11. ACCIDENTS AND PERSONAL INJURY

c. Safety Inspection (Continued)

Safety Bonuses For Foremen

A total of 130 foremen participated in the Safety Bonus plan and were paid a total of $7,335.24. Penalties amounted to $154.36. There were no penalties imposed at the Mather Mine, "A" and "B" Shafts, The Cliffs Power & Light Company, Negaunee Shaft and Exploratory Drilling Division.

These bonuses are appreciated by the foremen and certainly make them alert to the safety of their men.

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11. ACCIDENTS AND PERSONAL INJURY

c. Safety Inspection (Continued)

TABLE XXIII

SAFETY BONUSES PAID TO FOREMEN

| Mine Or Plant | AMOUNT | NO. OF MEN PARTICIPATING | AMOUNT OF PENALTIES IMPOSED |
|---|---|---|---|
| ATHENS | $ 922.35 | 16 | $ 14.55 |
| CAMBRIA-JACKSON | 554.40 | 11 | 16.86 |
| C.P.& L. CO. | 83.87 | 2 | None |
| CLIFFS SHAFT | 1,309.93 | 19 | 12.67 |
| LLOYD | 300.45 | 7 | 77.09 |
| MAAS | 978.08 | 12 | 25.14 |
| MATHER MINE, "A" SHAFT | 1,675.14 | 31 | None |
| MATHER MINE, "B" SHAFT | 1,013.28 | 17 | None |
| NEGAUNEE SHAFT | 191.94 | 6 | None |
| SPIES-VIRGIL | 278.88 | 7 | 8.05 |
| EXPLORATORY DRILLING DIVISION | 26.92 | 2 | None |
| TOTALS | $ 7,335.24 | 130 | $ 154.36 |

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11. ACCIDENTS AND PERSONAL INJURY

c. Safety Inspection (Continued)

TABLE XXIV

OCCUPATIONS OF MEN PARTICIPATING IN BONUS

| Title | ATHENS | CAMBRIA-JACKSON | CLIFFS SHAFT | C.P.& L. CO. | LLOYD | MAAS | MATHER MINE, "A" SHAFT | MATHER MINE, "B" SHAFT | NEGAUNEE SHAFT | SPIES-VIRGIL | EXPLORATORY DRILLING DIVISION | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHIFT BOSS | 13 | 8 | 14 | | 4 | 9 | 26 | 13 | 4 | 5 | | 96 |
| MAINTENANCE FOREMAN | | | | | | | 1 | | | | | 1 |
| TIMBER FOREMAN | 1 | 1 | 2 | | 1 | 1 | 1 | 1 | | | | 8 |
| SURFACE FOREMAN | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | 9 |
| MECHANICAL FOREMAN | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | 9 |
| UNDG. MECH. FOREMAN | | | 1 | | | | | | | | | 1 |
| ELECTRICAL FOREMAN | | | | 1 | | | 1 | 1 | | | | 3 |
| STEAM PLANT FOREMAN | | | | 1 | | | | | | | | 1 |
| DRILL FOREMAN | | | | | | | | | | | 2 | 2 |
| TOTALS | 16 | 11 | 19 | 2 | 7 | 12 | 31 | 17 | 6 | 7 | 2 | 130 |

11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation

Ventilation has played a very important part in our mines and during the last ten years has improved to a great extent. Our changes in mining methods has helped our ventilation problems, making it much more simple to ventilate mining areas. Very little top slicing is done today and this change in mining has done away with many auxiliary fan installations and we have less heat, which was caused by the heavy wood gob overhead.

The smaller mines very seldom present a serious ventilation problem but the larger mines do have complicated problems and as they are sunk deeper, they will require more and more planning. With the exception of the Lloyd Mine, all underground mines are equipped with main mine fans which will be adequate for several years in the future.

A brief summary of ventilation at underground mines follows:

ATHENS MINE

Because the shaft at the Athens Mine must be used for both intake and exhaust air, it has presented a trying ventilation problem because it is next to impossible to prevent recirculation of air in the shaft. This is especially serious in case of mine fire.

The fan, which is an American Blower, double-width, high-speed, Size 9, Class 2, is at present delivering about 80,000 C.F.M. against 5.5 in. Water Gauge. Air is drawn down the cage compartment of the shaft to the 10th Level where the fan is located and then discharged inside on the 10th Level from where the air is forced through raises and mining areas above the 10th Level. Air-lock doors are located on all levels except the 4th Level, which is the main exhaust level. Some air is permitted to pass through the air-locks on each level to ventilate the haulage drifts and shaft stations, discharging to the skip compartments. The greater volume of air exhausts to surface through the skip compartment but some is drawn by the fan to recirculate through the mine. Distribution of the air thru the mine has been very good.

In the near future, the Athens and the Negaunee Shaft shafts will be connected on several levels and this will improve the ventilation system in the mine.

AGNEW MINE

Ventilation of this mine has been by natural means in the past but soon will be by main mine fan. This mine being shallow, with openings to open-pit mining areas, has presented no serious problems. Air has entered the mine from the open-pits, passed through mining areas and exhausted up the Agnew shaft. Dead-ended mining contracts have been ventilated by auxiliary fans and conditions have been good.

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

CAMBRIA-JACKSON MINE

There has been quite a change in the ventilation set-up in this mine since the 8th Level was opened up.

At the present time, a Jeffery, Number 42 Fan operates on the 6th Level, taking air from the old caves which reach to surface at the west end of the mine and discharges approximately 26,000 C.F.M. down through the mining area between the 6th and 7th Levels. Part of this air is re-circulated air from the far west end workings near the Mather Mine, "A" Shaft boundary line, but the air travels such a long distance that it is not contaminated when it reaches the workings again.

On the 8th Level a Buffalo Fan has been installed near the connecting raise to the Mather Mine, "A" Shaft, 3rd Level. This fan delivers 25,000 C.F.M. and is passed through a heavy water curtain to cleanse it because it comes from the Mather Mine. This air is forced along the 8th Level and up through the working areas to the 7th Level and discharged through the main hoisting shaft. Total average volume being discharged through the shaft is 42,000 C.F.M., which indicates that approximately 9,000 to 10,000 C.F.M. is recirculated in the mine. Because this ventilation is new, the distribution of air is not what is desired but as new raises and airways are driven, the system should be good.

CLIFFS SHAFT MINE

A Jeffery Aerodyne, Jr. Fan, Size 9, with fixed-blades, furnishes air for this mine. It operates at 1.5 inches water gauge and delivers approximately 130,000 C.F.M. with about 15,000 C.F.M. recirculating around the pillars near the fan. None of this air enters work places. Distribution of air is very good. Air is exhausted through "A" and "B" Shafts, almost evenly divided at 54,000 and 56,000, respectively. A small amount now exhausts up the Moro Shaft which was opened during the year. This air has not yet been measured but amounts to about 10,000 C.F.M.

LLOYD MINE

Two fans are used to ventilate the Lloyd Mine. One is located on the 4th Level at Section 6 Shaft - it is a Sturtevant, Number 60, selected for 25,000 C.F.M. at .5-in. Water Gauge. It now produces 16,000 C.F.M. at approximately .7-inches. The second fan, A Buffalo, Size 5½, is located on the 8th Level and used as a necessary booster fan for the 9th Level mining area. This fan handles approximately 15,000 C.F.M. Both fans are reversed at various times during the day to clear smoke from blasting, but during the winter months exhaust air is forced up the Lloyd Shaft most of the time to prevent icing of the shaft. Distribution of air in the 9th Level mining area has been only fair and is very noticeable in average dust counts. Because of the limited mining area, it has been difficult to keep proper air and travelways open.

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

MAAS MINE

All air entering the Maas Mine is taken from surface through the Negaunee Number 2 Shaft, through the old Negaunee Mine and enters the Maas Mine from the Negaunee, 13th Level to the Maas, 4th Level and from the Negaunee, 14th Level to the Maas 6th Level.

The mine is served by a Jeffery Aerodyne, Size 8H-72 Fan, located on surface at #2 Shaft. At present it is delivering 63,900 C.F.M. at 4.4 inches Water Gauge. This fan is capable of 125,000 C.F.M. at 5.5 inches Water Gauge.

An American Blower fan is also located on surface at #2 Shaft and is capable of 100,000 C.F.M. at about 5 inches, Water Gauge and is used only in emergency.

Air from the fan comes down #2 Shaft to the 6th Level, then through a drift and raise to the Negaunee, 9th Level. From this point it passes through a series of raises to the 13th and 14th Levels and from these two levels to the Maas Mine. Only a small portion of air is used to ventilate each of the levels from the air-lock doors to the Negaunee Hoisting Shaft. On the 14th Level Shaft Station some of the air is used to ventilate the Negaunee Shaft sinking project below the 14th Level.

Air is very well distributed through mining contracts in the Maas Mine. Considerable work has been done during the past years to make this possible; also, the closing of the Negaunee Mine has helped the situation to give the Maas Mine fresh air. The amount of air entering the Maas Mine is 28,880 C.F.M. to the 400 Drift and 26,061 C.F.M. to the 600 Drift or 54,941 C.F.M. total.

MATHER MINE, "A" & "B" SHAFTS

The ventilation system in this mine has been completely changed. The main mine fan, a La-Del Troller, Model H56-36, is located on the 6th Level just east of the boundary line of both mines on the "B" Shaft side. All air passes through a water curtain before it enters the "A" Shaft side. The fan is handling 85,860 C.F.M.

On the "B" Shaft side another fan located on the 6th Level on top of an air raise coming from the 7th Level handles 21,500 C.F.M. and ventilates the 7th Level and mining area on and above the 6th Level. Distribution of the air is very good.

On the "A" Shaft side the air is split from the 6th Level to ventilate the 7th Level and mining areas above the 6th Level. Constant checking of the ventilation system is required in this large mining area but even with all the changes being made, ventilation has been very good in the mine.

11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

NEGAUNEE SHAFT

Ventilation of the Negaunee Shaft during sinking operations has been with a Sturtevant #45 Fan connected to the water column. The fan is located on the 14th Level, taking fresh air from the Negaunee-Maas ventilation system. Conditions in the shaft have been excellent.

SARGENT MINE

This mine depends on natural ventilation for most of its workings. It is shallow and air moves into the mine through openings into the adjoining open-pit and a small supply shaft. Dead-ended places are ventilated with auxiliary fans. The hoisting shaft is upcast. Distribution of air is good.

SPIES-VIRGIL MINE

A Jeffery Aerodyne, 8H-42 Main Mine Fan is located on top of the air shaft near the ore body east of the main hoisting shaft. It was selected for 20,000 C.F.M. at 3.5 inches Water Gauge in No. 4 Blade Position. At the present time, it is handling approximately 20,000 C.F.M. at 1.5 inches W.G. Under normal working conditions the air is drawn down the main hoisting shaft, enters the 6th Level to the working areas, then up through the stopes to the 4th Level. From here it travels to a raise which connects to the bottom of the air shaft and then to surface. Some air is permitted to enter the 4th Level for ventilation of the main drift and joins the main air current near the ventilation raise and air shaft.

The 8th Level development is ventilated by use of No. 45 Sturtevant fans connected to spiral steel tubing and drawing air from the headings. Smaller auxiliary fans sweep the headings to force gas and dust back to the intake of the ventilation pipe.

Ventilation in the mine is very good.

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

Dust Sampling & Analysis

During the year a total of 585 dust samples were taken and analysis made. These samples include general mine air on intake and exhaust, rock development, mining contracts, loading from chutes, dumping cars at shaft stations, mine headframes, crushers, Research Laboratory, Pelletizing Plant, Sample Crushing Plant and many other places.

As a whole, the conditions during the year were an improvement over the previous year. As in the past, samples taken from raises show the highest dust counts. Most raise headings have been well ventilated but miners often start the drill holes dry when supervisors are not present because they do not want to get wet. Also, the raise miners do not want the ventilating current to strike any part of the body while working in the heading and often will shut off the fan. It is believed that most of them do use their respirators for protection against dust.

The tables which follow show the various averages in different operations.

During the year we had the services of T. F. Hatch, Laboratory Director, and J. F. Morgan, Engineer, Industrial Hygiene Foundation of America, Inc. to check our dust elimination work and hazards of our dusts. Dr. Geo. McL. Waldie will report on same. Mr. Hill and myself assisted Mr. Morgan with his work at the various mines.

11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

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

TABLE XXV

DUST SAMPLES COLLECTED - ROCK AND ORE WORK

| Mine Or Plant | 1951 In Ore | 1951 In Rock | 1951 Total | 1933 - 1951 Total |
|---|---|---|---|---|
| ATHENS | 34 | 30 | 64 | 791 |
| CAMBRIA-JACKSON | 12 | 24 | 36 | 307 |
| CLIFFS SHAFT | 57 | 25 | 82 | 1,783 |
| LLOYD | 33 | 7 | 40 | 736 |
| MAAS | 26 | 27 | 53 | 724 |
| MATHER MINE, "A" SHAFT | 51 | 63 | 114 | 774 |
| MATHER MINE, "B" SHAFT | 21 | 58 | 79 | 229 |
| NEGAUNEE SHAFT | - | 16 | 16 | 785 |
| PRINCETON * | - | - | - | 85 |
| RESEARCH LABORATORY | 13 | - | 13 | 13 |
| SPIES-VIRGIL | 8 | 12 | 20 | 163 |
| TILDEN | 17 | - | 17 | 80 |
| MISCELLANEOUS | - | - | 51 | 162 |
| TOTALS | 272 | 262 | 585 | 6,584 |

* Now Closed Down

11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXVI

VARIOUS OCCUPATIONS WHERE DUST SAMPLES WERE COLLECTED

| Occupation | ATHENS | CAMBRIA-JACKSON | CLIFFS SHAFT | LLOYD | MAAS | MATHER MINE, "A" SHAFT | MATHER MINE, "B" SHAFT | NEGAUNEE SHAFT | SPIES-VIRGIL | TILDEN | RESEARCH LABORATORY | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DRILLING | 29 | 13 | 44 | 17 | 23 | 46 | 48 | 3 | 12 | | | 235 |
| SCRAPING | 15 | 6 | 8 | 16 | 23 | 28 | 15 | | 3 | | | 114 |
| Loading CARS (USING LOADERS) | 4 | 8 | 2 | | | 7 | 10 | | 3 | | | 34 |
| BLASTING | 1 | | | 1 | | | 2 | | | | | 4 |
| TIMBERING | 3 | 3 | | | 3 | 2 | 2 | | | | | 13 |
| HAND SHOVELING | 2 | 1 | 2 | | | | | | | | | 5 |
| BARRING BACK | 2 | | 3 | | 1 | | 1 | | | | | 7 |
| BLOWING CARS | 1 | | | 1 | 2 | | | | | | | 4 |
| GENERAL MINE AIR | 4 | 3 | 3 | 4 | | 24 | | 1 | 1 | | 5 | 45 |
| CHARGING HOLES | | 1 | 1 | | 1 | | 1 | 1 | | | | 5 |
| BREAKING CHUNKS | 3 | 1 | | 1 | | | | | 1 | | | 6 |
| CRUSHING ORE | | | 18 | | | | | | | 9 | 6 | 33 |
| LOADING AT POCKETS | | | | | | | | | | 8 | | 8 |
| SHARPENING TOOLS | | | | | | 1 | | 2 | | | | 3 |
| LAYING TRACK | | | 1 | | | | | | | | | 1 |
| USING HYDRO-MUCKER | | | | | | 6 | | 9 | | | | 15 |
| PELLETIZING | | | | | | | | | | | 2 | 2 |
| MISCELLANEOUS | 2 | 2 | 2 | 2 | 2 | 2 | 38 | | 1 | | | 51 |
| TOTALS | 66 | 38 | 84 | 42 | 55 | 116 | 117 | 16 | 21 | 17 | 13 | 585 |

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXVII

AVERAGE LIGHT FIELD COUNT OF ALL SAMPLES TAKEN

| Mine Or Plant | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 |
|---|---|---|---|---|---|---|---|---|---|---|
| ATHENS | | 32.90 | 14.12 | 28.32 | 26.69 | 12.85 | 12.59 | 9.89 | 7.28 | 25.80 |
| CAMBRIA-JACKSON * | | | | | | | | | | |
| CLIFFS SHAFT | 17.94 | 14.56 | 8.29 | 8.98 | 15.53 | 9.86 | 10.36 | 7.77 | 8.18 | 7.55 |
| LLOYD | | 9.90 | 12.42 | 39.25 | 20.25 | 10.84 | 13.47 | 11.73 | 8.05 | 6.95 |
| MAAS | | 7.46 | 27.55 | 35.75 | 150.98 | 11.24 | 36.90 | 8.71 | 17.29 | 8.46 |
| MATHER MINE, "A" SHAFT | | | | | | | | | 2.42 | 5.58 |
| MATHER MINE, "B" SHAFT * | | | | | | | | | | |
| NEGAUNEE | | 53.80 | 17.77 | 33.25 | 59.06 | 56.26 | 25.49 | 10.79 | 14.02 | 17.02 |
| PRINCETON * | | | | | | | | | | |
| SPIES-VIRGIL | | | | | 70.61 | 26.99 | 1.80 | 8.40 | 6.97 | |
| TILDEN | | | | 67.52 | 285.27 | 74.60 | 60.40 | | 49.60 | |
| GARDNER MACKINAW | | 27.77 | | 8.61 | 48.53 | | | | | |
| MISCELLANEOUS | | | 8.66 | 3.00 | 6.80 | 14.73 | | | | 3.00 |

* Not in Operation During This Period

(Table Cont'd. - Next Page)

11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXVII (Cont'd.)

AVERAGE LIGHT FIELD COUNT OF ALL SAMPLES TAKEN

| Mine Or Plant | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|---|---|
| ATHENS | 4.90 | 8.33 | 6.64 | 4.17 | 7.39 | 7.49 | 7.07 | 4.71 | 4.15 |
| CAMBRIA-JACKSON | 12.10 | 6.21 | 17.05 | 11.99 | 9.30 | 13.81 | 6.86 | 9.50 | 8.32 |
| CLIFFS SHAFT | 5.99 | 6.23 | 8.18 | 6.34 | 8.64 | 5.12 | 6.26 | 3.46 | 4.90 |
| LLOYD | 5.01 | 14.45 | 6.49 | 9.38 | 11.17 | 12.97 | 11.72 | 11.32 | 6.28 |
| MAAS | 12.48 | 8.78 | 8.17 | 9.29 | 6.08 | 21.08 | 10.55 | 4.45 | 4.84 |
| MATHER MINE, "A" SHAFT | 6.64 | 7.57 | 8.39 | 7.72 | 10.88 | 9.50 | 8.40 | 7.01 | 8.75 |
| MATHER MINE, "B" SHAFT | | | | | 2.23 | 4.16 | 2.46 | 6.68 | 5.04 |
| NEGAUNEE SHAFT | 4.65 | 11.81 | 11.92 | 6.67 | 7.05 | 5.48 | | | 2.27 |
| PRINCETON * | 10.59 | 6.32 | 8.48 | | | | | | |
| RESEARCH LAB. | | | | | | | | | 5.81 |
| SPIES-VIRGIL | | 5.59 | 14.22 | 3.59 | 11.65 | 5.24 | 10.12 | 18.78 | 6.05 |
| TILDEN | | | 24.18 | 66.92 | 33.65 | 2.93 | 4.38 | 3.74 | 6.34 |
| GARDNER MACKINAW * | | | | | | | | | |

* No Longer In Operation

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXVIII

COMPARISON OF DUST COUNTS IN RAISING TO DRIFTING

| Mine | Average In Raising | Average In Drifting | General Average |
|---|---|---|---|
| ATHENS | 4.26 | 2.81 | 4.15 |
| CAMBRIA-JACKSON | 18.91 | 5.30 | 8.32 |
| CLIFFS SHAFT | 6.05 | 3.19 | 4.90 |
| LLOYD | 8.53 | 7.14 | 6.28 |
| MAAS | - | 4.51 | 4.84 |
| MATHER MINE, "A" SHAFT | 24.81 | 8.16 | 8.75 |
| MATHER MINE, "B" SHAFT | 5.07 | 4.92 | 5.04 |
| SPIES-VIRGIL | 3.47 | 4.49 | 6.05 |

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXIX

AVERAGES IN ORE COMPARED TO AVERAGES IN ROCK

| Mine | Average In Ore | Average In Rock | General Average |
|---|---|---|---|
| ATHENS | 5.20 | 2.94 | 4.15 |
| CAMBRIA-JACKSON | 9.33 | 7.82 | 8.32 |
| CLIFFS SHAFT | 4.93 | 4.85 | 4.90 |
| LLOYD | 6.65 | 4.53 | 6.28 |
| MAAS | 4.91 | 4.78 | 4.84 |
| MATHER MINE, "A" SHAFT | 11.09 | 6.86 | 8.75 |
| MATHER MINE, "B" SHAFT | 4.90 | 5.09 | 5.04 |
| NEGAUNEE SHAFT | - | 1.84 | 2.27 |
| RESEARCH LAB. | 5.81 | - | 5.81 |
| SPIES-VIRGIL | 8.65 | 4.32 | 6.05 |
| TILDEN | 6.34 | - | 6.34 |

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11. ACCIDENTS AND PERSONAL INJURY

d. Ventilation (Continued)

TABLE XXX

COMPARISON OF AVERAGE DUST COUNTS IN VARIOUS OPERATIONS

| Operation | RES. LAB. | ATHENS | CAMB. JACK. | CLIFFS SHAFT | LLOYD | MAAS | Shafts "A" MATHER | Shafts "B" MINE | SPIES | TILDEN | NEG. SHAFT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RAISING IN ROCK | | | 19.26 | 4.23 | | | 8.94 | 5.07 | 3.47 | | |
| RAISING IN ORE | | 4.26 | 19.44 | 10.37 | 8.54 | | 31.67 | | | | |
| DRIFTING IN ROCK | | 2.81 | 4.04 | 5.68 | 3.74 | 4.74 | 8.59 | 4.91 | 4.49 | | |
| DRIFTING IN ORE | | 2.79 | 9.19 | 1.46 | 8.88 | 3.83 | 9.71 | 4.72 | | | |
| SLICING IN ORE | | 2.67 | | | | 4.97 | | | | | |
| STOPING IN ORE | | | | 3.76 | 5.62 | | | | 9.72 | | |
| BREAKING CHUNKS | | | | | 10.69 | | | | | | |
| BLOWING OUT CARS | | 6.27 | | | 5.08 | 4.73 | | | | | |
| SUB-LEVEL CAVING | | 21.92 | 6.36 | | | 3.46 | 14.91 | 4.96 | | | |
| BLOCK CAVING | | 6.15 | | | | 12.75 | | | | | |
| SINKING SHAFT | | | | | | | 1.57 | | | | 1.84 |
| SHARPENING TOOLS | | | | | | | 3.60 | | | | 5.22 |
| CRUSHING ORE | 5.88 | | | 6.33 | | | | | | 8.23 | |
| LOADING AT POCKETS | | | | | | | | | | 4.22 | |
| PELLETIZING | 14.01 | | | | | | | | | | |

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11. ACCIDENTS AND PERSONAL INJURY

e. Mine Safety and Mine Rescue Courses

Mine Rescue Training

This training was conducted at Iron River, Michigan for 11 Spies-Virgil Mine employees during the week of January 8 to 12; at the Central Mine Rescue Station, Mather Mine, "B" Shaft, January 15 to 22 and again at the Central Station during September and October.

Engineers from the U.S. Bureau of Mines did part of this instruction work. Members of the Safety Department conducted the rest of the training. Mr. Hill, who has conducted classes over a period of five years, received a permanent U. S. Bureau of Mines Mine Rescue Instructor's Certificate. Mr. Swanson and Mr. Silas are working on their instructors certificate at the present time. I have had mine for a number of years.

Training during the year included fighting fire with direct straight water stream and fog nozzle and building of line brattice and temporary stoppings.

Total number of men who received training was 218. These men are listed by mines in Table XXXI. and XXXI-A.

Mine Fires - Underground & Surface

At the Spies-Virgil Mine some trouble was encountered with chemical burning of sulphur in the black rock. Bulkheads of concrete block and some wooden brattices have been built to isolate these areas, which are now under control. An air and travel raise was driven from the 4th Level to the bottom of the air shaft to allow men to travel in case of emergency and to by-pass the burning stopes. Men building bulkheads have All-Service Gas Masks available and Mask-fones for communication.

