

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE VII

## FREQUENCY RATES

All Compensable Accidents

<u>Year</u>	<u>Total Man Days Worked</u>	<u>Number of Compensable Accidents</u>		<u>Frequency** Rate</u>
		<u>Non-Fatal</u>	<u>Fatal</u>	
1935	393,967	35	2	11.74
1936	567,891	33	2	7.70
1937	765,701	58	1	9.65
1938	491,303	46	3	12.49
1939	564,542	44	1	9.96
1940	714,391	59	5	11.19
1941	918,300	79	5	11.43
1942	1,024,713	75	2	9.39
1943	1,077,402 $\frac{1}{2}$	171	4	20.30

\*\* Based on 1 million man-hours of labor

TABLE VIII

## SEVERITY RATES

All Compensable Accidents

<u>Year</u>	<u>Non-Fatal</u>		<u>Fatal</u>		<u>All Accidents</u>	
	<u>Days Lost</u>	<u>Rate</u>	<u>Days Lost</u>	<u>Days Lost</u>	<u>Rate</u>	
1935	3,225	1.023	12,000	15,225	4.830	
1936	3,509	.772	12,000	15,509	3.413	
1937	7,881	1.286	6,000	13,881	2.266	
1938	6,290	1.600	18,000	24,290	6.181	
1939	3,264	.723	6,000	9,264	2.051	
1940	3,442	.602	30,000	33,442	5.852	
1941	5,403	.735	30,000	35,403	4.819	
1942	5,851	.500	12,000	17,851	2.177	
1943	10,355	1.201	24,000	34,355	3.986	

Based on days lost by accidents per 1000 man-hours of labor.

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE VIII-A

COMPENSABLE ACCIDENTS, INCLUDING FATALITIESBY MINES

<u>Mine or Plant</u>	<u>Frequency</u>	<u>Severity</u>
Athens	28.91	1.319
Cliffs Shaft	17.14	6.098
Canisteco	13.75	0.416
C. P. & L. Company	12.13	0.709
Sthse & Shops	22.42	1.946
Hill Trumbull	9.42	2.035
Holman Cliffs	11.71	0.212
Lloyd	14.80	9.071
Maas	15.69	0.603
Miscellaneous	0.00	0.000
Negaunee	33.14	6.928
Princeton	60.61	3.781
Spies Virgil	15.46	37.561
Tilden	15.18	0.349
Mather	3.68	1.655
Cambria Jackson	38.77	2.255
General	<u>0.00</u>	<u>0.000</u>
All Properties	20.30	3.986

TABLE VIII-B

COMPENSABLE ACCIDENTS, INCLUDING FATALITIES

<u>Mine or Plant</u>	<u>Days of Labor</u>	<u>Hours of Labor</u>	<u>Tons of Ore Mined</u>	<u>No. of lost time accidents</u>	<u>Days Lost</u>	<u>Fatalities</u>	<u>Frequency Rate</u>	<u>Severity Rate</u>
Athens	108091 <sup>1</sup> / <sub>2</sub>	864732	517814	25	1141	-	28.91	1.319
Cliffs Shaft	153125 <sup>1</sup> / <sub>2</sub>	1225004	634628	20	7470	1	17.14	6.098
Canisteeo	36400	291200	585016	4	121	-	13.75	0.416
C. P. & L.	20607 <sup>1</sup> / <sub>2</sub>	164860	-----	2	117	-	12.13	0.709
Sthse & Shops	27890 <sup>1</sup> / <sub>2</sub>	223124	-----	5	434	-	22.42	1.946
Hill Trumbull	66318 <sup>1</sup> / <sub>2</sub>	530550	871229	5	1080	-	9.42	2.035
Holman Cliff	74776	598208	1085689	7	127	-	11.71	0.212
Lloyd	92895 <sup>1</sup> / <sub>2</sub>	743162	494042	10	6740	1	14.80	9.071
Maas	143452 <sup>1</sup> / <sub>2</sub>	1147618	713069	18	693	-	15.69	0.603
Miscellaneous	3260 <sup>1</sup> / <sub>2</sub>	26086	-----	0	0	-	0.00	0.000
Negaunee	131993 <sup>1</sup> / <sub>2</sub>	1055946	954990	34	7316	1	33.14	6.928
Princeton	51503 <sup>1</sup> / <sub>2</sub>	412028	227185	25	1558	-	60.61	3.781
Spies-Virgil	24297	194376	124107	2	6387	1	15.46	37.561
Tilden	8231 <sup>1</sup> / <sub>2</sub>	65854	139991	1	23	-	15.18	0.349
Mather	33980 <sup>1</sup> / <sub>2</sub>	271844	1797	1	450	-	3.68	1.655
Cambria	38688 <sup>1</sup> / <sub>2</sub>	309510	147701	12	698	-	38.77	2.255
General Est.	61889 <sup>1</sup> / <sub>2</sub>	495116	-----	0	0	-	0.00	0.000
<b>Totals</b>	<b>1077402<sup>1</sup>/<sub>2</sub></b>	<b>8619218</b>	<b>6497258</b>	<b>171</b>	<b>34355</b>	<b>4</b>	<b>20.30</b>	<b>3.986</b>
1942 Totals	-----	8197704	-----	75	17851	2	9.39	2.177

\* National Safety Council: Frequency Rate- Number of accidents for every 1,000,000 man hours.  
Fatality 6000 days.  
Severity Rate- Number of days lost per 1000 man hours.

Safety Department  
Annual Report  
Year 1943

Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURY

b. Non-Fatal Accidents (Continued)

TABLE IX

SHOWING GROUP AGES OF INJURED WORKERS  
(Compensable Accidents)

<u>Age</u>	<u>Number injured</u>
16 to 25 years of age.....	23
26 to 30 years of age.....	27
31 to 35 years of age.....	30
36 to 40 years of age.....	21
41 to 45 years of age.....	16
46 to 50 years of age.....	17
51 to 55 years of age.....	15
56 to 60 years of age.....	12
61 to 65 years of age.....	11
66 to 70 years of age.....	3
	<u>175</u>

TABLE X

SHOWING TIME PERIODS WHEN  
COMPENABLE ACCIDENTS OCCURRED

<u>Time</u>	<u>Number</u>	<u>Working Period</u>
8:00 A.M. to 12:00 Noon.....	54.....	First half of day shift
12:00 Noon to 4:00 P.M.....	54.....	Second half of day shift
4:00 P.M. to 8:00 P.M.....	25.....	First half of afternoon shift
8:00 P.M. to 12:00 M.N.....	20.....	Second half of afternoon shift
12:00 M.N. to 4:00 A.M.....	12.....	First half of night shift
4:00 A.M. to 8:00 A.M.....	10.....	Second half of night shift
	<u>175</u>	

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYb. Non-Fatal Accidents (Continued)

TABLE XI

SHOWING OCCUPATION OF INJURED WORKERS  
(Compensable Accidents)

<u>Underground</u>	<u>Surface</u>
Miner.....97	Laborer.....16
Scraper Operator... 7	Truck Driver..... 4
Timberman..... 5	Drill Runner..... 2
Chuteman..... 5	Fireman..... 2
Motorman..... 5	Drill Helper..... 1
Shift Boss..... 3	Tractor Driver..... 1
Trackman..... 3	Truck Repairman..... 1
Skip Tender..... 3	Truck Foreman..... 1
Pipeman..... 2	Lineman..... 1
Motor Brakeman..... 2	Pit Foreman..... 1
Laborer..... 2	Machinery Operator.. 1
Mining Captain..... 1	Pumpman..... 1
Foreman..... 1	Top Lander..... 1
Trammer..... 1	Timber Handler..... 1
Track Foreman..... 1	Carpenter..... 1
<u>138</u>	Blacksmith..... 1
	Pitman..... 1
	<u>37</u>

## Safety Department

## Annual Report

Year 1943

11. ACCIDENT  
AND  
PERSONAL  
INJURYc. Safety Inspection

Mr. Harry Rogers, Safety Inspector and myself have each tried to inspect all surface and underground properties each month but because of numerous other jobs, this is impossible. Mr. Rogers makes a written report of each of his inspections but I have mostly made verbal reports, recommendations and suggestions. In nearly all cases, cooperation of officials and men have been 100%.

Because of the Athens Mine fire, I spent most of January and February underground at the Athens Mine helping control the fire and gases.

Because of the great number of new men employed, more time was spent with these employees to help instruct them in safety methods and safety rules than we ordinarily spend with the older and experience employees.

It can be seen by Table No. XII that there were many violations of company safe practices. Most of these were by new employees who did not understand the safety rules and in some cases just did not care.

Mr. G. R. Whittington, Safety Inspector on the Mesaba Iron Range made 222 inspections of the three mines operated there. The writer accompanied him on two of these inspection tours of all properties and made several recommendations and suggestions.

The following tables No. XII and XIII give the number of Safety recommendations and suggestions at the various properties.

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Fire Patrol Inspection

Patrols cover all parts of the underground mines at the beginning of each idle period and once every 24 hours thereafter. It is their duty to look for any incipient fires and see that all electric power is shut off. Some of these patrols also report any heavy ground or unusual conditions which must be taken care of immediately. They have discovered small fires and have put them out. These patrols have more than paid for themselves. Reports by them after each trip are sent to the Superintendent.

Idle and Abandoned Properties

All properties were inspected twice during the year. These inspections are made during the Spring and Fall when foliage is very light. All hazards are reported in writing. Considerable fencing was done around old pits and shafts. Children have been responsible for some of the damage done to fencing but grown-ups also have cut fences in order to cut small trees on some of the properties.

The old South Jackson Mine headframe which was sold for scrap was torn down during the Fall by the purchaser.

Blasting Inspection Reports

Each Shift Boss must observe blasting practices of each gang of miners at least twice each year. 1502 of these inspections were made during the year with 144 violations reported. Most of these violations were of a minor nature such as failing to use tamping in the bore hole.

One violation of blasting rules caused death to one employee when he lit a second lighter after the first one went out.

During the first half of 1943, considerable trouble was had with "Hot Wire Fuse Lighters." The manufacture had cut down the diameter of the lighter and used less wax which cut down on the intensity of the light and permitted moisture to enter the lighter. This was the cause of many missed holes in blasting because of the lighter going out before all fuses were lit and the men had to leave the place. Also it created a definite hazard in that some miners were tempted to light another lighter to complete lighting the round of holes. Indirectly the above mentioned accident was partly due to poor lighters. The manufacture was notified as soon as trouble was experienced with the lighters and some time later a better lighter was made.

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XII

<u>Mine or Plant</u>	<u>Violations of Standards</u>	<u>Safety Suggestions</u>	<u>Recommendations</u>	<u>Fire Hazard</u>	<u>Total</u>
Athens	21	5			26
Maas	23	22	12	2	59
Negaunee	30	14	5		49
Cambria	12	18	6	4	40
Princeton	19	19	4	1	43
Lloyd	9	8	5		22
Cliffs Shaft	18	17	11		46
Spies Virgil		3	1		4
Mather	4	6	6		16
Tilden	1	1	2		4
Ishpeming Hospital		6	5	1	12
Negaunee Dispensary		2			2
Cliffs Power & Light Co.	1	5	1		7
General Office & Eng. Bldg.			1	1	2
Gwinn Club House		1			1
Diamond Drills	3				3
Storehouse & Shops	<u>2</u>	<u>5</u>	<u>6</u>	<u>—</u>	<u>13</u>
Totals	143	132	65	9	349

TABLE XIII

<u>Mine or Plant</u>	<u>Number of Inspections</u>	<u>Recommendations</u>	<u>Violation of Standards</u>
Canistec	71	3	0
Hill Trumbull	75	28	0
Holman Cliffs	<u>76</u>	<u>23</u>	<u>0</u>
Totals	222	54	0



## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XIV

NUMBER OF INSPECTIONS MADE ON BLASTING  
PROCEDURE IN VARIOUS MINING CONTRACTS

<u>Mine</u>	<u>Number of Inspections</u>	<u>Number of Violations Reported</u>
Athens	133	25
Maas	317	38
Negaunee	327	56
Cliffs Shaft	572	0
Cambria Jackson	62	24
Princeton	12	0
Lloyd	65	1
Spies-Virgil	<u>14</u>	<u>0</u>
Total	1502	144

The following tables show the kind and number of safety inspection reports made by the mine and plant foremen, which were received and checked by this Department.

TABLE XV

Hoisting Rope Inspection.....	2453
Skip and Cage Roads.....	591
Ladder Roads.....	397
Safety Catches (Cage).....	112
Fire Doors U.G.....	14
Slack Rope Device.....	86
Hoist Inspection.....	189
Fire Equipment.....	20
Fire Extinguishers.....	31
Fire Prevention Inspection.....	<u>236</u>
Total	4129

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XVI

NUMBER OF FIRE EXTINGUISHERS INSPECTED

<u>Mine or Plant</u>	<u>2½ Gal.</u>		<u>2½Gal.</u>	<u>1-1½ Qt.</u>	<u>3 Gal.</u>	<u>Dry</u>	<u>Dry</u>	<u>Carbon</u>
	<u>Soda-</u>	<u>Non-</u>		<u>2½Gal.</u>	<u>Carbon</u>	<u>Carbon</u>	<u>Powder</u>	<u>Powder</u>
	<u>Acid</u>	<u>Freezing</u>	<u>Foamite</u>	<u>chloride</u>	<u>chloride</u>	<u>Type</u>	<u>Type</u>	<u>Type</u>
						<u>15-30</u>	<u>150</u>	
Athens Mine	5			14	2	3		
Maas "	6			21	5	4		
Negaunee "	6			15	3	5		
Mather "	4			23		10		
Cliffs Shaft Mine	9		2	26	2	1		
Lloyd Mine	3			13	3	2		
Princeton "	1			12	2	2		
Cambria-Jackson	11			14	1	3		1
Spies-Virgil	3			21	4	4		
Tilden	1	4		30	1	3		
Canisteco	7			16		12		
Holman Cliffs				22		12		
Hill Trumbull				15	1	19		
Hibbing District	3				1			
Ishpeming Hospital	9			12				
Ishpeming Residences				14				
Negaunee Dispensary	3			4				
North Lake Residences	2-5gal.			8				
Spies Location				17				
Shops & Storehouse	10	9		27				
Central Office	6		1	6				
Cliffs Power & Light Co.	4	2		13	15	11	1	
Gwinn District	2			7				
Totals	95	15	3	350	40	91	1	1

All Carbon Tetrachloride Type fire extinguishers are tested and inspected twice annually.

Soda Acid type, discharged and recharged once annually.

All other types inspected once annually.

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Rules and Regulations

No record has been made of distribution of rule books by the Cliffs Power & Light Company and the mines on the Mesaba Range.

All rule books are now distributed at the employment office for all mine surface and underground properties and reported to this department. Foremans rule books are distributed by the Safety Department.

TABLE XVII

RULE BOOKS DISTRIBUTED AT MICHIGAN MINES & PLANTSNew Combined Surface Rule Books

<u>Mine or Plant</u>	<u>For Foreman</u>	<u>Surface Employees</u>	<u>Totals</u>
Cambria-Jackson	2	49	51
Princeton		9	
Lloyd		73	
Negaunee		26	
Spies-Virgil		1	
Cliffs Shaft		29	
Athens		68	
Maas		30	
Tilden		11	
Mather		32	
General Shops		75	
Storehouse		49	
Miscellaneous		33	
Cliffs Power & Light		43	
Totals	2	528	530

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XVII

New Combined Underground Rule Books

<u>Mine or Plant</u>	<u>For Foremen</u>	<u>Employees</u>	<u>Totals</u>
Cambria-Jackson	8	169	177
Princeton	6	126	132
Lloyd	13	283	296
Negaunee	14	351	365
Spies-Virgil	6	60	66
Cliffs Shaft	15	378	393
Athens	15	302	317
Maas	12	412	424
Tilden	1		1
Mather	10	57	67
Miscellaneous	<u>26</u>	<u>        </u>	<u>26</u>
Totals	126	2138	2264

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Disciplinary Action

Because of the need for production and lack of labor, disciplinary action was not used as in normal years. It is difficult for bosses and foremen to penalize employees when there is a shortage of labor and knowing at the same time that some men are looking for a lay-off. Some men cannot stand a little prosperity and as soon as they have a few dollars to spare, they can think only of a good time.

TABLE XVIII

CAUSES AND NUMBER OF DISCIPLINARY ACTION

<u>Cause</u>	<u>Maas</u>	<u>Lloyd</u>	<u>Cliffs Shaft</u>	<u>Spies Virgil</u>	<u>Mather</u>	<u>Princeton</u>	<u>Total</u>
Losing time	7	2		3	1		13
Infraction of rules		3	1			2	6
Reporting to work in an intoxicated condition	5	2		2	1	1	11
Disregarding instructions	1						1
Insubordination	1						1
Totals	14	7	1	5	2	3	32

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Central Safety Committee

The committee met five times to classify accidents and discuss causes of accidents and several other important subjects. A method of fire control for each individual mine was discussed and the writer met with the superintendents to discuss methods. At a near future meeting of the committee each superintendent will present his plan.

The committee also met on other occasions to discuss company policy in regards to labor relations, minutes which were not recorded.

Foremen's Conference

The foremen met at only one conference during the year to discuss safety and accidents. This was due mainly because of other training and educational programs they attended. During the summer months, because of their extra time being taken up with gardening and recreation, all meetings are held at a minimum.

Mining Club

Because of the impossibility of arranging for a meeting of this kind, it was dropped again this year.

Cliffs Power & Light Company's Safety Conference

The annual safety meeting of C. P. & L. Co. employees was held July 22, 1943. Accidents were discussed and artificial respiration was practiced. At this meeting it was decided that foremen would hold meetings at the various plants of the company to discuss accident causes and practice first aid treatment for the injured.

Lake Superior Section, National Safety Council

The main meeting was held at Duluth, Minnesota, June 17 and 18 at the New Duluth Hotel with 525 in attendance. The company was represented by C. J. Stakel, Manager, L. C. Moore, Chief Mech. Engineer, E. E. Riedinger, Chief Clerk, Arthur Olson, Dist. Electrician, H. F. Rogers, Safety Inspector, A. J. Stromquist, Director of Safety and J. D. Preston, Genl. Manager, Cliffs Power & Light Co., all of the Marquette Range. The Mesaba Range mines were also well represented but attendance was not reported to this office.

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Lake Superior Section, National Safety Council (Continued)

The writer presented a paper on "Investigation and Fundamental Causes of Accidents" and headed the Panel Discussion.

The writer also was a member of the Exhibits Committee.

From the Marquette Range the company exhibited the following safety devices:

"Glory Be"	Device to drive forepoles in mining.
"Drill Bit Remover"	Used to remove detachable drill bits.
"Vacuum Water Syphon"	Used to clear water from places under low head.
"Safety Car Stop"	Simple positive device used to prevent cars from running into shafts.
"Measuring Pocket Door"	A non-sticking door operated by compressed air.
Shaft Plumbing Device"	A simple device for lining up shaft sets.
"Shaft Jack"	Small powerful, light weight jack which hooks onto shaft sets and used to line up shaft timber.

The 3rd quarterly section of the council met in Iron River, Michigan and at this meeting the company was represented by O. Marjama, Supt., Harry Scraffe, Mine Captain and Carl Christensen, Shift Boss, all of the Spies-Virgil Mine and Harry Rogers and myself of the Safety Department.

Mr. George Whittington, Safety Inspector on the Mesaba Iron Range attended the quarterly meetings held on that range and in Duluth, Minnesota.

National Safety Council, Annual Meeting

This meeting was held in Chicago, Ill., October 5th, 6th, and 7th. The company was represented by F.J. Haller, Supt., Mather Mine, Tom Hill, Vent. Engr. and myself of the Safety Department from the Marquette Range and George Whittington, Safety Inspector of the Mesaba Range.

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)Safety Flags

The Banner Flags which represent the best safety records for the year were awarded as follows:

Underground Mine-	Maas Mine-	Severity Rating-0.603
Open Pit-	Holman Cliffs Mine-	Severity Rating-0.212
Independent Unit-	Cliffs Power & Light Co.-	Severity Rating-0.709

The National Safety Flag was flown under the Stars and Stripes at all properties.

Miners' Safety Bulletin

Three issues of the Miners Safety Bulletin was published during the year. The "More Ore to Win the War" slogan was kept up in these issues although prizes for suggestions regarding equipment and methods were discontinued.

Foremen's Bonuses

One hundred and nine foremen participated in this bonus and it continues as a definite accident prevention measure. The payment of a bonus is based on the foremans efficiency in maintaining the companys safety standards.

Table XIX shows distribution of these bonuses.



## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XIX

SAFETY BONUSES PAID TO FOREMEN

<u>Mine or Plant</u>	<u>Amount</u>	<u>Men Participating</u>	<u>Amount of Penalties Imposed</u>
Athens	\$ 1015.14	16	32.70
Cliffs Shaft	1321.99	14	2.16
Lloyd	909.66	15	9.97
Maas	1336.69	14	15.02
Mather	187.58	8	-
Negaunee	1204.54	14	76.87
Spies-Virgil	208.57	6	22.81
Princeton	301.97	7	169.40
Cambria-Jackson	267.75	9	31.39
General Storehouse	47.86	2	-
C. P. & L. Co.	<u>112.69</u>	<u>4</u>	<u>5.00</u>
Totals	\$ 6,914.44	109	365.32

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYc. Safety Inspection (Continued)

TABLE XX

OCCUPATIONS OF MEN PARTICIPATING IN BONUS

Title	Gen.										Total	
	Athens	C.S.	Lloyd	Maas	Mather	Neg.	Spies- Virgil	Prince- ton	Cam. Jack.	Sthse. & Shops		G.P.&L
Shift Boss	11	9	6	10	5	10	3	3	3	-	-	60
Mech. Foreman	1	1	1	1	1	1	1	1	1	-	-	9
Elect. Foreman	1	1	1	1	1	1	1	1	1	1	-	10
Surface foreman	1	1	1	1	1	1	1	1	1	-	2	11
Timber Foreman	1	1	1	1	-	1	-	1	1	-	-	7
Garage Foreman	-	-	-	-	-	-	-	-	-	1	-	1
Scraper Foreman	-	1	-	-	-	-	-	-	-	-	-	1
Trammer Boss	1	-	-	-	-	-	-	-	2	-	-	3
Dist. Foreman	-	-	-	-	-	-	-	-	-	-	2	2
Sub- Boss	-	-	4	-	-	-	-	-	-	-	-	4
Police Captain	-	-	1	-	-	-	-	-	-	-	-	1
Totals	16	14	15	14	8	14	6	7	9	2	4	109

## Safety Department

## Annual Report

Year 1943.

11. ACCIDENTS  
AND  
PERSONAL  
INJURYd. Ventilation

Considerable work has been done on ventilation in the companys mines and shops. An attempt has been made to provide all work places with enough clean, fresh uncontaminated air so employees can do a full days work without undue fatigue. Underground, we have recommended at least 3,000 c.f.m. at all rock headings and 500 c.f.m. in ore. Results of good ventilation have been outstanding in both the Mather and Lloyd Mines development headings. Miners in these headings have been able to return to their work in the majority of cases about ten minutes after blasting, also the dust counts have been very favorable up to date.

The safety department has cooperated with the engineering department in making ventilation surveys. Also an agreement was made with the Chief Engineer to have engineers in his department to make a complete report on ventilating conditions. This has been of great help to the Safety department.

Mr. Edward Urban, Field Engineer, Saranac Laboratorys has given fine cooperation and assistance in control of ventilation and dust elimination. Together we have made complete ventilation surveys of all the company properties. Reports of these surveys have been submitted and recommendations made where and when necessary.

The number of cubic feet of air provided at each mine follows-

<u>Athens Mine</u>	92,000 c.f.m.	Well distributed to all working places.
<u>Cambria Jackson</u>	17,000 c.f.m.	Well distributed to all working places but insufficient for a mine of this size. New plans provide for larger fan when mine is connected to the Mather Mine.
<u>Cliffs Shaft</u>	54,000 c.f.m.	Natural ventilation. Well distributed but insufficient volume for large mine to remove smoke quickly.
<u>Lloyd Mine</u>	19,000 c.f.m.	Well distributed. New fan indicated as mine is deepened.
<u>Mather Mine</u>	In development	stage. Two headings each ventilated by 5,000 c.f.m. capacity fans. Conditions good.
<u>Maas Mine</u>	62,000 c.f.m.	This is return air from Negaunee Mine and is cleaned by water sprays. Air well distributed

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYd. Ventilation (Continued)

<u>Negaunee Mine</u>	108,000 c.f.m.	except on new 6th level. (New raise from 6th to 5th level will make conditions good) and 4th level where cross-section for return air is too small. Distribution good.
<u>Princeton Mine</u>	16,000 c.f.m.	Winter months, 3,500 c.f.m. Summer months natural ventilation. Fan now being installed.
<u>Spies-Virgil</u>	9,500 c.f.m.	Excellent Fan with 40,000 c.f.m. capacity but cross-section of old Virgil mines drifts too small. The few working contracts well ventilated thru use of auxiliary fans.

