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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXIV

COMPARISON OF DUST COUNTS

IN RAISING TO DRIFTING

| Mine | Average in Raising | Average in Drifting | General Average |
|---|---|---|---|
| Athens | 10.44 | 5.14 | 6.64 |
| Cliffs Shaft | 33.67 | 4.20 | 8.18 |
| Cambria-Jackson | ----- | 26.40 | 17.05 |
| Lloyd | ----- | 5.51 | 6.49 |
| Maas | ----- | ----- | 8.17 |
| Mather | 9.26 | 8.37 | 8.39 |
| Negaunee | ----- | 3.88 | 11.92 |
| Princeton | 17.77 | 6.65 | 8.48 |
| Spies-Virgil | 41.36 | 7.45 | 14.22 |

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXV

AVERAGES IN ORE COMPARED TO AVERAGES IN ROCK

| Mine | Average in Ore | Average in Rock | General Average |
|---|---|---|---|
| Athens | 6.42 | 7.35 | 6.64 |
| Cliffs Shaft | 6.69 | 11.22 | 8.18 |
| Cambria-Jackson | 9.17 | 40.68 | 17.05 |
| Lloyd | 6.51 | 6.46 | 6.49 |
| Maas | 4.94 | 1.24 | 8.17 |
| Mather | 12.72 | 7.25 | 8.39 |
| Negaunee | 14.05 | 3.88 | 11.92 |
| Princeton | 10.87 | 6.98 | 8.48 |
| Spies-Virgil | --- | 14.22 | 14.22 |

## TABLE XXV-A

### COMPARISON OF AVERAGE DUST COUNTS IN VARIOUS OPERATIONS

| Mine or Plant | Raising in Rock | Raising in Ore | Drifting in Rock | Drifting in Ore | Slicing in Ore | Stoping in Ore | Breaking Chunks | Blowing Out Cars | Loading From Chutes | Change House Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| Athens | 10.44 | ---- | 4.55 | ---- | 4.41 | ---- | ---- | 34.14 | 2.50 | ---- |
| Cliffs Shaft | 36.84 | 8.36 | 3.33 | 11.68 | ---- | 6.45 | ---- | ---- | ---- | ---- |
| Camb.-Jackson | ---- | ---- | 40.68 | 4.96 | 9.33 | ---- | 16.60 | ---- | ---- | ---- |
| Lloyd | ---- | ---- | 5.49 | 6.56 | 9.19 | ---- | 3.36 | 2.16 | 5.26 | ---- |
| Maas | ---- | ---- | 1.24 | ---- | 5.12 | ---- | ---- | 5.16 | 1.52 | 26.12 |
| Mather | 10.33 | 2.88 | 6.98 | 13.88 | 5.64 | ---- | ---- | ---- | 9.45 | ---- |
| Negaunee | ---- | ---- | 3.88 | 7.89 | 15.33 | ---- | ---- | 4.52 | 24.15 | ---- |
| Princeton | 23.42 | 6.48 | 3.57 | 11.89 | 11.35 | ---- | --- | 7.12 | ---- | ---- |
| Spies-Virgil | 41.36 | ---- | 7.45 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |

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e. Mine Rescue Training

During the fall months, mine rescue training was conducted by Mr. H. F. Rogers, Mr. T. W. Hill and myself. Examination of the men was conducted by Mr. Max Peterson, Mining Engr. of the U. S. Bureau of Mines.

Among the men trained are a number who do not pass the U. S. Bureau of Mines Physical requirements, but we are keeping on our lists all those who have had actual mining fire fighting experience while wearing Oxygen Breathing Apparatus and have proved themselves fit, able and cool headed under hazardous conditions. We do not keep any man on the list whose heart and lungs are not perfect and also eliminate the nervous type of man.

During 1946 we hope to replace a number of average mine rescue men with new and younger employees who can pass physical and mental requirements, but until we have enough of these new men we shall use the older ones.

A new Oxygen Breathing Apparatus is now on the market which does not require that a man meet the present physical requirements, but is not yet approved by the U. S. Bureau of Mines. This new apparatus does not require the use of a mouthpiece or nose clip and because of the fact that many of our best men have upper or lower, or both dentures they cannot use the Mc Caa type of oxygen apparatus. Also the weight of our present Mc Caa oxygen apparatus is 38 pounds compared to 13½ pounds in the new Chemox Apparatus.

At the present time we have 105 men who received mine rescue training during the fall months. Also if it were necessary we probably could use about 20 men who were dropped from the list and who wanted to give up mine rescue work. As men from the armed forces return we also shall have a number of good helmet men.

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11. ACCIDENTS AND PERSONAL INJURY

e. Mine Rescue Training (Cont'd.)

The following table shows the number of mine rescue men available at each mine.

TABLE XXVI

MEN TRAINED BY THE SAFETY DEPARTMENT AND EXAMINED BY U.S. BUREAU OF MINES 1945

| | | | |
|---|---|---|---|
| Athens Mine | 15 | Maas Mine | 8 |
| Cambria-Jackson | 15 | Mather Mine | 21 |
| Cliffs Shaft Mine | 13 | Negaunee Mine | 12 |
| Engineering Dept. | 5 | Princeton Mine | 4 |
| Lloyd Mine | 12 | Spies-Virgil | 10 * |

TOTAL 115

* Trained 1944

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11. ACCIDENTS AND PERSONAL INJURY

e. Mine Safety and Mine Rescue Courses (Cont'd.)

TABLE XXVII

FIRST AID SUPPLIES DISTRIBUTED

| Material | Number Distributed |
|---|---|
| Merthiolate Pads | 34,100 |
| Ounces of Merthiolate | 213 |
| 1" Roller Bandage | 390 |
| 2" " " | 337 |
| 3" " " | 273 |
| Rolls of Adhesive Tape | 40 |
| Picric Gauze | 268 |
| Plain Gauze | 496 |
| Leather Finger Cots | 128 |
| Merthiolate Applicators | 1,452 |
| Ozs. Aromatic Spirits of Ammonia | 13 |
| Tubes of Unguentine ($\frac{1}{2}$ oz.) | 20 |
| Ozs. Absorbent Cotton | 29 |
| Triangular Bandages | 3 |
| Pairs of Scissors | 20 |
| Totals | 37,782 |

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11. ACCIDENTS AND PERSONAL INJURY

e. Mine Safety and Mine Rescue Courses (Cont'd.)

Metal Mine Accident Prevention Course

During the early part of the year we trained 93 out of a possible 148 supervisors in Metal Mine Accident Prevention.

This course had more value in accident prevention than any I have ever known. It has been developed over a period of many years. The classes were held at the Athens Mine office for supervisors who live in Negaunee and vicinity and at the General Office for those living in the Ishpeming district. It required 10 classes of 2 hours duration to complete the course.

Members of the Safety Department took the Bureau of Mines Instructer, Max Peterson, to visit all properties to familiarize him with all our operating conditions and problems and also pictures were taken of various operations, devices and equipment. Lantern slides were made of some of these photographs and used to instruct classes, also slides were made of our accident statistics. The course was divided into 7 sections and time devoted to each section was as follows.

| | | |
|---|---|---|
| Accident Statistics | 1 | Class Period |
| Accidents from Falls of Ground | 2 | " Periods |
| Hoisting and Haulage Accidents | 2 | " " |
| Explosives Accidents | 2 | " " |
| Electrical and Mechanical Accidents | 1 | " Period |
| Fires, Gases and Ventilation | 1 | " " |
| Health and Other Accident Factors | 1 | " " |

The greatest benefit from the classes were the straight forward discussions drawn out of the men. I attended most of these classes mainly to cause various men to start discussions. Mr. Rogers and Mr. Hill also helped to draw these men out. We were able to call vital points of safety and operation from certain men by calling on them to begin a discussion.

At the conclusion of the course questionaires were given to each man who filled them in and returned them to us without his signature. Comments were very favorable.

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e. Mine Safety and Mine Rescue Courses (Cont'd.)

Metal Mine Accident Prevention Course (Cont'd.)

- 1 -

A summary of the various occupations represented follows:

| | | Total Employed | Number Completing | Partial |
|---|---|---|---|---|
| Superintendents and managers | - | 10 | 4 | 6 |
| Mining captains | - | 8 | 6 | 2 |
| Underground foremen | - | 9 | 8 | 1 |
| Shift bosses | - | 57 | 37 | 20 |
| Shaft foremen | - | 6 | 5 | 1 |
| Misc. underground foremen | - | 3 | 3 | 0 |
| "Extra" bosses | - | 4 * | 4 | 0 |
| Mechanics | - | 12 | 7 | 3 |
| Electricians | - | 16 | 5 | 3 |
| Open cut foremen | - | 1 | 1 | 0 |
| Surface foremen | - | 7 | 5 | 1 |
| Other supervisors (surface) | - | 5 | 2 | 0 |
| Mining engineers and geologists | - | 9 | 4 | 1 |
| Safety department | - | 3 | 3 | 0 |
| | | 150 | 94 | 38 |

* Includes only those attending one or more classes.

The attendance from the various mines operated by the company in the district follows:

- 2 -

| | | Total Employed | Number Completing | Partial |
|---|---|---|---|---|
| Athens Mine | - | 18 | 7 | 11 |
| Cambria-Jackson Mine | - | 12 | 12 | 0 |
| Maas Mine | - | 22 | 14 | 5 |
| Princeton Mine | - | 8 | 4 | 4 |
| Mather Mine | - | 11 | 9 | 2 |
| Negaunee Mine | - | 15 | 12 | 2 |
| Cliffs Shaft Mine | - | 20 | 19 | 0 |
| Lloyd Mine | - | 13 | 4 | 9 |
| Tilden Mine | - | 2 | 1 | 0 |
| General | - | 29 | 12 | 5 |
| | | 150 | 94 | 38 |

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous

Athens Mine Fire - November 28, 1945

On November 28, 1945, at approximately 8:00 A.M., a fire started in #42 contract, 660' sub, above 8th level. The fire was quickly extinguished by Mine Rescue Crews.

At midnight November 27th, the afternoon shift left #42 contract and opened the power switch on the 8th level which is the usual procedure. Nothing unusual had happened in the work place during the shift. All the equipment in the contract had been in use during the shift including the scraper hoist.

At about 8:00 A.M. on the 28th, the day shift crew of #42 contract threw in the power switch at the bottom of 816 A raise and proceeded to climb 816 raise. On reaching their work place at the top of 3-b raise the miners saw that the power cable was burning and that nothing could be done until the power was shut off on the 8th level (luckily these men realized that water could not be thrown on an electrical fire). One of the miners immediately went down to the 8th level, shut off the power and notified another miner who was close by. This other miner got in touch with the shift boss and he in turn had the mine fan shut down and notified the mining captain and superintendent. By the time the #42 contract miner reached his work place again the smoke from the fire had backed out toward the main raise and it was impossible for anyone to reach the fire without protection of respiratory equipment.

On receiving word of the fire the captain and superintendent sent out a call for Mine Rescue Men who were on shift and also notified the safety department. Mr. Rogers, safety inspector, happened to be at the adjoining Negaunee Mine and soon arrived with Oxygen Breathing Apparatus. Ten Mine Rescue Men went to the bottom of #816 raise, five stayed there in reserve and five climbed the raise and went to the top of 3-b raise where the fire was put out in just a few minutes. The smoke was not very thick so did not interfere with the work to any great extent. The number two crew did not have to use the oxygen apparatus.

Inspection after the fire showed the regular power cable to near the top of the raise; from that point through the raise cover to the switch box it was armored. It had not been squeezed but was hanging from the timber legs. Apparently during

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

blasting in the contract a small splinter had penetrated the cable insulation and later water entered this small hole and started a short from the wire to the armored cover of the cable. Conditions were just right at the time the power was turned on and the electric arc set fire to the cribbing piled behind the timber sets.

All timbering in this area is dry so if the fire had gained headway we would have had a real job on our hands.

The Mine Rescue Crews were experienced men and wasted no time in testing and getting into their apparatus. Also because the smoke was not very dense it allowed these men to get water on the fire without loss of time. Their work was well done and showed the value of training.

Athens Mine - August 10, 1945

Fire on top of Power Line Pole.

Cause - short circuit.

Put out by company police. Damage only to power line.

Cambria-Jackson Mine - February 17, 1945

Fire in Launder leading into machine shop.

Cause - Thawing out pipe line with blow torch.

Extinguished by police. Damage slight.

Cambria-Jackson Mine - May 6, 1945

Fire in railroad tie pile.

Cause - unknown.

Put out by police. Damage very slight.

Cambria-Jackson Mine - September 18, 1945

Fire in small building near headframe.

Cause - Plank left on top of electric heater.

Put out by police. No damage.

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

Lloyd Mine - November 21, 1945

Fire on landing in headframe.

Cause - Thawing frozen air line by using oily waste.

Fire small and put out with one pyrene extinguisher, by mining captain and a few others.

Lloyd Mine - February 22, 1945

Checking station and Fuse House.

Cause - Overheated metal smoke pipe form coal fired heating stove. Little damage to roof.

Put out by landers and police.

Negaunee Mine - May 19, 1945

Grass fire near transformer house.

Cause - Short circuit caused by broken insulator on high voltage line.

Negaunee Fire Department called to put out fire. No damage done.

Negaunee Mine - May 20, 1945

Grass fire near mine caves.

Cause - unknown.

Put out by policemen.

No other fires are known to have occurred in or about the mines during the year.

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

Spies-Virgil Mine Fire Bulkheads

During the year the entire Virgil side of the Spies-Virgil operations was sealed off with heavy concrete bulkheads on the 4th, 6th and 8th levels.

For almost a year temperatures and air analyses were taken by the department in the 4th level return air to determine whether the fire in the Virgil property was increasing or decreasing. It was interesting to note from these tests that the temperatures dropped during the early part of the year and then started to rise with oxygen content low. Finally a large cave occurred which connected the fire area directly with the first level. The flow of air increased from 7,000 c.f.m. to 22,000 c.f.m. on the 8th level and steam started to come out of the Virgil shaft which finally reached 155 degrees. This did not change conditions in the one or two contracts left in the stope but demanded constant watching. A fan was installed in a brattice on the 8th level to insure the safety of the men in the stopes. This fan was never needed. When mining was finished bulkheads were built as already mentioned but the top of the Virgil shaft was left partially open to release any pressure which may develope. At present there is a slight suction on all three bulkheads and a very small amount of air coming up the Virgil shaft with temperatures almost normal. It is possible we may be able to cover the Virgil shaft completely at some future date, depending on conditions we are able to find.

Lake Superior Mine

Mr. S. W. Sundeen, Mr. Burton Boyum and myself in company with the Oliver Mining Company engineer made an inspection of the above mine with the purpose of determining whether diamond drilling could be done from this mine into the Cliffs Shaft Mine. My part was mainly on the hazards which would be involved. My recommendations are contained in a separate report and could not be considered favorable for the job.

Ishpeming Hospital

Tests were made of the relative humidity in the operating room of the hospital when it was learned that inflamable and explos-

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

ive gas would probably be used as an anesthesia. Tests showed the need of a humidifier and a recommendation to that effect was made to Mr. Walter Gries.

Reports on Accident Statistics

These reports were sent out as usual to the following - Marquette County Mine Inspector, Iron County Mine Inspector, Itasca County Mine Inspector, Department of Labor, Department of the Interior, Lake Superior Mining Section, National Safety Council and the Edison Electric Institute.

Republic Mine

The department supervised the electrical blasting of ore samples in the outcropping at the old Republic Mine. All this blasting was done without damage to any of the surrounding buildings.

Ishpeming High School Exhibit

With the assistance of a representative of the Hercules Powder Company we placed an exhibit of dummy electric and fuse blasting caps on the High School Bulletin Board. This exhibit is still being used as a constant reminder of the dangers of detonators.

Mine Rescue Station

The company has one of the best equipped private mine rescue stations in the country where all of our mine rescue training is done and equipment is stored which is not in use. All mine rescue equipment is inspected at least once every month, but usually twice a month to keep it in first class condition for instant use. Inspection of equipment is done either by Mr. H. F. Rogers, Safety Inspector, Mr. T. W. Hill, Ventilation Engineer, or myself. Once a year we invite the Safety Division of the U. S. Bureau of Mines to send a representative to make an inspection of equipment and also make any recommendations he sees fit. This man usually examines our mine rescue men for certificates of training during the same visit.

Summary

During 1945 our severity rating was one of the best the company

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

has experienced. To date accident statistics of other companies are not available for 1945 with one exception where each range has listed severity ratings which have been available to me. As this is one of the larger operating companies I shall list their rates as a comparison. Also following are some of the available rates for years previous to 1945 which can be used as a comparison.

One of the strange things in the average ratings is the fact we are able to have a fairly high frequency rating and yet a very low severity rating. Although all accidents are potentially serious and frequency rates must be improved, the cost, loss in production, loss of time and suffering are reflected in the severity rating rather than the frequency ratings. All safety contests are judged by severity.

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

1945 Severity Ratings

| | | | | | | |
|---|---|---|---|---|---|---|
| A - Mining Company | - | Minnesota Mines | - | Severity Rating | | 2.184 |
| | - | Marquette-Gogebic | - | " | " | 6.57 |
| | - | Menominee | - | " | " | 10.20 |
| C. C. I. Co. | * | | * | " | " | 1.908 |

Comparison of Frequency and Severity of accidents in Iron Ore Mines of the Lake Superior District from 1940 to 1944 inclusive.

| | | | | |
|---|---|---|---|---|
| 1940 | Frequency | 12.27 | Severity | 4.46 |
| 1941 | " | 13.41 | " | 4.85 |
| 1942 | " | 17.23 | " | 5.76 |
| 1943 | " | 21.09 | " | 5.27 |
| 1944 | " | 22.083 | " | 4.292 |

C. C. I. Co. Frequency and Severity 1940 to 1945

| | | | | |
|---|---|---|---|---|
| 1940 | Frequency | 11.19 | Severity | 5.852 |
| 1941 | " | 11.43 | " | 4.819 |
| 1942 | " | 9.39 | " | 2.177 |
| 1943 | " | 20.30 | " | 3.986 |
| 1944 | " | 34.67 | " | 3.61 |
| 1945 | " | 33.04 | " | 1.908 |

Rates 1940 to 1943 inclusive only compensable accidents.
Rates 1944 to 1945 include all accidents.

Frequency and Severity of accidents in Metal Mines entered in National Safety Competition 1940 - 1943.

| | | | | |
|---|---|---|---|---|
| 1940 | Frequency | 14.47 | Severity | 6.09 |
| 1941 | " | 20.14 | " | 6.85 |
| 1942 | " | 20.62 | " | 5.55 |
| 1943 | " | 24.21 | " | 6.27 |

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11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

Average Frequency and Severity accidents in the Lake Superior District by methods of mining during four year period 1940 to 1943.

| | | | | |
|---|---|---|---|---|
| General Shops | Frequency | 5.41 | Severity | 1.17 |
| Open Cuts and Concentrator Plants | " | 11.14 | " | 4.58 |
| Top Slicing | " | 21.08 | " | 5.16 |
| Stoping | " | 19.25 | " | 6.48 |
| Sub-Level Caving | " | 24.10 | " | 7.09 |

Frequency and Severity of C. C. I. Co. 1945

| | | | | |
|---|---|---|---|---|
| General Shops | Frequency | 14.71 | Severity | 0.61 |
| Open Cuts and Concentrator Plants | " | 14.33 | " | 0.161 |
| Top Slicing | " | 47.94 | " | 3.282 |
| Stoping | " | 30.10 | " | 1.382 |
| Sub-Level Caving | " | 33.26 | " | 0.721 |

# ANNUAL REPORT OF THE MINING ENGINEERING DEPARTMENT FOR THE YEAR ENDING DECEMBER 31, 1945

The books of photographic maps and sections showing the work done during 1945 accompany this report. The maps show, in red, the areas that were mined and the development during the year. The sections of the Minnesota open pit properties, show, in color, the material left in place adjacent to the open pits as of the end of the operating season. There are also some views of the properties. Books have been prepared for the various companies interested in the different mines and the following list shows what books have been prepared for these companies, 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, 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 Ore Company | Hill-Trumbull and Holman-Cliffs. |
| Pittsburg 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 loose-leaf book was prepared for each of the partners of the Mesaba-Cliffs Mining Company with an extra copy for the Republic Steel Corporation. The books for the Bethlehem Steel Company and Pickands Mather & Company were also loose-leaf. A book was also prepared for the Canisteo Mining Company.

Similar loose-leaf books were made for fee-owners and superintendents as follows:

| Person or Company | Mines |
|---|---|
| Arthur Iron Mining Company | Hill-Trumbull and North Star-Bingham Lease of Holman-Cliffs. |
| Teal Lake Iron Mining Company | Cambria. |
| Walter A. Sterling, Asst. Manager, | Canisteo, Hill-Trumbull, and Holman-Cliffs. |
| W. R. Atkins, Supt. | Negaunee. |
| H. C. Bolthouse, Supt. | Hill-Trumbull and Holman-Cliffs. |
| F. J. Haller, Supt. | Mather. |
| O. Marjama, Supt. | Lloyd and Spies-Virgil. |
| H. O. Moulton, Supt. | Maas. |
| W. A. Pakkala, Supt. | Canisteo. |
| C. R. Sundeen, Supt. | Athens. |
| S. W. Sundeen, Supt. | Cliffs-Shaft. |
| J. Trosvig, Supt. | Cambria-Jackson. |
| J. S. Westwater, Supt. | Princeton. |

B. MAP REPORTS

Two sets of prints of the mine maps of the Michigan Mines were prepared at the end of each month, scale 1" = 50', showing, in red, the work done underground during that month. One set was for the Assistant Manager and the other for the Mine Superintendent. Maps of the Cliffs-Shaft Mine were posted four times during the year instead of monthly and sets made for the Assistant Manager and Mine Superintendent.

Other map reports were made for fee-owners and others, during the year, 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 Pickands Mather & Company. There was no work done on the Corbit Lease during the year so no maps were sent to the trustees of the Maria Corbit estate.

CLIFFS-SHAFT MINE

Two sets of whiteprints of the geological maps of the Bancroft and Section 10 Leases, scale 1" = 50', were prepared for the Oliver Iron Mining Company after each quarterly survey,- one for the Ishpeming office and one for the Duluth office. These maps showed in red the work done since the previous survey. The maps 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 estimate of the ore reserves for the Michigan State Tax Commission. Two copies of the estimate of ore reserves of the Bancroft and Section 10 Leases as of December 31, 1945, prepared for the Michigan State Tax Commission, accompanied the maps for the end of the year.

MAAS MINE

Each month a set of blueprints, scale 1" = 50', of the Maas Mine underground maps was sent to Mr. R. C. Miller of Negaunee, Michigan, showing in red the workings in the Maas Mine during the month. There was comparatively little work done on the Roman Catholic Cemetery Lease during the year but prints of that portion of the mine were sent to Mr. R. S. Archibald, Negaunee, Michigan, for the months in which mining was done.