A small fire which occurred in the skip-pit at the Sargent Mine was put out by a member of the Safety Department. Fire started from a small electric heater which had short-circuited. Gas masks were used - damage slight.

There were no other fires of any consequence reported underground except a few short-circuits in electrical equipment which caused but little damage.

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11. ACCIDENTS AND PERSONAL INJURY

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

TABLE XXXI

MINE RESCUE TRAINING

SEPTEMBER - OCTOBER — 1951

| Mine | No. Of Men |
|---|---|
| ATHENS | 20 |
| CAMBRIA-JACKSON | 16 |
| CLIFFS SHAFT | 19 |
| ENGINEERING DEPARTMENT | 8 |
| LLOYD | 10 |
| MAAS | 16 |
| MATHER MINE, "A" SHAFT | 48 |
| MATHER MINE, "B" SHAFT | 31 |
| NEGAUNEE SHAFT | 9 |
| TOTALS | 177 |

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11. ACCIDENTS AND PERSONAL INJURY

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

TABLE XXXI-A

MINE RESCUE TRAINING

JANUARY, 1951

| Mine | No. Of Men |
|---|---|
| ATHENS | 5 |
| CLIFFS SHAFT | 6 |
| ENGR. DEPT. | 2 |
| LLOYD | 5 |
| MATHER MINE, "A" SHAFT | 12 |
| MATHER MINE, "B" SHAFT | 2 |
| SPIES-VIRGIL | 11 |
| TOTALS | 43 |

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11. ACCIDENTS AND PERSONAL INJURY

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

TABLE XXXII

FIRST-AID SUPPLIES DISTRIBUTED

| MATERIAL | NO. DISTRIBUTED |
|---|---|
| Tyro-Thri-Cin Pads (Band-Aids) | 65,454 |
| Ounces Of Merthiolate | 217 |
| 1" Roller Bandage | 284 |
| 2" Roller Bandage | 247 |
| 3" Roller Bandage | 177 |
| Rolls Of Adhesive Tape | 160 |
| Picric Acid Gauze Pads (For Burns) | 174 |
| Plain Gauze Pads | 575 |
| Leather Finger Cots | 135 |
| Merthiolate Applicators | 3,046 |
| Ounces Of Aromatic Spirits Of Ammonia | 22 |
| Ounces Of Absorbent Cotton | 26 |
| Tubes Of Unguentine | 13 |
| Triangular Bandages | 99 |
| Pairs Of Scissors | 8 |
| Bottles, 1 Oz. (Medicine) | 47 |
| Elasto-Plasts (Elastic Band-Aids) | 208 |
| 2" Compress Bandages | 324 |
| 3" Compress Bandages | 208 |
| 5/8 Oz. Tubes Of Foille Ointment | 69 |
| TOTALS | 71,493 |

Safety Department

Annual Report

Year 1951

11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous

During the year almost 100% of the employees on the Marquette and Menominee Ranges were fitted for safety glasses, corrected lense glasses excepted. At least one man, usually the storehouse man, was trained to use the fitting sets so each mine can care for their own men. A follow-up on this program will start early in 1952.

Classes in electrical blasting were held at Mather Mine, "B" Shaft.

Sent in material and photographs for "Cliffs News".

Fire inspections made of all properties.

As a member of the "Paint up - Clean up - Fix up" committee, assisted Ishpeming City officials and prepared a paper for Tom Hill to read on radio broadcast.

Checked air conditions at the Breitung Mine Shaft after a contractor had set fire to surface debris and shaft collar.

Department members took part in "Open House" at the Mather Mine, "B" Shaft.

Made up exhibits for the Timber Producers' Association Meeting held in Marquette and had one man on duty during this period.

Table XXXIII gives a comparison of available accident statistics.

11. ACCIDENTS AND PERSONAL INJURY

f. Miscellaneous (Continued)

TABLE XXXIII

COMPARISON OF FREQUENCY, SEVERITY RATINGS
TAKEN FROM AVAILABLE STATISTICS

| | FREQUENCY | SEVERITY |
|---|---|---|
| 1950 National Rating, All Mining, Including Coal | 34.06 | 5.40 |
| 1950 " " , Coal Mining | 43.64 | 7.91 |
| 1950 " " , Other Mining (Not Including Coal) | 25.83 | 3.25 |
| 1950 " " , Metal Mining | 34.41 | 3.96 |
| 1950 Lake Superior District Mines (24 Companies Reporting) | 16.26 | 2.77 |
| 1951 Lake Superior Mines Safety Exchange (9 Co.'s) No C.C.I. | 8.59 | 2.581 |
| 1951 Lake Superior Mines Safety Exchange " " + C.C.I. | 14.15 | 2.495 |
| 1951 The Cleveland-Cliffs Iron Co., Compensable Injuries | 12.69 | 2.083 |
| 1951 The Cleveland-Cliffs Iron Co., All Injuries | 36.96 | 2.140 |
| 1951 The Cleveland-Cliffs Iron Co., Open-Cut Mining | 27.00 | .863 |
| 1951 The Cleveland-Cliffs Iron Co., Concentrating Plants | 18.87 | .075 |
| 1951 The Cleveland-Cliffs Iron Co., Top Slicing | 58.97 | .785 |
| 1951 The Cleveland-Cliffs Iron Co., Sub-Level Caving | 35.45 | .397 |
| 1951 The Cleveland-Cliffs Iron Co., Stoping | 44.18 | 4.929 |
| 1951 The Cleveland-Cliffs Iron Co., Block Caving | 57.44 | 4.409 |
| 1951 The Cleveland-Cliffs Iron Co., Shaft Sinking | 68.19 | 1.805 |
| 1951 The Cleveland-Cliffs Iron Co., General Shops | 7.61 | .604 |
| 1951 The Cleveland-Cliffs Iron Co., C.P.& L. Co. | 0.00 | .000 |
| 1951 The Cleveland-Cliffs Iron Co., General Roll | 14.66 | .003 |
| 1951 The Cleveland-Cliffs Iron Co., Miscellaneous | 0.00 | .000 |

| 1950 - LAKE SUPERIOR DIST. | |
|---|---|
| FREQUENCY | SEVERITY |
| 16.26 | 2.77 |
| 9.46 | 2.22 |
| 7.70 | 0.27 |
| 43.68 | 3.79 |
| 26.14 | 3.83 |
| 17.16 | 4.12 |
| 47.91 | 0.98 |
| 27.58 | 7.67 |
| 7.36 | 2.07 |

# ANNUAL REPORT OF THE MINING ENGINEERING DEPARTMENT FOR THE YEAR ENDING DECEMBER 31, 1951

The three volumes that accompany this written report contain maps showing both the surface and underground workings of mines operated by The Cleveland-Cliffs Iron Company and its affiliates. The 1951 yearly progress or development and areas in which mining was done are shown, in red, on the level or sub-level maps of the underground properties. The cross-sections of the open pit mines are colored to show the unmined or remaining formations, in addition to the portions of the pit removed during 1951. These books also contain photographs or views which tell the story of construction progress of the various current C. C. I. projects. Also incorporated into these volumes are the maps showing location of the Diamond Drill Holes, their logs or cross-sections of the yearly drilling activities.

Two sets of Annual Reports were compiled and bound, one for the Cleveland office, and one for the Michigan Engineering Department at Ishpeming. Other booklets of looseleaf nature were prepared and distributed as indicated below. The following table shows the company for which the booklets were prepared and the mine or mines in which that company has interest.

| Company | Mines | |
|---|---|---|
| | For Itself | As Operating Agent |
| The Cleveland-Cliffs Iron Company | Agnew | Athens |
| | Alworth | Atkins |
| | Cambria-Jackson | Bunker Hill |
| | Canisteo | Hill-Trumbull |
| | Cliffs-Shaft | Holman-Cliffs |
| | Hawkins | Mather |
| | Lloyd | Ohio |
| | Maas | |
| | Negaunee | |
| | Sally | |
| | Sargent | |
| | Spies-Virgil | |
| | Tilden | |
| | Wanless-Woodbridge | |
| The Mesaba-Cliffs Mining Company | | |
| Partners: Hanna Iron Ore Company | | Hill-Trumbull |
| Inland Steel Company | | Holman-Cliffs |
| Jones & Laughlin Steel Corporation | | |
| Pittsburgh Steel Company | | |
| Wheeling Steel Company | | |
| The Athens Iron Mining Company for Pickands Mather & Company | | Athens |
| The Negaunee Mine Company | | |
| Partner: Bethlehem Steel Company | | Mather Mine |
| | | "A" Shaft |
| | | "B" Shaft |

Loose-leaf books were prepared for other companies or fee-owners containing maps of mines in which they were interested.

| Company | Mines |
|---|---|
| Arthur Iron Mining Company | Atkins, Hill-Trumbull, North Star and Bingham Lease of Holman-Cliffs. |
| Inland Steel Company | Atkins. |
| International Harvester Company | Agnew, Hawkins and Sargent. |
| Teal Lake Iron Mining Company | Cambria-Jackson |

Similar loose-leaf books were prepared for various Company officials, as follows:

| Name | Mine |
|---|---|
| Grover J. Holt, Manager Minnesota District | Agnew, Alworth, Atkins, Canisteo, Hawkins, Hill-Trumbull, Holman-Cliffs, Sally, Sargent and Wanless-Woodbridge. |
| Arnold E. Hill, Superintendent | Agnew, Alworth, Sargent |
| Giulio D. Giuliani " | Atkins, Wanless-Woodbridge. |
| Ronald B. Pearson " | Canisteo |
| Paul P. Swanson " | Hawkins |
| Hugh J. Leach " | Hill-Trumbull |
| John J. Foucault " | Holman-Cliffs |
| John Trosvig " | Athens |
| William R. Atkins " | Cambria-Jackson |
| Onni Marjama " | Cliffs Shaft, Lloyd |
| Henry O. Moulton " | Maas, Tilden |
| James S. Westwater " | Mather |
| Curtis R. Sundeen " | Negaunee |
| LeRoy Hosking " | Ohio |
| T. Adolph Kauppila " | Spies-Virgil |

B. MAP REPORTS

At the close of each month, the Mining Engineers, assigned to the soft ore properties, inspect all the underground workings and post the work done durin the month, i. e., the mining progress, the advance of development contracts and the drilling exploration program. Two sets of prints of the working tracings were made, one set being kept in the Manager's office and the other is sent to the superintendent for use at the mine office. Small maps, showing the active working areas, are printed, trimmed and folded to pocket size and given to every captain, foreman and shift boss, who in turn carry these maps on their daily trips through the underground workings, to assist them in their day by day production planning. This volume of maps made for the operating personnel is continually increasing and at present, the Engineering Department makes 1000 maps per month.

Other map reports for fee-owners or partners, that were made during the year, were as follows:

ATHENS MINE

Two sets of monthly progress prints, with work done colored in red, were sent to Pickands Mather & Company. The Corbit Lease fee-owner trustee was given sets of maps showing work done in that Lease, as of June 30th and December 31st, 1951.

CLIFFS-SHAFT MINE

One set of geological maps (1" = 50') of the Bancroft and Section 10 Leases were forwarded to the Duluth office of the Oliver Iron Mining Company after each of the tri-annual surveys. These maps show, in color, the work done during each of these 4-month periods. The final issue of these progress maps for the year 1951, also show the ore areas used in the calculating of the estimate of ore reserves, as presented to the Michigan State Tax Commission.

MATHER MINE

A complete set of the working maps of both "A" and "B" Shafts were forwarded to Dr. Donald M. Fraser, Chief Geologist of Bethlehem Steel Company, at the end of each quarter, each showing the mining progress in color.

MICHIGAN STATE TAX COMMISSION

Complete sets of prints, containing all working maps of all mines, were forwarded to Mr. F. G. Pardee, State Geologist, during the first week of October. These 50' to 1" maps were colored to indicate the known ore reserves and associated geology. At the end of the year two sets of annual report maps were prepared, showing areas used in calculating the ore reserve estimates; one set was forwarded to the Cleveland office, the other was kept in the Engineering Department as a permanent record.

C. MINING LEASES

The following mining leases were executed and placed on file in the Engineering Department during 1951:

Lease No. 95

Arctic Iron Company to Jones and Laughlin Ore Company, dated January 16, 1951, covering Sundry Parcel No. 1 in Section 5, 47-26. Note: The surface of this parcel was sold to Jones and Laughlin Ore Company, as of January 16, 1951.

Lease No. 96

Arctic Iron Company to Jones and Laughlin Ore Company and The Cleveland-Cliffs Iron Company, dated January 1, 1950, covers the so-called 4.57 acre parcel in Section 6, 47-26.

Lease No. 97

The Cleveland-Cliffs Iron Company to Jones and Laughlin Ore Company, dated August 1, 1951, covers an undivided 1/16th interest in the Regent Group of Mines (Blue, Queen and Prince of Wales) in Section 5, 47-26.

Lease No. 98

State of Michigan (State Lease #44) to The Cleveland-Cliffs Iron Company, dated July 2, 1951, expires July 2, 2001, covering the $S\frac{1}{2}$ of $SW\frac{1}{4}$ of Section 22, 48-31, Baraga County, known as the Beaufort Mine.

Lease No. 99

Arctic Iron Company to Jones and Laughlin Ore Company and The Cleveland-Cliffs Iron Company, dated January 1, 1950, expires January 1, 2000, covering the N½ of SW¼ of Section 6, 47-26, except those parts included with the Maas, Negaunee and Bunker Hill Mines.

Lease No. 100

Agreement between North Range Mining Company and The Cleveland-Cliffs Iron Company, dated January 27, 1949, covering the N½ of NW¼ of Section 4, 47-28, providing for royalty payments on ore mined.

D. THE FORCE

The personnel of the Engineering staff has been increased during 1951 in order to take care of the needs of our expanding Mining Department. The development of Mather Mine, "B" Shaft and the Ohio Mine, the planning and construction of the Cliffs 8th Addition Housing Project and the accelerated low grade ore exploration program are all responsible for the enlargement of the Engineering Department. Present day mining methods, which includes the block caving, radial drill caving and sub-level caving, require accurate transit surveys during their development. This work is carried on by the mine surveyor, thus allowing the Mining Engineer to be of more assistance to the superintendent and captain in their production and development planning.

Current labor relations problems demand so much of the superintendent's time that he no longer has sufficient time to spend on production planning so the job of Operating Engineer was created in order to have someone responsible for this phase of mine supervision. At mid-year, three of our senior Mining Engineers, namely,Robert M. DeGabriele, Maxwell H. Madsen and John M. Haivala, were appointed Operating Engineers at Cliffs-Shaft Mine, Mather Mine, "A" Shaft and Mather Mine, "B" Shaft.

The field survey work necessary for our low grade ore exploration program is accelerated during the short summer season by employing undergraduate technical students of midwestern colleges. Our field season, which runs from June 15th to September 15th, not only gives us an opportunity to do extensive field mapping and sampling but also a chance to evaluate the capabilities of these field party members as possible permanent employees, either in the Engineering or Geological Departments. During the summer of 1951, there were five two-man parties working in the Cascade, Michigamme River and North and South Michigamme Districts.

Mr. Alexander McAfee left the Engineering Department on February 28th when he was recalled to active duty in the Marine Corps Reserve as Lieutenant.

The following table shows the personnel of the Department, their position and the period of employment:

| Name | Position | Entered | Left | 1951 Employment |
|---|---|---|---|---|
| Carl Brewer | Recorder | | | 12 Months |
| Grant T. Hollett | District Engineer | | | 12 Months |
| Keith R. Busby | Engineer | October 1st | | 3 Months |
| Robert B. Davis | Engineer | August 21st | | 4 Months |
| Robert M. DeGabriele | Engineer | | June 30th | 6 Months |

| Name | Position | Entered | Left | 1951 Employment |
|---|---|---|---|---|
| John M. Haivala | Engineer | | June 30th | 6 Months |
| Oiva W. Hakala | Engineer | July 2nd | | 6 Months |
| R. Charles Kincaid | Engineer | July 2nd | | 6 Months |
| Lionel N. Larson | Engineer | October 15th | | 2½ Months |
| Maxwell H. Madsen | Engineer | | June 30th | 6 Months |
| John F. Magnuson | Engineer | | | 12 Months |
| Kenneth C. Olson | Engineer | | | 12 Months |
| Bernhardt H. Petersen | Engineer | | | 12 Months |
| Robert L. Sundeen | Engineer | | | 12 Months |
| Victor E. Swan | Engineer | April 1st | | 9 Months |
| Robert G. Fountain | Asst. Engineer | August 27th | | 4 Months |
| Edgar G. Curtis | Asst. Engineer | | September 30th | 9 Months |
| P. Daniel Isaacson | Asst. Engineer | | | 12 Months |
| C. Arthur Koski | Asst. Engineer | | | 12 Months |
| F. Alfred Koski | Asst. Engineer | | | 12 Months |
| W. Harlow Stannard | Asst. Engineer | | | 12 Months |
| Anselm Mantyla | Draftsman | | | 12 Months |
| George B. Manzoline | Draftsman | | | 12 Months |
| Donald R. Nankervis | Draftsman | March 1st | | 10 Months |
| Donald W. Carlson | Clerk | | | 12 Months |
| Jean Jensen | Clerk | July 16th | | 5½ Months |
| Clifford H. Amel | Surveyor | | | 12 Months |
| Clarence P. Ayotte | Surveyor | | | 12 Months |
| Robert E. Anderson | Surveyor | | | 12 Months |
| Alfred B. Nault | Surveyor | | | 12 Months |
| Ernest A. Oja | Surveyor | | | 12 Months |
| Russell J. Paull | Surveyor | | | 12 Months |
| John R. Sleeman | Surveyor | | | 12 Months |
| Allan E. Wakkuri | Surveyor | January 16th | | 11½ Months |
| Clyde C. Anderson | Helper | | | 12 Months |
| Robert Em. Anderson | Helper | February 1st | July 17th | 5½ Months |
| Glenn L. Bettens | Helper | April 23rd | June 15th | 2 Months |
| Charles W. Cornish | Helper | January 2nd | | 12 Months |
| Clyde H. Dodge | Helper | October 1st | | 3 Months |
| Ronald C. Foisie | Helper | September 17th | | 3½ Months |
| John F. Gleason | Helper | May 28th | November 10th | 6 Months |
| John B. Hollister | Helper | August 1st | | 5 Months |
| Paul G. Jacka | Helper | April 16th | | 8½ Months |
| Leo S. Kantela | Helper | January 19th | May 11th | 4 Months |
| Herbert S. Kelly | Helper | | | 12 Months |
| William E. Kumpu | Helper | | October 5th | 9 Months |
| Donald E. Lampi | Helper | April 2nd | | 8 Months |
| William M. Leaf | Helper | | | 12 Months |
| Alexander McAfee | Helper | | February 28th | 2 Months |
| Louis R. Miller | Helper | | | 12 Months |
| Raymond E. Oja | Helper | | March 31st | 3 Months |
| Paul E. Poutanen | Helper | January 18th | | 11½ Months |
| Donald M. Peterson | Helper | June 18th | September 15th | 3 Months |
| Thomas E. Riberdy | Helper | | January 12th | ½ Month |
| Joseph J. Scoleri | Helper | May 21st | | 7 Months |
| Arnold A. Sundell | Helper | February 1st | | 11 Months |
| Richard Swanson | Helper | June 12th | August 31st | 2½ Months |
| Nicholas W. Tasson | Helper | November 19th | | 1½ Months |

| Name | Position | Entered | Left | 1951 Employment |
|---|---|---|---|---|
| Roy H. Thomas | Helper | | March 22nd | 3 Months |
| Wilburt H. Thomas | Helper | January 2nd | | 12 Months |
| Arthur W. Wassberg | Helper | June 18th | August 24th | 2 Months |
| Raymond S. Windsand | Helper | | | 12 Months |

The following table shows the summer field crew personnel, their position and their period of employment:

| | | | | |
|---|---|---|---|---|
| Wilson L. Bilhorn | Surveyor | June 7th | August 31st | 3 Months |
| Harley E. Clickner | Surveyor | June 7th | August 31st | 3 Months |
| William P. Cromwell | Surveyor | June 12th | June 30th | ½ Month |
| Joseph F. McAleer | Surveyor | June 18th | September 30th | 3½ Months |
| James P. Meyers | Surveyor | June 18th | September 15th | 3 Months |
| Wayne W. Sternitzky | Surveyor | May 28th | August 31st | 3 Months |
| Louis F. Taccolini | Helper | June 19th | August 17th | 2 Months |
| Warren N. Tidd | Surveyor | June 21st | August 31st | 3 Months |

The following 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 | 33 Years, 3 Months |
| Grant T. Hollett | August, 1940 | 11 Years, 4½ Months |
| Keith R. Busby | October, 1951 | 3 Months |
| Robert B. Davis | August, 1951 | 4 Months |
| Oiva W. Hakala | July, 1951 | 6 Months |
| R. Charles Kincaid | July, 1951 | 6 Months |
| Lionel N. Larson | October, 1951 | 2½ Months |
| John F. Magnuson | March, 1950 | 1 Year, 10 Months |
| Kenneth C. Olson | March, 1950 | 1 Year, 9½ Months |
| Bernhardt H. Petersen | November, 1950 | 1 Year, 1½ Months |
| Robert L. Sundeen | December, 1950 | 1 Year, ½ Month |
| Victor E. Swan | April, 1951 | 9 Months |
| Robert G. Fountain | August, 1951 | 4 Months |
| P. Daniel Isaacson | November, 1940 | 6 Years, 4½ Months |
| C. Arthur Koski | June, 1941 | 7 Years, 1 Month |
| F. Alfred Koski | January, 1936 | 10 Years, 9 Months |
| W. Harlow Stannard | November, 1940 | 11 Years, 2 Months |
| Anselm Mantyla | July, 1948 | 3 Years, 5½ Months |
| George B. Manzoline | December, 1947 | 4 Years, ½ Month |
| Donald R. Nankervis | March, 1951 | 10 Months |
| Donald W. Carlson | August, 1936 | 12 Years, 1 Month |
| Jean Jensen | July, 1951 | 5½ Months |
| Clifford H. Amel | May, 1944 | 7 Years, 7½ Months |
| Clarence P. Ayotte | April, 1948 | 3 Years, 8½ Months |
| Robert E. Anderson | July, 1948 | 3 Years, 6 Months |
| Alfred B. Nault | September, 1946 | 5 Years, 3½ Months |
| Ernest A. Oja | March, 1943 | 8 Years, 10 Months |
| Russell J. Paull | March, 1947 | 4 Years, 9 Months |
| John R. Sleeman | February, 1947 | 4 Years, 10½ Months |
| Allan E. Wakkuri | January, 1951 | 11½ Months |

| Name | Date Entered | Length of Service |
|---|---|---|
| Clyde C. Anderson | December, 1950 | 1 Year, 1 Month |
| Charles W. Cornish | January, 1951 | 1 Year |
| Clyde H. Dodge | October, 1951 | 3 Months |
| Ronald C. Foisie | September, 1951 | 3½ Months |
| John B. Hollister | August, 1951 | 5 Months |
| Paul G. Jacka | April, 1951 | 8½ Months |
| Herbert S. Kelly | May, 1948 | 3 Years, 7 Months |
| Donald E. Lampi | April, 1951 | 9 Months |
| William M. Leaf | July, 1950 | 1 Year, 6 Months |
| Louis R. Miller | August, 1945 | 6 Years, 3½ Months |
| Paul E. Poutanen | January, 1951 | 11½ Months |
| Joseph J. Scoleri | May, 1951 | 7½ Months |
| Arnold A. Sundell | February, 1951 | 11 Months |
| Nicholas W. Tasson | November, 1951 | 1½ Months |
| Wilburt H. Thomas | January 1, 1951 | 1 Year |
| Raymond S. Windsand | December, 1947 | 4 Years, ½ Month |