Dust samples taken during the year showed a favorable downward trend. Using water sprays, wet drilling and water blasts have helped a lot towards bringing dust counts to a safe limit but dilution of dust thru ventilation apparently is the most satisfactory method combined with wetting and spraying. Our average light field count of all mines during the year has been slightly over 8 million particles. This average includes both ore and rock counts. With the percentage of silica particles in ore ranging from one to about five per cent and rock averaging about 48%, it can be readily seen that dust hazards can be eliminated almost entirely with but little work and equipment.

Dust respirators have been used by all miners working in rock. Air line respirators and clean air blowers were not used during the year because of dust control as shown above. This has increased the efficiency of miners considerably and there should be no need of any change in this condition if proper dust elimination methods are continued.

Dust count analyses are sent to the superintendent immediately if the count is high but not until the end of the month if it is favorable. Recommendations are made when necessary.

The field representative of Saranac Laboratory receives a copy of all dust counts and discusses them with the writer. As Mr. Hill was used considerable at the Athens Mine fire, the number of counts made is not as high as we should like to have of each mine but during 1944 we shall have a clear, simple picture of

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYd. Ventilation (Continued)

dust conditions in every mine.

The following tables give location and various occupations where dust counts were taken, also total averages of counts since 1933 when the first counts were made.

TABLE XXI

Dust Samples Collected in Rock and Ore Work

<u>Mine or Plant</u>	<u>1943</u>		<u>Total 1943</u>	<u>Total</u>	
	<u>In Ore</u>	<u>In Rock</u>		<u>1933</u>	<u>-- 1943</u>
Athens	11	26	37		385
Cliffs Shaft	20	84	104		1214
Cambria Jackson	4	4	8		8
Lloyd	13	38	51		410
Maas	25	39	64		418
Mather	-	57	57		155
Negaunee	6	2	8		592
Princeton	3	20	23		23
Spies-Virgil			-		34
Tilden			-		21
Miscellaneous			-		96
<b>Total</b>	<b>82</b>	<b>270</b>	<b>352</b>		<b>3,356</b>

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYd. Ventilation (Continued)

TABLE XXII

VARIOUS OCCUPATIONS WHERE DUST SAMPLES WERE COLLECTED

	<u>Athens</u>	<u>Cliffs Shaft</u>	<u>Camb. Jack.</u>	<u>Lloyd</u>	<u>Maas</u>	<u>Mather</u>	<u>Neg.</u>	<u>Prince- ton</u>	<u>Totals</u>
Drilling	8	99	5	26	29	40	5	9	221
Scraping	10	2		4	22	4	1	10	53
Blasting	4			1		2		1	8
Timbering				2	2				4
Hand shoveling		2						2	4
Barring back			1						1
Blowing cars	1								1
Blowing pocket	2								2
Using compressed air loader to fill cars	10			15	6	11	2		44
General mine air	2		2	2	4			1	11
Rigging machine		1							1
Charging holes				1	1				2
<b>Totals</b>	<b>37</b>	<b>104</b>	<b>8</b>	<b>51</b>	<b>64</b>	<b>57</b>	<b>8</b>	<b>23</b>	<b>352</b>

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYd. Ventilation (Continued)

TABLE XXIII

AVERAGE LIGHT FIELD COUNT OF ALL SAMPLES TAKEN

<u>Mine or Plant</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>
Athens		32.90	14.12	28.32	26.69	12.85	12.59	9.89	7.28	25.80	4.90
Cliffs Shaft	17.94	14.56	8.29	8.98	15.53	9.86	10.36	7.77	8.18	7.55	5.99
Cambria Jackson											12.10
Lloyd		9.90	12.42	39.25	20.25	10.84	13.47	11.73	8.05	6.95	5.01
Maas		7.46	27.55	35.75	150.98	11.24	36.90	8.71	17.29	8.46	12.48
Mather									2.42	5.58	6.64
Negaunee		53.80	17.77	33.25	59.06	56.26	25.49	10.78	14.02	17.02	4.65
Princeton											10.59
Spies Virgil					70.61	26.99	1.80	8.40	6.97		
Tilden				67.52	235.27	74.60	60.40		49.60		
Gardner Mackinaw		27.77		8.61	48.53						
Miscellaneous			8.66	3.00	6.80	14.73				3.00	

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYe. Mine Safety and Mine Rescue CoursesFirst Aid Training

This training course was not conducted in complete form at any time during the year but demonstrations and practice was conducted for all foremen and bosses in the use of traction splints, artificial respiration and use of the Navy Stokes Stretcher. We have had several very favorable remarks from the doctors on the fine first aid treatment given injured men by our first aid trained employees. The proper first aid treatment of injured men has cut down on the number of days of disability. The writer conducted training in artificial respiration for most of the employees of the Cliffs Power & Light company. The company's foremen are continuing the practice training at the various operations.

The U.S. Bureau of Mines did not have instructors available during the year for any extensive training programs but have advised us now that trainers will be available during 1944 at which time we shall take full advantage of the first aid course.

Job Instructors Course

The War Manpower Commission has made available to industry three training courses namely, Job Instruction, Job Methods and Job Relations. Job Instruction teaches how to properly instruct new employees their duties on a certain job; also how to teach old employees taking new jobs.

Mr. Harry Rogers, Safety Inspector took the instructors course at Marquette, Michigan and now holds an Instructor's Certificate so is available to complete training in Job Instruction for the few of our employees who did not attend classes during October and November. The writer attended some of the classes at Marquette but did not complete the training. Two Instructors of the War Manpower Commission gave the Job Instruction to 84 employees of whom 75 completed the course and were certified. A request for Job Relations Training is now being fulfilled and will be reported in the 1944 Annual report. This course teaches supervisors how to handle men on the Job to best advantage.

We believe these courses will have a definite bearing on Safety, efficiency and good will among employees.



## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYe. Mine Safety and Mine Rescue Courses (Continued)Mine Rescue Training

During the year a number of mine rescue men entered the armed services, a few are past the age limit for this work and a few others asked to be relieved or were physically unable to continue this strenuous work. In order to have enough men for this type of work, the U.S. Bureau of Mines was requested to train 48 men. All other Mine Rescue Men were given additional training by Mr. Rogers, Mr. Hill and myself which gives us a total of 119 men fully trained.

Most of the above men took part in fighting and sealing the Athens Mine fire and later entered the fire seals on two different occasions.

During the above fire, two Oxygen Apparatus were lost when a cave-in occurred where the apparatus had been left close to the fire area. These apparatus have since been replaced with new ones.

Mine Rescue Station

Equipment kept at the station is inspected and tested at least once every month and reports of tests are sent to the manager.

The station is one of the best equipped in the Lake Superior District and contains 15 sets of Oxygen Breathing Apparatus and 10 Gas Masks with all accessories and supplies necessary to handle large underground mine fires.

The following tables show the number of new men trained at each mine and the total available at each mine at the close of 1943.

TABLE XXIV

MEN TRAINED BY THE U. S. BUREAU OF MINES 1943

Athens Mine	11	Lloyd Mine	8
Negaunee Mine	3	Princeton Mine	9
Maas Mine	5	Cliffs Shaft	2
Spies-Virgil Mine	10		
Total certified by the U. S. Bureau of Mines			48

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYe. Mine Safety and Mine Rescue Courses (Continued)

TABLE XXIV-A

MINE RESCUE MEN AVAILABLE AT EACH MINE

Athens Mine	25
Cliffs Shaft Mine	16
*Cambria Jackson Mine	**10
Lloyd Mine	17
Maas Mine	11
Mather Mine	12
Negaunee Mine	12
Princeton Mine	10
Spies-Virgil Mine	10
Engineering Dept.	<u>6</u>
Total	119

\* Trained by Republic Steel Corp.

\*\* Not included in total.

## Safety Department

Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYe. Mine Safety and Mine Rescue Courses (Continued)

TABLE XXV

FIRST AID SUPPLIES DISTRIBUTED

<u>Material</u>	<u>Number Distributed</u>
Merthiolate Pads.....	31,420
Ounces of Merthiolate.....	258
1" Roller Bandage.....	445
2" " " .....	322
3" " " .....	311
Rolls of Adhesive Tape.....	64
Picric Gauze.....	158
Plain Gauze.....	485
Leather Finger Cots.....	204
Merthiolate Applicators.....	1,344
Ozs. Aromatic Spirits of Ammonia.....	8
Tubes of Unguentine... ( $\frac{1}{2}$ oz).....	31
Ozs. Absorbent Cotton.....	63
Triangular Bandages.....	102
Pairs of Scissors.....	6
Total.....	35,221

## Safety Department

## Annual Report

Year 1943

11. ACCIDENTS  
AND  
PERSONAL  
INJURYSummary

The 1942 annual report showed a comparison of Frequency and Severity Ratings of the Cleveland Cliffs Iron Company with the National and Local (Marquette County) Ratings. Our 1942 rating was compared with the National Mining rate of 1941 which at that time was the latest available.

Following is a table including the companys 1942 and 1943 ratings with the National rating of 1942 which is the latest available.

TABLE XXVI

INJURY RATES AND SEVERITY OF INJURIES

	<u>Frequency</u>	<u>Severity</u>
All Mining, National Rate 1942	50.56	10.52
Cleveland Cliffs Iron Company 1942	9.39	2.177
" " " " 1943	20.30	3.986

It can be seen from the above figures that our 1942 ratings were very good compared with the National rate. The 1943 National ratings are expected to be higher than 1942. Our 1943 rating shows the National trend.

Local rates are not available at this time as the County Mine Inspector will report accidents for the calender year instead of a fiscal year which used to end September 30th of each year.

## Safety Department

## Annual Report

Year 1943

11. FIRE  
REPORTSAthens Mine Fire

At 7:30 P.M. January 1, 1943 smoke was reported in the Athens Mine Shaft by the pumpman. Mr. O. Marjama, asst. Supt. phoned me a few minutes later and we left for the mine immediately. The head pumpman had shut down the mine fan before our arrival. The first trip into the mine was made by Mr. Marjama, Mr. Mallett, Mng. Capt., Mr. Harry Rogers, Safety Inspector, a miner and myself. We had no trouble locating the fire which was in a slice on the 635 sub. above the 7th level, 720 crosscut. Heavy smoke was coming out of the slice. We immediately returned to the shaft station and started organizing oxygen apparatus crews and within a short time the first crew entered the slice to fight fire but had to return because fire had already burned enough timber to weaken the drift. Plans then were changed so as to run a line brattice from 721 raise into the breast of the slice and props were placed under the caps of the timber sets. The mine fan was put into operation so the apparatus men could see somewhat in doing their work. About 30 feet of line-brattice had been constructed when it was noticed there was a short circuit in the air. This forced everyone to return to surface. On arriving at surface it was found that the short-circuiting door, used during cold weather to prevent ice from forming in the down cast cage side, had been forced open due to pressure caused by both skips being hung at the shaft collar while repairs were being made on the skip hoist. The short circuit door was closed and locked but no one could enter the mine until all gases were forced out of the mine. During this time apparatus crews checked all ventilation doors on all levels and closed off all air leaks. When we returned to the fire area we found that ground had caved all around 721 raise and the fire had also spread to the 7th level in 720 crosscut. An attempt was made to fight the fire directly but soon had to be abandoned because as timber burned out the ground started to cave, so the hazard was too great. Fire seals were then built in 730 and 720 crosscuts, on the 6th level, over 726 raise on the 6th level and two seals in 814 raise. Because of cracked ground near 720 crosscut the ground had to be sealed by grouting with cement. At the same time thought had been given to flooding the fire area and preparations were made for concrete bulkheads. This plan was later dropped. On the 12th of January, mining contracts below the 7th level were put into operation and later those on the intake air on the 7th level were operated. Gases from the fire area were encountered above the 4th level coming thru the gob in at least two places which required building of additional brattices and stoppings on the 4th level and on some of the sub-levels before

## Safety Department

## Annual Report

Year 1943

11. FIRE  
REPORTSAthens Mine Fire (Continued)

mining could be resumed in that area.

From the time the first mining crews went to work on January 12th until April 26th, the mine air was checked on all three shifts for carbon monoxide gas and Seficiency of oxygen to protect employees. Since that time an automatic Carbon Monoxide Indicator has been located on the 4th level in return air to warn employees of any presence of gas. This alarm will ring a bell and turn on a red light in case Carbon Monoxide gas should reach .02 percent. Tests for gas in surface subsidence also have been made weekly and none has been found since the later part of March.

This brief report on the fire would not be complete without some mention of excellant work done by men wearing self-contained oxygen breathing apparatus. Some of the men had actual underground fire fighting experience before this fire but some had never been put to the real test. Out of about 60 Mine Rescue Men used only one asked to be relieved so as to attend his regular work and one man, an experienced man, was partially overcome because of talking too much with his mouthpiece loose in his mouth. He rested a short time and again went back to the work. This fine showing, I believe, comes from continual training and the training program will be continued. At the present time I believe we have some of the best Mine Rescue Men to be found anywhere in the country.

Engineers of the U. S. Bureau of Mines, Duluth, Minnesota who were called during the fire stayed with us but a few days, but thier equipment was used for some time after they left. These engineers two of whom have had considerable underground fire fighting experience, were unable to offer any better method of fighting the fire than we were already using. They admitted that a fire in the gob is the most difficult to control.

THE CLEVELAND-CLIFFS IRON COMPANY  
ORE MINING DEPARTMENT

STATEMENT OF SAFETY DEPARTMENT EXPENSE FOR YEAR-1943

Salaries .....	10,230.90
Auto Expense .....	214.40
Furniture and Fixtures .....	24.38
Insurance .....	14.31
Postage .....	9.63
Stationery and Printing .....	487.40
Supplies .....	86.63
Traveling and Entertainment .....	576.83
Telephone and Telegraph .....	20.51
Papers and Periodicals .....	10.00
Unemployment Insurance Tax .....	123.44
General - Unclassified .....	74.79
Old Age Benefit Tax .....	94.95
Depreciation .....	199.84
Equipment .....	45.49
Personal Injury Expense .....	1.00
<u>TOTAL .....</u>	<u>12,214.50</u>

Respectfully submitted,

A.J. Stromquist  
Director of Safety

JSM-L  
-2-

ANNUAL REPORT OF THE MINING ENGINEERING DEPARTMENT FOR THE YEAR ENDING  
DECEMBER 31, 1943

The regular annual report books of photographic maps, scale 1" = 200', showing the various sub-levels and levels in the operating mines on which mining operations were conducted during 1943, accompany this report. These books contain some views of a few of the properties, and also cross-sections of the Mesaba Range open pit mines. The development work and the areas mined during 1943 are shown in red on the plan maps. The Mesaba cross-section show in color the material adjacent to the open pits. Books have been prepared for the different companies interested in the various mines. The following list shows the companies for which books have been prepared and the mines included therein:

Company	Mines
The Cleveland-Cliffs Iron Company	Athens, Canisteo, Cambria-Jackson, Cliffs-Shaft, Hill-Trumbull, Holman-Cliffs, Lloyd, Maas, Mather, Morris, Negaunee, Pontiac, Princeton, Spies-Virgil and Tilden
Bethlehem Steel Company	Mather and Negaunee
Pickands Mather and Company	Athens
Canisteo Mining Company	Canisteo
Hanna Ore Mining Company	Hill-Trumbull and Holman-Cliffs
Inland Steel Company	Hill-Trumbull and Holman-Cliffs
Jones & Laughlin Steel Corporation	Hill-Trumbull and Holman-Cliffs
Pittsburgh Steel Corporation	Hill-Trumbull and Holman-Cliffs
Republic Steel Corporation	Hill-Trumbull and Holman-Cliffs
Wheeling Steel Corporation	Hill-Trumbull and Holman-Cliffs

There were two bound volumes made for the Cleveland-Cliffs Iron Company, one for the Cleveland office and one for the Engineering Department at Ishpeming. One bound volume and two loose-leaf books were prepared for the Canisteo Mining Company. Two loose-leaf books were prepared for the Republic Steel Corporation and one loose-leaf book for each of the other partners in the Mesaba-Cliffs Mining Company. The other books were also loose-leaf.

There were similar books made for the fee owners and superintendents, as shown by the following list:

Person	Mines
Arthur Iron Mining Company	Hill-Trumbull and North Star-Bingham Lease of Holman-Cliffs
Walter A. Sterling, District Supt.	Canisteo, Hill-Trumbull, Holman-Cliffs and Pontiac
H. C. Bolthouse, Supt.	Hill-Trumbull and Holman-Cliffs
W. A. Pakkala, Supt.	Canisteo
W. W. Graff, District Supt.	Athens and Negaunee
H. O. Moulton, Supt.	Maas
O. Marjama, Supt.	Lloyd and Spies-Virgil
F. J. Haller, Supt.	Mather
S. W. Sundeen, Supt.	Cliffs-Shaft



## B. MAP REPORTS

At the end of each month, two sets of blueprints of mine maps of the Michigan Mines, scale 1" = 50', were prepared, showing in red the areas mined during that month. One of these sets was for the General Superintendent and the other for the Mine Superintendent. Maps of the Cliffs-Shaft Mine are posted four times a year, instead of monthly, and sets made for the General Superintendent and Mine Superintendent.

Other sets of blueprints of Michigan Mines were prepared for fee owners and others, as follows:

### ATHENS MINE

Each month, except December, two sets of monthly blueprints of the Athens Mine, showing in red the work done during that month, were sent to the Cleveland office for the Pickands, Mather and Company.

Blueprints of the maps, scale 1" = 50', showing in red the work done on the Corbit Lease during the first half of the year, were sent to the Detroit Trust Company, successor to the Union Guardian Trust Company, as Trustees of the Maria Corbit estate. There was no work done on the Corbit Lease during the last half of the month.

### CLIFFS-SHAFT

Three sets of blueprints of the geological maps of the Bancroft Lease, scale 1" = 50', were prepared after each quarterly survey. Each was sent to the Ishpeming and Duluth offices of the Oliver Iron Mining Company and the other set to our Cleveland office. These maps showed in red the work done since the previous set, except that those made at the end of the year showed in red the work done during the entire year, as well as the areas used in making the ore reserve estimates for the Michigan State Tax Commission. This year, maps of the extension of the workings on to the Section 10 Exploration have been included in the above sets, as this property was taken under lease during the year. Two copies of the estimate of ore reserves of the Bancroft Lease and Section 10 Lease, as of Dec. 31, 1943, as prepared for the Michigan State Tax Commission, were sent with these maps, - one to the Duluth office and one to the Ishpeming office of the Oliver Iron Mining Company.

### MAAS MINE

Blueprints of those portions of the Maas Mine in the Roman Catholic Cemetery Lease were sent monthly to Mr. R. S. Archibald, Negaunee, Michigan, showing in red the areas mined during the month. A set of blueprints, scale 1" = 50', of the Maas Mine were sent each month to Mr. R. C. Miller of Negaunee, Michigan, showing in red the workings on the Maas Lease during the month.

### NEGAUNEE MINE

A set of blueprints of the Negaunee Mine, scale 1" = 50', were sent to Mr. R. C. Miller, Negaunee, Michigan, showing in red the areas of the Negaunee Lease mined during the month. At the end of the year, 11 sets of the annual report maps of the 4th, 6½, 9th, 10th, 11th, 12th, 13th and 14th levels were forwarded to the fee owners of this property. A set of blueprints of the North-South cross-sections affected by mining in 1943, scale 1" = 50', of the Negaunee Mine, was sent to Mr. W. L. Cumings, Geologist for Bethlehem Steel Company, Bethlehem, Pennsylvania.

SPIES-VIRGIL MINE

Five sets of blueprints of the Virgil Mine sub-levels, scale 1" = 50', were sent quarterly to the fee owners of the Virgil property of the areas mined during the previous three months.

MICHIGAN STATE TAX COMMISSION

Estimates of ore reserves in the Athens, Cambria-Jackson, Cliffs-Shaft, Lloyd, Maas, Negaunee, Princeton and Spies-Virgil Mines were made, as of December 31, 1943. Accompanying these estimates of ore reserves were annual report maps of each of the mines, showing the areas used in compiling these estimates and the general geological structure adjacent to the areas mined during the year. Two sets of these estimates were prepared, - one for the Michigan State Tax Commission and one for the Engineering Department at Ishpeming.

C. REMARKS ON MISCELLANEOUS DOCUMENTS AND ABSTRACTS

All documents affecting lands and rights held by the Company or its subsidiaries passed through the Engineering Department for recording and approval, irrespective of where these documents originated. Those documents affecting the disposal of Company lands were approved by the Geological Department and initialed by Mr. Derby. All documents were initialed by Mr. Brewer who made a special report if necessary. Copies of those documents which affect the mineral lands are kept on file in the Engineering Department.

The following table shows the number and classification of the documents that passed through the Department during the year:

<u>Classification</u>	<u>Number Received</u>	<u>Last File Number</u>
Mining Leases	4	76
Miscellaneous Documents	68	1515
Easements	2	421
Rights of Way	0	224
Water Rights	0	66
Surface Leases	90	5592
Applications for Sale	0	180
Sales	50	3067
Tax Histories	0	703

The following comments cover the various documents as listed above that were entered on the records of the Engineering Department during 1943.

MINING LEASES

The following mining leases were surrendered during the year:

No. 68 - Ravenna Lease. This lease comprising the  $S\frac{1}{2}$  of  $N\frac{1}{2}$ ,  $SW\frac{1}{4}$ , and  $W\frac{1}{2}$  of  $SE\frac{1}{4}$ , Section 19, 43-32, was surrendered to the fee owners, as of Dec. 31, 1943. These lands were originally leased to M. A. Hanna and Company, dated Feb. 23, 1911. It was subsequently transferred to the Cleveland-Cliffs Iron Company under date of Dec. 31, 1932. On Oct. 15, 1936, it was sub-leased, together with the Prickett lands, to the Inland Steel Company who, under date of Dec. 31, 1943, surrendered it to the Cleveland-Cliffs Iron Company.

MINING LEASES (CONT.)

No. 69 - Jackson Lease. This lease comprising the N.660' of N $\frac{1}{2}$  of NW $\frac{1}{4}$ , Section 1, and N.660' of NE $\frac{1}{4}$  of NE $\frac{1}{4}$  of Section 2, 47-27, was leased to the Republic Steel Corporation on April 15, 1936. The Republic Steel Corporation surrendered this lease, as of July 1, 1943, and it became a part of the Cambria-Jackson Mine operated by the Cleveland-Cliffs Iron Company.

The following mining leases were acquired during 1943:

No. 73 - Section 10 Exploration. This lease comprising the hard ore in the Northern part of the S $\frac{1}{2}$  of NW $\frac{1}{4}$  of Section 10, 47-27. The lease from the Oliver Iron Mining Company was dated Dec. 1, 1942 and expires Dec. 1, 1992.

No. 74 - Johnson Lease. This lease comprising the SW $\frac{1}{4}$  of Section 19, 43-34, from a sister and six Johnson Brothers and their wives, is adjacent to the Spies Mine property in the Iron River District. This lease was dated May 1, 1943 and expires May 1, 1993.

No. 75 - Cambria Mine. This lease comprises the fractional SE $\frac{1}{4}$  of Section 35 and the fractional S $\frac{1}{2}$  (except Lot 8) Section 36, 48-27, from the Teal Lake Iron Mining Company. The lease was dated May 1, 1943 and expires April 30, 1993. The former lease had been held by the Republic Steel Corporation and the Cleveland-Cliffs Iron Company took over operations, as of June 1, 1943.

MISCELLANEOUS DOCUMENTS

This is the general classification covering all documents that has to do with rights, sold or acquired, affecting either the operating mines or mineral lands. Some of them were merely copies of documents in the chain of title desired for reference purposes. There were nine documents concerning Negaunee City property, nine easements for highway and other purposes, fourteen concerning the Spies lands, sixteen covered the surrender of the Ravenna Lease, nine were in connection with the Minnesota properties, and the remaining were miscellaneous documents.

EASEMENTS

This heading covers all rights acquired by the Cliffs Power and Light Company. The two listed covers railroad crossings for service lines.

RIGHTS OF WAY

This file covers railway rights of way.

WATER RIGHTS

These are permits regarding the discharge of mine water across lands adjacent to mines.