NEGAUNEE MINE

Each month a set of prints of the working tracings of the Negaunee Mine maps, scale 1" = 50', were sent to Mr. R. C. Miller, Negaunee, Michigan, showing in red the areas mined during the month. A set of whiteprints of the North-South sections affected by mining in 1945, scale 1" = 50', of the mine was sent to Dr. Donald M. Fraser, Geologist for the Bethlehem Steel Company, Bethlehem, Pa.

SPIES-VIRGIL MINE

Six sets of prints of the Virgil Mine workings maps, scale 1" = 50', were sent to the fee-owner of the Virgil property for the first, second and third quarters, showing the areas mined during the previous three months. The fourth quarterly maps were omitted because operations in the Virgil had been suspended during September.

MICHIGAN STATE TAX COMMISSION

Estimates of the ore reserves in the Athens, Cambria-Jackson, Cliffs-Shaft, Lloyd, Maas, Mather, Negaunee, Princeton and Spies-Virgil Mines as of December 31, 1945, were made for the Michigan State Tax Commission. Accompanying these estimates of reserves were Annual Report maps of each of the mines showing the areas used in making these estimates and the general geological structure adjacent to the areas mined during the year. With the exception of the Mather Mine, all the estimates were made from plan maps. The estimate of the Mather Mine reserves was made from cross-sections. Two sets of these estimates and maps were prepared, one for the Tax Commission and one for the Engineering Department at Ishpeming, Michigan.

C. REMARKS ON MISCELLANEOUS DOCUMENTS AND ABSTRACTS

All documents affecting lands and rights held by the Company and its subsidiaries passed through the Engineering Department for recording and approval. The only exceptions to this were the permits for timber cutting by the Lumbering Department. These documents were placed on the Department records and initialed by Mr. Brewer, and also by Mr. Derby where certain mineral rights were affected. Copies of some of the documents that affect mineral lands were kept on file in the Engineering Department.

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

| Classification | Number Received | Last File Number |
|---|---|---|
| Mining Leases | 0 | 76 |
| Miscellaneous Documents | 26 | 1573 |
| Easements | 1 | 423 |
| Rights of Way | 0 | 224 |
| Water Rights | 1 | 67 |
| Surface Leases | 81 | 5860 |
| Applications for Sale | 0 | 180 |
| Sales | 112 | 3418 |
| Tax Histories | 0 | 704 |

The following comments cover the various documents as listed above, which were entered on the records of the Engineering Department during 1945:

MINING LEASES

There were no mining leases made or surrendered during the year.

The Cleveland-Cliffs Iron Company purchased the stock of the Canisteo Mining Company during the latter part of the year, but the details of the transfer have not been received in the Engineering Department.

MISCELLANEOUS DOCUMENTS

This classification covers documents of all types affecting the operating mines or mineral lands. There were seven documents covering purchase of lots in the City of Negaunee and five relative to the purchase of property at the Spies

Mine in Iron River. Five documents covered lands and rights acquired in Minnesota. Two documents covered sales and two covered railroad rights of way and five others conveyed miscellaneous rights.

EASEMENTS

This classification covers the easements for transmission line rights of way for the Cliffs Power & Light Company. The one easement received during the year was for a portion of the power line to the L. S. & I. Railroad shops at Marquette.

RIGHTS OF WAY

This classification covers railroad rights of way.

WATER RIGHTS

These are permits for the discharge of mine water across lands adjacent to the mines. The one permit received this year was made because of a land transfer near the Spies Mine.

SURFACE LEASES

All surface leases originate in the Land Department and cover permission to use Company lands for residence, camps, farms, gardens, etc.

APPLICATIONS FOR SALE

These also originate in the Land Department and are preliminary reports covering lands to be sold for farms in areas not valuable for their minerals.

SALES

This classification covers the transfer of property of all kinds. There were twenty-three Bills of Sale for Company houses on leased land. There were forty-three land contracts or deeds for farms or timber land, four for miscellaneous small parcels, and three miscellaneous permits. There were twenty-two deeds covering platted lots in Gwinn, twelve in Munising, and five other miscellaneous platted lots.

TAX HISTORIES

No tax histories were received during the year.

ABSTRACTS

There was no work done on abstracts during the year.

D. THE FORCE

Mr. Robert M. DeGabriele was the only Engineer entering the Department during the year. Mr. Leo A. Glass was employed one month as Draftsman and was replaced by Mr. Lawrence K. Viall who is still a member of the Department. Mr. Robert M. McGregor was employed as helper during the summer months. Mr. Werner J. Anderson left the Department to return to school and C. Arthur Koski re-entered the Department after his discharge from the military service. Miss Elizabeth M. LaForais left at the end of the year.

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

| Name | Position | Entered | Left | 1945 Employment |
|---|---|---|---|---|
| Carl Brewer | Recorder | | | 12 Months. |
| Robert M. DeGabriele | Engineer | Dec. 3rd | | 1 " |
| John M. Haivala | " | | | 12 " |
| Grant T. Hollett | " | | | 12 " |
| T. Adolph Kauppila | " | | | 12 " |
| Hugo H. Korpinen | " | | | 12 " |
| Maxwell H. Madsen | " | | | 12 " |
| Leo A. Glass | Draftsman | Mar. 19th | Apr. 13th | 1 " |
| W. Harlow Stannard | " | | | 12 " |
| Lawrence K. Viall | " | Apr. 24th | | 8 " |
| Edgar G. Curtis | Surveyor | | | 12 " |
| Ernest A. Oja | " | | | 12 " |
| Harry C. Swanson | " | | | 12 " |
| Clifford Amel | Helper | | | 12 " |
| Werner J. Anderson | " | | Aug. 25th | 8 " |
| John J. Dobson | " | | | 12 " |
| C. Arthur Koski | " | Dec. 4th | | 1 " |
| Robert M. McGregor | " | July 5th | Sept. 22nd | 2½ " |
| Louis R. Miller, Jr. | " | Aug. 17th | | 4½ " |
| Elizabeth M. LaForais | Stenographer | | Dec. 31st | 12 " |
| Marie J. Nicholas | " | | | 12 " |

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

| Name | Date Entered | Length of Service |
|---|---|---|
| Carl Brewer | August, 1906 | 27 years, 3 months. |
| Robert M. DeGabriele | December, 1945 | 1 " |
| John M. Haivala | March, 1943 | 2 " 10 " |
| Grant T. Hollett | August, 1940 | 5 " 4½ " |
| T. Adolph Kauppila | March, 1944 | 1 " 10 " |
| Hugo H. Korpinen | September, 1942 | 3 " 3½ " |
| Maxwell H. Madsen | September, 1943 | 2 " 4 " |
| W. Harlow Stannard | November, 1940 | 5 " 2 " |
| Lawrence K. Viall | April, 1945 | 8 " |
| Edgar G. Curtis | February, 1944 | 1 " 11 " |
| Ernest A. Oja | March 1943 | 2 " 9 " |
| Harry C. Swanson | June, 1943 | 2 " 7 " |
| Clifford Amel | May, 1944 | 1 " 7½ " |
| John J. Dobson | December, 1943 | 2 " ½ " |
| C. Arthur Koski | June, 1941 | 11 " |
| Louis R. Miller, Jr. | August, 1945 | 4½ " |
| Elizabeth M. LaForais | October, 1943 | 2 " 3 " |
| Marie J. Nicholas | March, 1943 | 2 " 9½ " |

In the above table the "length of service" covers only that period the men were employed in the Engineering Department. Some of them have been in other Departments at one time or another.

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

| Name | Days Worked | Days Sick | Days Absent |
|---|---|---|---|
| Carl Brewer | 266 | - | 11 |
| Robert M. DeGabriele | 20 | - | - |
| John M. Haivala | 267½ | - | 12½ |
| Grant T. Hollett | 268½ | 1 | 11 |
| T. Adolph Kauppila | 270½ | 1 | 7 |
| Hugo H. Korpinen | 273½ | 1½ | 5 |
| Maxwell H. Madsen | 270½ | - | 7½ |
| Leo A. Glass | 20 | - | - |
| W. Harlow Stannard | 263½ | 2 | 12½ |
| Lawrence K. Viall | 181 | 2 | 6 |
| Edgar G. Curtis | 265½ | 3½ | 13 |
| Ernest A. Oja | 271½ | - | 9½ |
| Harry C. Swanson | 276½ | 2 | 7 |
| Clifford Amel | 272½ | 3½ | 3½ |
| Werner J. Anderson | 175½ | - | 8½ |
| John J. Dobson | 264 | 2½ | 14½ |
| C. Arthur Koski | 13½ | - | 5½ |
| Robert M. McGregor | 51 | 1 | 6 |
| Louis R. Miller, Jr. | 93½ | 5½ | 3 |
| Elizabeth M. LaForais | 265½ | 5 | 6½ |
| Marie J. Nicholas | 239½ | 26½ | 11 |

The following table shows the distribution of time spent underground, in the field, and in the office:

| Name | Underground | Field | Office | Total |
|---|---|---|---|---|
| Carl Brewer | 1 | 53 | 212 | 266 |
| Robert M. DeGabriele | 5½ | - | 14½ | 20 |
| John M. Haivala | 110½ | 6½ | 150½ | 267½ |
| Grant T. Hollett | 104½ | 41½ | 122½ | 268½ |
| T. Adolph Kauppila | 120½ | 22½ | 127½ | 270½ |
| Hugo H. Korpinen | 105½ | 27 | 141 | 273½ |
| Maxwell H. Madsen | 69 | 37½ | 164 | 270½ |
| Leo A. Glass | - | - | 20 | 20 |
| W. Harlow Stannard | 6 | 31 | 226½ | 263½ |
| Lawrence K. Viall | - | 10½ | 170½ | 181 |
| Edgar G. Curtis | 75½ | 50½ | 139½ | 265½ |
| Ernest A. Oja | 101 | 68½ | 102 | 271½ |
| Harry C. Swanson | 115 | 74½ | 87 | 276½ |
| Clifford Amel | 89 | 97 | 86½ | 272½ |
| Werner J. Anderson | 65½ | 36 | 74 | 175½ |
| John J. Dobson | 108 | 52 | 104 | 264 |
| C. Arthur Koski | 4 | 3 | 6½ | 13½ |
| Robert M. McGregor | - | 27½ | 23½ | 51 |
| Louis R. Miller, Jr. | 21 | 30 | 42½ | 93½ |
| Elizabeth M. LaForais | - | - | 265½ | 265½ |
| Marie J. Nicholas | - | - | 239½ | 239½ |
| TOTAL | 1,101½ | 668½ | 2,519½ | 4,289½ |
| % | 25.7 | 15.6 | 58.7 | 100.0 |

The following resume of the work done by the members of the Department only refers to special work. A great deal of their time was spent in making the periodic inspections of working places, conferences with the Superintendents and Mining Captains, and general planning of underground work. The engineers made the monthly map reports and assisted the Superintendents in writing their monthly reports. They also assisted in the planning of new development and in geologizing underground workings. The engineers made the estimates of ore in stock and ore reserves. The practice of using two crews, each under a Surveyor, for giving lines, making surveys, etc. was continued throughout the year. This has been a great help as it permits more underground surveying than was possible previously and relieves the engineer of this work and gives him more time for planning and consultation with the Superintendent. One of these crews was under Mr. Swanson and the other was under Mr. Curtis. Mr. Swanson and his crew did the surveying at the Cambria-Jackson, Lloyd, Mather and Spies-Virgil Mines, while Mr. Curtis and crew took care of the Athens, Maas, Negaunee, Princeton and Tilden Mines. A special crew was organized during the summer under Mr. Oja for field work. Mr. Oja also assisted Mr. Madsen in surveying in the Cliffs-Shaft Mine.

CARL BREWER, Recorder, supervised the general work in the Department and made plans for the surface and underground maps, surveys, etc. He checked the various documents passing through the office and compiled the Annual Report books, Tax Commission report, stockpile estimates, etc. He spent a great deal of time planning for additional residential areas for the City of Ishpeming and made a special report on this subject. He prepared the tax lists for the Mining Department and the Cliffs Power & Light Company lands.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 43 | 209½ | 252½ | 94.9 |
| Cambria-Jackson Mine | - | 1 | - | 1 | .4 |
| Spies-Virgil Mine | - | 7 | - | 7 | 2.6 |
| Geological Department | 1 | 1 | - | 2 | .8 |
| Section 34, 47-28 | - | 1 | 2½ | 3½ | 1.3 |
| Total | 1 | 53 | 212 | 266 | |
| % | 0.4 | 19.9 | 79.7 | | 100.0 |

ROBERT M. DeGABRIELE, Engineer, entered the Department on December 3rd. He spent the month accompanying the other engineers through the different mines to familiarize himself with the nature of the work. He also assisted Mr. Hollett in the preparation of the maps and sections for the ore reserve estimates of the Cambria-Jackson and Mather Mines.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Athens Mine | 1 | | | 1 | 5.0 |
| Cambria-Jackson Mine | | | 9½ | 9½ | 47.5 |
| Lloyd Mine | | | 4 | 4 | 20.0 |
| Maas Mine | 1½ | | 1 | 2½ | 12.5 |
| Mather Mine | 1 | | | 1 | 5.0 |
| Negaunee Mine | 1 | | | 1 | 5.0 |
| Princeton Mine | 1 | | | 1 | 5.0 |
| Total | 5½ | - | 14½ | 20 | |
| % | 27.5 | - | 72.5 | | 100.0 |

JOHN M. HAIVALA, Engineer, did the engineering work at the Negaunee and Athens Mines for the entire year. He made a special estimate of the ore reserves in the Athens Mine during September for Pickands Mather & Company.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Athens Mine | 56½ | 2½ | 90½ | 149½ | 55.8 |
| Maas Mine | 2 | | | 2 | .8 |
| Negaunee Mine | 52 | 3 | 60 | 115 | 43.0 |
| Tilden Mine | | 1 | | 1 | .4 |
| Total | 110½ | 6½ | 150½ | 267½ | |
| % | 41.3 | 2.4 | 56.3 | | 100.0 |

GRANT T. HOLLETT, Engineer, was in charge of the engineering work at the Mather and Cambria-Jackson Mines throughout the year. Most of his time was spent at the Mather Mine because of the large amount of development work and the special problems that arose at that property.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Cambria-Jackson Mine | 32½ | 9½ | 38 | 80 | 29.8 |
| Mather Mine | 72 | 32 | 84½ | 188½ | 70.2 |
| Total | 104½ | 41½ | 122½ | 268½ | |
| % | 38.9 | 15.5 | 45.6 | | 100.0 |

T. ADOLPH KAUPPILA, Engineer, was in charge of the engineering work at the Maas and Princeton Mines throughout the year. At the Maas Mine, he kept track of production of the various contracts on the different leases for the mine office. He worked with the Superintendents and Captains planning development and underground work in general. He made a special report at the Maas Mine, showing the effect of poor ventilation on production and a comparison of wet and dry areas.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | 1 | 2 | 7½ | 10½ | 3.9 |
| Cambria-Jackson Mine | | ½ | | ½ | .2 |
| Maas Mine | 72 | 3 | 69 | 144 | 53.3 |
| Princeton Mine | 47½ | 17 | 51 | 115½ | 42.6 |
| Total | 120½ | 22½ | 127½ | 270½ | |
| % | 44.5 | 8.3 | 47.2 | | 100.0 |

HUGO H. KORPINEN, Engineer, had charge of the engineering work at the Lloyd and Spies-Virgil Mines for the entire year. He made the survey for the Mechanical Department in connection with the alignment of the pulley sheaves in the Lloyd Mine headframe. He also planned the development for stopes at both properties with the superintendent and mining captain. At the Spies, he spent considerable time on the installation of weirs and investigating the water in the East deposit workings.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Lloyd Mine | 55 | 11 | 68½ | 134½ | 49.2 |
| Spies-Virgil Mine | 21½ | 2½ | 46 | 70 | 25.6 |
| Geological Department | 29 | 3½ | 26½ | 59 | 21.5 |
| Otis Steel Company | | 10 | | 10 | 3.7 |
| Total | 105½ 9 | 27 | 141 | 273½ | |
| % | 38.5 | 9.9 | 51.6 | | 100.0 |

MAXWELL H. MADSEN, Engineer, was in charge of the engineering work at the Cliffs-Shaft and Tilden Mines during the year. At the Cliffs-Shaft Mine, he also did some geology and gave lines for raises, drill holes, etc. At the Tilden Mine, he gave lines for blast holes and planned stripping, grades for roads, etc. with the superintendent.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Cliffs-Shaft Mine | 69 | 2 | 106½ | 177½ | 65.6 |
| Princeton Mine | | 1 | | 1 | .4 |
| Tilden Mine | | 34½ | 57½ | 92 | 34.0 |
| Total | 69 | 37½ | 164 | 270½ | |
| % | 25.5 | 13.8 | 60.7 | | 100.0 |

LEO A. GLASS, Draftsman, entered the Department on March 19th and left on April 13th. Most of his time was spent in making new working tracings for the Athens Mine. He left because of a desire to take up other work.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| Athens Mine | - | - | 18 | 18 | 90.0 |
| Geological Department | - | - | 2 | 2 | 10.0 |
| Total | - | - | 20 | 20 | 100.0 |
| % | - | - | 100.0 | | 100.0 |

W. HARLOW STANNARD, Draftsman, was engaged throughout the year in making maps, tracings, special drawings and charts as were needed. He posted some of the diamond drill records for the Geological Department.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 3 | 88½ | 91½ | 34.7 |
| Athens Mine | - | - | 1½ | 1½ | .6 |
| Cambria-Jackson Mine | - | - | 5 | 5 | 1.9 |
| Lloyd Mine | - | - | 4 | 4 | 1.5 |
| Maas Mine | - | - | 7 | 7 | 2.7 |
| Mather Mine | 1 | ½ | 22 | 23½ | 8.9 |
| Princeton Mine | - | - | 10 | 10 | 3.8 |
| Negaunee Mine | - | - | 6½ | 6½ | 2.5 |
| Spies-Virgil Mine | 4 | - | 6½ | 10½ | 3.9 |
| Geological Department | 1 | - | 69 | 70 | 26.5 |
| Otis Steel Company | - | 10 | - | 10 | 3.8 |
| Section 34, 47-28 | - | 17½ | 6½ | 24 | 9.2 |
| Total | 6 | 31 | 226½ | 263½ | |
| % | 2.3 | 11.7 | 86.0 | | 100.0 |

LAWRENCE K. VIALL, Draftsman, entered the Department on April 24th. He has spent his time in the office making tracings, maps, etc. as were needed for the various mines. He also posted diamond drill records for the Geological Department.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | - | 14 | 14 | 7.7 |
| Athens Mine | - | - | 6 | 6 | 3.3 |
| Cambria-Jackson Mine | - | - | 8½ | 8½ | 4.7 |
| Cliffs-Shaft Mine | - | - | 8 | 8 | 4.4 |
| Maas Mine | - | - | 45½ | 45½ | 25.2 |
| Mather Mine | - | - | 40½ | 40½ | 22.5 |
| Negaunee Mine | - | - | 8 | 8 | 4.4 |
| Princeton Mine | - | 1 | 5 | 6 | 3.3 |
| Spies-Virgil Mine | - | 6 | 1 | 7 | 3.9 |
| Tilden Mine | - | ½ | 5 | 5½ | 3.0 |
| Geological Department | - | - | 23½ | 23½ | 12.9 |
| Section 34, 47-28 | - | 3 | - | 3 | 1.7 |
| Total | - | 10½ | 170½ | 181 | |
| % | - | 5.8 | 94.2 | | 100.0 |

EDGAR G. CURTIS, Surveyor, did a great deal of the surveying at the Athens, Maas, Negaunee and Princeton Mines and, in July, took over that for the Cambria-Jackson Mine also. This surveying consists of mapping sub-levels, location of raises, giving lines for development drifts, drill holes, etc.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 17 | 2½ | 19½ | 7.3 |
| Athens Mine | 26½ | ½ | 44½ | 71½ | 26.9 |
| Cambria-Jackson Mine | 6½ | 5½ | 9 | 21 | 7.9 |
| Cliffs-Shaft Mine | ½ | - | - | ½ | .2 |
| Maas Mine | 17½ | 3 | 42 | 62½ | 23.5 |
| Mather Mine | 1 | - | - | 1 | .4 |
| Negaunee Mine | 10 | 1 | 17½ | 28½ | 10.7 |
| Princeton Mine | 13½ | 18½ | 23½ | 55½ | 20.9 |
| Tilden Mine | - | 1 | - | 1 | .4 |
| Geological Department | - | 4 | ½ | 4½ | 1.8 |
| Total | 75½ | 50½ | 139½ | 265½ | |
| % | 28.4 | 19.0 | 52.6 | | 100.0 |

ERNEST A. OJA, Surveyor, was a helper for the first half of the year and a Surveyor for the balance. As Helper, he assisted in the underground and surface surveys especially in the Cliffs-Shaft Mine. In the office he helped in making blueprints, calculations, etc. In July, when he was made a Surveyor, he took charge of the survey party contouring in Section 34, 47-28 and made all the maps in connection with this survey. Later in the year he made surveys at all the mines, particularly the Cliffs-Shaft.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 9 | 36 | 45 | 16.6 |
| Athens Mine | 11½ | - | 1 | 12½ | 4.6 |
| Cambria-Jackson Mine | 4 | 1 | ½ | 5½ | 2.0 |
| Cliffs-Shaft Mine | 54½ | 1 | 39½ | 95 | 35.0 |
| Lloyd Mine | 1½ | 4 | 1½ | 7 | 2.6 |
| Maas Mine | 5½ | ½ | 1½ | 7½ | 2.8 |
| Mather Mine | 9½ | 1½ | 3½ | 14½ | 5.3 |
| Negaunee Mine | 3½ | - | 1 | 4½ | 1.6 |
| Princeton Mine | - | 4 | 3½ | 7½ | 2.8 |
| Spies-Virgil Mine | 4 | 4 | ½ | 8½ | 3.1 |
| Tilden Mine | - | 17 | 1½ | 18½ | 6.8 |
| Geological Department | 7 | 6½ | ½ | 14 | 5.1 |
| Section 34, 47-28 | - | 20 | 11½ | 31½ | 11.7 |
| Total | 101 | 68½ | 102 | 271½ | |
| % | 37.2 | 25.2 | 37.6 | | 100.0 |