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

| Name | Days Worked | Overtime | Sick | Absent |
|---|---|---|---|---|
| Carl Brewer | 222½ | | | 30 |
| Grant T. Hollett | 248 | 2½ | | 7 |
| Keith R. Busby | 66½ | 5 | | |
| Robert B. Davis | 90 | 1 | | 1 |
| Robert M. DeGabriele | 145½ | 1½ | 2 | 3 |
| John M. Haivala | 150½ | 2½ | 1 | |
| Oiva W. Hakala | 103½ | 4 | ½ | 3½ |
| R. Charles Kincaid | 136½ | 11½ | | |
| Lionel N. Larson | 51 | 1½ | | 2 |
| Maxwell H. Madsen | 154½ | 5½ | | |
| John F. Magnuson | 262 | 16½ | | 8½ |
| Kenneth C. Olson | 254½ | 6 | 3 | 1 |
| Bernhardt H. Petersen | 252½ | 12½ | | 12 |
| Robert L. Sundeen | 244½ | 4½ | 1½ | 11 |
| Victor E. Swan | 188½ | | | |
| Robert G. Fountain | 83½ | 1 | | 3 |
| Edgar G. Curtis | 211½ | 20½ | | |
| P. Daniel Isaacson | 282½ | 41 | | 10 |
| C. Arthur Koski | 249½ | 9 | | 12 |
| F. Alfred Koski | 256½ | 15½ | | 12 |
| W. Harlow Stannard | 244½ | 2½ | | 10½ |
| Anselm Mantyla | 194½ | 1½ | 53 | 3½ |
| George B. Manzoline | 256 | 9 | | 5½ |
| Donald R. Nankervis | 212½ | 2 | | |
| Donald W. Carlson | 242 | | 2½ | 8 |
| Jean Jensen | 94½ | 4 | 1 | 3 |
| Clifford H. Amel | 249½ | 9½ | | 12 |
| Clarence P. Ayotte | 292½ | 44 | | 4 |
| Robert E. Anderson | 242 | 7 | 11 | 4 |
| Alfred B. Nault | 268 | 25½ | | 10 |
| Ernest A. Oja | 246 | 3½ | | 10 |

| Name | Days Worked | Overtime | Sick | Absent |
|---|---|---|---|---|
| Russell J. Paull | 251½ | 11 | | 12 |
| John R. Sleeman | 263½ | 11½ | | 7 |
| Allan E. Wakkuri | 264½ | 29 | | 7 |
| Clyde C. Anderson | 247½ | 7 | 3 | 9 |
| Robert Em. Anderson | 117 | ½ | | ½ |
| Glenn L. Bettens | 38 | | | 1 |
| Wilson L. Bilhorn | 64 | 2 | | |
| Harley E. Clickner | 61½ | 1½ | | |
| Charles W. Cornish | 251½ | 4 | | 5 |
| William P. Cromwell | 14 | | | |
| Clyde H. Dodge | 67½ | 8 | | 2 |
| Ronald C. Foisie | 72½ | 3 | 1 | 2 |
| John F. Gleason | 110 | | 2 | 5 |
| John B. Hollister | 89 | | 12½ | 4 |
| Paul G. Jacka | 182 | 6½ | | 3 |
| Leo S. Kantela | 81½ | | | |
| Herbert S. Kelly | 249 | 10½ | 9 | 5 |
| William E. Kumpu | 204 | 9 | | 3 |
| Donald E. Lampi | 181½ | | | 7 |
| William M. Leaf | 253 | 16½ | 6 | 10 |
| Alexander McAfee | 43½ | 1½ | | |
| Joseph F. McAleer | 75 | 2 | | |
| James P. Meyers | 65 | 2 | | |
| Louis R. Miller | 207 | | 25½ | 10 |
| Raymond E. Oja | 68½ | 5½ | | |
| Paul E. Poutanen | 244 | 12 | | 17 |
| Donald M. Peterson | 65 | 1 | | |
| Thomas E. Riberdy | 9 | | | |
| Joseph J. Scoleri | 164½ | 13 | 1 | 3 |
| Arnold A. Sundell | 249½ | 22 | | 3 |
| Wayne W. Sternitzky | 68½ | ½ | | |
| Richard Swanson | 59 | 1 | | |
| Louis F. Taccolini | 43½ | ½ | | |
| Nicholas W. Tasson | 27½ | | | |
| Warren N. Tidd | 54 | 3 | | |
| Roy H. Thomas | 58½ | 1 | | |
| Wilburt H. Thomas | 265½ | 21 | 3 | 5 |
| Arthur W. Wassburg | 49 | | | |
| Raymond S. Windsand | 245 | 6 | 2 | 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 | | | 222½ | 222½ |
| Grant T. Hollett | 2 | 85½ | 160½ | 248 |
| Keith R. Busby | 32 | 9 | 25½ | 66½ |
| Robert M. Davis | 44½ | 7 | 38½ | 90 |
| Robert M. DeGabriele | 59 | 13 | 73½ | 145½ |
| John M. Haivala | 70 | 14 | 66½ | 150½ |
| Oiva W. Hakala | 53 | 4 | 46½ | 103½ |
| R. Charles Kincaid | 81 | 5½ | 50 | 136½ |

| Name | Underground | Field | Office | Total |
|---|---|---|---|---|
| Lionel N. Larson | | 32 | 19 | 51 |
| Maxwell H. Madsen | 115½ | | 39 | 154½ |
| John F. Magnuson | 137 | 14 | 111 | 262 |
| Kenneth C. Olson | 85 | 25½ | 144 | 254½ |
| Bernhardt H. Petersen | 93 | 80½ | 79 | 252½ |
| Robert L. Sundeen | 128½ | 8½ | 107½ | 244½ |
| Victor E. Swan | | 140 | 48½ | 188½ |
| Robert G. Fountain | | 31½ | 52 | 83½ |
| Edgar G. Curtis | 177 | | 34½ | 211½ |
| P. Daniel Isaacson | 168½ | 11½ | 102½ | 282½ |
| C. Arthur Koski | 131 | 40 | 78½ | 249½ |
| F. Alfred Koski | 94½ | 65½ | 96½ | 256½ |
| W. Harlow Stannard | | 4 | 240½ | 244½ |
| Anselm Mantyla | | | 194½ | 194½ |
| George B. Manzoline | | 2½ | 253½ | 256 |
| Donald R. Nankervis | | | 212½ | 212½ |
| Donald W. Carlson | | | 242 | 242 |
| Jean Jensen | | | 94½ | 94½ |
| Clifford H. Anel | | 161 | 88½ | 249½ |
| Clarence P. Ayotte | 186 | 7 | 99½ | 292½ |
| Robert E. Anderson | 131 | 24½ | 86½ | 242 |
| Alfred B. Nault | 190 | 14 | 64 | 268 |
| Ernest A. Oja | | 195½ | 50½ | 246 |
| Russell J. Paull | 153 | 16½ | 82 | 251½ |
| John R. Sleeman | 109½ | 67½ | 86½ | 263½ |
| Allan E. Wakkuri | 185½ | 9 | 70 | 264½ |
| Clyde C. Anderson | 144½ | 18 | 85 | 247½ |
| Robert Em. Anderson | | 65 | 52 | 117 |
| Glenn L. Bettens | | 30 | 8 | 38 |
| Wilson L. Bilhorn | | 60½ | 3½ | 64 |
| Harley E. Clickner | | 51 | 10½ | 61½ |
| Charles W. Cornish | 106 | 24½ | 121 | 251½ |
| William P. Cromwell | | 12 | 2 | 14 |
| Clyde H. Dodge | 51 | 2½ | 14 | 67½ |
| Ronald C. Foisie | 15 | 30 | 27½ | 72½ |
| John Gleason | | 100 | 10 | 110 |
| John B. Hollister | 18½ | 30½ | 40 | 89 |
| Paul G. Jacka | | 160 | 22 | 182 |
| Leo S. Kantela | 24 | 13½ | 44 | 81½ |
| Herbert S. Kelly | 179½ | 17½ | 52 | 249 |
| William E. Kumpu | 175½ | | 28½ | 204 |
| Donald E. Lampi | | 152 | 29½ | 181½ |
| William M. Leaf | 109½ | 58½ | 85 | 253 |
| Alexander McAfee | 39½ | | 4 | 43½ |
| Joseph F. McAleer | | 60½ | 14½ | 75 |
| James P. Meyers | | 52½ | 12½ | 65 |
| Louis R. Miller | | | 207 | 207 |
| Raymond E. Oja | | 45 | 23½ | 68½ |
| Paul E. Poutanen | 169 | 7½ | 67½ | 244 |
| Donald M. Peterson | | 62 | 3 | 65 |
| Thomas E. Riberdy | 7 | | 2 | 9 |
| Joseph J. Scoleri | 107½ | 20 | 37 | 164½ |

| Name | Underground | Field | Office | Total |
|---|---|---|---|---|
| Arnold A. Sundell | 139 | 38 | 72½ | 249½ |
| Wayne W. Sternitzky | | 55½ | 13 | 68½ |
| Richard Swanson | | 58 | 1 | 59 |
| Louis F. Taccolini | | 37 | 6½ | 43½ |
| Nicholas W. Tasson | | 17 | 10½ | 27½ |
| Warren N. Tidd | | 45 | 9 | 54 |
| Roy H. Thomas | 36½ | 1 | 21 | 58½ |
| Wilburt H. Thomas | 195 | 2½ | 68 | 265½ |
| Arthur W. Wassberg | | 48 | 1 | 49 |
| Raymond S. Windsand | 137½ | 23½ | 84 | 245 |

The following summary describes briefly the personnel of the Engineering Department and their work at the mine or mines to which they were assigned:

CARL BREWER, Recorder, spent 100% of his time with the Tax and Land Acquisition Division of the Engineering Department. His work consisted of the preparation of mining leases, deeds and documents, purchase of possible low grade ore lands, writing right-of-way agreements and land exchanges and compilation of land ownerships.

GRANT T. HOLLETT, District Engineer, administered the work of the Mining Engineering Department, correlating the engineering work at the various mines, assisted Mr. Brewer in land acquisition and preparation of documents, made several trips to various colleges and technical schools, interviewing and hiring both mining and geological graduates for permanent and summer employment, prepared the ore reserve estimates for the Michigan State Tax Commission and supervised the engineering details of the Cliffs 8th Addition Housing Project.

KEITH R. BUSBY, Mining Engineer, entered the Engineering Department on October 1st and was assigned to the Negaunee Mine on December 1st after spending several weeks familiarizing himself with our procedures in the Negaunee District. He was formerly employed by the American Smelting and Refining Company and had been working in Mexico during the past three or four years. He assisted in the planning of the plat and trench design and supervised the shaft alignment and hoist installation.

ROBERT B. DAVIS, Mining Engineer, entered the Engineering Department on August 21st after working as an underground laborer at Mather Mine, "A" Shaft for approximately two months. He was assigned to the Cliffs-Shaft Mine replacing Robert M. DeGabriele. He is a graduate of the University of Minnesota where he received his degree in Mining Engineering in June, 1951. Since his assignment, he worked on the development planning, ore reserve estimates, shaft sinking plans and surface plant revisions.

ROBERT G. FOUNTAIN, Office Engineer, entered the Engineering Department on August 27th. He is a Civil Engineering graduate of the University of Michigan and was formerly employed by the State of Michigan Conservation Department. After spending a few weeks familiarizing himself with our methods, he assisted in the planning of the Maas Mine Discharge, Barnum Pit Drainage System and Negaunee Sewage Disposal site.

OIVA W. HAKALA, Mining Engineer, entered the Engineering Department on July 2nd. After working at Mather Mine, "A" Shaft as an underground laborer for

approximately six months, he was assigned to this mine as Mining Engineer. Mr. Hakala was formerly employed in the Coeur d'Alene District after graduating from Michigan College of Mining and Technology. He assisted the mine superintendent and Operating Engineer in the production planning and problems encountered in shaft sinking and supervised the installation of the 7th Level conveyor system.

R. CHARLES KINCAID, Mining Engineer, entered the Engineering Department on July 2nd and was assigned to Mather Mine, "B" Shaft. Mr. Kincaid had worked as an underground laborer during the two previous summers at Cliffs-Shaft Mine and Mather Mine, "A" Shaft. He received his Mining Engineering degree at Lehigh University in June, 1951. He supervised the surface work, such as the construction of the East stocking trestle and timber tunnel, laying out of the parking lot and roads and assisted in the development and production planning.

LIONEL N. LARSON, Mining Engineer, entered the Engineering Department on October 15th after working as an underground laborer at Mather Mine, "A" Shaft for approximately four months and was assigned to the Ohio Mine. He received his degree in Mining Engineering at Michigan College of Mining and Technology in June, 1951. He supervised the construction of the plant, the making of pit cross-section maps of the East (Webster) Pit, laying out of the blast holes and revised the original Ohio Mine ore reserve estimate in view of the facts which point to the Westerly extension of the West (Norwood) Pit.

JOHN F. MAGNUSON, Mining Engineer, was assigned to the Lloyd and Spies Mines and had direct charge of all the engineering duties at both of these properties. He worked with the mine superintendent in planning the 8th Level drifting, the placing of geophones in the pillars in the Spies East deposit in order to study their load-carrying characteristics, the long hole drilling program in the Spies East deposit, watching the water temperature and air samples as it concerned the the mining progress of the Spies East deposit, time study work of the 6th Level haulage and 8th Level drifting and the design work of the 8th Level pocket and trench. At the Lloyd Mine, he made cross-sections and ore estimate calculations in connection with the diamond drill exploration below the 9th Level, in order to determine the advisability of deepening the winze, assisted in the plans for the proposed 10th Level development and in the preparatory work, such as engine room design, hoist location, etc., for the sinking of the winze.

KENNETH C. OLSON, Mining Engineer, was in charge of the engineering work at the Cambria-Jackson Mine until the middle of March when Robert L. Sundeen took charge of the engineering work at this property. He also served as Mining Engineer at the Maas and Tilden Mines throughout the year. At the Cambria-Jackson, he assisted the mine superintendent in the 8th Level development program. At the Maas Mine, he assisted in the planning of the 7th Level development program and the new Maas discharge line. He also took care of the engineering details at the Tilden Mine.

BERNHARDT H. PETERSEN, Mining Engineer, was in charge of the engineering work at the Negaunee Mine until December 1st when Keith R. Busby took charge of the engineering work at this property. He also served as Mining Engineer at the Athens Mine throughout the year. At the Negaunee Mine, he assisted in the planning of the hoist installation, headframe construction, proposed surface buildings, construction of the new engine house, cage hoist foundation and the laying out of a new entrance road. He assisted the mine superintendent and captain in the mining and development planning, including the connecting drift between the Athens 6th Level and the Negaunee No. 3 Shaft.

ROBERT L. SUNDEEN, Mining Engineer, was assigned to the Cambria-Jackson Mine during March to take care of the engineering work at this property. He assisted the mine superintendent in the planning of the 6th Level development for the proposed diamond drill hole exploration, 8th Level development and the relocation of the Cambria-Jackson Mine discharge. He also made experiments with the rotary drilling machine and the new auger-type steel and revised geological cross-sections while planning the 8th Level development.

VICTOR E. SWAN, Project Engineer, who was formerly Engineer for the City of Ishpeming, entered the Engineering Department on April 1st and was assigned to the Cliffs 8th Addition Housing Project. He supervised the plat layout, water and sewer design, site and street grading, and staking of lots for houses, which were built by Klippen-Holm of Duluth, Minnesota.

The following sheet shows in tabular form, the personnel of the Engineering Department and their classification, as of December 31, 1951:

## ENGINEERING DEPARTMENT PERSONNEL - 1951

| | ATHENS | CAMBRIA-JACKSON | CLIFFS-SHAFT | LLOYD | MAAS | MATHER "A" | MATHER "B" | NEGAUNEE | OHIO | SPIES |
|---|---|---|---|---|---|---|---|---|---|---|
| MINE ENGINEER | B. H. Peterson | R. L. Sundeen | R. B. Davis | J. F. Magnuson | K. C. Olson | Oiva W. Hakala | R. C. Kincaid | K. R. Busby | L. N. Larson | J. F. Magnuson |
| ASS'T MINE ENGINEER | | | C. A. Koski | | | P. D. Isaacson | F. A. Koski | | | |
| SURVEYOR | J. R. Sleeman | R. E. Anderson | | R. J. Paull | R. E. Anderson | C. P. Ayotte | A. B. Nault<br>A. E. Wakkuri | J. R. Sleeman | C. H. Amel | R. J. Paull |
| HELPERS | W. M. Leaf | C. C. Anderson | C. W. Cornish | R. S. Windsand | C. C. Anderson | H. S. Kelly<br>P. E. Poutanen<br>W. H. Thomas | A. A. Sundell<br>J. J. Scoleri<br>C. H. Dodge<br>R. C. Foisie | W. M. Leaf | P. G. Jacka<br>J. B. Hollister | R. S. Windsand |

| SURFACE | CLIFFS 8TH ADDITION |
|---|---|
| ENGINEER | V. E. Swan |
| SURVEYOR | E. A. Oja |
| HELPERS | D. E. Lampi<br>N. W. Tasson |

| OFFICE | |
|---|---|
| OFFICE ENGINEER | R. G. Fountain |
| ASS'T ENGINEER | W. H. Stannard |
| DEPT. CLERK | J. C. Jensen |
| DRAFTSMAN | A. Mantyla<br>G. B. Manzoline<br>D. R. Nankervis |
| PRINTER | L. R. Miller |

### SUMMER FIELD PARTIES
(June 15th to September 15th)

| Party No. | Name | District |
|---|---|---|
| 2 | Harley Clickner | Cascade |
| | Louis Taccolini | Cascade |
| 3 | Wayne Sternitzky | Cascade |
| 4 | Joseph J. McAleer | Michigamme River |
| 5 | James P. Meyers | Michigamme River |
| 6 | William P. Cromwell | North Michigamme |
| | | South Michigamme |
| | Warren Tidd | North Michigamme |
| | | South Michigamme |

F. COSTS

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

| | 1949 | 1950 | 1951 |
|---|---|---|---|
| Salaries | $91,052.07 | $100,143.54 | $159,185.49 |
| Auto Expense | 3,070.69 | 3,580.32 | 4,054.85 |
| Furniture and Fixtures | - | 653.56 | 396.01 |
| Heat, Light and Power | 634.29 | 556.29 | 631.20 |
| Insurance | 216.47 | 148.02 | 179.01 |
| Postage | 75.52 | 94.34 | 93.02 |
| Repairs | - | 3,640.80 | 332.78 |
| Stationery and Printing | 259.62 | 243.07 | 540.43 |
| Supplies | 8,000.02 | 10,250.34 | 15,475.61 |
| Taxes | 48.49 | 49.18 | 48.89 |
| Traveling and Entertainment | 1,868.71 | 866.70 | 3,177.55 |
| Telephone and Telegraph | 203.54 | 241.57 | 384.68 |
| Papers and Periodicals | 18.00 | 3.00 | 69.20 |
| Unemployment Insurance Tax | 1,048.00 | 1,164.79 | 1,545.71 |
| General - Unclassified | 2,316.14 | 1,068.00 | 1,094.45 |
| Old Age Benefit Tax | 822.80 | 1,343.98 | 2,061.07 |
| Depreciation | 60.00 | 64.00 | 108.00 |
| Equipment | - | - | 6,144.51 |
| Group Annuity Premiums | 3,233.49 | 695.95 | 1,760.82 |
| TOTALS | $113,381.35 | $124,807.45 | $197,283.28 |

H. AUTOMOBILES

The Ford Tudor sedan furnished by Four Wheels, Inc., and received on July 15, 1950 was operated for the first half of the year. It was replaced by a 1951 model Ford Tudor sedan on July 3rd. The latter has been operated for the balance of the year and is used mainly for trips to the Spies and Lloyd Mines. The Chevrolet Carry-All #1 (1949 model) was operated throughout the year, mainly by the Cliffs 8th Addition crew. The Chevrolet Carry-All #2 (1950 model) was operated throughout the year by the surface survey crews.

The following table shows the mileage covered in 1951, the total mileage to the end of the year or date of disposal, and the date the cars were received in the Department:

| Car | Miles | | Date | Date |
|---|---|---|---|---|
| | 1951 | Total | Received | Disposed of |
| Ford Sedan (1950 model) | 12,103 | 24,990 | 7/15/50 | 7/3/51 |
| Ford Sedan (1951 model) | 15,745 | 15,745 | 7/3/51 | |
| Chevrolet Carry-All #1 | 14,854 | 26,200 | 6/13/49 | |
| Chevrolet Carry-All #2 | 6,157 | 19,894 | 6/1/50 | |

I. MINES.

The following brief summary itemizes the special work done at the various properties during the year:

GENERAL

The Michigan mines were idle during the period, July 2nd to July 13th, due to an unauthorized walkout of the miners who were in sympathy with men who were discharged because of smoking underground.

ATHENS MINE

(a) The subsidence survey of the iron pins in the vicinity of the dry, shops and engine house was continued on a monthly basis throughout the year.

(b) The shaft was plumbed from the 1000' Level to the 6th Level and check surveys were run on these levels between the Athens Shaft and the Negaunee No. 3 Shaft in preparation of the drifting program on the 6th and 10th Levels connection.

CAMBRIA-JACKSON MINE

(a) The design and construction of the 8th Level storage trench and the giving of lines and grades for the 8th Level drifting and development program took considerable time.

(b) The Mining Engineer worked on the geological interpolations of possible ore areas in the structures between the 7th and newly developed 8th Level.

(c) Experiments were conducted on Intra-set bits, new auger type steel and the rotary drilling machine.

(d) A proposed relocation of the Cambria Mine discharge was planned and the cost estimated. This new relocation of the discharge will follow the West side of the abandoned D. S. S. & A. right of way, South underneath the L. S. & I.-Mather Mine, "A" Shaft main line tracks into Partridge Creek.

CLIFFS-SHAFT MINE

(a) In order to conform to the revised schedule of the Michigan State Tax Commission estimates, the dates and publishing of the quarterly surveys have been changed to triannually, as of March, July and November.

(b) A check survey was run from the Cliffs-Shaft Mine to the old Moro Mine workings. "K" Shaft of the Moro Mine was reopened and a new concrete collar was poured from ledge to surface, in conjunction with the revised ventilation system of the Cliffs-Shaft Mine.

(c) Mr. John B. Hollister, Jr. was assigned to this property to work with the mine superintendent, captain and underground foremen in their study of the present sampling procedure. It is felt that a more workable accurate method will evolve from this study.

(d) The construction of the new sanitary sewer system for the dry,

stockpile trestle layout, proposed changes in the crusher building, the preparation and presentation of data concerning the proposed shaft site and painting of boundary lines between The Cleveland-Cliffs Iron Company's and Oliver Iron Mining Company's properties throughout the underground workings required the assistance of the Engineering Department.

LLOYD MINE

(a) Holes were drilled from the 5th Level elevation and samples were taken of the gob to obtain material for metallurgical testing.

(b) At the completion of the diamond drill exploration below the 9th Level, cross-sections were made and ore reserves calculated to determine the advisability of deepening the winze.

(c) The design work of the engine room, hoist location, sump and plans and securing of equipment for winze sinking were part of the Mining Engineer's work.

MAAS MINE

(a) In order to obtain courses and coordinates on the newly developed 7th Level, the winze was plumbed from 6th to 7th Levels.

(b) The design, layout and excavation of the 7th Level pump house were done under the direction of the Engineering Department.

(c) In conjunction with the Mechanical and Safety Departments, an inspection trip was made of the Negaunee No. 2 Shaft, the fresh air intake of the Maas Mine vetilation system. This inspection revealed that a large amount of repair work is needed to insure its permanency in the planning or design of the steel sets in lagging.

(d) Locations were surveyed and profiles made for the proposed relocation of the Maas Mine discharge which will run East of the Headframe and North of the waste rock pile, thence Southeast underneath the old Marquette road, thence Easterly along the old D. S. S. & A. right of way to a swamp near the Carp River. This relocation work was done to remove the present Maas Mine discharge from the Teal Lake Development Company's Addition to the City of Negaunee. This new relocation will also give us an opportunity to construct a large settling basin if the Conservation Department prohibits the Company from dumping tainted water into the streams.

(e) Assistance was given Professor Bacon of Michigan Tech, in his efforts to map the ledge contours in the vicinity of the East end of Teal Lake by seismic methods.

