</u>
108	Richard Nicholls		2/5/46
192	E. A. Doty	4/1/26	6/26/46
193	J. F. Van Brocklin	4/1/26	5/11/46
207	J. E. Jopling	4/1/27	9/22/46
245	Charles Belanger	3/1/30	9/16/46

Number of deaths during year 1946	5
Number of pensions in force January 1, 1946	23
Number of pensions in force December 31, 1946	18
Average annual pension for 1946	\$245.59
Average annual pension for 1945	310.26

John A. Johnson continued as the only pensioner on the Holmes Mine pension payroll, and he receives \$240.00 annually. The Holmes Mine Department is included in the above tabulations.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. a. PENSION SYSTEM (Continued)

The table below shows pension payments for the Mining Department and Holmes Mine Department combined for the years 1908 through 1946.

<u>Year</u>	<u>Old age</u>	<u>Widows and Orphans</u>	<u>Total</u>
1908			
thru	672,238.46	22,547.00	694,785.46
1936			
1937	20,393.66	0.00	20,393.66
1938	18,360.44	0.00	18,360.44
1939	16,544.14	0.00	16,544.14
1940	14,237.87	0.00	14,237.87
1941	14,276.76	0.00	14,276.76
1942	11,632.15	0.00	11,632.15
1943	10,246.66	0.00	10,246.66
1944	8,485.25	0.00	8,485.25
1945	7,446.32	0.00	7,446.32
1946	<u>5,648.60</u>	<u>0.00</u>	<u>5,648.60</u>
	797,710.31	22,547.00	820,257.31

Includes payment of \$2,500.00 made by the Cleveland Office in 1930.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.
a. PENSION SYSTEM (Continued)

Republic Mine Department

Adolph Peterson, Pension number 16, died June 22, 1946, leaving three pensioners on the Republic Mine pension payroll at the end of the year. The average annual pension was \$214.01.

The table below shows the pension payments made over this roll for the years 1920 through 1946.

<u>Year</u>	<u>Amount</u>
1920	
thru	131,397.70
1936	
1937	2,853.58
1938	2,028.88
1939	1,868.88
1940	1,868.88
1941	1,741.92
1942	1,488.00
1943	1,285.00
1944	995.04
1945	995.04
1946	<u>856.04</u>
	147,378.97

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. a. PENSION SYSTEM (Continued)

Furnace Department

John Ollila continued as the only pensioner on the Furnace Department pension payroll for the year. He is paid \$223.80 annually.

The table below shows the pension payments made over this roll for the years 1910 through 1946.

<u>Year</u>	<u>Old Age</u>	<u>Widows and Orphans</u>	<u>Total</u>
1910			
thru	56,120.10	900.00	57,020.10
1936			
1937	1,662.72		1,662.72
1938	1,446.90		1,446.90
1939	1,374.96		1,374.96
1940	1,158.78		1,158.78
1941	926.72		926.72
1942	846.72		846.72
1943	687.17		687.17
1944	303.80		303.80
1945	223.80		223.80
1946	<u>223.80</u>		<u>223.80</u>
	64,975.47	900.00	65,875.47

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. a. PENSION SYSTEM (Continued)

Land Department

Erick Johnson continued as the only pensioner on the Land Department pension payroll during the year. He is paid \$240.00 annually.

The table below shows the pension payments made over this roll for the years 1927 through 1946.

<u>Year</u>	<u>Amount</u>
1927	
thru	2,876.88
1936	
1937	240.00
1938	240.00
1939	240.00
1940	240.00
1941	240.00
1942	240.00
1943	240.00
1944	240.00
1945	240.00
1946	<u>240.00</u>
	5,276.88

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

b. REPUBLIC MINE FUNDS

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

Dr. Paul Van Riper, who has his home and office at Champion, continues to take care of our employees in the Champion-Republic district. He uses the building at Republic, formerly used as a hospital and now established as a health center for the district, as his office when he holds office hours at Republic. Dr. Van Riper is paid on the basis of the number of employees who live in his district.

The Republic Hospital building, which is used as the health center, is now under the control of Republic Township. The Township and the school district provide certain funds for the maintenance of the building so that they may have some type of health service in the community.

A registered nurse, a married person, lives in the hospital building in the portion which has been turned over for living quarters. This nurse is on call in case of 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

Our visiting nurses continued their usual services throughout the year 1946. These services, particularly since we have had fewer doctors, have been especially necessary to the employees and their families. The visiting nurses also do a great deal of work for the doctors which saves time for the medical staff. Each nurse presents a monthly report showing activities during the month. The type of service which our industrial nurses render is a very fine example of social medical service extended to employees. We are fortunate in the fact that our industrial nurses have been with us a long time. They are experienced and tactful people. Their work during the past year was particularly heavy, as the reports which have been submitted indicate. We wish to express our appreciation for the fine work which has been conducted throughout the years by our industrial nursing staff.

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 in Gwinn from September 1, 1910 until October 1, 1927 when the Gwinn mines were closed. During a part of 1945 we had an industrial nurse in the Gwinn area but since we have again assigned a full time doctor to the Gwinn area, the visiting nurses' services are no longer continued in that area. Dr. S. J. Green continues to serve our people in the Gwinn area and since he lives in Gwinn it is not thought necessary to continue the services of an industrial nurse there.

During 1946 the following nurses were employed:

- Ishpeming - Miss Myrtle V. Welander
- Negaunee - Miss Ina E. Atkin
- Iron River - Miss Laura N. Fisk (part time)

Miss Welander and Miss Atkin submit reports to this office each week and they also submit monthly summaries. These monthly summaries are made a part of the monthly report of this department. These monthly reports give an idea of the services which are rendered by our industrial nurses. The men on our medical staff feel that the industrial nurses are of considerable assistance because they do the follow up work as well as carrying out medical orders issued by the doctors. Undoubtedly the services rendered by our industrial nurses has had considerable influence on the reduction of illness or at any rate, the reduction of time lost by our employees. While it is true that the work of the industrial nurses has become accepted by our employees, the work of the nurses does develop good public relations.

WELFARE DEPT. ANNUAL REPORT YEAR 1946.

23.

d. VISITING NURSES.

Following is the report of the Ishpeming visiting nurse for the year 1946:

Total number of patients cared for during year	804
Total number of new cases cared for during year	469
Total number of visits to patients	311
Number of families visited for the first time	46
Number of social calls	68
Number died	8

Classification of new cases for the year:

Number of adults	196	Male	24	Female	172
Number of children	273	Male	127	Female	146

Nationalities of new cases for the year:

American	297	Irish	1
English	26	Italian	40
Finnish	57	Norwegian	7
French	23	Swedish	18

Diseases and number of new cases:

Aenemia	3	Infections	39
Appendicitis	2	Influenza	1
Arteriosclerosis	2	Injury	17
Asthma	8	Kidney trouble	1
Baby welfare	3	Measles	33
Backache	9	Mumps	2
Bowel trouble	14	Nephritis	1
Bronchitis	1	Neuralgia	1
Burns	7	Obstetrical	54
Carcinoma	3	Phlebitis	1
Cerebral Adenitis	2	Pneumonia	6
Chicken Pox	2	Post Operative	22
Cold	66	Prenatal	12
Colitis	1	Rash	3
Dysentery	6	Rheumatism	5
Eczema	1	Rupture	6
Empetigo	1	Shingles	3
Fracture	3	Stomach trouble	8
Headache	1	Tonsilitis	12
Heart trouble	10	Unclassified	11
Hernia	1	Undiagnosed	16
Hypertension	1	Var. Ulcer	1
Infants, Newborn	60	Whooping Cough	7

Visiting Nurse: Miss Myrtle V. Welander.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

d. VISITING NURSES (Continued).

Following is the report of the Negaunee visiting nurse for the year 1946:

Total number of patients cared for during year	1149
Number of new cases cared for during year	567
Total number of visits to patients	4056
Number of families visited for the first time	20
Number of social calls	678
Number died	1

Classification of new cases for the year:

Number of adults	268	Male	96	Female	172
Number of children	299	Male	156	Female	143

Nationalities of new cases for the year:

American	285	Italian	45
Bohemian	1	Norwegian	3
Finnish	227	Swedish	4
French	2		

Diseases and number of new cases:

Adenitis	1	Jaundice	1
Aenemia	6	Laryngitis	2
Appendicitis	13	Lumbago	2
Arthritis	4	Nutrition	60
Adthma	4	Mastoditis	1
Bowel trouble	9	Measles	57
Bronchitis	13	Migraine	2
Burns	3	Mumps	1
Chicken Pox	1	Neuritis	2
Cholystitis	8	Obstetrical -	2
Cold	33	Paralysis	2
Colic	2	Pleurisy	6
Croup	2	Pneumonia	6
Diabetes	7	Post Operative	41
Eczema	1	Pregnancy	21
Enteritis	5	Pyelitis	1
Epilptic	1	Quinsy	1
Erysipelas	1	Rheumatism	7
Gastritis	3	Rupture	2
Gen. Debility	2	Scarlet Fever	4
Heart Trouble	11	Sore Eyes	8
Hypertension	1	Sprains	4
Infants, Newborn	3	Stomach trouble	4
Infections	30	Tonsilitis	30
Influenza	71	Unclassified	8
Injury	50	Var. Ulcer	2
		Whooping Cough	5

Visiting Nurse: Miss Ina E. Atkin.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. 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	804	469	24	172	127	146
Negaunee	1149	567	96	172	156	143
	<u>1953</u>	<u>1036</u>	<u>120</u>	<u>344</u>	<u>283</u>	<u>289</u>

	<u>Total No. Visits</u>	<u>Number died</u>	<u>Social Calls</u>	<u>Families Visited for First Time.</u>
Ishpeming	311	8	68	46
Negaunee	4056	1	678	20
	<u>4367</u>	<u>9</u>	<u>746</u>	<u>66</u>

NATIONALITIES OF NEW CASES.

	<u>American</u>	<u>Bohemian</u>	<u>English</u>	<u>Finnish</u>	<u>French</u>
Ishpeming	297	0	26	57	23
Negaunee	285	1	0	227	2
	<u>582</u>	<u>1</u>	<u>26</u>	<u>284</u>	<u>25</u>

	<u>Irish</u>	<u>Italian</u>	<u>Norwegian</u>	<u>Swedish</u>
Ishpeming	1	40	7	18
Negaunee	0	45	0	7
	<u>1</u>	<u>85</u>	<u>7</u>	<u>25</u>

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

f. NORTH LAKE CLUB

Each year we have included a report on the clubhouse at the North Lake Location. This clubhouse was maintained with the cooperation of the Inland Steel Company. It served the community for all kinds of community activities. It was felt, however, that within recent years the program of the clubhouse, as organized for the community, was not measuring up to what a good community program should be. Therefore, the North Lake Clubhouse was closed as of June 30th and it remains closed.

A group of young men in the North Lake district, known as the Tri-F Club, have been permitted to use a portion of the building for a clubroom. They provide their own light and heat and carry on a program to suit their own needs. As far as we know at this moment there is no thought of re-opening the clubhouse as a community center.

g. GWINN ASSOCIATION

On July 15, 1946 the Gwinn Association was transferred to the Board of Education at Gwinn. The clubhouse will continue to serve the community in the usual public educational, recreational and social services.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

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

For the past few years we have continued to mention the Ishpeming Y.M.C.A. building in our annual reports. Very little in addition to what has been reported in previous years can be added. The Ishpeming Industrial Association has been interested in re-opening the building as a sort of community center.

As has been pointed out in my annual report before, the need for the re-opening of the Y.M.C.A. is still somewhat doubtful. Certainly there should be some type of program definitely organized on a community needs basis before the building is re-opened. In other words, if the right kind of program can be organized in the community, undoubtedly the Y.M.C.A. building can be used to advantage. It seems unreasonable, however, to open the building merely for the sake of having a community building. The re-opening of this building should depend entirely upon a well-organized and planned program.

23.

i. SAFETY WORK

Under the direction of Mr. A. J. Stromquist, Safety Director, the Central Safety Committee held a number of meetings during 1946. Mr. Stromquist has given out a brief review of all accidents previous to the meetings and a general discussion is had at the meeting and a study is made of the possibility of preventing like accidents in the future. Each accident is then classified. Meetings were held on the following dates in 1946:

January 9	July 24
February 21	August 7
March 14	September 11
April 18	October 2
June 13	November 7
June 26	December 18
July 10	

The safety meetings are held on the third floor of the main building, which is known as the assembly room. The meetings generally last two or three hours and every effort is made to get a clear picture of the accident. The discussion is recorded and minutes are prepared and sent out to the members of the committee. Constant stress is placed on the need for creating and continuing good safety practices and for the prevention of accidents.

The following are members of the committee:

- H. O. Moulton, Chairman
- C. J. Stakel
- C. W. Allen
- Carl Brewer
- Walter F. Gries
- A. J. Stromquist
- W. E. Johnson
- H. F. Rogers
- J. D. Preston
- L. C. Moore
- E. D. Cory
- Grover Holt
- F. J. Haller
- Onnie Marjama
- S. W. Sundeen
- Folke Johnson
- W. R. Atkins
- John Trosvig
- J. S. Westwater
- Curtis Sundeen
- H. W. Sundberg
- Dr. George McL. Waldie
- Captain Richard Cattran

23.

j. HOSPITALS AND MEDICAL SERVICE

The Superintendent of the Welfare Department acts in the capacity of Administrator of the Ishpeming Hospital and maintains almost daily contact with the Ishpeming Hospital and the Negaunee Dispensary. Occasional trips are made to the Iron River District and contacts are made with the General Hospital Company of the Iron River District at Stambaugh. The Ishpeming Hospital Advisory Committee has continued to meet the second Tuesday of each month and the following men make up the committee: Mr. C. W. Allen, Assistant Manager; Mr. E. E. Riedinger, Chief Clerk; Mr. Walter F. Gries, Superintendent, Welfare Department. At each meeting Dr. A. W. Erickson, Chief of Staff, is present, as is the Superintendent of the Ishpeming Hospital. Mrs. Margaret Berg, R.N. resigned as Superintendent of the hospital on December 31, 1946. She has returned to her former position as chief surgical nurse and Mrs. Miriam Thomas, R.N. has assumed the duties of the Superintendent.

Visits are made to the Gwinn District several times a year. Contacts are made there with the doctor and with the work of the Gwinn Dispensary. In Iron River we contact Dr. L. E. Irvine who takes care of our medical needs in that area. Each year the Superintendent of the Welfare Department attends the annual meeting of the Board of Directors of the General Hospital of the Iron River District at Stambaugh.

In June of 1946 the monthly medical fee was raised from \$1.50 per month to \$2.00 per month and that fee has been in force since that time.

Dr. R. A. Burke of Negaunee continues to care for the medical needs of the Cambria-Jackson employees. Many of the Cambria-Jackson employees go to Dr. Mudge or Dr. Paine for services and the need for Dr. Burke's services are not as great as they were in the past.

ISHPEMING HOSPITAL

The Ishpeming Hospital has had a very active year during 1946. Service has been extended, not only to our own employees and their families, but to the community at large and to other communities outside the district. The hospital continues to maintain its high standard and has again been granted membership in the American Hospital Association and in the American College of Surgeons.

For most of the year we were fortunate in being able to maintain a good staff of nurses. Many of the married nurses who assisted us during the war years have left the hospital since their husbands have returned from the military services.

It has been our policy to mention in each annual report the fact that the people of this community and surrounding communities do not fully appreciate the real value of the Ishpeming Hospital as a community asset. The hospital is owned, operated, and maintained entirely by the Cleveland-Cliffs Iron Company,

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

with the assistance of cooperating and coordinating companies in the district. The community does not contribute to the hospital in any way. The lack of appreciation of the hospital is not a conscious thought on the part of our people since I feel that most people in this community feel that the Cleveland-Cliffs Iron Company is making a very great contribution to the general welfare and health of the entire community through the services rendered by the Ishpeming Hospital and our medical staff and nurses. In many communities the size of Ishpeming and Negaunee obligations are placed upon the community in connection with the support and maintenance of hospitals.

At various times the possibility of a re-organization of the hospital has been discussed. I feel that this should be done but that absolute control of the hospital should be kept by the Cleveland-Cliffs Iron Company. The great service which is rendered in connection with compensation and injury cases is a problem which the company should always be in position to guide and control. The hospital should be organized as a non-profit institution since we are now compelled to pay Michigan state sales tax. It is felt that the medical staff should be definitely disengaged from the hospital. Our doctors should organize and establish their own organization and practice as such.

The Hospital Advisory Administrative Committee, which has met almost monthly for the past few years, has had an opportunity to familiarize itself with some of the problems which arise in the conducting of the business of a hospital. The committee has been very faithful and attentive to the needs of the hospital. The functioning of this committee makes it possible for three individuals employed in executive capacities of the company to know something about the problems and the cost of operating a hospital.

The staff of the Ishpeming Hospital during the year 1946 was made up of the following:

- Dr. A. W. Erickson, Chief of Staff
- Dr. P. P. Hartt
- Dr. R. G. Williams

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

- Dr. W. A. Mudge
- Dr. R. L. Paine

Dr. S. J. Green continues to serve our people in the Gwinn area.

Dr. R. A. Burke, who has his own hospital in Negaunee, continues to serve our Cambria-Jackson employees by agreement. Dr. Burke is paid \$1.50 per man per month for each of the Cambria-Jackson employees for medical and we also supplement this with \$1.00 per man per month to assist Dr. Burke in caring for accidents and injuries and in the maintenance of his own hospital.

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

A review of the enrollment at the Ishpeming Hospital over recent years indicates that the Ishpeming Hospital is gradually rendering more service each year. It has taken care of the needs of the people of this community, although at times in recent years facilities became inadequate because people have been more hospital conscious than they formerly were. We provide for the care of our own people first and two beds are always reserved for accidents and injuries regardless of what other conditions may be. At the present time we are listing the hospital as having a capacity of 52 beds and 20 bassinets. There is a closed medical staff, a complete nursing staff and we engage only graduate nurses. There is no nurses' training school in connection with the hospital.

The hospital is very well equipped with x-ray apparatus, laboratory facilities, surgical equipment, operating room equipment, obstetrical rooms, as well as excellent equipment for all accidents and injuries and for diathermy treatments. The emergency room on the first floor of the hospital is a very busy place. Practically all minor injuries of both our own employees and the outside practice are cared for in the emergency room.

The Welfare Department as a whole and the Administrator of the hospital wish to record here their appreciation to the participating companies in the district for the cooperation and support they have given the Ishpeming Hospital.

A special report is attached to this general report, giving information regarding the operation of the Ishpeming Hospital for 1946.

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

GOVERNING BOARD

E. B. Greene, President
C. J. Stakel, Manager
C. W. Allen, Assistant Manager

ADVISORY COMMITTEE

C. W. Allen
E. E. Riedinger
W. F. Gries, Secretary and Chairman
J. C. Cameron
W. T. McCormick

ACTIVE MEDICAL STAFF

A. W. Erickson, M.D., President	George McL. Waldie, M.D.
P. P. Hartt, M. D.	R. G. Williams, M.D.
W. A. Mudge, M.D.	S. J. Green, M.D.
	R. L. Paine, M.D.

COURTESY STAFF

F. Van Riper, M.D.
I. Sicotte, M.D.
F. O. Paull, M.D.

CONSULTING STAFF

A. W. Erickson, M.D.

DEPARTMENTS

Laboratory and Roentgenology
A. W. Erickson, M.D.

Anesthesia
P. P. Hartt, M.D.

Gwinn Dispensary
S. J. Green, M.D.

Histories
A. W. Erickson, M.D.

Negaunee Dispensary
W. A. Mudge, M.D.
R. L. Paine, M.D.

Industrial Hygiene
Geo. McL. Waldie, M.D.