HARRY C. SWANSON, Surveyor, did the surveying at the Cambria-Jackson, Lloyd, Mather and Spies-Virgil Mines until July when the requirements of the Mather and Spies-Virgil Mines made it necessary for him to relinquish the work at the Cambria-Jackson. The development at the Mather and Spies required a large amount of surveying for lines, raises and sub-level development.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 4½ | 3½ | 8 | 2.9 |
| Athens Mine | 1 | - | - | 1 | .4 |
| Cambria-Jackson Mine | 10 | 6½ | 14 | 30½ | 11.0 |
| Lloyd Mine | 18½ | 4 | 11½ | 34 | 12.3 |
| Cliffs-Shaft Mine | ½ | - | - | ½ | .2 |
| Maas Mine | - | 3 | - | 3 | 1.1 |
| Mather Mine | 42 | 40 | 36½ | 118½ | 42.8 |
| Negaunee Mine | 1 | - | 1 | 2 | .8 |
| Spies-Virgil Mine | 13 | 6 | 7 | 26 | 9.4 |
| Geological Department | 29 | 10½ | 13½ | 53 | 19.1 |
| Total | 115 | 74½ | 87 | 276½ | |
| % | 41.6 | 26.9 | 31.5 | | 100.0 |

CLIFFORD AMEL, Helper, assisted in the surface and underground surveys and with the calculations, etc. He assisted in the blueprinting room in the office, doing most of the Annual Report white-print work.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 4½ | 76½ | 81 | 29.7 |
| Athens Mine | 9 | 1 | ½ | 10½ | 3.8 |
| Cambria-Jackson Mine | 9½ | 5 | 1 | 15½ | 5.7 |
| Cliffs-Shaft Mine | ½ | 1 | - | 1½ | .5 |
| Lloyd Mine | 11 | 6 | ½ | 17½ | 6.4 |
| Maas Mine | 4 | 2½ | - | 6½ | 2.4 |
| Mather Mine | 23 | 19 | 3 | 45 | 16.5 |
| Negaunee Mine | 5 | 1 | - | 6 | 2.2 |
| Princeton Mine | 11½ | 18½ | 1½ | 31½ | 11.6 |
| Spies-Virgil Mine | - | 1 | 2 | 3 | 1.2 |
| Tilden Mine | - | 22 | 1½ | 23½ | 8.6 |
| Geological Department | 15½ | 8 | - | 23½ | 8.6 |
| Section 34, 47-28 | - | 7½ | - | 7½ | 2.8 |
| Total | 89 | 97 | 86½ | 272½ | |
| % | 32.7 | 35.6 | 31.7 | | 100.0 |

WERNER J. ANDERSON, Helper, assisted in the surface and underground surveys and blueprinting on the office, until he left the Department on August 25th.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 14½ | 74 | 88½ | 50.5 |
| Athens Mine | 20½ | 1 | - | 21½ | 12.3 |
| Cambria-Jackson mine | 7 | 1 | - | 8 | 4.5 |
| Lloyd Mine | 2 | ½ | - | 2½ | 1.4 |
| Maas Mine | 10 | - | - | 10 | 5.7 |
| Mather Mine | 4½ | ½ | - | 5 | 2.8 |
| Negaunee Mine | 7 | - | - | 7 | 4.0 |
| Princeton Mine | 9 | 8½ | - | 17½ | 9.9 |
| Tilden Mine | - | 4½ | - | 4½ | 2.6 |
| Geological Department | 5½ | 4½ | - | 10 | 5.7 |
| Section 34, 47-28 | - | 1 | - | 1 | .6 |
| Total | 65½ | 36 | 74 | 175½ | |
| % | 37.3 | 20.5 | 42.2 | | 100.0 |

JOHN J. DOBSON, Helper, assisted in surface and underground surveys at all the mines throughout the year. In the office he assisted in the blueprinting and was responsible for seeing that the Department's automobiles were properly serviced.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 18½ | 104 | 122½ | 46.4 |
| Athens Mine | 5½ | - | - | 5½ | 2.1 |
| Cambria-Jackson Mine | 5 | 2 | - | 7 | 2.7 |
| Cliffs-Shaft Mine | 54½ | - | - | 54½ | 20.6 |
| Lloyd Mine | 3½ | 4 | - | 7½ | 2.8 |
| Maas Mine | 6½ | 2 | - | 8½ | 3.2 |
| Mather Mine | 20½ | 3½ | - | 24 | 9.1 |
| Negaunee Mine | 3 | ½ | - | 3½ | 1.3 |
| Princeton Mine | 4½ | 4½ | - | 9 | 3.4 |
| Tilden Mine | - | 11 | - | 11 | 4.2 |
| Geological Department | 5 | 3½ | - | 8½ | 3.2 |
| Section 34, 47-28 | - | 2½ | - | 2½ | 1.0 |
| Total | 108 | 52 | 104 | 264 | |
| % | 40.9 | 19.7 | 39.4 | | 100.0 |

C. ARTHUR KOSKI, Helper, entered the Department on December 4th after his discharge from the military service. He assisted in the Annual Report printing and with underground surveys.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | - | 6½ | 6½ | 48.2 |
| Cambria-Jackson Mine | - | 1 | - | 1 | 7.4 |
| Mather Mine | 3 | 2 | - | 5 | 37.0 |
| Princeton Mine | 1 | - | - | 1 | 7.4 |
| Total | 4 | 3 | 6½ | 13½ | |
| % | 29.6 | 22.2 | 48.2 | | 100.0 |

ROBERT M. McGREGOR, Helper, was employed from July 5th to September 22nd when he returned to college. He was helper for the survey of Section 34, 47-28 and assisted in other surface surveys at the various mines.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 2 | 1 | 3 | 5.8 |
| Lloyd Mine | - | 2 | - | 2 | 3.9 |
| Maas Mine | - | - | 1½ | 1½ | 2.8 |
| Princeton Mine | - | 1 | - | 1 | 2.4 |
| Spies-Virgil Mine | - | 2 | - | 2 | 3.9 |
| Geological Department | - | 3 | - | 3 | 5.8 |
| Section 34, 48-27 | - | 17½ | 21 | 38½ | 75.4 |
| Total | - | 27½ | 23½ | 51 | |
| % | - | 53.9 | 46.1 | | 100.0 |

LOUIS R. MILLER, JR., Helper, entered the Department on August 17th. He assisted in the surface and underground surveys, principally in the Negaunee District and at the Princeton Mine. He assisted in calculations, blueprinting, etc. in the office.

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

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | - | 6 | 16½ | 22½ | 24.2 |
| Athens Mine | 5 | ½ | ½ | 6 | 6.4 |
| Cambria-Jackson Mine | 2½ | 5½ | 1 | 9 | 9.6 |
| Cliffs-Shaft Mine | - | - | 6 | 6 | 6.4 |
| Maas Mine | 6½ | 2 | 6 | 14½ | 15.5 |
| Mather Mine | 1 | ½ | ½ | 2 | 2.1 |
| Negaunee Mine | 1 | 1 | 3½ | 5½ | 5.8 |
| Princeton Mine | 5 | 9 | 5 | 19 | 20.3 |
| Geological Department | - | 2 | ½ | 2½ | 2.7 |
| Section 34, 47-28 | - | 3½ | 3 | 6½ | 7.0 |
| Total | 21 | 30 | 42½ | 93½ | |
| % | 22.5 | 32.1 | 45.4 | | 100.0 |

ELIZABETH M. LAFORAIS, Stenographer, did the stenographic work for both the Engineering and Geological Departments. She left the Department at the end of the year.

MARIE J. NICHOLAS, Stenographer and Blueprinter, had charge of the blueprinting throughout the year. She also did considerable stenographic work for both Departments, especially in the monthly and special reports.

## E. DISTRIBUTION OF TIME

Most of the work of the Department during the year has been in connection with underground mining. The development at the Mather and Spies-Virgil Mines required more than the ordinary attention. The Cambria-Jackson and Mather Mines required more surface work than all the other mines put together. The other main surface work was the contouring in Section 34, 47-28.

The following table shows the distribution of time for the year, divided between underground, field and office, for the different mines and other properties, and the percentage of time spent on each property:

| Property | Underground | Field | Office | Total | % |
|---|---|---|---|---|---|
| General Engineering | 1 | 124 | 864 | 989 | 23.1 |
| Athens Mine | 136½ | 5½ | 162½ | 304½ | 7.1 |
| Cambria-Jackson Mine | 77 | 38½ | 86½ | 202 | 4.7 |
| Cliffs-Shaft Mine | 179½ | 4 | 160 | 343½ | 8.0 |
| Lloyd Mine | 91½ | 37½ | 91 | 220 | 5.1 |
| Maas Mine | 125½ | 16 | 173½ | 315 | 7.3 |
| Mather Mine | 178½ | 99½ | 190½ | 468½ | 10.9 |
| Negaunee Mine | 83½ | 6½ | 97½ | 187½ | 4.4 |
| Princeton Mine | 93 | 83 | 99½ | 275½ | 6.4 |
| Spies-Virgil Mine | 42½ | 22½ | 67½ | 132½ | 3.1 |
| Tilden Mine | - | 91½ | 65½ | 157 | 3.6 |
| Geological Department | 93 | 46½ | 136 | 275½ | 6.4 |
| Section 34, 47-28 | - | 73½ | 44½ | 118 | 2.8 |
| Otis Steel Company | - | 20 | - | 20 | .5 |
| Stenography | - | - | 281 | 281 | 6.6 |
| Total | 1,101½ | 668½ | 2,519½ | 4,289½ | |
| % | 25.7 | 15.6 | 58.7 | | 100.0 |

F. COSTS

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

| | 1943 | 1944 | 1945 |
|---|---|---|---|
| Salaries | $ 27,057.96 | $ 30,138.74 | $ 30,073.34 |
| Auto Expense | 1,896.56 | 2,174.41 | 2,506.99 |
| Furniture and Fixtures | 76.08 | 47.30 | 27.65 |
| Heat, Light and Power | 671.07 | 563.04 | 617.29 |
| Insurance | 10.19 | 12.55 | 86.00 |
| Postage | 46.06 | 37.67 | 28.99 |
| Repairs | 466.43 | 68.62 | 67.77 |
| Stationery and Printing | 124.55 | 251.15 | 126.23 |
| Supplies | 2,934.60 | 3,532.24 | 3,695.97 |
| Taxes | 41.63 | 46.79 | 46.72 |
| Travel and Entertainment | 177.08 | 155.78 | 210.15 |
| Telephone and Telegraph | 128.58 | 199.44 | 122.24 |
| Papers and Periodicals | 11.50 | 10..07 | 12.24 |
| Unemployment Insurance Tax | 341.74 | 378.55 | 390.15 |
| General - Unclassified | 351.06 | 502.92 | 228.33 |
| Old Age Benefit Tax | 262.86 | 291.20 | 300.15 |
| Depreciation | 104.07 | 104.07 | 104.07 |
| Equipment | 88.91 | 15.09 | 995.15 |
| Total | $ 34,806.06 | $ 38,449.63 | $ 39,639.43 |

## H. AUTOMOBILES

The Ford four-door sedan furnished by Four Wheels, Inc., and the Company-owned Ford and Chevrolet station-wagons were operated throughout the year. All cars have been kept in good condition and are still serviceable.

The following table shows the mileage covered in 1945, the total mileage to the end of the year, and the date the cars were received in the Engineering Department:

| Car | Miles 1945 | Miles Total | Date Received |
|---|---|---|---|
| Ford Sedan | 6,550 | 40,573 | January 30, 1941 |
| Ford Station-Wagon | 7,521 | 33,873 | January 24, 1941 |
| Chevrolet Station-Wagon | 10,177 | 29,641 | July 29, 1943 |

## I. MINES

The following summary covers the special work done at the various operating mines during the year:

### GENERAL

The inspections of soft ore mines were stepped up from about three per month to weekly about the middle of the year when a third survey crew was organized to help out. These survey crews have very materially increased the amount of surveying done underground and has made our maps more complete and accurate than was possible previously. The engineers continued to confer with the superintendents and mining captains regarding development and other work in connection with the operation of the mines. The survey crews gave lines for drifts and raises and ran surveys to sub-levels as were required during the year. Diamond drill holes were located as specified by the Geological Department and were later surveyed for exact location, course and dip. The surveyors also assisted in laying out the underground development work and gave the lines and grades as were required from time to time.

The adoption of mining certain areas of some of the mines by the Gogebic sub-level caving method required considerably more attention by the engineers and surveyors. This type of mining had to be watched more carefully as it was a new procedure for the Marquette Range. The system requires more surveying than the top-slicing method, because it is necessary that the mining slices be kept parallel to each other.

### ATHENS MINE

More iron pins were placed South of the South trestle as a check on ground settlement. So far there has been no settlement in this area, and no material extension of the outline of the caved area over the mine. Athens House No. 38, known as the Primeau purchase, was removed during the year. At the request of the Legal Department, Mr. Brewer prepared several metes and bounds maps relative to the purchase of the so-called Blais parcel on Harvey Lot 8.

Surveys were run to the various sub-levels as required and lines were given for raises and sub-level development drifts. The old survey plugs on the 6th and 8th Levels were replaced as they had become quite insecure through rot

and were in danger of being lost. Plans were prepared prior to the re-opening of the fire area by the sub-level caving method. Also, plans were considered for commencing mining operations on the Corbit Lease, but no mining had been started by the end of the year. An estimate of the remaining ore on the property was made in connection with the visit by the engineers of Pickands Mather & Company.

CAMBRIA-JACKSON MINE

Grading for the new track arrangement at the shaft and stocking ground was done by the mine rather than the railroad company and, while the railroad supplied the plans, the grades and lines were given by the engineers and surveyor as required. After the old engine house was removed, lines and grades were given for the grade adjacent to US-41 for landscaping and a new road into the property. The new rock trestle was designed and staked out in the field. Southeast of the shaft, new cracks appeared, with ground settlement, due to old Cambria and Hartford mine workings. These cracks and caves were mapped.

Underground, lines were given for development and drifting as required. Plans were prepared for the extension of the 7th Level toward the Mather 2nd Level drift. Surveys were run for the air raise and development in the No. 3 deposit adjacent to the 6th Level. On the old 5th Level, lines were given for diamond drilling, using old plugs left by the Republic Steel Corporation. We have not yet run surveys to the 5th Level, but these will be run prior to any mining at this elevation.

CLIFFS-SHAFT MINE

Early in the year, we were notified that the Oliver Iron Mining Company intended to discontinue pumping at the Holmes and Angeline Mines. Messrs. S. W. Sundeen and Brewer made a study as to whether or not this would have any effect on water entering the Cliffs-Shaft Mine. Their study determined that the flooding of the old Lake Superior hard ore and Angeline basins would not have any appreciable effect on the water entering the Cliffs-Shaft Mine, at least as far as the underground mining areas were concerned.

Quarterly surveys were run at the property throughout the year. Lines were given for raises and development work very frequently, especially on the Section Lease where a large amount of drifting and raising has been done in preparation for stope mining. The excavation of a new pump house on the 15th Level was supervised and lines and elevations given as needed.

LLOYD MINE

A special survey was made for the Mechanical Department for realigning the skip hoisting sheaves in the headframe where considerable rope wear had developed. Underground, the development for stoping and sub-level mining above the 8th Level required considerable attention with surveys, lines, etc. Plans were prepared for the development of the 9th Level by a winze from the 8th Level. Drifting on the 8th Level to the proposed plat was started later in the year.

MAAS MINE

Lines and grades were given for the installation of the pumps in the new 3rd Level pump house. The development of the area West of the Race Course above the 5th and 6th Levels required considerable planning and much surveying for the mapping of raises, new subs, etc. Also, the mining by stoping required considerable

attention. Lines and grades were given for the connection with the 13th and 14th Levels, Negaunee Mine, for ventilation purposes.

MATHER MINE

The roadway between the shops and the new storage shed was graded and hard-surfaced. This work was done under the supervision of Mr. Swanson who worked out the proper grades for drainage. This required a careful study as the ground was quite flat. Some grading was done on the new South stockpile ground, according to a plan prepared in the Department. The construction of the piers for the new steel trestles was supervised by Mr. Swanson. The tracks on the top tram were laid out with the proper curves.

Lines were given for the extension of the 960' Level and for the drilling to intercept the 1000' level of the old Cleveland Hematite property. The construction of the bulkhead and dam was supervised. On the 2nd Level, plans were drawn and lines given for the transfer drifts and future development stopes and sub-level caving drifts above. On the 5th Level, the construction of the trenches was supervised and lines and grades given for the drifting and development at this elevation. On the 6th Level, lines were also given for development and plans prepared for the new pump house and sump arrangement.

NEGAUNEE MINE

Surveys were run on the 13th and 14th Levels for the extensions that were driven thereon, and for the sub-level development above.

PRINCETON MINE

An iron pin survey was run on Section 19 in preparation for the surface drilling that was planned by the Geological Department. Plans were prepared for the new coal dock and lines and grades given for its construction. Underground, the development of the 7th Level required considerable surveying throughout the year. Because of the heavy nature of the ground, it was impossible to keep survey stations and it was necessary to run the surveys more frequently and for longer distances when lines were needed. The raise from the 7th to the 6th Level for No. 3 shaft was holed in February. The installation of the shaft sets was supervised as stripping progressed. From time to time studies of the ore body were made as new information was disclosed by drifting and raising. The ore body is quite different in shape and thickness than was anticipated from previous knowledge and hence it was necessary to revise plans quite often.

SPIES-VIRGIL MINE

Surveys were run along the North line of the section for the locating of drilling in this portion of the property. A line was also run near the center of the SE¼, also for locating diamond drill holes. Mr. Brewer made an extensive study of the surface water situation in the District because of the large amount of water encountered in the East deposit. He had several conferences with the members of the United States Geological Survey who were in the District making a study of the underground water problems. The result of this study seemed to indicate that water could be diverted from the East Deposit workings by underground drifting and raising rather than by deep well pumping from surface.

Stoping on the Virgil property continued until September 24th when mining operations were discontinued and the underground drifts bratticed off. The fire conditions in this property were carefully watched and mining plans changed from time to time. After the property was closed, a set of underground maps were prepared and filed away, showing what ore pillars remained, according to the best judgement of the superintendent, mine captain and engineer. The preparation of this set of maps was deemed advisable so that some record would be available as to what may be recovered if the property was reopened sometime in the future, if fire conditions permitted.

The development of the East deposit required constant attention with lines and surveys. The large amount of water encountered handicapped mining operations and various plans for its control were considered. Toward the end of the year, a proposed drainage plan was prepared for a collecting drift above the proposed stopes from which horizontal drill holes would serve as collecting units for the water. This raise was well underway at the end of the year.

A 15" bore hole was started in December 1944 from the bottom of the 7' circular shaft. Because of deviation this hole was stopped at 139' and an 8" churn drill hole put down to connect with a raise from the 4th Level. It took sometime to locate this hole from the raise as final surveys showed it had deviated about 30' from the horizontal. The enlarging of this hole to 15" was completed in June. Late in December, sinking operations were started around this drill hole for the final ventilation shaft. Mr. Swanson spent several weeks at the shaft supervising the commencing of these sinking operations.

TILDEN MINE

The change-over from steam locomotives and dump cars to trucks made it advisable that entirely new maps of both the East and West Pits be prepared. Considerable surveying was necessary to bring our information up to date. This was done during the summer months and by the end of the year the maps were completed. During the operating season, churn drill holes were located and grades and lines given for roads as needed. Surveys were also run to Summit Pit and estimates for stripping were prepared. The blasts in the various pits were planned and supervised by the Engineer in charge.

J. MISCELLANEOUS

SHAFT GAUGING

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

| Mine | Shaft | Date |
|---|---|---|
| Athens | - | April 22nd |
| Cambria-Jackson | Hartford #2 | June 3rd |
| Cliffs-Shaft | "A" | May 27th |
| Cliffs-Shaft | "B" | May 27th |
| Lloyd | No. 2 | May 20th |
| Maas | - | April 29th |
| Mather | - | June 17th |
| Negaunee | No. 3 | May 6th |
| Princeton | No. 2 | June 10th |
| Princeton | No. 3 | June 10th |
| Spies-Virgil | Spies | May 13th. |

STOCKPILES

The ore in stock at the various mines was estimated and reported as of November 1st. The following table shows a comparison of the ore in stock at Michigan Mines as of November 1st, 1944 and November 1st, 1945:

| Mine | Nov. 1, 1944 | Nov. 1, 1945 | Difference |
|---|---|---|---|
| Athens | 8,616 | 4,049 | -4,567 |
| Cambria-Jackson | 4,666 | 18,626 | +13,960 |
| Cliffs-Shaft | 67,216 | 876 | -66,340 |
| Lloyd | 208,460 | 217,590 | +9,130 |
| Maas | 23,265 | 80,395 | +57,130 |
| Mather | 0 | 0 | - |
| Negaunee | 13,235 | 20,449 | +7,214 |
| Princeton | 127,187 | 160,167 | +32,980 |
| Spies-Virgil | 58,369 | 10,670 | -47,699 |
| Total | 511,014 | 512,822 | +1,808 |

TAXES

Mr. Brewer prepared the tax lists for the Mining Department lands in Michigan, Wisconsin and Minnesota and also for the lands of the Cliffs Power & Light Company. The tax description of the Maas and Negaunee Mines were revised in order to eliminate the Adams strip as a separate taxing unit and to include the Maas Area with the Negaunee Mine, and eliminate it from the Maas Mine. The delinquent tax lists for the annual Tax Sale held in May 1945, were checked by Mr. Brewer prior to the sale to see that no Company lands were listed and to make such recommendations for purchase as seemed advisable to protect mineral interests.

EXPLORATIONS

The exploration of Company lands by diamond drilling under the Geological Department required frequent surveys for the preliminary and final location of the holes. The following drill holes were located and surveyed during the year:

| Hole No. | Location |
|---|---|
| 50, 51 | Section 19, 45-25 |
| 141, 142, 143 | " 1, 47-27 |
| 43, 44 | " 3, " |
| 30, 31 | " 4, " |
| 34 | " 5, " |
| 72, 73, 74, 75, 76, 77 | " 24, 43-35. |

## SURFACE SURVEYS

Another triangulation quadrangle in Section 2, 47-27 was surveyed during June. This quadrilateral is in the South half of the Section and was needed in order to tie in the South boundary corners of the Mather Mine. The iron pin surveys in this locality were run in 1912 and they were tied in to the triangulation system and used for the calculation of the boundary corners. Two iron pins in the North half of Section 11, 47-27 were tied in by these triangulation surveys, but nothing further was done in this area. The boundary corners of the Mather Mine were all calculated so the mineral boundary of the mine is entirely completed.

An iron pin survey was run in the East portion of Section 5, 47-27 to facilitate the location of drill holes in this area.

## OTIS STEEL COMPANY

The annual estimate of ore in stock at the Otis Steel Company plant in Cleveland, Ohio, was made in June by Messrs. Korpinen and Stannard. Their report was made direct to the Cleveland office.