(f) In conjunction with the exploration drilling campaign carried on in the Western end of the 6th Level and adjacent to the Pioneer and Arctic and the possibilities of developing sizeable ore bodies in that area, a study was made of the remaining residences and their effect on the mineability of these deposits.

MATHER MINE

"A" Shaft

(a) A complete check survey was run between Mather Mine, "A" Shaft

and "B" Shaft on the 6th Level so that adjustments might be made prior to the connection of any drifts driven from these two shafts and connected in the vicinity of the boundary lines.

(b) To confirm the cu. ft. per ton factor currently being used on our stockpile calculations, an estimate was made of the ore in stock on the South trestle at "A" Shaft.

(c) Installation of the belt conveyor, head pulley and takeup pulley and construction of the pocket for belt loading facilities required Engineering Department supervision. Prior to this installation, the connection or holing through of two mining contracts that were driving the conveyor drift which was approximately 25' above the 7th Level showed the results of competent and accurate surveying.

(d) A check shaft plumbing was made between 6th and 7th Levels to confirm the accuracy of previous plumbings to this newly developed 7th Level.

(e) During the shaft sinking operations, a number of combined shaft plumbings and surveys were made around the rock pentice to determine the correct and accurate locations of the shaft steel below the pentice.

(f) The design, excavation and installation of the engine room, dumping devices and loading facilities, pertinent to shaft sinking operations, were carried on with the assistance of the Engineering crew assigned to this property.

"B" Shaft

(a) Several shaft plumbings were carried on during the year; in December, 1950, courses and coordinates were carried from the 6th to 7th Levels and in July, 1951, the shaft was plumbed from 7th to 8th Levels. A special plumbing was made to determine the relative position of the counterweight pipe in respect to the shaft steel.

(b) Check surveys were made on the 6th, 7th and 8th Levels to confirm previous results. A check elevation survey was run between "A" and "B" Shafts of the Mather Mine.

(c) Construction of the stocking trestle which was being erected at right angles and to the East of the main conveyor trestle, construction of the timber tunnel and grading of the stocking grounds and parking area was planned and supervised by members of the Engineering Staff.

NEGAUNEE MINE

(a) Surveys were made and information gathered for the surface construction, specifically, the addition to the engine house, surface dry, stocking ground grading and the headframe and crushing layout.

(b) The design of the proposed shaft plats, trenches and measuring pockets were taken care of by the Mining Engineer.

(c) Special surveys and plumbings were made in the shaft for the installation of bearer sets and the alignment of shaft sets.

OHIO MINE

(a) Contour maps, profiles and location maps of the proposed mill site were prepared for the plant designers.

(b) The draining of the area adjacent to the proposed Norwood Pit was accomplished by the blasting of beaver dams that had been rebuilt during the winter.

(c) Construction of the Ohio Mine plant and its facilities, such as the stocking conveyor, tailings disposal conveyor, water lines, haulage roads, transmission and telephone lines and building of dikes were supervised by the Engineering Department Staff.

(d) A complete set of working maps, both plan and section, have been started to assist in the general mine development planning.

(e) The original Ohio Mine ore reserves estimate was revised in view of the facts that point to a Westerly extension of the Norwood Pit.

SPIES MINE

(a) Water temperatures were observed and air samples taken in the area of the East Deposit in order to correlate facts pertaining to the oxidation of the pyrites in the black slates.

(b) Surveys were run and elevations taken of the area West of the rock pile which is suitable for a surface settling sump.

(c) Time and motion studies were taken on the 6th and 8th Levels in an effort to assist in the planning of a revised haulage and drifting program.

(d) The Spies Shaft was plumbed from 6th to 8th Levels to establish courses and coordinates for the development of the 8th Level.

(e) The pocket and trench design and construction were carried on under the supervision of the Mining Engineer.

(f) Geophones were placed in the ore pillars of the Spies East Deposit in an attempt to derive information as to their ability of support for the surface material.

(g) The staking and locating of diamond drill holes in the Hilltop Exploration Program was taken care of by the Spies Mine Engineering personnel.

TILDEN MINE

(a) The staking of blast holes and calculation of powder requirements were done prior to the blasts of August 29th and September 7th.

(b) Iron pin survey stations were established and surveys were run in the vicinity of the Summit Pit.

J. MISCELLANEOUS

ORE ESTIMATES

The following table shows a comparison of the tonnages are reported

to the Michigan State Tax Commission:

| Mine | Tons As of 9/30/50 | As of 8/31/51 |
|---|---|---|
| Athens | 2,116,173 | 1,806,463 |
| Cambria-Jackson | 1,078,019 | 896,658 |
| Cliffs-Shaft | 2,105,343 | 2,100,419 |
| Lloyd | 229,212 | 136,951 |
| Maas | 4,611,552 | 3,753,152 |
| Mather | | |
| "A" Shaft | 10,090,277 | 6,454,213 |
| "B" Shaft | 8,373,773 | 10,197,317 |
| Spies | 550,143 | 310,352 |
| Total Developed Ore | 29,154,492 | 25,655,525 |
| Undeveloped Reserves | | |
| Bunker Hill | 488,352 | 488,352 |
| Sec. 3, 47-27 | 302,378 | 302,378 |
| Total Undeveloped Reserves | 790,730 | 790,730 |
| Grand Total All Ores | 29,945,222 | 26,446,255 |

STOCKPILES

Estimates of the ore in stock were made by the Engineering Department at the Cliffs-Shaft, Lloyd, Mather "B" and Spies Mines during October.

The following table shows the comparison of ore in stock on November 1, 1950 and November 1, 1951:

| Mine | Nov. 1, 1950 | Nov. 1, 1951 |
|---|---|---|
| Athens | 42,243 | 13,012 |
| Cambria-Jackson | 71,918 | 0 |
| Cliffs-Shaft | 89,528 | 77,903 |
| Lake | 58,678 | 0 |
| Lloyd | 119,031 | 144,167 |
| Maas | 125,804 | 21,681 |
| Mather "A" | 115,951 | 24,388 |
| Mather "B" | 298 | 75,274 |
| Spies | 44,248 | 17,046 |
| Totals | 667,699 | 373,471 |

SHAFT GAUGING

The runners in the various operating shafts were gauged on the dates shown on the following table:

| Mine | Date |
|---|---|
| Athens | February 25th |
| Cambria-Jackson | January 28th |

| Mine | Date |
|---|---|
| Cliffs-Shaft | January 30th |
| | November 2nd |
| Lloyd | February 11th |
| Maas | March 18th |
| Mather "A" | January 21st |
| | October 14th |
| Mather "B" | February 4th |
| | October 21st |
| Negaunee | February 11th |
| Spies | March 4th |
| | April 3rd |

CLIFFS 8TH ADDITION

(a) What was thought to be the final plat layout map was completed and approved by the Ishpeming City Council early in January but due to F.H.A. regulations and suggestions offered by them, this plat design had to be revised and redone according to specifications. The final F.H.A. approved plat design was presented to the City Countil in March at which time they adopted it as an addition to the city.

(b) Street, alley and lot grades were staked continually throughout the site grading program.

(c) Water, sanitary sewer, storm sewer, sidewalk and curb design work was done by the Project Engineer and his survey crew assigned to this job.

(d) Lots were grade staked and house positions were located on each of the 100 lots, upon which the houses were built by Klippen-Holm, general contractors.

(e) The Mining Engineers of this Department acted as representatives of the Cliffs Realty Company during a sales campaign carried out at each of the three Ishpeming and Negaunee Banks the first week of June.

Listed below are the contract groups, work that they covered, contractor and starting date of each project:

| Group | Project | Contractor | Starting Date |
|---|---|---|---|
| 1 | Site Grading | A. Lindberg | 5/15/51 |
| 2 | Sanitary Sewers | A. Lindberg | 7/1/51 |
| 3 | Gravel Surfacing, Concrete Curb & Sidewalk | A. Lindberg | 11/15/51 |
| | 100 Houses | Klippen-Holm | 6/1/51 |
| | Water* | A. Lindberg | 7/15/51 |

* City of Ishpeming's Contract.

SCHOOL OF SURVEYING INSTRUCTION

The school of surveying instruction was completed in March after having a total of ten Saturday morning sessions of instruction in surveying, calculating, use and care of instruments, mapping and fundamental drafting.

The interest and calibre of work has been greatly increased since this school of instruction.

HARD ORE ELECTRIC SHOP

Lines and elevations were given for the construction of the new addition to the North side of the electrical repair shop located at the Central Shops. Cross-sections were taken and volumes calculated for the proposed grading in the vicinity of this building and the shop personnel parking area.

PELLETIZING PLANT AND CORE STORAGE BUILDING

The Cliffs-Shaft survey crew spent several days in giving lines and grades for the erection of the addition to the pelletizing plant and the construction of the new diamond drill core storage building in the vicinity of the General Storehouse.

NEGAUNEE SEWAGE DISPOSAL PLANT

Profiles were run on the abandoned Marquette and Western right of way in connection with the proposed sewage disposal plant and the Athens and Negaunee Mine water discharge. The proposed sewage disposal plant and the mine water ditch will be located in the NE$\frac{1}{4}$ of Section 5, 47-26.

U.S.G.S. SURVEY

In cooperation with the U.S.G.S. mapping program of this area, the Engineering Department marked numerous section corners and supplied coordinates and bearing data for these section corners and quarter-section corners. This work was done in anticipation of the U.S.G.S. aerial photography which started in mid-October. Locations and coordinates of numerous C.C.I. Co. triangulation stations were supplied so they could occupy these stations and indicate their positions on the Government published maps.

LAKE ANGELINE BASIN AND BARNUM PIT

Since the removal of a pump from "D" Shaft of the Lake Superior Hematite Mine in the Lake Angeline Basin, the water elevation has gradually risen. At mid-year, a flow from this Basin created some damage in the vicinity of the Chicago & North Western Roundhouse. An effort to control the water elevation in this Basin and to remedy the presence of the above mentioned flow at the Chicago & North Western Roundhouse, it was decided to excavate a ditch from the North end of the Barnum Pit, Westerly to the Carp River. Surveys were run and profiles made of the proposed overflow ditch. After many negotiations with both the Chicago & North Western and Duluth, South Shore and Atlantic Railroads, an excavation was started and the ditch completed by the early part of 1952.

EXTENSION OF EUCLID STREET

The proposed extension of Euclid Street to the West was staked and graded. This project calls for filling in the South end of Lake Bancroft for the proposed roadway and enlargement of the Cliffs-Shaft parking lot.

NORTH LAKE SUPT.'S HOME

Surveys were run surrounding the Superintendent's house in the

North Lake District so that a metes and bounds description could be written of the area. This was done in connection with the sale of this property.

TRIANGULATION SYSTEM

The work of changing the coordinates and course values of the Athens-Bunker Hill, Tracy and Lucky Star into our triangulation system was started.

SUMMER FIELD CREWS

Michigamme River District

The two 2-man summer field crews that were based in the Michigamme River District brushed and established an iron pin base line from the Cannon Mine Southeasterly to Republic. From this NW-SE base line, lines were brushed at right angles on approximately 1000' centers in order to carry on geologic mapping, geophysical prospecting and sample picking.

The manner in which these men worked, that is, staying at a camp in the vicinity of the area which was being mapped and geologized, has worked out exceedingly well. The problem of transporting men to and from the job has been eliminated. It was found that these two field parties accomplished a lot more work with a greater degree of interest shown on their parts, as to their final results, because they were living together and working toward one aim.

Cascade District

Two summer field crews worked in this area establishing section lines and quarter lines in Sections 19, 20, 29 and 32, 47-26, in connection with geological mapping, geophysical prospecting and sampling of iron-formation for metallurgical testing. These crews used the Isabella Mine building as an office or base of operations.

North Michigamme Area

One field party ran the section lines of this area in preparation for geological prospecting and field mapping.

HOLIDAYS

The following holidays were granted during the year:

| | |
|---|---|
| January 1st | - New Year's Day |
| May 30th | - Memorial Day |
| July 4th | - Independence Day |
| September 3rd | - Labor Day |
| November 22nd | - Thanksgiving Day |
| December 24, 25, 26($\frac{1}{2}$) | - Christmas |
| December 31st | - New Year's Eve |

Respectfully submitted,

Grant T. Hollett
District Engineer

GTH:JJ
8-20-52

# MECHANICAL DEPARTMENT
# ANNUAL REPORT
# YEAR 1951

## ATHENS MINE:

During the spring months of the year the subsidence of the area around the miners' Dry building became more pronounced and by May it was evident that the building was becoming unsafe for use. Plans and specifications for a temporary 48' x 132' Dry Building were rushed and by June 18th MacDonald and Kaake, contractors, started foundations. By the end of August the building was enclosed. All plumbing and heating facilities were installed by company crews and the new Dry was occupied in September.

Major mechanical repairs consisted of replacement of Cage Hoist brake toggle in March and regrouting of hold down foundation bolts in April. The skip hoist spider on north side became loose on main shaft and was repaired.

Frequent checks of all surface machinery installations were made and adjustments made as required due to surface subsidence.

## CAMBRIA-JACKSON MINE:

All mechanical equipment operated without major breakdown for the entire year. Underground maintenance men spent the bulk of their time on the winze belt conveying system. The Bathke Feeder which feeds the belt was designed for too fast a speed. This was corrected by changing the driving motor to D.C. and substituting slower gearing in the Falk Reducer. Operating speed of feeder at end of conversion was 11 F.P.M. A controlled torque coupling was installed on the feeder drive for protection against jamming as a result of head shaft and bearing failure previously.

Pump repair was of minor nature. An 8" Naylor spiralweld pipe column was installed in shaft from 4th level to surface to replace old pipe that was eroded to discard.

It is interesting to note that the 4th level pump sump was cleaned of 3000 tons of iron ore mud in February. This was the first time the sump had been cleaned since we took over the operation of this property from Republic Steel Corporation.

## CLIFFS SHAFT MINE:

The surface equipment at this property is all quite obsolete and therefore must be frequently repaired to prevent production stoppages.

In the crusher building the revolving trommel drive was converted from flat belt to direct flexible coupling drive through Falk Speed Reducer, in January, to eliminate flat belt slippage due to frost accumulation. The McCully No. 8 crusher was an item of almost constant maintenance. First, the countershaft bearing cap casting broke and was replaced with new spare. The mantle nut threads on the standard shaft stripped and had to be built up and re-cut. A number of eccentrics were rebabbited.

A new double drum top tram hoist was designed in collaboration with Lake Shore Engineering Company and at the end of the year same was on foundation but not in service.

CLIFFS SHAFT MINE: (continued)

During June, July and August the old Morrow Shaft Collar was opened and reconditioned for use as ventilation outlet. Steel sets to ledge were fabricated in General Shops.

Master Mechanic William Lawer became incapacitated in April and by August his replacement, Fred Keskey, was permanently assigned to this position as it was evident that Bill Lawer would never be active again on the job.

A new Northwest Model 25 Crawler Crane was received in September to replace the old Bucyrus-Erie 10B which was transferred to General Storehouse Division.

In October, arrangements were made with Western-Knapp to design new surface flow sheet which would give better washing, picking, crushing and sizing control. Several flow sheet arrangements were made but it was decided not to spend money to carry through this proposed project but to incorporate same into master plan which includes a new hoisting shaft.

LLOYD MINE:

A new Wheatley 8 x 10 piston pump rated 484 GPM was installed on 8th level to pump to the 6th level. On 6th, the old Aldrich Triplex pump condition was getting so shaky that an Ingersoll-Rand 700 GPM - 1200' TDH Centrifugal pump was rented from Mather Mine "A" Shaft to act as standby until a Gould Centrifugal could be reconditioned.

The only serious pump trouble developed on August 31st when the Morris Mine Substation burned. There was a power outage for 10 hours. Dams were installed on 5th, 6th, and 7th levels. Power was restored just two hours ahead of maximum storage behind the dams.

The only new surface installation consisted of a 50 HP single drum electric hoist for handling heavy replacements to top tram. This hoist was one used at Mather "B" for lowering counterweight pipe.

The wrought steel intermediate shaft of winze hoist broke in June and was replaced with new high tensile shaft.

MAAS MINE:

Repairs to underground reciprocating pumps was the item of greatest mechanical expense. Even the newest Worthington Piston Pump gave trouble by breaking piston rod, stuffing box partition plate and cylinder liner.

In December a new Wheatley Piston Pump was installed on 7th level to handle the water to the 5th.

For safety reasons, a coupling brake was designed and installed on winze hoist.

On surface the main pump discharge pipe lines were relocated to avoid relocation of C. & N.W. railroad tracks.

A top tram car was demolished by allowing same to run off end of stocking trestle at full speed. This was caused by drunken operator who was discharged.

MATHER MINE "A" SHAFT:

The largest mechanical installation at this property this year was the 7th level belt conveying system. By March the conveyor drift was sufficiently completed that

MATHER MINE "A" SHAFT: (continued)

installation of idler supports could begin. At the end of the year the 2500' center to center belt installation was complete and had been test run. At the load end the pan feeder and 36" x 42" Jaw Crusher had been installed. It is expected that this installation will be in service in January, 1952.

In the headframe, new 230 cu. ft. bottom dump "Jeto" skips were installed in both skip roads May 30th. The original Jeto was removed to be remodeled to latest style.

In May, a used 60" x 40" single drum Ottumwa electric hoist was installed at a location 125 ft. below 7th level preparatory to sinking the main shaft. Fabrication of accessory equipment such as sinking skip, etc. was done in General Shops and sinking began in earnest during July. At year's end the shaft work was complete.

During October and early November the inside of the headframe, from top to trestle deck, was cleaned and spray painted. Also, 85% of exterior of north stock pile trestle was painted. This work will continue next year.

Pumping troubles were of minor nature. On the 7th level a temporary pump station was made up with shaft motor pumps to relay water to the 6th.

The Allis-Chalmers Jaw Crusher in headframe gave trouble until the main bearings were equipped with tin base babbitt lined water cooled shells, the pitman cap rebabbitted, speed reduced 30% and an automatic lubrication system installed.

Eccentric bearing troubles were experienced on two occasions with Simplicity Shakeout Screen. The manufacturer worked the problem out with us and the trouble is now cleared up.

MATHER MINE "B" SHAFT:

The largest mechanical installation at this property this year was the surface belt conveyor stockpiling facilities. The structural portion of main north gallery was completed by Bethlehem Steel Company in January. The sheathing contractor moved in in late February and by the time his work was completed in early May our own crews had installed all the treated decking, the conveying equipment, etc. The first trial runs were made in late May and ore was officially run over the entire flow sheet and stocked from the elevated gallery June 19, 1951.

In October, Worden-Allen Company began erection of the 450' east lateral belt conveyor gallery. By the end of the year the sheathing contractor, American Steel Band Company, had 75% of the insulated enclosure in place.

The design of the final 1200' long west lateral belt conveyor gallery is proceeding and when this is installed in 1953 it will complete all necessary ore stockpiling facilities at this mine.

The most serious mechanical failure was the partial collapse of the clutched drum shell on the Nordberg Skip Hoist due to same being defective. Temporary repair was made and Nordberg agreed to make no-charge replacement. This occurred in March and at year's end we were still operating satisfactorily, however, the repaired drum shell does bobble due to excentricity.

The shop-made bottom dump skip design did not prove out due to bridging at the discharge opening and so was replaced with shop-made Kimberley style skip in March.

The Truscon steel building used to house sinking hoist was sold to Geological Department and moved off property. The old Nordberg compressor was scrapped except for motor which is stored at Negaunee Shaft.

MATHER MINE "B" SHAFT: (continued)

A 100,000 CFM Axivane Fan was installed on 6th level near "A" Shaft boundary. When placed in service in June, "13" Shaft became "down cast" and "A" Shaft "up cast."

Underground water has given no particular trouble. Excavation of main pump station on 10th level was begun in December. It is proposed to design for four pumps and only install one high lift plunger pump until development of the mine dictates when others will be required.

A new D-8 tractor was received in December and will not go into service until equipped with automatic lubrication system.

NEGAUNEE SHAFT:

Operations preliminary to shaft sinking were well under way at the beginning of the year. New steel sets were installed in the circular portion of the shaft, the erection of the "Kennedy" double drum skip hoist was going forward, the new engine house wing was being erected by MacDonald & Kaake, contractors.

Active shaft sinking began April 3rd after the old headframe was torn down and semi-permanent sinking headframe was erected. The "Kennedy" hoist was operated as A-C unit until the end of May when it was converted to D-C drive for operational reasons.

The new engine house wing was completed in July and during the ensuing months the old skip and cage hoists were removed and foundations poured for the 12' x 12' "Republic Hoist" which will serve as the permanent cage hoist.

At the end of the year all mechanical equipment in use for shaft sinking was working satisfactorily. Sinking in balance with cage and skip did not prove too satisfactory from safety and operational view point. Most of the sinking was done unbalanced with sinking cage.

Considerable trouble was experienced with the Falk herringbone gear set on the "Kennedy Hoist." Abnormal scuffing of teeth at pitch line is still being experienced and this condition is being watched carefully.

OHIO MINE:

Plans and specifications were prepared for shop-warehouse-office building during early spring. The successful contractor, Kielinen & Son, moved to job site in late May and by end of July his work was 95% complete. Our own plumbing crews handled the entire plumbing and heating installation.

In June, Straits Engineering Company moved in to handle general grading and installation of mill foundation. The mobil mill arrived in in August about the same time as the 54-B Electric Shovel and the four 22 ton Euclid Trucks.

At the end of October all equipment had been erected and test run. 2800 tons of material was crushed and placed in surge pile. Due to lateness of season it was decided not to operate the mill until next year. Our steel crew stayed on to enclose the mill in corrugated iron. Stripping will continue through the winter.

SPIES MINE:

Pumping acid water out of this mine was the major mechanical problem again this year. New all stainless steel centrifugal pumps were received and installed on the 4th and 6th levels. A new 6" rubber lined discharge column with stainless steel accessories was installed from 4th to 6th levels.

SPIES MINE: (continued)

By November all water was being handled with centrifugal pumps; a portion on automatic operation. We are gaining a lot of experience in handling this hot (110°F) acid mine water, but our problems would be much simpler if the Byron-Jackson Pump Company did not commit an error of some kind on every pump we have bought from them.

GENERAL SHOPS:

During the year a total of 4001 work orders were received and 3869 were processed. 68 all steel timber trucks were fabricated for the Mather Mine. Total pieces of underground steel supports produced were 35,457.

In February a 5 ton capacity Hyster mobile crane was placed in service in the General Shops area. New ½ ton International Pickup trucks were assigned to Tom Guy, Chief Master Mechanic and John Fandrem, Carpenter Shop Foreman.

In August a new #3 Kearney & Trecker Universal Milling machine was received and placed in service in Machine Shop.

The addition to Electric and Hoist Repair Shops were completed and in service in May. This addition houses a new boiler plant that handles the heating load of all shops.

ARCHITECTURAL AND CONSTRUCTION DEPARTMENT:

During the year the following new projects were completed. Plans and specifications prepared by this department.

1. Addition to and remodeling of Cliffs Shaft Miners' Dry.
2. Addition to General Shops Electric and Hoist Repair Shops.
3. Addition to and remodeling of Negaunee Shaft Miners' Dry.
4. Relocation and remodeling of 60' x 80' Truscon Steel Building for Core Storage Depot for Geological Department.
5. Addition to No. 2 Warehouse in General Storehouse Area.

At the end of the year plans had been completed for remodeling of the Employment Office and construction work was 80% complete.