Walter F. Gries, Administrator

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

ISHPEMING HOSPITAL
STATISTICAL REPORT FOR THE YEAR 1946

Number of patients remaining in the hospital at the beginning of year		38
Number of adult patients admitted	1299	
Number of child patients admitted	127	
Number of births	369	
-		
Total new patients for year		<u>1795</u>
Total of all patients during year		<u>1833</u>
Number of deaths	62	
Number discharged during year	<u>1736</u>	
Total number leaving hospital		<u>1798</u>
Number of patients remaining in the hospital at the end of year		35
Classification of new cases:		
Newborn	369	
Surgical	619	
Medical	406	
Obstetrical	<u>401</u>	
Total		1795
Number of operations:		
Major	197	
Minor	413	
Circumcisions	<u>167</u>	
Total		777
Emergency Room Operations		479
Number of patient days:		
Newborn	3109	
Other	<u>16731</u>	
Total		19840
Average number patients per day		54.37
Average stay per patient		11.03
Number meals for patients		50193
Number meals, nurses, help, etc.		23322
Total meals		73515

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

DEATHS FOR 1946 CLASSIFIED BY DISEASE

Arteriosclerosis.....	4
Atelectasis.....	1
Carcinoma, Gastric.....	1
Carcinoma, Stomach.....	1
Carcinoma, Thyroid.....	2
Carcinomatosis.....	1
Cardiorespiratory Failure.....	3
Cardiovascular Renal Disease.....	1
Cerebral Hemorrhage.....	4
Cervical Vertebrae, Fractured.....	1
Coronary Occlusion.....	4
Diabetes Mellitus.....	1
Endocarditis.....	1
Gunshot Wound, Chest.....	1
Heart Failure.....	3
Hemorrhage following Ectopic Pregnancy....	1
Leukemia.....	1
Malignancy of Biliary Tract.....	1
Myocarditis.....	1
Obstruction, Intestinal.....	1
Peritonitis.....	1
Pneumonia, Hypostatic.....	1
Pneumonia, Lobar.....	2
Pneumonitis.....	1
Premature Birth.....	8
Premature Separation of Placenta.....	1
Pulmonary Atelectasis.....	1
Pulmonary Embolus.....	2
Septicemia.....	1
Skull Fracture, Base.....	1
Stillborn.....	7
Thyrotic Crisis.....	1
Tumor, Brain.....	1
Total	62

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

DEATHS DURING THE YEAR 1946

Surgical.....4
 Medical.....34
 Traumatic Injuries.....6
 Newborn.....11
 Stillborn.....7

Total 62

Deaths under 48 hours.....24
 Deaths over 48 hours.....31
 Stillborn.....7

Total 62

TRAUMATIC DEATHS

<u>Case No.</u>	<u>Patient</u>	<u>Age</u>	<u>Diagnosis</u>
27580	Eugene Swanson	46	Thyrotic Crisis
27689	Edward Morecom	44	Fractured Cervical Vertebrae
28020	George Barry	60	Fracture, Base of Skull
28111	Alex Lepola	77	Pulmonary Embolism
28127	Arthur Hill	35	Gunshot Wound of Chest
28326	Robert Crisp	59	Coronary occlusion. Fracture, right femur. Hypostatic pneumonia.

FRACTURE CASES DURING 1946

Cleveland-Cliffs Iron Company....36
 Inland Steel Company.....6
 Hercules Powder Company.....1
 Outside Patients.....145

Total 188

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

LABORATORY REPORT FOR 1946

Blood Chemistry.....	882
Blood Type and Match.....	152
Bleeding Time.....	182
Cultures.....	25
Coagulation Time.....	200
Differential Count.....	1730
Feces.....	70
Gastric Analysis.....	24
Glucose Tolerance.....	9
Hemoglobin.....	2240
Icteric Index.....	69
Miscellaneous.....	719
Pathological Specimen.....	342
Red Cell Count.....	2273
Sedimentation.....	401
Smears.....	371
Special Blood Examinations.....	27
Spinal Fluid.....	3
Sputum.....	59
Urinalysis.....	5458
Vena Puncture.....	1308
White Blood Count.....	2457
Rh Factor.....	76
Galactose Tolerance.....	3
Prothrombin Time.....	18
Bromsulfalein Test.....	6
Biliary Drainage.....	1
	<u>19105</u>

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

TREATMENTS FOR THE YEAR 1946

Basal Metabolism.....	173
Ultra-violet Ray.....	502
Infra-Red.....	264
Diathermy.....	1704
Dressings.....	97
Cautery.....	71
Massage and Manipulation.....	204
Intramuscular Injections.....	242
<u>Water Bath with Exercise.....</u>	<u>29</u>

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DEPARTMENT OF INDUSTRIAL HYGIENE

January, 1946 to December, 1946

Blood Chemistry.....	22
Differential Count.....	38
Glucose Tolerance Tests.....	8
Hemoglobin.....	1764
Miscellaneous.....	6
Red Blood Count.....	66
Sedimentation.....	1746
Smear.....	1
Urinalysis.....	1778
Vena Puncture.....	1757
White Blood Count.....	1753
<u>"300" Differential.....</u>	<u>17</u>

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WELFARE DEPT. ANNUAL REPORT YEAR 1946

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

X-RAY REPORT FOR 1946

Extremities.....	873
Shoulder.....	111
Spine.....	165
Ribs.....	40
Skull.....	32
I. V. Pyelogram.....	19
Kidney.....	38
Pelvis.....	66
Stomach.....	92
Fluoroscope.....	68
Foreign Bodies.....	12
Colon.....	43
Abdomen.....	20
Chest & Heart.....	353
Jaw.....	8
Sinuses.....	1
Esophagus.....	5
E.K.G.....	186
Fetus.....	83
Nasal Bones.....	6
Gall Bladder.....	162
Orbits.....	<u>2</u>

Total 2385

No. of Out Patients.....1857

No. of In Patients.....528

Total 2385

INDUSTRIAL HYGIENE DEPARTMENT

Chest.....1768

Miscellaneous.....167

Total 1935

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

DIETARY REPORT--ISHPEMING HOSPITAL--YEAR 1946

Patient Meals.....	50193
Doctors, Nurses, Employees, Visitors.....	23322
Total Meals for the Year.....	73515
Formulas.....	369

Special Diet--Patient Days:

Diabetics.....	459
Ulcer.....	42
Initial Ulcer.....	84
Sippy.....	115
Salt Free.....	23
Low Salt.....	106
Special Soft.....	17
Modified Sippy.....	78
Low Protein.....	19
Chronic Colitis.....	30
Soft Dry.....	9
High Carbohydrate, Low Fat.....	19
Dry.....	9
Nephritic.....	6
High Carbohydrate, High Caloric, High Protein.....	24
Post-operative Gastric.....	31
Low Fat, High Caloric, High Carbohydrate.....	3
1000 Calorie.....	25
Soft Selective.....	13
Reduction.....	8
Hypertension.....	1
High Caloric, High Carbohydrate.....	11
Bland.....	240
Low Fat.....	498
Allergy.....	18
Fat Free.....	131
High Caloric.....	302
Selective.....	258
High Caloric, High Vitamin, Low Residue.....	21

Total Special Diet Patient Days.....	2600
Total Special Diet Meals.....	7800

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

Total Minor Operations....471	Total Major Operations....226
Adenoidectomy.....1	Abdominal fistula, excised.....1
Anal fissure, repair.....5	Adhesions, freeing of.....2
Application, thrombin.....2	Amputation.....6
Bartholin cyst, excision.....4	Appendectomy.....100
Biopsy.....14	Caesarean Section.....8
Blood transfusion.....5	Cholecystectomy.....12
Cast.....2	Hernioplasty.....37
Cauterization, cervix.....15	Hysterectomy.....10
Cervix amputated.....3	Laparotomy, exploratory.....2
Cervical dilatation.....3	Ligation, Fallopian tubes.....3
Cervical packing.....1	Oophorectomy.....9
Cervical repair.....1	Perforated gastric ulcer.....4
Circumcision.....16	Reduction, open.....3
Colporrhaphy.....1	Salpingectomy.....7
Curettement of calcification.....1	Splenectomy.....1
Cyst, excised.....53	Supra pubic cystotomy.....1
Cystocele, repair.....1	Suspension.....3
Cystoscopic examination.....3	Skin graft.....4
Debridement.....1	Thyroidectomy.....13
Dilatation and curettage.....93	
Extraction, teeth.....2	
Foreign body, removed.....2	
Ganglia, repair.....1	
Gunshot wound, bullet removed.....1	Total Infant Circumcisions.....179
Hemorrhoidectomy.....29	
Hydrocele.....6	
Ingrown toenails, excised.....6	
Incision and drainage.....14	
Kirschner wire, insertion.....5	
Lacerations, sutured.....10	
Mastectomy.....2	
Muscle repair.....3	
Perineorrhaphy.....2	
Proctoscopic examination.....8	
Pilonidal cyst, excised.....6	
Reduction, closed.....4	
Rectocele, repair.....5	
Saphenous ligation.....18	
Sigmoidoscopic examination.....2	
Spinal puncture.....4	
Tenorrhaphy.....2	
Tonsillectomy.....42	
Tonsillectomy and Adenoidectomy.....61	
Trachelorrhaphy.....1	

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)

EMERGENCY ROOM REPORT

	<u>Company Cases</u>	<u>Outside Cases</u>	<u>Total Cases</u>
January	131	83	214
February	95	90	185
March	114	82	196
April	96	95	191
May	117	96	213
June	157	102	259
July	157	99	256
August	162	169	331
September	216	132	348
October	262	142	404
November	217	141	358
December	<u>98</u>	<u>50</u>	<u>148</u>
Total	1822	1281	3103

	<u>Company Visits</u>	<u>Outside Visits</u>	<u>Total Visits</u>	<u>Operations</u>
January	279	200	479	26
February	210	210	420	20
March	280	216	496	38
April	150	253	403	19
May	328	242	570	41
June	456	346	802	45
July	543	363	906	53
August	438	386	824	50
September	595	379	974	46
October	547	356	903	44
November	499	328	827	43
December	<u>218</u>	<u>125</u>	<u>343</u>	<u>39</u>
Total	4543	3404	7947	464

J. HOSPITALS AND MEDICAL SERVICE (Continued)

WELFARE DEPT. ANNUAL REPORT YEAR 1946

	<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	152	134	137	139	147	135	166	150	145	179	147	164	1795
Patients Discharged	123	143	139	148	141	138	160	157	136	166	166	166	1783
Number of Men	38	36	35	26	39	36	32	37	34	37	25	43	418
Number of Women	72	69	70	77	75	63	76	69	80	89	70	71	881
Number of Children	12	7	6	3	8	20	25	10	6	6	11	13	127
Newborn	30	22	26	33	25	16	33	34	25	47	41	37	369
Classified as:													
Newborn	30	22	26	33	25	16	33	34	25	47	41	37	369
Obstetrical	34	23	27	35	30	21	34	34	32	52	40	39	401
Medical	35	36	33	25	46	33	38	34	34	28	24	40	406
Surgical	23	31	25	25	26	28	21	18	28	26	17	28	296
Gynecological	10	11	16	7	8	11	4	11	9	4	11	7	109
E.E.N.T.	6	2	3	6	5	20	27	5	6	7	4	3	94
Traumatic Surgery	14	9	7	8	7	6	9	14	11	15	10	10	120
Daily Average	52.83	59.03	56.00	58.90	53.54	50.33	55.22	52.03	48.00	56.45	55.56	52.64	54.37
Newborn Days	269	221	184	260	218	140	235	312	236	373	342	319	3109
Patient Days	1369	1432	1552	1507	1504	1370	1477	1301	1204	1377	1325	1313	16731
Total Days	1638	1653	1736	1767	1722	1510	1712	1613	1440	1750	1667	1632	19840
Operations:													
Emergency Room	26	20	38	19	41	46	53	64	46	44	43	39	479
Major	15	21	17	20	16	11	11	15	21	18	16	15	196
Minor	33	28	28	26	37	49	50	28	41	34	23	38	415
Circumcisions	10	15	10	19	11	7	14	18	14	18	17	16	169

Note: 62 deaths included in discharges

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

NEGAUNEE DISPENSARY

The Negaunee Dispensary, formerly the Negaunee Hospital, continues to serve as the medical center for our employees in Negaunee. Dr. W. A. Mudge and Dr. R. L. Paine have their offices in the Dispensary building, as does Miss Ina Atkin, the industrial nurse for the Negaunee District. There are approximately 1300 employees in the Negaunee area and most of them have their medical needs taken care of through the Negaunee Dispensary. We also have two regular nurses at the Dispensary in Negaunee. They assist the doctors and take care of the Dispensary work. Regular visits are made to the Negaunee Dispensary two or three times each week and conferences are held regularly with the doctors and the nurses.

The Negaunee Dispensary, in addition to being the medical center and the offices for our doctors in the Negaunee District, also serves as an emergency hospital or clinic for injuries which do not need to be brought to the Ishpeming Hospital. No cases are hospitalized at the Negaunee Dispensary but many slight injuries are taken care of there.

The living quarters in the Negaunee Dispensary are occupied by Mr. John Roberts, the custodian and janitor of the building. Mr. Roberts keeps the building in good shape, takes care of the fires, unpacks the supplies and materials and takes care of the doctors' and nurses' cars.

GWINN DISTRICT

Dr. S. J. Green is giving full time to the medical needs of our employees in the Gwinn area. He lives in the home which the doctor has always occupied and in which he has his office and dispensary. While a full time doctor is in service at Gwinn we do not maintain an industrial nurse. We have had an industrial nurse at various times when we did not have a full time doctor for the Gwinn area.

REPUBLIC HOSPITAL

Each year we include a paragraph in our annual report on the building which was formerly known as the Republic Hospital. This building is now under the supervision of the Republic Township Board. Dr. Van Riper of Champion, who cares for our medical needs in the area, uses the Republic Hospital daily as an office and as sort of a health center. The maintenance of medical service at the old Republic Hospital is a great convenience to the people of Republic and the surrounding area.

The Republic Township Board engages a registered nurse, a married person, who, as part of her remuneration, is granted the use of an apartment in the hospital building. The nurse is on duty to assist Dr. Van Riper and to give attention to emergency cases. The arrangement appears to be a very good one.

23.

j. HOSPITALS AND MEDICAL SERVICE (Continued)IRON RIVER HOSPITAL

During 1946 several visits were made to the General Hospital of the Iron River District at Stambaugh. We receive a monthly report from the Iron River Hospital and we make an effort each year to attend the annual meeting. The General Hospital of the Iron River District cares for the medical and hospital needs of our employees at the Spies-Virgil Mine at Iron River. The annual meeting this year was attended by Walter F. Gries, Superintendent of the Welfare Department, and Onnie Marjama, Superintendent of the Spies-Virgil Mine. The Iron River Hospital is managed by a board of trustees and the hospital is administered in a very business-like manner.

Dr. L. E. Irvine of Iron River continues to provide medical attention for our Spies-Virgil employees. He also gives the physical examinations, both pre-employment and periodical, for our Spies-Virgil men. Dr. Addison at Crystal Falls cares for a small group of our employees who request his services in the Crystal Falls area.

PAYMENTS TO PHYSICIANS

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

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

From time to time the rates for membership in the Company's medical plan have been changed. On January 1, 1944 the monthly rate was raised from \$1.25 to \$1.50. The Company increased its contribution at that time from 50¢ to 75¢ per man per month. In June of 1946 the employees' rate was increased from \$1.50 per man to \$2.00 per man per month.

PHYSICAL EXAMINATION OF EMPLOYEES

The Industrial Hygiene Department continues to give physical examinations to employees. The Employment Department makes regular physical examination schedules for each working day. It has been the policy, as far as possible, to examine twelve men per day. Copies of the physical examination schedule are filed with the Welfare Department and the results of the physical examinations are also reported to the Welfare Department and a record is kept in the file of each employee.

23. j. HOSPITALS AND MEDICAL SERVICE (Continued)

The contract which the Company formerly had with the Trudeau Foundation of Saranac Lake, New York was not renewed in the fall of 1945. We feel that our own Industrial Hygiene Department can take care of our needs.

INDUSTRIAL HYGIENE DEPARTMENT

Our Industrial Hygiene Department was organized on April 1, 1939. Dr. George McL. Waldie continues to have charge of this department. The department continues the usual physical examination program, as well as the follow-up program in cases where employees have been found to have some deficiency. Considerable valuable information has been gathered by this department during the past several years. We feel that we have excellent records on all employees from the standpoint of their physical condition.

Naturally the work of the Department of Industrial Hygiene has expanded since we did not renew our Saranac contract in the fall of 1945. All films which formerly were sent to Saranac for reading and interpretation are being read and interpreted locally by Dr. Waldie. This work covers also the Inland Steel Company and the North Range Mining Company's employees on the Marquette and Menominee Ranges, as well as the employees of the Hercules Powder Company. Dr. Waldie renders monthly reports, as well as periodical reports, covering fully the work of his department.

In cases where it seems necessary for an employee to have medical attention of some kind, Dr. Waldie refers him to a regular member of our medical staff. The department makes an effort to correct any defect which may be found and in cases where employees are found to have some defect or some type of illness, a follow-up program is instituted and a check-up is made from time to time to determine what the employee's condition is.

The following number of examinations have been conducted through December 31, 1946:

Cleveland-Cliffs Iron Company	20,898
Inland Steel Company	3,503
Republic Steel Company	1,653
North Range Mining Company	1,237
Oliver Iron Mining Company	725
Pickands Mather & Company	149
M. A. Hanna Company	199
Hercules Powder Company	181
Calumet & Hecla Company	29
Marquette County Road Commission	10
Total	28,584

23.

k. COMMUNITY HEALTH

Each year we include in this report a statement concerning the general health conditions in Marquette County. We are pleased to report again that for the year 1946 the general health conditions in Marquette County were good. There were no epidemics during the year and there was no great loss of time at the mines because of illness. It appears that the reason for most of the absenteeism, which is not serious, was due to the fact that our employees have been earning high wages and occasionally they take time off because they feel that they can afford to.

There continues to be a gradual increase in the use of the Ishpeming Hospital. Last year the average admittances exceeded those of 1945. Very often the hospital has to arrange a schedule for admittances of people due to the fact that there is a great demand for hospitalization.

The three cities in Marquette County each have a health officer and a full-time school nurse. The City of Marquette also employs a full-time nurse whose services are made available, for the most part, to the township districts. The townships also have health officers.

The city health officers in Marquette County are:

Ishpeming	-	Dr. W. A. Corcoran
Marquette	-	Dr. C. P. Drury
Negaunee	-	Dr. G. A. Knudson

The Northern Michigan Children's Clinic at Marquette, supported largely by funds from the Michigan Children's Fund, has continued to serve children throughout the entire Northern Peninsula. This clinic operates at Marquette in cooperation with St. Luke's Hospital. It is felt that we are very fortunate in the Northern Peninsula counties to have such a fine clinic available.

The Bay Cliff Health Camp at Big Bay was in session again this past summer. This is the twelfth year of service. About 150 children from the counties in the Northern Peninsula were enrolled. These children are cared for for about six or seven weeks and during the past years special services have been given for various groups, such as services for poliomyelitis convalescent children, cardiac cases, rheumatic hearts, speech and hearing defects, diabetics and under-nourished children. The Superintendent of the Welfare Department has continued to serve as Chairman of the Board of Directors during the past year.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

1. RED CROSS.

I have continued to serve on the Board of Directors of the American Red Cross. The following is the report of the Marquette County Chapter nurse for the year 1946:

Home Calls.

Children needing eye examinations	27
Children with frequent sore throats	5
Children with defective hearing	27
Children with defective speech	2
Feeble minded children	2
Crippled children	18
Rheumatic heart cases	45
School home calls	124
Communicable disease calls	102
Infant	26
Pre-school	59
Adult	57
Pre-natal	9
Post-natal	5

Other Calls:

School calls	145
School Board members and lay helpers	20
County Supervisors	3
Social Welfare Office	48
Hospitals	5
Northern Michigan Children's Clinic	10
Physicians	40
Nurses	17
Nurses Aides	6
So Social Agencies	14
Marquette City Health Dept.,	6
Bay Cliff Health Camp	6

Teacher Consultations	318
Inspections of School Children	473
Glasses issued to children through Children's Fund	7
Children examined at Cardiac Clinic	71
Children examined at U.P. Children's Center	2
Children examined at No. Michigan Children's Clinic	38
Children admitted to hospitals	2

Immunization Clinics:

Smallpox vaccinations	311
First Diphtheria Toxoid	396
Second Diphtheria Toxoid	423

WELFARE DEPT. ANNUAL REPORT YEAR 1946.