## OFFICE EQUIPMENT

During March a Bruning Model 55 blueprint machine was purchased for the Engineering and Geological Departments. The old Wagenhorst vertical arc-light blueprint machine that had been in use for nearly forty years was not suitable for making whiteprints directly according to the new method. It has been found that whiteprints are much more satisfactory than blueprints for the monthly mine map reports. A Bruning Model 54 developing machine was also purchased. These new machines have vastly improved the printing done in the office and has speeded up the work tremendously. The purchase of whiteprint paper in sheets saves a great deal of time that was formerly spent in trimming the old blueprints.

## GROUND WATER LEVELS

The elevation of the ground water in the test holes at the Athens, Maas and Negaunee Mines were read monthly throughout the year. The following table shows the water elevations at the beginning and end of the year, the net differences and the elevation of water as originally encountered when the hole was drilled and the difference to date:

RELATIVE ELEVATION OF GROUND WATER LEVELS
MAAS MINE

| Test Hole No. | Jan. 1, 1945 | Jan. 1, 1946 | Difference 1946 | Original Elevation | Total Difference |
|---|---|---|---|---|---|
| 1W | 1250.1 | 1248.7 | -1.4 | 1317.0 | -68.3 |
| 2W | 1242.0 | 1243.9 | +1.9 | 1318.8 | -74.9 |
| 5W | 1248.5 | 1246.5 | -2.0 | 1366.6 | -120.1 |
| 9W | 1269.4 | 1268.7 | -0.7 | 1281.8 | -13.0 |
| 13W | 1305.6 | 1304.9 | -0.7 | 1340.0 | -39.1 |
| 14W | 1295.0 | 1292.7 | -2.3 | 1323.8 | -31.1 |
| 15W | 1309.7 | 1309.8 | +0.1 | 1326.3 | -16.5 |
| 16W | 1280.6 | 1281.8 | +1.8 | 1324.8 | -43.0 |
| 18W | 1251.3 | 1253.3 | +2.0 | 1319.4 | -66.1 |
| 20W | 1259.6 | 1259.6 | - | 1319.0 | -59.4 |
| 21W | 1237.6 | 1236.9 | -0.7 | 1229.1 | -92.2 |

## NEGAUNEE MINE

| Test Hole No. | Jan. 1, 1945 | Jan. 1, 1946 | Difference 1946 | Original Elevation | Total Difference |
|---|---|---|---|---|---|
| 6A | 1176.6 | 1180.5 | +3.9 | 1197.0 | -16.5 |
| 7 | 1182.3 | 1183.0 | -0.3 | 1195.1 | -12.1 |

## ATHENS MINE

| | | | | | |
|---|---|---|---|---|---|
| 104W | 1295.6 | 1300.8 | +5.2 | 1299.5 | +1.3 |
| 105W | 1298.5 | 1298.8 | +0.3 | 1301.5 | -2.7 |
| 106W | 1295.2 | 1295.9 | +0.7 | 1302.4 | -6.5 |

We did not read ground water levels until November, 1939. During 1940 and 1941, the readings were taken weekly, but since then have been taken monthly. During 1940, there was quite a drop in all of the holes, due, I believe, to the fact that a large portion of the surface over the West half of the Maas Mine started to cave. The cracks first appeared in the fall of 1939. During 1941, the elevation dropped from 3' to 10', but in 1942 it raised 3 to 10' and continued to rise during 1943 about the same amount. In 1944 the water level dropped 3 to 10', while in 1945 has practically remained stationary. There has been a fluctuation of 1 to 2' in each hole during each year, as the fall or rise has not been steady. It is very apparent from this study of the fluctuation of the ground water, that caving ground has more influence in draining the surface than the deep well pumps now operating.

## AERIAL SURVEY MAPS

Early in the year, the Jones & Laughlin Ore Company engaged the Aero Service Corporation to make contour maps of some of their property near Negaunee by aerial photography. The Cleveland-Cliffs Iron Company and the Inland Steel Company joined with the Jones & Laughlin Company in this work. Each Company designated certain areas to be mapped. During April, survey stations and section corners were marked in the field with long strips of cheesecloth for identification purposes on the aerial maps. During September, survey crews of the Company were in the field running traverses and elevations to these corners for control points of the maps which were to be made in their Philadelphia office. These maps are to be 200' to the inch and will show all the topographical features and have 5' contour lines. The following descriptions are the areas which this company wanted mapped:

| | | | |
|---|---|---|---|
| NW¼ of NW¼ of | Section | 7, | 47-26 |
| Entire | " | 18, | " |
| " | " | 19, | " |
| " | " | 12, | 47-27 |
| " | " | 13, | " |
| " | " | 24, | " |
| " | " | 23, | " |
| W½ of | " | 22, | " |
| E½ of E½ of | " | 21, | " |
| Entire | " | 27, | " |
| S½ of | " | 26, | " |
| SW¼ of | " | 25, | " |
| Entire | " | 34, | " |
| " | " | 35, | " |
| W½ of | " | 36, | " |

We had not received any of these maps by the end of the year.

PROPOSED LOTS FOR THE CITY OF ISHPEMING

The City of Ishpeming, through its Manager, asked the Company if there were any areas that might be platted for residential purposes. There has been quite a shortage of housing in the city and there seemed to be quite a demand for lots.

Several years ago the Engineering Department had made a study of the possible areas that might be available for building purposes, but owing to the war, nothing was decided or completed. At that time, the most suitable location seemed to be the area just North of the City limits, comprising the S½ of the SE¼ of Section 34, 48-27. Authorization was given to make a topographical survey of this area. During June, July and September, most of this area was mapped and contoured and a proposed arrangement of lots and streets were made. This area will provide about 225 lots and has all the advantages desirable for building. Because this area is outside the city limits, the city would not be able to furnish it with the necessary water and sewer system. The city officials are desirous of having it included in the city limits, but as public elections are necessary to accomplish this, it is probable that some time will elapse before this land can be made available for building.

In the meantime, a search was made for possible building sites closer to the city where water and sewer systems could be provided at a minimum of expense. A portion of the W½ of the NE¼ of Section 9 seemed to be the most desirable, but unfortunately was subjected to flooding by the Carp River and it was believed to be overlain with a considerable amount of muskeg. Subsequent study and survey, however, disclosed that by deepening 4,000' of the present channel and providing 2,700' of new channel, the flooding of the Carp River would not only be prevented but would keep dry any basement in the entire area. The survey further disclosed that the muskeg was only about 1½' deep over most of the area so that if the Carp River work was done, it would provide a very suitable and desirable building location. Mr. Brewer worked with the City Manager and City Engineer in making plans for platting and estimates of cost of installing streets, sewer and water systems. The approval of the Cleveland office for opening this area for building purposes had not been received by the end of the year.

WATER SUPPLY SYSTEMS

The Township of Republic requested that new maps be made of the water system in the village of Republic. During July these maps were finished with information furnished by the village officials.

New maps were also made of the water system in Gwinn, Austin and Princeton. The old maps had been made many years ago and many changes had been made in the installation since that date. Considerable time was spent picking up information and checking the location of pipes, shut-offs and new installations before the maps were completed.

VENTILATION SURVEYS

The Engineering Department had previously made semi-annual surveys and studies of the ventilation systems in the various mines, tabulating the volume and course of the air currents. This work has been taken over by the Safety Department, but the engineers continued to assist when they were called upon.

HOLIDAYS

The following holidays were granted during the year:

| | |
|---|---|
| January 1st | New Years Day |
| May 30th | Memorial Day |
| July 4th | Independence Day |
| August 15th-16th | V-J Day |
| September 3rd | Labor Day |
| November 22nd | Thanksgiving |
| December 24th-25th | Christmas |

Carl Brewer

Recorder

CB:DWC
3/1/46

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ATHENS MINE

The air receiver which started leaking during March was by-passed by the 6 inch discharge line. The receiver was repaired, tested to 150 lbs. per square inch and placed in service again in June with no leaks.

The Ingersoll Rand compressor began developing excessive heat and was cleaned thoroughly. A thermometer and thermostat was installed in the discharge line, changes made on clearance control piping which reduced the air discharge temperature from 350° to 300°. A thermostat was also added to the Nordberg compressor.

The water cooling tank south of the engine house and the tank in the engine house were both cleaned and fresh water added.

An old aftercooler was found, overhauled completely and installed in the engine house, reducing the danger of fire and explosions in the discharge line to a minimum.

Hoists and flywheel set were given a coating of buff paint similar to color scheme at the Mather Mine.

A valve chest from the Republic hoist was installed temporarily on power brake on cage hoist while the old one which was leaking badly was repaired.

A new rope was installed on the south skip January 7th. The north skip rope was tested with a new type rope dressing to compare with the Keystone treatment used in the past. New ropes were installed on both the North and South skips during July and both ropes were turned end for end in November.

Repairs were begun to the headframe in February and continued intermittently during the year, replacing badly corroded steel.

On February 7th a skip rebuilt with an extended frame was installed and after a months service less wear was indicated on the wood runners. Wearing straps were replaced in the skip dump during October.

On pulley stand No. 4 numbering from shaft house, the shaft was too short when rope was at extreme end of drum. The old shaft was replaced by a longer one and new rubber lined light steel idler sheaves were installed on all pulley stands.

A new 6" air line from air receiver to shaft was installed replacing the old one which was badly pitted after 29 years operation.

During August 120 feet of the 6" air line in the shaft was replaced and in November a 20 foot section was renewed.

All fire extinguishers were tested and refilled as needed during July.

A new hot water tank was installed in the change house in the month of November. A new set of rubber liners was placed in the drive sheave of south top tram engine.

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ATHENS MINE (Cont'd.)

No. 1 Prescott pump, 10th level, developed a crack in the front cylinder which was repaired by welding February 14th. A set of Marlo packing which was installed on No. 2 Prescott, same level, December 19, 1944 for a test was replaced April 13th and did not give the service expected. In July the skip pit pump was replaced by a repaired one. Measuring pocket doors were rebuilt during February.

CAMBRIA-JACKSON MINE

On January 2nd a rebuilt belt on the Ingersoll Rand compressor broke causing a 16 hour delay. A spare belt which had previously been shipped for repairs arrived at the mine January 31st. New felts were added to all covers to eliminate oil vapors in the hopes that insulation deterioration on the motors would be checked.

A heat control relay was installed on the Imperial Type 10 air compressor in June.

The engine house floor and machinery were painted light grey during March.

When the 500 Hp. hoist motor burned out on April 14th the main drum shaft bearings were adjusted to eliminate side thrust. New brake lining was installed.

A 2300 cu. ft. air compressor was purchased secondhand from the Holmes Mine. Foundations for building extension and for compressor were completed in September and by November the building was completed and erection of the compressor will be completed by January.

The east skip sheave was replaced in January due to a loose axle. Hoisting rope lubrication tests continued with 410 lbs. of Sonoco Vacuum Light Lubricant liquid grease used between Oct. 15th and Feb. 24th and applied to rope twice a week. The west skip rope was changed April 30th. A four foot piece was cut from the new 1-3/8 Roebling rope and the hemp center was found to be dry. A complaint was made to the manufacturers. During January the safety catches on the cage were repaired and in July the combination skip and cage were removed and replaced by a rebuilt one. In August the west skip box was changed. One of the idler sheaves was replaced during April.

In the headframe two new fan heaters were installed on the landing near the dump plates but did not prove satisfactory as they were too large for the volume of steam used at the mine. The position of the various water, air and power lines in the shaft were checked and drawings made at each level. In July and old air line was removed between the 4th and 6th levels to make room for a new discharge line. Part of the 8" discharge line between the 4th level and surface was removed during July and in August the remainder was taken out.

During June on surface to the west of the shaft water was siphoned into Teal Lake from the old pits to reduce underground piping. This totaled approximately 200 G.P.M. for 18 days.

The stoker in the change house was equipped with a new worm gear, and new blades installed on the blower.

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CAMBRIA-JACKSON MINE (Cont'd.)

When blasting to enlarge the 7th level pump house for the new plunger pump, the present centrifugal pump was badly damaged. The pump was repaired at the General Shops and placed in use again Feb. 20th. The new 7½" x 12" Gould triplex pump, 400 G.P.M., 700 ft. head and driven by a 100 HP., 900 R.P.M. motor was received at the mine in September, foundation was completed in October and the erection of the pump was completed in December. This pump will raise the water from the 7th to the 4th level, a distance of 675 feet.

A secondhand Prescott horizontal duplex pump with poles 4-7/8 x 18" and driven by a 150 HP. motor was purchased from the Holmes Mine and will also be installed in the 7th level pump house. While this pump has a capacity of 300 G.P.M. at 1600 ft. head, at present it will be installed to pump only 675 feet to the 4th level pump house. The present 6" discharge line in shaft will carry the pressure but will have to be replaced if the pump raises the water to surface, a distance of 1500 feet. The sump was cleaned of 88 skips of mud during October.

In the 4th level pump station, a suction pipe was changed on #2 Prescott pump during February.

The 6th level hoist used for cleaning skip pit was overhauled during December. In March an 8H-42" Aerodyne fan was installed on this level.

A drill Jumbo was secured from the Maas Mine and a truck built for it ready for drifting.

CANISTEO MINE

Ore operations for the season opened May 7th and closed October 11th producing 659,836 tons of concentrates. The mine operated most of the year on 3 shifts/day and 6 days per week with 1/2 day per week reserved for repairs to equipment.

In the pit the two 85-B shovels took care of a heavy program for the year. No. 48 loaded 715,650 tons crude ore and 480,347 yds. stripping while No. 49 was a close second with 633,048 tons crude and 485,198 yds. stripping. For tonnages of over one million per year the 120-B shovel seems to be a better machine than the 85-B. A new 120-B shovel was bought in May for this mine. It was received in December and ready for the stripping program to start on the north bank the first part of 1946.

Some trouble developed on the pit drainage pump operated from scow in drainage pond. The water was lowered too far for the pump suctions and the mud in the bottom was carried thru the pumps causing cavitation. New impellers and repairs are on order.

At the Washing Plant two new Selective Media Concentrators were purchased from The Stearns-Roger Mfg. Company, Denver, Colorado and set up in the east wing to compare results with the present 66" Akins classifiers. The seasons operation showed the Akins to be the best machine on this ore so the S.M.C. machines were dismantled in November and moved to the Hill-Trumbull Mine Washing Plant to increase

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CANISTEO MINE (Cont'd.)

capacity of high density plant there. These units use a 48" diameter impeller driven by a 7½ HP., 1200 RPM., 440 V motor and a 42" wide chain drag to dewater the concentrate driven by a 7½ HP. gear motor. Two 8" Model "C" Wilfley sand pumps with capacity of 1550 GPM. against 34 ft. head and V-belt driven by 50 HP., 440 V., 1750 RPM motors were bought to handle the pulp through these classifiers. To reduce the overload at Washing Plant, 3 - 100 KVA., 2200V/440V single phase transformers were installed to operate the two new Selective Media Concentrators and Wilfley pumps.

The Minerals Separation North American Corporation continued its testing for the season and added a 40 ft. diameter thickener with concrete foundation on south side of plant.

To keep low spots in the pit free from dirty water a Model A-4102 Carver self-priming centrifugal pump on skids was bought and equipped with 30 HP., 1760 R.P.M., 440 volt motor. This is more dependable after heavy rains than a gas driven unit.

At the shops, in July, a water tank was installed on an old 15 ton Euclid truck that was too near worn out for heavy hauling. This unit keeps the roads in good condition and stops dust troubles.

Tests were run during the year with one 15 ton truck equipped with a standard diesel engine built by the Buda Company. This gave such good results on combustion and repairs that a second Buda supercharged engine was tried on a truck at the Holman-Cliffs Mine. The results were very favorable so it is now planned to buy two new 20 ton Walter trucks equipped with Buda supercharged engines and compare them with the Euclid 20 ton trucks with Cummins engines.

In October the railroad track back of shops was elevated so coal cars could be unloaded through bottom doors to a secondhand Ziegler car unloader that transferred the coal to a Barber Greene 18" wide drag conveyor which elevated coal to bin above heating boiler. The whole combination cost about $1500.00 and eliminated manual labor hard to get when needed most.

CLIFFS-SHAFT MINE

Underground the pump house on 15th level for new 1000 Gal., 1000 ft. head plunger pump was completed, the pump was received and will be installed as soon as possible.

At crushing and screening plant the rock picking pan conveyor feeding crusher was rebuilt in January and August with new supporting I beams added; the revolving screen was equipped with new drive pinion and manganese screen sections and the No. 8 crusher required a new eccentric and driving belt. It was also necessary to rebuild the rock pocket and chute to use a truck for haulage instead of tram car. On the lower fine ore tram the pullback engine is in poor condition and a new improved one is almost completed in General Shops.

In engine house to reduce discharge air temperature on compressors it was necessary to not only clean out the rust and mud from cylinder jackets, but the intercooler tubes on No. 2 machine were replaced and the other two cleaned. Due to

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CLIFFS SHAFT MINE (Cont'd.)

bad score and wear in low pressure cylinder bushing of No. 2 machine, a new bushing, piston and piston rings were installed in June. These machines as well as hoists and other equipment were painted similar to the Mather Mine engine house which improves the appearance of the whole interior. New brake blocks were added to both drums of hoist and the secondary brakes for motor shafts were received but not installed. Between engine house and "A" shaft the supporting rope idlers were changed from 12" diameter cast iron wheels to 20" diameter rubber lined steel plate sheaves which makes a smoother operation and reduces the noise.

For 3 months during the summer our structural steel crew worked on the trestles between crusher house and "A" and "B" shafts replacing badly worn braces, installing an extra ground support at curve near "B" shaft and welding where needed.

At the miners change house a new boiler and stoker were ordered during the summer but did not arrive in time for the winter heating so a temporary hand fired boiler was set up to assist the old one as long as necessary. Due to piping rusting out, new lines were put in between change house, engine house, "B" shaft, oil house and mine office. To eliminate any chance for another scalding accident in shower room, two new "Excelso" heaters No. 36 each with a capacity to heat 800 gals., 100 degrees in 8 hours were installed in January complete with 1½" circulating pump, temperature regulator on hot water tanks and temperature control on boiler for pump. The maximum temperature is now 140°. One heater supplies all needed water and the second is held as a spare.

HILL-TRUMBULL MINE:

Ore operations for the season opened April 23rd and closed down November 1st with the Washing Plant producing 836,685 tons. The Cone Plant tonnage was 359,247. In the pit, stripping averaged 23 days per month of 3 - 8 hour shifts each until ore loading started in April. Average production was close to 6000 yd/day using a maximum of 6 - 15 ton and 6 - 20 ton Euclid trucks. As the average age on the 15 ton trucks is now over 15,000 hours it is planned to replace two old 15 ton trucks with two new 20 ton Euclid trucks for 1946. Due to 3-120B shovels, No. 34, 35 and 58 operating at this mine and only one at the Holman-Cliffs Mine it was decided to move No. 35 to the shops for repairs, then ship it to the Holman and exchange it for the No. 51 Marion shovel. These transfers were completed by May 1st. At the crushing and screening plant it was necessary to build up the Ross feeder chains. The heavier chains and bushings on conveyor between bin and belt conveyor proved that they could last a full season. In September the link belt gear reducer on second flight of conveyor belt developed bearing trouble and caused a bad delay. Our best luck has been with reducers made by the Falk Corporation. Some of these have run for 25 years with no trouble.

At the shops all repair work to 30 yd. cars and locomotives was completed before shipping season opened. This fall the electric locomotive repairs were completed first so the shops could overhaul Locomotives 101, 105 and 106 shipped over from the Holman-Cliffs Mine. No. 47 Marion shovel was also given an overhaul in November. Near the shops in August the electric haulage system substation was improved by replacing the present manual operated overload switch with a high speed D.C. breaker which protects not only against short circuits but automatically closes circuit if trouble clears.

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HILL TRUMBULL MINE (Cont'd.)

At Washing Plant the old 5'x14' Robbins screen was removed in January and replaced with a Style B - 5'x14" Allis-Chalmers screen formerly used at the Champion Mine. After operating for the summer it was decided to add a second screen by placing them side by side and splitting the load. The structural steel work on building for this change was started this fall. The old Robbins screen was sent to the Holman washing plant to supply spare parts for the one operating there last summer.

The hydroseal tailings pump trouble was eliminated when 2 pumps running at 550 R.P.M. in tandem replaced one pump operating at 850 R.P.M. For test purposes one pump was equipped with a hard iron and the other with a rubber impeller. An inspection at the end of season showed the iron impeller so badly worn it would not last another season while the rubber one showed practically no wear. Due to other pump makers wanting us to try their pumps with metal impellers and are willing to supply the pumps free on test, it is planned to try them next season in tandem with one of the Hydroseal pumps and check on their wear and efficiency. The Pettibone-Mulliken Company and Allis-Chalmers Company are furnishing pumps for these tests.

Due to increased tonnage of jig material developed in pit it was decided to increase capacity of High Density plant to that of the Washing Plant and eliminate the expense of storage and slower feed. Several changes are planned in both washing plant and high density plant. First, the old cone high density machine is being removed and will be replaced with a 78" Akins high density separator and driven by 20 HP., 900 R.P.M. motor with a 3 HP. motor to operate the lifting device, using a 60 cell flat plate battery for power when the A.C. power fails. This eliminates the 2 hour delay required in the past to clean out the machine for a restart when the high tension power failed due to electric storms etc. Following the 78" classifier is a 48" Akins Densifier driven by 5 HP. motor at various speeds between 158 R.P.M. and 472 R.P.M. Also a 66" Akins separator will be built heavier from one which we now have on hand. Cost of these machines from Akins is close to $20,000. Second, a 20 ft. extension is being added to the north end of high density plant building to make room for these machines and also the following additional Allis-Chalmers vibrating screens:

One concentrate 6'x16' single deck, low head with No. 4 mechanism and driven with 15 HP., 1750 R.P.M. motor;

One Tailings drain screen size 5'x6' - 3" single deck, low head with No. 2 mechanism and driven by 5 HP., 1750 R.P.M. motor;

OneTailings washing screen 5'x14' single deck, low head with No. 3 mechanism driven by 7½ H.P., 1750 R.P.M. motor;

One Style "B" Primary heavy duty screen 5'x14' double deck with No. 4 mechanism ½" throw and 1000 R.P.M. driven by 15 HP., 1750 R.P.M. motor.

Third, the present two Selective Media Concentrators and the two duplicate machines from the Canisteo Mine will be moved from the old location and set up on the old table floor in the Washing Plant where there is plenty of room for them. Fourth, several new 24" belt conveyors will be installed to connect these various machines in their proper sequence. These changes make a heavy program of winter work, but if deliveries are made as promised the plant should be ready in time for start of ore season in May.

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HILL TRUMBULL MINE (Cont'd.)