MECHANICAL DEPARTMENT
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COMPARATIVE TABLES

| CLIFFS SHAFT MINE: YEAR | TONS ORE AND ROCK HOISTED | CU. FT. AIR USED | CUBIC FT. AIR PER TON HOISTED | GALLONS OF WATER PUMPED | G.P.M. |
|---|---|---|---|---|---|
| 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 |
| 1946 | 415 426 | 968 670 000 | 2 331 | 397 294 033 | 751 |
| 1947 | 562 650 | 1 527 345 000 | 2 715 | 424 721 789 | 809 |
| 1948 | 603 745 | 1 607 625 000 | 2 663 | 382 905 017 | 726 |
| 1949 | 504 513 | 1 124 105 000 | 2 228 | 433 229 875 | 821 |
| 1950 | 679 751 | 1 619 055 000 | 2 381 | 407 263 395 | 776 |
| 1951 | 725 319 | 1 713 735 000 | 2 362 | 425 640 074 | 808 |
| ATHENS MINE: | | | | | |
| 1942 | 699 590 | 1 351 440 000 | 1 931 | 204 533 558 | 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 | 873 710 000 | 2 035 | 174 073 654 | 331 |
| 1946 | 376 417 | 745 605 000 | 1 990 | 168 139 933 | 317 |
| 1947 | 533 366 | 1 191 510 000 | 2 234 | 178 537 561 | 340 |
| 1948 | 527 876 | 1 183 970 000 | 2 243 | 169 128 786 | 320 |
| 1949 | 550 977 | 992 700 000 | 1 801 | 176 437 598 | 334 |
| 1950 | 611 162 | 1 161 045 000 | 1 899 | 199 518 654 | 380 |
| 1951 | 635 039 | 1 303 065 000 | 2 051 | 233 856 740 | 444 |
| MAAS MINE: | | | | | |
| 1942 | 894 963 | 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 |
| 1946 | 487 523 | 965 880 000 | 1 981 | 607 511 502 | 1 148 |
| 1947 | 721 051 | 1 506 960 000 | 2 090 | 571 767 866 | 1 090 |
| 1948 | 683 074 | 1 389 825 000 | 2 035 | 569 972 839 | 1 081 |
| 1949 | 621 946 | 1 233 540 000 | 1 983 | 550 080 422 | 1 043 |
| 1950 | 659 467 | 1 374 300 000 | 2 083 | 602 179 256 | 1 148 |
| 1951 | 722 803 | 1 442 025 000 | 1 995 | 587 940 301 | 1 118 |
| NEGAUNEE MINE: | | | | | |
| 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 |
| 1946 | 418 232 | 542 025 000 | 1 295 | 360 778 626 | 682 |
| 1947 | 531 492 | 717 300 000 | 1 350 | 390 741 304 | 744 |
| 1948 | 386 215 | 743 625 000 | 1 925 | 402 657 133 | 757 |
| 1949 | 79 699 | 233 415 000 | 2 928 | 464 467 219 | 880 |
| 1950 | 0 | 82 755 000 | - | 635 580 650 | 1 212 |
| 1951 | 0 | 426 150 000 | - | 581 233 593 | 1 103 |

MECHANICAL DEPARTMENT
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COMPARATIVE TABLES

| CAMBRIA-JACKSON MINE: YEAR | TONS ORE AND ROCK HOISTED | CU. FT. AIR USED | CUBIC FT. AIR PER TON HOISTED | GALLONS OF WATER PUMPED | G.P.M. |
|---|---|---|---|---|---|
| *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 |
| 1946 | 303 881 | 374 013 000 | 1 230 | 159 192 131 | 300 |
| 1947 | 548 027 | 628 515 000 | 1 147 | 190 950 934 | 363 |
| 1948 | 496 083 | 548 896 500 | 1 106 | 171 964 375 | 325 |
| 1949 | 438 064 | 508 050 000 | 1 159 | 173 342 402 | 328 |
| 1950 | 452 035 | 545 206 500 | 1 206 | 197 474 896 | 376 |
| 1951 | 384 499 | 539 419 500 | 1 402 | 242 744 183 | 461 |

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

LLOYD MINE:

| | | | | | |
|---|---|---|---|---|---|
| 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 |
| 1945 | 334 117 | 419 088 500 | 1 254 | 59 943 400 | 114 |
| 1946 | 243 836 | 264 838 500 | 1 086 | 51 014 600 | 84 |
| 1947 | 262 395 | 254 470 500 | 970 | 69 182 000 | 131 |
| 1948 | 128 672 | 285 111 000 | 2 216 | 48 334 500 | 91 |
| 1949 | 209 161 | 231 241 500 | 1 105 | 50 828 500 | 96 |
| 1950 | 234 748 | 354 888 000 | 1 511 | 100 272 000 | 191 |
| 1951 | 260 477 | 395 635 000 | - | 166 347 500 | 316 |

MATHER MINE "A" SHAFT:

| | | | | | |
|---|---|---|---|---|---|
| 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 |
| 1946 | 417 677 | 542 250 000 | 1 298 | 97 460 579 | 184 |
| 1947 | 817 145 | 1 144 800 000 | 1 401 | 133 005 294 | 253 |
| 1948 | 1 100 225 | 1 901 700 000 | 1 728 | 103 059 168 | 195 |
| 1949 | 1 154 538 | 1 207 350 000 | 1 045 | 91 876 158 | 174 |
| 1950 | 1 405 738 | 1 612 800 000 | 1 147 | 215 904 871 | 411 |
| 1951 | 1 312 451 | 1 753 200 000 | 1 335 | 266 832 027 | 507 |

MATHER MINE "B" SHAFT:

| | | |
|---|---|---|
| 1950 | 99 832 | (First hoisting in August) |
| 1951 | 632 596 | |

TILDEN MINE:

| | |
|---|---|
| 1942 | 235 207 |
| 1943 | 139 991 |
| 1944 | 214 824 |
| 1945 | 197 476 |
| 1946 | 101 968 |
| 1947 | 168 669 |
| 1948 | 140 692 |
| 1949 | 88 503 |
| 1950 | 107 465 |
| 1951 | 103 022 |

THE CLIFFS POWER & LIGHT CO.
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The total energy delivered to the transmission system during the year 1951 was 152,073,200 Kwh which was 12.8% more than was delivered to the system during the year 1950. The sales of energy amounted to 136,806,680 Kwh, an increase of 12.5% over the previous year. These production and sales totals were reached in spite of two short strikes during the year covering a period of approximately 15 days, which, however, did not have a very serious effect on the total annual output. Of the total of 152,073,200 Kwh delivered to the transmission system, 114,923,200 Kwh were generated by the hydro plants, 1,883,000 Kwh by the Diesel Plant, 35,259,000 Kwh by the Steam Plant, and 8,000 Kwh were purchased.

The year 1951 was the highest hydro production year which the company has ever experienced and was made possible by extremely unusual rainfall. The precipitation in Ishpeming was 43.50" and was scattered well throughout the year. In spite of the high hydro production, water storage at the end of December amounted to 40,258,000 Kwh, which is 86.2% of the total amount capable of being stored. This compares with 17,766,000 Kwh in storage at the end of December, 1950, which represented 38.6% of the storage capacity filled. It is obvious that we are entering into the year 1952 with an ample supply of water to permit operating the hydro facilities at capacity straight through the breakup period.

In July, it was evident that production was increasing at a pace which would necessitate installation of additional generating facilities in the immediate future. Accordingly, a load forecast was drawn up which gave the anticipated loads which would be experienced by the system for the 11-year period from 1951 to 1961 inclusive. This estimate predicted a total generated and purchased for the year 1951 of 148,315,000 Kwh and for the year 1952, 152,475,000 Kwh. On the basis of this estimate, the economic situation in regard to the installation of a second generating unit was studied both by our company and by the Stone & Webster Engineering Corporation. The conclusions of this study were that on the basis of a 2-1/2 year construction program for the installation of a second unit, we would be justified in waiting until the summer or fall of 1952 before starting actual work on the unit. Load forecasts on the system capabilities showed that our present generating facilities, if supplemented by an emergency stand-by contract with the Wisconsin Michigan Power Company, would be adequate to handle anticipated demands for power and energy until the beginning of 1955. It will be noticed, however, that the total energy generated during 1951 was approximately that which these load studies had indicated would be experienced in 1952. Accordingly, if the load growth continues at the rate which has been experienced in the last year, we have reached a position one year ahead of our anticipated load growth and it is evident that it will be necessary to begin early in 1952 with serious consideration being given to a second turbine installation in the Ishpeming Steam Electric Station.

In connection with this load study, it was deemed advisable to execute a contract with the Wisconsin Michigan Power Company for the stand-by service mentioned previously, and such a contract was submitted to us in the latter part of the year. The contract, as submitted, provided that we would be entitled to 4,000 KW of emergency power from their lines at such a time as an emergency arose on our system requiring that quantity of energy. For the privilege of having this stand-by service available, we were to pay them $18,000 a year plus 1.25¢ per Kwh for all energy used. It is not anticipated that any energy will be

purchased under this contract except in the case of extreme emergency. However, the additional 4,000 KW of stand-by power is necessary for us to provide a guarantee that our system use will not be curtailed in case of accident or failure of any of our large generating units. This contract was properly executed and forwarded to the Wisconsin Michigan Power Company to become effective on January 2, 1952.

At the beginning of the winter season in 1950, work had been started by Intrusion-Prepakt, Inc. for resurfacing the downstream face of the spillway at the McClure Dam. During the winter months this company proceeded with the chipping of the downstream face of the dam, completing that work during the last week of February. The plans for this work called for the chipping of the dam during the winter months and then ceasing all work until weather conditions in the spring would enable them to place the necessary concrete. This operation was resumed early in June. Because of difficulty in obtaining workmen, together with the flood waters which overflowed the dam several times during the month, progress was slow. Extremely high water continued to plague the operation but work was continued building forms, drilling the dam for anchor bolts, and doing similar preliminary work so that the first pour could be made early in September. Placing of the concrete then continued steadily until October. All of the concrete was placed and the construction facilities were dismantled and removed from the location prior to November 1.

During January, negotiations were completed with the Riley Stoker Corporation for them to have a man with us during a shutdown and inspection of our boiler at the Steam Plant which took place during the first ten days of February. As a result of the inspection, several changes were made in the combustion chamber of the boiler and a new type of cinder injection apparatus was installed, and the entire boiler was overhauled and inspected. At the same time, many small repairs and adjustments were made throughout the plant. All of the changes which were made at this time were made on the recommendation of the Riley Stoker Corporation and all of them proved to be very wise alterations of the previous installation. This plant continued to operate throughout the year after this shutdown with good economy and with comparatively few small difficulties and no serious breakdowns or delays.

At the time that the boiler shutdown was taking place, the General Electric Company sent an engineer to Ishpeming to check the vibration of the turbine, the action of the throttle valves, and leakage of oil. It was not possible during the short period of this shutdown to lift the cover of the turbine and make a complete inspection, nor was it possible to install a remodeled throttle valve during this shutdown. Accordingly, a later shutdown was arranged for the middle of March, at which time the throttle valve was altered and the turbine was rebalanced in such a manner as to eliminate vibration of the turbine valves.

After approximately a year of operation of the Steam Plant, trouble was experienced with a deposit of scale in the condenser which reduced the vacuum obtainable. Several attempts were made to dissolve this scale by adding acid to the cooling water, but none of these methods were successful. On Saturday, March 4, Dowell, Inc., who had been retained to clean this scale, had their man in Ishpeming and while the turbine was shut down, cleaned the condenser system thoroughly. The water was then treated in accordance with the recommendations of Hall Laboratories, Inc. for the prevention of both scale and algae formation with the result that no further difficulty was experienced with the condenser operation for the remainder of the year.

Some years ago a very active program for clearing brush from the right of way of the transmission lines was inaugurated. The practice of the company in the past had been to trim this right of way at regular intervals in an attempt to keep the brush and hazardous trees cut back to the point that they would not cause serious interruptions by coming in contact with the transmission lines. This trimming was done by the company's own forces. It was decided that the brush which was left on the right of way grew so rapidly that a much less expensive procedure would be to use bulldozers wherever possible and clear the right of way of all brush, stumps and roots rather than merely cutting the brush off at the ground level. This plan was very successful but there were certain portions of the right of way on which it was impractical to use the bulldozers, and at the beginning of the year 1951, we had retained a local contractor on a contract basis to cut brush in those places which could not be cleared by bulldozers. This work continued for the first few months of the year, at which time all of the lines had been very well taken care of. In the fall of 1950, just before the winter season set in, a sample stretch of right of way, on which the brush had been permitted to grow for a period of five years since the original bulldozing, was sprayed with a commercial brush killer, and in the summer of 1951, this trial spraying was inspected. It was so successful that it was decided to purchase a truck capable of traveling on the right of way, together with high pressure spraying equipment, and use this truck as long as possible before the fall season in the spraying of all right of way which had been previously bulldozed. This truck was placed in operation on July 23, and operated until fall, during which period it had been able to spray all of the lines to the McClure, Carp and Hoist power plants. We think this method of treating right of way will result in very material savings in the future.

During the period of the spring run-off, there was a renewal of the slippage on the earth levee at the Carp Dam. Immediately after the construction of this dam, a similar tendency of the earth levee to slip on the downstream side due to being saturated was experienced, and Mr. McClure at that time made emergency repairs which were effective in stopping the slippage and which have satisfactorily prevented difficulties until the present. Part of the success of his repairs had depended on a vitreous tile installed in the levee on wooden cribbing which had been used to brace the levee. Due to the tile having become broken or stopped up since it was installed, and due to a certain amount of rotting of the cribbing, the levee had become saturated and was slipping to the point that it was considered hazardous. Accordingly, we made arrangements with A. Lindberg & Sons to remove the saturated earth and to place the necessary rock fill and riprap, together with suitable drainage, to prevent further slippage in the future. Due to the continued rainfall throughout the summer, it was impractical to do any of this work until fall, but the repair of the levee was undertaken and completed during the month of October and the results were very gratifying. It is felt that the slippage of earth which had been occurring previously has been completely stopped and that no re-occurrence of this difficulty will be encountered for a number of years.

On May 29, the thrust bearing on the #2 unit at the Hoist Plant failed. This machine had been overhauled in the summer of 1950, and the thrust bearing had been replaced at that time. Seemingly, there was something wrong either with the manner in which the machine was re-assembled or with the material which was used in preparing the new bearing surface. A man was obtained from the Allis-Chalmers Manufacturing Company to install the new bearing which had been sent to that company for rebabbitting. After dismantling the machine, it was decided that this failure, and all of those which had been experienced previously, was due to the porosity of the cast iron runner which bore the weight of the

machine on the babbitt surface. Accordingly, they manufactured a new runner using steel and they feel that this will remedy the troubles which we have been experiencing. Obtaining the repair of the bearing and new runner, together with the installation of them, kept the unit out of service from May 29 until June 27.

The anticipated opening of the new Ohio Mine west of Michigamme in Spurr Township necessitated the construction of a transmission line from the end of our present 30 KV system at the Champion Mine in Champion to the site of the new mine. Active work was started on the cutting of brush and clearing of right of way for this line during May. The contract for the construction of the line was given to the A.E.G. Electric Company who carried on the construction activities until the latter part of August, at which time the line was completed and placed in operation.

In May also, a short line was started from a point near the Carp Intake Dam on the Carp transmission line to the Lindberg Gravel Pit. The contract for the construction of this line was also given to the A.E.G. Electric Company, but construction forces to work on it were not available until the completion of the Ohio Mine line. Work on this line was completed and service rendered to the customer October 19.

Another short line was placed in operation during May to serve the Tracy Mine of the Jones and Laughlin Ore Company. This line had been started several weeks previously and was built by our own crews. The line and temporary substation were placed in operation during May, although the customer did not take power from it immediately but anticipated that they would in the immediate future. The substation installed was a temporary one and will be replaced at a later time with a permanent substation and larger transformers for the operation of the mine when it is completed.

During the early part of the year, plans for the installation of a short wave radio sending and receiving system were approved and application was made to the Federal Communications Commission for a license and wave length under which it could be operated. A considerable amount of confusion was experienced in obtaining a suitable wave length; however, one was finally assigned and the necessary materials for the installation were received during the month of June and the equipment was installed. The original plan called for a sending antenna to be placed on the top of the smokestack at the Steam Electric Station. However, this location did not give satisfactory service and it was necessary to locate the aerial on the hill just north of Lake Angeline. The revision in the installation was made during July and satisfactory operation was being obtained by the first of August. This equipment provides for communication between the Steam Plant and the Ishpeming Office, the Hoist Plant, the McClure Plant, the Carp Plant and one mobile receiving and sending set in the Ishpeming line truck. Operation has been satisfactory and it is felt that this will remedy much of the difficulty which we have had in communicating with the power plants and the line truck during storm periods which cause failure of our transmission lines as well as the communicating lines of the Michigan Bell Telephone Company.

At about 1:00 A. M. on the morning of August 31, during a severe lightning and rain storm, one of the transformers at the Morris Mine was damaged by lightning and caught on fire. The fire completely consumed the indoor substation and the building and contents were a total loss. Service was restored to the mine through a temporary connection by 10:30 A. M., September 1. The installation which was made at that time was of a temporary nature and a more permanent

arrangement was made during the month of September, but the final arrangement of this substation had not been completed at the end of the year due to inability to obtain delivery of materials necessary to place the reconstructed substation in operation. It is anticipated that this substation will be rebuilt during the summer of 1952.

At the suggestion of Mr. V. P. Geffine, several conferences were held during the latter part of the year relative to the advisability of presenting a claim for higher rates under our contract to the Michigan Gas & Electric Company. The contract with that company had been executed effective January 1, 1949, and contained a clause which permitted the re-opening of the contract by either party for discussion of rates on January 1, 1952. As a result of these conferences, it was decided to confer with the Michigan Gas & Electric Company relative to this situation and such a conference was held in Chicago on November 30. At that time the Michigan Gas & Electric Company signified that it would be willing to pay us a rate which would compensate our company for our cost to serve it, including an adequate earning on the invested capital necessary to render the service, and recommended that we conduct a study of our system with the idea of obtaining the cost analysis necessary to demonstrate the actual cost in rendering our service to them. Subsequent to this conference our company retained the services of Mr. L. R. Lefferson, head of the rate department of Ebasco Services, Inc., 2 Rector Street, New York City, and under his direction began the study necessary to procure the cost analysis. It is anticipated that negotiations will be resumed with the Michigan Gas & Electric Company some time prior to the first of March, 1952.

At the time that the AuTrain Plant was converted to automatic operation, an attempt was made to repair the hydraulic units in such a manner that satisfactory automatic operation could be obtained. It was found, however, that certain parts of the turbine were so badly worn that such repairs were not practical and that fully automatic operation could not be obtained unless the units were completely rebuilt. Accordingly, the necessary parts for this rebuilding, including stainless steel runners, had been ordered and many delays had been experienced in the delivery of these materials. However, they were received in the summer of 1951 and on September 10, the first unit was shut down and dismantled prior to rebuilding. This unit was returned to service on October 29, and the #2 unit was shut down early in November to do upon it the same work which had been done on the #1 unit. The entire plant was back in operation by the first of December, and after small adjustments were made, operation on a fully automatic basis was practical.

Due to extending of the quarrying operations of the Inland Lime & Stone Company into the area which was occupied by our 66,000 volt line feeding them, it was necessary to re-route approximately 1.8 miles of this line. The construction contract on the re-routing of this line was given to the A.E.G. Electric Company who started work on it soon after the completion of the line to the Ohio Mine. The main portion of the line was re-routed and cut over onto the new line September 29. There still remained the changing over of the 6600 volt lines feeding Germfask and Blaney Park which was completed during the month of October. There still remained some work to be done changing the line between the Quarry and the Dock, but since this required a shutdown of both the Quarry and Dock, the Inland Lime & Stone Company was not willing to have the work done until after the end of the year. It is anticipated that this work will be done some time during January, and this entire contract closed at that time.

In the past, The Cliffs Power & Light Company has occupied jointly with The Cleveland-Cliffs Iron Company Mechanical Department the Brownstone Office in Ishpeming as its general office. For the space which it occupied, it paid no rental to The Cleveland-Cliffs Iron Company but shared in the operating expense of the office building. Conditions became so crowded during 1951 that both The Cliffs Power & Light Company and the Iron Company were seriously suffering from lack of office space. Since our company had no right of occupancy in the present building, it was decided that the company should construct a temporary office building which would serve as its quarters until such a time as a permanent office building could be constructed, the probable time of construction being at the time that an addition is being made to the Ishpeming Steam Electric Station. As plans were being drawn for this temporary structure, it was realized that the most economical arrangement for the Power Company could be obtained by continuing to jointly use portions of the present building, particularly storage space in the fireproof vault for its records. At the same time it was realized that the temporary office of the Power Company was being constructed in such a manner and location that its north exposure furnished the most suitable location for the Mechanical Drafting Department of The Cleveland-Cliffs Iron Company. Accordingly, an agreement was reached between these two companies that the Power Company would construct the temporary structure but would permit portions of it to be occupied by the Mechanical Department of The Cleveland-Cliffs Iron Company if the Mechanical Department would furnish to the Power Company approximately equal floor space in the present office building. Under this arrangement the contract for the temporary office building of The Cliffs Power & Light Company was let and construction started on September 17. Progress was slow for a while due to wet weather and labor conditions, but the temporary structure was entirely enclosed by the first of January, and it is anticipated that it will be ready for occupancy by February 15.

For several years it has been realized that our property accounting system had permitted certain practices which had resulted in a slight confusion in our property account records. In order to correct this, a survey was made of the various power plants and substations with the idea of obtaining a record of the equipment which was actually installed in them and permitting the property records to be corrected in such a way that the physical location of property as shown by the books of the company would conform with the actual physical location of the property. Such a survey was made, and during the latter part of the year, the necessary transfers were made on the company books so that as of January 1, 1952, the accounts and the physical property locations were in agreement. At the same time, a new method of handling these accounts was devised and will be put into operation in the early part of 1952 in order that the confusion which existed in the past will not be experienced again in the future.

Due to the increased activities of both The Cliffs Power & Light Company and The Cleveland-Cliffs Iron Company, it was necessary during the year to make a physical separation of the stores facilities of these two companies. The Cliffs Power & Light Company had an interest in the warehouse building which was constructed by The Cleveland-Cliffs Iron Company several years ago and had occupied space in that building. Need for more space by both companies prompted the Power Company to trade its interest in The Cleveland-Cliffs Iron Company warehouse for the interest which that company held in the Brownstone Substation building, a portion of which was suitable for the Power Company warehouse. This trade was effected and the warehouse materials of the Power Company were moved into the new building, thus releasing the space in The Cleveland-Cliffs Iron Company warehouse for use by the company. This arrangement has worked very satisfactorily and will result in economies for both companies.

In the fall of 1950, an E. & A. was approved to extend the outdoor substation at the Steam Plant to provide for additional circuit breakers and circuits into that station. Excavation of rock and rock removal for this extension was started in December of 1950, and was completed about the first of February, 1951. At the time of the approval of the E. & A., the steel substation structure and the necessary switches had been ordered. The steel for the station was received and erected during the summer of 1951, and work has been carried on to the end of re-routing the lines into the station and installing the oil circuit breakers. During the past summer, however, a failure of one of the transmission lines caused one of the old oil circuit breakers now installed in the Brownstone Substation to open. This opening was accompanied by a considerable amount of oil being thrown from the circuit breaker and a small fire resulted therefrom. This instance impressed on everyone that the interrupting capacity of the breakers in the Brownstone Substation was insufficient to be relied upon because of the additional generating capacity which has been installed on the transmission system, and that failure would result in fire in the Brownstone Substation. This would constitute a serious loss and would result in a prolonged interruption of service to this area. Accordingly, a second E. & A. was requested, supplementing the first, to provide for the purchase and installation of oil circuit breakers with adequate interrupting capacity for all circuits coming into Ishpeming. These new breakers are to be installed in the outdoor substation built under the former E. & A. Due to delayed deliveries of these oil circuit breakers, it will not be possible to install them for a considerable period of time. However, it is anticipated that all of the circuits will be re-routed into the substation during the winter of 1951 and 1952, and that the oil circuit breakers now inside of the Brownstone building will be moved to the outdoor location to serve temporarily until the new equipment can be obtained. This move will eliminate the danger of a hazardous fire, even if one of the breakers so moved should fail in attempting to perform its duty.

THE CLIFFS POWER & LIGHT CO.