SURFACE LEASES

These surface leases all originate in the Land Department and cover all sorts of permits for the use of Company lands such as residences, camps, farms, gardens, etc.

APPLICATION FOR SALE

These also originate in the Land Department and are preliminary reports covering lands to be sold on areas off the mineral formation.

SALES

This classification covers the transfer of property of all kinds, most of which originate in the Land Department. There were nineteen warranty deeds, nine easements, five bill of sales and seventeen land contracts.

TAX HISTORIES

The tax histories of the Spies Mine lands purchased early in 1942, were brought up-to-date in order to make a complete report on the title.

ABSTRACTS

The abstracts of the Spies Mine lands were also brought up-to-date and an abstract was secured of SW $\frac{1}{4}$  of Sec. 19, 43-34, on which a mining lease was taken, as above mentioned.

Mr. Brewer spent some time with Mr. Bell tracing the title of lots in the Carlson Maple Valley Addition to the City of Iron River. The Spies purchase covered the minerals under this addition and the abstract of title showed that 8 lots had reverted to the State for delinquent taxes, but was incomplete as to the true status of these lots. It was subsequently found that the State had transferred the fee title of four lots to the former owner of the surface and retained the mineral title in four others.

D. THE FORCE

There were many changes in the Engineering Department during the year. Among the engineers, Messrs. Trosvig and Atkins were appointed Assistant Superintendents. Mr. Haivala entered the Department in March, Mr. Kujala in June and Mr. Madsen in September. None of the helpers who were in the Department on January first, worked the year through, so that there were a considerable number of changes during the year. This class of labor has been difficult to obtain and the Department has been seriously affected by not being able to secure suitable and permanent men.

The following table shows the personnel of the Department during the year, their positions and period of employment:

<u>Name</u>	<u>Position</u>	<u>Entered</u>	<u>Left</u>	<u>1943 Employment</u>
Carl Brewer	Chief Mining Engineer			12 months
John Trosvig	Engineer		May 28	5 "
William R. Atkins	"		July 15	6 $\frac{1}{2}$ "
Curtis R. Sundeen	"			12 "
James S. Westwater	"			12 "
Grant T. Hollett	"			12 "
Hugo H. Korpinen	"			12 "
John M. Haivala	"	March 1		10 "
Arvo E. Kujala	"	June 1		7 "
Maxwell H. Madsen	"	Sept. 8		4 "
W. Harlow Stannard	Draftsman			12 "

<u>Name</u>	<u>Position</u>	<u>Entered</u>	<u>Left</u>	<u>1943 Employment</u>
Harry C. Swanson	Surveyor	June 1		7 months
Verne Johnson	Helper		July 16	6½ "
Oscar R. Sandell	"		Jan. 31	1 "
Warren F. Farley	"	Jan. 4	Jan. 15	½ "
Herbert Anderson	"	Feb. 1	Feb. 28	1 "
Ernest Oja	"	Mar. 22		8½ "
Thomas Hosking, Jr.	"	Aug. 19	Nov. 18	3 "
Leslie A. Beerling	"	Sept. 7	Dec. 11	3 "
John J. Dobson	"	Dec. 8		½ "
William M. Junttila	"	Dec. 9		½ "
Elsie L. Carlson	Stenographer		June 4	5 "
Marie J. Nicholas	"	Mar. 15		9½ "
Elizabeth M. LaForais	"	Oct. 1		3 "

The next table shows the length of service in the Engineering Department of those employed at the end of the year:

<u>Name</u>	<u>Date Entered</u>	<u>Length of Service</u>
C. Brewer	August, 1906	25 years, 3 months
C. R. Sundeen	February, 1940	3 years, 10½ months
J. S. Westwater	May, 1940	3 years, 7½ months
G. T. Hollett	August, 1940	3 years, 4½ months
H. H. Korpinen	September, 1942	1 year, 3½ months
J. M. Haivala	March, 1943	10 months
A. E. Kujala	June, 1943	7 months
M. H. Madsen	September, 1943	4 months
W. H. Stannard	November, 1940	3 years, 2 months
H. C. Swanson	June, 1943	7 months
E. Oja	March, 1943	8½ months
J. J. Dobson	December, 1943	½ month
W. M. Junttila	December, 1943	½ month
M. J. Nicholas	March, 1943	9½ months
E. M. LaForais	October, 1943	3 months

The above "length of service" covers only the period that the men were employed in the Engineering Department.

The following table shows the number of days worked, sick or absent during the year of all those who were in the Department:

<u>Name</u>	<u>Days Worked</u>	<u>Days Sick</u>	<u>Days Absent</u>
C. Brewer	224	1	10
J. Trosvig	118	0	0
W. R. Atkins	150	0	3
C. R. Sundeen	269	4½	11½
J. S. Westwater	282½	0	4½
G. T. Hollett	282½	0	4½
H. H. Korpinen	287½	3	0
J. M. Haivala	241½	0	1
A. E. Kujala	163	4	1½
M. H. Madsen	88	0	0

<u>Name</u>	<u>Days Worked</u>	<u>Days Sick</u>	<u>Days Absent</u>
W. H. Stannard	269 $\frac{1}{2}$	1 $\frac{1}{2}$	11
H. C. Swanson	170 $\frac{1}{2}$	1 $\frac{1}{2}$	11
V. Johnson	103 $\frac{1}{2}$	63	0
O. R. Sandell	22 $\frac{1}{2}$	0	0
W. F. Farley	5 $\frac{1}{2}$	0	0
H. Anderson	21 $\frac{1}{2}$	$\frac{1}{2}$	0
E. Oja	222	0	2
T. Hosking, Jr.	79 $\frac{1}{2}$	0	0
L. A. Beerling	73	2	0
J. J. Dobson	17	0	0
W. M. Junttila	15	1	0

The following table showing the distribution of time spent underground, in the field and in the office covers only those who were engaged in the mapping and surveying in the mines.

<u>Name</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>
C. Brewer	6 $\frac{1}{2}$	35 $\frac{1}{2}$	182	224
J. Trosvig	20	12	86	118
W. R. Atkins	68	5 $\frac{1}{2}$	76 $\frac{1}{2}$	150
C. R. Sundeen	110 $\frac{1}{2}$	16	142 $\frac{1}{2}$	269
J. S. Westwater	92 $\frac{1}{2}$	44 $\frac{1}{2}$	145 $\frac{1}{2}$	282 $\frac{1}{2}$
G. T. Hollett	152 $\frac{1}{2}$	46 $\frac{1}{2}$	83 $\frac{1}{2}$	282 $\frac{1}{2}$
H. H. Korpinen	130	26	131 $\frac{1}{2}$	287 $\frac{1}{2}$
J. M. Haivala	95 $\frac{1}{2}$	20	126	241 $\frac{1}{2}$
A. E. Kujala	53 $\frac{1}{2}$	26	83 $\frac{1}{2}$	163
M. H. Madsen	20	8	60	88
W. H. Stannard	5	20 $\frac{1}{2}$	244	269 $\frac{1}{2}$
H. C. Swanson	77 $\frac{1}{2}$	43 $\frac{1}{2}$	49 $\frac{1}{2}$	170 $\frac{1}{2}$
V. Johnson	26	9	68 $\frac{1}{2}$	103 $\frac{1}{2}$
O. R. Sandell	2		20 $\frac{1}{2}$	22 $\frac{1}{2}$
W. F. Farley		2	3 $\frac{1}{2}$	5 $\frac{1}{2}$
H. Anderson	10 $\frac{1}{2}$	$\frac{1}{2}$	10 $\frac{1}{2}$	21 $\frac{1}{2}$
E. Oja	64	59 $\frac{1}{2}$	98 $\frac{1}{2}$	222
T. Hosking, Jr.		35 $\frac{1}{2}$	44	79 $\frac{1}{2}$
L. A. Beerling	29	12	32	73
J. J. Dobson	6 $\frac{1}{2}$	1 $\frac{1}{2}$	7	15
W. M. Junttila	4	2	11	17
TOTAL	973 $\frac{1}{2}$	426	1706	3,105 $\frac{1}{2}$
%	31.3	13.8	54.9	100.0

The following resume of the work done by the various men in the Department during the year only mentions some of the special work they did. The engineers made weekly inspections of all the working places in the soft ore mines accompanied by either the mining captain or the shift boss. This enabled the engineers to assist in planning development, as well as to know the general operating plans. There were frequent conferences with the superintendent and captain over proposed new developments. As the work progressed, lines were given according to these prepared plans. Grades were established and carefully watched. Engineers often planned the method of timbering at turnouts, supervised construction of pockets and other work where it was necessary to have frequent supervision. They also kept the mine maps up-to-date and made the monthly map reports for the mine in which he was working, and assisted the superintendent by writing the underground portion of the monthly reports. They posted the general geology of the property and often conferred with the Geological Department concerning special geological questions. This regular routine work of the engineers occupied most of their time and left them little opportunity for other work. The engineers made the estimates of ore in stock and the estimates of ore reserves. The helpers assisted in the underground and surface surveys of all the properties, and at the office, assisted not only with the calculations, but with whatever other work was needed.

CARL BREWER, Chief Mining Engineer, supervised all the work done by the various men in the Department. He assisted in some of the field and underground work such as plumbing shafts, and in other important surface surveys. He spent considerable time calculating mineral boundaries of the Mather, Cambria and adjacent properties. He planned and assisted the survey of the Spies lands and worked with Mr. Bell in connection with the title in the Company's holdings, preparing a special map showing the outstanding rights. He checked and entered on the Department's records, all documents affecting Company property.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		17½	167½	185	82.6
Athens	½	1½	3	5	2.2
Cambria	1	2½	2	5½	2.5
Cliffs-Shaft	1½	½	2½	4½	2.00
Lloyd	1	½		1½	0.7
Maas	1		1	2	0.9
Mather	1½	1	½	3	1.3
Princeton		½		½	0.2
Spies-Virgil		11	5½	16½	7.4
Geological Department		½		½	0.2
TOTAL	6½	35½	182	224	
%	2.9	15.8	81.3		100.0

JOHN TROSVIG, Engineer, had charge of the engineering work at the Cliffs-Shaft Mine and inspected the mining operations on the Jackson Lease by the Republic Steel Corporation. He spent ten days during May in Cleveland, Ohio, estimating ore in stock at the Otis Steel Company plant. He made an estimate of the ore of the Jackson Lease for Company purposes early in the year. He left the Department May 28th to become Asst. Superintendent at the Cambria-Jackson Mine.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
Cambria-Jackson	5½		39	44½	37.7
Cliffs-Shaft	14½	1½	47	63	53.4
Otis Steel Company		10		10	8.5
Geological Department		½		½	0.4
TOTAL	20	12	86	118	
%	16.9	10.2	72.9		100.0

WILLIAM R. ATKINS, Engineer, took care of the engineering work at the Maas and Princeton Mines. At the former, he plumbed to the 6th Level and planned and supervised this development. He also supervised the installation of the pocket at the shaft on the main level. At the Princeton Mine, he laid out the arrangement of stocking trestles and planned the 7th Level and other development. He left the Department on July 15th to become Assistant Superintendent at the Athens and Negaunee Mines.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
Maas	48½		51	99½	66.3
Mather	1			1	0.7
Princeton	18½	5½	25½	49½	33.0
TOTAL	68	5½	76½	150	
%	45.3	3.7	51.0		100.0

CURTIS R. SUNDEEN, Engineer, had charge of the engineering work at the Negaunee and Spies-Virgil Mines until June, after that, he took over the engineering work at the Maas Mine and supervised the engineering at the Negaunee Mine. He made the estimate of ore in stock and the Maas Mine ore reserves. He also assisted in the plumbing of the Hartford and Cambria Shafts.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
Cambria-Jackson	1	1		2	0.7
Maas	47	2	53½	102½	38.1
Mather		2		2	0.7
Negaunee	45½		63	108½	40.4
Spies-Virgil	17	11	26	54	20.1
TOTAL	110½	16	142½	269	
%	41.1	5.9	53.0		100.0



JAMES S. WESTWATER, Engineer, had charge of the engineering work at the Tilden throughout the year and of the Lloyd until April 1st, and after that date, of the Athens Mine. At the Tilden Mine, he planned the new roads into the property and into the 2nd Bench at the East Pit. He planned and laid out the churn drilling and supervised the different blasts that were made during the shipping season. He supervised and estimated the stripping that was done during the year. At the Athens Mine, he planned developments on the various levels and especially on the 4th and 6th Levels in connection with the mining of ore East of Block 4. He estimated the ore in stock and made the annual estimated ore reserves.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			7½	7½	2.7
Athens	77½	2½	93½	173½	61.4
Cambria-Jackson	1	½		1½	0.5
Lloyd	14		20	34	12.0
Spies-Virgil			½	½	0.2
Tilden		41	24	65	23.0
Geological Department		½		½	0.2
TOTAL	92½	44½	145½	282½	
%	32.7	15.8	51.5		100.0

GRANT T. HOLLETT, Engineer, in charge of the engineering work at the Mather the entire year. Up to April, he was also engineer at the Athens and after July 1st, took over the Princeton Mine. At the Mather property, he supervised the construction of trenches and pockets of the 1st and 2nd Levels, gave lines, etc. for the rapid development on both these levels. The Princeton Mine took considerable time with its peculiar ore formation which required careful planning for proper development.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
Athens			6	6	2.1
Cambria-Jackson	3½			3½	1.2
Mather	126	31½	58	215½	76.3
Princeton	23	15	19½	57½	20.4
TOTAL	152½	46½	83½	282½	
%	53.9	16.5	29.6		100.0

HUGO H. KORPINEN, Engineer, was engaged in general surveys for all the mines until April 1st. He gave lines, grades, etc. as required for development work at all the properties. On April 1st, he took over the engineering work at the Lloyd Mine and during July, that at the Spies-Virgil Mine. The Lloyd Mine required constant attention because of the development of the 8th Level and in the small narrow deposits above the 7th. Most of the work at the Spies covered the surface surveys. The mine was closed down most of the last half of the year.

The following table shows the distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			3	3	1.0
Athens	4		2	6	2.1
Cambria-Jackson	1		$\frac{1}{2}$	$1\frac{1}{2}$	0.5
Cliffs-Shaft	16	$\frac{1}{2}$	17	$33\frac{1}{2}$	11.7
Lloyd	$87\frac{1}{2}$	4	73	$164\frac{1}{2}$	57.2
Maas	4	1	2	7	2.4
Mather	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{2}$	0.9
Negaunee	2		2	4	1.4
Princeton	$2\frac{1}{2}$		3	$5\frac{1}{2}$	1.9
Spies-Virgil	$11\frac{1}{2}$	$13\frac{1}{2}$	28	53	18.5
Tilden		1		1	0.3
Geological Department		$5\frac{1}{2}$	$\frac{1}{2}$	6	2.1
TOTAL	130	26	$131\frac{1}{2}$	$287\frac{1}{2}$	
%	45.2	9.0	45.8		100.0

JOHN M. HAIVALA, Engineer, entered the Department on March 1st. He spent a few months assisting the engineers at the different properties and in May took over the engineering work at the Cliffs-Shaft Mine. He made the quarterly surveys and located drill holes, etc. as necessary. He made the estimated ore reserves at the Cliffs-Shaft as well as the Negaunee Mine.

The following table shows the distribution of his time during the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			4	4	1.7
Athens	$6\frac{1}{2}$		6	$12\frac{1}{2}$	5.2
Cambria-Jackson	2		2	4	0.8
Cliffs-Shaft	57	$8\frac{1}{2}$	92	$157\frac{1}{2}$	65.2
Lloyd	6		$1\frac{1}{2}$	$7\frac{1}{2}$	3.1
Maas	$10\frac{1}{2}$		$7\frac{1}{2}$	18	7.5
Mather	1	1	$\frac{1}{2}$	$2\frac{1}{2}$	1.0
Negaunee	1		8	9	3.7
Princeton	$11\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	$17\frac{1}{2}$	7.3
Spies-Virgil		8	2	10	4.1
Geological Department		1		1	0.4
TOTAL	$95\frac{1}{2}$	20	126	$241\frac{1}{2}$	
%	39.5	8.3	52.2		100.0

ARVO KUJALA, Engineer, entered the Department on June 1st. He had been engineer at the Cambria Mine with the Republic Steel Corporation and when the property was taken over, he joined the Department. He continued as engineer at the Cambria-Jackson Mine for the rest of the year. After August 1st, he did the engineering at the Negaunee Mine. The rearrangement of the surface layout at the Hartford shaft required considerable time in the field. New surveys were run underground and he assisted in the shaft plumbing at the Mather where he ran a check survey on the second level.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		$\frac{1}{2}$		$\frac{1}{2}$	0.3
Cambria-Jackson	34	$22\frac{1}{2}$	53	$109\frac{1}{2}$	67.2
Negaunee	$19\frac{1}{2}$	3	$30\frac{1}{2}$	53	32.5
TOTAL	$53\frac{1}{2}$	26	$83\frac{1}{2}$	163	
%	32.8	16.0	51.2		100.0

MAXWELL H. MADSEN entered the Department on September 8th. He spent the rest of the year assisting with the engineering at the Cliffs-Shaft Mine. He spent some time with Mr. Boyum studying the geology and assisting John M. Haivala in making quarterly surveys underground.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			$1\frac{1}{2}$	$1\frac{1}{2}$	1.7
Cambria-Jackson	1	$2\frac{1}{2}$	1	$4\frac{1}{2}$	5.1
Cliffs-Shaft	$18\frac{1}{2}$	$5\frac{1}{2}$	$41\frac{1}{2}$	$65\frac{1}{2}$	74.5
Mather	$\frac{1}{2}$		1	$1\frac{1}{2}$	1.7
Negaunee			$10\frac{1}{2}$	$10\frac{1}{2}$	11.9
Spies-Virgil			$4\frac{1}{2}$	$4\frac{1}{2}$	5.1
TOTAL	20	8	60	88	
%	22.7	9.1	68.2		100.0

W. HARLOW STANNARD, Draftsman, was in the office most of the year making working maps for the different mines, special maps as required and each month spent several days posting the diamond drill records for the Geological Department. He spent a few days out of the office assisting in surveys underground and in the field.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		1	35	36	13.2
Athens	2		$12\frac{1}{2}$	$14\frac{1}{2}$	5.3
Cambria-Jackson		$2\frac{1}{2}$	23	$25\frac{1}{2}$	9.4
Cliffs-Shaft		$\frac{1}{2}$	$9\frac{1}{2}$	10	3.5
Lloyd		2	$6\frac{1}{2}$	$8\frac{1}{2}$	3.2
Maas	1		13	14	5.2
Mather			$25\frac{1}{2}$	$25\frac{1}{2}$	9.4
Morris			6	6	2.2
Princeton	2	$3\frac{1}{2}$	$26\frac{1}{2}$	32	12.9
Spies-Virgil			$\frac{1}{2}$	$\frac{1}{2}$	0.2
Tilden		1	1	2	.7
Geological Department			73	73	27.0
Otis Steel Company		10		10	3.5
Negaunee			12	12	4.4
TOTAL	5	$20\frac{1}{2}$	244	$269\frac{1}{2}$	
%	1.9	7.6	90.5		100.0

HARRY C. SWANSON, Surveyor, entered the Department as surveyor on June 1st. He had considerable previous experience in surveying and became a very valuable man in giving lines, grades, etc. both underground and on surface, as required.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			27	27	15.8
Athens	3	$\frac{1}{2}$		$3\frac{1}{2}$	2.1
Cambria-Jackson	11	$12\frac{1}{2}$	$4\frac{1}{2}$	28	16.4
Cliffs-Shaft	$5\frac{1}{2}$	$3\frac{1}{2}$	$8\frac{1}{2}$	$17\frac{1}{2}$	10.3
Lloyd	13	$1\frac{1}{2}$	2	$16\frac{1}{2}$	9.7
Maas	$17\frac{1}{2}$	1	1	$19\frac{1}{2}$	11.4
Mather	17	$\frac{1}{2}$	$1\frac{1}{2}$	19	11.2
Negaunee	4	3		7	4.1
Princeton	$5\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$11\frac{1}{2}$	6.7
Spies-Virgil	1	8	2	11	6.5
Tilden		4	$\frac{1}{2}$	$4\frac{1}{2}$	2.6
Geological Department		$4\frac{1}{2}$	1	$5\frac{1}{2}$	3.2
TOTAL	$77\frac{1}{2}$	$43\frac{1}{2}$	$49\frac{1}{2}$	$170\frac{1}{2}$	
%	45.5	25.5	29.0		100.0

VERNE JOHNSON assisted in underground and surface surveys and did the blue-printing in the office. During March and April, he was absent on account of illness. He left the Department on July 16th to go to Rochester for an operation and, becoming very much discouraged with life, committed suicide on August 19th.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			$62\frac{1}{2}$	$62\frac{1}{2}$	60.4
Athens		1		1	1.0
Cliffs-Shaft	$13\frac{1}{2}$		6	$19\frac{1}{2}$	18.8
Lloyd	$6\frac{1}{2}$	$\frac{1}{2}$		7	6.8
Maas	2	$\frac{1}{2}$		$2\frac{1}{2}$	2.4
Mather	3			3	2.9
Negaunee	1			1	1.0
Princeton		$\frac{1}{2}$		$\frac{1}{2}$	.5
Spies-Virgil		5		5	4.8
Geological Department		$1\frac{1}{2}$		$1\frac{1}{2}$	1.5
TOTAL	26	9	$68\frac{1}{2}$	$103\frac{1}{2}$	
%	25.1	8.7	66.2		100.0

OSCAR R. SANDELL assisted in the general office work and surface during the month he was in the office. He left the Department on January 31st and moved his family to Ann Arbor.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			20 $\frac{1}{2}$	20 $\frac{1}{2}$	91.1
Athens	1			1	4.5
Negaunee	1			1	4.5
TOTAL	2		20 $\frac{1}{2}$	22 $\frac{1}{2}$	
%	8.9		91.1		100.0

WARREN F. FARLEY entered the Department on January 4th and left on January 15th to enter the armed service. He was taken on to assist in the office without it being realized that he was to be inducted so soon.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		2	3 $\frac{1}{2}$	5 $\frac{1}{2}$	
%		36.4	63.6		100.0

HERBERT ANDERSON entered the Department as Helper on February 1st and left on February 28th. Contrary to general practice, he started work without a physical examination, owing to the absence of the physician. When the examination was made, it was found that he would not be permitted to go underground and was, therefore, forced to leave the Department.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			10 $\frac{1}{2}$	10 $\frac{1}{2}$	48.9
Athens	2			2	9.3
Cliffs-Shaft	$\frac{1}{2}$			$\frac{1}{2}$	2.3
Lloyd	1			1	4.7
Maas	1			1	4.7
Negaunee	1			1	4.7
Princeton	3			3	14.0
Spies-Virgil	2			2	9.3
Tilden		$\frac{1}{2}$		$\frac{1}{2}$	2.3
TOTAL	10 $\frac{1}{2}$	$\frac{1}{2}$	10 $\frac{1}{2}$	21 $\frac{1}{2}$	
%	48.9	2.3	48.9		100.0

ERNEST OJA, Helper, entered the Department on March 27th and for the balance of the year he has assisted with surveys both on surface and underground, and blue-printing in the office and other work, as required.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		2	97	99	44.6
Athens	13 $\frac{1}{2}$	2 $\frac{1}{2}$		16	7.2
Cambria	12	17 $\frac{1}{2}$	$\frac{1}{2}$	30	13.5
Cliffs-Shaft	1	5 $\frac{1}{2}$		6 $\frac{1}{2}$	2.9
Lloyd	4	1 $\frac{1}{2}$		5 $\frac{1}{2}$	2.5
Maas	14			14	6.3
Mather	11 $\frac{1}{2}$	$\frac{1}{2}$		12	5.4
Negaunee	4	4	1	9	4.1
Princeton	1	6		7	3.2
Spies-Virgil	3	11		14	6.3
Tilden		4		4	1.8
Geological Department		5		5	2.3
TOTAL	64	59 $\frac{1}{2}$	98 $\frac{1}{2}$	222	
%	28.8	26.8	44.4		100.0

THOMAS HOSKING, Helper, was employed during the period from August 19th to Nov. 18th to help out on our surface surveys. He was not permitted to go underground but was valuable in helping in the office during the time when our stockpile surveys were being made.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			42	42	52.8
Athens		1 $\frac{1}{2}$	2	3 $\frac{1}{2}$	4.4
Cambria		8 $\frac{1}{2}$		8 $\frac{1}{2}$	10.7
Cliffs-Shaft		7 $\frac{1}{2}$		7 $\frac{1}{2}$	9.4
Lloyd		2 $\frac{1}{2}$		2 $\frac{1}{2}$	3.1
Negaunee		3		3	3.8
Princeton		3		3	3.8
Spies-Virgil		7		7	8.8
Tilden		1		1	1.3
Geological Department		1 $\frac{1}{2}$		1 $\frac{1}{2}$	1.9
TOTAL		35 $\frac{1}{2}$	44	79 $\frac{1}{2}$	
%		44.7	55.3		100.0

LESLIE A. BEERLING, Helper, from Sept. 7th to Dec. 11th, formerly worked at the Cliffs-Shaft Mine and wanted some engineering experience. He assisted in underground surveys, blueprinting, etc. in the office while he was in the Department.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		1	24	25	34.3
Athens	8½	1½		10	13.7
Cambria	3	2½		5½	7.5
Lloyd	1½			1½	2.1
Maas	9½	1		10½	14.4
Mather	3			3	4.1
Princeton	1½	2		3½	4.8
Spies-Virgil	2	1		3	4.1
Tilden		3	3	6	8.2
Geological Department			5	5	6.8
TOTAL	29	12	32	73	
%	39.7	16.4	43.9		100.0

JOHN J. DOBSON, Helper, entered the Department on Dec. 8th. He is regularly employed at the Tilden Mine during the operating season. He entered the Department during the Tilden Mine's idle period and has assisted in surface and underground surveys and in blueprinting in the office.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			11	11	64.8
Athens	1			1	5.9
Francis		1		1	5.9
Lloyd	1½			1½	8.8
Mather	1½			1½	8.8
Princeton		½		½	2.9
Geological Department		½		½	2.9
TOTAL	4	2	11	17	
%	23.5	11.8	64.7		100.0

WILLIAM M. JUNTILA, Helper, also was a regular employee of the Tilden Mine, coming into the Department during its idle period. He has assisted in surface and underground surveys and did blueprinting in the office.