In February Hugh Leach was made superintendent of the mine and John Foucault moved to the Holman-Cliffs Mine.

HOLMAN-CLIFFS MINE

Ore operations for the season opened May 1st and closed October 27th producing 780,764 tons of concentrates mostly from the Bingham lease. In March, when 80 acres were secured north of the pit, the stripping haul from Bingham Pit was shortened from that in January and February as the dump was next to pit. After shipping season, stripping started on the Brown No. 2 and Holman and dump used to the east of the pit. This mine now owns 9 - 20 ton, and 5 - 15 ton trucks with most of the work performed by the larger, newer units. Due to satisfactory tests on No. 53 Euclid 20 ton truck equipped with Buda supercharged engine, it is planned to run further tests by buying one 20 ton Walter truck equipped with Buda engine and one 20 ton Euclid equipped with Cummins engine for next years operations and hold in reserve some of the 15 ton trucks that have operated over 17,000 hours and whose repair costs are high.

In the pit the 54-B, No. 55 shovel worked from January until October then broke the top of main frame so badly a new casting was required. The plant making this machine is out on strike so the shovel still stands idle at the shop waiting for repairs. No. 35 shovel from Hill-Trumbull was moved to this mine in May and was exchanged for the Marion No. 51 electric shovel moved to the Hill-Trumbull in June. This gives both mines 2 - 120-B shovels with the smaller shovels to assist when needed.

At the shops repair work was mostly confined to trucks and shovels while the main overhauling on cars and locomotives was left to the Hill-Trumbull shops that were better equipped to handle this work.

At the Washing Plant regular repairs were completed before shipping season. Erection of hydrotator and hydrosizer was delayed due to lack of labor. The hydrotator was completed in July and the hydrosizer in September. Some of the tailings fed to them from the Bingham were so poor it was not possible to make grade. Further testing will continue next season. An inspection of the split 36" conveyor belt shows the repairs still in fair condition and the belt should last another season. At the close of shipping season the Robbins 5'x14' screen was removed and will be replaced with a Style "B" Allis-Chalmers screen of the same size. The state legislature increased clearance over railroad tracks from 21'6" to 22'8" which caused several changes at the three washing plants.

Two new 8"x6" type C.W.G. pumps built for dirty water by Allis-Chalmers Company were connected thru V-belt drive to motors on hand and are giving satisfaction pumping the settled dirt out of the mine pit sumps.

Superintendent Youngberg resigned in February and was replaced by John Foucault.

LLOYD MINE

In shaft house the head frame was raised for south skip so sheave could align with center of shaft and reduce fleet angle on drum. This change reduced

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LLOYD MINE

wear on hoisting rope when at extreme ends of drum. New pocket plates and wearing straps on skip dump were installed in April on both skips. The old cage was replaced with a rebuilt one.

In engine house both cylinder jackets were cleaned on Sullivan compressor and dirty valves replaced. A new coat of paint was added to floor but no change made on machinery.

Underground a spare Alberger 4" centrifugal pump and motor was cleaned on surface and shipped to the Princeton Mine. Some repairs were needed on both the Butler and Eimco loaders. Plans are underway to install a winze hoist and sink the shaft an additional 200 ft. As much of the equipment from the Maas Mine as possible will be utilized on this job.

MAAS MINE

In the engine house the rotor on the skip hoist motor burned out January 24th and was replaced by a spare rotor. A new Falk flexible coupling was installed at this time and a matching half was purchased to fit the burned out rotor which will speed up changes should another burnout occur.

The brake band and air brake engine were given minor necessary repairs. The coupling on the cage hoist motor became loose and a spare motor from the Lake storage was installed on Feb. 14th. The coupling was repaired and is kept for a spare.

During March, the main gear was welded to the drum shaft and in July minor repairs were made to the power brake. A thermostat was installed on the #1 Ingersoll Rand Compressor, valves replaced and a new nest of cooling tubes installed in the intercooler.

In the machine shop a new pipe and bolt threading machine was installed during May. A thorough cleaning was given the hot water heater in the dry and the mine heating boiler. A new stack was erected for this boiler during April.

The spare cage replaced the old one which was sent to the General Shops for repairs. In the shafthouse the skip dumps were repaired.

On surface the Layne pump was removed from #4 well. In the shaft repairs were made to the air line.

During May the excavating for the new Aldrich pump was completed in the 3rd level pump station. Erection of this pump began in June and continued throughout the following months whenever spare time was available. The Aldrich in the 5th level pump station was repaired. The piston rod in the 6th level Worthington pump broke and was replaced by a new one.

All spare time during December was used to remove the hoist from the 5th level and bringing it to surface.

The crushing and screening plant operated three days during September, 22 days in October and 3 days in November. A test was made on Princeton ore in September by running a carload over the Allis Chalmers Ripleflo screen using variable throws on the eccentric shaft.

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MATHER MINE

In the engine house a new entrance was made from the north wall basement near boiler room to surface mens clean clothes room. Installation of all water flow indicating meters on both M.G. sets and slip regulator tanks was completed and all cooling water piping below 3" diameter was changed from steel to copper. New rope slides built at the General Shops were installed for both hoists during January and February. An oil change was made in February on both compressors after being in use for two years. The cooling pond was cleaned during April. The heating boiler was equipped with water compound feeder, cleaned out and new cocks installed. The heating system was overhauled during October.

In the change house, the clean clothes rooms were equipped with hangers and baskets eliminating the use of lockers. Additional hangers, benches and racks were installed in the dirty clothes room.

On surface a new fire protection line was laid in the timber yard and a new fire hydrant was installed near the north end of the shop building. A rack was made for the storage building to hold various sizes of steel.

Due to sticky type ore developed, repairs and changes went on in the headframe at various times during the year. The north railroad pocket was remodeled and butterfly equipped chutes added, vibrators installed on the pockets and a water line was put in to reach the upper chute and skip dumps. The 100 HP. crusher motor was loaned to the Negaunee Mine in January to replace temporarily the burned out motor on the ventilating fan at #2. The motor was returned in May.

A bridge of rope slats supported by two cables anchored between engine house wall and turn sheaves was installed under skip and cage ropes to keep them out of surface sand when slack rope occurs.

Additions were completed on the stocking trestles by the Worden Allen Company during November. The top tram Allway cars were given needed minor repairs. One skip was equipped with a loose rubber bottom to prevent ore from sticking. This skip is working satisfactorily.

Underground on the 1000 ft. level, due to water encountered by drilling to the old Nelson Mine workings, 2 new pumps were installed and put in use the latter part of September. These are Ingersoll Rand centrifugal pumps, 500 G.P.M., 1200 ft. head powered by 250 HP. motors. By November the water had been drained to the extent that only one pump was used for 3 hours out of each 24. In connection with this pump station a large concrete dam and heavy steel bulkhead door was installed during February and March between the pump station and breast of the drift. A battery charging station was installed on the 2nd level with racks and jib cranes. To improve safety conditions for pumpmen, platforms were built over the discharge valve chambers of the Aldrich pumps in the 3rd level pump station. The #1 Aldrich was given minor repairs. A 25 HP scraper hoist was installed over the 5th level loading trench and the camel back car dumper was rebuilt. On the 6th level a new measuring pocket was built during the year of concrete and lined with steel plates. It was equipped with sliding doors operated by air cylinders. A 40 G.P.M. Ingersoll Rand centrifugal pump was installed during June on the 6th level to pump to the 3rd. Ore trains on the 2nd and 5th levels were equipped with bells and tail lights. All cars and loaders were given necessary repairs.

The ignitron charging set which was installed on the 5th level was wired for operation during December.

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YEAR 1945

NEGAUNEE MINE

In the engine house some repairs were made to the cage hoist brake. The Ingersoll-Rand compressor intercooler was cleaned in April.

At the headframe, the south skip was replaced by a repaired one during February and again in April at which time the skip dumps were repaired. In October the north skip was changed, and again in December the south skip was changed. During January old liners were replaced in the skip and counterweight sheaves, and in April a new heavy type sheave replaced the old light sheave for the south skip road. The crusher screen was repaired during May.

In the shops, a new shaper was installed during December. The 120-B electric shovel belonging to the Mather Mine was used again at this mine for loading ore. Underground cars, a locomotive and several scrapers were repaired during the year.

At No. 2 shaft, the 125 HP motor driving the large ventilating fan burned out January 6th and was replaced by the 100 HP crusher motor borrowed from the Mather Mine. This was returned in May and the repaired motor placed in operation. Various repairs were made to the heating plant during the year to improve its operation.

In the shaft 30 ft. of the 6" air line was replaced in January and underground a truck with hoist was built to lift scraper hoist to sublevels. Pumps gave no trouble during the year.

PRINCETON MINE

In the engine house at #2 and #3 brake blocks were installed on the skip and cage hoists. The motor on the cage hoist at #3 shaft burned out and was replaced. New supports were installed under the pinion shaft bearings to compensate for difference in height of the motors. The Nordberg compressor was cleaned and a new relay was installed on the air discharge line. Repairs were made on the cooling tank.

In the change houses the heating boilers were cleaned and repaired. A new steel top tram car was built at the mine shop, cars and scrapers and head blocks repaired. A jammer for the timber yard, and an oil sprayer for the hoisting ropes were built at the shops. Repairs were made to the furnace and heaters installed.

In the headframe the spare skip replaced the one in use which was repaired. The dumps were overhauled during December.

Underground a 4" air line was installed from #3 to #2 shaft during June. The 7th level pocket was repaired in January.

To eliminate water from draining underground some diamond drill holes were cemented on surface.

#8 steam shovel was repaired and used for loading ore during the shipping season. In November the shovel was piped to #3 shafthouse and used for heating purposes.

A new water line was installed from #2 mine buildings to Princeton location. Water mains and sewer lines in Princeton, Austin and Gwinn were repaired and cleaned

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PRINCETON MINE (Cont'd)

several times during the year. At the Gwinn pump station a New Layne Northwest pump was installed replacing the old centrifugal which was sold and shipped to the Hill-Trumbull Mine. The new pump has a capacity of 500 G.P.M. against a head of 128 ft. and is powered by a 20 HP., 1750 R.P.M. Vertical motor.

Dismantling was begun during June on the Gwinn District crushing plant. Motors and electrical equipment were stored in the Austin Mine shops.

SPIES-VIRGIL MINE

In the engine house, repairs were made on the cage hoist air brake. The main bearing on the Ingersoll Rand compressor ran hot and required two days to bring it back to normal. A new relay thermostat and thermometer were installed in the discharge line.

In the change house, repairs were made to the stoker. A new tank and water heater were installed. A new hot water tank, shower and heater were installed in the new change house at the air shaft. Two unit heaters were added in the shops.

In the shaft house the railroad pocket was repaired and in November, new heaters connected to steam shovel were installed at the skip dumps and grizzly bars. A new door was made for the top tram car.

In the shaft the 8" discharge line split and a new section of pipe was installed near the bottom.

Underground in the 3rd level pump house the main gear on the triplex pump stripped five teeth. A secondhand cast iron gear was found and put in use and the pump was in service again in April. A new 16' belt was put in use on this and safety guards were added. The teeth stripped again on the main gear during October and a new steel gear was ordered from Falk Company. In January a 100 G.P.M. centrifugal pump was installed in the 4th level pump station to raise mine water to the 3rd. A concrete foundation was poured during April in the 4th level station and in May an Aldrich 8"x9" Triplex pump was installed. The pump will raise the water to the 3rd level. The new pump house on the 6th level was completed in May, sump and foundation for pump completed in June. Erection of this pump, an Aldrich Quintuplex, 600 G.P.M., 1200 ft. head and driven by a 250 HP. motor, purchased secondhand from the Holmes Mine in Ishpeming was begun in July and was in operation early in October.

In the 8th level pump house repairs were made to the #2 Prescott pump during February, May and August.

The 4th level cars were equipped with extended dump irons to provide more clearance for locomotives. Diamond Drill Holes #15 and #18 were plugged with cement reducing the mine water 100 G.P.M.

Work done during December in the air shaft completed preparations for sinking.

A new dipper lip was installed on the #15 shovel and the water tank repaired.

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## TILDEN MINE

At the crusher building the pocket was revamped and 20 feet of the north end of the building was removed to permit the movement of electric shovels. West side 10" Crusher was equipped with new diaphragm liners, a new upper and lower mantles, the spider changed and concaves turned during January. In July new concaves were installed and these were turned in September. During July the concaves in the East side 10" crusher were turned and in September, new concaves were installed.

Hydraulic steering equipment was installed on all Euclid trucks and new type oil filters were placed on #3, 4 and 5. These trucks operated satisfactorily and only a few minor repairs were needed.

No. 31 Electric shovel was overhauled and repaired during January and February. No. 29, 46 and 52 Electric shovels were repaired during March and April.

The four old steam locomotives were stripped of all usable parts, cut up and sold for scrap.

The large centrifugal pump was overhauled and used for hydraulicing the overburden on the east end pit.

The mine was idle November and December.

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COMPARATIVE TABLES

| YEAR | TONS ORE AND ROCK HOISTED | CU. FT. AIR USED | CUBIC FT. AIR PER TON HOISTED | GALLONS OF WATER PUMPED | G.P.M. |
|---|---|---|---|---|---|
| **CLIFFS SHAFT MINE** | | | | | |
| 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 |
| 1944 | 614 214 | 1 459 890 000 | 2 376 | 448 361 410 | 851 |
| 1945 | 567 691 | 1 194 570 000 | 2 104 | 444 687 684 | 848 |
| **ATHENS MINE** | | | | | |
| 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 | 1 305 945 000 | 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 |
| 1944 | 443 576 | 900 765 000 | 2 030 | 162 835 951 | 308 |
| 1945 | 429 136<br>stockpile 21 656 | 873 710 000 | 2 035 | 174 073 654 | 331 |
| **MAAS MINE** | | | | | |
| 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 |
| 1944 | 614 836 | 1 542 835 000 | 2 509 | 578 257 239 | 1 097 |
| 1945 | 572 652 | 1 205 145 000 | 2 104 | 555 380 166 | 1 058 |
| **NEGAUNEE MINE** | | | | | |
| 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 |
| 1944 | 760 871 | 1 165 140 000 | 1 531 | 375 706 897 | 713 |
| 1945 | 671 220 | 873 270 000 | 1 301 | 357 175 559 | 681 |

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YEAR 1945

COMPARATIVE TABLES

| YEAR | TONS ORE AND ROCK HOISTED | CU. FT. AIR USED | CUBIC FT. AIR PER TON HOISTED | GALLONS OF WATER PUMPED | G.P.M. |
|---|---|---|---|---|---|
| **CAMBRIA-JACKSON MINE** | | | | | |
| *1943 | 155,513 | 216,657,000 | 1,393 | 123,714,000 | 431 |
| 1944 | 286 761 | 410 875 000 | 1 432 | 196 252 831 | 372 |
| 1945 | 319 222 | 386 626 500 | 1 211 | 190 159 826 | 362 |
| (*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.) | | | | | |
| **LLOYD MINE** | | | | | |
| 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 (10M) | 91 |
| 1942 | 588 749 | 588 451 000 | 999 | 39 486 100 | 74 |
| 1943 | 531 260 | 525 280 500 | 988 | 65 024 800 | 124 |
| 1944 | 391 057 | 436 293 000 | 1 115 | 51 625 550 | 97.6 |
| 1945 | 334 117 | 419 088 500 | 1 254 | 59 943 400 | 114.2 |
| **MATHER MINE** | | | | | |
| 1943 | 29 517 | (First hoisting in September) | | | |
| 1944 | 127 438 | 425 700 000 | 3 340 | 74 006 311 | 140 |
| 1945 | 258 028 | 378 600 000 | 1 467 | 134 384 517 | 256 |
| **TILDEN MINE** | | | | | |
| 1936 | 291 341 | | | | |
| 1937 | 305 418 | | | | |
| 1938 | 85 889 | | | | |
| 1939 | 170 276 | | | | |
| 1940 | 205 612 | | | | |
| 1941 | 302 943 | | | | |
| 1942 | 235 207 | | | | |
| 1943 | 139 991 | | | | |
| 1944 | 214 824 | | | | |
| 1945 | 197 476 | | | | |
| **PRINCETON MINE** | | | | | |
| 1942 | 83 918 | | | | |
| * 1943 | 248 845 | 490 680 000 | 1 971 | 109 444 342 | 250 |
| 1944 | 236 310 | 434 091 000 | 1 836 | 104 716 106 | 198.5 |
| 1945 | 280 491 | 362 925 000 | 1 293 | 119 237 162 | 227 |
| (* Air and water figures are for last 10 months of 1943.) | | | | | |

THE CLIFFS POWER & LIGHT COMPANY
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YEAR 1945

Further reductions in mining operating schedules during the year 1945 reduced the energy generated and purchased during the year from the peak year of 1943 by approximately 7.7%, and below the year 1944 by 5.1%, to a total generated and purchased of 101,027,280 KWH. Of this amount, we generated in our own power plants 93,210,000 KWH and purchased 7,817,280. The KWH sold were proportionately reduced to 91,297,978. The rainfall during the year was slightly below that which has been experienced since 1941, but additional storage facilities and the manner in which the precipitation occurred permitted us to keep our energy generated above 90,000,000 KWH and approximately 14,000,000 KWH more than was generated in 1944. Neither of our large storage basins filled at any time during the year, but the Deer Lake storage dam attained a height considerably above that permitted by the old dam and accordingly contributed materially towards the annual hydro production.

Still unsettled at the close of 1944 was the electric rate situation in Ishpeming, Negaunee and Munising which had been instigated by H. J. Adams and the report of Dr. John Bauer during 1943. In January of 1945, our Company offered a reduction in wholesale rate from 1.2¢ per KWH to 1.1¢ per KWH to the Michigan Gas & Electric Company who, in turn, during February offered a comparable reduction in city of Ishpeming electric energy schedules. On March 7th the city of Ishpeming accepted the rate proposal submitted to them and dismissed the controversy then pending before the Michigan Public Service Commission. The Cliffs Power & Light Company immediately made a reduction of 1 mill in its rate to all companies to whom it was selling power for resale and the entire rate controversy was settled.

On January 1st, 1945 construction was in progress on increasing the height of the Silver Lake Dam. This work was continued until the month of June at which time it was completed by the contractor. About the time of completion, heavy rainfall in the Silver Lake area caused considerable washing of the dam due to lack of sod to prevent erosion. About the same time the levee settled which necessitated refilling a portion of the upstream side of the dam. This work was successfully completed and during the summer water was caught in the dam well above the level which would have been permitted by the older structure.

During 1944, the Company had ordered a carrier current signal equipment for the Gwinn and Brownstone substations which would permit the operation of the Gwinn switching station from the Brownstone substation over our own transmission conductors rather than through leased lines of the Michigan Bell Telephone system which had been utilized in the past. This equipment arrived during the year and was installed, but although it was possible to operate the equipment, complete utilization of both metering and dispatching channels could not be obtained so the problem was referred to the Westinghouse Company for a final solution. After numerous tests and changes of apparatus, the factory felt that it had sufficient data on which to complete the changes of the equipment to guarantee satisfactory operation. However, the redesigned portions had not been received and installed, and we had not accepted the equipment as being in satisfactory operation at the end of 1945.

On April 23rd an employee of the Ericson Oil Company, named Kenneth Sleeman, was badly burned while unloading a car of gasoline at the Oil Company's siding on the L.S.&.I. Railroad at Negaunee. Sleeman was in the hospital for several months and finally died in December as a result of his burns. This was an unfortunate accident, but at the same time the occurrence was extremely fortunate that the gasoline tank car did not explode and cause extensive property damage and loss of life.

THE CLIFFS POWER & LIGHT COMPANY
ANNUAL REPORT
YEAR 1945

In May and June there were meetings held between the citizens of the Upper Peninsula and the U. S. Army Engineering Corps in regard to harbor improvements at the mouth of the Au Train river and in regard to the proposed ship canal from Lake Superior to Lake Michigan by way of the Au Train River, Whitefish River and Little Bay de Noc. Although we were promised reports on these meetings by the Army Engineers, none have been received and since there has been no further comment in regard to the matter presume that it has been decided that no immediate action shall be taken.

After having considered the break which occurred in the steel pipe line of the Carp Plant during 1944, it was decided that the entire pipe should be welded on each side of the lockbar joints to strengthen these joints and to assist in preventing a reoccurrence of the failure which had been experienced. Accordingly, we received permission to begin the work and during the months of August, September and October the welding was conducted. In order to ascertain the most economical method of doing the work, various schemes of operation were tried and the most economical decided upon. It is anticipated that this work will be started again as soon as weather conditions permit in 1946.

No serious difficulties were experienced during the year with any of the hydraulic generating equipment, and the only major repairs that were done was the rebuilding of the forebay and wing walls at the Republic power plant which was started in August and was completed before the end of the year.

On October 26th notice was received from the United Steelworkers of America, CIO, that a majority of our employees were members of that organization, and that it had requested an election for the purpose of having the union designated as bargaining agent for our Company's employees. Negotiations for this election were conducted during the remainder of the year and Friday, January 11, 1946, was set as the date at which the election was to be held. At the time of writing this report the election has been held and the union was designated as the bargaining agent by a vote of 25 to 15.