23. 1. RED CROSS (Continued)

Report of Nurse (Continued)

138 children given cardiac screening examinations at Big Bay by Dr. M. Cooperstock.
 18 children attended pediatric clinic at Big Bay.
 Assisted with physoccal examinations of 4-H Club boys and girls at Camp Shaw.
 Made 19 trips to Ann Arbor. Transported 11 women, 11 men, and one child to the U of M. Hospital. Brought back to Marquette County 7 women and 3 men.
 Transported 1 boy to Michigan School for the Deaf.
 Brought back to Marquette County for Christmas vacation 1 boy from the Michigan School for the Deaf.
 Transported 1 feeble-minded child to Lapeer.
 Brought 1 feeble-minded child from Lapeer to Newberry.
 Brought 4 patients to doctor's offices in Marquette.
 Brought 2 patients to Northern Michigan Children's Clinic.
 Brought 2 patients home from St. Luke's Hospital.
 Transported 1 crippled girl from Sault Ste. Marie to Bay Cliff Health Camp.
 " 2 crippled girls from Sault Ste. Marie to Bay Cliff Health Camp.
 " 5 counselors and 15 children to Bay Cliffs Health Camp.
 Brought two sick children from Graevret High School to their homes at Big Bay and Choccolay Township.
 Brought Dr. Hoppe's College Health Education class to the Gwinn and Turin schools.
 Brought Mr. Hedgecock's College class to the Eagle Mills school.
 Made arrangements for the T. B. Mobile Unit at Gwinn, Republic, Champion and Michigamme.
 Interviews with State Consultants 14.

Meetings:

Public Health Conference in Grand Rapids	1
Counsel on Community Nursing	2
U. P. Health Conference at Graveraet	1
Parent-Teachers Institute at Graveraet	1
Special Education Institute at College	1
Home Nursing meeting at Children's Clinic	1
Child Welfare meeting at American Legion Conference	1
Marquette District Nurses Association	5

Office Hours : 215.
 Mileage: 31,032.

(Miss) Emma C. Anderson, R.N.
 County Health Nurse.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

m. RELIEF WORK

We carried on our usual program of extending assistance to certain of our families during the year. During the year we assisted 23 families, compared with 24 families in 1945.

It was decided early in 1947 to discontinue the giving of relief orders and in all cases to extend cash relief.

The following is a statement of assistance rendered in 1946:

	<u>Ishpeming</u>	<u>Negaunee</u>	<u>Republic</u>	<u>Gwinn</u>	<u>Marquette</u>	<u>Total</u>
January	\$ 99.06	23.72	23.45	81.35	20.00	247.58
February	8.06	138.82	8.00	86.95	--	241.83
March	34.28	63.72	8.00	55.60	10.00	171.60
April	23.06	47.73	--	55.60	10.00	136.39
May	34.80	122.68	16.00	55.60	10.00	239.08
June	23.06	43.60	8.00	20.00	20.00	114.66
July	35.00	47.73	8.00	55.60	--	146.33
August	70.68	67.90	8.00	91.20	20.00	257.78
September	44.92	70.82	8.00	35.00	--	158.74
October	24.60	117.07	--	55.60	--	197.27
November	45.56	24.20	8.00	146.81	20.00	244.57
December	<u>55.80</u>	<u>84.34</u>	<u>36.09</u>	<u>35.00</u>	<u>--</u>	<u>211.23</u>
	\$498.88	852.33	131.54	774.31	110.00	2367.06
Number of families assisted	7	8	2	5	1	23
Average amount of relief per family						\$102.91

n. EMPLOYMENT

The Welfare Department keeps in almost daily touch with the Employment Office, in charge of Mr. H. W. Sundberg. In cases where there may be some question regarding the employment of a certain individual the case is reviewed. Every effort is made to protect the best interests of the Company in connection with the employment of people.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.
0. 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 these men had suffered some disability through accidents or through injuries at the mines, and there are some with large families who have become incapacitated.

The Mining Department Donation payroll included twenty-three people on January 1, 1946, and on December 31, 1946 there were still twenty-three payees. Mr. Dominic Tasson was dropped from the roll as of June 1, 1946 when he was transferred to the Retirement Payroll. Mr. Sam Wehmanen was added to the payroll as of February 1, 1946. These were the only changes during the year. A total of \$7,826.80 was expended.

The Holmes Mine Donation Payroll remained identical with the 1945 roll, there being four recipients under this department for a total expenditure of \$923.88.

The Furnace Department donations, after being granted, were paid originally by the Furnace Department itself and later by the Cliffs-Dow Chemical Company. By directions from Cleveland on September 1, 1937 the donations have been paid from this office. The payroll on January 1, 1946 included three names, but one man, John Schrandt, died on March 31, 1946 and was dropped from the roll as of that date. The total expenditure over this roll for 1946 was \$615.00

The Mesaba-Cliffs Mining Company Donation payroll was made up of two people on January 1, 1946. As of October 1, 1946 Mr. Ray Wilson was transferred from this roll to the Retirement Roll of that Company, leaving Mr. Chester Adams as the only recipient on December 31, 1946. The total expenditure for the year 1946 was \$585.00

It might be added that two widows are still included on the Mining Department Donation payroll. They are Mrs. J. H. Tregoning and Mrs. Fiina Kampinen. Each was paid \$300.00 during the year. The statistics on the Mining Department payroll include both widows.

Amount of Mining Department Donations (including widows)	\$ 7,826.80
Amount of Holmes Mine Donations	923.88
Amount of Furnace Department Donations	615.00
Amount of Mesaba-Cliffs Mining Company Donations	<u>585.00</u>
	\$ 9,950.68

23. o. INCAPACITATED EMPLOYEES (Continued)

Retirement Roll

Fifty-one new names were added to the Mining Department Retirement Roll during 1946. 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 roll. The purpose of the plan is to provide retirement under Social Security benefits to men in our employ 65 years of age or over. The Company continues to supplement the Social Security benefits by paying \$10.00 monthly to each retired employee. Retired employees are given the opportunity to continue to carry the medical plan and one-half of the principal amount of their original group insurance policy, and this is generally appreciated and done.

Nine names were dropped from the Mining Department Retirement Roll during the year.

Added

William J. Roberts, Sr.	Effective 1/1/1946
Jacob Korpi	"
Ulrick Ulrickson	"
Albert Anderson	"
Elias Latunen	"
Matt Amel	"
Gaetano Della Corte	"
William Tobin	2/1/1946
Martin Anderson	"
Peter Robare	4/1/1946
James Bennett	"
John Linna	"
August Norell	"
William J. Nyman	"
Frank Sarvello	"
Julius Wiig	5/1/1946
Jacob Koski	6/1/1946
Dominic Tasson	"
Andrew Engman	"
Edward Gimse	"
Jacob Hahka	7/1/1946
Charles Poggi	"
Thomas H. Roberts	"
Charles Arntson	"
Lorenzo Marta	"
John W. Carlson	8/1/1946
Albin Hamalainen	"
Louis Nault	"
John O. Jokela	"

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23.

o. INCAPACITATED EMPLOYEES (Continued)Retirement Roll (Cont'd)

Archie Blair	Effective	9/1/1946
John Luoma		10/1/1946
George R. Thompson		"
Geroloma Armatti		"
Jules Verstraete		11/1/1946
Theodore J. Manninen		"
Leander Anderson		"
Ernest Gaboury		"
Carl Balzarini		12/1/1946
William Etelamaki		"
Fred Garceau		"
William Garceau		"
Frank Helgren		"
Thomas Hosking		"
R. James Martin		"
Gust Sippola		"
Frank Winter		"
Richard H. Burrows		"
Albert J. Lehmann		"
John H. Van Brocklin		"
William Westermeyer		"
Richard J. Williams		"

Dropped

Ret. #				Dropped as of	
37	Henry Beale	Died 1/9/1947		12/31/1946	
61	Gust Palomaki	Died 1/6/1947		"	12/31/1946
68	John Cox	Died 11/29/1946		"	11/30/1946
118	Querino Piziali	Died 12/22/1946		"	12/31/1946
120	John P. Treloar	Died 2/24/1946		"	2/28/1946
123	William Denney	Died 8/31/1946		"	8/31/1946
156	Charles Gyles	Died 8/22/1946		"	8/31/1946
171	Richard H. Coad	Died 11/13/1946		"	10/31/1946
187	August Norell	Ret to work 5/21/1946		"	4/30/1946

Minnesota Retirements

This office continued to handle payments to retired employees of our Minnesota properties during the year 1946. As in 1945 two payrolls were prepared, one for the Canisteo Mine retired employees and the other for the Mesaba-Cliffs Mining Company or employees of the Hill-Trumbull and Holman-Cliffs Mines.

There was no change in the Canisteo Mine roll during the year.

On the Mesaba-Cliffs Mining Company Retirement Payroll Mr. Andre Sasah was dropped as of June 30, 1946 when he was given seasonal employment and again picked up as of November 1, 1946 when that employment ceased. Mr. Ray G. Wilson was also added to the roll as of October 1, 1946 by transfer from the Donation Payroll of this same company. These comprised the only changes during the year.

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

o. INCAPACITATED EMPLOYEES (Continued)Retirement Roll (Cont'd)

A resume of the 1946 Retirement Payrolls follows:

Number of Mining Department Retired Employees 1/1/46	133	
Number of Mining Department Retired Employees 1/1/47	175	
Total Expenditure to Mining Department Retired Employees for year		25,507.68
Number of Canisteo Mine Retired Employees 1/1/46	7	
Number of Canisteo Mine Retired Employees 1/1/47	7	
Total Expenditure to Canisteo Mine Retired Employees for year		840.00
Number of Mesaba-Cliffs Retired Employees 1/1/46	14	
Number of Mesaba-Cliffs Retired Employees 1/1/47	15	
Total Expenditure to Mesaba-Cliffs Retired Employees for year		1,670.00
Total Number of Retired Employees 1/1/46	154	
Total Number of Retired Employees 1/1/47	197	
Total Expenditure to Retired Employees for year		28,017.68

23. p. COST OF LIVING

Each year we make a brief statement regarding living costs as they come to our attention during the year. We make an effort to check local prices and to make comparisons, particularly with other parts of the Peninsula as well as in the Southern Peninsula. We use the Federal Department of Agriculture and the State Department of Social Welfare charts and indices in determining what the present living rates are as compared with previous years. While there has been no great change during the year 1946, we can report that in a few cases there has been some reduction in the cost of necessary foods.

We learned from local merchants that general business conditions in the district are good. Some of the shortages which they formerly experienced are no longer problems. These merchants report that many people have acquired a taste for better things and that they are willing to pay the prices for them.

There was some increase in the number of businesses during the year. Some of the servicemen who have returned have gone into business. There are a few new local stores, new garages, repair shops and bake shops.

Housing

There has been no improvement in the housing situation as reported last year. Homes and apartments are very difficult to get and during the past few years there has been very little new building. It is felt that there will be considerable new construction in the district as soon as materials become easier to get.

Relief Situation

The public relief load in Marquette County has not increased. The average for the year will again be under 100 cases per month. This low case load is due to the fact that many people are employed and that they are making better wages than they ever have. The few people who are receiving public relief are either old folks who are not employable or persons having personality problems.

The number of older persons in Marquette County who received Old Age Assistance from the State Social Welfare Commission was 901 cases in December of 1946, compared with 819 cases in December of 1945. The average Old Age Assistance grant for December, 1946 in Marquette County amounted to \$35.01 compared with \$27.22 for 1945. The number of cases of Aid to Dependent Children amounted to 169 cases in December, 1946, compared with 124 cases in December of 1945. The average grant in the Aid to Dependent Children cases in 1946 amounted to \$72.21 compared with \$63.43 in 1945. Eleven blind persons were given Aid to the Blind in Marquette County during 1946, compared with fourteen during the previous year. The average grant amounted to \$38.12 per month, compared with \$33.90 per month in 1945.

23.

p. COST OF LIVING (Continued)

It is our opinion that this mining area, despite the fact that new influences through organized labor have had their effect, is still one of the happiest and best mining communities in the whole country. Many of our people appreciate the fact that working conditions, as well as living conditions in this community, are considerably above the average as compared with other mining communities in the country. Contacts are made with employees almost daily and very seldom do we encounter any employee who is dissatisfied or unhappy.

q. IMPROVEMENT WORK

Mr. Julien Payen continues to have charge of all the improvement work and care of all the grounds in the whole district. This program has been carried on for many years and has had a very good effect upon the general morale of the community. Moreover, we feel that the keeping of our own grounds in good condition is an incentive to our employees.

r. GARDENS AND WELL KEPT PREMISES

It was decided not to conduct the Best Kept Premises and Vegetable Gardens contest during 1946. Mr. Mather established this event many years ago and it is hoped that we may re-consider and re-establish this program.

s. COMMUNITY SERVICE WORK

The American Legion building in Ishpeming has served for many years as the center for all Legion activities and for various other types of activities in the district. The John V. Braden Post of the American Legion leases this building from our Company and the Oliver Mining Company, maintains it and takes care of the upkeep. It is now proposed to turn the building over to the Legion Post.

The American Legion building in Negaunee is also leased from our Company and there is considerable activity at all times being carried on there. There has been an increase in membership of the John H. Mitchell Post at Negaunee due to the fact that the men of World War II are returning and becoming members of the Legion. This building has always been kept in good condition and a recent inspection indicates the interest of the Legion Post in taking over the building as their own property in the near future.

COLLECTORIAL BOARD

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

s. COMMUNITY SERVICE WORK (Continued)

We have no additional report regarding the old Ishpeming Y.M.C.A. building. There was some hope that this building might have been taken over for an armory for the local state military group which is now being organized.

The number of fraternal organizations in the district is rather large for a community of this size. Many of the fraternal orders maintain their own club rooms and considerable of the social life of the community centers around these organizations.

t. SATURDAY NOON LUNCHEON CLUB

The Saturday Noon Luncheon Club, made up of superintendents and heads of departments, approximately thirty in number, has not had many meetings during 1946. Mr. Stakel, Manager, has called these meetings when he wished to discuss some particular program or problem with the entire group.

u. OUTDOOR ACTIVITIES

The interest in outdoor activities in the community has increased considerably in recent years. The Winter Sports Club, which maintains a clubhouse north of the city, is a very popular organization and there is greater activity there each winter. This area is also made available during the summer months for various types of outdoor meetings.

The Ishpeming Ski Club has been working for several months, preparing for the National Ski Tournament on February 22nd and 23rd, 1947.

The Mather Inn

The Mather Inn continues to be the most popular hotel in the Northern Peninsula. It is serving the public in a very fine manner. Many meetings of civic and community nature are held here. People often express the hope that some time the Inn may be enlarged.

23.

w. VARIOUS DEPARTMENTS AND ACTIVITIES

Each year a statement is included in the annual report covering special activities of this department throughout the year. In 1946 the Superintendent of the Welfare Department completed his seventh year as a member of the State Social Welfare Commission. This commission is the state agency which meets once a month and establishes the programs and policies and all matters dealing with Old Age Assistance, Aid to Dependent Children, Aid to the Blind, the Child Welfare Services, direct relief, problems of adoption and licensing of boarding homes, maternity hospitals, homes and camps for transients, and matters dealing with delinquency of juveniles.

Other activities carried out through the year 1946 were as follows: I have continued to serve as Chairman of the Board of Directors of Bay Cliff Health Camp, at Big Bay. I also have served another year as Director of the county chapter of the American Red Cross, as a Director of the Marquette County branch of the Michigan Tuberculosis Association, as a Director of the Michigan Welfare League, as a Director of the Michigan Society for Crippled Children and Disabled Adults, and as a District Chairman in the Northern Peninsula for the American Cancer Society.

x. POLICE DEPARTMENT

The Police Department is under the direct supervision of the Superintendent of the Welfare Department and is in direct charge of Mr. R. J. Veale, Chief. Almost daily conferences are held with Mr. Veale, dealing with police work and plant protection. Mr. Veale submits a monthly report.

Our police have been uniformed for several years and we have felt that we get excellent service from them. New men for the department are selected with care and we no longer follow the old policy of using older men in their declining years as members of our police force.

y. MINERS' BULLETIN

Throughout the year there have been a few issues of the Miners' Bulletin. For a long period during the time of the labor dispute and for some time thereafter no bulletin was issued. The Welfare Department works with the Safety Department in preparing material for the bulletin. We have reached the point where we feel that the name of the bulletin should be changed and that more attention be given to a more extensive presentation of matters of interest to the employees. Much good can come from a good company magazine or paper. In the new year it is planned to conduct a contest for a new name and to include more material in the paper and to issue it about every two months, or six issues during the year.

WELFARE DEPT. ANNUAL REPORT YEAR 1946.

23.
w. VARIOUS DEPARTMENTS.

LAND DEPARTMENT

COMPARATIVE STATEMENT OF GENERAL WELFARE EXPENSES

YEARS 1943 - 1946, INCLUSIVE.

<u>General Welfare Acct. No. 11.</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>
A-2 Prop. charged by Treas.	\$ 300.00	300.00	300.00	300.00
11-F Miscellaneous Expenses	240.00	240.00	240.00	240.00
	\$ 540.00	540.00	540.00	540.00
 <u>Donations:</u>				
U. P. Development Bureau	500.00	500.00	500.00	500.00
American Red Cross	550.00	825.00	905.00	465.00
Munising Fire Department			20.00	10.00
Mather High School - Munising	20.00			
Construction of Honor Roll monument- Munising		13.22		
Munising Community Chest				100.00
Alger County War Fund			100.00	
	1070.00	1338.22	1525.00	1075.00
 <u>Compensation:</u>				
Monthly payments to doctors	407.77	328.13	489.29	471.51
 <u>Compensation - Logging Operations.</u>				
Medical and hospital	91.50	176.56	8.00	39.00
Compensation payments	4800.55	3480.29	3122.12	2135.12
Percentage of Payroll	4.7	3.5	2.9	1.6%
 Physical examinations - Company employees				 \$ 45.00

WELFARE DEPT. ANNUAL REPORT YEAR 1946.

23. w. VARIOUS DEPARTMENTS (Continued)

LAKE SUPERIOR & ISHPEMING RAILROAD COMPANY

COMPARATIVE STATEMENT OF GENERAL WELFARE EXPENSE

YEARS 1943 - 1946, INCLUSIVE.

<u>Donations.</u>	1943	1944	1945	1946
Fire Departments	5.00	15.00	35.00	32.50
American Red Cross	200.00	350.00	350.00	250.00
Munising War Fund		30.00	30.00	
Marquette Honor Roll			100.00	
Alger County Community Chest				24.00
Community Chest Fund-				
Marquette, Negaunee, & Ishpeming	575.00	387.50	437.50	300.00
Tuberculosis Association			10.00	10.00
Munising Hospital Association				2000.00
	<u>780.00</u>	<u>782.50</u>	<u>962.50</u>	<u>2616.50</u>
 <u>Pensions:</u>	 5700.00	 5760.00	 5040.00	 5004.16
 <u>Compensation:</u>				
Compensation Paid	2386.38	712.16	1158.18	1475.40
Medical Expense	1180.34	768.07	2811.58	1371.45
Percentage of payroll	.0025	.0007	.0012	.0013

WELFARE DEPT. ANNUAL REPORT YEAR 1946

23.

z. APPRECIATION

It is a privilege to record in this report my appreciation for the cooperation, the guidance and the understanding which have always been given this department by Mr. C. J. Stakel, Manager, and by Mr. C. W. Allen, Assistant Manager. I wish also to express my appreciation for the cooperation which has always been received from Mr. A. J. Stromquist, Safety Director, and from Captain H. F. Rogers, his assistant. We shall strive to coordinate and cooperate with the work of this department at all times. It should also be mentioned here that the Superintendent of the Welfare Department, who acts as Administrator of the Ishpeming Hospital, appreciates the splendid cooperation and help of Mr. C. W. Allen, Assistant Manager, and Mr. E. E. Riedinger, Chief Clerk, who have been serving as members of the Ishpeming Hospital Advisory Administrative Committee, which meets every month. During the latter part of the year the following members were added to this committee: Mr. Joseph Cameron, Superintendent of the Hercules Powder Company, and Mr. Ray Satterley, Superintendent of the Inland Steel interests in this area.

I wish to conclude my annual report by expressing appreciation for the splendid help and assistance of Mr. W. E. Johnson, Compensation Agent. I also wish to express appreciation for the splendid service which is being rendered by Mr. L. C. Holmgren, Mr. Johnson's assistant. We record again that we are very pleased to express appreciation for the fine services rendered by Miss Emily Nicholas, Secretary to the Superintendent of the Welfare Department, and Miss Mary Ryan, who acts as Office Receptionist and File Clerk. Their continued cooperation and pleasant attitude in the face, some times, of heavy work is highly appreciated.

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ATHENS MINE:

No serious difficulties have occurred with the hoisting equipment during the year. The 10,000 ampere D.C. circuit breaker for the skip hoist has been rebuilt and put into service. The main contacts of the breaker, the buss leads and connections were all silver plated for better contact and consequently less heating.