The following table is a distribution of his time for the year:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering			6½	6½	43.3
Cambria		½		½	3.3
Lloyd	3½			3½	23.3
Maas	1		½	1½	10.0
Mather	2	½		2½	16.8
Geological Department		½		½	3.3
TOTAL	6½	1½	7	15	
%	43.3	10.0	46.7		100.0

ELSIE L. CARLSON assisted in the stenographic work for both the Geological and Engineering Departments until June 4th when she left to join her husband who was in the armed forces.

MARIE J. NICHOLAS entered the Department on March 15th to take charge of the blueprinting. During the summer, she was doing the stenographic work for both the Engineering and Geological Departments. She has charge of the blueprinting room and does all the blueprints for the annual reports, tax estimates, etc. She also does stenographic work for both the Geological and Engineering Departments, as necessary.

ELIZABETH M. LAFORAIS has been the stenographer for both the Geological and Engineering Departments since October 1st.

#### E. DISTRIBUTION OF TIME

Practically all of the work done in the Department throughout the year was in connection with the operating mines. The large amount of development work going on at many of the properties and the Department being shorthanded, prohibited very much general surface surveying being done. Whatever was done has been charged to general engineering, which also includes time spent blueprinting, looking after cars, etc., and the time distributed, for payroll purposes, proportionately to the different operating mines.

The following table shows the distribution of time for the year, except stenographic work, divided between underground, field and office, for the different mines and other properties:

<u>Property</u>	<u>Underground</u>	<u>Field</u>	<u>Office</u>	<u>Total</u>	<u>%</u>
General Engineering		21	487	508	16.9
Athens	147 $\frac{1}{2}$	32	172	351 $\frac{1}{2}$	11.7
Cambria-Jackson	35 $\frac{1}{2}$	47 $\frac{1}{2}$	70 $\frac{1}{2}$	153 $\frac{1}{2}$	5.1
Cliffs-Shaft	128	33 $\frac{1}{2}$	224	385 $\frac{1}{2}$	12.9
Lloyd	133	12 $\frac{1}{2}$	103	248 $\frac{1}{2}$	8.3
Maas	146 $\frac{1}{2}$	4 $\frac{1}{2}$	129	280	9.3
Mather	163	37	87 $\frac{1}{2}$	287 $\frac{1}{2}$	9.6
Morris			6	6	0.2
Negaunee	79	13	127	219	7.3
Princeton	67	40	81	188	6.3
Spies-Virgil	34 $\frac{1}{2}$	74 $\frac{1}{2}$	69	178	5.9
Tilden		52 $\frac{1}{2}$	25 $\frac{1}{2}$	78	2.6
Geological Department		20 $\frac{1}{2}$	74 $\frac{1}{2}$	95	3.2
Otis Steel Company		20		20	0.7
TOTAL	934	408 $\frac{1}{2}$	1656	2998 $\frac{1}{2}$	
%	31.2	13.6	55.2		100.0



## F. COSTS

The next table shows a comparison of costs for the Engineering Department for the last three years:

	<u>1941</u>	<u>1942</u>	<u>1943</u>
Salaries	\$19,486.36	\$21,913.49	\$27,057.96
Auto Expense	1,143.41	1,325.26	1,896.56
Furniture and Fixtures	236.81	193.90	76.08
Heat, Light and Power	569.41	625.49	671.07
Insurance	81.50	33.78	10.19
Janitor and Cleaning		18.17	9.13
Postage	34.29	29.90	46.06
Repairs	118.50	885.08	466.43
Stationery and Printing	116.35	252.55	124.55
Supplies	1,801.68	2,497.84	2,934.60
Taxes	46.40	45.49	41.63
Travel and Entertainment	153.23	166.60	177.08
Personal Injury Expense	53.25	5.25	6.00
Telephone and Telegraph	106.02	120.38	128.58
Papers and Periodicals		10.25	11.50
Unemployment Insurance Tax	645.10	361.58	341.74
General - Unclassified	110.09	65.24	351.06
Old Age Benefit Tax	195.50	225.96	262.86
Depreciation	84.96	84.96	104.07
Equipment			88.91
TOTAL	\$24,982.86	\$28,861.17	\$34,806.06

## H. AUTOMOBILES

The Ford Station-Wagon and the Ford four-door sedan furnished by Four Wheels, Inc. were operated during the entire year by the Department. A Chevrolet Station-Wagon was purchased on July 29, 1943 for additional transportation purposes for the Department.

The following table shows the mileage covered in 1943, the total mileage to the end of the year and the date the car was received in the Department:

<u>Car</u>	<u>1943</u>	<u>Miles</u> <u>Total</u>	<u>Date Received</u>
Ford Sedan	9,122	29,143	Jan. 30, 1941
Ford Station-Wagon	6,384	20,352	Jan. 24, 1941
Chevrolet Station-Wagon	3,752	5,168	July 29, 1943

## I. MINES

The following summary covers the special work done by the men in the Department during the year:

### GENERAL

The weekly inspections of soft ore mines were continued throughout the year. Owing to the amount of other work, the depleted force and frequent changes, these inspections were often interrupted, but were made as far as it were practically possible. The engineers were accompanied by the mining captain or shift boss. General geology was noted and posted on the maps, and frequent trips with the members of the Geological Department were made for more detailed work. Engineers assisted the various superintendents with their monthly and annual reports.

### ATHENS MINE

The ground settlement extended further to the East and adjacent to the houses along the South boundary. These extensions were frequently surveyed and elevations taken on the various iron pins, that had been placed for this purpose to determine whether settlement was taking place where there was no evidence on the ground. Athens house No. 5 was sold and moved off the premises in May, shortly after the cave crack appeared along the front fence of this house. The crack extended under the house occupied by the Anderson family. This house was afterwards purchased (Athens house No. 39) and was torn down in September. The Primeau house (Athens house No. 38) was also purchased. The cracks have not yet touched this building. There are two more houses owned by outside parties which are either within or close to the caving area. For the first time, cracks have appeared along the North side of the mining limits about 200' South of the dry.

The development of the ore body above the 4th Level and adjacent to the Lucky Star property made it necessary to open negotiations regarding the possible mining on the Lucky Star property. A study of the possible ore body on the boundary line was made and several estimates prepared using different angle of mining limit. The condition of the runners in the circular part of the Athens Shaft made it imperative that repairs be made. On July 7th, a single wire was hung in the North skip road to obtain measurements for aligning the skip runners. This, however, was not sufficient, and two wires were hung in the same skip road on Aug. 8th, which gave us the information needed. When the skips were realigned, pieces of heavy belting were inserted between the steel and runner to act as a cushion. This has apparently been very successful as the shaft for the rest of the year had much better alignment with much less repair. The mining in Blocks 2, 3 and 4 throughout the year was quite rapid, and as the areas in each block became much smaller, it became necessary to do crosscutting and raising from practically all of the levels. This required considerable study and planning prior to the actual drifting.

On January 1st, fire was discovered on the 635' Sub-level and the area was immediately blocked off. An estimate of the ore that would have to be left because of the fire, was submitted to the Michigan State Tax Commission on March 16th.

### CAMBRIA-JACKSON MINE

The Jackson Lease to the Republic Steel Corporation was surrendered, as of May 1st, and the Cambria Mine was leased by the Company, as of the same date. The Company took over the operation on June 1st. Throughout the balance of the year, there was a great deal of survey work needed on surface. The entire stock-

ing arrangements were revamped. The ground was filled and grades were given, as needed. A new trestle layout was designed and staked out in the field. The pocket tracks were graded and straightened for which grades and lines were given. Surveys were run on the old Lillie property for a new drainage ditch. A new timber yard was planned and grades, stakes and lines were given. A new addition to the dry was staked out.

The surveys of the Cambria and Jackson Lease had previously been based on the South quarter corner, Section 35, 48-27, as in origin, and the South line of the SE $\frac{1}{4}$ , as East and West. It was decided to put the mine on our triangulation system to conform to and because of possible connections with the Mather Mine. On July 25th, the shaft was plumbed to the 6th and 7th Levels and shortly afterwards, check surveys run on both of these levels. The shaft was again plumbed in December to the 7th Level and a check survey made on the 7th Level in accordance with the plan to connect with the 2nd Level of the Mather Mine. New underground maps are being prepared on the new survey system, but these have not yet been completed.

Prior to June 1st, monthly maps were prepared of the Jackson Lease, as operated by the Republic Steel Corporation. After this date, of course, the workings on the Cambria side were also mapped.

#### CLIFFS-SHAFT MINE

In preparation for a possible drill hole ventilation connection with the Section 9 Deposit, a surface survey was run from "B" Shaft. It will be necessary to plumb the shaft again and run a check survey to this deposit on the 10th Level before this hole can be drilled.

The Section 10 Exploration Lease will require a joint survey with the Oliver Iron Mining Company engineers to determine the South boundary for mapping purposes. It was not possible to make this survey this year, but as the underground workings are still a long distance away, there is no immediate need.

Quarterly surveys were made of the underground workings, as of March, June, September and November, and in between, frequent surveys were run for the new development drifts and raises. All drill holes were located and surveyed. A study of the water entering the mine through the old incline and No. 3 workings was made with the idea of collecting this water in a pit of the old No. 3 workings and pump directly to the surface, thus saving considerable pumping charge. It was necessary to do considerable work underground to collect this water so that it can be measured by means of weirs and to determine the feasibility of the project. This study has not yet been completed.

#### LLOYD MINE

On March 4th, the Lloyd Shaft was plumbed from the 7th to the 8th Levels when drifting started at the latter elevation. Lines and grades were given as the drift was extended to the ore body and plans prepared and lines given for development above. On the 7th Level, a new footwall drift to avoid the formation was planned and lines and grades given, as needed.

#### MAAS MINE

The extensions to the 4th and 5th Levels were planned and lines and grades given, as necessary. Early in the year, the 6th Level winze and plat were ready for the development of this level, and on March 6th, surveys were carried down from the 5th to the 6th Levels. The 6th Level was planned and lines and grades given throughout the year, as were required. Drifting was started toward the shaft on the 6th Level. At the shaft, the construction of the 6th Level pocket was supervised.

MATHER MINE

Most of the railroad tracks adjacent to the shaft were surveyed and mapped.

The shaft was bottomed on January 12th at the 7th Level, at a depth of 2350'. Drifting was immediately started on the 2nd Level (1600') and the 3rd Level (1750'). Construction of pockets and storage trenches on both levels was supervised and after drifting started, the rapid advance required frequent grades and lines on both levels. Furthermore, the location of various crosscuts and drill holes required considerable attention and study. The shaft was plumbed on June 5th to the 2nd and 3rd Levels. The proposed ventilation connection on the 2nd Level with the 7th Level Cambria-Jackson Mine required accurate surveys, and toward the end of the year, plans were made for complete check survey and replumbing of the shaft.

NEGAUNEE MINE

Very little special work of this property was done during the year as the underground property had been nearly fully developed. Drill holes were located and surveyed, as needed.

PRINCETON MINE

The levelling of the ground of the old stockpile Southeast of the shaft required new layout for stocking trestles and the permanent and temporary trestles were designed and supervised. On the North stocking ground, the old coal dock track was levelled off and two single stocking trestles were planned and staked out.

The proposed layout for the 7th Level was planned and lines given, as required, as the drifts were extended.

SPIES MINE

The finding of ore on the Northeast of the Southeast quarter of Section 24 and leasing of the SW $\frac{1}{4}$  of Section 19, 43-34, by drilling, presented a new situation as to surface surveys at the Spies Mine. A number of iron pins were set across Section 24 and on the SW $\frac{1}{4}$  of Section 19, and concreted. Surveys were run from the West line of Section 24. New concrete iron pins were also set along the North line of the Section and connected by the new surveys. Some of the new lands were mapped and surveys were run to the property corners adjacent to the SW $\frac{1}{4}$  of Section 19.

The Inland Steel Company closed the public highway along the West line of the Virgil property. The Village of Mineral Hills acquired two-thirds of the surface of the Virgil forty and a new road was constructed by the County, East of the Virgil Mine workings, outside of any possible danger of cave.

The development of the new deposit required the installation of a second skip and a rearrangement of ladder and pipe compartment in the shaft. For this purpose, the underground operations were discontinued between July 17th and October 11th. A line was dropped down the ladder road and information taken for the installation of the counterweight pipe. Plans were drawn for the pocket and the trench on the 4th Level. This work was started but not finished by the end of the year. On the Virgil property, frequent inspections were made by the Safety Department on account of fire conditions and the stopes and mining were inspected at frequent intervals.

TILDEN MINE

General operations of the Tilden Mine were watched carefully through the year and the churn drill holes located for blasts, as needed, and all blasts supervised. Plans were prepared for the new road to the 2nd Bench of the East Pit and, as constructed, grades were given and the final paving supervised, also the new road into the Mine was planned and watched, together with the new dam for collecting surface water for hydraulicing. The stripping at both the East and West Pits was estimated and supervised as work progressed.

J. MISCELLANEOUSSHAFT GAUGING

The following table shows the dates when the cage runners of the shafts at the operating mines were gauged:

<u>Mine</u>	<u>Date</u>
Mather	January 26th
Hartford #2 - Cambria	May 30th
Princeton #2 and #3	June 6th
Lloyd	June 13th
Athens	June 20th
Negaunee	June 27th
Cliffs-Shaft "A" and "B"	July 8th
Maas	July 11th

STOCKPILES

The ore in stock at the various mines was estimated and recorded, as of November 1st. The following table is a comparison of the ore in stock of Michigan Mines, as of November 1st., 1942 and 1943:

<u>Mine</u>	<u>November 1, 1942</u>	<u>November 1, 1943</u>	<u>Difference</u>
Athens	1,658	4,820	3,162
Cambria-Jackson	--	48,148	48,148
Cliffs-Shaft	90,298	87,045	- 3,253
Lloyd	168,907	105,011	-63,896
Maas	14,026	12,242	- 1,784
Negaunee	12,496	65,228	52,732
Princeton	42,669	96,430	53,761
Spies-Virgil	66,988	71,644	4,656
TOTAL	397,042	490,568	93,526

During May, Messrs. Trosvig and Stannard estimated the ore in stock at the plant of Otis Steel Company at Cleveland. Their report was made direct to the Cleveland office.

TAXES

The delinquent tax lists for the annual sale in May were checked and recommendations made concerning Company property. The 1943 tax lists for the Mining Department and Cliffs Power and Light Company lands were prepared. New printed tax receipts were made. The old forms had been so successful that it was decided, as new printing was needed, to reduce the size of the tax receipt to 9"xl2", corresponding to the annual report.

TRIANGULATION SURVEYS

The triangulation surveys in the N $\frac{1}{2}$  of Sections 1 and 2, 47-27, were completed and recorded in their final form. The Northern boundaries of the Mather and Jackson Mines were calculated and boundary line maps made for office records.

EXPLORATIONS

The surface exploration on Company lands required the locating of holes by the Geological Department. The following holes were surveyed during the year:

Holes 35 to 39 in Section 3, 47-27  
 Holes 18 - 31, inclusive, in Section 5, 47-27  
 Hole 1 in Section 19, 43-34  
 Holes 63 to 67, inclusive, in Section 24, 43-35

VENTILATION

Ventilation surveys were made in the various operating mines in February and August and the usual set of maps made, showing the courses and volumes through each of the mines. Special reports were prepared on each property for the Superintendent. These surveys were made with the Safety Department, also during the year, other studies were made of the different mines for special problems, as suggested by the Safety Department.

UNDERGROUND WATER

The elevation of the water in the test holes at the Maas-Negaunee Mines were measured monthly during the year. The following table shows the water elevation at the beginning and at the end of the year and the net difference:

Elevation of Water

<u>Test Hole</u>	<u>Jan. 1, 1943</u>	<u>Jan. 1, 1944</u>	<u>Difference</u>
W1	1242.6	1258.8	+16.2
W2	1237.0	1251.2	+14.2
W5	1246.0	1253.0	+ 7.0
W9	1266.6	1271.4	+ 4.8
W13	1313.3	1309.8	- 3.5
W14	1295.3	1295.0	- 0.3
W15	1308.1	1308.0	- 0.1
W16	1278.6	1280.0	+ 1.4
W18	1242.9	1253.6	+10.7
W20	1251.1	1262.4	+11.3
W21	1231.6	1246.1	+15.5
6A	1177.9	1180.1	+ 2.2
7	1183.8	1186.4	+ 2.6

Maas Well No. 1 pumped about 350 gallons per minute until June 15th when the motor burned out. It was idle for the rest of the year. The rise in the water levels in holes W1, W2, W5, W9 and W21 is due to the stoppage of this pump. No. 2 Well was idle at the beginning of the year, started on March 16th, and pumped about 550 gallons for the balance of the year. The influence of this pump is shown by the water level in hole W13 which went down 3 $\frac{1}{2}$ '. It is interesting to note that since No. 2 Well was put into commission in September, 1939, the water elevation in hole W13 has dropped a total of 33.2 feet. The drop this year being less than one-half of what it was last year, and only about one-third of the previous years. Well No. 4 operated throughout the year and pumped be-

tween 125 and 150 gallons per minute. Negaunee Well No. 1 operated throughout the year and pumped approximately 225 gallons per minute.

Five of the seven test holes put down at the Athens last year have filled up with sand and we have been able to get water level readings from only two, as follows:

<u>Test Hole</u>	<u>Jan. 1, 1943</u>	<u>Jan. 1, 1944</u>	<u>Difference</u>
104W	1292.6	1292.6	0
105W	1297.1	1297.6	+0.5

Well No. 2 superseded Well No. 1 during the year and has been pumping about 50 gallons per minute, and apparently had very little effect on the water elevations in the test holes.

Our records of water on the different levels at the Maas-Negaunee Mines are incomplete, and it is impossible to make any comparison from our records with last year.

#### OFFICE HOURS

The office hours were from 8:30 to 12:00 Noon and 1:15 to 5:00 P.M., except Saturday when the office closed at 12:00 Noon.

#### HOLIDAYS

The following holidays were granted during the year:

January 1st	New Years Day
July 5th	Independence Day
September 6th	Labor Day
November 25th	Thanksgiving Day
December 24th	Christmas Eve ( $\frac{1}{2}$ day)
December 25th	Christmas Day ( $\frac{1}{2}$ day)
December 31st	New Years Eve ( $\frac{1}{2}$ day)

*Carl Orsawa*

Chief Mining Engineer

CB:el

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

ATHENS MINE

New drum spiders were installed on the skip hoist in January. The old spiders were loose on drum shaft. Safety guards were placed over the indicator gears of the skip hoist, necessary on account of the change in drive for indicator after the spider change. A foundation bolt broke on the brake pedestal of the skip hoist in June and repairs made by welding a threaded stub to the broken bolt.

A crew was busy most of the month of August tightening and relining steel sets in circular part of shaft. The two bad spots were improved so that skip speed could be increased to 1300 F.P.M.

In the headframe the steel supporting the top tram tracks was in poor condition. It was replaced on week-ends so as not to interfere with hoisting operations. A new 8'-0" head sheave was installed in February to replace a sheave that had a loose axle. A new axle was pressed into the old sheave and the sheave stored at the mine for a spare.

A new water cylinder for the underground pump was received and installed in February. An automatic water level control was installed on the #2 surface well in June.

A test is being made by the Standard Oil Co. on hoisting rope lubrication. An oil pump was installed on the head sheave deck and operated from a connection on the sheave axle. It operates only when the skips are in motion and can be adjusted to feed any required amount of oil. The test was started in October with Standard Oil Co's. Stanogear leaded lubricant #1-X. The result of this test can not be determined until the ropes are taken off.

In December a rebuilt intercooler was installed in the Ingersoll-Rand compressor to replace the old one which was leaking badly.

CAMBRIA-JACKSON MINE

The operation of this mine was taken over from Republic Steel Corporation on June 1st.

The clean water pump, in poor condition, was taken to the General Shops in June and a set of coils ordered for the motor which was burned out. All necessary repairs to pump and motor were completed in July, when the pump was put in operation. The water from this pump was condemned for drinking purposes so water from the city system is now being used.

The Aldrich triplex pump on the 7th level was in poor condition. It was necessary to operate this pump with two plungers while repairs were being made to the third. This reduced operation continued during June and July, when repairs to plungers and water cylinders were completed.

The fire-box in dry heating boiler was in such poor condition it required a complete overhaul. Due to additional steam needed in the headframe and change house, a used boiler was purchased in August from Nelson Machinery Co. of Green Bay. This boiler was received in October and was installed with the stoker used on the old boiler and put in operation in November. The old boiler was repaired and shipped to the Holman-Cliffs Mine to be used in new truck garage.

New steel liners were installed in the west head sheave in June.



MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

CAMBRIA-JACKSON MINE (Cont'd.)

The headframe at this mine is in poor condition. Repairs could not be made until shipping season, when the broken I-beams supporting the Larry car track were replaced in August and September. The Ferro-bord sheeting to enclose the headframe from landing to sheave deck will be completed in January.

In July one Larry car was completely rebuilt as it was in bad shape.

Changes to the dry were started in August and the heating system was about completed by January. Shower bath room, lockers in the clean clothes room and the ventilating fans in the dirty clothes room are operating. In the surface dry, heating system is completed, dirty clothes racks are in and sewer lines completed. A new steam line was installed from the dry to shops and headframe. A small boiler is being installed in basement of engine house to heat this building, eliminating a long steam line from shops to engine house which was in poor condition.

The discharge valves in the Ingersoll-Rand compressor were in poor condition. A reseating tool was secured from the I.R.Co. to make the necessary repairs which were completed in December.

A short steel trestle to cross the pocket tracks to the north side stocking ground was built at the General Shops and erected at the mine in November.

CANISTEO MINE

Pit operations on ore started May 10th and closed October 30th, with a concentrate tonnage for the season totaling 585,016. Only two shifts per day and six days per week for most of the season were required to secure this total. The rest of the year was needed to strip the ore along south bank in preparation for next season's operation. During January the extreme cold weather caused excessive breakage on both 85-B shovels, but with milder weather in February only one dipper bail broke. In March Shovel No. 48 carried on stripping while No. 49 was overhauled, with crews working three shifts per day. This repair work was delayed due to slow delivery of repair parts from factory. By the middle of April No. 2 shovel was completed and carried the load while No. 1 was repaired, but both were finished by the start of ore season.

In the Washing Plant new 4" x 6" angles replaced the badly worn ones in logs of 25 foot log washers, the Symonds crushers were overhauled and a new vulcanizer made all 36" conveyor belts endless, eliminating wear due to steel belt fasteners.

To uncover ore needed for next season it was necessary to lower the water in pit sump. The present pump of 1500 G.P.M. had reached its limit in head so it was replaced by two 1250 G.P.M. units, each equipped with a 150 H.P. motor and good for a head of 370 feet, which is the bottom of the ore body. No further change in pumps is now needed until the pit is exhausted.