## THE CLIFFS POWER & LIGHT COMPANY

## STATISTICAL DATA - 1945

| | KILOWATT HOURS GENERATED & PURCHASED | | | | | | | | STATION USE | DELIVERED TO LINES | KWH SOLD | TRANSMISSION LOSSES | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | McCLURE | CARP | HOIST | AuTRAIN | REPUBLIC | ESCANABA | PURCHASED | TOTAL | | | | KWH | % |
| Jan. | 3,588,000 | 1,090,000 | 1,300,000 | 313,100 | 118,900 | 220,000 | 1,176,640 | 7,806,640 | 18,370 | 7,788,270 | 7,145,723 | 642,547 | 8.25 |
| Feb. | 4,389,000 | 896,000 | 1,453,000 | 362,300 | 102,300 | 218,000 | 861,400 | 8,282,000 | 21,010 | 8,260,990 | 7,421,644 | 839,346 | 10.1 |
| Mar. | 3,968,000 | 1,703,000 | 1,273,000 | 374,900 | 128,100 | 354,000 | 241,000 | 8,042,000 | 18,980 | 8,023,020 | 7,301,886 | 721,134 | 8.98 |
| Apr. | 3,157,000 | 2,044,000 | 1,087,000 | 629,200 | 318,000 | 1,094,000 | 2,000 | 8,331,200 | 18,030 | 8,313,170 | 7,722,395 | 590,775 | 7.10 |
| May | 4,242,000 | 1,156,000 | 1,486,000 | 694,400 | 301,000 | 758,000 | 0 | 8,637,400 | 18,520 | 8,618,880 | 7,921,277 | 697,603 | 8.09 |
| June | 3,568,000 | 1,562,000 | 1,283,000 | 663,000 | 344,200 | 1,008,000 | 385,000 | 8,813,200 | 17,220 | 8,795,980 | 8,049,717 | 746,263 | 8.48 |
| July | 4,337,000 | 1,240,000 | 1,506,000 | 583,900 | 329,800 | 542,000 | 0 | 8,538,700 | 19,400 | 8,519,300 | 7,663,238 | 856,062 | 10.04 |
| Aug. | 4,389,000 | 1,211,000 | 1,510,000 | 400,600 | 130,300 | 282,000 | 0 | 7,922,900 | 19,918 | 7,902,982 | 7,123,732 | 779,250 | 9.86 |
| Sept. | 4,500,000 | 1,322,000 | 1,527,000 | 219,900 | 104,600 | 300,000 | 466,000 | 8,419,918 | 19,582 | 8,419,918 | 7,506,116 | 913,802 | 10.85 |
| Oct. | 3,988,000 | 1,428,000 | 1,355,000 | 218,700 | 82,000 | 371,000 | 1,714,760 | 9,157,460 | 19,650 | 9,137,810 | 8,037,069 | 1,100,741 | 12.04 |
| Nov. | 3,305,000 | 1,550,000 | 1,190,000 | 259,000 | 115,400 | 625,000 | 1,345,120 | 8,389,520 | 18,410 | 8,371,110 | 7,854,096 | 517,014 | 6.17 |
| Dec. | 3,608,000 | 1,097,000 | 1,358,000 | 357,000 | 217,400 | 404,000 | 1,625,360 | 8,666,760 | 19,630 | 8,647,130 | 7,551,085 | 1,096,045 | 12.67 |
| Yr. | 47,039,000 | 16,299,000 | 16,328,000 | 5,076,000 | 2,292,000 | 6,176,000 | 7,817,280 | 101,027,280 | 228,720 | 100,798,560 | 91,297,978 | 9,500,582 | 9.42 |

THE CLIFFS POWER & LIGHT COMPANY
ANNUAL REPORT
YEAR 1945

## STATISTICAL DATA - 1945

| Month | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precipitation - | 0.77 | 2.09 | 1.69 | 3.39 | 3.38 | 3.05 | 2.31 | 3.50 | 3.31 | 2.06 | 3.81 | 1.45 |

Total Precipitation at Ishpeming during 1945 - 30.81" (2.56 ft.)
Average " " Marquette - 32.80" (46 year record)

## CARP RIVER PLANT:

| | | |
|---|---|---|
| Drainage area above Intake Dam | | 66.66 sq. miles |
| Cubic feet precipitation in 1945 | 4,757,437,000 | |
| Kilowatt hours generated in 1945 | 16,299,000 | |
| Cubic feet water utilized (90 cu. ft. - 1 Kwh.) | 1,466,910,000 | |
| " " " in Carp Storage Basin Jan. 1, 1945 | 224,160,000 | |
| " " " " " " " Dec. 31, 1945 | 288,543,000 | |
| " " " added to storage in 1945 | 64,383,000 | |
| " " " wasted over Intake Dam | 175,752,000 | |
| Total run-off for year 1945 (Cubic feet) | 1,707,045,000 | |
| Run-off per sq. mile of drainage area (cubic feet) | 25,608,000 | |
| Second - feet of run-off | | 0.81 |

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

| | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |

| | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precipitation | 27.10 | 30.23 | 30.10 | 35.32 | 33.58 | 30.34 | 32.20 | 34.26 | 32.04 | 32.77 | 30.81 |
| 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 | 0.70 | 0.81 |

## McCLURE PLANT:

| | | |
|---|---|---|
| Drainage area above Intake Dam | | 140.52 sq. miles |
| Cubic feet precipitation in 1945 (Hoist Plant-37.94" 3.16') | 12,379,213,000 | |
| Kilowatt hours generated at McClure Plant in 1945 | 47,039,000 | |
| Cubic feet water utilized (125 cu. ft. - 1 Kwh) | 5,879,875,000 | |
| " " " wasted over Intake Dam | 0 | |
| " " " in Hoist Storage Basin Jan. 1, 1945 | 1,508,606,000 | |
| " " " " " " Dec. 31, 1945 | 1,587,952,000 | |
| " " " added to " " in 1945 | 79,346,000 | |
| " " " in Silver Lake January 1, 1945 | 0 | |
| " " " " " " December 31, 1945 | 91,408,000 | |
| " " " added to Silver Lake in 1945 | 91,408,000 | |
| Total run-off for year 1945 (Cubic feet) | 6,050,629,000 | |
| Run-off per sq. mile of drainage area | 43,058,000 | |
| Second-feet of run-off | | 1.36 |

| | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precipitation | 35.10 | 42.03 | 26.60 | 30.49 | 24.06 | 43.95 | 35.51 | 43.80 | 38.75 | 30.81 | 37.02 |
| Sec.ft. per sq.mile run-off | 1.02 | 1.54 | 0.85 | 0.92 | 0.52 | 1.52 | 1.80 | 2.22 | 1.36 | 1.45 | 1.10 |

| | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precipitation | 32.54 | 35.07 | 35.02 | 29.96 | 32.16 | 38.18 | 40.93 | 41.22 | 36.59 | 38.15 | 40.20 |
| Sec.ft. per sq.mile run-off | 1.23 | 1.30 | 1.16 | 0.90 | 1.05 | 1.19 | 1.75 | 1.69 | 1.47 | 1.28 | 1.15 |

| | 1943 | 1944 | 1945 |
|---|---|---|---|
| Total Precipitation | 35.64 | 37.62 | 37.94 |
| Sec.ft.per sq.mile run-off | 1.43 | 1.17 | 1.17 |

THE CLIFFS POWER & LIGHT COMPANY
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SUBSTATION TRANSFORMERS:

Substation transformers installed as of December 31, 1945.

| | Phase | No. | K.V.A. | Total K.V.A. | |
|---|---|---|---|---|---|
| **66,000/2300 Volts** | | | | | |
| Munising Substation | 1 | 3 | 667 | 2,001 | |
| Seney " | 1 | 1 | 25 | 25 | |
| Inland #1 " | 1 | 3 | 500 | 1 500 | |
| " #2 " | 1 | 3 | 500 | 1 500 | |
| AuTrain Prison Camp Sub | 1 | 1 | 50 | 50 | 5,076 K.V.A. |
| **2300/66,000 Volts** | | | | | |
| AuTrain Substation | 1 | 3 | 333-1/3 | 1 000 | |
| | | | | | 1 000 |
| **33,000/66,000 Volts** | | | | | |
| Gwinn Substation | 1 | 3 | 1,250 | 3 750 | |
| | | | | | 3 750 |
| **33,000/12,000 Volts** | | | | | |
| Clarksburg Substation | 1 | 3 | 37-1/2 | 112½ | |
| " " | 1 | 2 | 150 | 300 | |
| | | | | | 412½ |
| **33,000/2300 Volts** | | | | | |
| 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 " | 1 | 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 |
| **2300/33,000 Volts** | | | | | |
| Republic " | 1 | 3 | 250 | 750 | |
| Hoist Plant " | 3 | 1 | 2 500 | 2 500 | |
| Escanaba " " | 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 |
| **12,000/440-220 Volts** | | | | | |
| Piqua-Marquette Substation | 1 | 3 | 100 | 300 | |
| **12,000/2300 to 2300/440-220** | ( 1 | 3 | 185 | 555 | |
| Piqua-Marquette Substation | ( 1 | 3 | 100 | 300 | 1 155 |
| **12,000/220-110 Volts** | | | | | |
| D.S.S.&.A. Ry at Clarksburg | 1 | 1 | 2-1/2 | 2½ | |
| | | | | | 2½ |
| **12,000/2300 Volts** | | | | | |
| 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
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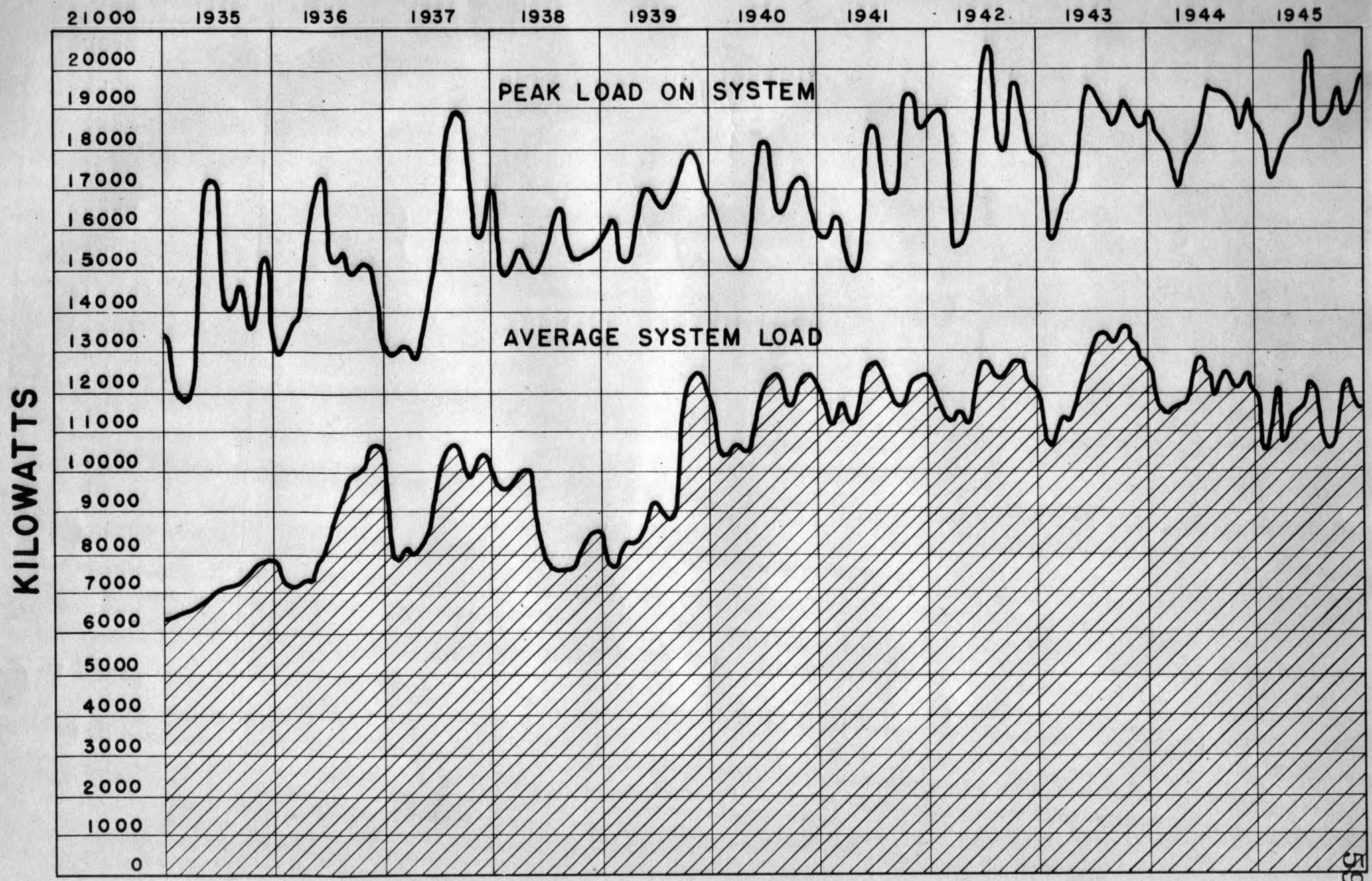
YEAR 1945

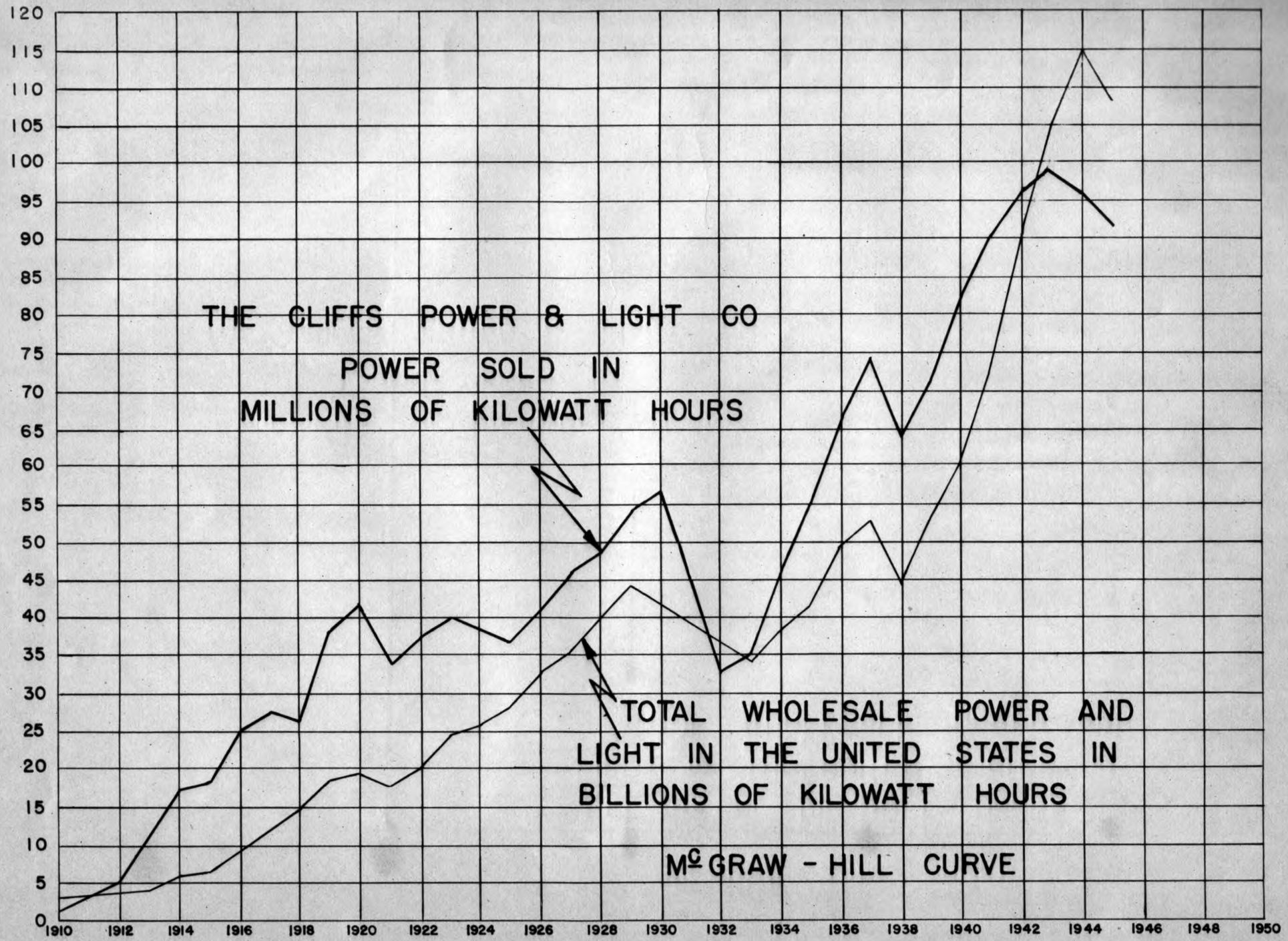
SUBSTATION TRANSFORMERS: (CONT'D.)

| | Phase | No. | K.V.A. | Brought Fwd. Total K.V.A. | 61,641 KVA |
|---|---|---|---|---|---|
| 6,600/2300 Volts | | | | | |
| Inland #1 Substation | 1 | 3 | 25 | 75 | |
| Blaney Park " | 1 | 2 | 25 | 50 | |
| " " " | 1 | 1 | 15 | 15 | |
| AuTrain Lake " | 1 | 1 | 25 | 25 | |
| | | | | | 165 |
| 6,600/115-230 Volts | | | | | |
| Furnace Substation Lighting | 1 | 1 | 1-1/2 | 1½ | |
| | | | | | 1½ |
| | | | | Grand Total ..... | 61,807½ KVA |

DISTRIBUTION TRANSFORMERS:

| | Number | Capacity |
|---|---|---|
| Total at first of year | 380 | 2,426-1/2 K.V.A. |
| " purchased during year | 23 | 85-1/2 |
| " installed " " | 10 | 24-1/2 |
| " sold " " | 7 | 36 |
| " at close of year | 396 | 2,476 |
| In stock at close of year | 32 | 171 |
| " service at " " " | 326 | 1,926 |
| C.P.&.L.Co. Plants & Auxiliaries | 38 | 379 |
| | 396 | 2,476 |


21000
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
KILOWATTS
PEAK LOAD ON SYSTEM
AVERAGE SYSTEM LOAD


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
Mc GRAW - HILL CURVE
120
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1910
1912
1914
1916
1918
1920
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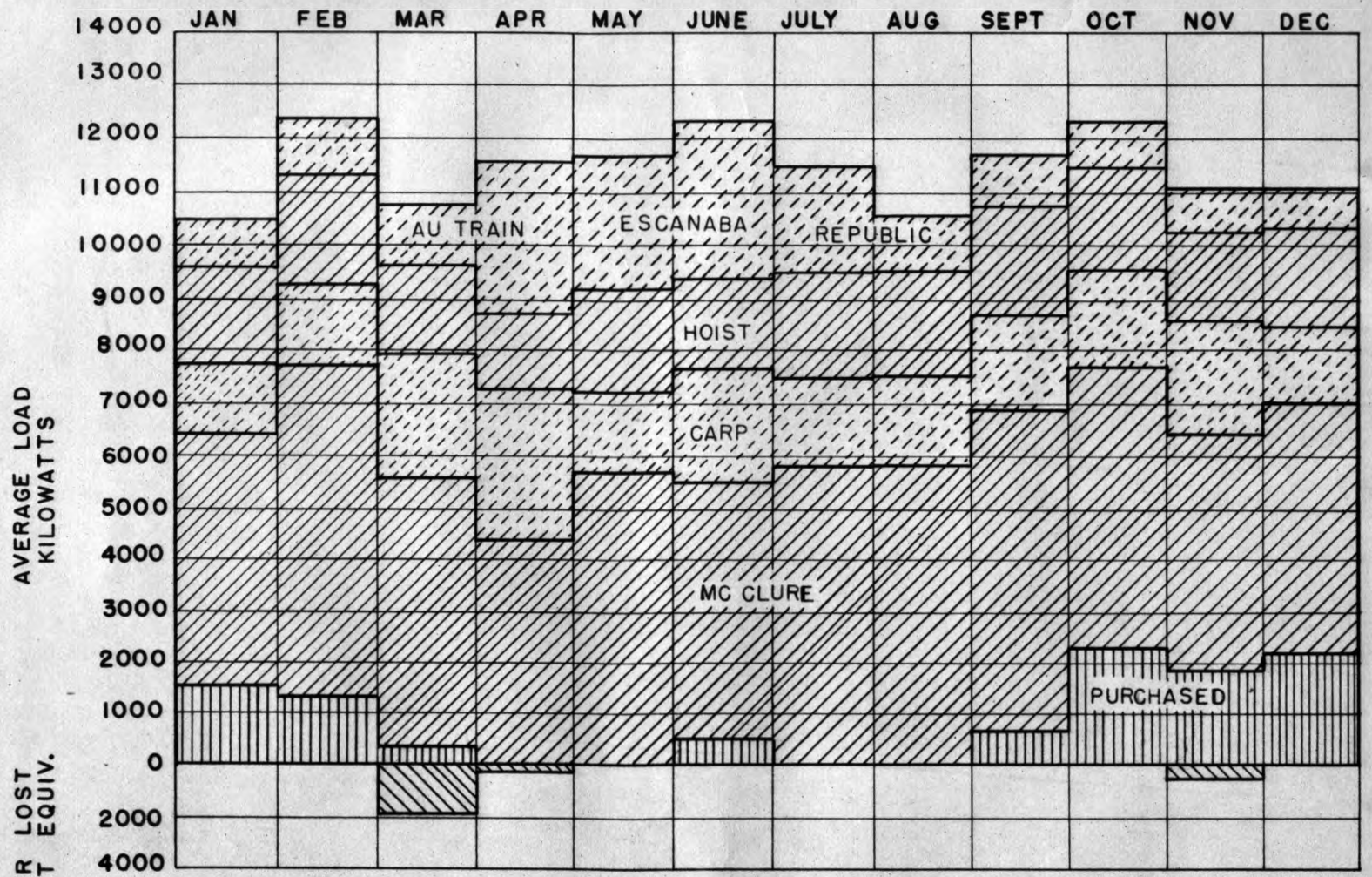
1924
1926
1928
1930
1932
1934
1936
1938
1940
1942
1944
1946
1948
1950

# 1945




CURRENT GENERATED BY WATER POWER

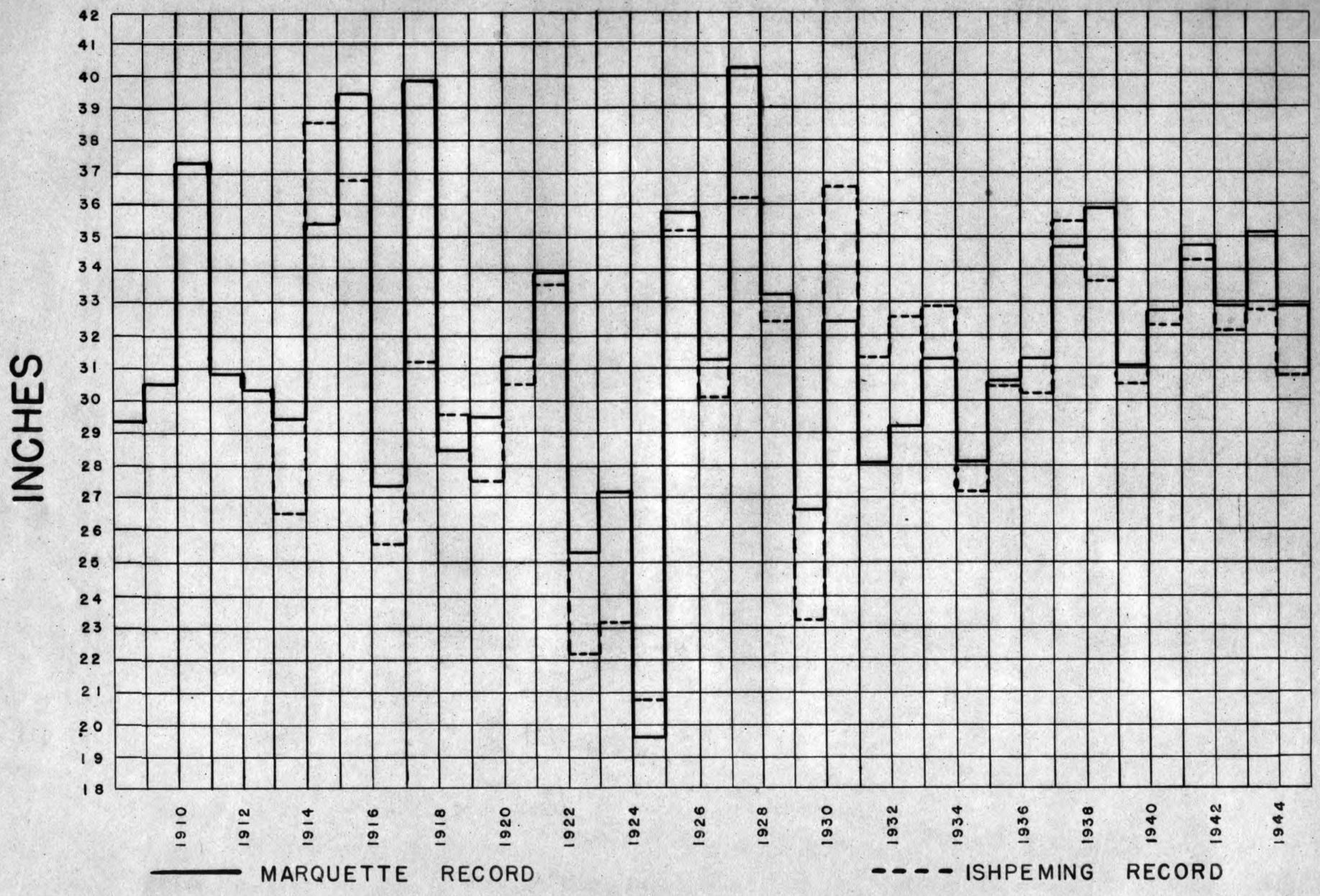
POWER PURCHASED

KILOWATT EQUIVALENT WATER LOST AT CARP

" " " MC CLURE

| | |
|---|---|
| MC CLURE | 46.56 % |
| CARP | 16.09 |
| HOIST | 16.18 |
| AU TRAIN | 5.03 |
| ESCANABA | 6.14 |
| REPUBLIC | 2.26 |
| PURCHASED | 7.74 |

# PRECIPITATION BY YEARS



WELFARE DEPT. ANNUAL REPORT YEAR 1945

The work of the Welfare Department, including the categories which have to deal with matters of welfare, relief, insurance, compensation, personal problems and all other angles which have to be considered by a welfare department, continued in the usual manner during the year 1945. 1945, a war year, brought some special problems, particularly those problems which concerned employees who had entered the military service and the return of other employees who have been discharged from the military service. Some attention had to be given to post-war problems due to the fact that many veterans who returned during the last half of 1945 created special problems with respect to return to employment. About 175 veterans returned to work for the company during the year and only a small percentage of this group had any particular problems as far as return to work with the company was concerned. The establishment of the veterans' counsellor service in the County of Marquette will make it possible for all veterans to have the assistance of a central bureau in the solution of their problems.