The failure of a commutating coil in the exciter of the skip hoist motor-generator set was the cause of a short delay. This coil was taken out and repaired at the General Electric Co. shops while the generator was kept in operation minus one coil. The speed adjustment of the skip hoist has been kept at approximately 1440 feet per minute for the entire year. Some changes were made previously on account of shaft repairs.

One of the 2300 volt 2/0 3-conductor power cables in the shaft failed during an electrical storm in September. The break occurred near the 4th level about 1800 feet from surface. The load was switched to the #1 cable while repairs were made with no delay in mining operations.

Minor changes have been made in the pump station requiring a four-way subway box and cable for separate service to pump motors, converters and haulage motor-generator sets. On account of bearing and slip ring failure, one of the 400 HP Westinghouse pump motors was taken apart for repairs, which were completed September 17th. Two motor failures occurred on the 25 HP pump at the Breitung shaft. These have both been rewound and one spare is now in storeroom at the mine.

The Ingersoll-Rand compressor overheated in February and burned the thermometer near the outlet of the high pressure cylinder. The Fenwal thermo relay was tested and proved to be O.K. It tripped the circuit breaker at 358 degrees F.

Rotor and stator windings of the synchronous motors on the Nordberg and Ingersoll-Rand compressors have been repaired and repainted.

The two haulage converters were taken to the general shops and repaired during the year. One of the G.E. IM-2T6-LL locomotives was taken from the 8th level to the 7th level.

CAMBRIA-JACKSON MINE:

Hoisting has been carried on with some difficulty with the electrical equipment during the year. The contactor and grid control troubles have been cleaned up, but motor difficulties occur intermittently.

The 500 HP Westinghouse motor is now solidly connected to the pinion shaft with the new brake wheel and auxiliary brake. Several failures have occurred in the slip ring insulation on the rotor while the main rotor winding has held up well. One failure of the stator winding occurred which required cutting two coils out of the winding.

The 7th level pump station work is completed so far as subway box and cable connections are concerned and the rebuilt distribution panel is also connected to both shaft cables through the 7th level switch box. Installation of the new Goulds 100 HP pump and starting equipment on the 7th level has also been completed.

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CAMBRIA-JACKSON MINE: (Continued)

Repairs to the 250 HP synchronous motor for compressor purchased from the Holmes Mine were completed and the machine put in service during January 1946.

Some changes have been made in the electric haulage and tram equipment, including the arrangement for parallel operation of the G.E. 150 KW D.C. generator and the Crocker-Wheeler 150 KW D.C. generator including larger equalizer switches and cables. The D.C. busses and cables at the panels have been rebuilt for the increased load and a larger circuit breaker has been ordered from the General Electric Co.

CLIFFS SHAFT MINE:

Several changes have been made in the controls and emergency brakes of A and B shaft hoists during 1946. New air brakes with solenoid controls were installed to operate with Lilly control circuits. On account of the higher current requirement for the larger solenoids, larger transformers were also installed for the Lilly control circuits of each hoist. Breaks in rotor circuits and band wires on the 750 HP hoist motors have been the cause of three stoppages during the year. New slack rope signal equipment was set up for A and B shaft hoists consisting of red lights and 110 volt grounded system to replace the old battery signal set up.

Two 5 HP compressors were purchased for auxiliary purposes. One was installed in the engine house for air brake purposes and the other in the main pump room for charging air chambers of the plunger pumps.

Installation of the new 1000 GPM Worthington plunger pump has been completed. The electrical equipment consists of one 300 HP synchronous motor with exciter and line starter. A suction pump is also a part of this equipment, which has a 25 HP 440 volt induction motor with a line starter. Two 25 KVA 2300/440 volt transformers formerly used for scraper power distribution at the 2nd level B shaft were set up as a permanent installation in the main pump station to furnish 440 volt 3 phase power for the 25 HP suction pump and for welding purposes in and near the pump station.

The failure of a starting compensator was the cause of a lengthy shut down of #1 compressor in February. The flashover from the broken down coils set fire to the coils and connecting cables, and opened the main breaker in the substation. The necessary equipment required for complete repairs, including the compensator, was borrowed from the Cambria-Jackson Mine. A spare compensator has since been built which is interchangeable with the compressor operating equipment at several of our mines.

Several changes in transformers were made necessary to overcome some of the difficulties encountered by low voltage in the underground scraper power distribution. One 50 KVA transformer was borrowed from the Mather Mine and moved to the 10th level substation, A shaft; and another 50 KVA unit was transferred from the Cambria-Jackson 4th level pump station to the 6th level, A shaft.

The 6-ton LM-101-M1 locomotive recently purchased from the Holmes Mine and used at the Princeton Mine was taken to the Cliffs Shaft and is now stored on surface near the shops.

LLOYD MINE:

Several delays in ore hoisting have occurred during the year due to broken coil connections in the 500 HP hoist motor. After these several temporary

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LLOYD MINE: (Continued)

repair jobs, the motor was taken apart, the laminations repaired and the slots filled to stop vibration and avoid breaks in coil connections. There has been no difficulty since this last repair on October 20th.

A similar repair job was recently completed on the synchronous motor of the Sullivan compressor, made necessary by the movement of the stator coils in the slots due to shrinkage and drying of the insulating material.

The changes and repairs to the haulage system have been very much routine during the year. In order to improve the D.C. voltage on the 8th level, a 4/0 concentric cable was installed to connect the 7th and 8th level trolley and rails through a raise near the ore body.

MAAS MINE:

The ore hoist electrical equipment has drifted into several difficulties during the year largely due to overloading of skips near the bottom of the shaft. On several occasions, the skip jammed with ore between the stringers and skip guides, causing extreme overloads with consequent burning of brushes and slip rings of the motor.

The failure of a cable from the contactor panel to the motor was the cause of the most serious shut down. A complete new cable and connections were installed to replace the faulty equipment. The liquid rheostat and controls have also been rebuilt.

All electrical equipment for the 200 HP hoist from the Maas winze which was recently repaired for the Lloyd Mine, including control panels, grids, controller switches and 200 HP motor is stored in the Lake Mine storage house. The hoist and drum equipment is on surface near the Lloyd Mine shaft.

Several changes have also taken place with the pumping equipment. The new section of the 3rd level pump station is now completed and the 350 HP plunger pump installation completed and operating. This set up of electrical equipment consists of the 350 HP 2300 volt slip ring motor from the Gardner-Mackinaw Mine, the grids, switches and controls from the Allis-Chalmers centrifugal pump at the Maas. The old Alberger pump controls have been transferred to the 1000 GPM Allis-Chalmers pump. The 125 HP centrifugal pump from the 7th level at the Princeton Mine was taken to the Maas 5th level pump station and installed there with a 150 HP General Electric starting compensator from storage. After several attempts to use the pump while cleaning the 5th level sump, a failure in the pump rotor occurred and the entire set up was taken to the general shops for repairs. The No. 1 surface well pump has continued to run during the year, while No. 2 has been tied up intermittently for repairs. Three hundred feet of #4 3-conductor cable and 3/8" messenger wire was installed to replace old wiring under the east trestle which is a part of the 2300 volt line to the well pumps.

Minor repairs have been made to the compressor motors and exciters. The No. 2 compressor motor is still operating with seven coils cut out of the stator.

MATHER MINE:

The installation of a connection changing panel between the two hoist motor-generator sets for switching the set up from one to two set operation on the skip and cage hoists has been completed and tested. The hoisting operations are at present carried on with the two motor-generators sets in operation.

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MATHER MINE: (Continued)

The 100 KW Westinghouse rotary converter from the Princeton Mine was sent to the Mather Mine with D.C. and A.C. panels, transformers, meters and all necessary equipment for its complete installation and will be kept in the engine house basement for use in case of failure of present D.C. equipment.

Installation of the new 200 KW Westinghouse Ignitron has been completed and it is in service. The three Westinghouse-Whitcomb 8 ton trolley locomotives are also underground and in service.

Changes in the pumping equipment includes moving the 40 HP 250 gallon Allis-Chalmers pump and line starter from the Cambria-Jackson Mine storage to the 5th level. This pump was formerly used for surface water supply from the Cambria sub shaft.

NEGAUNEE MINE:

Several interruptions in the ore hoisting occurred early in the year due to open coils in the 500 HP skip hoist armature. Installation of the rebuilt armature was completed in March. The old armature with the faulty winding is stored outside near the engine house in a sheet iron enclosure.

The pumping equipment has served very well during the year with routine repairs.

On account of difficulty encountered with the auxiliary compressor with its low capacity and overheating due to continuous operation, the 15 HP compressor from the Princeton Mine was moved to Negaunee Mine and installed with the auxiliary compressor equipment. The synchronous motor for the Rand compressor failed several times during the year. After the necessary repair jobs this motor is now operating with six coils cut out of the stator winding.

SPIES-VIRGIL MINE:

The skip hoist motor windings and bearings were repaired in April.

The final section of the new 2/0 2300 volt power cable from the engine house to the 3rd level has been completed with the necessary subway boxes and switches for parallel operation with the #1 cable from the engine house to the 8th level.

Failure of the rotary converter for the D.C. haulage and scraper system occurred in the month of May. Shop tests revealed several breaks in the rotor winding which would be very costly to repair and it was therefore decided to move the 100 KW motor-generator set from the Princeton Mine. Equipment including the 100 KW General Electric D.C. generator, the Westinghouse 215 HP synchronous motor, AC and DC panels with circuit breakers and meters for parallel operation with the present haulage equipment has been set up and is now in continuous service.

22. REPORT OF GEOLOGIST FOR THE YEAR ENDING DECEMBER 31, 1946A. STAFF

The staff of the Geological Department for the year 1946 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	-	99 $\frac{3}{4}$	97	99.9
Burton H. Boyum	Asst. Geologist	17 $\frac{1}{4}$	91		94.6
William E. Bertholf, Jr.	Asst. Geologist	-	-		100.0
Archie Minnear	Draftsman	-	86 $\frac{3}{4}$		95.6
Ernest A. Allen	Sampler	7 $\frac{1}{4}$	98		94.7
George M. Olson	Sampler	21 $\frac{1}{2}$	93 $\frac{3}{4}$		94.2
Mrs. Belle F. Bloch	Office Asst.	29	75 $\frac{1}{4}$		94.8

Mr. Bertholf joined the Geological Department as an Assistant Geologist on November 1st. He served the Republic Steel Corporation as Mining Engineer and Geologist at its Tobin-Columbia Mine in Crystal Falls before entering the U. S. Navy in June 1943. He held the rank of Lieut. (J.G.) in the Navy and was discharged in February, 1946. Following his discharge he completed work at the University of Chicago on his Masters Degree in Geology. He had received his Bachelors Degree also at the University of Chicago.

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

TABLE II.

Total Working Days	276 days (1994 hours)
Sundays	52 "
Full days resulting from	
Saturday afternoons	26 "
Holidays	11 "
TOTAL	<u>365 days</u>

Table III, below, shows the average number 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>
1942	4.0
1943	4.2
1944	5.6
1945	6.0
1946	6.2

B. GENERAL CLASSIFICATION OF THE WORK OF THE DEPARTMENT

The work of the Geological Department was divided into the several classifications shown in Table IV, below:-

TABLE IV.

ITEMS	HOURS WORKED	PERCENT
<u>MINES</u>		
Athens	164 $\frac{1}{4}$	1.4
Atkins	85 $\frac{3}{4}$	.7
Book	54 $\frac{1}{2}$	.5
Cambria-Jackson	350	3.0
Canisteco	46 $\frac{3}{4}$	.4
Cliffs-Shaft	736 $\frac{1}{2}$	6.3
Hill-Trumbull	85 $\frac{1}{4}$	.7
Holman-Cliffs	61 $\frac{1}{4}$	.5
Lloyd	102 $\frac{3}{4}$	.9
Maas	111	.9
Mather	1,387 $\frac{1}{2}$	11.8
Morris	147	1.3
Negaunee	120 $\frac{3}{4}$	1.0
Pontiac	22	.2
Princeton	57 $\frac{1}{4}$	.5
Republic	46 $\frac{3}{4}$	.4
Section 11 Development	24 $\frac{1}{4}$	.2
Spies	255 $\frac{1}{4}$	2.2
Tilden	3 $\frac{3}{4}$	.0
Total Mines	3,862 $\frac{3}{4}$	32.9
<u>EXPLORATIONS</u>		
Cambria-Jackson Mine	190 $\frac{1}{4}$	1.6
Cliffs-Shaft Mine	338 $\frac{3}{4}$	2.9
Lloyd Mine	125 $\frac{1}{2}$	1.1
Mather Mine	219 $\frac{3}{4}$	1.9
Negaunee Mine	80 $\frac{3}{4}$	.7
Spies Mine	227	1.9
Section 1, 47-27	1,153 $\frac{3}{4}$	9.8
Section 3, 47-27	331 $\frac{1}{4}$	2.8
Section 4, 47-27	1,249 $\frac{1}{4}$	10.6
Section 11, 47-27	133	1.1
Section 24, 43-35	257 $\frac{3}{4}$	2.2
Total Explorations	4,307 $\frac{3}{4}$	36.6
<u>MISCELLANEOUS</u>		
Annual Report	74 $\frac{1}{4}$	.6
Beneficiation of Iron Ores	183	1.6
Engineering Department	46	.4
Geological Surveys on Company's Mineral Estate	2,609	22.2
Investigating Mineral Land Offers	348	3.0
Investigating Outside Explorations	57 $\frac{1}{2}$	.5
Michigan Mineral Land Company	3 $\frac{1}{2}$	.0
Miscellaneous Geological Expense	260 $\frac{3}{4}$	2.2
Total Miscellaneous	3,582	30.5
GRAND TOTAL	11,752 $\frac{1}{2}$	100.0

B-1. DESCRIPTION OF WORK BY STAFF MEMBERS

The writer continued to have direct supervision throughout the year of all drilling, explorations, geological surveys and other activities of the Department. This required frequent trips to the Mesaba Range in the interest of drilling, metallurgical test work on drill samples and estimates of ore reserves at the Atkins, Canisteo, Hill-Trumbull and Holman-Cliffs Mines. In addition to this routine, the more important activities of the writer included the following:-

In JANUARY, the writer held two conferences with Mr. R. S. Archibald in connection with a proposal that the 16th Level of the Blueberry Mine be extended Westward onto the Company's property, the N $\frac{1}{2}$ of NW $\frac{1}{4}$ of Section 4, 47-28, from which exploring might be accomplished by underground drilling. At the second conference, Mr. S. L. Mather was present and we went into more detail in defining the costs of certain items of such a program. Special reports cover both of these conferences.

The writer met with several officials of the E. J. Longyear Company at its office in Minneapolis and discussed with them the problem of increased core recovery in our diamond drilling operations, together with possible changes in design of the clinometer case used to contain a drill hole compass in connection with our proposed plan to wedge branch holes from many of our deep surface holes to be drilled in the future. He also attended the 19th Annual Meeting of the Minnesota Section of the A. I. M. E., which was held in Duluth on January 14th.

In FEBRUARY, Mr. S. L. Mather was in Ishpeming and the writer conferred with him on our current drilling program and the question of what to do with the Pontiac Mine. The writer went over the later problem in detail with Messrs. Sterling and Holt while in Hibbing and the findings were incorporated in a special report written by Mr. Holt. The writer also attended the Annual Meeting of the A. I. M. E. held in Chicago.

In MARCH, the writer spent two days conferring with Mr. F. G. Pardee, State Appraiser of Mines, going over the estimates of reserve tonnages in the various operating mines which had been submitted in our report to the Tax Commission. Mr. Brewer joined us in this conference. Also, the writer conducted Mr. Pardee in an underground inspection trip in the Cambria-Jackson and Mather Mines.

The writer conferred with Mr. C. J. O'Connell, one of the engineers in the office of the Tax Commissioner of Minnesota, in St. Paul, relative to the estimate of future stripping which we had submitted on the Hill-Trumbull Mine. Mr. O'Connell had questioned the increase in this stripping but was convinced of the accuracy of our statement following the conference. The writer also spent part of a day at the Mines Experiment Station, conferring with Messrs. Davis and Wade on the Company's ore beneficiation problems.

The writer had two conferences with Mr. R. S. Archibald on matters of the Michigan Mineral Land Company and particularly in connection with the proposed sale of the surface of the M.M.L. Company's land adjacent to the Ravenna-Prickett Mine in Iron County. Also, at this time, we made our annual recommendations to Mr. Bush relative to M. M. L. Co. mineral holdings which should be protected at the May Tax Sale of the surface lands on which taxes have become delinquent.

In APRIL, the writer went to the Cleveland office on two occasions. In the first instance, April 9th, conferences were held with Messrs. A. C. Brown, S. L. Mather, H. A. Raymond and others on matters relating to the proposed surface drilling program at the Book Mine and problems at the Lloyd, Mather and Pontiac Mines. Following these conferences, he spent one day in Columbus, April 10th, attending a meeting of the Technical Committee of the group of iron and steel companies who are sponsoring a research program at the Battelle Memorial Institute on the concentration of the iron formations in the Lake Superior District. In the second instance, Mr. C. W. Allen joined the writer for conferences on the Mather and Negaunee Mines, at which data was prepared that was used at the Director's meeting of the Negaunee Mine Company. This Cleveland trip followed a conference that Messrs. Allen, Bubb and the writer had in Lansing on April 15th with Messrs. Pardee and Eddy, of the State Tax Commission, going over the tentative valuations and factors used by the Commission in appraising our Michigan operating properties.

In MAY, the writer spent one day at the Cleveland office enroute to New York where he attended a regular meeting of the Board of Directors and Annual Stockholders meeting, both of the Consolidated Coppermines Corporation, of who's board he is a member. While in Cleveland, he made a study of the valuations placed on the Company's Michigan Mines by the State Mine Appraiser with Mr. Geffine.

The writer also spent one day in Minneapolis and St. Paul, principally on tax matters of our Minnesota properties and on current developments in our iron ore beneficiation problems at the Mines Experiment Station. He joined Messrs. Walter Sterling and Holt in a conference with Messrs. Diehl, Cronk and Wolff at the Oliver Iron Mining Company office in Duluth, discussing the question of mining ore along the common boundaries between the Hill-Trumbull and Holman-Cliffs Mines and Oliver lands. Favorable arrangements for mining all of the boundary ore on Company property have resulted from this conference.

The writer made three inspection trips during the month to the surface drilling being done at the Book Mine, anticipating a continued joint interest in the property with the North Range Mining Company which operates it.

In JUNE, the writer made a superficial study of all of the data on the Bruce Mine, near Chisholm, Minnesota, formerly operated by the International Harvester Company, but abandoned and the lease surrendered by them to the State in 1938. He was joined in this study by Messrs. W. A. Sterling and Holt. As a result, he presented a bid by the Company for an exploring permit on this property to Governor Thye of Minnesota and his Council in St. Paul on June 10th. The bid was accepted by the State. During the 90 days which followed, and before it was necessary to commence exploring, a more careful and detailed study was made. This included a reclassification of the available drill samples and the examination of all mine records and available data. As a result, we were convinced that the property did not merit the acquisition of a lease and, consequently, the exploring permit was cancelled near the end of the period.

Messrs. Holt and the writer reviewed data on the so-called Niles lands covered by Land Offer No. 2355 and submitted by Messrs. M. H. Barber and W. L. Taylor of Hibbing. We recommended that the offer be declined and had a conference in Hibbing with Messrs. Barber and Taylor to define our position. This was not necessary, of course, but on account of Mr. Barber's former connection with the Company, we considered it an act of courtesy.

On June 25th, Dr. R. J. Lund called on the writer. He showed Dr. Lund around the Range and acquainted him with some of the problems in the future in connection with the concentration of our local lean ores and jasper iron formation. Dr. Lund is on the staff of the Battelle Memorial Institute at Columbus, Ohio, and at least a part of his time is devoted to the research problem of the concentration of Lake Superior District iron formations, which is being sponsored by ten iron mining and steel companies, of which the Company is one.

In JULY, the writer conferred with Mr. Frank E. Downing, Mining Engineer, in the office of the Minnesota State Commissioner of Taxation in St. Paul, relative to submitting an ad valorem tax report on the Atkins Mine for the year 1946. As a result of this conference, it will not be necessary to file such a report until 1947. This eliminates the possibility of several complications.

Mr. H. G. Outright of New York, Vice President of the Pittston Company, and recently elected a Director of Cliffs Corporation, spent a week in Ishpeming from July 5th to 12th, inclusive, becoming acquainted with the Company's operations and staff. It became the writer's duty to spend considerable time with him during this period. He also conducted Mr. George A. Smainis and party around the Range and went over with Mr. Smainis the current activities at the Cambria-Jackson Mine with special emphasis on current and planned drilling programs. Mr. Smainis is a prominent mining engineer of Chicago. He has a small interest in and represents the balance of the fee of the Teal Lake Iron Mining Company lands, of which the Cambria property is a part.