The tailings basin was almost filled by November, when the three low sides were built about 20 feet higher with stripping material from pit, hauled and packed down on the banks with eight 15-ton Euclid trucks. One tailings sand pump developed a blister on propeller in September. The load was shifted to the second pump and blister repaired with no delay. It is planned to move this tailings pump station to a location near the washing plant and eliminate the pumpmen by letting the plant crew look after them. This means a saving of at least \$2,000 per year.

CLIFFS SHAFT MINE

In January the cast iron sump on the condensate pump in the change house cracked and repairs were made at the General Shops. Also in January the A shaft skip dump was repaired.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

CLIFFS SHAFT MINE (Cont'd.)

A new deflecting sheave on the skip hoist rope in B shaft was installed to replace a sheave which had several loose spokes. In February the timber supporting this deflecting sheave was replaced with steel, the old wood supports being in poor condition.

A new chute was installed in the crusher building between the crusher and screen in January. A new mantle was installed in the #8 crusher in July to replace the old badly worn and cracked one. Some experimenting was undertaken in the crusher building in rock picking and screening. A 4' x 10' vibrating screen which was on hand was tried out but proved too light to handle this ore. The rock picking belt was rebuilt in December. The stairs in the crusher building were relocated and changed to standard tread. They were too steep and this improvement was needed.

A new stiff leg was installed on the A shaft trestle to add support where the bank was settling and pulling the trestle out of line. Some repairs were necessary to the B shaft trestle near the headframe.

During April the brake bands on A and B shaft hoists were repaired with new end lugs, adjusting screws and nuts.

A new Goulds centrifugal pump was received in May with capacity of 600 GPM against 1000' head, size 4-4S, figure 336, RPM 3550, Serial #258A525, with 250 H.P. motor. This pump installation and wiring was completed in July and the pump put in operation in September.

Additional counterweight was installed at A shaft in March, increasing total weight to 11,240 pounds.

New doors were installed on B shaft cage to replace the old worn one. New bearings and wearing shoes were installed on B shaft skip in October.

In the bit shop an Ingersoll-Rand hot mill for sharpening jack bits was installed in April, together with the necessary furnaces and equipment for heating and tempering. A bit is sharpened about every 15 seconds.

The railroad car spot hoist which was in poor condition was rebuilt at the General Shops and put in operation in June.

The Ingersoll-Rand cooling water pump was moved from the engine house basement and installed in a small pump house on the lake shore.

GENERAL SHOPS

A used locomotive type boiler was purchased from Copper Range Railway Co. for heating the shops as the old boiler was too small. It was installed in a new room just north of the electric shop. The boiler room floor is about 8 feet below shop floor, with top of coal bin level with the ground and coal can now be dumped direct from truck to bin.

Work was started on the new change house in October and the walls and sheeting on the roof are completed. Roofing will be put on as soon as weather permits.

A 20" lathe from the Cambria-Jackson was moved to the shops. A used steam hammer was purchased from S. Mayer of Chicago for the blacksmith shop as the old hammer is worn out.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

HILL-TRUMBULL MINE

The washing plant started May 8th on basis of three shifts per day and six days per week and closed October 31st, with total concentrate for season of 871,229 tons. The retreat plant required some changes during the season, but lost very little time and completed its season November 6th with a concentrate total of 281,467 tons. Due to the heavy stripping program needed to uncover the ore the shovel and truck crews lost no time for the year.

The crushing and screening plant in pit worked satisfactorily with exception of 48" pan conveyor loading fines under the screen to 36" conveyor belt. The links and pins are too light to last a full ore season and a heavier conveyor may be needed to offset this wear. After ore season the Ross chain feeders showed bad wear which is being repaired. Due to cold weather in January the main crawler frame on one side of No. 35 shovel broke and had to be welded. No. 34 shovel carried on ore stripping and No. 35 was brought to shops for an overhaul, which was completed by March 20th. By this time No. 34 was ready for an overhaul in the shops, which was completed in April.

On receipt of tender wheels, repairs to old locomotives sold to Hyman Michaels Co. were completed and machines shipped. Other second hand equipment sold during the year were the two Jordan spreaders. The 350 ton Marion steam shovel in pit equipped with 6 ton dipper was scrapped and sold to Duluth Iron & Metals Co. It was removed during November and December. The only parts the company retained were the 175 H.P. boiler, 10 ton trolley and two lighting generators.

Due to savings possible with electric haulage over steam the second hand electric haulage equipment formerly used at the Wabigon Mine was purchased from M. A. Hanna Co. and track electrified from conveyor belt discharge pocket on south side of pit to crude ore receiving pocket at washing plant. Due to scarcity of labor this installation was not completed until September but the two months the two 45 ton electric locomotives and 4 car trains were used proved they will show the savings anticipated. The main items included in this purchase were 3 - 45 ton General Electric locomotives, a 300 K.W. synchronous converter set complete with substation and switchboard to tap the 20,000 volt transmission line. Wooden poles and some trolley wire with fittings were bought new. To prepare for an emergency a second 300 K.W. converter set was purchased second hand from Butler Bros. and set in substation house ready to operate.

Due to stripping in the pit where the deep well pump was formerly located contract for \$16,000 was given to Layne-Northwest Co. to move the pump to new location and place it in good condition. This work was completed and pump started in May. The new hole made only 500 GPM instead of the 1000 GPM anticipated and the pump discharge had to be throttled. As the water carried considerable sand the new bowls wore out during May and June. A smaller bowl of 500 GPM was bought but due to delay in delivery it was necessary to install a temporary pump in pit to hold the water low enough to continue ore loading. On receipt of new pump bowl the deep well pump was again placed in commission and has given no further trouble.

The Fairbanks Morse conveyor belt scales gave some trouble but after the factory expert had overhauled them their readings were accurate and operation satisfactory.

Some changes were necessary in the retreat plant. Power curves taken on 66" classifier proved the 15 H.P. motor too small. A 50 H.P. motor was ordered and the classifier will be reinforced to take the heavier load.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

HILL-TRUMBULL MINE (Cont'd.)

Equipment has been purchased to pump the tailings from washing and retreat plant to new location 4000 feet to the southwest. This installation will be completed before 1944 ore season starts.

HOLMAN-CLIFFS MINE

The iron ore concentrate for the year totaled 1,085,689 tons with the washing plant starting on May 12th and closing November 3rd. During January stripping was continued on the Bingham and North Star 7 days a week but many break downs and delays occurred on No. 51 shovel due to cold weather. In February the boom cracked on this shovel and it had to go to the shop for an overhaul while 120-B shovel No. 32 continued the stripping. A Marion Shovel Co. man reinforced the boom on No. 51 shovel while the shop crew made other repairs. As No. 32 shovel was in poor shape the No. 47 Marion shovel from Hill-Trumbull Mine was shipped into pit and assisted until the end of April, when it was moved to Hill-Trumbull concentrate stock pile to load out ore. As soon as No. 51 shovel repairs were completed in March it returned to pit stripping and No. 32 shovel was overhauled at the shops. As the pit sump had to be lowered to eliminate surface water on top of ore body a second 40 foot deeper sump was dug to the east of the old one and the floating pump scow connected up. Until this sump was completed the wet ore caused trouble and delay both to shovels and trucks. In June a new Bucyrus 54-B 2½ yard diesel driven shovel was received and operated in the wet bottom most of the time.

As the steam locomotives needed an overhaul all of them with exception of #106 were shipped to the Hill-Trumbull shops, the small locomotive shed being reserved for the repair of 30 yard cars and trucks. The 15 ton Euclid trucks belonging at the mine were needed on ore for the summer and it was necessary to rent six additional trucks in August to keep up with the stripping.

In September the 4,000 GPM Ingersoll-Rand centrifugal pump wore out an impeller and to save the pit from flooding a 2000 G.P.M. 200 ft. head centrifugal pump was trucked from Ishpeming. The Ingersoll-Rand pump will be overhauled and used to drain the Deane Mine in 1944.

At the washing plant a serious accident occurred to a new 36" conveyor belt on the third day of operation in May. A short piece of 40# scrap rail in the crude ore caught in the chute and cut the 36" belt in two lengthwise about 22" from one side. An old belt from Hill-Trumbull was substituted until the new belt could be repaired with patch plates. No more trouble was experienced for the rest of the season after the new belt was put back on in June. This fall the patch plates showed thin and will have to be replaced or it may be better to buy a second hand piece of belting for this location.

Plans were completed and approved in the fall for a new garage repair shop and an experimental laboratory to be located east of the present locomotive shed on land belonging to our company. The concrete foundations were poured and a contract for shop given to the Polaris Concrete Co. of Duluth, Minnesota. At the end of the year the steel work was up and the concrete blocks being laid for repair shop. So far it has not been possible to secure the steel building for the laboratory.

At the washing plant it was necessary to overhaul the 8 ft. pan conveyor after shipping season closed. From past experience it has been found this conveyor has to be rebuilt after carrying five million tons crude ore and that the rebuild costs about \$6,640.00.

In December a new Bucyrus 120-B electric shovel No. 57 was received, erected and started working on stripping. This will relieve the heavy work on the lighter machines.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

LLOYD MINE

In January a new pilot valve for the unloader on the Sullivan air compressor was installed to replace the old one which was in poor condition. The Ingersoll-Rand compressor motor was taken to the shops in January for repairs to a bearing. The carbon was cleaned from the Sullivan compressor in June when the valves were also inspected and repaired.

In February a new head sheave was installed on the north skip to replace a sheave with loose axle. The old sheave was repaired and kept for a spare.

The worn pinion on the north tram plant was replaced by a new one in March.

The stoker for the heating plant boiler in the dry was completely overhauled in August as it was in poor condition.

The threads on the upper end of crusher head shaft were in poor condition. A new type nut was purchased, the shaft taken to the general shops and rethreaded to fit new nut.

In September the countershaft on the skip hoist broke and a new one was made at the shops with no hoisting delay.

The chutes below the butterfly in the head frame are in poor condition and steel is being prepared at the shops to make necessary repairs.

MAAS MINE

In January, due to base cracking on air brake lever support on the skip hoist, it was necessary to reinforce the base with anchor bolts and an additional layer of reinforced concrete.

In February the old steam lines for turbine in the engine room were removed.

A new 8'-0" sheave was installed in the headframe for the north skip. Two new 8'-0" sheaves were received in October. On account of the above trouble the axle diameters were changed from 6" in hub to 7-27/32" and bearings from 5-31/32" to 6-15/16".

The 800 GPM 1200 ft. head Alberger centrifugal pump on the third level was in such poor condition it was scrapped. It will be replaced with an Aldrich triplex pump purchased from the Calumet and Hecla Co.

In July the axle in the north skip sheave broke, causing the rope to come off the sheave and break. The skip dropped to the bottom of the shaft and was completely wrecked. A new skip was built at the shops for spare.

On February 7th a new pump for circulating the solution was installed for the skip liquid rheostat.

The #2 well pump was put in operation in March after being closed down for repairs.

Repairs were completed on the grizzly and chutes at the crusher plant in May.

The 12" counterweight pipe was extended from 5th to 6th level in June.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

MAAS MINE (Cont'd.)

The Allis-Chalmers centrifugal pump on the 3rd level was completely rebuilt in July. A connecting rod strap on the 5th level Aldrich pump broke in August. Repairs were made at the general shops.

The hot water heaters in the dry gave some trouble due to sand in clean water supply. A temporary heater was installed and new coils ordered to repair the old heaters.

MATHER MINE

The pinion shaft bearings on the skip hoist were dowel pinned in January. The skip ropes were put on the hoist and the skips added. A few minor changes were necessary on the skips and dumps. The north skip was put in operation and the first skip of rock hoisted at 2:30 P.M. on February 9th. The south skip was used as a counter-weight until February 18th, when the first skip of rock was hoisted on that side.

In April the main bearings on the skip hoist motor-generator set burned out due to the failure of the cooling water supply. The bearings were sent to Milwaukee, rebabbitted and installed in the set in May, when the skip and cage hoists were switched back to the skip hoist motor-generator set.

The piston rod on the south grizzly air cylinder broke in testing and a new solid one was installed. Coil rebound springs were installed on the grizzly bars in headframe.

In March 10 Lake Shore Engineering Co. underground cars were received. Five new 90 cubic foot underground low head tram cars were received from the Pressed Steel Car Co. Also in March two Type 125 Conway underground loaders were received. The frames on the underground locomotives were shortened to allow lowering into mine on the cage deck. Four locomotives and two extra batteries were taken underground during April, two on the 1600 foot and two on the 1750 foot levels.

One Larry car was received, hoisted on trestle and put in service in May. These Larry cars have given considerable trouble due to poor brakes and poor design of trolley system. Arrangements were made with the Lake Shore Engineering Co. to change the present power brakes and also add a hand brake to each car. The cab entrance of the car is also being changed from side to rear for additional safety.

The water jacket on the low pressure cylinder on the #1 Ingersoll-Rand air compressor cracked in June and a new cylinder purchased and installed. The old cylinder has been repaired and stored as a spare. A new cooling water tower south of the engine house was completed and put in operation in October.

The installation of the 10" pump discharge piping in the shaft was completed in July. The #1 Aldrich pump installation was completed in October. Pipe connections to the main discharge line were completed and pump put in operation in November. The #2 pump is now being installed.

A new motor driven Canedy-Otto drill press was installed in the machine shop during October.

A triplex pole pump having a capacity of 350 GPM and 1000 foot head was moved from storage at Republic Mine to the general shops. After overhauling, this pump will be used at bottom of shaft to pump shaft water to new pump station on 1750 foot level.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

NEGAUNEE MINE

An alarm was installed between engine house and #2 shaft ventilation system that notifies the floor engineer if steam pressure at fan house drops below 5 pounds. The low pressure occurs if safety pin is sheared in stoker due to tramp iron in coal. By catching this trouble in time the system will not freeze up and cause trouble. Some leaks in the steam piping were repaired in September.

In February the pinion on the north tram plant broke. It was replaced with a spare from stock and new pinion purchased.

Some repairs were necessary on the steel stocking trestle. Cross members supporting the track were broken and repairs were made in April. In November this trestle again broke in another place. Steel has been ordered to make permanent repairs in the summer of 1944.

A new crankshaft was installed on pump #3248 on the 13th level in May. In November a spur pinion on the 12th level Aldrich pump broke and was repaired by building up the broken teeth. A new herringbone gear and pinion has been ordered to replace the present spur gear and pinion which are in poor condition.

Due to burned field coils in exciter of Ingersoll-Rand compressor in October it had to be taken out of service for general repairs. It was replaced with old Nordberg compressor exciter from Lake Mine storage.

The #2 heating boiler in the dry is in poor condition. The mud ring and both sides and end plates are being replaced for a height of 8".

PRINCETON MINE

A safety guard across the state highway that prevents the hoist ropes at #3 shaft from dropping across the road was installed in January.

The 500 GPM 500 foot head Allis-Chalmers centrifugal pump gave some trouble in January. New impellers were ordered, received and installed in March.

The #3 steam shovel boiler was used to thaw ice in #3 shaft in March. In June two tubes were replaced in #8 shovel. This shovel boiler is now being used to thaw ice in #3 shaft.

In March screens were placed on all windows and doors at #2 and #3 engine houses.

A new 6" discharge line was installed in #2 shaft from 5th level to surface in May. Also added a new set of brake blocks to #2 hoist.

A safety guard was installed over the coupling on the underground haulage set at #3 engine house in May.

Repairs to the 20,000 cubic foot fan from the Cambria-Jackson Mine were completed in December and fan shipped to the Princeton Mine.

The air pressure was raised from 80 to 90 pounds in June. The pressure will be lowered again as soon as the drift is completed between #2 and #3 shafts. The Ingersoll-Rand compressor formerly used at the Ropes Gold Mine was moved to Princeton #3 engine house in July.

A new 8 foot steel lined sheave was installed on the headframe at #2 shaft east skip.

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

SPIES-VIRGIL MINE

In March new clearance valves were installed in Ingersoll-Rand compressor. All water lines from tank to pumps and compressor in cooling water system were replaced in July as they were in poor condition.

Compressor panels were moved to make room for new location of door and new hoist installation.

A new bearing cap was installed on crusher drive shaft in March. This crusher was put in operation on October 16th after general wiring and repairs were completed.

From June to October the following changes and repairs were made in the head-frame. Erected a steel A-frame on top of shaft house to handle 8'-0" sheave. The head-frame was originally arranged for one skip and cage. To change it for two skips and cage it was necessary to install two new sheave girders, install four new head sheaves, two new skip dumps, new grizzlys, new chutes from grizzly and crusher to landing and railroad pockets. Also installed new butterfly stoppers and air cylinders, new air operated chute stoppers, new steel in landing deck and new channels for attaching skip and cage runners. Also enclosed headframe from landing to sheave deck. The pulley stands were rebuilt for four ropes. Installed Wellman-Seaver-Morgan hoist formerly used at Mackinaw Mine for cage hoist. Also installed new 10" counterweight pipe in shaft.

TILDEN MINE

In January a new cast steel frame was ordered for 10" Allis-Chalmers crusher #8067. New concaves were installed in this crusher in June. The new steel frame was installed in December. After inspection by Major Knight of the Allis-Chalmers Mfg. Co. it was decided to ship the two broken 10" main frames to Milwaukee as scrap in order that the maker can check broken sections to improve design and also make chemical analysis of material. On completion of test the company will advise credit they can offer. This main frame gave low crushed tonnage before breaking.

The concaves in the west 10" crusher were turned in June. New upper and lower mantles were installed in the west crusher in August.

The following repairs were completed in February. Cleaned car dump motor, built up drum and changed oil in gear reducer, repaired grizzly and chutes. On belt conveyor, cleaned motor and changed oil in gear reducer.

In March on #29 shovel, the center casting was riveted to main frame; repaired dipper; cleaned collector rings and installed 12 new insulators; repaired controller and installed new brushes and bearings in generator set; new wabblers shaft and pinion installed. In September the caterpillar side frame broke and was repaired by electric welding.

On #31 shovel: In March new sprockets were added on the caterpillars and repairs made on dipper and sticks. In April repaired cab, installed new ventilator, cleaned and repaired air compressor, cleaned and renewed brushes in generator set. A new rotating pinion was installed in June.

On #52 shovel: Repairs were made to dipper and a complete new set of contactors were put on. In April installed new rotating pinion and new shaft in boom point sheaves. In March two new bearings and springs were installed in #3 locomotive and new bushings in connecting rods on #4 locomotive.



MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

TILDEN MINE (Cont'd.)

In March rebuilt forging and hardening furnaces in bit shop. In July a new radiator was installed on the #1 Euclid truck to replace one broken by a rock falling from the shovel dipper.

In September the outboard bearing on countershaft of 42" crusher burned out and was repaired in place.

A new macadam road from crusher house to lower bench in west pit was completed in October, as well as a new road to upper bench in east pit. New trucks will be purchased ready for an all truck operation next season.

651

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

COMPARATIVE TABLES

<u>YEAR</u>	<u>TONS ORE AND ROCK HOISTED</u>	<u>CU. FT. AIR USED</u>	<u>CUBIC FT. AIR PER TON HOISTED</u>	<u>GALLONS OF WATER PUMPED</u>	<u>G.P.M.</u>
<u>CLIFFS SHAFT MINE</u>					
1934	235,639	394,168,500	1,672	348,670,324	
1935	288 053	516 140 000	1 791	366 504 523	692
1936	484 310	907 194 000	1 873	389 395 743	739
1937	579 759	1,102,635,000	1 901	370 765 799	705
1938	352 983	735 452 000	2 083	362 700 824	689
1939	415 682	790 875 000	1 902	363 540 036	693
1940	573 487	1 053 990 000	1 837	362 590 686	686
1941	677 249	1 218 780 000	1 799	343 850 964	655
1942	733 970	1 223 325 000	1 666	339 185 356	643
1943	669 300	1 368 045 000	2 044	376 325 326	718
<u>ATHENS MINE</u>					
1934	166,412	334,485,000	2,009	179,244,454	
1935	205 683	527 355 000	2 561	154 911 562	292
1936	318 604	698 985 700	2 193	134 999 491	255
1937	455 512	884 565 000	1 941	134 521 343	257
1938	276 800	643 005 000	2 322	165 316 266	313
1939	416 225	819 405 000	1 968	173 774 003	331
1940	526 456	1,196,505,000	2 272	185 418 833	351
1941	638 178	1 350 945 000	2 116	185 835 174	354
1942	699 590	1 351 440 000	1 931	204 553 558	387
1943	532 590	1 013 220 000	1 902	195 041 792	372
<u>MAAS MINE</u>					
1934	294,372	601,920,000	2,044	550,020,020	
1935	370 399	686 520 000	1 853	597 349 626	1,129
1936	549 615	897 919 800	1 634	674 397 310	1 279
1937	784 328	1,251,710,000	1 595	686 467 622	1 307
1938	438 359	742 635 000	1 694	752 268 448	1 429
1939	528 389	1 005 165 000	1 902	726 916 014	1 386
1940	709 755	1 288 665 000	1 815	710 849 782	1 346
1941	849 963	1 646 145 000	1 936	595 239 587	1 135
1942	894 045	1 703 655 000	1 905	553 194 582	1 049
1943	782 074	1 916 100 000	2 450	575 868 620	1 098
<u>NEGAUNEE MINE</u>					
1934	240,808	437,985,000	1,818	435,724,897	
1935	311 446	481 680 000	1 546	485 600 207	918
1936	530 844	737 716 000	1 389	483 287 423	916
1937	839 283	1,096,200,000	1 306	562 290 718	976
1938	439 588	771 210 000	1 754	534 118 975	1,015
1939	577 510	1 026 945 000	1 778	532 642 228	1 015
1940	890 598	1 296 675 000	1 455	377 169 929	714
1941	1,077,854	1 500 165 000	1 391	338 385 511	644
1942	1 128 737	1 432 260 000	1 268	345 945 101	656
1943	978 130	1 137 375 000	1 162	401 169 615	765

652

MECHANICAL DEPARTMENT  
ANNUAL REPORT  
YEAR 1943

COMPARATIVE TABLES

<u>YEAR</u>	<u>TONS ORE AND ROCK HOISTED</u>	<u>CU. FT. AIR USED</u>	<u>CUBIC FT. AIR PER TON HOISTED</u>	<u>GALLONS OF WATER PUMPED</u>	<u>G.P.M.</u>
<u>LLOYD MINE</u>					
1934	136,951	145,926,000	1,065		
1935	248 410	289 426 500	1 165		
1936	377 572	383 994 000	1 017		
1937	545 274	559 512 000	999		
1938	286 864	293 247 000	1 022		
1939	323 639	273 042 000	843		
1940	487 287	398 308 500	839		
1941	572 778	534 456 000	933	40,031,200 (10 MO.)	91
1942	588 749	588 451 000	999	39 486 100	74
1943	531 260	525 280 500	988	65 024 800	124

TILDEN MINE

1934	167,688
1935	190 511
1936	291 341
1937	305 418
1938	85 889
1939	170 276
1940	205 612
1941	302 943
1942	235 207
1943	139 991

PRINCETON MINE

1942	83,918				
1943	248 845	490,680,000	1,971	109,444,342	250

(Air and water figures are for last 10 months of 1943)

MATHER MINE

1943	29,517	(First hoisting in September)
------	--------	-------------------------------

CAMBRIA-JACKSON MINE

1943	155,513	216,657,000	1,393	123,714,000	431
------	---------	-------------	-------	-------------	-----

(This mine operated by The Cleveland-Cliffs Iron Co. from June 1, 1943 and the above figures are for the last 7 months of the year only.)

653

THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

During the year 1943 continuation of heavy iron ore production and affiliated industries, together with increased residential and commercial demands, resulted in an increase in sales of electric energy of approximately 3%. This increase was accompanied by a corresponding increase in gross revenues of approximately 2.8%. Transmission and distribution losses necessary to furnish the 98,917,910 KWH which were sold necessitated an input to the transmission system of 109,441,600 KWH. Of this amount 101,041,600 KWH were generated in our own plants and 8,400,000 KWH were purchased from outside sources. This total generation is an increase over that of 1942 of approximately 3,300,000 KWH and is practically equal to the amount that the energy supplied to the transmission system this year exceeded that supplied to the system last year. This, of course, leaves the amount purchased during the two years from outside sources approximately equal.

At the beginning of the year there was considerable snow on the ground which had resulted from heavy snowfalls during the latter part of November and December of 1942. This snowfall resulted in a good run-off during the year and all reservoirs were filled in the spring, even though the total precipitation during the calendar year 1943 was slightly below average. There was no heavy precipitation during the fall and there is comparatively little snow on the ground at the beginning of 1944 so that it has been necessary to purchase power continuously to the end of the year and will be necessary to continue these purchases until the spring break-up of 1944.