STATISTICAL DATA - 1951

| | McCLURE | CARP | HOIST | AuTRAIN | REPUBLIC | ESCANABA | TOTAL HYDRO | DIESEL | STEAM | TOTAL GENERATED |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 3,804,000 | 1,423,000 | 1,311,000 | 232,800 | 106,900 | 233,000 | 7,110,700 | 127,400 | 4,368,000 | 11,606,100 |
| Feb. | 3 968 000 | 1 077 000 | 1 342 000 | 313 000 | 78 400 | 211 000 | 6 989 400 | 1 529 300 | 3 394 000 | 11 912 700 |
| Mar. | 3 830 000 | 1 464 000 | 1 274 000 | 403 800 | 161 600 | 357 000 | 7 490 400 | 133 200 | 3 859 000 | 11 482 600 |
| Apr. | 4 170 000 | 2 039 000 | 1 335 000 | 670 800 | 282 400 | 787 000 | 9 284 200 | 0 | 3 480 000 | 12 764 200 |
| May | 4 508 000 | 1 950 000 | 1 581 000 | 763 200 | 336 700 | 981 000 | 10 119 900 | 8 900 | 2 796 000 | 12 924 800 |
| June | 4 078 000 | 1 789 000 | 1 430 000 | 734 100 | 295 300 | 678 000 | 9 004 400 | 0 | 3 116 000 | 12 120 400 |
| July | 4 505 000 | 2 203 000 | 1 470 000 | 751 600 | 330 200 | 825 000 | 10 084 800 | 14 200 | 1 750 000 | 11 849 000 |
| Aug. | 5 133 000 | 1 956 000 | 1 787 000 | 636 800 | 172 900 | 528 000 | 10 213 700 | 0 | 2 714 000 | 12 927 700 |
| Sept. | 5 161 000 | 2 572 000 | 1 786 000 | 346 400 | 314 800 | 780 000 | 10 960 200 | 15 500 | 2 410 000 | 13 385 700 |
| Oct. | 5 295 000 | 2 810 000 | 1 841 000 | 316 200 | 332 000 | 843 000 | 11 437 200 | 12 300 | 2 317 000 | 13 766 500 |
| Nov. | 5 256 000 | 2 700 000 | 1 827 000 | 516 900 | 350 500 | 901 000 | 11 551 400 | 35 200 | 2 357 000 | 13 943 600 |
| Dec. | 5 049 000 | 2 335 000 | 1 734 000 | 684 400 | 288 500 | 586 000 | 10 676 900 | 7 000 | 2 698 000 | 13 381 900 |
| | 54,757,000 | 24,318,000 | 18,718,000 | 6,370,000 | 3,050,200 | 7,710,000 | 114,923,200 | 1,883,000 | 35,259,000 | 152,065,200 |

THE CLIFFS POWER & LIGHT CO.

STATISTICAL DATA - 1951

| | TOTAL GENERATED | PURCHASED | TOTAL GEN. AND PURCH. | STATION USE | DELIVERED TO LINES | KWH SOLD | TRANSMISSION LOSSES KWH | TRANSMISSION LOSSES % |
|---|---|---|---|---|---|---|---|---|
| Jan. | 11,606,100 | 0 | 11,606,100 | 341,815 | 11,264,285 | 10,431,298 | 832,987 | 7.39 |
| Feb. | 11 912 700 | 2 000 | 11 914 700 | 266 090 | 11 648 610 | 10 715 415 | 933 195 | 8.01 |
| Mar. | 11 482 600 | 0 | 11 482 600 | 346 950 | 11 135 650 | 10 393 062 | 742 588 | 6.66 |
| Apr. | 12 764 200 | 2 000 | 12 766 200 | 341 650 | 12 424 550 | 11 596 860 | 827 690 | 6.66 |
| May | 12 924 800 | 0 | 12 924 800 | 322 770 | 12 602 030 | 11 705 009 | 897 021 | 7.11 |
| June | 12 120 400 | 0 | 12 120 400 | 340 660 | 11 779 740 | 11 003 543 | 776 197 | 6.58 |
| July | 11 849 000 | 4 000 | 11 853 000 | 238 760 | 11 614 240 | 10 576 473 | 1 037 767 | 8.93 |
| Aug. | 12 927 700 | 0 | 12 927 700 | 311 800 | 12 615 900 | 11 739 166 | 876 734 | 6.94 |
| Sept. | 13 385 700 | 0 | 13 385 700 | 315 040 | 13 070 660 | 11 945 456 | 1 125 204 | 8.60 |
| Oct. | 13 766 500 | 0 | 13 766 500 | 311 000 | 13 455 500 | 12 441 848 | 1 013 652 | 7.53 |
| Nov. | 13 943 600 | 0 | 13 943 600 | 316 250 | 13 627 350 | 12 376 433 | 1 250 917 | 9.17 |
| Dec. | 13 381 900 | 0 | 13 381 900 | 318 890 | 13 063 010 | 11 882 117 | 1 180 893 | 9.03 |
| | 152,065,200 | 8,000 | 152,073,200 | 3,771,675 | 148,301,525 | 136,806,680 | 11,494,845 | 7.75 |

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SUBSTATION TRANSFORMERS:

Substation transformers installed as of December 31, 1951.

| | Phase | No. | KVA | Total KVA | |
|---|---|---|---|---|---|
| **66,000/2300 Volts** | | | | | |
| Munising Substation | 1 | 6 | 500 | 3,000 | |
| Seney " | 1 | 1 | 25 | 25 | |
| Inland #1 " | 1 | 3 | 500 | 1 500 | |
| Inland #2 " | 1 | 3 | 667 | 2 000 | 6,525 KVA |
| **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 |
| **33,000/6600 Volts** | | | | | |
| Princeton Substation | 1 | 1 | 37-1/2 | 37-1/2 | 37-1/2 |
| **33,000/2300 Volts** | | | | | |
| Cliffs Shaft Substation | 1 | 3 | 590 | 1,770 | |
| Gwinn (old) " | 1 | 3 | 75 | 225 | |
| Morris-Lloyd " | 3 | 1 | 2 500 | 2 500 | |
| Cambria-Jackson " | 1 | 3 | 500 | 1 500 | |
| Mather Mine "B" Shaft Substation | 3 | 1 | 5 000 | 5 000 | |
| Mather Mine "A" Shaft " | 3 | 1 | 5 000 | 5 000 | |
| Maas Substation | 1 | 3 | 1 250 | 3 750 | |
| Brownstone Substation | 1 | 3 | 625 | 1 875 | |
| Volunteer " | 1 | 1 | 625 | 625 | |
| " " | 1 | 1 | 500 | 500 | |
| Greenwood " | 1 | 2 | 500 | 1 000 | |
| Princeton " | 1 | 1 | 25 | 25 | |
| Tilden " | 1 | 3 | 150 | 450 | |
| Palmer Rural (3 Substations) | 1 | 4 | 15 | 60 | |
| Negaunee-Athens Substation | 1 | 3 | 1 000 | 3 000 | |
| Champion Mine " | 3 | 1 | 1 250 | 1 250 | |
| Tracy Mine " | 1 | 2 | 625 | 1 250 | |
| Ohio Mine " | 1 | 3 | 150 | 450 | |
| Lindberg Gravel Pit " | 1 | 3 | 200 | 600 | 30,830 |
| **2300/33,000 Volts** | | | | | |
| Republic Substation | 1 | 3 | 250 | 750 | |
| Hoist Plant " | 1 | 3 | 667 | 2 000 | |
| " " " | 3 | 1 | 2 500 | 2 500 | |
| Escanaba Plant Substation | 1 | 6 | 400 | 2 400 | |
| McClure Plant " | 3 | 2 | 5 000 | 10 000 | |
| Carp Plant " | 1 | 3 | 1 900 | 5 700 | |
| Diesel Plant " | 1 | 3 | 2 000 | 6 000 | |
| " " " | 3 | 1 | 5 000 | 5 000 | 34,350 |
| **4160/33,000 Volts** | | | | | |
| Steam Plant Substation | 3 | 1 | 10,000 | 10,000 | 10,000 |

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SUBSTATION TRANSFORMERS: (continued)

| | Phase | No. | KVA | Total KVA | |
|---|---|---|---|---|---|
| 12,000/2300 Volts | | | | | |
| Green School | 1 | 1 | 15 | 15 | |
| McClure Plant (Furnace Line) | 3 | 1 | 1 250 | 1 250 | |
| Inland #1 | 3 | 1 | 1 250 | 1 250 | |
| AuTrain Substation | 1 | 3 | 185 | 555 | |
| Chatham " | 1 | 3 | 50 | 150 | |
| Eben " | 1 | 1 | 25 | 25 | |
| Rumley " | 1 | 1 | 25 | 25 | 3,270 KVA |
| 12,000/440 Volts | | | | | |
| Piqua Substation | 1 | 3 | 500 | 1,500 | 1,500 |
| 6600/2300 Volts | | | | | |
| Rumley Substation | 1 | 1 | 15 | 15 | |
| Inland #1 " | 1 | 2 | 75 | 150 | |
| Blaney Park Substation | 1 | 2 | 25 | 50 | |
| " " " | 1 | 1 | 15 | 15 | |
| Sundell " | 1 | 1 | 15 | 15 | |
| Gwinn (old) " | 1 | 1 | 185 | 185 | |
| Little Lake " | 1 | 1 | 50 | 50 | |
| AuTrain Lake " | 1 | 1 | 50 | 50 | |
| Princeton " | 1 | 1 | 50 | 50 | 580 |
| 6600/115-230 Volts | | | | | |
| Furnace Substation (Lighting) | 1 | 1 | 1-1/2 | 1-1/2 | 1-1/2 |
| 2300/120-240 Volts | | | | | |
| C. C. I. Co. Research Lab. Sub. | 1 | 3 | 50 | 150 | 150 |
| | | | | Grand Total . . . . | 91,994 KVA |

DISTRIBUTION TRANSFORMERS:

| | Number | Capacity |
|---|---|---|
| Total at first of year | 689 | 4,177.5 KVA |
| Total purchased during year | 87 | 933 |
| Total installed during year | 28 | 183.5 |
| Total sold during year | 26 | 509 |
| Total at close of year | 750 | 4,601.5 KVA |
| In stock at close of year | 126 | 768.5 KVA |
| In service at close of year | 586 | 3 454 |
| In service at plants and auxiliaries | 38 | 379 |
| | 750 | 4,601.5 KVA |

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## STATISTICAL DATA - 1951

| Month | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precipitation - | 0.83 | 2.05 | 2.63 | 3.76 | 2.37 | 8.51 | 5.38 | 7.48 | 4.93 | 2.74 | 1.92 | 0.90 |

Total precipitation at Ishpeming during 1951 - 43.50" (3.62 ft.)
Average " " Marquette - 32.80" (46 year record)

### CARP RIVER PLANT:

| | |
|---|---|
| Drainage area above intake dam | 66.66 sq. miles |
| Cubic feet precipitation in 1951 | 6,627,314,401 |
| Kilowatt hours generated in 1951 | 24 318 000 |
| Cubic feet water utilized (90 cu. ft. - 1 Kwh) | 2 188 620 000 |
| " " " wasted over intake dam in 1951 | 625 192 000 |
| " " " in Carp storage basin Dec. 22, 1950 | 412 838 000 |
| " " " " " " " Dec. 22, 1951 | 836 352 000 |
| " " " added to Carp storage in 1951 | 423 514 000 |
| Total run-off for year 1951 (cubic feet) | 3 237 326 000 |
| Run-off per sq. mile of drainage area (cubic feet) | 48 729 762 |
| Second-feet of run-off | 1.548 |

| | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip. | 30.11 | 26.53 | 38.40 | 36.83 | 25.46 | 31.05 | 29.50 | 27.40 | 30.38 | 33.67 | 21.90 | 22.95 | 20.71 |
| Sec.-ft. Run-off | 1.03 | 0.67 | 0.93 | 1.29 | 0.70 | 0.79 | 0.83 | 0.73 | 0.68 | 1.06 | 0.59 | 0.50 | 0.25 |

| | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 | 1938 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip. | 35.69 | 29.86 | 36.06 | 32.28 | 23.14 | 36.70 | 31.20 | 32.72 | 32.87 | 27.10 | 30.23 | 30.10 | 35.32 |
| Sec.-ft. Run-off | 0.85 | 0.98 | 1.11 | 0.67 | 1.10 | 0.83 | 1.13 | 1.14 | 1.00 | 0.79 | 0.89 | 0.86 | 1.33 |

| | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip. | 33.58 | 30.34 | 32.20 | 34.26 | 32.04 | 32.77 | 30.81 | 26.12 | 32.88 | 22.87 | 37.23 | 30.64 | 43.50 |
| Sec.-ft. Run-off | 1.47 | 1.05 | 0.83 | 0.84 | 1.17 | 0.70 | 0.81 | 0.56 | 0.88 | 0.44 | 0.77 | 1.09 | 1.54 |

### McCLURE PLANT:

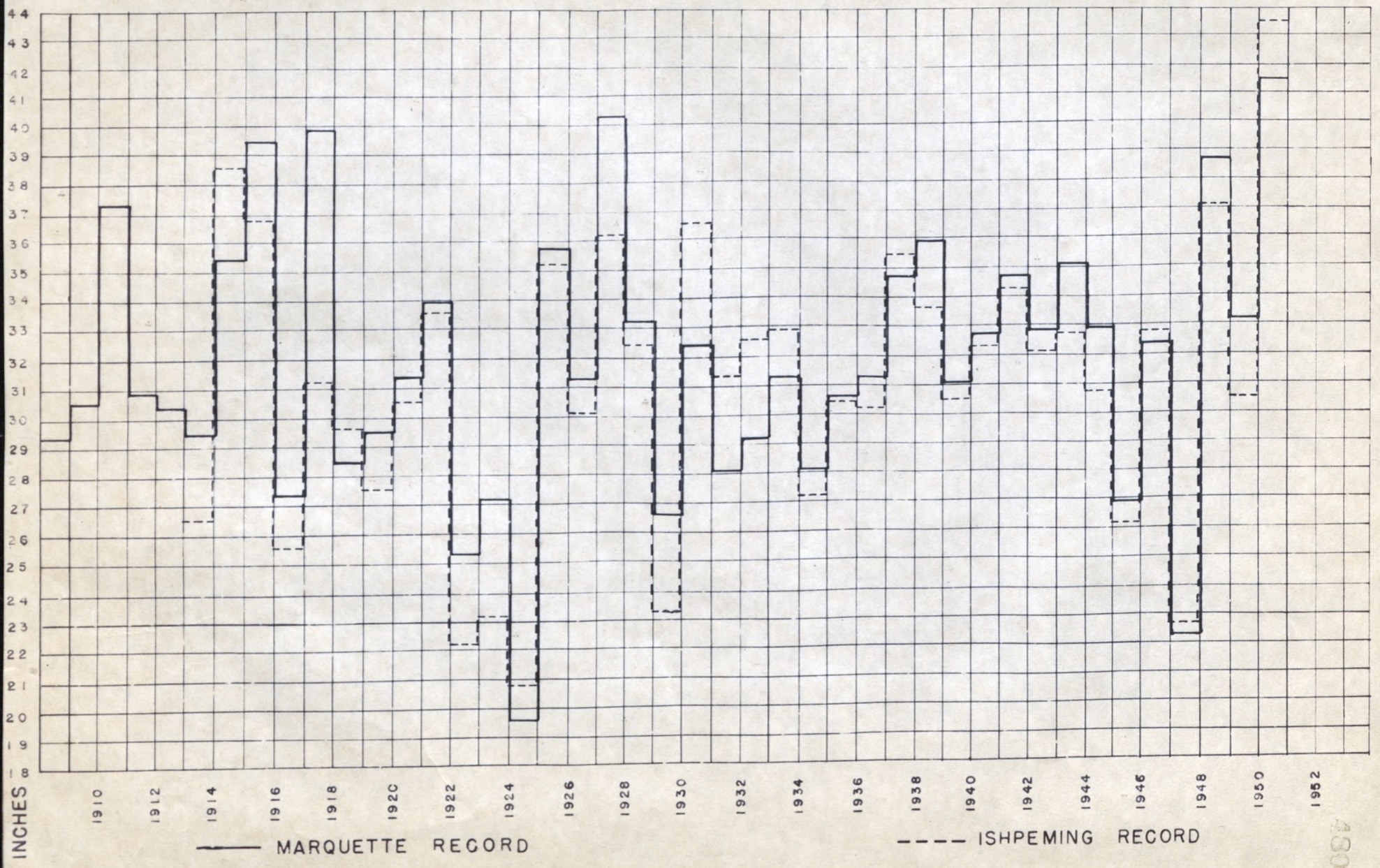
| | |
|---|---|
| Drainage area above intake dam | 140.52 sq. miles |
| Cubic feet precipitation in 1951 (Hoist Plant-50.90"-4.24') | 15,941,002,936 |
| Kilowatt hours generated in 1951 | 54 757 000 |
| Cubic feet water utilized (125 cu. ft. - 1 Kwh) | 6 844 625 000 |
| " " " wasted over intake dam in 1951 | 518 904 000 |
| " " " in Hoist storage basin Dec. 22, 1950 | 1 195 234 000 |
| " " " " " " " Dec. 22, 1951 | 2 118 395 000 |
| " " " added to Hoist storage in 1951 | 923 161 000 |
| " " " in Silver Lake Dec. 22, 1950 | 118 778 000 |
| " " " " " " Dec. 22, 1951 | 970 000 000 |
| " " " added to Silver Lake in 1951 | 851 222 000 |
| Total run-off for year 1951 (cubic feet) | 9 137 912 000 |
| Run-off per sq. mile of drainage area (cubic feet) | 65 029 262 |
| Second-feet of run-off | 2.09 |

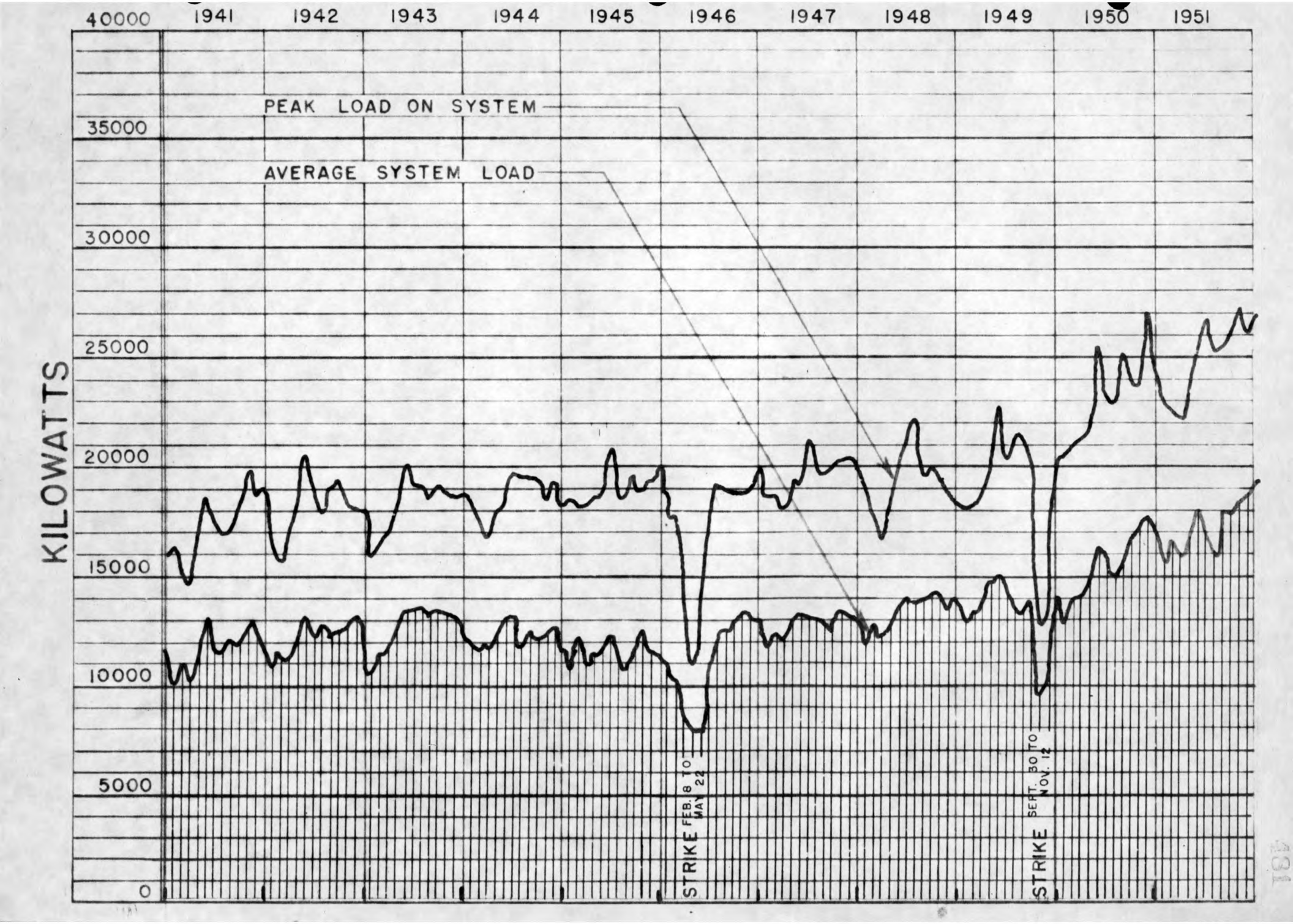
| | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | 1932 | 1933 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip. | 35.10 | 42.03 | 26.60 | 30.49 | 24.06 | 43.95 | 35.51 | 43.80 | 38.75 | 30.81 | 37.02 | 32.54 | 35.07 |
| Sec.-ft. Run-off | 1.02 | 1.54 | 0.85 | 0.92 | 0.52 | 1.52 | 1.80 | 2.22 | 1.36 | 1.45 | 1.10 | 1.23 | 1.30 |

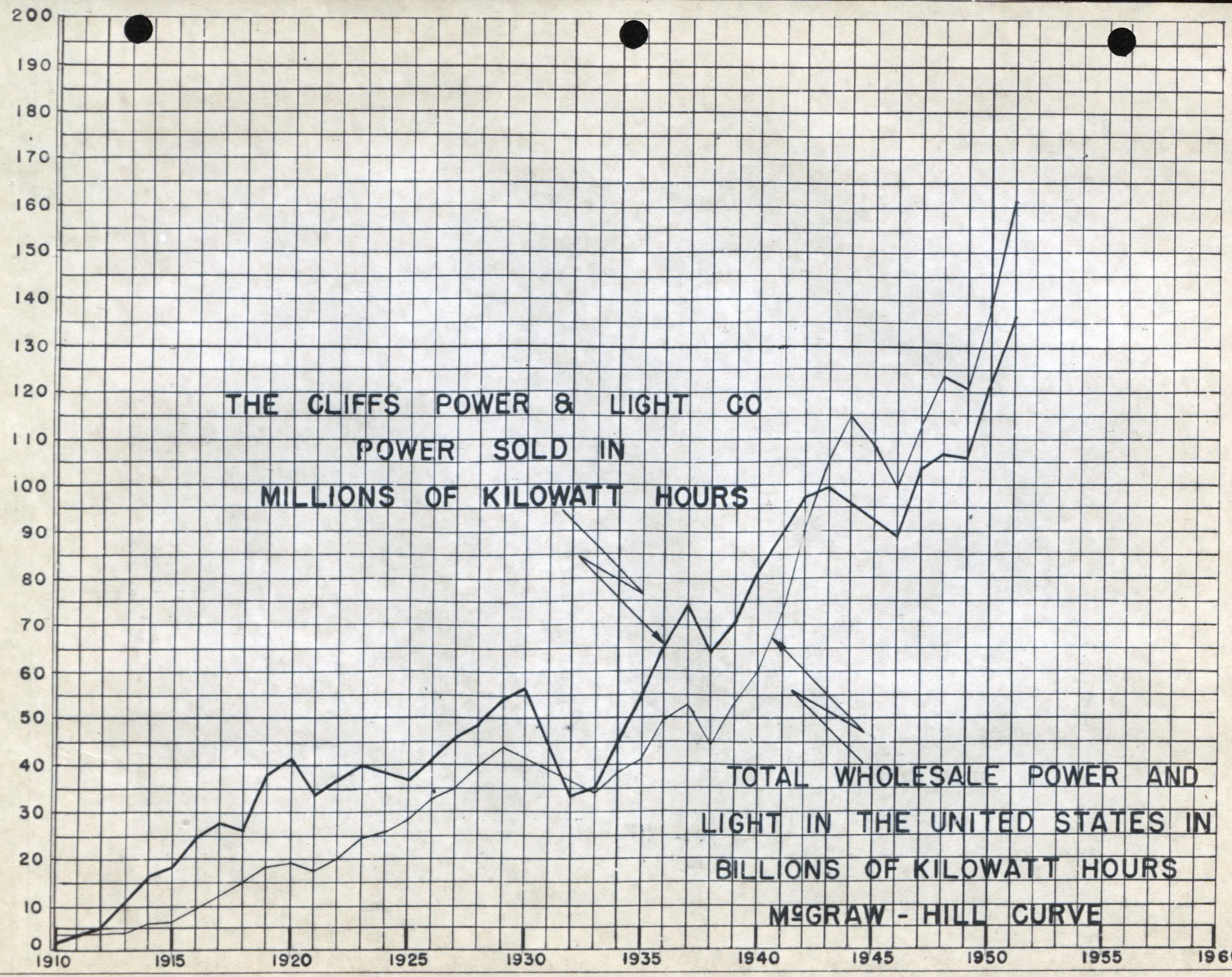
| | 1934 | 1935 | 1936 | 1937 | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Precip. | 35.02 | 29.96 | 32.16 | 38.18 | 40.93 | 41.22 | 36.59 | 38.15 | 40.20 | 35.64 | 37.62 | 37.94 | 31.91 |
| Sec.-ft. Run-off | 1.16 | 0.90 | 1.05 | 1.19 | 1.75 | 1.69 | 1.47 | 1.28 | 1.15 | 1.43 | 1.17 | 1.36 | 0.86 |

| | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|
| Total Precip. | 37.27 | 28.81 | 43.28 | 40.65 | 50.90 |
| Sec.-ft. Run-off | 1.22 | 0.78 | 1.24 | 1.37 | 2.09 |