It was the writer's honored privilege to give a more or less informal talk on geology, exploring and metallurgical problems as applied to the Company's mineral estate, to Directors W. G. Mather, E. B. Greene, Burwell, Brown, Gund and Jones, on July 20th. Mr. W. E. Brewster, General Superintendent of the Wisconsin Steel Works, International Harvester Company, Chicago, and his wife, were on the Range on July 22nd and 23rd. The writer entertained them and acquainted Mr. Brewster with all of the Company's operating mines and other activities and arranged for his meeting many of our staff. On July 20th we were honored by the presence of Messrs. Hubert Merryweather and W. S. Cumings of the Bethlehem Steel Company. They made an underground inspection at the Mather Mine and looked over the surface area of the proposed Section 1 Development, together with the Negaunee Mine surface. The writer joined in all of this activity.

On July 23rd, Messrs. George M. Cannon and S. E. Quayle of the M. A. Hanna Company at Iron River, came to Mr. Stakel's office, where the writer joined the group and went over with them the Hanna Company's current underground development in the Bates Mine approaching the Spies Mine boundary and its proposed plan of drifting on and exploring the South side of its property from the 4th Level, Spies-East Deposit.

In AUGUST, the writer accompanied Mr. Stakel in attendance at a gathering in Bethlehem, Pennsylvania, on August 10th, of the heads of many departments of the Bethlehem Steel Company and guests from numerous companies with which the Mining Department of Bethlehem either has business connections or close relations. This gathering^{ing} was sponsored and arranged by Mr. M. L. Jacobs, Vice President.

On August 16th, Mr. C. B. Randall, Vice President of the Inland Steel Company, came to the writer's office, where they discussed the Section 11 Development and later examined the surface area.

In SEPTEMBER, Mr. Greene, President, conducted a party of Bethlehem Steel Company officials to the Marquette Range on September 4th. The party was composed of Mr. Homer, recently elected President, Mr. Jacobs, Vice President, and Mr. Berkeley, Assistant to the President. While they were here, the writer gave them an informal talk to acquaint them with the Company's holdings on the Marquette Range and a generalized geological explanation of the occurrence of high grade ore. He also joined Messrs. Greene, Stakel, Allen and Holt in conducting the party around the Range.

On September 10th and 11th, the writer attended a two day session of the Technical Committee of the Battelle Institute research program on concentration of Lake Superior District iron formation at the Androy Hotel in Hibbing. There was a total of 22 men in the group, including five scientists of Battelle. Following this meeting, the writer joined with Mr. Walter Sterling in a conference with Messrs. Downing and McAdams, Engineer and Assistant Engineer, respectively, in the office of the Minnesota State Commissioner of Taxation, St. Paul. We went over the ad valorem reserve estimates of the Canisteo and Hill-Trumbull properties and cleared up several points which had been questioned by Mr. Downing. The writer, together with Mr. Holt, made a trip to the District in Ontario about 35 miles East of the Sault and examined an exposure of high grade hard iron ore covered by Land Offer No. 2365. The deposit proved to be disappointing in the amount of high grade ore present.

On September 23rd, Mr. Gordon Cronkhite of Pasadena, California, and Mr. George A. Smainis of Chicago, spent the day with the writer on the Marquette Range. These men represent the Teal Lake Iron Mining Company which owns the fee of the Cambria-Hartford Mine property. We went over all phases of the current and past operations in the Cambria-Hartford property and discussed possible future explorations. We also visited the surface of the property and saw something of the rest of the Range. Both of these gentlemen were particularly interested in what might be done in the future toward the mining, by open pit method, the relatively rich jasper iron formation on Teal Lake lands and the concentration of this material into high grade ore. The writer discussed these problems quite frankly with them and convinced them, he thought, that although such concentration is possible, it is not economically probable for many years to come.

On September 24th, the writer joined Messrs. C. W. Allen and Choquette in attendance at a meeting of Michigan mine operators at Crystal Falls, called by Mr. Carl G. Lindquist, State Representative from Iron County. Mr. Louis Nims, Chairman of the State Tax Commission, acted as Chairman of the meeting. The purpose was to discuss the framing of a bill to be presented to the State Legislature at its next session which will encourage the exploration for iron ore by placing only a nominal tax value on it for the first ten years of its proven existence. The meeting was attended by representatives of most of the mining companies and by other members of the State Legislature, representing the iron mining industry counties of the Upper Peninsula; also by Mr. LaChance, member of the State Tax Commission, and Mr. F. G. Pardee, Deputy State Geologist and Mine Appraiser. Considerable progress was made at the meeting and it was the recommendation of the group that Mr. Nims draw up a proposed bill embodying the principals developed at the meeting and report to the group for further discussion at a date soon after the November election. The latter meeting was held but the writer did not attend. It is his understanding, however, that a bill satisfactory to the mining fraternity, and drafted by Mr. Nims, is to be presented to the Legislature at its current session.

In OCTOBER, the writer conferred, in Iron River, with Mr. F. E. Brown, Mining Engineer representing the fee interests in the Mineral Mining Company, in connection with Land Offer No. 2371, covering the Beta-Nanaimo and Buckholtz properties in Iron River. Later in the month, Mr. Brown and the writer conferred in Iron Mountain with the former's father, Mr. E. F. Brown, who is one of the stockholders in the Mineral Mining Company. Thus far the Mineral Mining Company has not committed itself on specific terms for a proposed option for lease.

The writer attended the Michigan Sectional meeting of the A.I.M.E. at Calumet on October 11th. A luncheon of the members was held at the Miscowaubik Club, where we greeted Dr. Louis S. Cates, President of the Institute and Mr. A. B. Parsons, Secretary. We were addressed by both of these gentlemen in a most interesting manner.

The writer spent one day at the Mines Experiment Station, Minneapolis, going over metallurgical problems confronting us at our three Western Mesaba Range operations. He arranged for a large experimental treatment of two carloads of material from the Hill-Trumbull Mine which has given considerable trouble in the present flow sheet. It is expected, as a result of these tests, which have now been completed, to improve the grade of concentrate produced by a relatively simple and inexpensive alteration in the mill.

In NOVEMBER, the writer spent parts of two days in St. Paul in preparation for and in attendance at the annual ad valorem tax hearing before the State Commissioner of Taxation, and was accompanied by Mr. Donovan. It was unnecessary to protest any of the estimates assigned to Company properties by the Commissioner, as we had kept these figures in line with our own tax return as a result of several previous conferences with the Engineering Department of the Tax Commissioner.

The writer examined and sampled test pits in the $W\frac{1}{2}$ of the $NW\frac{1}{4}$ of Section 35, 40-17, Wisconsin, which had been put down recently by Mr. Elmer Larson, owner of the land, and covered by Land Offer No. 2380. Analytical results of this material were not encouraging and the offer was declined. Mr. Bertholf accompanied the writer on this examination, which is covered by a special report.

The writer spent November 25th at the Cleveland office on his way to attend a regular meeting of the Board of Directors of Consolidated Coppermines Corporation in New York on the following day. While in Cleveland, he joined Messrs. S. L. Mather and Fayette Brown, Jr. in conference with Mr. Renville Wheat relative to Land Offer No. 2367, covering the $W\frac{1}{2}$ of the $E\frac{1}{2}$ of Section 25, 43-35, South of the Spies Mine property in Iron River. He also conferred with Mr. William J. Mericka, who represented interests in mineral lands on the West coast of Lower California in Mexico. He spent some further time in conference with Messrs. Geffine, Bubb, Gordon and Probeck, going over reserve estimates of our active mines for depletion. Messrs. Gordon and Probeck spent five days conferring with the writer in Ishpeming, from November 18th to 22nd, working up detailed figures of ore reserves and associated data for depletion calculations covering the year 1945. Also, we laid out a pattern to be followed for such calculations in the future.

In DECEMBER, Mr. C. W. Allen and the writer spent December 20th at the Cleveland office attending a conference on the Blueberry Mine. Messrs. Joy, Allen, Miney and Wilmont, represented the Ford Motor Company, and Messrs. A. C. Brown, S. L. Mather, H. A. Raymond, W. McK. Green and Fayette Brown, Jr. comprised the other representatives of the Company. The question was discussed of the Company taking over the operation of that mine, now being operated by the North Range Mining Company as Agent for the Ford Motor Company. Much data has been assembled and special reports prepared on such an operation, based on either an assignment of the lease by the Ford Motor Company, or the Company operating merely as Agent.

BURTON H. BOYUM. Mr. Boyum continued as Assistant Geologist throughout the year. He spent 53% of his time on the geological surveys, maps and cross-sections of our operating mines; 21% on the current drilling explorations, both surface and underground; and 26% on miscellaneous duties including the routine work of the Department. The geological surveys at the Mather Mine accounted for the largest single item of time spent on the mines. This was followed, in importance and time consumed, by the Cliffs-Shaft, Cambria-Jackson, Spies and Athens Mines in this order, with the remaining mines accounting for the balance in lesser individual amounts. The time spent on current explorations included classifying the drill cores and making daily and weekly reports of the drilling.

In March we adopted a policy of wedging branch holes from deep holes after completing the latter where information is desired within 150' to 200' of the parent hole. In order to get the required deflection, ^{at} a pre-determined horizon, it is necessary to set several wedges in the branch hole while it is being drilled. Theoretically, the wedge is designed to deflect the hole 1° 50' in inclination, but in practice the deflection may be as little as 1° and sometimes less. This wedging saves both the time and money of redrilling the ground above the point of placing the first wedge. Mr. Boyum spent considerable time in connection with this work, both in redesigning the type of wedge used in the past to adapt it more successfully to our present problems, and also, at the drills, setting the segments of the wedges before they are lowered into the holes.

WILLIAM E. BERTHOLF, JR. Mr. Bertholf, as noted above, joined the Department as an Assistant Geologist on November 1st. In order that he might become acquainted with the work of the Department and his own duties as soon as possible, he spent most of the time during the balance of the year working closely with Mr. Boyum. He assisted the latter in every part of the work and accompanied him on all underground geological surveys. Following this training period, it is anticipated that he will take over the geological surveying at the Cliffs-Shaft, Lloyd, Maas and Spies Mines. Because of his technical training in the field of sedimentation, he will apply this knowledge in research work connected with classifying formations where unusual difficulty arises using more common methods. His training also fits him for assisting in all magnetic and petrographic work required by the Department.

ARCHIE MINNEAR. Mr. Minnear continued as a draftsman and office assistant with the Department during the year. He spent 61% of his time in drafting work associated with the geological surveys and maps of our operating mines. Principally, this consisted of posting the extensions on the geological tracings of the maps and cross-sections of the operating mines. He spent the balance, or 39%, of his time on miscellaneous duties, including the routine work of the Department. An important part of this latter time was spent in assisting, each month, in calculating the average analyses of the various runs of ore in the current drilling.

ERNEST A. ALLEN. Mr. Allen spent 74% of his time during the year labeling and filing drill core and sludge samples of the current drilling, making tests for the dip and bearing in some of the drill holes with the Maas Compass, and assisting Mr. Boyum in the setting of wedges in the deep drill holes referred to above. About 22% of his time was spent in making thin sections and polished sections of rock and core samples for our petrographic study and refiling old drill cores and hand specimens. The latter required moving the material from the core room to refiling space provided in the old Cliffs-Shaft engine house. He spent 2% of his time in connection with the geological surveys of the operating mines. The balance of his time, also amounting to approximately 2%, was charged to the Engineering Department for his weekly observations and recording of the water levels in the various deep well holes scattered over the surface at the Maas, Negaunee and Athens Mines. These wells were drilled for the purpose of observing and plating the fluctuation and drainage of surface water, to eliminate troublesome water conditions in mining the ore bodies within these areas.

GEORGE M. OLSON. Mr. Olson spent 86% of his time assisting Mr. Allen in the core room and at the drills. This work consisted chiefly of labeling and filing drill core and sludge samples from the current drilling and making Maas Compass tests in the various holes as drilling progressed. He spent 1% of his time in connection with the geological surveys of the operating mines. The remainder of his time, or 13%, was spent in assisting Mr. Allen in making thin-sections and polished-sections for microscopic study, refiling old core and rock specimens, and on certain routine work of the Department.

MRS. BELLE F. BLOCH. Mrs. Bloch continued as an Office Assistant with the Department throughout the year. About 46% of her time was spent in recording the daily progress of current drilling and the analyses of drill samples in our permanent record books, and in typing the daily and weekly reports of drill hole classifications. She spent approximately 33% of her time in coloring whiteprint geological maps and cross-sections in connection with the geology of our operating mines and current explorations. This included coloring the relatively large number of prints of explorations and mine maps that accompany various reports prepared in the Department during the year. She spent 21% of her time on miscellaneous routine duties of the Department. This included assisting in the calculation of the average analyses of the runs of ore encountered in the current drilling and in drill bit accounting. The latter consists of recording the performance and calculating the cost of both the mechanically-set Bortz bits and the hand-set carbon bits. Comparative costs of these two types must be watched closely to insure that the cheaper bit, all things considered, is being used. Both the price and quality of the former have fluctuated considerably during the year.

C. SURFACE GEOLOGICAL SURVEYS

Surface geological work, during 1946, was confined entirely to a magnetometer survey made in Section 4, 47-27. This was commenced in September and carried on intermittently into November.

This was the first serious attempt at magnetic surveying which we have made on the Marquette Range for many years. We believe the use of a modern magnetometer will prove of considerable value in locating greenstone and dike contacts with inclosing rocks at ledge surface when buried under

drift-covered areas. The simple dip-needle has been used for such work spasmodically in years gone by. We believe, however, that the magnetometer will do a much better job and obtain data that would be missed entirely by the ordinary dip needle. We have no magnetometer, but have purchased one which should be delivered during the current spring. We were able to engage Prof. W. A. Longacre of the Michigan College of Mining and Technology and two magnetometers owned by the College. One instrument is used to take readings at survey stations, while the other remains at a base station for periodic observation to record the frequent variations of the earth's magnetic intensity throughout the day. Prof. Longacre is an expert in this geophysical work and particularly in the use of magnetometers. Geophysics is a branch of science requiring a specialist to interpret the data from field observations to get the best results. Prof. Longacre is training Mr. Boyum in this work, but we shall, at least for a time, plan on employing Prof. Longacre as a Consultant.

The end-point in a magnetometer survey usually is the location of lines of faulting. The magnetometer does this by locating dikes which frequently occupy fault planes or zones, and by locating the interruption in an otherwise continuous trend or strike of the greenstone sheets. These interruptions usually are caused by faulting. The location of fault lines at ledge surface are invaluable to us in planning the locations of deep drill holes, because the faults are responsible for forming the structural crotches in the slate footwall that contain bodies of merchantable ore which the drill holes seek to locate.

The magnetic work done in Section 4 to date has not been completed but enough has been done already to confirm and indicate the more or less accurate position of faulting previously suspected and which should assist materially in our deep drilling as it progresses to the West of the present activities. In addition to Mr. Boyum, Messrs. Allen and Olson also are being trained in a certain part of this work in the field. Mr. Bertholf, too, will have the opportunity to develop his theoretical knowledge in this field. We anticipate making a magnetometer surveys in all of the areas favorable for exploring on the Company's mineral estate, concentrating possibly first in Sections 4 and 5, 11 and 12, all in 47-27.

We continued to cooperate closely with a party of geologists from the United States Geological Survey, Washington, D. C., which is making a study of the Iron River-Crystal Falls District, both surface and underground. The party continued to be under the leadership of Dr. Carl E. Dutton. During the past year, most of the work was confined to surface magnetometer surveys. We understand that the maps showing results of this work are nearly ready for distribution.

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 newly opened and more important areas in the mine workings of the soft ore mines were surveyed and mapped by Mr. Boyum. At the Mather Mine, which is still pretty much in the early development stages, Mr. Boyum mapped all of the geological details in the

stopes as well as the development drifts and cross-cuts. This is particularly important in order to record accurately the structures controlling the ore bodies in a new area like this where surface drilling was comparatively limited. Geological data in the balance of the soft ore workings frequently was obtained by the engineers at the several properties and turned over to the Department for mapping. All geological data collected was posted on the geological maps and cross-sections of each property.

At the Cliffs-Shaft Mine, the engineering surveys are made quarterly instead of monthly as in the soft ore mines. There are two reasons for this. In the first place, the advance made by each contract in a month's time is relatively small and, in the second place, due to the large area occupied by the mine workings, it takes a much longer time to go through the mine than in the soft ore properties where the stoping is concentrated in much smaller areas. Mr. Boyum has accompanied the engineering crew on each quarterly survey and mapped the geology of all current extensions. As stated previously, it is planned that Mr. Bertholf will take over this geological work and he already has started to become familiar with it. The geological structure at this property is exceedingly complex and because it is so closely related with the formation of the ore itself, it follows that all geological work must be done with the greatest detail.

The strike of the C.I.O. Union closed all of the Company's mines, with the exception of an insignificant production at the Mather Mine for a limited period, from February 8th to May 21st, inclusive. Before the strike and following it throughout the year, all mines except the Princeton and Tilden operated two 8-hour shifts 6 days per week. The Princeton followed this schedule up to the time of the strike but was not reopened thereafter. It has been abandoned and the shaft sealed with concrete. The Tilden Mine open pit operated 59 days between June 1st and early in October on a single shift of 8 hours.

E. OPTIONS AND LEASES

The Canisteo Mining Company assigned all of its interest in the Holman-Brown leases of the Holman-Cliffs Mine to the Mesaba-Cliffs Mining Company and all of its interest in the leases of the Canisteo Mine to The Cleveland-Cliffs Iron Company, both as of March 31st, 1946.

As of April 1, 1946 the Inland Steel Company deeded a one-half interest to The Cleveland-Cliffs Iron Company in the fee of the SE $\frac{1}{4}$ of NW $\frac{1}{4}$ of Sec. 12,58-19, and assigned a one-half interest in a lease-hold estate on the N $\frac{1}{2}$ of the SW $\frac{1}{4}$ and the N $\frac{1}{2}$ of the SE $\frac{1}{4}$, both in Sec. 12,58-19. The leased property is an extension of the Atkins Mine, formerly operated by the Inland Steel Company. The Cleveland-Cliffs Iron Company will operate the Atkins Mine as operating agent for Inland Steel Company and The Cleveland-Cliffs Iron Company. The mine will be operated as an open pit.

F. EXPLORATIONS AND COSTS

Drilling explorations were carried on in 1946 in the following Districts and Mines:

F-1 - FROM SURFACE

<u>DISTRICT</u>	<u>RANGE</u>	<u>PROPERTY</u>
Buhl	Mesaba	Atkins Mine
Coleraine	"	Canisteco Mine
Marble	"	Hill-Trumbull Mine
Taconite	"	Holman-Cliffs Mine
Negaunee	Marquette	Section 1 Exploration
Ishpeming	"	Section 3 Exploration
Ishpeming	"	Section 4 Exploration
Ishpeming	"	Section 11 Exploration
Iron River	Menominee	Spies Mine

F-2 - FROM UNDERGROUND

<u>DISTRICT</u>	<u>RANGE</u>	<u>MINE</u>
Negaunee	Marquette	Cambria-Jackson
Ishpeming	"	Cliffs-Shaft
North Lake	"	Lloyd
Ishpeming	"	Mather
Negaunee	"	Negaunee
Iron River	Menominee	Spies

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 \$7.23 per foot, excluding certain overhead items which customarily are charged to the explorations. By including these items, the average cost of surface drilling was \$7.96 per foot. The cost of underground drilling, in the same way, was \$4.88 per foot and \$5.29 per foot, respectively.

By comparison with 1945, the cost of drilling in 1946 was higher. The increase in surface drilling was \$1.15 or 18.9%, but the increase in underground drilling was only 12¢ or 2.5%. A moderate increase is accounted for by a sharp rise in the price of Bortz used in the mechanically set bits, together with a poorer quality of the Bortz itself. Also, following the settlement of the strike in May, the scale of labor was increased approximately 20%. It is evident, were it not for these unavoidable increases, that the cost of underground drilling in 1946 would have been materially less than in 1945.

The relatively large increase in the cost of surface drilling was enhanced by the fact that the expense of carrying our foreman and assistant foreman during the period of the strike was charged to this item. They acted as watchmen during the period to protect the valuable equipment at the various drill locations which was threatened by virtue of its exposure and relative ease of access. Furthermore, a larger percentage of the footage drilled in the surface explorations was at greater depths in 1946 than in 1945.