The start of 1943 found us with the McClure Plant completely shut down due to the failure of the steel penstock at a point approximately one-quarter of a mile above the plant, which failure occurred December 20, 1942. This penstock was not repaired until January 5, 1943 and continuous service through the pipe line was not obtained until the latter part of the month due to leaks which continued to develop in the wood stave portion of the pipe line. During the month of January the Michigan State Police made a thorough investigation of the break and the circumstances surrounding it and submitted a report to the effect that there was no sabotage connected with the failure. The final conclusion of those familiar with the failure of the pipe was that it was caused by undue strain placed on the pipe due to deterioration of wooden blocking placed under the pipe at the time it was constructed.

Both hydraulic units at the AuTrain Plant were completely overhauled during the year. Work on the #1 unit was started during January and was carried on from time to time during the succeeding months whenever the water situation in the AuTrain reservoir was such that one unit could be removed from service without causing loss of water over the retaining dam. This was the first time that these units have been overhauled in many years and it is felt that they are now in condition for continuous operation for a long period.

During the month of March the company had a fatal truck accident when our truck #25 collided with a passenger car near Wetmore. None of the occupants in our truck were injured, but the accident resulted in injuries to Reynold Miron, his wife and 10 year old son. The child was so severely injured that it later died in the hospital at Munising. This accident was turned over to the Aetna Casualty and Surety Company for settlement but up to the end of the year we have received no notification of final settlement by that company.

Mr. F. C. Stanford, who for many years had been electrical engineer for both our company and The Cleveland-Cliffs Iron Company, retired in the early part of 1943 and on April 14th Mr. E. D. Cory came with the company to take over the duties of Mr. Stanford. Mr. Cory's work has been very satisfactory and we feel that he has been a welcome addition to our engineering force.

THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

During May a severe leak developed in the Silver Lake storage dam which was being operated and maintained by the City of Marquette. This leak was causing spillage of water into our Hoist reservoir, which at that time was overflowing, and was resulting in loss of stored water which we ultimately could have used to increase our generation at the Hoist and McClure plants. Since the City of Marquette refused to repair the leak, we made temporary repairs with our own crews and immediately instituted proceedings to acquire control of that dam. After much negotiation with the City of Marquette and with the Longyear Estate, the City of Marquette finally turned the dam over to us during August. Immediately after this resolution was passed by the Marquette City Commission we proceeded to construct a road to the dam site and to drain the lake so that during the winter months we could construct an adequate intake on the dam which would permit complete repair during the summer of 1944. After consultation with Mr. McClure it was decided that raising of the dam approximately 6 feet was advisable and the construction of the intake will be made of sufficient height to permit this increase when repairs to the dam are made. The end of the year found this work progressing well in that the road had been constructed and graveled, the lake drained and excavating for the intake has been started on the up stream side of the present dam.

For the first time in a number of years the intake tunnel between the Hoist dam and the steel penstock to the plant was thoroughly inspected. It was found that though this tunnel was lined with concrete at the time of its construction, the concrete had deteriorated badly and was permitting a certain amount of rock and concrete to be washed from the walls and subsequently into the turbo units. This constituted a hazard to the units but at the same time it was realized that under the present load conditions it was impossible to reline the tunnel. Accordingly, a rock trap was built near the junction of the tunnel and the steel penstock to catch such debris as washed down the pipe. This trap was very successful and after its installation we have experienced practically no trouble from the rocks which had previously caused a continual source of annoyance and hazard.

On June 8th an independent logger by the name of Otto Christensen dragged a log jammer into the 60 Kv transmission line between Munising and Senev and was electrocuted. Settlement of this claim was turned over to the insurance company, who were later notified by Mrs. Christensen's attorney that they claimed damages on account of this accident. This claim was settled by the insurance company soon thereafter for the nominal sum of \$500.00.

During the first part of July 1943 we received a notice from the National Labor Relations Board that a petition had been received from the United Steelworkers of America of the CIO asking for an election for a certain portion of the employees of The Cliffs Power & Light Company to determine whether that union constituted a proper bargaining agent for those employees. A meeting was held with the Board on July 10th and the company was told that the Board would not grant the petition since, in the Board's opinion, the petition was improperly drawn in that it covered only a "portion" of the company's employees. This matter was discussed from time to time after this meeting but the ultimate decision of the Board was the same as that indicated in the July meeting, and since the United Steelworkers of America did not file a revised petition the election was denied and the matter has not been brought up again.

Starting in September Mr. H. J. Adams, a former employee of The Cleveland-Cliffs Iron Company and a member of the Ishpeming City Council, started an active campaign against the retail rates of the Michigan Gas and Electric Company in Ishpeming, and filed a report with the City of Ishpeming stating that those rates were too high. This report stated that a contributory cause of the rates being excessive was the excessive wholesale power rate charged to the retailing company by our company. After filing the report Adams continued to be active in this rate agitation and during November succeeded in getting permission of the councils of Ishpeming, Negaunee and Munising to retain Dr. John Bauer of the American Public Utilities Bureau to make a report on the

THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

earnings and justified rate structures of both the Michigan Gas and Electric Company and The Cliffs Power & Light Company. Dr. Bauer visited Ishpeming and talked to the representatives of the combined councils during October and again in November. At the latter meeting he actively started assembling data for his report, which he anticipated would be given to the councils during the following January.

The work of placing a concrete covering over the wooden penstocks for both the McClure and Carp pipe lines was completed in the fall of this year. This work had been started experimentally in 1930 but not until 1937 was it decided to completely encase both lines. In 1940 two crews were placed at work, one on each of the two pipe lines, and this speeded up the rate of progress to such an extent that we were able to complete the entire work during 1943. After having had sections of this pipe in service for two winter seasons it was found that considerable spalling occurred unless the pipes were completely covered with earth. Accordingly, as much pipe has been so covered as is possible and at the end of the year both concreting and back filling the pipe has been completed on the Carp pipe line. However, there are still several months of back filling to be done on the McClure line.

THE CLIFFS POWER & LIGHT COMPANY

STATISTICAL DATA - 1942

	KILOWATT HOURS GENERATED & PURCHASED								STATION USE	DELIVERED TO LINES	KWH SOLD	TRANSMISSION LOSSES	
	McCLURE	CARP	HOIST	AuTRAIN	REPUBLIC	ESCANABA	PURCHASED	TOTAL				KWH	%
Jan.	2,094,000	1,994,000	1,594,000	460,000	155,000	374,000	871,000	7,542,000	23,350	7,518,650	7,002,791	515,859	6.86
Feb.	4 155 000	2 080 000	1 465 000	311 000	122 000	278 000	0	8 411 000	21 180	8 389 820	7 583 783	806 037	9.60
Mar.	4 212 000	1 761 000	1 415 000	321 000	103 000	292 000	6 000	8 110 000	20 100	8 089 900	7 405 985	683 915	8.45
Apr.	3 758 000	1 970 000	1 237 000	627 000	259 000	794 000	13 000	8 658 000	20 310	8 637 690	8 024 357	613 333	7.10
May	4 063 000	2 586 000	1 209 000	664 000	266 000	936 000	15 000	9 739 000	18 540	9 720 460	8 761 035	959 425	9.87
June	4 585 000	1 717 000	1 528 000	691 000	284 000	835 000	20 000	9 660 000	19 120	9 640 880	8 724 924	915 956	9.50
July	4 914 000	1 596 000	1 709 000	627 000	188 000	615 000	14 000	9 663 000	18 350	9 644 650	8 638 158	1,006,492	10.43
Aug.	4 805 000	2 422 000	1 659 000	597 000	90 000	242 000	2 000	9 817 000	19 630	9 797 370	8 747 192	1 050 178	10.71
Sept.	4 289 000	2 170 000	1 513 000	316 000	44 000	227 000	1,119,000	9 678 000	19 460	9 658 540	8 598 967	1 059 573	10.97
Oct.	3 454 000	1 969 000	1 226 000	351 000	24 700	238 000	2 131 000	9 393 700	19 140	9 374 560	8 596 959	777 601	8.29
Nov.	3 455 000	2 090 000	1 244 000	384 000	35 100	419 000	2 062 000	9 689 100	19 350	9 669 750	8 700 084	969 666	10.02
Dec.	<u>3 374 000</u>	<u>1 637 000</u>	<u>1 194 000</u>	<u>395 000</u>	<u>78 800</u>	<u>255 000</u>	<u>2 147 000</u>	<u>9 080 800</u>	<u>19 610</u>	<u>9 061 190</u>	<u>8 133 675</u>	<u>927 515</u>	<u>10.23</u>
Yr.	47,158,000	23,992,000	16,993,000	5,744,000	1,649,600	5,505,000	8,400,000	109,441,600	238,140	109,203,460	98,917,910	10,285,550	9.41

THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

657

STATISTICAL DATA - 1943

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Precipitation	1.07	0.64	2.33	1.84	3.62	10.35	1.90	2.63	1.55	2.23	3.43	0.45
Total Precipitation at Ishpeming during 1943	- 32.04" (2.67 ft.)											
Average " " Marquette	- 32.80" (46 year record)											

CARP RIVER PLANT:

Drainage area above Intake Dam	66.66 sq. miles
Cubic feet precipitation in 1943	4,961,858,964
Kilowatt hours generated in 1943	23 992 000
Cubic feet water utilized (90 cu.ft. - 1 Kwh)	2 159 280 000
" " " in Carp Storage Basin Jan. 1, 1943	423 806 000
" " " " " " " Dec.31, 1943	328 700 000
" " " used in 1943	95 106 000
" " " wasted over Intake Dam	401 050 000
Total run-off for year 1943 (Cubic feet)	2 465 224 000
Run-off per sq. mile of drainage area	36 982 058
Second-feet of run-off	1.17

	<u>1913</u>	<u>1914</u>	<u>1915</u>	<u>1916</u>	<u>1917</u>	<u>1918</u>	<u>1919</u>	<u>1920</u>	<u>1921</u>	<u>1922</u>	<u>1923</u>
Total Precipitation	30.11	26.53	38.40	36.83	25.46	31.05	29.50	27.40	30.38	33.67	21.90
Sec.ft. per sq.mile run-off	1.03	0.67	0.93	1.29	0.70	0.79	0.83	0.73	0.68	1.06	0.59
	<u>1924</u>	<u>1925</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>	<u>1931</u>	<u>1932</u>	<u>1933</u>	<u>1934</u>
Total Precipitation	22.95	20.71	35.69	29.86	36.06	32.28	23.14	36.70	31.20	32.72	32.87
Sec.ft. per sq.mile run-off	0.50	0.25	0.85	0.98	1.11	0.67	1.10	0.83	1.13	1.14	1.00
	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>	<u>1942</u>	<u>1943</u>		
Total Precipitation	27.10	30.23	30.10	35.32	33.58	30.34	32.20	34.26	32.04		
Sec.ft. per sq.mile run-off	0.79	0.89	0.86	1.33	1.47	1.05	0.83	0.84	1.17		

McCLURE PLANT:

Drainage area above Intake Dam	140.52 sq. miles
Cubic feet precipitation in 1943 (Hoist Plant 35.64")	11,634,894,121
Kilowatt hours generated at McClure Plant in 1943	47 158 000
Cubic feet water utilized (125 cu.ft. - 1 Kwh)	5 894 750 000
" " " wasted over Intake Dam	805 484 000
" " " in Hoist Storage Basin Jan. 1, 1943	1 293 032 000
" " " " " " " Dec. 31, 1943	1 270 000 000
" " " taken from Hoist Storage Basin in 1943	23 032 000
" " " in Silver Lake Jan. 1, 1943	320 950 000
" " " " " " " Dec.31, 1943	0
" " " taken from Silver Lake in 1943	320 950 000
Total run-off for year 1943 (Cubic feet)	6 356 252 000
Run-off per sq.mile of drainage area	45 233 788
Second-feet of run-off	1.43

	<u>1920</u>	<u>1921</u>	<u>1922</u>	<u>1923</u>	<u>1924</u>	<u>1925</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>
Total Precipitation	*27.40	35.10	42.03	26.60	30.49	24.06	43.95	35.51	43.80	38.75	30.81
Sec.ft. per sq.mile run-off	1.22	1.02	1.54	0.85	0.92	0.52	1.52	1.80	2.22	1.36	1.45
	<u>1931</u>	<u>1932</u>	<u>1933</u>	<u>1934</u>	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>	<u>1940</u>	<u>1941</u>
Total Precipitation	37.02	32.54	35.07	35.02	29.96	32.16	38.18	40.93	41.22	36.59	38.15
Sec. ft.per sq.mile run-off	1.10	1.23	1.30	1.16	0.90	1.05	1.19	1.75	1.69	1.47	1.28
	<u>1942</u>	<u>1943</u>									
Total Precipitation	40.20	35.64									
Sec.ft.per sq.mile run-off	1.15	1.43									

\* - 1920 Precipitation figure is total precipitation at Ishpeming.



THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

SUBSTATION TRANSFORMERS:

Substation transformers installed as of December 31, 1943.

<u>66,000/2300 Volts</u>	<u>Phase</u>	<u>No.</u>	<u>K.V.A.</u>	<u>Total K.V.A.</u>	
Munising Substation	1	3	667	2,001	
Sney " "	1	1	25	25	
Inland #1 " "	1	3	500	1 500	
" #2 " "	1	3	500	1 500	
					5,026 K.V.A.
<u>2300/66,000 Volts</u>					
AuTrain Substation	1	3	333-1/3	1 000	1 000
<u>33,000/66,000 Volts</u>					
Gwinn Substation	1	3	1,250	3 750	3 750
<u>33,000/12,000 Volts</u>					
Clarksburg Substation	1	3	37-1/2	112 1/2	
" " "	1	2	150	300	412 1/2
<u>33,000/2300 Volts</u>					
Gwinn Substation	1	3	75	225	
Cliffs Shaft-Holmes Substation	1	6	500	3 000	
Morris-Lloyd " "	1	3	590	1 770	
Cambria-Jackson " "	1	3	400	1 200	
Maas " "	1	6	590	3 540	
Brownstone " "	1	3	625	1 875	
Palmer " "	1	2	625	1 250	
Greenwood " "	1	2	400	800	
Princeton " "	1	3	150	450	
Tilden " "	3	1	1 250	1 250	
Palmer Rural " "	1	4	15	60	
Negaunee-Athens " "	1	3	1 000	3 000	
Mather " "	1	3	2 000	6 000	24 420
<u>2300/33,000 Volts</u>					
Republic " "	1	3	250	750	
Hoist Plant " "	3	1	2 500	2 500	
Escaraba " "	1	3	590	1 770	
McClure " "	3	2	5 000	10 000	
Carp " "	1	3	1 900	5 700	
Hoist " "	1	3	667	2 000	
" " " "	1	3	200	600	23 320
<u>12,000/440-220 Volts</u>					
Piqua-Marquette Substation	1	3	100	300	300
<u>12,000/220-110 Volts</u>					
D.S.S.&A.Ry. at Clarksburg	1	1	2-1/2	2 1/2	2 1/2
<u>12,000/2300 Volts</u>					
McClure Plant (Furnace Lines)	3	2	1 250	2 500	
AuTrain Substation	1	3	185	555	
Chatham " "	1	3	25	75	
Eben " "	1	1	25	25	
Rumely " "	1	2	15	30	
Inland #1 (Wis. Mich. Line)	1	3	50	150	
Rumely Substation	1	1	25	25	3 360

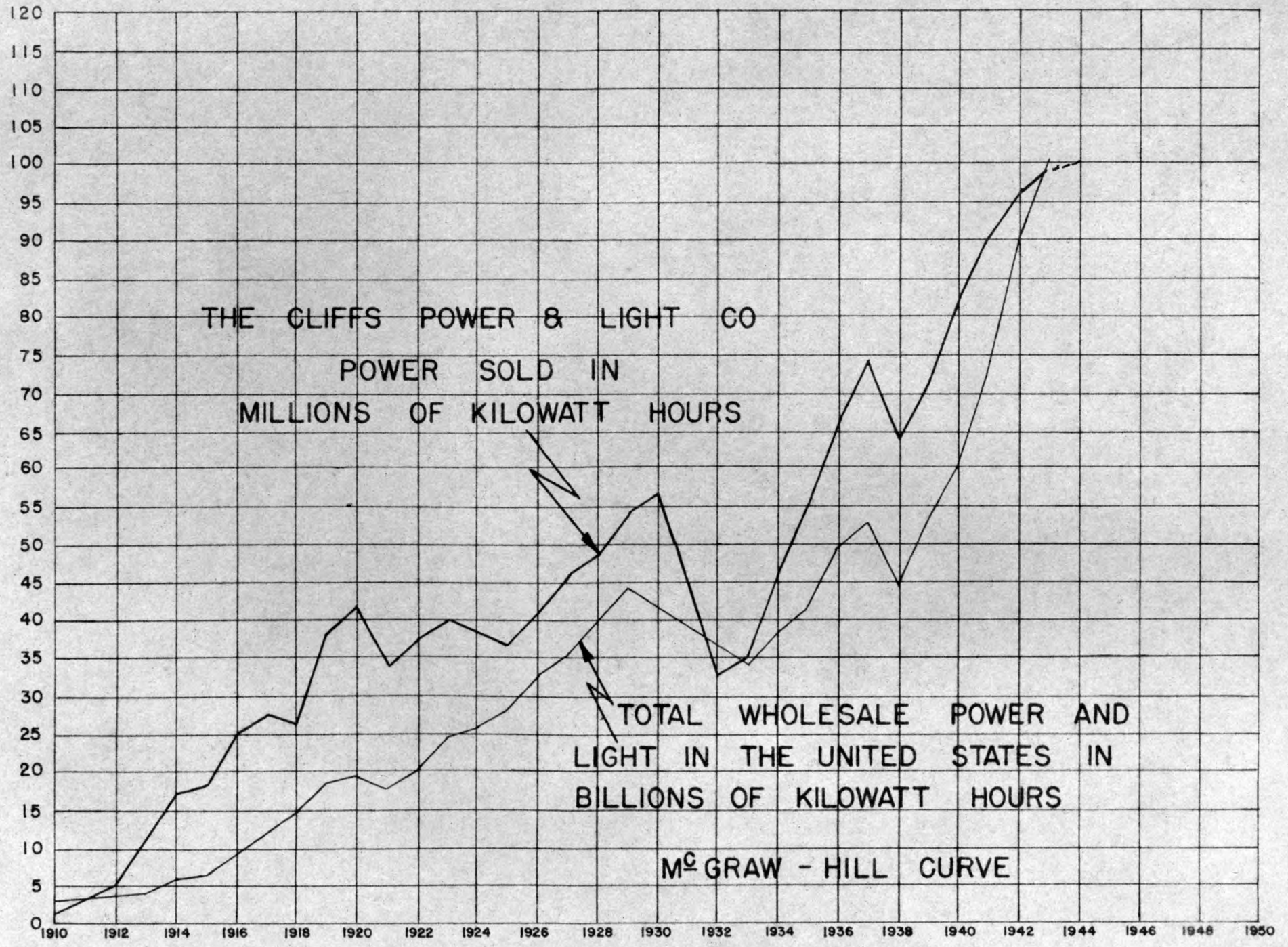
THE CLIFFS POWER & LIGHT COMPANY  
ANNUAL REPORT  
YEAR 1943

SUBSTATION TRANSFORMERS: (CONT'D.)

	<u>Phase</u>	<u>No.</u>	<u>K.V.A.</u>	<u>Brought Fwd.</u> <u>Total K.V.A.</u>	61,591 KVA
<u>6,600/2300 Volts</u>					
Inland #1 Substation	1	3	25	75	
Blaney Park "	1	2	25	50	
" " "	1	1	15	15	
AuTrain Lake "	1	1	25	<u>25</u>	165
<u>6,600/115-230 Volts</u>					
Furnace Substation Lighting	1	1	1-1/2	<u>1 1/2</u>	<u>1 1/2</u>
Grand Total.....					61,757 1/2 KVA

DISTRIBUTION TRANSFORMERS:

	<u>Number</u>	<u>Capacity</u>
Total at first of year	371	2,216-1/2 K.V.A.
" purchased during year	7	85
" installed " "	4	33
" sold " "	4	38
" retired " "	1	15
" at close of year	377	2,281-1/2
In stock at close of year	27	151
" service at " " "	314	1,826-1/2
C.P.&L.Co. Plants & Auxiliaries	<u>36</u>	<u>304</u>
	377	2,281-1/2 K.V.A.