The Welfare Department was created in July of 1938 following the retirement of Mr. William H. Moulton, who had been Secretary of the department for many years, and during his secretaryship the department was known as the Pension Department. Mr. Moulton was succeeded on July 1, 1938 by Walter F. Gries who became the head of the Welfare Department with the title of Superintendent. It should be recorded in this report that hardly a week passes by but what we are obliged to refer to records, files, memoranda, and reports which were made during the long service of Mr. W. H. Moulton. His great service to the company as Secretary of the Pension Department for many years has always been a challenge to those of us who have been privileged to follow him.

The Welfare Department has supervision of all matters dealing with and pertaining to the general welfare and health of the company's employees. Herewith are listed some of the various activities of this department: The promotion of the general welfare and health of employees; social security; workmen's compensation; group insurance; retirement of older employees; the donation roll; direct relief roll; the carrying on of the company's pansion system and of the several cases which are still carried as pensions; matters dealing with public relations ; civic problems; public health; safety; publishing of the Miners' Bulletin; preparation for the periodic safety meetings and writing of the minutes; problems which arise in connection with various types of legislation dealing with welfare, relief, safety and compensation; personnel direction; and many other problems which the Welfare Department is called upon to consider.

The Superintendent of the Welfare Department also acts in the capacity of a liaison officer since he serves as Administrator of the Ishpeming Hospital. In addition to this, the Superintendent of the Welfare Department has had the opportunity of keeping in direct touch with welfare problems from the State standpoint since he has been a member of the State Social Welfare Commission since 1939. Three years he served as Chairman of this commission.

WELFARE DEPT. ANNUAL REPORT YEAR 1945

We wish to record here that the department has had the excellent cooperation of the Safety Department under Mr. A. J. Stromquist, Director, and Captain H. F. Rogers, Assistant Director. The cooperation of the Safety Department has undoubtedly reacted in a fine manner to the company's benefit and we believe the association we have had with this department has been helpful in every respect. It is also our desire to express appreciation for the fine cooperation which we have had from Mr. Walter E. Johnson who has carried on the work as Compensation Agent in the Welfare Department for a number of years. This part of the department's work has been extremely heavy during the past year but Mr. Johnson, by training, experience, and understanding, has carried on this work, as well as the work dealing with group life and benefit insurance, in a very splendid fashion. We are pleased again to have the services of Mr. Lowell C. Holmgren who worked in the department as an assistant to Mr. Johnson before entering the military service in 1942. Mr. Holmgren has resumed his position in Mr. Johnson's office and the work of this part of the department is being handled very well.

We wish to record again that we have appreciated the cooperation and leadership of Mr. C. J. Stakel, our present Manager, and of Mr. C. W. Allen, our Assistant Manager.

The Police Department has continued under the direction of our Chief of Police R. J. Veale. Mr. Veale supervises the department closely and we are pleased to report that it is a well organized and well operated unit. There was some reduction in the force during the year because of the end of the war and the need for fewer officers. Mr. Veale reports to the Superintendent of the Welfare Department practically every day and regular conferences are held in connection with the operation of our Police Department. We express our appreciation for Mr. Veale's careful supervision of the department and for the fine manner in which our police work has been carried on throughout the year. We feel that we have been very fortunate throughout the war years since we have been able to maintain a police force of loyal, faithful, conscientious and well-trained men.

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

Walter F. Gries, Superintendent
Walter E. Johnson, Compensation Agent
Miss Emily Nicholas, Secretary to the Superintendent
Miss Mary Ryan, Receptionist and File Clerk
Lowell C. Holmgren, Assistant in the Compensation Office
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.

TOBIAS HANNINEN - Athens Mine

Hanninen had filed a claim on June 17, 1944, alleging that he was now suffering from tuberculosis and injuries to his body and internal organs which were the result of a gassing at the Athens Mine during the fire which occurred in February 1943. The matter was heard before Deputy Commissioner James W. Nolan on December 20, 1944, and a detailed report was included in the annual report for that year. It was his opinion that there was no cause of action, and he denied compensation. We anticipated that Hanninen would appeal from this decision, and on March 23, 1945 the matter was heard on appeal before the full Compensation Commission, and it was their decision that the order of the Deputy Commissioner denying compensation should be affirmed and that no compensation was due Mr. Hanninen.

JOHN DUCOLI, SR - Negaunee Mine

This case had been heard by Deputy Commissioner James W. Nolan on December 20, 1944, and an award in our favor was made. Ducoli appealed to the full board, and on March 30, 1945 the Compensation Commission reviewed the order of the Deputy Commissioner and granted compensation at the rate of $18.00 per week from January 16, 1943 less any period that Mr. Ducoli had worked subsequent to that date. It was the opinion of the Commission that Ducoli had inhaled an excessive amount of gas or smoke on January 16, 1943, the date of the alleged accident. It was our opinion that the Commission had misinterpreted the testimony and that they had read in certain conditions that did not appear on the record made before the Deputy Commissioner. A strong effort was made by Mr. Francis A. Bell, our attorney, to get the matter before the Supreme Court, but as there was no question of law involved, he was not able to get such permission.

WALFRED SALO - Princeton Mine - Acc. Rept. No. 186

Salo sustained a comminuted fracture of both bones of the right lower leg on September 24, 1942. He was paid for total disability at the rate of $18.00 per week until the time of his return to work as a company account miner on July 6, 1943. As there was a difference of earning capacity, he was entitled to partial compensation at the rate of $5.14 a week subsequent to July 6, 1943. He later returned to work as a regular contract miner, and his earnings were equal or exceeded his earnings at the time of the accident. He refused to sign a settlement receipt, so we applied for a hearing in order to close the case. The hearing was held before a Deputy Commissioner on August 27, 1945 who subsequently entered an order denying further compensation.

11.

a. WORKMEN'S COMPENSATION (Continued)

FATALITIES

The following fatality occurred in 1945:

Richard Oates, Sr
Age 54

Maas Mine
Occurred March 26, 1945
Struck by stage planks and fall of ground
Dependent widow and one child

| | |
|---|---|
| Compensation - 400 weeks at $21.00 | $8400.00 |
| Funeral expense | 300.00 |
| | $8700.00 |

11.

a. WORKMEN'S COMPENSATION (Cont'd)

LUMP SUM SETTLEMENTS

During the year settlements were arranged in nine cases. Three were back injuries, one was a fractured wrist, three were silicotic cases, and one a fatality. All were settled on a partial basis, and all were settled by redemption of liability so that there will be no further possibility of the cases being reopened. The settlements were arranged through the attorneys for the various individuals and, of course, all had to be approved by the Compensation Commission. Following is a list of the individuals with whom the settlements were made:

| | | | |
|---|---|---|---|
| John Baggiore | Cambria-Jackson Mine | Fractured wrist | $1,600.00 |
| Henry Caron | " | Back injury | 2,675.88 |
| Joseph Zoppetti | Lloyd Mine | Silicosis | 2,500.00 |
| George Kokko | Maas Mine | Back injury | 2,600.00 |
| Frank Gensheimer | " | Back injury | 2,853.00 |
| John Puskola | Spies-Virgil | Fatality | 5,000.00 |
| Theodore Salonen | Negaunee Mine | Silicosis | 1,800.00 |
| Victor Sivula | " | " | 1,300.00 |
| John Wiita | " | " | 2,800.00 |

11.

a. WORKMEN'S COMPENSATION (Continued)

Following is a list of the more serious cases other than fatalities which occurred in 1945:

| Mine and Report No. | Name | Nature of Injury | Compensation Paid to 12-31-45 |
|---|---|---|---|
| Cliffs-Shaft 1163 | William Collins | Spiral fracture, upper third of left femur. | $ 966.00 * |
| Cliffs-Shaft 1164 | John Hakala | Amputation, middle finger, right hand. | 822.50 |
| Cliffs-Shaft 1172 | Matt Amel | Fracture, lower third, tibia and fibula, right leg. | 525.00 |
| Princeton 231 | Victor Niemi | Dislocation, right shoulder joint. | 462.00 * |
| Maas 636 | Gerald Labresh | Fracture - dislocation of left ankle. | 252.00 * |
| Maas 642 | Jafet Servio | Fracture, tibia and fibula, lower third, left. Severe laceration, right leg. | 21.00 * |
| Lloyd 857 | Robert Peterson | Incomplete fracture, middle third of left femur. | 364.00 |
| Lloyd 859 | George Carlson | Fractured ankle, left leg. | 430.50 |
| Negaunee 775 | William Kosonen | Loss of right eye. | 966.00 * |
| Negaunee 782 | Alec Juidici | Bruised left foot and ankle. Ruptured muscle, left thigh. | 343.00 * |
| Negaunee 788 | Rhinehardt Hansen | Comminuted fracture, lower third, left femur. | 84.00 * |
| Mather 6 | Samuel W. Sapila | Laceration of right hand with severance of ligaments to index and middle fingers. | 228.34 |
| Cambria-Jackson 26 | Abraham Auvinen | Contusion over lower dorsal and lumbar area of back. | 714.00 * |
| Cambria-Jackson 32 | John B. Emanuelson | Fracture of tibia and fibula, right leg. | 252.00 * |

* Payments still being made.

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STATEMENT OF COMPENSATION PAYMENTS FROM
JANUARY 1, 1945 TO DECEMBER 31, 1945

| | Average No. of Employees | No. of Fatal Accs. | No. of Non-fatal Accidents | | | Actual Comp Paid in 1945 | 1937 | 1938 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | Estimated Compensation Still Pending | Medical & Special Expense | Fatal Cases Pending | Accident Cases Pending | O.D. Cases Pending |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cambria-Jackson | 169 | | 9 | 12 | 26 | 7,291.12 | | | | | | 5,896.54 | | 1,394.58 | 2,341.20 | 2,315.75 | | 5 | |
| Cliffs-Shaft | 402 | | 17 | 9 | 70 | 11,729.41 | | 477.00 | | | 354.00 | 1,327.68 | 4,660.05 | 4,910.72 | 10,783.07 | 4,131.17 | | 9 | 3 |
| General Storehouse and Shops | 153 | | | 2 | 20 | | | | | | | | | | | 1,382.45 | | | |
| Ishpeming Office | 148 | | | | | | | | | | | | | | | 1,338.00 | | | |
| Lloyd | 210 | | 11 | 13 | 60 | 18,432.98 | 2,880.00 | | | 1,421.28 | 1,205.28 | 3,330.00 | 6,538.00 | 3,058.42 | 28,740.55 | 2,573.04 | 3 | 13 | 4 |
| Maas | 360 | 1 | 19 | 25 | 79 | 15,477.50 | | 936.00 | 4,493.00 | 936.00 | | 3,082.00 | 2,850.00 | 3,180.50 | 13,393.00 | 4,545.43 | 1 | 7 | 1 |
| Princeton | 150 | | 9 | 8 | 25 | 6,197.79 | | | | | 233.28 | 3,162.00 | 1,484.00 | 1,318.51 | 3,912.72 | 1,369.50 | | 7 | |
| Spies-Virgil | 75 | | 1 | 6 | 15 | 7,471.50 | | | | | | 1,026.00 | 6,239.00 | 206.50 | 6,340.00 | 506.90 | 1 | 1 | |
| Tilden | 27 | | 2 | 1 | 5 | 49.00 | | | | | | | | 49.00 | | 246.00 | | | |
| Miscellaneous | 37 | | | | 10 | | | | | | | | | | | 331.50 | | | |
| Cleveland Roll | 19 | | | | | | | | | | | | | | | 169.50 | | | |
| Cliffs Power & Light Company | 59 | | | | | 936.00 | | | | 936.00 | | | | | 1,332.00 | 532.50 | 1 | | |
| Negaunee | 310 | | 17 | 16 | 59 | 20,847.96 | | | 1,908.00 | 2,903.76 | 1,289.64 | 4,035.00 | 3,606.42 | 7,105.14 | 20,083.35 | 5,132.77 | 4 | 11 | 1 |
| Mather | 182 | | 5 | 10 | 79 | 2,555.84 | | | | | | | 1,253.00 | 1,302.84 | 6,762.00 | 3,632.65 | 1 | 2 | 1 |
| E & A #9, Sec 1, Hole 141 | | | 1 | | | 231.00 | | | | | | | | 231.00 | 273.00 | | | 1 | |
| Athens | 314 | | 14 | 11 | 50 | 4,241.08 | | | 287.04 | | 1,175.04 | 1,092.00 | 371.00 | 1,316.00 | 1,113.01 | 2,911.62 | | 4 | |
| Total - Michigan Mines | 2,615 | 1 | 105 | 113 | 498 | 95,461.22 | 2,880.00 | 1,413.00 | 6,688.04 | 6,197.04 | 4,257.24 | 22,951.22 | 27,001.47 | 24,073.21 | 95,073.90 | 31,118.78 | 11 | 60 | 10 |
| Hibbing Office | 28 | | | | | | | | | | | | | | | 168.00 | | | |
| Canisteo | 137 | | | 4 | 42 | | | | | | | | | | | 818.00 | | | |
| Hill-Trumbull | 161 | | 3 | 9 | 28 | 1,852.38 | | | 490.78 | | | 247.10 | 1,074.50 | 40.00 | | 1,213.12 | | | |
| Holman-Cliffs | 198 | | | 3 | 35 | 263.75 | | | | 40.00 | | 223.75 | | | | 1,314.75 | | | |
| Total - Minnesota Mines | 524 | | 3 | 16 | 105 | 2,116.13 | | | 490.78 | 40.00 | | 470.85 | 1,074.50 | 40.00 | | 3,513.87 | | | |
| Total - All Mines | 3,139 | 1 | 108 | 129 | 603 | 97,577.35 | 2,880.00 | 1,413.00 | 7,178.82 | 6,237.04 | 4,257.24 | 23,422.07 | 28,075.97 | 24,113.21 | 95,073.90 | 34,632.65 | 11 | 60 | 10 |

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

WELFARE DEPT. ANNUAL REPORT YEAR 1945

11.

a. WORKMEN'S COMPENSATION (Continued)

ANNUAL STATEMENT OF COMPENSATION PAYMENTS
FROM JANUARY 1st, 1945 to DECEMBER 31st, 1945

| | | |
|---|---|---|
| Compensation paid on 1945 accidents | $ 24,113.21 | |
| Estimated compensation still pending | 95,073.90 | |
| Cost of medical and hospital service, also special expense | 34,632.65 | |
| | | 153,819.76 |
| Less pending for years 1937 to 1944 inclusive | 78,615.82 | |
| Less medical and special expense on accidents occurring prior to January 1, 1945 | 5,464.89 | |
| | | 84,080.71 |
| | | 69,739.05 |
| Less compensation paid in 1945 on Occupational Disease cases | 17,747.50 | |
| Estimated compensation still pending on Occupational Disease cases | 1,029.00 | |
| | | 18,776.50 |
| Estimated cost of 1945 accidents | | 50,962.55 |
| Percentage of payrolls | | .00637 |
| Percentage of payrolls including Occ. Dis. cases | | .00872 |
| Number of fatal accidents | | 1 |
| Number of compensable accidents | | 108 |
| Number of non-compensable accidents | | 129 |
| Number of slight accidents | | 603 |

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 | 6 |

WELFARE DEPARTMENT

11.

a. WORKMEN'S COMPENSATION (Continued)

Compensation Payments including Medical and Special Expense

| Year | C. C. I. Co. | Negaunee Mine Co. | Athens Ir. Mng. Co. | Cliffs Pr. & Light Co. | Mesaba-Cl Mng Co | Holman-Cl Mng Co | Canisteo Cl. Mng. Co. | Alexandria Mine | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1912 to 1935 | 1,168,129.43 | 149,169.86 | 96,087.35 | 12,057.95 | 68,413.36 | 2,131.39 | 2,768.69 | 5,382.63 | 1,504,140.66 |
| 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 | 35,644.38 | 11,236.47 | 6,174.30 | 526.75 | 3,465.08 | | | | 57,046.98 |
| 1939 | 39,532.53 | 7,183.99 | 6,838.49 | 855.50 | 4,110.34 | | | | 58,520.85 |
| 1940 | 38,659.10 | 9,720.57 | 6,754.69 | 642.50 | 5,281.16 | | | | 61,058.02 |
| 1941 | 37,451.05 | 12,085.67 | 12,376.95 | 1,238.50 | 5,501.05 | | | | 68,553.22 |
| 1942 | 38,471.33 | 19,984.64 | 10,755.90 | 1,575.25 | 6,820.97 | | | | 77,708.09 |
| 1943 | 53,607.70 | 17,270.60 | 8,993.40 | 1,715.25 | 9,337.43 | | | | 90,924.38 |
| 1944 | 66,219.66 | 21,147.85 | 11,489.34 | 1,594.75 | 6,325.95 | | | | 106,777.55 |
| 1945 | 85,558.58 | 32,400.22 | 7,152.70 | 1,468.50 | 5,630.00 | | | | 132,210.00 |
| | 1,627,381.03 | 296,034.79 | 178,447.82 | 22,729.17 | 122,047.13 | 2,131.39 | 2,768.69 | 5,382.63 | 2,256,922.65 |

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, 1945. It includes all cases in which disability began prior to September 30, 1945.

| | Death Claims | | Health & Accident | | Total | |
|---|---|---|---|---|---|---|
| | No. of Cases | Amount Paid | No. of Cases | Amount Paid | No. of Cases | Amount Paid |
| Cambria-Jackson | | | 25 | 2,224.57 | 25 | 2,224.57 |
| Cliffs-Shaft | 3 | 4,375.00 | 52 | 3,591.69 | 54 | 7,966.69 |
| General Roll | 5 | 14,375.00 | 11 | 532.43 | 13 | 14,907.43 |
| General Storehouse & Shops | 1 | 1,875.00 | 7 | 450.86 | 7 | 2,325.86 |
| Ishpeming Hospital | | | 7 | 256.56 | 7 | 256.56 |
| Lloyd | 2 | 3,750.00 | 22 | 1,423.42 | 24 | 5,173.42 |
| Maas | 4 | 6,875.00 | 34 | 1,628.00 | 37 | 8,503.00 |
| Princeton | | | 12 | 715.14 | 12 | 715.14 |
| Spies-Virgil | 1 | 1,250.00 | 4 | 414.86 | 5 | 1,664.86 |
| Tilden | | | 2 | 290.00 | 2 | 290.00 |
| Retirement Roll | 7 | 6,500.00 | | | 7 | 6,500.00 |
| Total - C. C. I. Co. | 23 | 39,000.00 | 176 | 11,527.53 | 193 | 50,527.53 |
| Negaunee | 3 | 5,625.00 | 41 | 2,444.87 | 44 | 8,069.87 |
| Mather | | | 20 | 1,313.43 | 20 | 1,313.43 |
| Total - Neg Mine Co. | 3 | 5,625.00 | 61 | 3,758.30 | 64 | 9,383.30 |
| Athens Iron Mng Co. | 2 | 3,750.00 | 38 | 2,138.00 | 40 | 5,888.00 |
| Cliffs Power & Light Co. | | | 4 | 493.14 | 4 | 493.14 |
| Total - All Companies | 28 | 48,375.00 | 279 | 17,916.97 | 301 | 66,291.97 |

Six of the twenty-eight death claims shown above were paid disability in addition to the death benefit which accounts for the discrepancy in the number of cases shown.