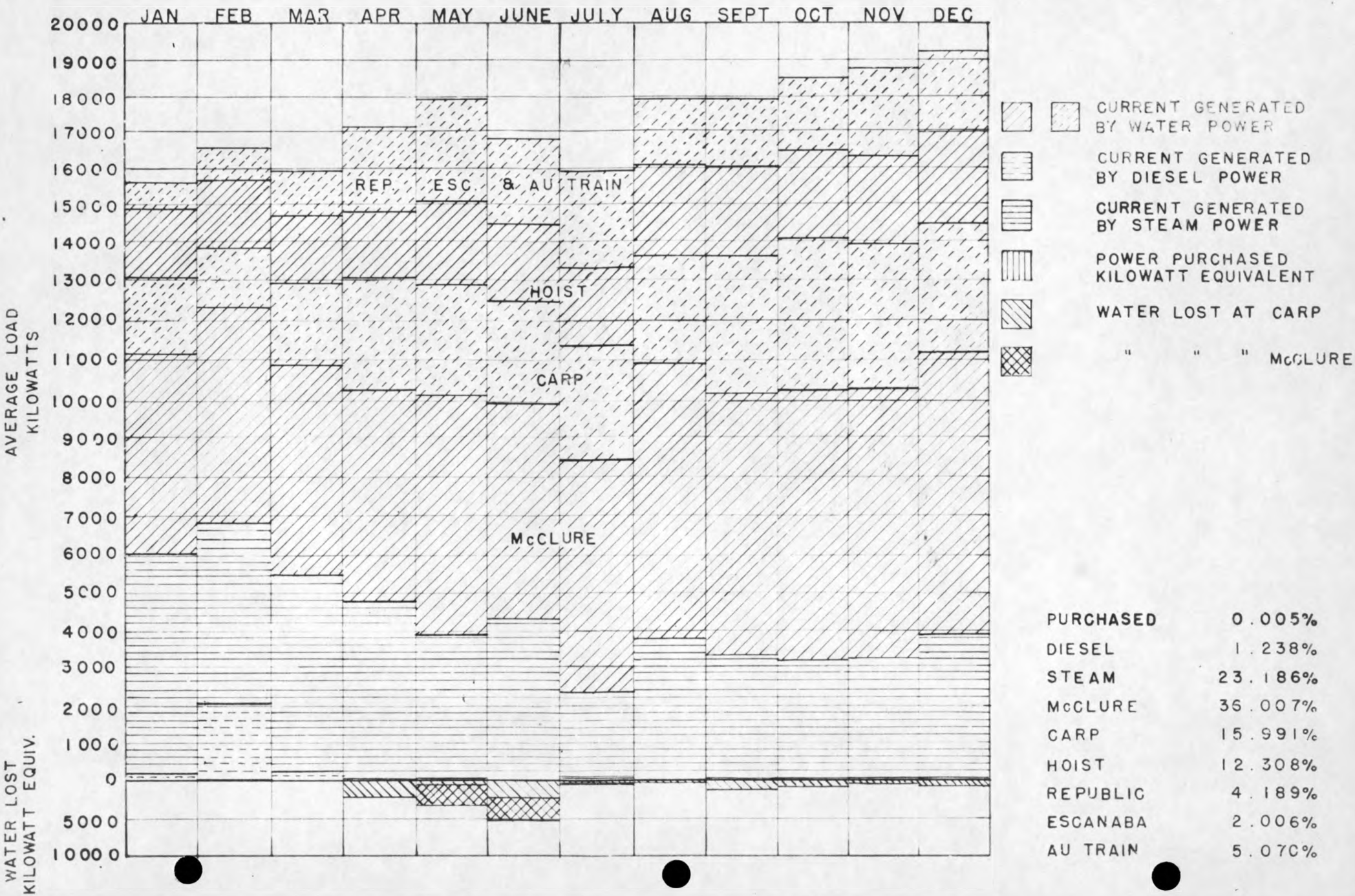
# PRECIPITATION BY YEARS




40000
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
PEAK LOAD ON SYSTEM
AVERAGE SYSTEM LOAD
35000
30000
25000
20000
15000
10000
5000
0
KILOWATTS
STRIKE FEB. 8 TO MAY 22
STRIKE SEPT. 30 TO NOV. 12


THE CLIFFS POWER & LIGHT CO
POWER SOLD IN
MILLIONS OF KILOWATT HOURS
TOTAL WHOLESALE POWER AND
LIGHT IN THE UNITED STATES IN
BILLIONS OF KILOWATT HOURS
McGRAW - HILL CURVE
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960

# 1951




| | |
|---|---|
| PURCHASED | 0.005% |
| DIESEL | 1.238% |
| STEAM | 23.186% |
| McCLURE | 36.007% |
| CARP | 15.991% |
| HOIST | 12.308% |
| REPUBLIC | 4.189% |
| ESCANABA | 2.006% |
| AU TRAIN | 5.070% |

During 1951 the Welfare Department carried on the usual functions coming within its sphere of activities. These activities may include anything affecting the health, welfare and best interests of the community in general and Cleveland-Cliffs employees in particular. Specifically the functions of this department include matters concerning employee welfare and relief, group insurance, workmen's compensation, social security, safety, police and plant protection, publication of the house organ, the "Cliffs News", the administration of the Ishpeming Hospital, company-sponsored employee activities, and in a more general way, matters concerning civic and community affairs and public health problems. The problem of obtaining deferments for key personnel who are reservists or who are eligible for draft call has also been delegated to this department.

It is here again recorded that this department was formerly known as the Pension Department, and for many years, Mr. W. H. Moulton, who retired on July 1, 1938, headed the department with the title of Secretary. In July of 1938, the name of the department was changed from the Pension Department of the Welfare Department, and Mr. W. F. Gries became the head of the department with the title of Superintendent. Dealing as we do with all matters of Company interest that affects the health, welfare or peace of mind of the employee and his community, it is felt that this department has now outgrown its present name. The word "welfare" does not fully connote activity in the fields of public relations, employee relations, and industrial relations. Since the efforts of this department often go beyond the scope of welfare work and more often than not a direct effect on molding the opinion of the employee and the community toward the Cleveland-Cliffs Iron Company, we believe that the name of this department should be changed to "Industrial Relations Department" or to some other more suitable name.

We wish to record at the outset that this department has had the excellent cooperation of the Safety Department under the leadership of Mr. A. U. Stromquist, Director, and Captain H. F. Rogers, Assistant Director. We believe that the cooperative association of the two departments has resulted in considerable benefit to the company and its employees.

Mr. W. E. Johnson, Compensation Agent, has been in charge of the Compensation Department since 1926. In 1951 his excellent work and great experience continued to be an invaluable asset to this department and the Company. His loyal service and cooperation are greatly appreciated.

During 1951, Mr. L. C. Holmgren continued his excellent work in carrying out most of thedetails in connection with our group insurance plan and the various pension payrolls. His faithful and cooperative service mean a great deal to the proper functioning of this department. Miss Marilyn Holmgren, Secretary to Mr. Johnson of the Compensation

Department, continues to carry on in her usual efficient way, and we express again our appreciation for her loyalty and faithful service throughout another busy year.

We wish to record also our appreciation of the cooperation of Mr. Robert J. Veale, our Chief of Police, who works under the supervision of the Superintendent of the Welfare Department. He presently heads a staff of 39 regular uniformed plant policemen. Mr. Veale makes contacts with the head of the department almost daily and matters governing police supervision and plant protection are discussed continually.

During 1951, Mr. John S. Bowen, Assistant to the Superintendent, continued his excellent work in carrying out his duties, which include assisting the Superintendent in all matters, and handling the increasing problem of obtaining military deferments for essential personnel. His loyal service and cooperation are greatly appreciated.

Miss Shirley Holmgren, Secretary to the Superintendent, and Receptionist, continued her loyal, competent service throughout another busy year. Her efficiency and faithfulness are commendable and we express our appreciation.

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

Walter F. Gries, Superintendent
John S. Bowen, Assistant to the Superintendent
Miss Shirley Holmgren, Secretary to the Superintendent and Receptionist
Walter E. Johnson, Compensation Agent
Lowell C. Holmgren, Assistant, Group Insurance Division
Miss Marilyn Holmgren, Secretary, Compensation and Insurance Division
Robert J. Veale, Chief of Police

WELFARE DEPT. ANNUAL REPORT YEAR 1951

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.

While there were a number of cases that required extra attention during the year most of them were largely routine. However, the following case was a little unusual.

EINARD A. MAKI - HAWKINS MINE

On the night of July 11, 1950 Mr. Maki was foreman of a crew of six men who were replacing a damaged pulley at the wash plant. The old pulley had been removed and a new one was hoisted into position. It was necessary to move this pulley fifteen or twenty feet and this was done with the aid of a chain block and hoist. Mr. Maki and a fellow employe were placing planks over which the pulley was dragged but this did not necessitate any extreme exertion on his part. The pulley was placed in position at about 4:00 A. M. and shortly after, while the men were completing details of the installation, Mr. Maki collapsed. The doctor was called but Mr. Maki had expired when the doctor arrived. A subsequent autopsy revealed that he had died of a coronary sclerosis with occlusion of the right coronary artery and massive congestion and swelling of the lungs. There was no evidence of a rupture of the artery having occurred suddenly to have caused death and it was the opinion that death resulted from a long continuing progressive sclerosis and that the congestion of the lungs had originated at least several days prior to his death. There was medical history to the effect that Maki had been under a doctor's care for several weeks prior to this accident and it was the opinion of his attending physician that death would have resulted within a short time--possibly within a week. Two hearings were held in this case and the fact was brought out that the work was being rushed as the plant had been idle due to the defective pulley and could not operate again until repairs had been made. It was also shown that it was a muggy, hot night and that the men perspired freely and at times they were required to work in rather cramped quarters. While the testimony presented was not too damaging, we kept in mind the fact that the compensation act is construed very liberally by the Commission and Courts and should an award be obtained by the claimant the possibility of its being disturbed by the Commission or the Supreme Court would be remote. When the offer was made to settle this case on a 50% basis it was felt, after much discussion, that it might be to our advantage to accept it in view of the above mentioned attitude of the administrators of the law. The potential liability in this case should we lose it would be $10,000 plus $350.00 for a funeral allowance. If the case was fought through to conclusion and we got an adverse decision there would be the additional attorney expenses and court costs should it be taken to the Supreme Court. The settlement finally agreed upon was for $5,000 plus an additional $100.00 for attorney fees covering the initial preparation of the case making a total of $5,100.00. From this Mrs. Maki was required to pay the funeral allowance of $350.00 plus the attorney fees of $1,262.50. The accrued compensation amounting to $2,150 was paid to Mrs. Maki in a lump sum and the balance on order of the referee was deposited in the First National Bank at Nashwauk to the credit of Helmi L. Maki on which she was able to draw as needed, however, not more than $30.00 per week.

11.

a. WORKMEN'S COMPENSATION (Continued)

The following changes in the Minnesota Workmen's Compensation Act were made effective July 1, 1951.

Temporary Total Disability: Increases temporary total maximum compensation to $32 (formerly $30) per week during the period of such disability not to exceed 310 (formerly 300) weeks.

Temporary Partial Disability: Provides for payment of compensation of compensation in temporary partial cases during disability not beyond 310 (formerly 300) weeks.

Permanent Partial Disability: Increases healing period to 104 weeks (formerly 15 weeks with an additional 35 on application to the commission.)

The schedule providing for a specified number of weeks for the 100% loss of various members was increased 10% in all categories.

Permanent Total Disability: For permanent total disability, maximum is increased to $32 (formerly $30) per week, and total amount payable for permanent total disability from employer and insurer is increased to $18,000 (formerly $10,000 from employer and $5,000 from special fund.)

Widows with dependent children and orphans, after having been paid the present maximum compensation of $10,000 will receive an additional $2,500 from the employer--insurer instead of from the special fund upon petition to the commission. Those widows and orphans receiving benefits as the result of deaths prior to July 1, 1949 when the maximum was $7,500 will receive the additional $2,500 from the special fund if eligible and after filing a petition therefor.

The amendment provides that the first week of disability is now payable if disability continues for three weeks or longer. Formerly the law provided that the first week should be paid at the end of four weeks of disability.

Medical and Surgical Treatment: An amendment made effective April 18, 1951 provides that in addition to the employer furnishing the medical, surgical and hospital treatment, including nursing, medicines, medical supplies as may reasonably be required to cure and relieve from the effects of the injury, he "shall likewise furnish replacement or repair for artificial members, glasses or spectacles, artificial eyes, dental bridge work, dentures or artificial teeth, hearing aids, canes, crutches or wheel chairs, damaged by reason of an accident arising out of and in the course of the employment."

Chapter 708, Laws of 1951, effective April 23, 1951, provides for an interim commission of six members, three from the House of Representatives, to be appointed by the speaker, and three from the Senate to be appointed by the committee on committees of the Senate, to revise and codify the workmen's compensation law and file its report not later than the opening day of the next regular legislative session.

WELFARE DEPARTMENT

11.

a. WORKMEN'S COMPENSATION (Continued)

Following is a list of the more serious cases other than fatalities which occurred in 1951:

| Mine and Report No. | Name | Nature of Injury | Compensation Paid to 12-31-51 |
|---|---|---|---|
| Cliffs Shaft 1284 | Wiljo Pesola | Compressed fracture 12th dorsal vertebra | 0.00* |
| Negaunee Shaft 2 | Leslie Ranta | Amputation right index finger | 1,200.00 |
| Mather "A" Shaft 155 | Vernie LaCosse | Amputation left leg | 1,008.00* |
| Mather "A" Shaft 163 | Donald Hakala | Compressed fracture 3rd lumbar vertebra. Fracture 5 ribs. Head injuries | 552.00* |
| Mather "A" Shaft 174 | Lauri Poutanen | Contused back. Fracture 5 ribs, left side | 156.00* |
| Spies 182 | John Swienty | Compound fracture right leg | 0.00* |
| Cambria Jackson 92 | Waino J. Kunnari | Fracture left femur extending into knee joint | 725.00 |
| Agnew 31 | John Bashel | Compound fracture left leg | 128.00* |
| Hawkins 13 | Peter Lucas | Contused left ankle and foot | 656.58 |
| Hawkins 16 | Tony Stimac | Fracture right leg | 384.00* |
| Holman Cliffs 66 | Alvin Schroeder | Severe crushing left leg and pelvis | 256.00* |
| Canisteo 53 | LeRoy Foix | Fractured bones left hand and right foot | 352.00* |
| Mather "B" Shaft 35 | Douglas Quayle | Fracture right patella | 0.00* |
| Mather "B" Shaft 41 | Emil Saari | Amputation middle finger right hand | 840.00 |

*Payments still being made.

WELFARE DEPARTMENT

11.

a. WORKMEN'S COMPENSATION (Continued)

Settlements on a partial disability basis were made in the following cases during 1951.

| | | | |
|---|---|---|---|
| Arnold Lind | Atkins Mine | 15% permanent disability left ring finger | 90.00 |
| John Evancevich | Agnew Mine | 15% permanent disability right foot | 675.00 |
| Jovo Jurich | Agnew Mine | 20% permanent disability | 2,704.11 |
| Ole Stone | Agnew Mine | 35% permanent disability right arm | 2,100.00 |
| Sam Latkovich | Canisteo Mine | 75% permanent disability left hand | 3,937.50 |
| Steve Latkovich | Canisteo Mine | 30% permanent disability left hand | 1,575.00 |
| Charles Flynn | Hawkins Mine | Loss left ring finger | 800.00 |
| Matt Briske | Sargent Mine | 35% permanent disability left thumb | 630.00 |
| Lee Jackson | Sargent Mine | 35% permanent disability left thumb | 630.00 |
| Matt Sikich | Sargent Mine | 25% permanent disability left foot | 1,125.00 |
| Ernest Glavich | Wanless Mine | 5% permanent disability left foot | 225.00 |
| Walter Peippo | Wanless Mine | 15% permanent disability left index finger | 157.50 |

11.

a. WORKMEN'S COMPENSATION (Continued)

FATALITIES

The following fatalities occurred in 1951:

PAUL L. GRUND
Age 24

Lloyd Mine
Occurred June 10, 1951
Paul Grund, Francis Nault, and Wilhart Alanko were cutting out and timbering No. 832 raise. Room had been blasted for two sets of timber. After lunch Grund and Nault returned to the Sub to land the timber and Alanko stayed on the level to lash the timber. Two legs were hoisted into the place and stood up at the North end of the raise. Two more legs were then hoisted and landed into the place. Mr. Nault then stepped over to the ladder compartment and called for Mr. Alanko to bring up a short piece of pole or "Johnny." At this instant a large chunk dropped from the hanging side of the raise and struck Grund in the head knocking him down and killing him instantly.
Died on June 10, 1951
Dependents - wife and daughter

| | |
|---|---|
| Compensation at $26.00 per week | $ 10,400.00 |
| Funeral expense | 300.00 |
| | $ 10,700.00 |

ROBERT LERLIE
Age 19

Mather Mine "B" Shaft
Occurred November 28, 1951
Although there were no actual witnesses, it is believed that Mr. Lerlie attempted to walk across the top of the previously filled sand bin and caused the bridging effect of the sand in the bin to give way, bearing Mr. Lerlie in the standing position in which he was found with the lower portion of his legs protruding through the opening in the bottom. It is believed that the removal of two or three 650 lb. bucket fulls of sand caused a large void in the bottom of the bin which was not noticeable from the top of the bin at the time Mr. Lerlie attempted to walk across the hopper.
Broken neck.
Died on November 28, 1951
No dependents

| | |
|---|---|
| Payment to Second Injury Fund | $ 1,000.00 |
| Funeral expense | 300.00 |
| | $ 1,300.00 |

11.

a. WORKMEN'S COMPENSATION (Continued)

Compensation Payments including Medical and Special Expense

| Year | C.C.I. Co. | Negaunee Mine Co. | Athens Ir. Mng. Co. | Cliffs Pr. & Light Co. | Mesaba-Cl. Mng. Co. | CCI Co, Opt. Agt, Atkins | Miscellaneous Companies | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1912 to 1941 | 1,383,523.76 | 205,231.48 | 140,056.48 | 16,375.42 | 93,932.78 | | 10,282.71 | 1,849,402.63 |
| 1942 | 38,471.33 | 19,984.64 | 10,755.90 | 1,575.25 | 6,820.97 | | | 77,608.09 |
| 1943 | 53,607.70 | 17,270.60 | 8,993.40 | 1,715.25 | 9,337.43 | | | 90,924.38 |
| 1944 | 66,219.66 | 21,147.85 | 11,489.34 | 1,594.75 | 6,325.95 | | | 106,777.55 |
| 1945 | 85,558.58 | 32,400.22 | 7,152.70 | 1,468.50 | 5,630.00 | | | 132,210.00 |
| 1946 | 84,009.42 | 25,391.20 | 5,373.63 | 1,528.50 | 7,693.03 | 174.50 | | 124,170.28 |
| 1947 | 76,355.69 | 28,582.02 | 14,540.71 | 1,153.75 | 9,186.43 | 1,353.77 | | 131,172.37 |
| 1948 | 73,727.12 | 28,162.82 | 8,548.15 | 687.00 | 9,083.73 | 824.57 | | 121,033.39 |
| 1949 | 96,910.98 | 37,433.06 | 15,401.72 | 916.50 | 9,356.57 | 1,248.75 | | 161,267.58 |
| 1950 | 87,512.40 | 35,352.22 | 12,815.81 | 740.00 | 10,757.22 | 3,522.62 | | 150,700.27 |
| 1951 | 111,447.53 | 45,102.62 | 10,814.25 | 734.50 | 13,757.87 | 1,286.55 | | 183,143.32 |
| | 2,157,344.17 | 496,058.73 | 245,942.09 | 28,489.42 | 181,881.98 | 8,410.76 | 10,282.71 | 3,128,409.86 |

Detail of Miscellaneous Companies:

| | |
|---|---|
| Holman-Cliffs Mining Company | 2,131.39 |
| Canisteo-Cliffs Mining Company | 2,768.69 |
| Alexandria Mine | 5,382.63 |
| | 10,282.71 |