Table VI, which also follows, summarizes the footage drilled and cost per foot of drilling for the past five years.

TABLE V.
SUMMARY OF DRILLING FOR 1946.

PROPERTY	SECTION	T.	R.	STAND-	CHURN	DIAMOND	TOTAL	FIRST	SECOND	LEAN	TOTAL	COST	TOTAL	COST	
				PIPING	DRILLING	DRILLING	DRILLING	CLASS ORE	CLASS ORE	ORE	COST	PER FT.	COST	PER FT.	
				FT.	FT.	FT.	FT.	FT.	FT.	FT.	"A"	"A"	"B"	"B"	
<u>SURFACE DRILLING</u>															
Atkins Mine	12	58	19, Minn.	396	531	90	1,017	199	134	95	\$ 5,760.24	\$5.66	\$ 4,597.37	\$4.52	
Canisteo Mine	29,30,31 & 32	56	24, "	610	2,241	-	2,851	-	-	1,440	13,087.67	4.59	11,803.81	4.14	
Hill-Trumbull Mine	17	56	23, "	90	865	-	755	-	-	225	1,936.77	2.57	1,637.84	2.17	
Holman-Cliffs Mine	21 & 22	56	24, "	535	2,213	-	2,748	-	-	1,202	15,294.45	5.57	13,880.54	5.05	
Section 1, 47-27 Exploration	1	47	27, Mich.	62	1	4,228	4,291	207	121	42	39,081.97	9.11	35,160.30	8.19	
Section 3, 47-27 Exploration	3	47	27, "	-	-	827	827	10	21	23	3,019.23	3.65	2,026.74	2.45	
Section 4, 47-27 Exploration	4	47	27, "	249	7	5,486	5,742	89	110	74	68,320.00	11.90	63,319.10	11.03	
Section 11, 47-27 Exploration	11	47	27, "	6	-	991	997	-	15	13	10,506.81	10.54	9,171.15	9.20	
Spies Mine Surface	24	43	35, "	570	8	2,117	2,695	114	51	73	17,598.62	6.70	17,008.96	6.31	
TOTAL SURFACE DRILLING				2,518	5,666	13,739	21,923	619	452	3,187	\$174,607.76	\$7.96	\$158,605.61	\$7.23	
<u>UNDERGROUND DRILLING</u>															
Cambria-Jackson Mine	1	47	27, Mich.	-	-	1,187	1,187	25	15	12	\$ 4,842.36	\$4.08	\$ 4,376.06	\$3.69	
Cliffs-Shaft Mine	3, 9 & 10	47	27, "	-	-	3,070	3,070	167	112	74	12,354.72	4.02	11,311.93	3.68	
Lloyd Mine	6	47	27, "	-	-	866	866	-	2	4	6,033.07	6.97	5,030.28	5.81	
Mather Mine	2	47	27, "	-	-	2,080	2,080	217	191	178	7,936.55	3.82	7,109.84	3.42	
Negaunee Mine	6	47	26, "	-	-	967	967	-	-	10	4,696.66	4.86	3,868.16	4.00	
Spies Mine	24	43	35, "	-	-	2,808	2,808	603	83	21	22,234.75	7.92	21,923.23	7.81	
TOTAL UNDERGROUND DRILLING				-	-	10,978	10,978	1,012	403	299	\$58,098.11	\$5.29	\$53,619.50	\$4.88	
GRAND TOTAL DRILLING				2,518	5,666	24,717	32,901	1,631	855	3,486	\$232,705.87	\$7.07	\$212,225.11	\$6.45	

Note:- Cost "A" includes office expense, engineering, analysis, legal personal injury, social security, etc.
 Cost "B" excludes " " " " " " " " " " " " (to compare with contract prices)
 All drilling at the Atkins Mine was done on contract by the S. E. Atkins Company of Duluth, Minnesota.
 All drilling at the Canisteo, Hill-Trumbull and Holman-Cliffs Mines, except for 300' of churn drilling at the Hill-Trumbull Mine done with Company personnel and equipment, was done on contract for \$4.42 per foot, by J. S. Schultze & Sons of Grand Rapids, Minnesota.
 At the Section 4, 47-27 Exploration, 2,311' were drilled on contract for \$12.18 per foot by the E. J. Longyear Company of Minneapolis, Minnesota.
 All drilling at the Spies Mine, both from surface and underground, was done on contract by the E. J. Longyear Company of Minneapolis, Minnesota.

TABLE VI.
SUMMARY OF FOOTAGE DRILLED AND COST PER FOOT OF DRILLING FOR THE PAST FIVE YEARS.

YEAR	SURFACE DRILLING			UNDERGROUND DRILLING		
	FEET	COST PER FOOT	COST PER FOOT	FEET	COST PER FOOT	COST PER FOOT
	DRILLED	"A"	"B"	DRILLED	"A"	"B"
1942	37,079	\$ 5.71	\$ 4.98	11,601	\$4.37	\$3.91
1943	36,034	6.77	5.93	16,481	3.20	2.91
1944	41,627	6.74	5.95	18,309	3.85	3.53
1945	35,150	6.88	6.08	22,616	5.05	4.76
1946	21,923	7.96	7.23	10,978	5.29	4.88

F-3. DIAMOND DRILL CARBON AND BORTZ

The following tabulation 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:

	CARBON			BORTZ		
	Carats	Amount	Per Ct.	Carats	Amount	Per Ct.
On Hand, Jan. 1, 1946 -	933.15	\$76,471.78	\$81.95	88.23	\$ 572.09	\$6.48
Purchased during 1946 -	93.08	8,442.95	90.71	-	-	-
Total - - - - -	1026.23	\$84,914.73	\$82.76	88.23	\$ 572.09	\$6.48
Used During 1946 - - -	27.42	2,260.41	82.44	1.73	11.21	6.48
On Hand Dec. 31, 1946 -	998.81	\$82,654.32	\$82.75	86.50	\$ 560.88	\$6.48

In using the above carbon and Bortz, it is set into bits, core barrels and reamers by hand by our own organization. In addition, we are using a large number of mechanically-set Bortz bits purchased ready for use. After each bit has ceased to cut satisfactorily, or ceased to function economically, it is returned to the manufacturer for a salvage credit. The good Bortz remaining is cut out and re-set in new bits for our account.

F-4. DRILL SECTIONS

Cross-section tracings of all drilling, showing the analyses and classification of the material encountered during the year on the Marquette and Menominee Ranges, will be found recorded in colors, in the Annual Report books that are submitted as a part of the Annual Report of the Engineering and Geological Departments. The holes drilled at our Mesaba Range properties are shown on cross-sections, also in colors, in these Annual Report books.

G. DESCRIPTION OF EXPLORATIONS

THE CLEVELAND-CLIFFS IRON COMPANY

G-1. EXPLORATIONS IN SECTION 3, 47-27, MICHIGAN

Drilling from surface in Section 3, during 1946, consisted of completing Hole No. 44, located in the SE $\frac{1}{4}$ of NE $\frac{1}{4}$, which is leased from the Oliver Iron Mining Company. This hole, which was drilled vertically from a point approximately 250' South and 460' West of Hole No. 41, was located approximately on the 16380 W. meridian, and only about 30' North of the South boundary of the property. The purpose of the hole was to follow up a possible Southwesterly extension of the ore encountered in Hole No. 41, but no such ore was found. The hole was drilling in soft ore jasper at a depth of 2097' on the first of January and was bottomed in footwall Siamo slate at a depth of 2750' on June 19th. Several narrow seams of lean and second class ore, the richest being 52% in Iron, constituted the only enrichments of the iron formation that were cut in this drilling. Ten feet of 61% ore, however, was encountered between 1780 and 1790', in October, 1945.

It is possible that ore in commercial amounts may be found to the South of this drilling in fault structures having a general East-West extent. Hole No. 44, however, is located close to the North limit of the built-up area of the City of Ishpeming and if ore were found to the South, the surface complications would be material. The immediate objective of all the drilling in this locality was to prove up this lease, the SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of the section. Much of the area not explored by drilling to date on this description lies under Lake Bacon. The freezing weather, when a drill rig could be supported by ice on the lake, is not long enough for the completion of a single deep hole and, therefore, to drill beneath the lake would require expensive foundations constructed in the lake itself. We do not feel the possibility of a large ore body beneath it is sufficient to warrant such expense. It was decided, therefore, to discontinue all further drilling in Section 3 on the completion of Hole No. 44.

G-2. EXPLORATIONS IN SECTION 4, 47-27, MICHIGAN

Drilling in Section 4 continued throughout the year. Part of the work was done under contract by the E. J. Longyear Company of Minneapolis and the balance by Company drill rigs. The latter were closed down during the strike period, from February 8th to May 21st, inclusive. All drilling has been done on the 23600 W. meridian, located approximately 75' West of the North-South center line, and all holes are located in the S $\frac{1}{2}$ of the section. A total of 5,742 feet was drilled in five vertical holes and two branch holes wedged from their parent vertical holes.

The purpose of this exploration is to explore structural crotches formed by the displacement in the footwall slate due to faulting. The first hole to be drilled in this program, No. 30, was completed in 1945, and encountered 12' of ore about 70' above the slate footwall. Hole No. 31, located about 575' to the South of No. 30, was drilling in soft ore jasper at a depth of 2659' on the first of the year. It encountered four seams of high grade ore as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
2748	2760	12'	61.03	.070	.013
2795	2816	21'	59.37	.148	.010
2961	2968	7'	61.84	.171	.018
2970	2985	15'	61.90	.183	.027

Footwall slate was encountered at 2997' and the hole bottomed in it at 3044' on March 8th.

At about that time we decided to wedge branch holes from our deep holes whenever information is important at a distance of 100 to 200 feet from the parent holes. This eliminates the necessity of re-drilling the ground down to the elevation of the wedge and thus effecting a saving in this cost, and, even more important, a saving of the time to do such drilling. The wedge used, which is our own design, allows for a theoretical deflection of 1° 50'. Practically, however, this much deflection is not realized in many cases depending on whether the wedge is being set in a direction toward the perpendicular to the dip of the formation, or away from such perpendicular.

To gain our objective, it is necessary to place several wedges in each branch hole. The number depends on the amount of deflection experienced on each previous wedge placed in the hole.

The first wedge was placed in Hole No. 31 at a depth of 1813'. The branch hole thus started is No. 31-A. The wedge was set to deflect the hole due South. This is away from the perpendicular to the dip of the formation. Four additional wedges were set, the top of the 5th wedge being at a depth of 2028'. When this hole reached the zone of enrichment encountered in the parent hole, No. 31, it had been deflected 130'. It encountered ore material from 3010 to 3043', a total of 33', but it isn't quite up to the grade of first class ore. It averaged only 55.30% Iron, .190% Phos. and .011% Sulphur. This undoubtedly connects with the ore encountered in the parent hole between 2961 and 2985', and is likely a slightly leaner phase of the same. Footwall slate was encountered at 3054' and the hole bottomed in it at 3112' on August 24th.

Realizing that this drilling is in a most interesting and promising area with faulting of relatively great magnitude indicated by Holes 30 and 31, it was decided in December 1945, to start a second drill without waiting for the completion of the latter hole. Any large body of ore in this general location is bound to be deep and to require a considerable time to reach it. A Company rig was employed using the crew which recently had completed a campaign of drilling in Section 5 to the West. Hole No. 32, therefore, was located approximately 500' due South of No. 31 and drilling commenced on December 27th, 1945. The purpose of the hole was to continue the exploration of the fault block already indicated by holes 30 and 31. This hole was stand-piping in surface material at a depth of 41' on the first of the year.

For an unexplainable reason and beyond our control, the hole started to deflect from the vertical and assumed a Southeasterly direction at a relatively shallow depth (less than 600'). By the time it had reached a depth of about 2300', it had wandered a horizontal distance of approximately 280' Southeasterly from the collar of the hole. It was decided to attempt to steepen it by the use of wedges, reversing the process employed in Hole No. 31-A. A total of four wedges was used and some steepening effected. Although all possible care was taken in selecting the position for each wedge, the hole apparently became enlarged in the vicinity of the 3rd wedge, enough to loosen it. This caused it to turn out of position, a circumstance that very seldom happens. The top of this wedge was at a depth of 2310'. Finally, it twisted so far out of position that it blocked the hole when the latter had reached a depth of 2590'. After considerable effort was made to get hold of the wedge and remove it, without success, we finally blocked off the hole above and set the 5th wedge with its top at 2281', and started to drill an entirely new or branch hole from this point. This hole is No. 32-A and drilling commenced in it on October 23rd.

Hole No. 32 ledged in hanging wall quartzite at a depth of 90' and stayed in hanging wall material (quartzite, slate and some conglomerate) to a depth of 786' where dike was encountered. Soft ore jasper was cut beneath the dike at 809'. From this point down, dike and greenstone were bedded with the soft ore jasper to a depth of 1255'. At this point the hole encountered the upper contact of the main greenstone intrusive sill. A seam of enrichment to soft ore occurred in the jasper from 947 to 966', lying on the dike. This 19' of enrichment averaged 60.03% Iron and .144% Phos. It has no particular economical importance and apparently was concentrated on the dike which was cut

immediately below it between 966' and 1006'. It now appears likely that another fault of large magnitude is occupied by the dike mentioned above between 786' and 809'. The movement along this fault, as was the case along the fault to the North, has been downward on the South side. This accounts for the relatively great thickness of the quartzite in the hole. It will be remembered that Hole No. 31 to the North encountered no hanging wall quartzite material whatsoever.

Drilling below 1255' continued in the greenstone sill to 1849'. Here soft ore jasper was cut to 1929' where a faulted off-set of the same greenstone sill was encountered. This continued to a depth of 2151'. Below the latter point drilling in both holes 32 and 32-A was all in soft ore jasper for the balance of the year with the exception of two or three small dikes, and Hole 32-A had reached a depth of 2893' on the last of the year.

I referred above to the relatively great thickness of hanging wall material encountered in the upper part of Hole No. 32. This was the first indication that a second major fault occurred in this locality. It became important to learn more about the complex fault structure and the relationship of the faulted horizons to one another, between Holes 31 and 32. It was decided, therefore, to drill a series of smaller diameter and relatively shallow holes in this 500' span to assist in locating the faults at ledge surface and getting some idea as to their angles of dip. In this way only are we able to estimate where the faults intersect the footwall and form structures that may be very important in the location of future holes to discover and explore ore-bearing crotches in the slate. A series of three vertical holes was drilled for this purpose, Nos. 33, 34 and 35.

Hole No. 33 was located 85' South of No. 31; No. 34, 110' South of No. 33 and No. 35 is 105' South of No. 34. This makes the position of the latter hole 200' North of Hole No. 32.

Hole No. 33 ledged in soft ore jasper at 70', but passed into dike at 80'. It continued in dike until it was finally bottomed at a depth of 448' on October 12th.

Hole No. 34 ledged in dike at 75' which extended to 92'. From 92' to 105', it cut soft ore jasper, followed again by dike from 105' to 112'. Soft ore jasper was encountered at 112' and extended to 177'. At this point the drill cut into a ferruginous dike and was bottomed in it at a depth of 179' on October 30th.

Hole No. 35 ledged in enriched hard ore jasper at a depth of 51'. Except for 6' of unenriched hard ore formation from 124' to 130', this enrichment extended to a depth of 137'. Eight feet of high grade hard ore was cut in this zone from 108' to 116'. It averaged 61.44% Iron and .018% Phos. Narrow seams in the zone averaged from 46.50% Iron to 54.50% Iron, but the ground between 56' and 108', a thickness of 52' was a typical conglomeratic second class hard ore averaging 53.51% Iron and .063% Phos. This kind of material frequently is mined and mixed with richer material to make a shipping product from the Cliffs-Shaft Mine. Because of this discovery, added consideration will be given to our geologic study of the North side of the hard ore horizon in the "B" Shaft area of the Cliffs-Shaft Mine.

It is likely that drill holes will be carried into this general area from an underground elevation, with the possibility of developing mineable hard ore along this North rim of the formation that now we have delimited on the South by a fault which we may be able to trace Southeasterly into the present Cliffs-Shaft workings. Hole No. 35 continued in hard ore formation and cut additional seams of enrichment, but of no particular importance. It had reached a depth of 270' at the end of the year.

Hole No. 33 was drilled under contract by the E. J. Longyear Co. and on its completion this drill was laid off and the contract cancelled. It was replaced by one of our own rigs which drilled Holes 34 and 35.

G-3. EXPLORATIONS IN SECTION 11, 47-27, MICHIGAN

For some time past, the Company has considered a campaign of drilling in Section 11 in search of a body of commercial ore for early development. Further consideration during the late summer and early fall of 1946 crystallized in a decision to commence this work at once. The area selected for the first drilling is the NE $\frac{1}{4}$ of the Section. No drilling had been done previously in this general area so the only knowledge we have is an approximate conception of ledge geology gathered from mapping the rock outcrops and connecting this information with similar data surrounding the area. No less than six holes have been drilled across Section 2 to the North on the 11400 W. meridian. The hole nearest the North line of Section 11 on this meridian is No. 44 on Section 2, located approximately 1160' North of the Section 11 boundary. It will be recalled that this hole encountered 216' of high grade ore between the depths of 3234 and 3450'.

Hole No. 9, the first hole in the current program, is located on the 11400 W. meridian approximately 450' South of the North line of the section. It is being drilled vertically. It is hoped the information gained as drilling progresses can be correlated with the structural features indicated by the six holes across Section 2 and thus be of mutual advantage to both parties. Section 2 comprises the Mather Mine.

The work of moving equipment to the area commenced on October 1st. Some considerable preparation was necessary in starting the anticipated large scale campaign, including a water supply and pump station equipment, pipe lines, etc. Actual drilling began on October 22nd. The hole ledged in dike at a depth of 6'. Dike alternated with soft ore jasper, with several narrow seams of enrichment in the jasper carrying from 46% to 56% Iron, but not of commercial dimensions, until the hole encountered the main greenstone sheet or sill at a depth of 393'. Drilling continued in greenstone without interruption for the balance of the year and the hole had reached a depth of 997' on the last of the year.

Since there has been no deep drilling in the vicinity of Hole No. 9, some considerable work will have to be completed before we shall know the approximate location of geological structures favorable for large scale ore concentration. A study of surface geological conditions, however, indicates that this hole is close to a fault contact at ledge. This influenced its location to a large degree. The fault may develop an important structural condition where it intersects the footwall slate and if the dip of the fracture is to the South, this hole may find ore in commercial quantity as it approaches the slate.

G-4. SPIES MINE SURFACE, SECTION 24, 43-35, MICHIGAN

It will be recalled that three attempts were made toward the end of 1945 to sink a standpipe with a dip of -60° due South at location No. 77, without success. This pipe was located on the 4000 E. meridian and approximately 900' due West of Hole No. 71. The purpose was to continue exploring for a Westerly extension of the favorable-looking iron formation encountered in Hole No. 71 in hopes that a structural fold might be encountered which would contain another body of high grade ore. After the third unsuccessful attempt to reach ledge in December, 1945, the drill was moved 100' South, also on the 4000 E. meridian and Hole No. 78 was drilled with an initial inclination of -71° to the South. This initial steepening of the standpipe (from -60° to -71°) solved the problem and the hole was ledged in graywacke at a depth of 278'. The standpipe flattened to $-67\frac{1}{2}^{\circ}$ at 170' and the hole, in ledge, flattened to -56° at a depth of 400'. From this point on, however, actually there was a slight steepening of the hole. No iron formation was found and the hole was finally bottomed in hanging wall gray slate at a depth of 1198' on April 18th. The inclination at the bottom was -60° .

The results of Hole 78 indicated that the horizon of iron formation encountered in Hole 71 has swung considerably to the South. This change of position in the Iron River District means folding and folding frequently means the formation of an ore body. It was decided, therefore, to drill another hole to the South of No. 78. Hole No. 79 was located 450' to the South, also on the 4000 E. meridian, and standpiping started with a dip of -70° due South. The hole was ledged in hanging wall gray slate and graywacke at a depth of 292'. After passing through hanging wall slate to a depth of 1003', it encountered a very favorable looking cherty iron formation, which we believe to be the same horizon as encountered in Hole No. 71 to the Northeast. From 1205' down to the graphitic black slate footwall, which was cut at 1484', this iron formation was extremely rich and considerable high grade ore was encountered. The analysis of this ore is tabulated below:

From	To	Amount	Iron	Phos.	Sul.
1205	1234	29'	62.55	.386	.011
1365	1406	41'	57.59	.318	.087
1430	1445	15'	56.00	.366	.048
1445	1474	29'	55.98	.466	.111

The hole was bottomed in footwall graphitic black slate at a depth of 1497' on August 23rd.