WELFARE DEPT. ANNUAL REPORT YEAR 1945

11.

c. GROUP INSURANCE (Continued)

The following deaths occurred during the policy year ending September 30, 1945:

| Name | Mine | Date of Death | Amount of Insurance |
|---|---|---|---|
| Ognibene Zenti | Athens Mine | 9-17-44 | 1875.00 |
| Tony D'Ambrosio (3) | Athens Mine | 4-11-45 | 1875.00 |
| Nels Eilola | Cliffs-Shaft | 11-27-44 | 1875.00 |
| Caleb Torma | " | 11-29-44 | 1250.00 |
| Ivar J. Mantynen * | " | 5-26-45 | - |
| Thomas Boase | " | 6-30-45 | 1250.00 |
| Wilbur W. Graff | General Roll | 10-2-44 | 6250.00 |
| Roy Prin | " | 2-17-45 | 1875.00 |
| Oscar W. Nicholls | " | 5-4-45 | 1875.00 |
| Ernest G. Kalm | " | 5-5-45 | 2500.00 |
| Leonard R. Bjorklund | " | 6-25-45 | 1875.00 |
| Carl George Ostlund | General Storehouse | 2-10-45 | 1875.00 |
| Henry E. Kumpula | Lloyd Mine | 12-27-44 | 1875.00 |
| August L. Palomaki | " | 6-6-45 | 1875.00 |
| John J. Keranen | Maas Mine | 2-19-45 | 1875.00 |
| Richard Oates (1) | " | 3-26-45 | 1875.00 |
| James Lanyon | " | 7-16-45 | 1250.00 |
| Fred Peterson | " | 7-19-45 | 1875.00 |
| Frank E. Kujansu | Negaunee Mine | 11-17-44 | 1875.00 |
| Esko Holappa (2) | " | 3-16-45 | 1875.00 |
| John Toivonen (2) | " | 3-16-45 | 1875.00 |
| Patrick Leo Raher | Spies-Virgil | 7-14-45 | 1250.00 |
| Joseph Menzer | Retirement Roll | 11-15-44 | 500.00 |
| Peter Nelson | " | 12-18-44 | 500.00 |
| Charles M. Roseveare | " | 2-25-45 | 500.00 |
| John E. Hennessey | " | 1-28-45 | 500.00 |
| Henry Hendrickson | " | 5-20-45 | 750.00 |
| William J. Phillips | " | 6-6-45 | 750.00 |
| John Scoble ** | " | - | 1125.00 |
| John L. Iskola | " | 7-5-45 | 1875.00 |

(1) Killed in occupational accident
(2) " non-occupational accident
(3) Suicide

(*) Wife in Finland. Because of unsettled conditions in that country, it has been impossible to pay this claim to date.
(**) Supplemental payment to bring total payment to $1875.00.

WELFARE DEPARTMENT

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

a. PENSION SYSTEM.

The pension system which went into effect on January 1, 1909 completed the thirty-seventh year of its operation in 1945.

No changes in the rates of pensions were made during the year 1945. On January 1, 1933, the pension payments were reduced 50%; those under $20.00 remaining the same and those over $20.00 having a minimum rate of $20.00. There have been no additions to the pension rolls since January 1, 1932.

The following Mining Department pensioners passed away during 1945:

| No. | Name | Pension Began | Date of Death |
|---|---|---|---|
| 106 | Matt Tuttila | 2-1-1921 | 8-19-1945 |
| 114 | Henry Leppanen | 4-1-1921 | 6- 8-1945 |
| 186 | John A. Lindberg | 8-1-1925 | 3-11-1945 |
| 257 | Philip Pepin (Holmes Mine) | 3-1-1931 | 12-16-1945 |

| | 1944 | 1945 |
|---|---|---|
| Number of deaths | 4 | 4 |
| Number of Old Age pensions in force Dec. 31, | 28 | 24 |
| Average annual pension | $ 303.04 | $ 310.26 |

John Ollila continued as the only pensioner on the Furnace Department pension roll and his average annual pension was $223.80.

23.

a. PENSION SYSTEM (Continued)

Pension payments for the years 1908 to 1945, inclusive, are as follows:

| Year | Old Age | Widows and Orphans | Total |
|---|---|---|---|
| 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 | 6978.95 |
| 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 | 8889.14 | 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 | 14276.76 | 0.00 | 14276.76 |
| 1942 | 11632.15 | 0.00 | 11632.15 |
| 1943 | 10246.66 | 0.00 | 10246.66 |
| 1944 | 8485.25 | 0.00 | 8485.25 |
| 1945 | 7446.32 | 0.00 | 7446.32 |
| | 789561.71 | 22547.00 | 812108.71 |
| Payment made by Cleveland Office in 1930 | 2500,00 | | 2500.00 |
| | $ 792061.71 | | 814608.71 |

WELFARE DEPARTMENT.

PENSION SYSTEM (Continued)

Republic Mine.

There was no change in the Republic Mine pension roll during the year 1945.

On December 31, 1945 there were four pensioners on the roll and the average annual pension was $321.25.

The payments made from October 1, 1920 to December 31,1945, 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 | 1285.00 |
| 1944 | 995.04 |
| 1945 | 995.04 |
| | $ 146522.93 |

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

a. PENSION SYSTEM. (Continued)

Furnace Department.

Pension payments for the years 1910 to 1945, inclusive, are as follows:

| Year | Old Age | Widows and Orphans | Total |
|---|---|---|---|
| 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 | | 268.20 |
| 1919 | 130.55 | | 130.55 |
| 1920 | 223.80 | | 223.80 |
| 1921 | 781.63 | | 781.63 |
| 1922 | 1118.04 | | 1118.04 |
| 1923 | 1179.38 | | 1179.38 |
| 1924 | 2085.82 | | 2085.82 |
| 1925 | 2833.39 | | 2833.39 |
| 1926 | 5351.35 | | 5351.35 |
| 1927 | 4819.73 | | 4819.73 |
| 1928 | 5481.50 | | 5481.50 |
| 1929 | 6137.02 | | 6137.02 |
| 1930 | 6191.42 | | 6191.42 |
| 1931 | 5531.30 | | 5531.30 |
| 1932 | 3327.09 | | 3327.09 |
| 1933 | 2528.04 | | 2528.04 |
| 1934 | 2309.43 | | 2309.43 |
| 1935 | 1930.54 | | 1930.54 |
| 1936 | 1902.72 | | 1902.72 |
| 1937 | 1662.72 | | 1662.72 |
| 1938 | 1446.90 | | 1446.90 |
| 1939 | 1374.96 | | 1374.96 |
| 1940 | 1158.78 | | 1158.78 |
| 1941 | 926.72 | | 926.72 |
| 1942 | 846.72 | | 846.72 |
| 1943 | 687.17 | | 687.17 |
| 1944 | 303.80 | | 303.80 |
| 1945 | 223.80 | | 223.80 |
| | 64751.67 | 900.00 | 65651.67 |

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

a. PENSION SYSTEM (Continued)

Land Department.
Erick Johnson continued on the pension roll during the year 1945. His annual pension amounts to $240.00.

Total pension payments from January 1, 1927 to December 31, 1945 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 | 240.00 |
| 1944 | 240.00 |
| 1945 | 240.00 |
| | $ 5036.88 |

WELFARE DEPARTMENT.

23.

b. REPUBLIC MINE FUNDS

Every year it is recorded in the annual report of this department that the 1930 annual report carries a full statement of Sick Benefit Relief and Fatal Accident Funds of the closed Republic Mine. The unused balances which remained in these funds have now been all expended. In our report for 1942 we carry an outline of the use which was made of these funds.

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

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

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

c. SUSPENSE FUNDS

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

23.

d. VISITING NURSES

The services of our industrial nurses were made available throughout the year 1945. These services, particularly during the war years when we have been short of doctors, has meant a great deal to our employees and their families. Each nurse presents a monthly report and these reports show very definitely that our nurses have been very helpful. The type of service which the nurses render is a very excellent example of social medical service extended to employees and we are very fortunate because of the fact that our industrial nurses have been nurses of excellent training and long experience. They are very capable and they do everything in their power when called upon to visit the sick in the homes of employees. During 1945, particularly, their work was arduous and they often times served long hours. It is our desire to express our appreciation for the fine work of our industrial nurses.

The work of the visiting nurses was started at Ishpeming on May 1, 1908 and in Negaunee on September 8, 1912. These services were also available at Gwinn from September 1, 1910 until October 1, 1927 when the Gwinn mines were closed. During the year we have had an industrial nurse in the Gwinn area during the time that we had no doctor assigned to that area. However, since Dr. S. J. Greene has been assigned to the Gwinn area and since he lives at Gwinn, we have dispensed with the services of the industrial nurse there.

During the year 1945 the following nurses were employed:

Ishpeming - Miss Myrtle V. Welander
Negaunee - Miss Ina E. Atkin
Gwinn - Mrs. Margaret Kemp
Mrs. Isabelle Vercellino (until Dr. Greene was assigned to Gwinn)
Iron River - Miss Laura N. Fisk
(Miss Fisk is employed jointly with other companies)

Miss Welander, Miss Atkin, and Mrs. Kemp and Mrs. Vercellino submitted reports each week and we also receive monthly summaries of their work. These monthly summaries of the industrial nurses are made a part of the monthly report of this department. These monthly reports give an excellent picture of the services which are rendered by our industrial nurses. Our doctors feel that the industrial nurses are of considerable assistance because they do the follow-up work as well as the carrying out of medical orders on the part of the doctors. It seems reasonable to state that the continued services of our industrial nurses has had considerable influence on the reduction of illnesses amongst our employees and moreover, their many contacts over the years with our employees is one of the best avenues we have for the development of good public relations.

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

d. VISITING NURSES.

Following is the report of the Ishpeming Visiting Nurse for the year 1945:

| | |
|---|---|
| Total number of patients cared for during year | 543 |
| Total number of new cases cared for during year | 302 |
| Total number of visits to patients | 2981 |
| Number of families visited for the first time | 106 |
| Number of social calls | 76 |
| Number died | 5 |

Classification of new cases for the year:

| | | | | | |
|---|---|---|---|---|---|
| Number of adults | 119 | Male | 21 | Female | 98 |
| Number of children | 153 | Male | 68 | Female | 85 |

Nationalities of new cases for the year:

| | | | |
|---|---|---|---|
| American | 144 | Irish | 2 |
| English | 24 | Italian | 23 |
| Finnish | 54 | Norwegian | 5 |
| French | 28 | Swedish | 20 |
| German | 2 | | |

Diseases and number of new cases:

| | | | |
|---|---|---|---|
| Aenemia | 3 | Infections | 20 |
| Appendicitis | 3 | Injury | 17 |
| Asthma | 3 | Kidney Trouble | 2 |
| Baby Welfare | 5 | Obstetrical | 17 |
| Bowel Trouble | 4 | Paralysis | 1 |
| Burns | 7 | Parkingson's | 1 |
| Carcinoma | 1 | Post Operative | 23 |
| Cerv. Adenitis | 1 | Prenatal | 12 |
| Chicken Pox | 6 | Quinsy | 1 |
| Cold | 52 | Rash | 5 |
| Cystitis | 3 | Rheumatism | 3 |
| Diabetes | 4 | Scarlet Fever | 1 |
| Dysentery | 1 | Sprains | 2 |
| Enteritis | 3 | Stomach trouble | 5 |
| Fracture | 6 | Swollen Glands | 1 |
| Gall Bladder | 2 | Teething | 2 |
| Gen. Debility | 1 | Tonsilitis | 9 |
| Heart Trouble | 6 | Unclassified | 11 |
| Hives | 1 | Undiagnosed | 18 |
| Influenza | 4 | Var. Ulcer | 3 |
| Infants, Newborn | 31 | | |

Visiting Nurse: Mrs. Marion Silas, Feb. to July, incl.

Miss Myrtle Welander, Aug. to Dec. incl.

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

d. VISITING NURSES (Continued)

Following is the report of the Negaunee Visiting Nurse for the year 1945:

| | |
|---|---|
| Total number of patients cared for during year | 1235 |
| Number of new cases cared for during year | 637 |
| Total number of visits to patients | 4385 |
| Number of families visited for the first time | 24 |
| Number died | 3 |

Classification of new cases for the year:

| | | | | | |
|---|---|---|---|---|---|
| Number of adults | 305 | Male | 93 | Female | 212 |
| Number of children | 332 | Male | 160 | Female | 172 |

Nationalities of new cases for the year:

| | | | |
|---|---|---|---|
| American | 296 | Italian | 60 |
| Danish | 1 | Swedish | 14 |
| Finnish | 266 | | |

Diseases and number of new cases:

| | | | |
|---|---|---|---|
| Aenemia | 14 | Infections | 35 |
| Appendicitis | 8 | Injury | 86 |
| Arthritis | 7 | Influenza | 90 |
| Asthma | 3 | Mal-Nutrition | 59 |
| Bowel Trouble | 13 | Measles | 6 |
| Bronchitis | 10 | Neuritis | 3 |
| Burns | 8 | obstetrical | 8 |
| Carcinoma | 2 | Otitis media | 7 |
| Cellulitis | 1 | Paralysis | 1 |
| Cerv. Adenitis | 4 | Pleurisy | 2 |
| Cholystitis | 9 | Pneumonia | 9 |
| Chicken Pox | 14 | Post-Operative | 37 |
| Cold | 24 | Pregnancy | 26 |
| Croup | 5 | Quinsy | 1 |
| Diabetes | 3 | Rheumatism | 4 |
| Eczema | 1 | Rupture | 4 |
| Epistaxis | 3 | Scarlet Fever | 4 |
| Gastritis | 1 | Sore Eyes | 8 |
| Gastro-Enteritis | 15 | Sprains | 5 |
| Gastro-Intestinal | 6 | Stomach Trouble | 10 |
| Heart Trouble | 3 | Strep. Throat | 1 |
| Herpes | 1 | Tonsilitis | 50 |
| Hives | 1 | Unclassified | 12 |
| Hypertension | 1 | Undiagnosed | 2 |
| Infants, newborn | 9 | Var. Ulcer | 3 |

Visiting Nurse: Miss Ina E. Atkin.

WELFARE DEPT. ANNUAL REPORT YEAR 1945.

23.

d. VISITING NURSES (Continued)

NUMBER OF PATIENTS ATTENDED AND CALLS MADE.

| | No. of Patients | No. of New Cases | Male Adult | Female Adult | Male Children | Female Children |
|---|---|---|---|---|---|---|
| Ishpeming | 543 | 302 | 93 | 98 | 68 | 85 |
| Negaunee | 1235 | 637 | 21 | 212 | 160 | 172 |
| | 1778 | 939 | 114 | 310 | 228 | 257 |

| | Total no. Visits. | Number died | Social Calls | Families Visited for First Time. |
|---|---|---|---|---|
| Ishpeming | 2981 | 5 | 76 | 106 |
| Negaunee | 4385 | 3 | 761 | 25 |
| | 7366 | 8 | 837 | 131 |

NATIONALITIES OF NEW CASES.

| | American | Danish | English | Finnish | French |
|---|---|---|---|---|---|
| Ishpeming | 144 | | 24 | 54 | 28 |
| Negaunee | 296 | 1 | - | 266 | - |
| | 440 | 1 | 24 | 320 | 28 |

| | German | Irish | Italian | Norwegian | Swedish |
|---|---|---|---|---|---|
| Ishpeming | 2 | 2 | 23 | 5 | 20 |
| Negaunee | - | - | 60 | - | 14 |
| | 2 | 2 | 83 | 5 | 34 |

WELFARE DEPARTMENT.

23.

f. NORTH LAKE CLUB

The clubhouse at the North Lake Location has carried on its usual community service and activities during the year 1945. Mr. Dewey Urquhart continues in the position of director of the clubhouse. The Inland Steel Company cooperates with our company in the maintenance of the clubhouse and its operation. The clubhouse continues to serve the community as a center for all kinds of community activities. Recreation facilities are available at the clubhouse and practically every other kind of activity in the North Lake District centers around the North Lake Clubhouse.

Following is a statement showing the receipts and expenditures for 1945:

| | TOTAL FOR YEAR |
|---|---|
| RECEIPTS: | |
| Membership Fees | $290.50 |
| Bowling Alleys | ---- |
| Pool and Billiards | 53.30 |
| Telephone Tolls | 55.40 |
| TOTAL | 399.20 |
| EXPENDITURES: | |
| Building Maintenance | 38.15 |
| Grounds Maintenance | 73.03 |
| Lighting | 97.96 |
| Heating | 623.79 |
| Water | 60.75 |
| Pool Room | 40.18 |
| Office Expense - Telephone | 123.82 |
| Salaries and Wages | 2,844.00 |
| Reading Room | 38.72 |
| Miscellaneous | 29.12 |
| Personal Injury Expense | 9.75 |
| Unemployment and O.A.B. Taxes | 66.10 |
| Fire and Boiler Insurance | 92.37 |
| Fidelity Bond Premium | 6.79 |
| TOTAL | $4,144.53 |
| Deficit | $3,745.33 |
| Billed to Inland Steel Company | $ 960.00 |
| Billed to Lloyd Mine | $2,785.33 |

23.

g. GWINN ASSOCIATION.

The Club House is maintained through the financial assistance of the Cleveland-Cliffs Iron Company, the Cliffs Power & Light Company, the township Board of Education, and membership fees received from residents of the community.

The average monthly membership was 240, a decrease of 18 over last year. 190 members were employed at the different mines; the remainder were employed elsewhere, or held complimentary memberships as retired employees or members of the armed forces.

Activities at the building covered bowling leagues for men and women; card playing facilities for adults; a library, receiving 7 weekly and 21 monthly magazines and daily and weekly newspapers; a library with popular fiction; a recreation room with pool, billiard and table tennis tables; the gymnasium equipped for class work or recreation, such as basketball, volleyball, handball, badminton, boxing, wrestling; and also used for dancing. Separate showers and locker rooms are provided for men and women. Meeting rooms are provided for Scout organizations, the American Legion, and the different churches and other groups.

Total number of meetings of a business, social, educational or recreational nature was 356; of this number 6 were annual events. Church organizations used the building on 131 occasions, Scout troops held 66 meetings; 45 dances were held. Federal agencies, women's organizations, rehearsals for plays and musical events, sportsmen's meetings and Legion and committee meetings totaled 114. Equipment in the Club kitchen was used on 90 occasions and equipment loaned for outside events 38 times.

The gymnasium was used 415 periods for supervised class work or for recreational activities by High School students or adults. There were 123 scheduled basketball games, including league games for boys and girls.

Outdoor activities covered softball, hardball, touch football, and horseshoe pitching. Equipment was furnished by the Club for the above. The estimated attendance, including participants, for all outdoor activities and cottage at Bass Lake . . . . . 8500.

During the year fuel, supplies, and equipment were purchased to keep all departments functioning properly and the usual attention was given to the building to keep it in good repair. Arrangements are now underway whereby the local post of the American Legion will take over rooms formerly used as Red Cross quarters for general meetings and social activities.

Employees of the Club expect an increase in attendance and activities during the coming year due to the fact that many former members are being discharged from the armed forces and are returning to the district.

WELFARE DEPT. ANNUAL REPORT YEAR 1945

23.

g. GWINN ASSOCIATION (CONTINUED)

The annual report of the Gwinn Association is herewith submitted:

Membership:

| | | |
|---|---|---|
| | Number on roll January 1, 1945 | 253 |
| | Number on roll January 1, 1946 | 229 |
| | High membership for year - January | 253 |
| | Low membership for year - December | 229 |
| A | Average monthly membership | 246 |

Attendance:

The attendance at the building showed a slight increase due to the fact that many of the former members are being discharged from service.

| | |
|---|---|
| Total estimated attendance at building during year | 76265 |
| Average monthly attendance | 6355 |
| High monthly attendance . . . December | 9000 |
| Low monthly attendance . . . July | 3750 |

Attendance for out-door activities covers recreations at the different locations in the district where equipment was furnished by the Association. These locations were Princeton, Austin and New Swanzy. Activities included Softball, Hardball, Touch Football, Horse-Shoe pitching, and loop tennis. The cottage at Bass Lake was operated as in previous years but no check on the attendance was possible. Estimated attendance ay all outdoor activities. . 8900.

Financial Information: (from December statement)

| | |
|---|---|
| Total Receipts, including 1944 balance | $5,655.97 |
| Total expenditures for the year | 5,537.18 |
| Balance on hand January 1, 1946 | $ 118.79 |

Buffet, Billiards, and Bowling:

| | |
|---|---|
| Receipts for year | 1,271.00 |
| Expenditures for year | 832.59 |
| | $ 438.41 |

Receipts from memberships and rentals 3,650.00

General Activities and Organizations Using Building.

12 Commiteee meetings.
15 meetings Women's Card groups
9 meetings Women's Study club.
26 meetings Federal agencies.
14 meetings Women's Guild; 3 parties.
12 meetings Daughters of Isabelle; 4 social events.
24 meetings Methodist Church circles; 24 Church school classes; 2 church suppers; 35 choir rehearsals; 8 play rehearsals; 1 play; 4 socials.
9 meetings Sportsmen's Association.
3 meetings Beagle Club.
2 card parties to raise funds by different organizations.
2 meetings by W. C. T. U.
5 meetings by American Legion.
17 rehearsals for plays and musical events.

WELFARE DEPARTMENT.

23.

g. GWINN ASSOCIATION (Continued)

2 married folks parties.
1 Hunter's Ball by American Legion.
3 gift showers for women.
7 social parties - no dancing - by Youth groups.
45 dances held- 28 under Club Supervision; 15 by High School students; 2 special dances.
90 lunches held by different organizations.
38 times - equipment loaned for outside events.
1 Annal Christmas Treat for Children by residents of the Community.

Library and Reading Room:

| | |
|---|---|
| Library books loaned during year | 1489 |
| New books added | 30 |

| | | | |
|---|---|---|---|
| Weekly magazines received | 7 | Daily Newspapers | 2 |
| Monthly magazines received | 21 | Weekly newspapers | 3 |

Recreation Room.

This room is again very popular with the returning of men from the armed services. It will be necessary to re-cover the pool and billiards tables . It was very difficult to secure table tennis balls at different periods of the year, but this has been corrected and with other miscellaneous games on hand no doubt this room will find much usage.

Bowling:

The Association is again conducting leagues for men and women; the men's league has eight teams and the women's four. 49 bowling classes were conducted for High School seniors without charge. At the end of the regular league deason a bowling tournament was held for both men and women.

Physical Recreation and Athletic Department:

Including all activities in the gymnasium whether under the local or Club supervision, and all outdoor recreations; such as, furnishing equipment at the different locations and school playground for softball, hardball and football.

Summary: Supervised Gymnasium Activities.

| | Periods | Attendance |
|---|---|---|
| High School classes (Girls) | 135 | 3536 |
| High School classes (Boys ) | 134 | 2623 |
| High basketball practice | 79 | 801 |
| Boys basketball league | 23 | 840 |
| Girls basketball league | 9 | 352 |
| Junior Boys | 10 | 293 |
| Seniors: volleyball, basketball and badminton | 25 | 205 |
| Total | 514 | 8650 |

Basketball games under High School or Club Supervision:

High School played 5 games at home and 11 away from home - winning the District Championship at Ishpeming.

WELFARE DEPARTMENT.