WELFARE DEPARTMENT

ANNUAL REPORT - 1951
STATEMENT OF COMPENSATION PAYMENTS FROM
JANUARY 1, 1951 TO DECEMBER 31, 1951

| | Average No. of Employees | No. of Fatal Accs. | No. of Non-Fatal Accidents | | | Actual Comp. Paid in 1951 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | Estimated Compensation Still Pending | Medical & Special Expense | Cases Pending | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | Fatal | Acc. | O.D. |
| Cambria Jackson | 202 | | 2 | 32 | 10 | 7,122.00 | | 1,092.00 | | | | 1,404.00 | 1,300.00 | 1,092.00 | 1,439.67 | 794.33 | 22,051.50 | 3,097.60 | 3 | 1 | 1 |
| Cliffs Shaft | 485 | | 24 | 97 | 33 | 16,300.35 | | 936.00 | | 1,092.00 | 1,008.00 | 1,092.00 | 1,092.00 | | 6,813.67 | 4,266.68 | 15,096.00 | 7,510.30 | 1 | 8 | 1 |
| General Storehouse | 210 | | | 45 | 3 | | | | | | | | | | | | | 1,917.75 | | | |
| Ishpeming Office | 220 | | | 2 | | | | | | | | | | | | | | 1,979.25 | | | |
| Ishpeming Hospital | | | | | | 117.01 | | | | | | | | | 117.01 | | | 8.00 | | | |
| Lloyd | 156 | 1 | 9 | 21 | 8 | 9,171.66 | 900.00 | 450.00 | 2,184.00 | | | | 3,276.00 | | | 2,361.66 | 16,265.00 | 1,457.50 | 2 | 4 | 1 |
| Maas | 394 | | 13 | 86 | 31 | 11,133.65 | | | 1,190.83 | 1,590.00 | 24.50 | 2,288.00 | | 2,080.00 | 3,176.33 | 783.99 | 30,429.50 | 3,922.06 | 5 | 2 | 1 |
| Negaunee Shaft | 79 | | 2 | 20 | 11 | 457.83 | | | | | | | | | | 457.83 | 816.00 | 969.75 | | 1 | |
| Princeton | | | | | | 4,596.00 | | 3,504.00 | | 1,092.00 | | | | | | | 1,757.66 | | | 1 | |
| Spies | 114 | | 3 | 26 | 4 | 2,820.00 | | 266.00 | | | | | 756.00 | | 400.00 | 1,398.00 | 4,726.00 | 763.50 | | | 1 |
| Tilden | 18 | | | 2 | 1 | | | | | | | | | | | | | 166.50 | | | |
| Miscellaneous | 31 | | | 6 | 1 | | | | | | | | | | | | | 287.00 | | | |
| Cleveland Roll | 30 | | | | | | | | | | | | | | | | | 270.75 | | | |
| Research Laboratory | | | | 17 | 1 | 150.00 | | | | | | | | | 150.00 | | 5.00 | 93.15 | | 1 | |
| Ohio | 43 | | 1 | 5 | 1 | 15.00 | | | | | | | | | | 15.00 | | 276.25 | | | |
| General Shops | | | 4 | | | 1,434.33 | | | | | | | | | | 1,434.33 | | | | | |
| Unc. Const. E & A cc 175 | | | | | | 308.00 | | | | | | | | | 308.00 | | | | | | |
| Cliffs Power & Light Company | 78 | | | 10 | | | | | | | | | | | | | | 734.50 | | | |
| Negaunee | | | | | | 11,578.50 | | 1,872.00 | | 1,092.00 | 1,092.00 | | 3,986.50 | 2,184.00 | 1,352.00 | | 19,328.00 | 83.19 | | 4 | 6 |
| Mather Mine "A" Shaft | 720 | | 28 | 225 | 69 | 11,833.76 | | | 608.00 | | | 2,550.08 | 1,019.67 | | 3,030.67 | 4,625.34 | 25,580.57 | 7,865.35 | 2 | 9 | |
| Mather Mine "B" Shaft | 425 | 1 | 18 | 129 | 38 | 8,501.60 | | | | | | | 1,196.00 | | 4,231.27 | 3,074.33 | 13,740.06 | 5,240.22 | 2 | 1 | |
| Athens | 341 | | 10 | 89 | 26 | 7,060.85 | 87.02 | | | | 3,136.50 | | | 1,352.00 | 1,079.67 | 1,405.66 | 5,072.90 | 3,753.40 | | 3 | 4 |
| Total - Michigan Mines | 3,546 | 2 | 114 | 812 | 237 | 92,600.54 | 987.02 | 8,120.00 | 3,982.83 | 4,866.00 | 5,261.00 | 7,334.08 | 12,626.17 | 6,708.00 | 22,098.29 | 20,617.15 | 154,868.19 | 40,396.02 | 15 | 35 | 15 |
| Hibbing Office | 66 | | | | | | | | | | | | | | | | | 598.50 | | | |
| Miscellaneous - Hibbing | 44 | | | 6 | | | | | | | | | | | | | | 394.50 | | | |
| Agnew | 105 | | 3 | 64 | 13 | 8,270.44 | | | | | | | 5,669.51 | | 2,290.50 | 310.43 | 2,328.22 | 1,346.86 | | 4 | |
| Canisteo | 200 | | 2 | 80 | 7 | 3,487.25 | | | | | | | | | 1,638.75 | 1,848.50 | 2,732.50 | 1,879.33 | | 3 | |
| Hawkins | 225 | | 10 | 82 | 19 | 8,499.36 | | | | | | | 567.00 | | 5,400.00 | 2,532.36 | 782.84 | 2,584.04 | | 3 | |
| Hill Trumbull | 219 | | 5 | 74 | 5 | 3,427.24 | | | | | | | 1,404.00 | | 1,287.00 | 736.24 | 1,485.00 | 2,761.34 | | 1 | |
| Holman Cliffs | 210 | | 4 | 68 | 3 | 3,115.34 | | | 898.88 | | 1,248.00 | | 459.00 | | | 509.46 | 5,794.77 | 4,453.95 | 1 | 2 | |
| Sargent | 112 | | 5 | 80 | 10 | 5,336.04 | | | | | | | | | 4,545.72 | 790.32 | 8,897.50 | 1,899.62 | 1 | 1 | |
| Wanless | 63 | | 1 | 25 | | 205.65 | | | | | | | | | 160.65 | 45.00 | | 600.75 | | | |
| Atkins | 49 | | 1 | 21 | 1 | 1,023.30 | | | | | | | | 931.50 | | 91.80 | | 263.25 | | | |
| Total - Minnesota Mines | 1,293 | | 31 | 500 | 58 | 33,364.62 | | | 898.88 | | 1,248.00 | | 8,099.51 | 931.50 | 15,322.62 | 6,864.11 | 22,020.83 | 16,782.14 | 2 | 14 | |
| Total - All Mines | 4,839 | 2 | 145 | 1,312 | 295 | 125,965.16 | 987.02 | 8,120.00 | 4,881.71 | 4,866.00 | 6,509.00 | 7,334.08 | 20,725.68 | 7,639.50 | 37,420.91 | 27,481.26 | 176,889.02 | 57,178.16 | 17 | 49 | 15 |

WELFARE DEPT. ANNUAL REPORT YEAR 1951

11.

a. WORKMEN'S COMPENSATION (Continued)

ANNUAL STATEMENT OF COMPENSATION PAYMENTS
FROM JANUARY 1st, 1951 to DECEMBER 31st, 1951

| | | |
|---|---|---|
| Compensation paid on 1951 cases | 27,481.26 | |
| Estimated compensation still pending | 176,889.02 | |
| Cost of medical and hospital service and special expense | 57,178.16 | |
| | | 261,548.44 |
| Less pending for years 1942 to 1950 inclusive | 147,913.18 | |
| Less medical and special expense on accidents occurring prior to January 1, 1951 | 7,602.65 | |
| | | 155,515.83 |
| | | 106,032.61 |
| Less compensation paid on 1951 occupational disease cases | 2,544.33 | |
| Estimated compensation still pending on 1951 occupational disease cases | 4,778.00 | |
| | | 7,322.33 |
| Estimated cost of 1951 accidents | | 98,710.28 |
| Percentage of payrolls on accidents | | .00488 |
| Percentage of payrolls including Occup. Dis. cases | | .00524 |
| Number of fatal accidents | | 2 |
| Number of compensable accidents | | 145 |
| Number of lost-time accidents - non-compensable | | 295 |
| Number of slight accidents | | 1,312 |

The following occupational disease cases occurred during 1951. 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 | 7 |

During 1951 a total of $20,587.33 was paid on occupational disease cases, and it is estimated that it will cost $38,749.00 to complete payments on the fifteen cases still active on December 31, 1951. Of these, two originated in 1946, four in 1948, four in 1949, three in 1950, and two in 1951.

WELFARE DEPARTMENT

11.

c. GROUP INSURANCE (Continued)

The following statement shows the amount of claims paid under the group insurance and hospitalization plan during the policy year from March 1, 1951 to February 28, 1952.

| | Hospitalization | Health & Accident | Death Claims | Total |
|---|---|---|---|---|
| Cambria Jackson | 9,106.39 | 4,157.85 | 5,000.00 | 18,264.24 |
| Cliffs Shaft | 18,691.52 | 9,640.98 | 7,500.00 | 35,832.50 |
| Cleveland Roll | 613.04 | 890.87 | | 1,503.91 |
| General Roll | 8,939.31 | 2,253.12 | 5,000.00 | 16,192.43 |
| General Storehouse | 4,948.80 | 3,331.69 | 10,000.00 | 18,280.49 |
| Ishpeming Hospital | 3,307.63 | 3,053.15 | 2,500.00 | 8,860.78 |
| Inactive | | | 26,000.00 | 26,000.00 |
| Lloyd | 6,618.46 | 4,884.26 | 12,500.00 | 24,002.72 |
| Maas | 13,800.95 | 7,086.86 | 11,875.00 | 32,762.81 |
| Miscellaneous | 2,859.08 | 1,410.00 | 2,500.00 | 6,769.08 |
| Negaunee Shaft | 2,766.43 | 932.29 | 2,500.00 | 6,198.72 |
| Ohio | 471.30 | 89.14 | | 560.44 |
| Spies | 2,920.18 | 1,151.40 | | 4,071.58 |
| Tilden | 170.10 | 37.14 | | 207.24 |
| Total-C. C. I. CO. | 75,213.19 | 38,918.75 | 85,375.00 | 199,506.94 |
| Mather Mine "A" Shaft | 26,239.35 | 13,286.13 | 5,000.00 | 44,525.48 |
| Mather Mine "B" Shaft | 16,293.77 | 3,215.38 | | 19,509.15 |
| Total-Negaunee Mine Co. | 42,533.12 | 16,501.51 | 5,000.00 | 64,034.63 |
| Athens Iron Mining Co. | 14,351.71 | 6,748.85 | 12,500.00 | 33,600.56 |
| Cliffs Power & Light Co. | 2,481.18 | 791.14 | | 3,272.32 |
| TOTAL-MICHIGAN DISTRICT | 134,579.20 | 62,960.25 | 102,875.00 | 300,414.45 |
| Bargaining Unit | 113,584.53 | 52,993.99 | 84,750.00 | 251,328.52 |
| Salaried & Non Bargaining Unit | 20,994.67 | 9,966.26 | 18,125.00 | 49,085.93 |
| | 134,579.20 | 62,960.25 | 102,875.00 | 300,414.45 |
| Number of Claims | | | | |
| Bargaining Unit | 1,200 | 418 | 44 | 1,662 |
| Salaried & Non Bargaining Unit | 201 | 69 | 6 | 276 |
| | 1,401 | 487 | 50 | 1,938 |

WELFARE DEPARTMENT

11.

c. GROUP INSURANCE (Continued)

The following death claims were paid during the period from March 1, 1951 through February 28, 1952.

| Name | Mine | Date of Death | Amount of Insurance |
|---|---|---|---|
| Matt E. Linna | Athens Mine | 7-28-51 | 2500.00 |
| Jacob Sarkiniemi | Athens Mine | 9-13-51 | 2500.00 |
| John S. Anderson | Athens Mine | 9-12-51 | 2500.00 |
| John H. Karhi | Athens Mine | 1-12-52 | 2500.00 |
| Louis Terzaghi | Athens Mine | 1-29-52 | 2500.00 |
| Clifford B. Ninnis | Cliffs-Shaft Mine | 5-8-51 | 2500.00 |
| Harold Williams | Cliffs-Shaft Mine | 5-29-51 | 2500.00 |
| William Malen | Cliffs-Shaft Mine | 12-31-51 | 2500.00 |
| Frank L. Debelok | Cambria-Jackson Mine | 5-12-51 | 5000.00 |
| John F. Dawe | General Roll | 2-8-51 | 5000.00 |
| Richard Guy | General Storehouse | 3-26-51 | 5000.00 |
| Henry T. Riberdy | General Storehouse | 5-26-51 | 2500.00 |
| William Asikainen | General Storehouse | 1-19-52 | 2500.00 |
| Charles E. Larson | Ishpeming Hospital | 7-18-51 | 2500.00 |
| Ellsworth J. LaBeau | Lloyd Mine | 2-18-51 | 2500.00 |
| Paul L. Grund | Lloyd Mine | 6-10-51 | 5000.00 |
| Isaac Lampsa | Lloyd Mine | 11-30-51 | 5000.00 |
| John Rowse | Maas Mine | 3-13-51 | 5000.00 |
| Joseph Annear | Maas Mine | 5-6-51 | 1875.00 |
| Mike Tasson | Maas Mine | 12-4-51 | 5000.00 |
| Amelino Rovedo | Mather Mine "A" Shaft | 8-5-51 | 5000.00 |
| Olga Norell | Miscellaneous | 4-20-51 | 2500.00 |
| Victor Lyytinen | Negaunee Shaft | 8-17-51 | 2500.00 |
| Victor Ollikainen | Inactive | 2-2-51 | 500.00 |
| Anton Seagren | Inactive | 2-19-51 | 500.00 |
| Alexander Boz | Inactive | 3-7-51 | 500.00 |
| Louis Nault | Inactive | 3-29-51 | 750.00 |
| Simon Maki | Inactive | 3-28-51 | 750.00 |
| Mike Lelko | Inactive | 4-18-51 | 1875.00 |
| Gust V. Holmgren | Inactive | 5-7-51 | 500.00 |
| Abraham Auvinen | Inactive | 6-7-51 | 750.00 |
| Steve Festa | Inactive | 6-8-51 | 1250.00 |
| Charles G. Abrahamson | Inactive | 7-1-51 | 500.00 |
| John Vercoe, Sr. | Inactive | 7-20-51 | 5000.00 |
| John Bjorne, Sr. | Inactive | 7-20-51 | 500.00 |
| Roland J. Martin | Inactive | 8-14-51 | 500.00 |
| William P. Kevern | Inactive | 8-16-51 | 1250.00 |
| Ernest A. Gaboury | Inactive | 8-13-51 | 500.00 |
| Joseph Conte | Inactive | 8-14-51 | 500.00 |
| Andrew Engman | Inactive | 8-16-51 | 750.00 |
| Adelore LaFreniere | Inactive | 9-19-51 | 500.00 |
| Henry Racette | Inactive | 8-7-51 | 750.00 |
| Elrick Roberts | Inactive | 10-28-51 | 1250.00 |
| Ervin J. Tonkin | Inactive | 10-31-51 | 1250.00 |
| Charles P. Campain | Inactive | 12-3-51 | 1250.00 |

11.

c. GROUP INSURANCE (Continued)

The following death claims were paid during the period from March 1, 1951 through February 28, 1952.

| Name | Mine | Date of Death | Amount of Insurance |
|---|---|---|---|
| John Wilson | Inactive | 12-9-51 | 750.00 |
| Hilmer L. Lerlie | Inactive | 12-15-51 | 500.00 |
| Emil Granlund | Inactive | 1-7-52 | 1250.00 |
| Simon Luoma | Inactive | 1-11-52 | 750.00 |
| Peter Larson | Inactive | 1-28-52 | 1250.00 |

One death was due to suicide, two were the result of non-occupational accidents and two were occupational accidents.

11.

c. GROUP INSURANCE

Our group life, disability, hospitalization and surgical fee insurance plan with the Aetna Life Insurance Company of Hartford, Connecticut under group policies 14,440, GS-14,440, and H-14,440 continued in force during the year. This plan originated on September 1, 1947 and was liberalized on March 1, 1950. For the details of the original plan and the liberalization reference is made to the Annual Reports of 1947 and 1950.

For the purpose of record reference is made to the Annual Reports of 1936 and 1937 where a description of the Company's first group insurance plan and its liberalization may be found.

Effective March 1, 1950 a division between bargaining unit and non-bargaining unit employees was made with respect to the computation of total premium cost and the payment of claims. Two sets of premium rates are used in computing the premium cost of the plan, and the rates for the policy year from March 1, 1951 through February 29, 1952 are as follows:

| | |
|---|---|
| Bargaining Units: | |
| Life | - 1.47 per month per $1,000.00 |
| Disability | - .088 per month per $1.00 |
| Hospitalization Insurance: | |
| Employee Daily Hosp. Benefit | - .17 per month per $1.00 |
| Employee Surgical Fee Benefit | - .36 per month per employee |
| Dependent Daily Hosp. Benefit | - .374 per month per $1.00 |
| Dependent Surgical Fee Benefit | - 1.50 per month per employee |
| Non-Bargaining Units: | |
| Life | - 1.99 per month per $1,000.00 |
| Disability | - .088 per month per $1.00 |
| Hospitalization Insurance: | |
| Same as for Bargaining Units | |

WELFARE DEPARTMENT

11.

c. GROUP INSURANCE (Continued)

The following table shows a tabulation from the group insurance premium statements prepared by this office of the total premium cost by unit of our group insurance plan for the policy year from March 1, 1951 through February 29, 1952:

| Unit | Premium Cost Bargaining Unit | Non-Bargaining Unit |
|---|---|---|
| Cambria-Jackson | 26,986.67 | 2,753.44 |
| Cliffs-Shaft | 56,612.25 | 4,571.30 |
| General Storehouse & Shops | 22,279.63 | 1,142.22 |
| General Payroll - Ishpeming Office | - | 36,293.38 |
| " - Ishpeming Hospital | - | 6,957.71 |
| Ishpeming Office Inactive | 5,045.25 | 1,618.12 |
| Lloyd | 18,722.54 | 1,647.32 |
| Maas | 48,652.48 | 2,970.00 |
| Misc. Payroll - C. S. Lab. | 3,193.22 | - |
| " - Ishpeming Hospital | - | 3,108.85 |
| Negaunee Shaft | 8,712.72 | 1,795.98 |
| Ohio | 1,383.45 | 345.05 |
| Spies | 13,081.82 | 1,361.97 |
| Tilden | 1,306.30 | 396.45 |
| C. C. I. Co. - Old Plan | 453.35 | 12.16 |
| Mather Mine "A" Shaft | 83,892.38 | 7,647.09 |
| Mather Mine "B" Shaft | 47,856.17 | 4,688.13 |
| Neg. Mine Co. - Old Plan | 398.56 | - |
| Athens | 40,728.27 | 3,890.57 |
| C. P. & L. Co. | 6,147.41 | 1,720.10 |
| TOTALS | 385,452.47 | 82,919.84 |

WELFARE DEPARTMENT

23.

a. PENSION SYSTEM (Continued)

Retirement Payrolls

The purpose of the Retirement Payrolls was to provide retirement to employees of 65 years or over under Social Security benefits. This program began on March 16, 1939 and continued as the major Company retirement plan through February 1950 when the Pension Plan of 3/1/1950 took effect. This latter plan all but eliminated additions to the Retirement Payrolls, and any additions now are in the nature of special or unusual cases.

Through the Retirement Payrolls it was the original policy of the Company to supplement an employee's Social Security benefit by $10.00 per month. Beginning with July 1948 all retirement allowances were increased by $10.00 per month, so that the usual allowance became $20.00 per month. As in the past our retired employees continued to carry the Company medical plan at a cost of $1.00 per month if they so desired. They also continued to carry fifty percent of their group life insurance and since March 1, 1950 this has been done without premium cost to them.

The following two men were added to the Mining Department Retirement Payroll during 1951:

| | | | |
|---|---|---|---|
| Simon Luoma | Added effective | 10/1/1951 | Transf. from the Donation Payroll |
| Gust Wernholm | " | 12/1/1951 | " |

Sixteen deaths were recorded on the Mining Department Retirement Payroll during 1951 and a list follows:

| | | |
|---|---|---|
| Sam Sims | Died | 1/3/1951 |
| George S. Hill | | 2/7/1951 |
| Anton Seagren | | 2/19/1951 |
| Alex Boz | | 3/7/1951 |
| Simon Maki | | 3/28/1951 |
| Louis Nault | | 3/29/1951 |
| Gust Holmgren | | 5/7/1951 |
| Steve Festa | | 6/8/1951 |
| Charles Abramson | | 7/1/1951 |
| John Bjorne, Sr. | | 7/20/1951 |
| Henry Racette | | 8/7/1951 |
| Ernest Gaboury | | 8/13/1951 |
| R. James Martin | | 8/14/1951 |
| Joseph Conte | | 8/15/1951 |
| Andrew Engman | | 8/16/1951 |
| Adelore LaFreniere | | 9/19/1951 |

23.

a. PENSION SYSTEMS (Continued)

Retirement Payrolls (Cont'd)

This office continued to handle payments by Retirement Payroll to retired employees of our Minnesota properties. Two payrolls are prepared, one for the Canisteo Mine and the other for the Mesaba-Cliffs Mining Company.

The only change on the Canisteo Mine Retirement Payroll during the year was the death of John Wirtanen on December 30, 1951.

There were no changes to the Mesaba-Cliffs Mining Company Retirement Payroll during the year.

A resume of the 1951 Retirement Payrolls follows:

| | | |
|---|---|---|
| Number of Mining Department Retired Employees 12/31/1950 | 187 | |
| Number of Mining Department Retired Employees 12/31/1951 | 173 | |
| Total Expenditure to above employees for year 1951 | | 46,588.34 |
| | | |
| Number of Canisteo Mine Retired Employees 12/31/1950 | 7 | |
| Number of Canisteo Mine Retired Employees 12/31/1951 | 6 | |
| Total Expenditure to above employees for year 1951 | | 1,680.00 |
| | | |
| Number of Mesaba Cliffs Mng. Co. Retired Employees 12/31/1950 | 22 | |
| Number of Mesaba Cliffs Mng. Co. Retired Employees 12/31/1951 | 22 | |
| Total Expenditure to above employees for year 1951 | | 5,280.00 |
| | | |
| Total Number of Retired Employees 12/31/1950 | 216 | |
| Total Number of Retired Employees 12/31/1951 | 201 | |
| Total Expenditure to retired employees for year 1951 | | 53,548.34 |

WELFARE DEPARTMENT

23.

a. PENSION SYSTEM

The pension system which went into effect on January 1, 1909 completed the forty-third year of its operatin in 1951.

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

There were three deaths on the Mining Department pension payroll during the year.

| No. | Name | Pension Began | Date of Death |
|---|---|---|---|
| 84 | Michael Alanen | 2/1/1919 | 6/21/1951 |
| 201 | Andrew Erickson | 10/1/1926 | 2/18/1951 |
| 258 | Joseph Young | 5/1/1931 | 5/5/1951 |

| | |
|---|---|
| Number of deaths during year 1951 | 3 |
| Number of pensions in force 1/1/1951 | 8 |
| Number of pensions in force 12/31/1951 | 5 |

| | |
|---|---|
| Average annual pension for 1951 | $179.85 |
| Average annual pension for 1950 | $200.06 |

The Holmes Mine pension payroll became inactive in April 1949 and will remain inactive.

The total expenditure over the Mining Department pension payroll for 1951 was $1,438.78.

WELFARE DEPARTMENT

23.

a. PENSION SYSTEM (Continued)

The table below shows pension payments for the Mining Department and Holmes Mine Department combined for the years 1908 through 1951. The Holmes Mine pension payroll became inactive with the death of its last pensioner on April 23, 1949.

| Year | Old Age | Widows and Orphans | Total |
|---|---|---|---|
| 1908 thru 1941 | 754,251.33 | 22,547.00 | 776,798.33 |
| 1942 | 11,632.15 | 0.00 | 11,632.15 |
| 1943 | 10,246.66 | 0.00 | 10,246.66 |
| 1944 | 8,485.25 | 0.00 | 8,485.25 |
| 1945 | 7,446.32 | 0.00 | 7,446.32 |
| 1946 | 5,648.60 | 0.00 | 5,648.60 |
| 1947 | 4,156.68 | 0.00 | 4,156.68 |
| 1948 | 3,840.68 | 0.00 | 3,840.68 |
| 1949 | 3,260.68 | 0.00 | 3,260.68 |
| 1950 | 2,400.68 | 0.00 | 2,400.68 |
| 1951 | 1,438.78 | 0.00 | 1,438.78 |
| | 812,807.81 | 22,547.00 | 835,354.81 |

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

Republic Mine Department

Mr. Frank Vierela was the only pensioner on this payroll for the year, and he was paid a total of $240.00.

The table below shows the pension payments made over this roll for the years 1920 through 1951.

| Year | Amount |
|---|---|
| 1920 thru 1941 | 141,759.84 |
| 1942 | 1,488.00 |
| 1943 | 1,285.00 |
| 1944 | 995.04 |
| 1945 | 995.04 |
| 1946 | 856.04 |
| 1947 | 715.04 |
| 1948 | 515.04 |
| 1949 | 240.00 |
| 1950 | 240.00 |
| 1951 | 240.00 |
| | 149,329.04 |

23.

a. PENSION SYSTEM (Continued)

Land Department

Mr. Erick Johnson remained the only pensioner on this payroll during the year. He was paid a total of $240.00.

The table below shows the pension payments made over this roll for the years from 1927 through 1951.

| Year | Amount |
|---|---|
| 1927 thru 1941 | 4,076.88 |
| 1942 | 240.00 |
| 1943 | 240.00 |
| 1944 | 240.00 |
| 1945 | 240.00 |
| 1946 | 240.00 |
| 1947 | 240.00 |
| 1948 | 240.00 |
| 1949 | 240.00 |
| 1950 | 240.00 |
| 1951 | 240.00 |
| | 6,476.88 |

Furnace Department

This payroll became inactive in 1948. During the years when it was active - 1910 through 1948 - a total of $66,155.22 was expended over the roll.