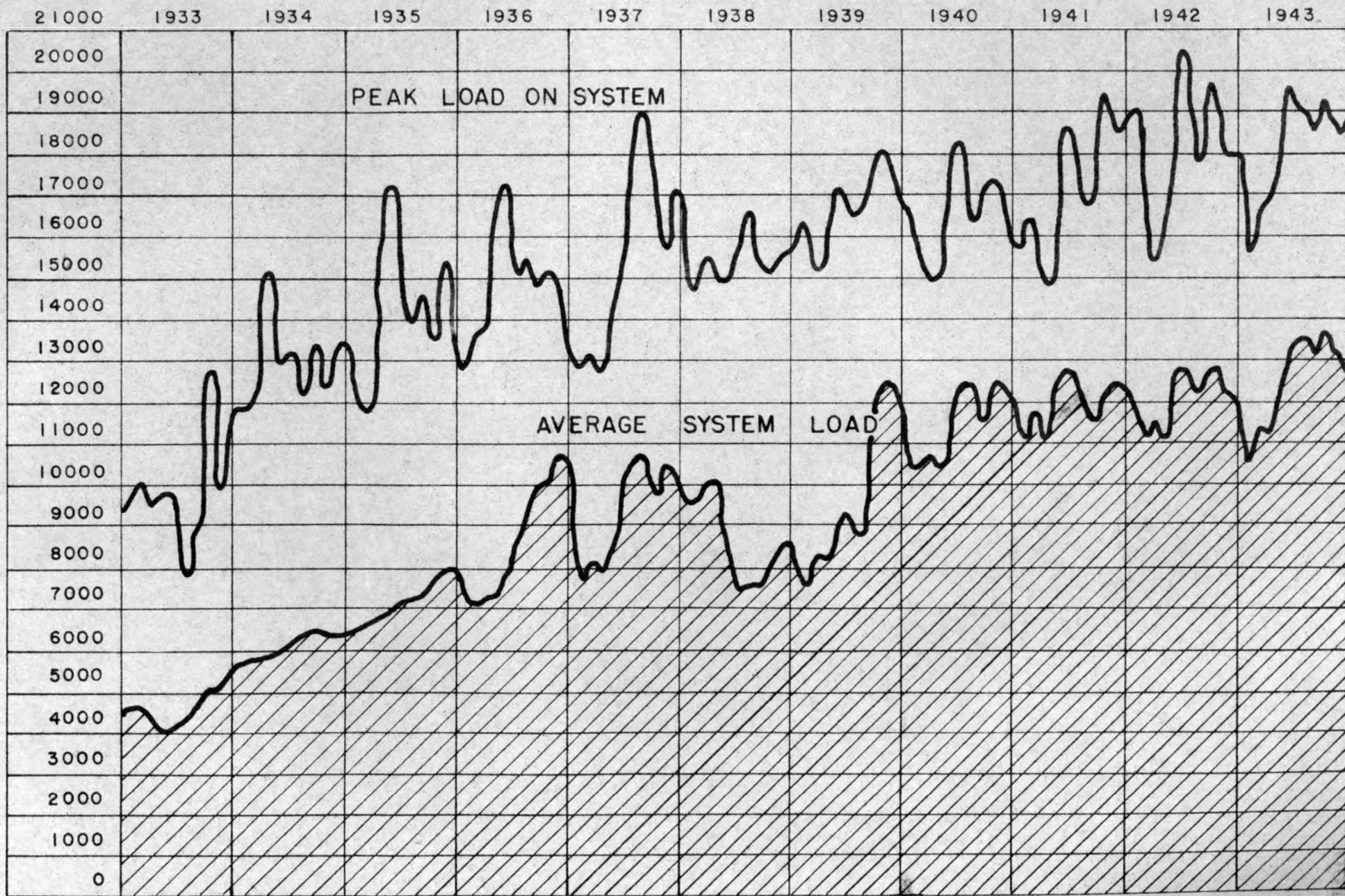


THE CLIFFS POWER & LIGHT CO  
 POWER SOLD IN  
 MILLIONS OF KILOWATT HOURS

TOTAL WHOLESALE POWER AND  
 LIGHT IN THE UNITED STATES IN  
 BILLIONS OF KILOWATT HOURS

McGRAW - HILL CURVE

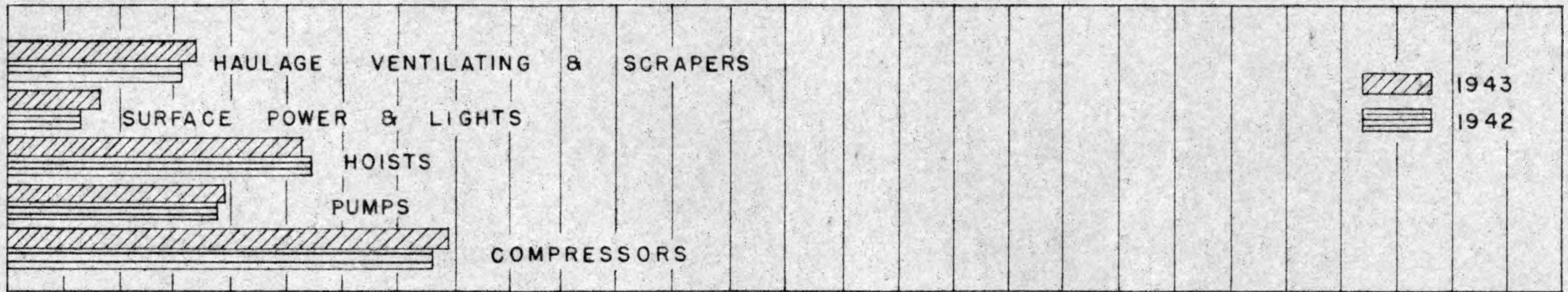
KILOWATTS



# C.P. & L.CO.

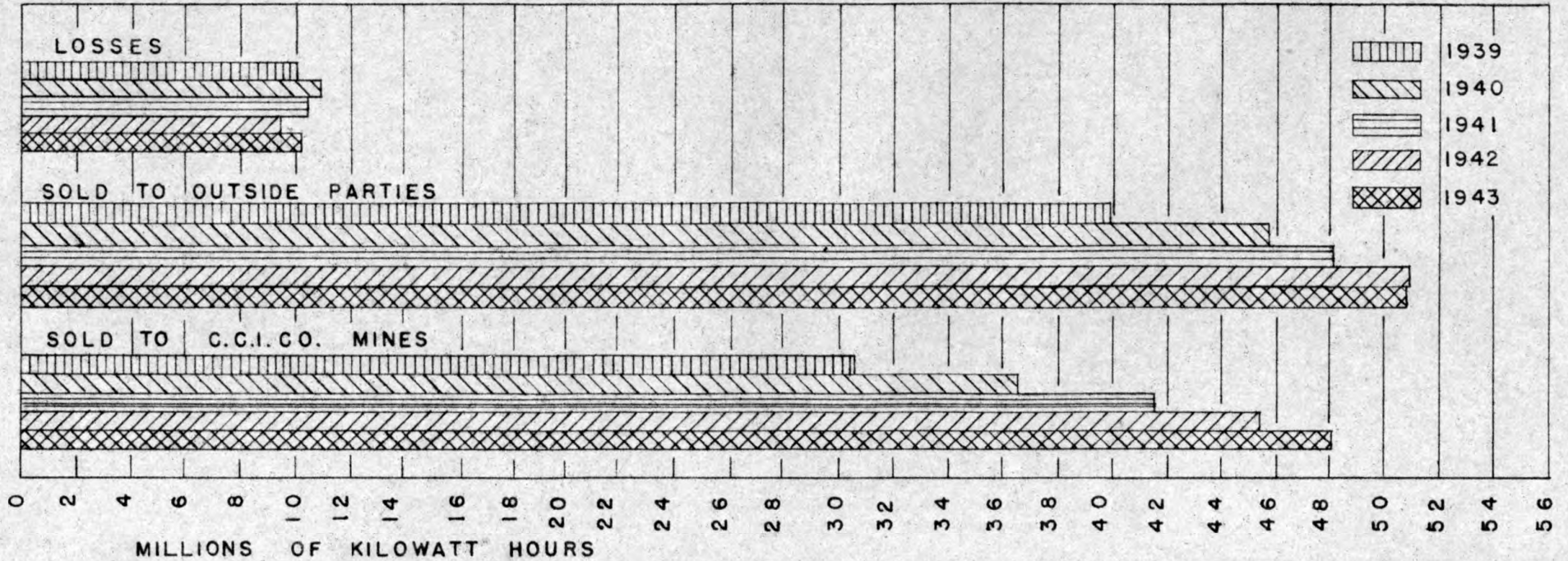
DISTRIBUTION OF ELECTRIC POWER TO C.C.I.CO. MINES

1942 - 1943

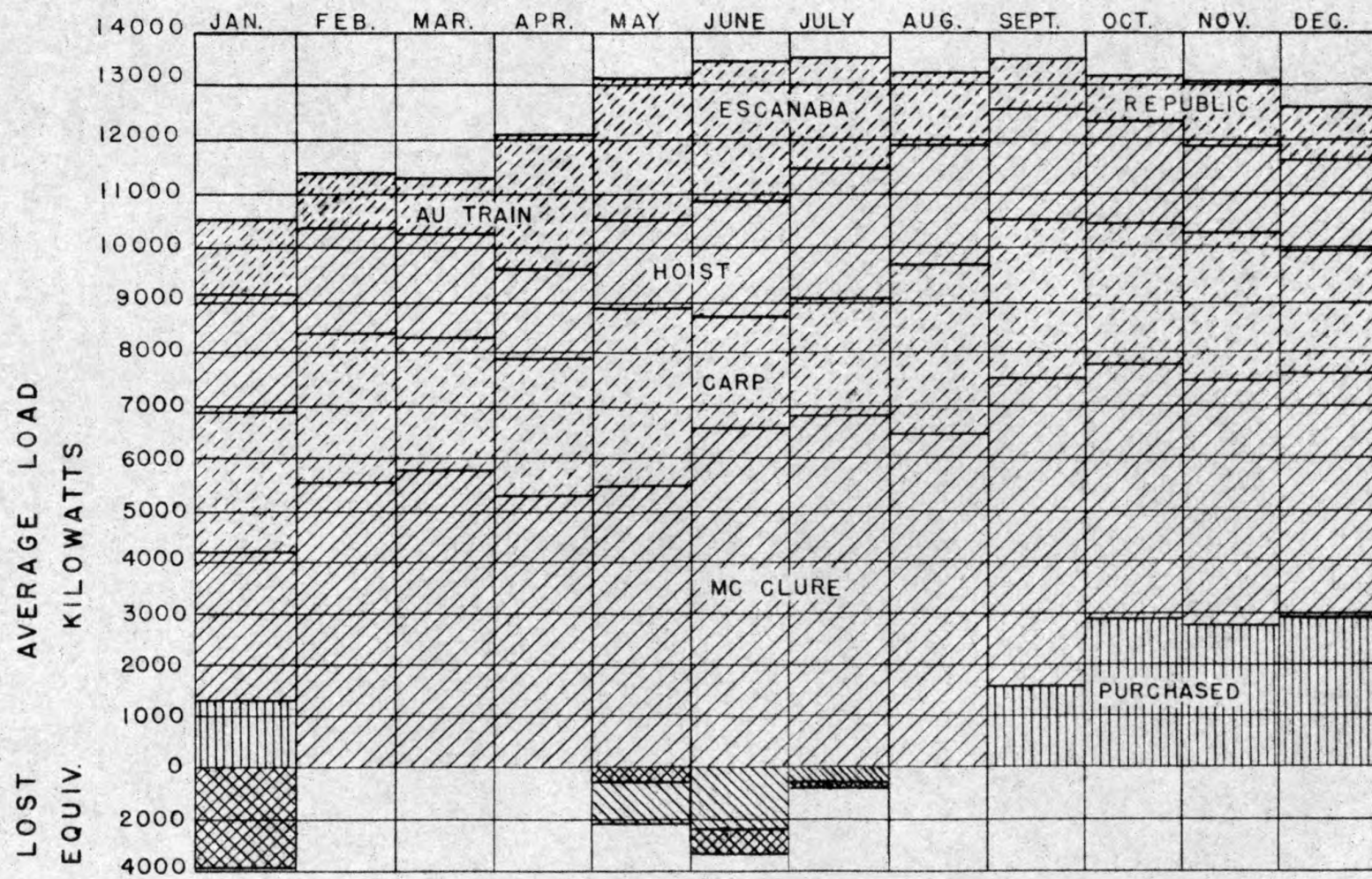


DISTRIBUTION OF ELECTRIC POWER

1939 - 1940 - 1941 - 1942 - 1943



# 1943

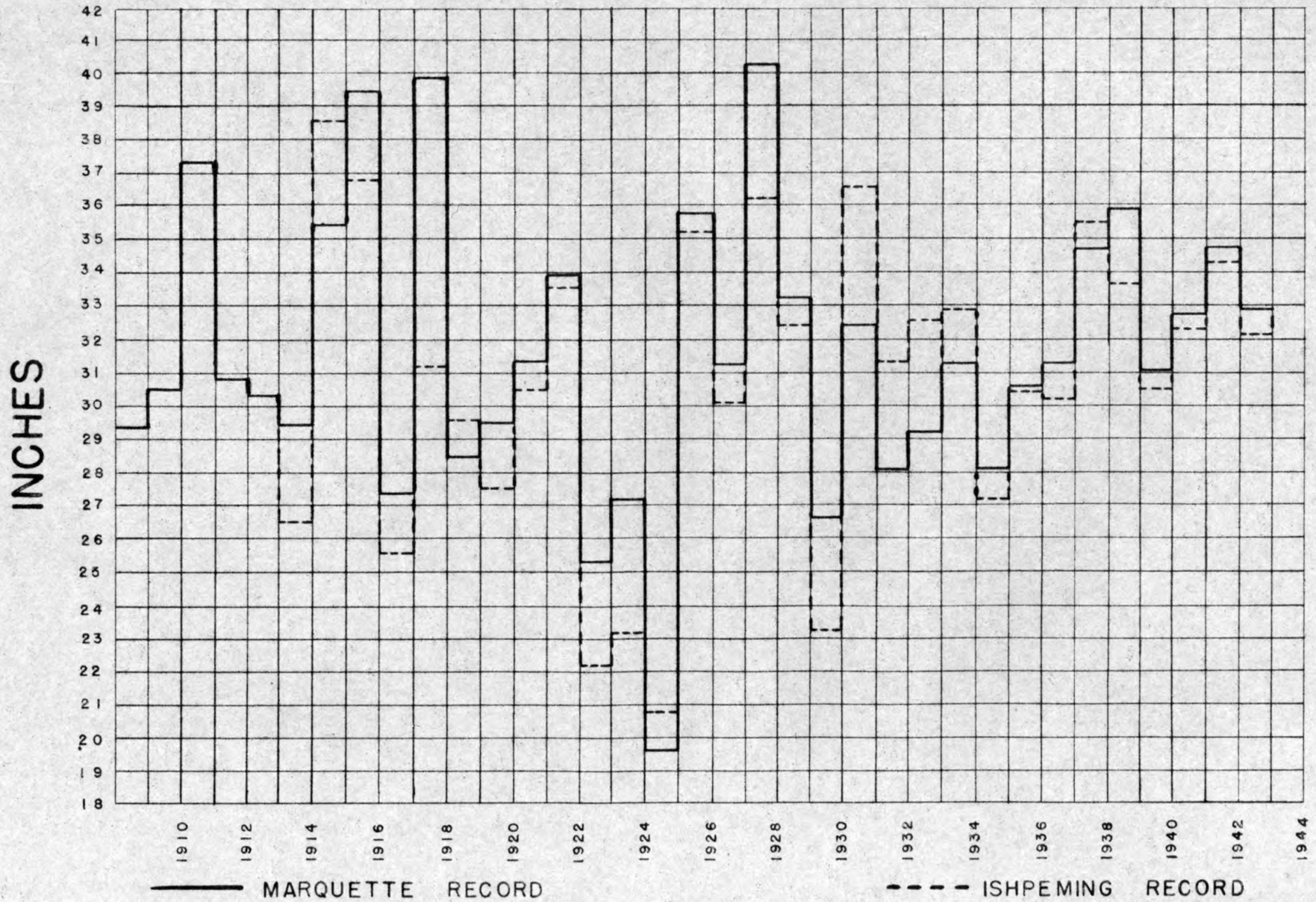


AVERAGE LOAD  
KILOWATTS  
  
 WATER LOST  
KILOWATT EQUIV.

- CURRENT MADE BY WATER POWER
- POWER PURCHASED
- KILOWATT EQUIVALENT WATER LOST AT CARP
- " " " MC CLURE

MC CLURE	43.09 %
CARP	21.92
HOIST	15.53
AU TRAIN	5.25
ESCANABA	5.03
REPUBLIC	1.51
PURCHASED	7.67

# PRECIPITATION BY YEARS



WELFARE DEPT. ANNUAL REPORT YEAR 1943

The Company's Welfare Department carried out its usual functions through the year 1943. The increase in the number of employees during the year was at about the same rate as the previous year and new problems arose, most of them dealing with matters arising out of conditions due to the war. During the year many employees entered the military service and the problem of filling their places was rather a difficult one because not many qualified men are now available in the communities. Some attention has been given to post war problems during the year, but to date no definite conclusions with respect to post war problems have been reached.

The Welfare Department supervises all matters which deal with and pertain to the general welfare and the health of the Company's employees. This department is charged with the following activities: Problems of welfare, Social Security, Workmen's Compensation, group insurance, pensions, donations, retirement allowances, and special relief cases. The department also endeavors to be helpful to many former employees who have problems of a personal nature. Many former employees, as well as present employees, come to the department for various types of information and advice. Wherever possible, the department does all it can to assist in cases of this nature. The department also concerns itself with matters dealing with civilian problems, public health, safety, public relations, personnel direction, and all such special problems which in some manner deal with the general welfare of the Company's employees.

For the purpose of keeping this record intact and continuous, it is again recorded that this department was previously known as the Pension Department and for many years Mr. W. H. Moulton, who retired on July 1, 1938, headed the department with the title of Secretary. In July of 1938 the name of the department was changed from the Pension Department to the Welfare Department and Walter F. Gries became the head of the department with the title of Superintendent. Mr. W. H. Moulton, although not in good health, continued to give us the benefit of his experience when we called upon him. It is desired to record in this report our appreciation to Mr. Moulton for his continued counsel and advice. His cooperation has been very helpful and it is greatly appreciated. It is also desired to express appreciation for the excellent cooperation of the Safety Department under Mr. A. J. Stromquist, Director, and Captain H. F. Rogers, Assistant Director. This department works cooperatively and closely with the Safety Department.

Within the past few years many new policies and procedures have been established. During 1943 the new policies and procedures seemed to have become quite regularly established and with the splendid attention and cooperation given by Mr. S. R. Elliott, retired Manager, and Mr. C. J. Stakel, present Manager, the business of this department was carried out throughout the whole year in a manner which seems to have been entirely successful. Since we are dealing in this department almost entirely with human relations, we very often have to make decisions rather speedily. It is always a source



WELFARE DEPT.            ANNUAL REPORT            YEAR 1943

of genuine pleasure and satisfaction to this department to have the old and faithful employees report that they always can depend upon cooperation in connection with any of their problems.

The Police Department has been maintained at full strength throughout the whole year. This department is a bureau of the Welfare Department and is under the direction of Chief of Police Mr. R. J. Veale. Mr. Veale comes in regularly for conferences and discussions with respect to police problems and plant protection. His supervision and cooperation have been superior and it is desired to record here an appreciation for Mr. Veale's cooperation. The Police Department is functioning in a very able manner. The fact that we have had very little difficulty of any kind in and about our mines and properties is rather good evidence that our Police Department is doing a good piece of work.

In connection with the Workmen's Compensation and group insurance work, the details of these programs are immediately under the supervision of Mr. Walter E. Johnson who has been in the department for a good many years. This part of our welfare program has been very effectively carried out and well administered for a long time. Mr. Johnson is thoroughly familiar with all the details of his particular assignment and his work is well organized and well taken care of.

The personnel of the Welfare Department is made up of the following people:

Walter F. Gries, Superintendent  
Walter E. Johnson, Compensation Agent  
Miss Mary Ryan, Receptionist and File Clerk  
Miss Emily Nicholas, Secretary to the Superintendent  
and in charge of special assignments  
Mrs. Mabel Quayle, Secretary in the Compensation  
and Group Insurance Division  
Robert J. Veale, Chief of Police.

11.

a. WORKMEN'S COMPENSATION

The direct work of the Compensation Department has been taken care of by Mr. Walter E. Johnson, as has been the plan since 1926.

Following are the cases of those men who required some special attention during the year.

GEORGE NEWMAN - Maas Mine - Acc. Rept. No. 573

Following the death of George Newman as a result of the accident on July 14th, 1941, compensation payments were made to his widow Helen Newman for the benefit of herself and three dependent children. In July of 1943 Mrs. Newman requested that the balance of compensation be paid to her in a lump sum, the money to be used for the purchase of a home in Marquette, Michigan. In addition to the compensation, Mrs. Newman was drawing monthly benefits from the Social Security Fund so that she was not entirely dependent on the compensation for her living expenses, and we therefore filed no objection to the proceedings. The matter was heard by the Compensation Board on July 13th, 1943, and her request was allowed with the understanding that the deed to the property was to be in the name of herself and the three children. She complied with this order, and the case was settled on the basis of the present worth of the remaining 193 weeks.

ARNE KANGAS - Maas Mine - Acc. Rept. No. 512D

Kangas suffered a back injury on April 8th, 1937 when he was struck by a three foot section of steel rail. He was disabled for a short time following this injury and then returned to work. During the period from 1937 to December of 1942, Kangas was disabled at various times due to the lame back. The condition had become more or less chronic, and he was paid compensation weekly from December of 1942 to December of 1943. During this period he made three trips to Mayo's without obtaining any relief. It was the opinion of our doctors that Kangas would not be able to return to his work as a miner, and the probability was that we would undoubtedly be called upon to pay compensation for the balance of 150 weeks which would round out the 500 week period provided for in the Workmen's Compensation Law. Kangas then petitioned the Compensation Commission for the balance of the compensation in a lump sum, and his petition was allowed.

CRESCENZO SAURO - Cliffs-Shaft Mine - Acc. Rept. No. 1136

Sauro was severely injured by a fall of ground on July 20th, 1943 and died within an hour or two after reaching the hospital. Very little is known of his family, but it is understood that he has a wife living at Ripa Bottoni, Province of Campo Basso, in Italy, although so far we have been unable to definitely determine whether she is still alive. His employment record, made on October 10, 1938, shows that in addition to his wife he had a son, now 23, and a daughter, now 21, but the whereabouts of these children are unknown. It is assumed that they are probably both in Italy. As the children are both over sixteen, they would not be considered dependents, and Mrs. Sauro would be the only claimant. Mr. Joseph F. Deeb, United States Attorney at Grand Rapids, Michigan, has advised us that he has been directed by the Attorney General of the United States to make claim for compensation for the death of Mr. Sauro on behalf of the Alien Property Custodian. It will be incumbent upon the Alien Property Custodian to show that Mrs. Sauro is the widow of the deceased, that she is alive, and that she has not remarried.

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943

11. a. WORKMEN'S COMPENSATION (Continued)

FATALITIES

The following fatalities occurred in 1943.

<u>Crescenzo Sauro</u> Age 48	Cliffs Shaft Mine Occurred July 20, 1943 Struck by fall of ground Funeral expense See note	    \$ 200.00
<u>John G. Solka</u> Age 29	Negaunee Mine Occurred July 26, 1943 Died July 28, 1943 Lighting round of holes. Stayed too long and was caught by blast Dependent widow and one child Compensation - 300 weeks at 18.00 Funeral expense	       \$5400.00 200.00 <u>\$5600.00</u>
<u>Peter E. Lehto</u> Age 41	Lloyd Mine Occurred September 3, 1943 Struck by fall of ground Dependent widow and five children Compensation - 400 weeks at 27.00 Funeral expense	      \$10800.00 300.00 <u>\$11100.00</u>
<u>Frank J. Filipczuk</u> Age 54	Spies Virgil Mine Occurred July 30, 1943 Electrocuted Dependent widow Compensation - 400 weeks at 19.00 Funeral expense	      \$7600.00 300.00 <u>\$7900.00</u>

Crescenzo Sauro - No payments have been made in this case pending receipt of proof that there is a surviving widow.

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943

11.

a. WORKMEN'S COMPENSATION (Continued)

Following is a list of the more serious cases other than fatalities which occurred during 1943:

<u>Mine and Report no.</u>	<u>Name</u>	<u>Nature of Injury</u>	<u>Compensation Paid to 12-31-43</u>
Athens #420	Ernest Kallionen	Comminuted fracture left ankle	564.72
Athens #433	Carl S. Luoma	Fracture both bones right leg	294.00*
Athens #434	Werner Lukkonen	Fracture left fibula at ankle	294.00*
Cliffs Shaft #1127	Kanstu Saastamoinen	Fractured hip. Rock imbedded in buttock	783.00
Cliffs Shaft #1128	William Linna	Comminuted fracture right femur extending into knee joint. Fracture right clavicle.	828.00*
Cliffs Shaft #1132	John McIntyre	Fracture 4 transverse processes, right spine	534.00*
Princeton #190	Joseph Roberto	Fracture 4 transverse processes with separation	810.00*
Princeton #198	Leonard Wilson	Fracture middle third right femur	576.00
Princeton #209	Dominic Barbieri	Fracture both bones lower left leg. Fracture 1st lumbar vertebra	210.00*
Princeton #213	Emil Halme	Depressed skull fracture. Fracture of right scapula and 3rd and 4th ribs. Fracture right tibia.	0.00*
Maas #595	William Kamppinen	Comminuted fracture upper 1/3 right tibia	643.68*
Maas #599	Peter Bessola, Jr.	Compression fracture 12th dorsal vertebra	327.00
Lloyd #823	Richard J. Williams	Compound fracture right tibia and fibula	555.00
Lloyd #824	Theodore Klingkammer	Contusion chest, back, and pelvis. Neurosis.	720.00*

\* Payments still being made.