It is gratifying to have found what appears to be another body of high grade ore on Spies lands. Drilling in this vicinity, however, is extremely difficult because of the deep surface and the excessive difficulty and cost of sinking standpipes through it. Also, the overburden contains a considerable depth of water over the ledge. Such water conditions have been giving us a lot of trouble in opening and developing the new Spies-East ore body. Under such a handicap, it is quite essential to get as much information about the trend of this newly discovered ore-bearing formation as possible to assist us in locating additional drill holes. It was thought, on the completion of Hole 78, that valuable information might be obtained from a magnetic survey of the area. We were not equipped to do this, but a party of geologists from the U. S. Geological Survey was working in the District. We decided, therefore, to do no further drilling from

surface until these geologists finished their magnetic survey. This work was completed late in the year and no magnetic anomalies were found. This does not preclude the existence of favorable folding, but the absence of magnetic lines prevents tracing the trend of the iron formation or of any particular horizon to the West of our drilling. The water-soaked surface material on the ledge remains as a dampening influence in continuing this drilling to explore for an extension of the ore already discovered and likely the work will be deferred for some time to come,-- at least until we have been able to solve the water problem above our Spies-East deposit.

G-5. CAMBRIA-JACKSON MINE

Drilling in the Cambria-Jackson Mine was carried on from the beginning of the year until August 30th, but was interrupted during the period of the strike from February 8th to May 21st. A total of 1187' was drilled in five holes, Nos. 172 to 175, inclusive, and No. 169, which was re-entered and deepened.

Holes No. 172 and No. 173 were drilled from near the South end of the cross-cut on the 5th Level leading South from the shaft at approximately the same location as Nos. 166, 167 and 170, which were drilled in 1945. Hole No. 172 was drilled with a dip of -61° S. 54° E. and Hole No. 173 with a dip of -45° due South. The purpose of the holes was to explore down the dip and pitch for the ore encountered in Holes 166, 167 and 170. Although some enrichment was encountered in No. 173, neither hole was able to pick up the extension of the high grade ore. The continuation of the latter, therefore, is quite limited below the 5th Level elevation. Enough ore was discovered, however, to warrant a development drift on the 6th Level with raises into the ore. This will allow mining its extension above the 5th Level, which the earlier drilling indicated.

Hole No. 174 was drilled horizontally and due South on the 10436 W. meridian from the 90' Sub-Level in the Northwest ore vein of the property. This sub-level is approximately 180' above the 7th or bottom main level. The development at this elevation from a raise put up from the 7th did not show as much ore as anticipated. For that reason, it was thought that additional ore might be found in the hanging wall. This hole was drilled to test such a possibility. It encountered 25' of ore between the depths of 55' and 80', averaging 60.64% Iron, .112% Phos. and .009% Sulphur.

Hole No. 175 was drilled horizontally and N. 34° W. from the West end of the main ore drift on the 7th Level in order to test the ground between this drift and the main slate footwall contact. Mr. Trosvig, Superintendent, thought there might be an Easterly extension of a narrow seam of ore encountered in Hole No. 163 about 300' to the West. The hole was blank, but it did define the footwall slate contact at a point considerably out of line with our previous knowledge in this area, which indicates a decided change in strike, probably due to a gentle fold. Although this fact has no material geological significance, the information may help in planning future development drifts.

Hole No. 169, which was re-entered and deepened upon the completion of Hole No. 175, was drilled horizontally and S. 34° W. from the extreme West end of the 6th Level. The purpose of the hole was to explore South

and West of the Northwesterly-Southeasterly fault dike that forms the West limit of the Hartford-Cambria-Jackson ore bodies. The drilling done previously in this block of ground was confined to relatively shallow holes at higher elevations and from the surface, all without encountering ore. Hole 169 was drilled to a depth of 86' in November, 1945, where it was stopped temporarily in order to use the drill and crew for the group of holes located in the South cross-cut on the 5th Level. These holes were Nos. 170 to 173, inclusive. Drilling was resumed in No. 169 in July and the hole was finally bottomed at a depth of 684' on August 30th. The hole was in footwall slate at 86' and was drilled toward the hanging. It encountered the slate-transition jasper contact at a depth of 194' and the main soft ore jasper horizon at 282'. Jasper iron formation continued but no enrichment was encountered. This completed the drilling in the mine during the year.

G-6. CLIFFS-SHAFT MINE

Drilling was continuous in the Cliffs-Shaft Mine throughout the year except for the period of the Strike, February 8th to May 21st, inclusive. Part of the time, when personnel was available, two drill rigs were used. Nine holes were completed and two partially drilled for a total of 3,070'. The holes completed were Nos. 561 and 563 (which had been started in 1945), Nos. 564 to 568, inclusive, Nos. 570 and 571. Holes 569 and 572 were incomplete at the end of the year. This drilling developed a total of 167' of high grade ore, 112' of second class ore (some of which can be mined and mixed with high grade material) and 74' of lean ore.

In discussing this drilling, the holes will be considered by levels instead of in their chronological order.

On the 1st Level, "B" Shaft, Holes 561 and 565 were drilled horizontally from the Section 9 workings to assist in outlining the geological structure of the area. They are the 4th and 5th holes in a series planned for this purpose. No. 561 was drilled on a course of S. 30° E. and was in hanging wall slate and quartzite at a depth of 441' on the first of the year. It was bottomed in the same material without further change at a depth of 513' on January 17th. No. 565 was drilled S. 43° W. and encountered 22' of high grade ore from 101 to 123'. This ore averaged 64.89% Iron and .201% Phos. Hanging wall quartzite and slate followed the ore and the hole was bottomed in it at a depth of 461'. Ordinarily the hole would have been stopped soon after entering the hanging, but it was carried ahead to find out if the hanging contact folded back again to the West. The workings in this area on the 1st Level are located in the point of a Westerly pitching anticlinal fold. Folding becomes synclinal somewhere to the Southeast but beyond the bottom of Hole 565. This structure will have to be followed with drilling in another area.

On the 2nd Level "A" Shaft, Hole No. 570 was drilled horizontally and North 2° West from the North side of the level, starting approximately on the 413 E. meridian at 73 South. The object of the hole was to explore a hitherto untapped area along the jasper-slate hanging wall contact. The slate, at this elevation, occurs as a synclinal tongue extending more or less East and West, pitching to the West and coming to an end a short distance East of this meridian. Several mineable seams of high grade ore were

encountered both to the South and North of the slate synclinal tongue. Footwall dike was cut at a depth of 215' and the hole bottomed in it without further change at 451'. It was hoped that faulting might have off-set this footwall material and repeated the ore horizon within the footage tested. The ore material encountered was as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>
0	3	3'	60.80	.175
7	10	3'	63.10	.065
28	40	12'	57.03	.271
154	164	10'	60.14	.167
185	190	5'	61.47	.208
202	215	13'	60.63	.223

On the 2nd Level, "B" Shaft, Hole No. 571 was drilled due North on the 0 meridian from the North side of the level. The object of the hole was to continue exploring the North limb of the syncline demonstrated by Hole No. 570 described above which was located 400' to the East, with the possibility that the ore encountered in the latter hole might extend this distance to the West. The hole started in ore located along the North rib of an old stope which proved to be 14' thick. It averaged 59.75% Iron and .152% Phos. This was followed by a 3' dike and then by 3' of ore from 17' to 20', which averaged 59.20% Iron and .160% Phos. Hanging wall slate was cut at 20'. The North side of the syncline in the slate was encountered at 197', and conglomeratic material followed to 230'. At this point the drill cut 15' of 52% conglomerate ore and a 5' seam of unenriched conglomerate and then a 6' seam of high grade ore from 250 to 256'. The latter averaged 60.30% Iron and .050% Phos. Footwall dike was encountered beyond the ore and the hole was drilling in it at a depth of 272' on the last of the year. Although narrow, it is believed that the ore encountered in this hole at the slate contact on both limbs of the syncline connects with the ore in Hole No. 570. It will be developed by cross-cutting and drifting.

On the 3rd Level, "B" Shaft, two horizontal holes were drilled from the Section 9 deposit, again to test the anticlinal hanging wall slate contact which was explored by a series of holes on the 1st Level and mentioned above in connection with Holes 561 and 565. The first hole, No. 567, was drilled due North. It encountered 18' of second class ore averaging 52.60% Iron and 20' of 48% lean ore, but no high grade material. It was bottomed in hanging wall quartzite at a depth of 361'. Hole No. 568 was drilled due South and from footwall material into the quartzite hanging. It cut conglomerate at the contact, but no ore or hard ore iron formation. Apparently the iron formation was eroded before the quartzite was deposited with nothing remaining of the former but the conglomerate.

On the 6th Level "A" Shaft, Hole No. 563 was drilled with a dip of -29° S. 5° E. starting on the 979 E. meridian at approximately the North boundary of the Section 10 Lease. In drilling South onto the lease, it crossed the boundary at a depth of 4' and remained on the Lease thereafter. The object of the hole was to get beneath the hanging material encountered in a fault complex cut by Hole 562. The latter was drilled horizontally, on the same course, and from approximately the same location. Hole 563 was started in December 1945 and had reached a depth of 121' at the beginning of the year. It was in conglomerate mixed with a seam of 52% second class ore at this point. Slaty conglomerate and graywacke followed to a depth of

149' broken by a 4' seam of 48% lean ore from 141 to 145'. This was followed by slate and dike to 155' and then by 17' of hard ore jasper to 172'. A seam of black chert was cut from 172 to 179' and then the drill entered soft ore jasper iron formation. It was bottomed in the latter material without further change at 196' on January 15th.

On the 8th Level "A" Shaft, Holes 564 and 566 were drilled horizontally and due South from the Southeast end of the level on the Section 10 Lease. Hole No. 564 was located on the 2320 E. meridian and 566 on the 2140 E. meridian,-- approximately 180' apart. The purpose of Hole 564 was to explore the area South of an East-West fault which cuts the level at approximately the collar of the hole. The object of Hole No. 566 was to explore for the Westerly extension of the ore encountered in No. 564.

Hole 564 started in ore which extended to a depth of 11' and averaged 58.06% Iron and .158% Phos. Ore again was cut from 130 to 185'. This 55' averaged 61.97% Iron and .129% Phos. It was followed by 54% second class ore from 185 to 212'. Undoubtedly some of this material will be mined and graded with the adjacent high grade ore. Hanging wall slate was cut at 212' and extended to 250'. This was followed by 10' of 52% second class conglomerate ore from 250 to 260', and by a mixture of conglomerate and lean ore to a fault contact at 281'. Dike was encountered beyond the fault which probably represents footwall material faulted up against the hanging. The hole was bottomed in dike at a depth of 466' but several narrow seams of soft ore jasper and sideritic chert were interbedded with it.

Hole 566 started in dike and cut 9' of hard ore jasper from 10' to 19'. This was the only hard ore formation encountered in the hole. It cut into sideritic chert at 19' and encountered no enrichment whatsoever. Alternate seams of soft ore jasper and dike followed this sideritic chert below 144' and the hole was bottomed in soft ore jasper at a depth of 358'. The fact that this hole encountered formation entirely different from that cut in No. 564, makes us believe that there is a considerable displacement, either by folding or faulting, between this hole and No. 564. Such structural complications are prevalent throughout the mine.

Some years ago two holes, Nos. 407 and 408, were drilled horizontally to the Northeast from the extreme East end of the 8th Level "A" Shaft to hole into the West end of the 6th Level, No. 3 Mine, and unwater it. This was done successfully, but during the passing years the holes have become partially blocked with mud and other material at the intake on the 6th Level, No. 3 Mine. It was decided, therefore, to drill another hole along side of these old holes for an additional opening to increase the flow and insure the continued drainage of No. 3 Mine. Hole No. 569 was planned for this project. After drilling 10', however, the engineer checked the line of the hole and found a mistake had been made in his survey. Hole No. 572 was therefore laid out to take its place. It is a large hole (3½" in diameter) and was drilled with a dip of -10° 25' N. 30° E. It started in sideritic chert on December 14th and was still drilling in this material without change at a depth of 63' on the last of the year. It holed into the old workings of the 6th Level, No. 3 Mine at a depth of 135' on January 16th, 1947, and is draining the accumulated water successfully.

G-7. LLOYD MINE

Only one hole was completed and one partially drilled during the year in the Lloyd Mine. These are holes Nos. 176 and 177. Both holes are located or started from the 8th Level and a total of 866' was drilled.

Hole No. 176 was started on September 30th. It was drilled horizontally and due South from the South end of the cross-cut along the 2120 E. meridian. The purpose of the hole was to cross-cut the iron formation on this meridian and explore for possible dikes which, if dipping toward and intersecting the footwall slate, may have influenced the formation of additional bodies of high grade ore. All the ore in the Lloyd Mine has been found in contact with ore close to such dikes. They have intersected the iron formation at relatively low angles and have, in most cases, occupied planes of faulting. The hole started in footwall slate and drilled toward the hanging. It encountered the slate-soft ore jasper contact at 239'. Several small dikes were cut and one important diabase dike, the latter from 522 to 554'. The hole was bottomed in soft ore jasper iron formation at a depth of 658' on November 29th. Although no high grade ore was encountered, the several dikes, and particularly the thicker or diabase dike, pointed to the possibility of additional favorable structures in depth.

Hole No. 177 is being drilled with a dip of -46° and practically due South directly under Hole No. 176. The object is to encounter at a lower elevation the dikes which were cut in Hole No. 176, in order to determine their dips and the approximate location of crotch structures as they approach the slate footwall in depth and, also of course, to explore for any possible ore that might be found in contact with them. The hole started in footwall graywacke and slate and was still drilling in it at a depth of 208' on the last of the year.

G-8. SPIES MINE

One exploratory drill hole and 16 drainage holes were completed and one drainage hole partially completed in the Spies Mine during the year. These were all drilled in the Spies-East deposit. A total of 2808' was drilled and 603' of high grade ore encountered. All drilling was done under contract by the E. J. Longyear Company.

The exploratory hole, No. 20, was drilled with a dip of -65° due East from the 4th Level on the 2800 S. line at 4920 E. This location is in a drift running parallel to and approximately 150' West of the hanging wall of the ore body. The object of the hole was to explore for the downward continuation of the ore at the approximate elevation of a proposed 6th Level. This level is planned at the same elevation as the 6th Level, Virgil Mine, from the Spies shaft and is approximately 365' vertically below the 4th Level. The hole cut the ore body between 345' and 440'. This 95' of ore averaged 60.43% Iron, .234% Phos. and .016% Sulphur.

As the work of opening up the Spies-East ore body for mining above the 4th Level has progressed, difficulty has been experienced by increasing amounts of ground water which finds its way into the stopes and seriously affects the mining conditions. It was decided to drill a series

of short holes into the wall rock in all directions from the +1330' Sub-Level to try and drain the ground above the area being stoped. The +1330' Sub-Level is approximately 300' above the 4th main level on which the ore is trammed to the shaft. Sixteen such holes, Nos. 21 to 36, inclusive, were completed and the 17th, Hole No. 37, was started during the balance of the year. All were drilled approximately horizontal and were radiated in all directions from the sub-level. Although not as yet successful in catching all of the water above the stopes, nevertheless they have succeeded in catching a lot of it. At the end of the year these holes were making approximately 200 gallons of water per minute in the aggregate. Several of the holes encountered ore but this was a part of the ore body itself and has added nothing to our knowledge of its limits. The grade of this ore checked closely with expectations.

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G-9. Section 1, 47-27 Exploration

Drilling from the surface on the North half of Section 1 was continuous throughout the year. Two drill rigs were employed until the early part of December. Holes Nos. 142, 143 and 144 were completed. Also, one branch hole, No. 142-A, was drilled from the parent hole, No. 142, and drilling commenced in the second branch hole, No. 142-B. A total of 4291' was drilled and 207' of high grade ore encountered.

Hole No. 142, which was started in May 1945, had reached a depth of 2770' at the beginning of the year. This hole was drilled vertically on the 10200 W. meridian about 300' North of the East-West center line and close to the West boundary of the section. The object of the hole was to explore the block lying on the up side and to the West of a major fault trending a little North of West and South of East. This fault is the West limit of all the ore developed and known in the Hartford-Cambria-Jackson Strip ore bodies. It will be recalled that Hole No. 140, drilled during 1945 on the same meridian and 1000' to the North, but also on the West side of this fault, was blank. Hole No. 142 encountered several runs of high grade ore in November and December 1945 and it was still drilling in high grade ore at 2770' on the first of the year. This ore, however, bottomed at 2780' at the contact with the Siamo slate footwall and the hole itself was stopped in the latter without further change at a depth of 2871' on January 11th. The ore encountered in this hole, from the beginning, was as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
2232	2243	11'	64.00	.022	.013
2252	2261	9'	58.62	.014	.010
2517	2530	13'	61.67	.175	.016
2559	2660	101'	61.44	.091	.010
2670	2730	60'	57.34	.119	.020
2758	2780	22'	60.31	.186	.024

Undoubtedly the above ore extends Westward onto Mather Mine property in Section 2 and may have an important connection or relationship with the deep ore in surface holes 27-A and 40 on the Mather.

Hole No. 142-A was the first hole to be wedged from parent hole No. 142. It was deflected to the South in order to again cut the ore horizon in the parent hole at a point at least 100' to the South without drilling an entirely new hole all the way from surface. The top of the first wedge was located at a depth of 1626'. Five additional wedges were placed in the hole with their tops at 1726', 1781', 1850', 1920' and 2012', respectively. This resulted in a total deflection between the parent and branch holes of 150' at the bottom of No. 142-A. Its depth was 2805' and it bottomed in footwall Siamo slate on November 21st. This slate was encountered at 2722'. Several seams of high grade ore, but some relatively thin, were cut. They do not match up, either in position or in corresponding thickness with the ore encountered in Hole 142. Clear evidences of faulting between the two holes are present in the branch hole and the elevation at which it encountered the slate footwall indicates a displacement upward on the South side of this fault amounting to approximately 100'. Finding this fault so close to the parent hole and yet not indicated by it alone emphasizes the importance of wedging branch holes from this deep drilling. The main ore horizons cut in Hole 142 apparently are cut off and terminated by the fault a short distance to the South of the hole. The ore in 142-A, therefore, may be considered as separate in a large measure and of the fault zone variety which probably is of relatively less importance than the ore in the parent hole. The ore encountered in Hole 142-A is as follows:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
2253	2276	23'	60.26	.044	.008
2318	2360	42'	62.88	.041	.013
2365	2370	5'	61.65	.051	.017
2425	2435	10'	59.76	.083	.029
2477	2480	3'	57.30	.073	.011
2497	2506	9'	61.35	.059	.009
2575	2583	8'	63.17	.088	-
2606	2635	29'	57.51	.129	.015
2689	2722	33'	61.71	.176	.013

Hole No. 142-B is now being wedged due North from the parent hole No. 142, in order to cut the ore horizon encountered in the latter at a point up the dip. This will enable us to predict more accurately the importance of the ore encountered in the parent hole and assist in planning underground development for mining it later on. It is always easier to wedge in this direction, which is against the dip, and therefore we anticipate a deflection somewhat greater than experienced in 142-A, and probably with fewer wedges. The first wedge was set with its top at 1291' and drilling off of it, in soft ore jasper formation, had progressed to a depth of 1367' at the end of the year. All depths are measured from the collar of the parent hole.

Hole No. 143, which was drilled vertically on the 7200 W. meridian, 400' due North of No. 141, and approximately 150' South of the North line of the section, was drilling in soft ore jasper iron formation at a depth of 785' on the first of the year. The purpose of the hole was to find out the importance and extent up the dip of the 22' of ore encountered in Hole No. 141, and thus to determine whether or not this locality can be included in the general area to be selected for a shaft site, surface buildings and stockpile grounds in opening and developing the large reserves of ore on Section 1.

The footwall Siamo slate was encountered at 1381' and the hole bottomed in it without further change at 1449' on March 31st. No high grade ore was encountered. Apparently, therefore, the ore cut in Hole No. 141 has no important extension up the dip on this meridian. Since the hole is only 150' South of the Hartford Lease, it is probable there is no important body of merchantable ore along the South side of the Lease in this vicinity.