(continued)

WELFARE DEPT. ANNUAL REPORT YEAR 1943

11. a. WORKMEN'S COMPENSATION (Continued)

<u>Mine and Report no.</u>	<u>Name</u>	<u>Nature of Injury</u>	<u>Compensation Paid to 12-31-43</u>
Lloyd #830	Paul Jarvi	Multiple fractures of pelvis	486.00
Negaunee #735	John Rosten	Fracture 12th dorsal and 1st lumbar vertebrae	468.00*
Negaunee #746	Maffio Bianchi	Comminuted fracture of left clavicle	416.50
Negaunee #754	John E. Saari	Fractured both bones right leg near ankle	21.00*
Mather #2	Donald B. Olson	Fracture right hip. Compound fracture left femur. Fracture upper end left fibula.	828.00*
Spies Virgil #154	Fred Brunell	Fractured 4 ribs left side. Fractured left heel. Chip fracture 2nd and 3rd lumbar vertebrae. Fracture lateral processes 2nd and 3rd lumbar vertebrae.	432.00*
Cambria Jackson #3	Henry Caron	Compression fracture 6th dorsal vertebra	420.00*
Cambria Jackson #4	Hannes Alanko	General contusions and bruises. Infected bursites left elbow	434.00
Hill Trumbull #103	George W. Tobeck	Loss of 3rd finger left hand and partial loss of use of 2nd finger	360.00*
Hill Trumbull #108	William S. Loeffert	Amputation terminal phalanges middle and ring fingers right hand	140.00*

\* Payments still being made

ANNUAL REPORT - 1943  
STATEMENT OF COMPENSATION PAYMENTS FROM  
JANUARY 1, 1943 to DECEMBER 31, 1943

	Average No. of Employees	No. of Fatal Accs.	No. of Non-fatal Accidents			Actual Comp. Paid in 1943	1934	1936	1937	1938	1940	1941	1942	1943	Estimated Compensation Still Pending	Medical & Special Expense	Fatal Cases Pending	Injury Cases Pending
Gambria-Jackson	200		12	7	36	1,701.00							1,701.00	1,344.00	364.00		7	
Cliffs-Shaft	499	1	20	7	96	8,204.04	936.00		2,340.00			1,166.04	3,762.00	6,798.00	3,233.51	3	6	
Cliffs-Shaft Laboratory	10														60.00			
Chief of Police	1														6.00			
Cleveland Roll	18														105.50			
District Welfare	3														18.00			
Gardner-Mackinaw						936.00			936.00					664.00		1		
General Storehouse	150		5		22	672.00							672.00		899.00			
General Welfare	2														12.00			
Geological Department	4														22.00			
Gwinn Office															1.50			
Ishpeming Office	26														154.00			
Lloyd	324	1	11	5	98	8,984.01		2,808.00			1,542.60	1,106.28	3,527.13	26,546.70	2,111.55	2	8	
Maas	516		17	9	162	14,243.13	200.00	3,464.95	936.00	1,872.00	5,544.00	366.00	1,860.18	10,405.32	3,477.48	2	4	
Mechanical Engineering	7														41.25			
Mining Engineering	11				2										67.00			
Miscellaneous	3				4										19.00			
Princeton	181		18	15	29	4,000.47						913.15	3,087.32	2,704.81	1,144.45		8	
Purchasing Department	6														36.50			
Repairs to Steam Shovels						936.00						936.00		108.00			1	
Safety Department	2														12.00			
Shipping Department	7														45.50			
Spies-Virgil	84	1	2		26	1,337.00							1,337.00	7,724.00	500.00	1	1	
Tilden	28		1		1	81.96							81.96		169.75			
Workmen's Compensation	2														12.50			
The Cliffs Power & Light Company	85		2		7	1,203.00					936.00		267.00	3,414.00	512.25	1	1	
Negaunee	481	1	33	2	141	12,513.77	915.20	144.00		1,872.00	2,188.56	3,270.00	3,924.01	20,115.17	3,206.55	4	13	
Mather	109		2	3	35	856.00							856.00	1,044.00	694.48		1	
The Athens Iron Mining Company	397		26	7	101	6,530.15			962.68	329.28	483.00	1,792.96	2,962.05	3,727.52	2,463.25	1	9	
<b>Total - Michigan Mines</b>	<b>3156</b>	<b>4</b>	<b>149</b>	<b>55</b>	<b>760</b>	<b>61,998.53</b>	<b>1,851.20</b>	<b>200.00</b>	<b>6,416.95</b>	<b>5,174.88</b>	<b>4,073.28</b>	<b>10,694.16</b>	<b>9,550.43</b>	<b>24,037.63</b>	<b>84,615.52</b>	<b>19,586.42</b>	<b>15</b>	<b>59</b>
Hibbing Office	29														177.25			
Canisteo	123				31										740.60			
Hill-Trumbull	214		4	3	28	3,471.59				612.00	2,037.76		821.83	1,090.67	1,549.70		3	
Holman-Cliffs	232		5	3	56	1,724.24				474.81	896.57		352.86	108.80	1,674.15		1	
<b>Total - Minnesota Mines</b>	<b>598</b>	<b>0</b>	<b>9</b>	<b>6</b>	<b>115</b>	<b>5,195.83</b>					<b>1,086.81</b>	<b>2,934.33</b>	<b>1,174.69</b>	<b>1,199.47</b>	<b>4,141.60</b>	<b>0</b>	<b>4</b>	
<b>Total - All Mines</b>	<b>3754</b>	<b>4</b>	<b>158</b>	<b>61</b>	<b>875</b>	<b>67,194.36</b>	<b>1,851.20</b>	<b>200.00</b>	<b>6,416.95</b>	<b>5,174.88</b>	<b>4,073.28</b>	<b>11,780.97</b>	<b>12,484.76</b>	<b>25,212.32</b>	<b>85,814.99</b>	<b>23,730.02</b>	<b>15</b>	<b>63</b>

Canisteo Mine risk insured by the Employer's Mutual Liability Insurance Company since January 1, 1939

WELFARE DEPT. ANNUAL REPORT YEAR 1943

11. a. WORKMEN'S COMPENSATION (Continued)

ANNUAL STATEMENT OF COMPENSATION PAYMENTS  
FROM JANUARY 1st, 1943 to DECEMBER 31st, 1943

Compensation paid on 1943 accidents	\$ 25,212.32	
Compensation still pending	85,814.99	
Cost of medical and hospital service, also special expense	<u>23,730.02</u>	134,757.33
Less pending for years 1934 to 1942 inclusive	47,681.17	
Less medical and special expense on accidents occurring prior to January 1, 1943	<u>401.08</u>	<u>48,082.25</u>
		86,675.08
Less compensation paid in 1943 on Occupational Disease cases	4,068.00	
Estimated compensation still pending on Occupational Disease cases	<u>7,204.00</u>	<u>11,272.00</u>
		75,403.08
Estimated cost of 1943 accidents		
Percentage of payrolls		.0088
Percentage of payrolls including Occ. Dis. cases		.0101
Number of fatal accidents		4
Number of compensable accidents		158
Number of non-compensable accidents		61
Number of slight accidents		875

The following Occupational Disease cases occurred during the year. 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	5

WELFARE DEPT. ANNUAL REPORT YEAR 1943

11.

a. WORKMEN'S COMPENSATION (Continued)

Compensation Payments including Medical and Special Expense

<u>Year</u>	<u>C. C. I. Co.</u>	<u>Negaunee Mine Co.</u>	<u>Athens Ir. Mng. Co.</u>	<u>Cliffs Fr. &amp; Light Co.</u>	<u>Mesaba-Cl. Mng. Co.</u>	<u>Holman-Cl. Mng. Co.</u>	<u>Canisteeo Cl. Mng. Co.</u>	<u>Alexandria Mine</u>	<u>TOTAL</u>
1912	1,073.81	105.08							1,178.89
1913	13,149.70	1,152.87	27.15						14,329.72
1914	27,416.82	2,840.13	446.63						30,702.58
1915	15,657.71	1,699.23	656.07						18,013.06
1916	32,404.74	3,496.75	672.29						36,573.78
1917	45,129.92	5,301.30	911.46						51,342.68
1918	43,734.77	6,198.93	1,197.57						51,131.27
1919	59,417.51	11,724.68	2,234.77		263.00				73,639.96
1920	59,535.76	8,888.01	2,928.15		3,057.46				74,409.38
1921	59,065.26	4,709.80	5,208.92		2,953.08				71,937.06
1922	56,794.35	5,283.24	2,048.23		1,866.67				65,992.49
1923	57,856.37	4,142.00	5,007.88		4,874.48				71,880.73
1924	56,335.89	5,487.07	6,394.01		9,408.59				77,625.56
1925	49,376.47	4,464.79	8,305.60		7,316.55				69,463.41
1926	51,123.41	5,433.85	7,087.93	514.40	9,537.84				73,697.43
1927	86,156.10	5,311.69	5,489.81	939.86	7,147.98				105,045.44
1928	87,186.58	6,532.66	6,235.08	1,331.30	4,576.56	9.00			106,371.18
1929	76,959.01	8,899.76	6,303.92	1,895.50	3,557.86	292.83	4.50		97,913.38
1930	76,753.51	10,603.63	5,803.45	1,930.48	2,531.15	1,236.18	1,357.05	1,993.76	102,209.24
1931	75,167.79	10,723.30	5,233.65	1,867.50	1,489.36	559.63	1,346.64	1,700.87	98,088.74
1932	52,920.75	12,137.00	5,012.72	1,398.25	1,336.00	33.75	65.50	1,074.00	73,972.97
1933	23,425.69	9,605.70	5,298.56	993.45	2,180.61			614.00	42,128.01
1934	26,672.34	7,573.97	8,429.38	468.46	2,468.61				45,612.76
1935	34,874.17	6,854.34	5,154.12	218.75	3,778.56				50,879.94
1936	31,597.79	7,139.26	4,588.74	438.50	3,514.63				47,278.92
1937	32,509.48	8,695.66	7,235.96	615.72	3,647.16				52,703.98
1938	35,664.38	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	11,985.67	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	6,920.97				77,708.09
1943	53,607.70	17,270.60	8,793.40	1,715.25	9,337.43				90,924.38
	1,475,671.79	242,386.72	159,605.78	19,665.92	110,122.18	2,131.39	2,768.69	5,382.63	2,017,935.10



11. a. WORKMEN'S COMPENSATION (Continued)

The personnel of the Michigan Compensation Commission is as follows:

- Betty W. Allie, Chairman
- James L. Hill
- Charles H. Mahoney
- Vincent F. McAuliffe
- Charles M. Woodbury
- Joe M. Moore, Secretary

The Commission is appointed by the Governor, and the terms of the Commissioners are for periods of six years, on a staggered basis. This is a departure from the old practice whereby the entire personnel of the Commission was changed whenever there was a change in administration.

The following is a brief review of the important changes brought about by the 1943 amendments to the Michigan Workmen's Compensation Law. These changes became effective on July 30, 1943.

The amendments now make the act compulsory for all employers employing eight or more workers.

All public employers in the state, county, township, and municipal level are now covered by the act, regardless of the number of employees in the governmental unit.

Previous to the amendments now in effect (July 30, 1943) compensation was paid only for accidental injuries arising out of and in the course of employment. The change makes all personal injuries compensable. This is particularly important in connection with industrial diseases. The amendments eliminate the old schedule of industrial diseases entirely and include all industrial diseases. (It is estimated that there are more than nine hundred different industrial diseases which may arise out of a person's employment.)

The maximum payment in silicosis cases has been raised from \$3,000.00 to \$4,000.00.

The weekly compensation rate is still based on 66 2/3% of the weekly wage, but the maximum has been increased from \$18.00 to \$21.00 and the minimum from \$7.00 to \$10.00.

The Legislature devised a sliding scale of benefits in death claims, based on the number of dependents and commencing from the date of death. Under these provisions, in the case of a worker leaving one dependent, such dependent would receive \$2.00 less than 2/3 of the weekly wage, and the benefits would increase by \$2.00 steps for each additional dependent up to five. Thus the minimum for one dependent would be \$8.00 and the maximum \$19.00. Under the \$2.00 step increases, the minimum for five dependents would therefore be \$16.00 and the maximum \$27.00. Payments will continue for 400 weeks, an increase of 100 weeks.

Burial allowances are now increased from \$200.00 to \$300.00.

11. a. WORKMEN'S COMPENSATION (Continued)

Previous to the new amendments, a maximum of five hundred weeks was allowed for total disability. This benefit period has been retained under the new amendments, except that for permanent total disability, such as the loss of both eyes, arms, legs, or any two thereof, benefits are extended to seven hundred fifty weeks.

Under the amendments, the benefits for a major loss, that is hand, arm, foot, leg, or eye, have been materially increased. They are as follows: hand, increased from 150 weeks to 200 weeks; arm, from 200 weeks to 250 weeks; foot, from 125 weeks to 150 weeks; leg, from 175 to 200 weeks; eye, from 100 weeks to 150 weeks. Under the new amendments, 80% loss of vision is equivalent to complete loss.

The waiting period of seven days after the starting of disability before compensation can be paid has been retained. Under the amendments, the pick-up of the waiting period commences at the fourth week, if the disability continues that long.

Before the amendments, the injured worker was entitled to hospitalization and medical care for ninety days after the date of injury. These provisions have been increased to six months, and at the discretion of the Compensation Commission an additional six months may be granted.

The agreement system has been abolished and direct payment of compensation without approval of the Commission has been substituted. Compensation is to be paid on the fourteenth day after the employer has notice or knowledge of the disability.

A Second Injury Fund is now established. This fund makes it possible for an employee who has previously lost a limb or an eye and subsequently loses another such member or organ to collect an aggregate of 750 weeks of compensation. The employer pays according to the specific loss schedule, and the difference between the number of weeks allowed under that schedule and 750 weeks of compensation is then paid from the Second Injury Fund.

The Second Injury Fund is financed by payments of \$1,000.00 into the State Treasury by the employers of persons fatally injured but having no dependents.

The weekly wage was computed before the amendments on a basis of a six-day week, for compensation purposes, a period not in keeping with the number of days currently worked per week in industry. This is now based by the amendments on the weekly wage of the employee at the time the injury occurs, but not less than forty times the hourly rate.

Under the old provisions, the maximum payment for any injury was \$9,000.00, or \$18.00 a week for 500 weeks. The amendments now provide for \$21.00 a week, making the total maximum amount \$10,500.00. Moreover, for permanent total disability the maximum sum has been increased to 750 weeks at \$21.00 a week, or a total of \$15,750.00.

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943

11.

a. WORKMEN'S COMPENSATION (Continued)

MINNESOTA COMPENSATION LAW

The present members of the Commission are as follows:

- J. D. Williams, Chairman
- A. E. Ramberg
- P. C. Reynolds
- E. D. McKinnon, Secretary
- E. L. Olson, Asst. Secretary

The following table shows the principal items of the changes made in the Minnesota Law at different periods as affecting our properties:

<u>MINNESOTA LAW</u>	<u>When Law went into effect Oct.1,1913</u>	<u>As Amended Apr.26, 19 19</u>	<u>As Amended June 6, 19 21</u>	<u>In effect since Oct. 1, 19 23</u>
Percentage of weekly wage	50	66 2/3	66 2/3	66 2/3
Maximum weekly compensation	10.00	15.00	18.00	20.00
Minimum weekly compensation	6.00	6.50	8.00	8.00
Waiting period	2 weeks	1 week	1 week	1 week
Waiting period picked up at end of	--	--	4 weeks	4 weeks
Maximum death payment	3,000.00	4,500.00	7,500.00	7,500.00
Maximum compensation for total disability	4,000.00	5,000.00	10,000.00	10,000.00

The provisions of the Compensation Law covering occupational diseases were completely revised during the year. This subject was covered by a special report made on January 24, 1944 by Mr. Walter F. Gries.

11. c. GROUP INSURANCE (Continued)

The direct work in connection with claims under the group insurance plan has been taken care of by Mr. Walter E. Johnson since the adoption of the plan on October 1, 1936. Every effort has been made to facilitate the prompt payment of claims. Frequent contacts are made with the men drawing benefits, and we find their attitude toward the plan exceedingly favorable.

The increase of 25% in life insurance, which became effective on December 20, 1937, remained in force throughout the year. A copy of the notice which was given to each employee at the time the increase was announced will be found in the annual report of the year 1937. This notice shows the amount of increase for each class of insurance, also the monthly premium, and the weekly benefit for sickness and accident.

Effective November 13, 1941, men placed on the Retirement Roll will be insured for an amount equal to one-half of the face value of the policy held at the time of retirement. The 25% increase which became effective on December 20, 1937 does not apply to the insurance policies of men placed on the Retirement Roll.

WELFARE DEPT. ANNUAL REPORT YEAR 1943

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, 1943. It includes all cases in which disability began prior to September 30, 1943.

	<u>Death Claims</u>		<u>Health &amp; 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>
Cliffs-Shaft	4	6,250.00	45	2,916.30	49	9,166.30
General Roll	3	6,250.00	10	489.43	12	6,739.43
General Storehouse & Shops	2	2,500.00	6	296.86	7	2,796.86
Ishpeming Hospital			7	588.85	7	588.85
Lloyd	1	1,875.00	34	2,741.43	35	4,616.43
Maas	1	1,875.00	51	3,099.71	51	4,974.71
Princeton	1	1,875.00	18	1,568.29	19	3,443.29
Spies-Virgil	2	2,500.00	9	486.85	11	2,986.85
Tilden			2	185.14	2	185.14
Retirement Roll	6	4,625.00			6	4,625.00
<b>Total - C. C. I. Co.</b>	<b>20</b>	<b>27,750.00</b>	<b>182</b>	<b>12,372.86</b>	<b>199</b>	<b>40,122.86</b>
Negaunee	4	6,875.00	45	2,660.00	49	9,535.00
Mather			8	431.14	8	431.14
<b>Total - Neg. Mine Co.</b>	<b>4</b>	<b>6,875.00</b>	<b>53</b>	<b>3,091.14</b>	<b>57</b>	<b>9,966.14</b>
Athens Iron Mining Co.	1	1,875.00	43	2,140.03	44	4,015.03
The C. P. & L. Company			3	34.00	3	34.00
<b>Total - All Companies</b>	<b>25</b>	<b>36,500.00</b>	<b>281</b>	<b>17,638.03</b>	<b>303</b>	<b>54,138.03</b>

Three of the twenty-five death claims shown above were paid disability benefits in addition to the death benefit which accounts for the discrepancy in the total number of cases shown.

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943

11.

## c. GROUP INSURANCE (Continued)

The following deaths occurred during the policy year ending September 30, 1943:

<u>Name</u>	<u>Mine</u>	<u>Date of Death</u>	<u>Amount of Insurance</u>
Alex Forstrom	Athens Mine	6-27-43	1875.00
Earl E. Maata	Cliffs Shaft	5-29-43	1875.00
Hilmer O. Anderson	" "	5-28-43	1250.00
Elmer Jarvinen	" "	6-14-43	1875.00
Crescenzo Sauro (2)*	" "	7-20-43	-----
Valentine Maki	" "	8-23-43	1250.00
Samuel Dozzi	Princeton Mine	2-25-43	1875.00
Andrew J. Yungbluth	General Roll	10-8-42	2500.00
Harry J. Shaney	" "	11-2-42	1875.00
Verne Johnson (1)	" "	8-18-43	1875.00
Alvin L. Chapman	General Storehouse	4-22-43	1250.00
Martin A. Gellein	" "	4-26-43	1250.00
Peter Lehto (2)	Lloyd Mine	9-3-43	1875.00
John Sleeman	Maas Mine	6-8-43	1875.00
Arthur E. Johnson (3)	Negaunee Mine	9-26-42	1250.00
Tony Marta	" "	4-11-43	1875.00
Derwin Butcher	" "	6-8-43	1875.00
John Solka (2)	" "	7-28-43	1875.00
Arthur S. Cox	Spies-Virgil	5-13-43	1250.00
Frank J. Filipezuk (2)	" "	7-30-43	1250.00
August Recklad	Retirement Roll	10-27-42	500.00
John K. Johnson	" "	12-20-42	500.00
John Scoble	" "	1-16-43	750.00
Jacob Bietala	" "	1-21-43	1875.00
Victor Carlson	" "	3-11-43	500.00
David H. Reed	" "	5-1-43	500.00

(1) Suicide

(2) Killed in occupational accidents

(3) " " non-occupational accidents

\* Wife in Italy. Unable to make payment

WELFARE DEPT. ANNUAL REPORT YEAR 1943.

23.

a. PENSION SYSTEM.

The pension system which went into effect on January 1, 1909 completed the thirty-fifth year of its operation in 1943.

No changes in the rates of pensions were made during the year 1943. On January 1, 1933, the pension payments were reduced 50%; those under \$20.00 remaining the same, 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 1943:

<u>No.</u>	<u>Name</u>	<u>Pension Began</u>	<u>Date of Death</u>
133	Philip Christian	6/1/1921	5/14/43
134	August E. Anderson	6/1/1921	2/20/43
214	August Brodine	7/1/1927	2/ 4/43
215	August Fagerberg	6/1/1927	10/26/43
234	Thomas Dyer	11/1/1928	8/13/43
241	Harry Brewer	1/1/1928	12/28/43
242	Emil J. Olson	1/1/1930	4/ 8/43
263	J. S. Mennie	1/1/1932	10/13/43

	<u>1942</u>	<u>1943</u>
Number of deaths	4	8
Number of Old Age pensions in force Dec. 31, 40		32
Average annual pension	\$ 290.80	320.20

There was one death in the Furnace Department pension payroll. This was

<u>No</u>	<u>Name</u>	<u>Pension Began</u>	<u>Date of Death</u>
20	Henry W. Nebel	7/1/1931	7/21/43

On December 31, 1943 there were two pensioners on the Furnace Department pension roll and the average annual pension was \$343.59.

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943.

23.

a. PENSION SYSTEM (Continued)

Pension payments for the years 1908 to 1943, inclusive, are as follows:

<u>Year</u>	<u>Old Age</u>	<u>Widows and Orphans</u>	<u>Total</u>
1908	69.10	48.00	117.10
1909	351.92	464.00	815.92
1910	896.44	1043.00	1939.44
1911	1690.37	2649.00	4339.37
1912	3865.95	3113.00	6798.95
1913	5133.62	3025.00	8158.62
1914	6179.57	3403.00	9582.57
1915	7910.35	2372.00	10282.35
1916	8787.02	1694.00	10481.02
1917	9327.22	1266.00	10593.22
1918	8889.12	944.00	9833.14
1919	9605.02	888.00	10493.02
1920	12613.29	814.00	13427.29
1921	21856.64	14.00	21870.64
1922	29063.85	168.00	29231.85
1923	29564.57	168.00	29732.57
1924	31987.64	168.00	32155.64
1925	34926.34	163.00	35089.34
1926	38924.88	143.00	39067.88
1927	45841.03	0.00	45841.03
1928	51869.03	0.00	51869.03
1929	52701.19	0.00	52701.19
1930	53779.24	0.00	53779.24
1931	56379.39	0.00	56379.39
1932	40615.13	0.00	40615.13
1933	30981.29	0.00	30981.29
1934	28205.25	0.00	28205.25
1935	24987.66	0.00	24987.66
1936	22736.32	0.00	22736.32
1937	20393.66	0.00	20393.66
1938	18360.44	0.00	18360.44
1939	16544.14	0.00	16544.14
1940	14237.87	0.00	14237.87
1941	12476.76	0.00	12476.76
1942	11632.15	0.00	11632.15
1943	<u>10246.66</u>	<u>          </u>	<u>10246.66</u>
	773630.14	22547.00	796177.14
Payment made by Cleveland Office in 1930	<u>2500.00</u>	<u>          </u>	<u>2500.00</u>
	\$ 776130.14		\$ 798677.14



WELFARE DEPT.      ANNUAL REPORT      YEAR 1943.

23.

a. PENSION SYSTEM (Continued)Republic Mine.

Two men on the Republic Mine pension roll died during the year 1943. These were:

<u>No.</u>	<u>Name</u>	<u>Pension began</u>	<u>Date of Death</u>
26	John Goodney	12/1/1926	4/22/1943
36	Emil Nymen	12/1/1928	11/ 6/1943

On December 31, 1943 there were four pensioners on the roll and the average annual pension for the year was \$321.25.

The payments made from October 1, 1920 to December 31, 1943, follow:

1920	\$278.61
1921	3427.97
1922	5672.82
1923	6641.51
1924	8172.96
1925	8379.08
1926	9539.90
1927	12185.24
1928	12768.21
1929	14199.74
1930	13148.40
1931	11809.51
1932	7673.31
1933	4908.04
1934	4400.52
1935	4160.52
1936	4031.36
1937	2853.58
1938	2028.88
1939	1868.88
1940	1868.88
1941	1741.92
1942	1488.00
1943	<u>1285.00</u>

\$ 144532.85

WELFARE DEPT. ANNUAL REPORT YEAR 1943.

23.

a. PENSION SYSTEM (Continued)

FURNACE DEPARTMENT.

Pension payments for the years 1910 to 1943, inclusive, are as follows:

<u>Year</u>	<u>Old Age</u>	<u>Widows and Orphans</u>	<u>Total.</u>
1910	\$ 111.75	0.00	111.75
1911	268.20	120.00	388.20
1912	268.20	180.00	448.20
1913	268.20	180.00	448.20
1914	268.20	180.00	448.20
1915	268.20	180.00	448.20
1916	268.20	60.00	328.20
1917	268.20	0.00	268.20
1918	268.20	0.00	268.20
1919	130.55	0.00	130.55
1920	223.80	0.00	223.80
1921	781.63	0.00	781.63
1922	1118.04	0.00	1118.04
1923	1179.38	0.00	1179.38
1924	2085.32	0.00	2085.32
1925	2833.39	0.00	2833.39
1926	5351.35	0.00	5351.35
1927	4819.73	0.00	4819.73
1928	5481.50	0.00	5481.50
1929	6137.02	0.00	6137.02
1930	6191.42	0.00	6191.42
1931	5531.30	0.00	5531.30
1932	3327.09	0.00	3327.09
1933	2528.04	0.00	2528.04
1934	2309.43	0.00	2309.43
1935	1930.54	0.00	1930.54
1936	1902.72	0.00	1902.72
1937	1662.72	0.00	1662.72
1938	1446.90	0.00	1446.90
1939	1374.96	0.00	1374.96
1940	1158.78	0.00	1158.78
1941	926.72	0.00	926.72
1942	846.72	0.00	846.72
1943	<u>687.17</u>	<u>0.00</u>	<u>687.17</u>
	\$ 64223.57	900.00	\$ 65123.57

WELFARE DEPT.      ANNUAL REPORT      YEAR 1943

23.

a. PENSION SYSTEM (Continued)LAND DEPARTMENT.

Erick Johnson continued on the pension roll during the year 1943. His annual pension amounts to \$240.00.

Total pension payments from January 1, 1927 to December 31, 1943 are as follows:

1927	\$ 333.36
1928	333.36
1929	333.36
1930	333.36
1931	333.36
1932	250.08
1933	240.00
1934	240.00
1935	240.00
1936	240.00
1937	240.00
1938	240.00
1939	240.00
1940	240.00
1941	240.00
1942	240.00
1943	<u>240.00</u>
	\$ 4556.88