Hole No. 144 was drilled vertically on the 9000 W. meridian at S. 1075. This location is about 500' South of the Jackson Strip and on a meridian approximately half way between Holes 140 and 142 on the West and Holes 136, 137 and 139 on the East. The total distance between these two rows of holes is an average of 2450'. The purpose of Hole No. 144 was to explore the ore horizon just above the footwall slate at approximately the elevation of the 6th Level, Mather Mine. This will assist in planning a drift on the 6th Level elevation which is anticipated will be driven to connect the Mather Mine workings with the later development of the ore on Section 1. Drilling commenced on June 17th. The footwall slate contact was cut at 2223' and the hole bottomed in it at 2271' on December 4th. Two lenses of ore were encountered. The first lens was cut between 2110 and 2131'. It averaged 60.25% Iron, .133% Phos. and .018% Sulphur. This lens is in the jasper iron formation. The second lens was cut between the interbedded slate and the main footwall and from 2199 to 2217'. This ore averaged 64.00% Iron, .173% Phos. and .014% Sulphur. The second drill rig was discontinued upon the completion of this hole.

G-10. MATHER MINE

Diamond drilling in the Mather Mine was carried on until July 30th, except during a part of the strike period, and with two rigs most of this time. Drilling was resumed again the last of November and continued the balance of the year. Four holes, Nos. 24 to 27, inclusive, were completed and the fifth, No. 28, partially drilled for a total of 2080'. Two hundred seventeen feet of high grade ore was encountered.

Hole No. 24 was drilled horizontally and S. 34° E. from the South end of No. 7 cross-cut on the 2nd Level. The purpose of the hole was to explore for and check the grade of the ore cut in surface Hole No. 39 and in underground Hole No. 10 which was drilled into this same area from the 3rd Level. It is assumed that there is an ore connection between these two holes. No. 24 started on December 27th, 1945 and was drilling in rich soft ore jasper iron formation at a depth of 79' on the first of the year. As drilling progressed, the following ore was encountered:

<u>From</u>	<u>To</u>	<u>Amount</u>	<u>Iron</u>	<u>Phos.</u>	<u>Sul.</u>
782	790	8'	57.20	.024	-
854	874	20'	58.40	.036	.011
895	917	22'	64.01	.020	.021

Although the ore above is relatively thin and separated with seams of lean ore and jasper, it apparently is a part of an ore body connecting surface Hole No. 39 with underground Hole No. 10, the latter drilled from the 3rd Level, as mentioned above. No. 24 bottomed in jasper iron formation at a depth of 1005' on July 30th.

A series of three holes, Nos. 25, 26 and 27, was drilled due South from the breast of the 4th cross-cut on the 5th Level, or approximately on the 12765 W. meridian. Hole No. 25 was drilled horizontally, No. 26 with a dip of -28° and No. 27 with a dip of $+18^{\circ}$. The purpose of Hole No. 25 was to determine if a continuation of the 4th cross-cut was warranted. The cross-cut had been driven only through the interbedded ore into the interbedded slate. Another ore zone normally exists above or to the South of the interbedded slate. Only a 5' seam of high grade ore was cut, namely from 250 to 255', but a considerable footage of second class ore was encountered. This extended from 175 to 292' and averaged approximately 54% in Iron.

Thinking that the above second class ore might be merely a lean phase of an important ore lens, Holes 26 and 27 were drilled with dips below and above the level, respectively, to check and test its possible extension in both directions. The slate changed in dip sufficiently below the level so that Hole No. 26 followed practically parallel to the bedding. It was stopped, therefore, in ferruginous slate at a depth of 113' without getting into the ore horizon. Hole No. 27, on the other hand, passed out of the interbedded slate at 65'. It encountered enrichment from 65 to 91', but no high grade ore. The balance of the hole was unenriched soft ore jasper iron formation and it was bottomed at a depth of 270' on July 25th. Drilling was discontinued temporarily upon the completion of Holes 24 and 27.

Drilling was resumed with Hole No. 28 on November 29th. It was drilled horizontally and due South from the cut-out for the proposed fifth cross-cut on the 5th Level and on the 12490 W. meridian. The purpose of the hole was to determine if sufficient ore is present in the ore horizons crossing this meridian and at this elevation to warrant a cross-cut being driven. Hereafter this policy will be followed generally. In other words, as the footwall drift is being driven, turn-offs will be cut at regular intervals where cross-cuts are planned, but the latter will not be advanced until holes have been drilled along their proposed meridians through the ore horizons and thus determine if ore is present in quantity sufficient to warrant the expense.

Hole No. 28 cut high grade ore between the main footwall and the interbedded slate from 48 to 78'. It averaged 62.76% Iron, .156% Phos. and .016% Sulphur. It cut high grade ore on the hanging wall side of the interbedded slate in the jasper iron formation from 225 to 405'. This 180' of ore averaged 62.89% Iron, .148% Phos. and .024% Sulphur. The hole was drilled in the latter ore at a depth of 355' on the last of the year and was bottomed in soft ore jasper iron formation at 462' on January 16, 1947.

G-11. NEGAUNEE MINE

Three holes were drilled in the Negaunee Mine during the year for a total of 967'. Two holes, Nos. 52 and 53, were drilled horizontally from the 9th Level and Hole No. 54 was drilled horizontally from the +115' Sub-Level. No ore was encountered in any of this drilling.

The object of Holes 52 and 53 was to test the hanging wall along the South limb of the main ore area before the mine is exhausted. It was thought possible that one or two risers of ore along ore-bearing dikes might have been overlooked during the mining and caving at this elevation. Hole No. 52

was drilled N. 54° W. from the 600 E. meridian. It was started on June 6th and bottomed at 265' on June 28th. Except for a narrow dike, from 4 to 10', the hole was in unenriched soft ore jasper iron formation its entire length. Hole No. 53 was drilled due North from the same location and was bottomed at a depth of 199' on July 20th. This hole likewise encountered unenriched soft ore jasper iron formation.

Hole No. 54 was drilled horizontally and due South on the 870 W. meridian in order to determine and explore the structural relationship adjacent to a fault zone which was encountered at the end of the drift on the +115' Sub-Level. This sub-level is approximately 40' above the 14th or bottom main level. The hole started in the Siamo slate footwall, was drilled toward the hanging and encountered soft ore jasper iron formation at a depth of 323'. Drilling continued in the latter until the hole was finally bottomed at a depth of 503' on September 11th. No enrichment was found in this fault block and drilling in the Negaunee Mine was discontinued upon the completion of this hole.

THE CLEVELAND-CLIFFS IRON COMPANY

G-12. ATKINS MINE, SECTION 12, 58-19, MINNESOTA

When the Company became the operating agent of the Atkins Mine in April, the Inland Steel Company were conducting a drilling exploration to outline the open pit ore extending Southeasterly from the original Atkins Mine. That drilling was done on the NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of Section 12 under contract by the S. E. Atkins Company of Duluth. Five holes, Nos. 1100 to 1104, inclusive, were completed. The Company continued this drilling plan and drilled six additional holes, Nos. 1105 to 1110, inclusive. These holes were located on the NW $\frac{1}{4}$ of SE $\frac{1}{4}$. All holes were drilled vertically with churn drill equipment and delimited the extension of the ore body sufficiently for stripping. A total of 1017' was drilled by the Company and the work completed on July 24th.

G-13. CANISTEO MINE, SECTIONS 29, 30, 31 AND 32, 56-24, MINNESOTA

As previously noted, the Company became the sole lessee of the Canisteo Mine on March 31st. A total of 14 vertical structure drill holes (Nos. 727 to 740, inclusive) was drilled during the year. Some were located in the pit near its edge and the balance around the perimeter on the surface. A total of 2851' was drilled and this developed 1440' of crude wash ore and jig material. All of the work was done under contract by J. S. Schultze & Sons of Grand Rapids, Minnesota.

Six holes were drilled on the East side of the North Bovey Lease and in the NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Section 30. Five holes were drilled on the South Bovey Lease in the NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 31. One hole was drilled in the South Bovey Lease in the NW $\frac{1}{4}$ of NW $\frac{1}{4}$ of Section 32. The remaining two holes were drilled on the Hemmens Lease in the SW $\frac{1}{4}$ of SW $\frac{1}{4}$ of Section 29. All of the drilling was in connection with current mining operations and to more clearly define the limits of ore, both in depth and in horizontal area.

THE MESABA-CLIFFS MINING COMPANY

G-14. HILL-TRUMBULL MINE, SECTION 17, 56-23, MINNESOTA

One structure drill hole, which had been started late in 1945, was completed and two structure drill holes were drilled in their entirety during the year. In addition, ten churn drill holes also were drilled. The total drilling amounted to 755' and resulted in developing 225' of crude wash ore and jig material. The structure drilling was done under contract by J. S. Schultze & Sons of Grand Rapids, Minnesota, and the churn drilling by Company personnel and equipment.

Hole No. H-232 was located on the SW $\frac{1}{4}$ of NW $\frac{1}{4}$, a Hill forty. It had been drilled to a depth of 105' at the beginning of the year and was completed to a depth of 129' in January. Hole No. H-233 was located on the SW $\frac{1}{4}$ of NE $\frac{1}{4}$, also a Hill forty. Hole No. T-182 was located on the NW $\frac{1}{4}$ of SE $\frac{1}{4}$, a Trumbull forty. The ten churn drill holes, Nos. H-100 to H-109, inclusive, all were located on the SW $\frac{1}{4}$ of NE $\frac{1}{4}$, which is a Hill forty. The structural drilling was in connection with current mining operations and to more clearly define the limits of the ore, both in depth and lateral extent. The churn drill holes were drilled from the pit bottom to a depth of 30' each and intended principally for sampling the ore within that horizon for current mining.

G-15. HOLMAN-CLIFFS MINE, SECTIONS 21 AND 22, 56-24, MINNESOTA

Thirteen structure drill holes (Nos. H-300 to H-312, inclusive) were drilled vertically in the Holman-Cliffs Pit and around its perimeter during the year, for a total of 2748'. This developed 1202' of crude wash ore and jig material. All of the work was done under contract by J. S. Schultze & Sons of Grand Rapids, Minnesota.

Five holes were drilled on the SW $\frac{1}{4}$ of NW $\frac{1}{4}$ and one hole on the SE $\frac{1}{4}$ of NW $\frac{1}{4}$, both in Section 22, and both Brown No. 2 Leases. This drilling was in connection with current mining operations and to more clearly define the limits of the ore both in depth and lateral extent.

The remaining seven holes were drilled on Oliver Iron Mining Company property approximately 120' South of the Holman-Cliffs Pit. One of these holes was located in the NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of Section 21 and the remaining six in the NW $\frac{1}{4}$ of SW $\frac{1}{4}$ of Section 22. The purpose of these seven holes was to define the limits of the ore body in its extension South onto Oliver property and in a zone along the boundary line. From this data, plans will be formulated for mining the boundary ore through the Holman-Cliffs Pit by the Company. In this way all of the Holman-Cliffs ore may be recovered, but, in the process, some Oliver ore will be mined for the latter's account.

H. EXAMINATION OF LAND OFFERS

A total of 32 land offers was received by this office during the year 1946. Twenty-five were mineral land offers and the remaining seven were offers of real estate and all located in the City of Negaunee. The offers and their numbers are as follows:

<u>Offer No.</u>	<u>Description</u>	<u>Remarks</u>
2352	Parts of Lots 6 and 7, Block 10, Pioneer Iron Co. Plat, Negaunee . . . . .	.Declined
2353	House and S $\frac{1}{2}$ of Lots 1 and 2, Block 3, Pioneer Iron Co.'s Second Addition, Negaunee	"
2354	2,400 acres of iron lands in Michipicoten District, Ontario	"
2355	Gilpin-Tehan and Gilpin Reserve, Mesaba Range, Minnesota	"
2356	E $\frac{1}{2}$ of NE $\frac{1}{4}$, Section 13, 48-27, Marquette County	"
2357	Fee of Lot 33 and Minerals of Lots 39 and 40, Iron Plat, Negaunee	"
2358	SW $\frac{1}{4}$ of Section 6, 48-28, Marquette County, Michigan	"
2359	Bruce Mine, Mesaba Range, Minnesota	"
2360	Abbott property in Sections 26 and 35, 47-28, Marquette County.	"
2361	Portions of Sections 17 and 18, 56-24, St. Louis County, Minn.. . . .	"
2362	W $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 5, 46-29, Crow Wing County, Minnesota	"
2363	North 60' Lot 10, Block 3, Jackson Iron Co's. Addn., Negaunee . . . . .	.Withdrawn
2364	Hill Annex lean ore stockpiles, Mesaba Range, Minnesota . . . . .	.Pending
2365	Iron ore lands 32 miles from Sault Ste. Marie, Ontario . . . . .	.Declined
2366	House and Lot 7, Block 2, Maitland Addition, Negaunee	"
2367	Fractional mineral rights and some surface in Section 25, 43-35, Iron County, Michigan . . . . .	.Pending
2368	120 acres North of Winton Mine, Lake County, Minnesota . . . . .	.Declined
2369	House and part of Lot 14, Block 26, Pioneer Iron Co. Plat, Negaunee	" "
2370	Zyprian Fountain estate in Boyer Plat, Harvey Lot No. 2, Negaunee . . . . .	.Pending
2371	Beta-Nanaimo and Buckholtz Mines near Iron River, Michigan. . . . .	.Pending
2372	Various lands in 59-15, St. Louis County and 47-29, Crow Wing County, Minnesota . . . . .	.Declined
2373	Southeast Quarter (SE $\frac{1}{4}$), Section 34, 49-18, Florence County, Wisconsin	"
2374	Garden Lake Iron Company lands in Lake County, Minnesota.	"
2375	Iron properties in Northern Province of Lower California, Mexico	"
2376	Lands in Section 33, 136-26 and Section 30, 47-29, Crow Wing County, Minnesota	"
2377	Lands in Section 5, 42-30 and Sec. 31, 43-30 near Sagola, Mich.	"
2378	Iron ore lands in Wyoming	"
2379	Lands in Sections 10 and 11, 45-26, Aitkin County, Minnesota.	"
2380	W $\frac{1}{2}$ of NW $\frac{1}{4}$ of Section 35, 40-17, Florence County, Wisconsin	"
2381	Blueberry Mine, Section 4, 47-28, Marquette Range . . . . .	.Pending
2382	Agnew, Hawkins and Sargent Mines on Mesaba Range, Minnesota. . . . .	.Leased
2383	Wanless Mine, E $\frac{1}{2}$ of SE $\frac{1}{4}$ of Section 16, 58-19, Mesaba Range, Minnesota . . . . .	.Leased.

I. METALLURGICAL TESTS AND EXPERIMENTS

Test Laboratory

The Test Laboratory located near the Holman-Cliffs office at Taconite, Minnesota, owned by the Mesaba-Cliffs Mining Company and operated by Cleveland-Cliffs personnel, continued to play an important part in the metallurgical study and classification of the crude ore mined in the Canisteo, Hill-Trumbull and Holman-Cliffs Mines, as well as the many samples from drilling and pit banks at these properties.

Mines Experiment Station

Tests were made at the Mines Experiment Station, University of Minnesota at Minneapolis, on two of our concentrating problems,-- one on hard ore jasper from outcrops at the Republic Mine and the other on jig material from the Hill-Trumbull Mine.

The work on the Republic ore consisted of selective crushing to various sizes to find out at what size the iron oxide was sufficiently freed from its silica gangue to make a high grade concentrate. Samples of the crushed material also were sent to the American Cyanamid Company's laboratory at Stamford, Connecticut, for small scale flotation tests. The results of these tests will be incorporated in a large scale flotation test supervised by them to be made at the Mines Experiment Station in the spring of 1947. Gravity tests also will be made at the Station on this ore.

Jig material from the Hill-Trumbull Mine, which could not be brought up to grade in the flow sheet being used at the Hill plant, was treated in a ball mill for abrasive action, with a minimum of grinding. The results proved so successful that a ball mill is being installed at the Hill-Trumbull plant for 1947 operation.

Cone Plant Operation

As mentioned in my report for 1945, the cone, using as a heavy density medium a mixture of ferro-silicon and magnetite, was replaced in 1946 by a 66" Akins spiral classifier-type machine. The operation was satisfactory and a decided improvement over the cone. The capacity of the mill was doubled by installing a second Akins machine (a 72" machine) together with the necessary screens, etc. to augment the 66" unit. This part of the mill made a very satisfactory product and treated the coarse material larger than 3/16".

Selective Media Concentration

The two Selective Media Concentrators formerly used at the Canisteo mill were moved and installed at the Hill-Trumbull plant augmenting the two already in use. These machines treated the -3/16" feed and replaced the Double Classification circuit used in previous years. Their action, however, has not been entirely satisfactory. It is anticipated that they will be able to make a satisfactory product during 1947 after the material is first given an abrasive action in the ball mill mentioned above. It is expected that two units will be able to handle all of the product from the ball mill.

Hydrotator and Hydrosizer

Comparative tests with the Roberts & Schaefer Hydrotator and the Dorr Hydrosizer continued to be made at the Holman mill during the 1946 season, using current mill tailings as feed. The Hydrosizer proved to have a slight advantage over the Hydrotator. As a result, it is planned to install four Hydrosizer units for the treatment of the richer portion of the Holman tailings basin waste material during the 1947 season. These units will be located at the edge of the tailings basin. The Holman mill itself is being moved to a new location just South of the Holman pit.

Oil Flotation Tests

The pilot plant operation of the flotation testing unit at the Canisteo washing plant continued throughout the ore season of 1946. This operation is conducted by the Minerals Separation North American Corporation of New York City. The flow sheet is designed to recover the fine iron now being wasted in the tailings basins resulting from concentrating operations on the Mesaba Range and, in particular, the Canisteo Mine tailings basin. In the process being used, the silica or gangue material is floated and the iron oxides depressed. No formal report has been issued by Minerals Separation and none is expected until the tests have been completed. It is expected that the work will continue in 1947.

Flotation tests of pilot size continued to be made on the Mesaba Range in 1946. These were conducted by the American Cyanamid Company of New York City for Butler Bros. and by Pickands Mather & Company with their own research staff and personnel. The Oliver Iron Mining Company are also planning to make similar tests at their Trout Lake washing plant.

New Concentrating Plants

The Oliver Iron Mining Company has purchased the Patrick Woolen Mill plant in Duluth and is equipping it as a research laboratory on a lavish scale. According to the press, the company has appropriated a fund of over \$33,000,000 to be spent over the next six to ten years on an elaborate plan of research in beneficiating lean ores and taconite to produce high grade concentrates.

Pickands Mather & Company, as announced in the press, has appropriated from one to two million dollars for the construction of a large scale pilot plant for the concentration of magnetic taconite on a semi-commercial scale. From this operation, it is expected that a fairly accurate estimate can be made of the cost of producing concentrates from magnetic taconite in a full scale commercial operation.

Reserve Mining Company has a force of engineers and designers laying out detailed plans for the early construction of a plant for full scale commercial concentration of magnetic taconite. A railroad will be constructed from the mine to Lake Superior and their own shipping dock erected. I understand it is planned to do the coarse crushing and eliminate the coarse worthless material at the mine. The balance then will be shipped to the concentrator on the shore of Lake Superior for concentration.

J. EXPENSE STATEMENTS

Tables VII and VIII which follow, show a detailed statement of charges to Geological Expense for the year 1946, 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 1946

Salaries	\$ 22,890.78
Travel and Entertainment	1,771.56
Operating Automobiles	1,135.79
Supplies and Office Expense	2,832.39
Personal Injury	-
Unemployment Insurance Tax	216.72
Old Age Benefit Tax	166.70
Unclassified	655.39
TOTAL	<u>\$ 29,669.33</u>

TABLE VIII

COMPARATIVE STATEMENT OF CHARGES TO GEOLOGICAL DEPARTMENT
FOR THE LAST THREE YEARS

	<u>1946</u>	<u>1945</u>	<u>1944</u>
Salaries	\$22,890.78	\$20,943.50	\$18,656.90
Travel and Entertainment	1,771.56	2,216.92	4,444.20
Operating Automobiles	1,135.79	1,070.03	974.39
Supplies and Office Expense	2,832.39	3,158.89	3,040.92
Unemployment Insurance Tax	216.72	212.42	178.75
Old Age Benefit Tax	166.70	163.40	137.49
Unclassified	655.39	3,522.89	671.43
TOTALS	<u>\$29,669.33</u>	<u>\$31,288.05</u>	<u>\$28,104.08</u>

Respectfully submitted,

E. L. Derby, Jr.
Geologist

ELD:DWC
4-17-47



