DEAD RIVER STORAGE DAM

The construction work is practically completed on the Dead River Storage Dam as far as it is possible to go until the remaining property rights are secured. We now have rights up to an elevation of 1341, which is 4 ft. below ultimate completion. This 4 ft. represents 28% of the capacity in stored water for years when the basin fills. It is important that these rights be secured at the earliest possible time.

Construction was sufficiently advanced in the Spring of 1924 so that the basin could be filled to elevation 1338.5. At that time 1339 was the limit of our rights. Enough water was wasted to have filled the basin to 1344.

The amount of water stored is going to be enough to take us through the driest year we have ever had until the breakup of 1925. This partial filling allows the levee to become well seasoned before full pressure is put on it. At the elevation of 1338.5, which is 6.5 below ultimate head, the seepage through the levee was no more than was expected.

The fact that we are getting through this record dry year with only one-half of storage basin capacity makes it evident that with anything near an average year we are going to have considerable surplus power. The best index to power possibilities is the record of the output of the Carp River Plant for the past twelve years. The average is 15,500,000 K.W.H. The average for the last two years is 11,400,000 K.W.H. The output in 1924 was 11,000,000 K.W.H., that is, the average output was 40% more than the minimum. The output of the Carp Plant was used rather than the precipitation record.

CARP PLANT OUTPUT FOR 12 YEARS

1913	-	13,977,100 K.W.H.
1914		17 937 400
1915		17 470 300
1916		23 200 600
1917		18 310 100
1918		16 043 300
1919		16 400 200
1920		15 471 100
1921		11 490 910
1922		15 304 900
1923		11 852 300
1924		10 980 700

It is interesting to note that only three years out of the twelve are appreciably below the average.

DEAD RIVER STORAGE DAM (Cont'd)

In 1924 we generated a total of 45,000,000 K.W.H. (switchboard), 42,000,000 of this by water power and 3,000,000 by steam. Due to dam not being completed we wasted water equivalent to 6,000,000 K.W.H.; that is to say, with the driest year ever recorded and with our 1924 load we would have had 3,000,000 K.W.H. surplus. This would have given a minimum water power capacity of 48,000,000 K.W.H. With an average year, which is shown in the Carp Plant table to be 40% more than 1924, our output would be as follows:

	1924	AVERAGE	
Carp Plant	11,000,000	15,500,000	(switchboard)
Hoist "	5,000,000	7,000,000	
Au Train Plant	2,000,000	2,800,000	
McClure "	22,000,000	30,800,000	
Storage benefit - McClure Plant		16,000,000	
" " - Hoist "		4,000,000	
TOTAL		76,100,000	K.W.H.

22,000,000 is used above as the output of the McClure Plant rather than the actual figure of 24,218,000, because it is estimated that the equivalent of 2,000,000 K.W.W. was from stored water. Deducting 15% for transmission losses from 76,000,000 K.W.H. would give us 65,000,000 K.W.H. delivered to meters.

Our largest annual load was in 1920, when it was 42,000,000 K.W.H. used and sold. In 1924 it was 38,000,000. In 1924 the Gardner-Mackinaw, Francis and Salisbury mines were closed down, and curtailment in other mines reduced our load 4,500,000 K.W.H. Our commercial load was shut off in January, February, March and part of April, amounting to 1,500,000 K.W.H. Without these latter causes our load the past year would have been 44,000,000, or 4,000,000 less than our water power capacity in a minimum year.

Our commercial load is growing, and with an active year in the mines our load in 1925 will reach 48,000,000 or 50,000,000 K.W.H. used and sold.

DEAD RIVER STORAGE DAM (Cont'd)

Our water power is capable of the following expansion:

On the Escanaba River, near Princeton -	5,000,000	K.W.H.
Au Train	3,000,000	
Increase Carp Storage Basin	5,000,000	
	13,000,000	K.W.H.
Average year other plants	65,000,000	
	78,000,000	K.W.H.
Steam reserve plants	16,000,000	
	94,000,000	K.W.H.

The increase in Carp Storage Basin would allow carrying over from very wet years to dry years about 6,000,000 K.W.H. equivalent of water. In dry years the present basin supplies complete storage.

If 1925 proves to be a dry year we will have plenty of water power to pull through, and if an average year we will have a surplus of about 15,000,000 K.W.H.

ELECTRICAL DEPARTMENT

The operation of the Electric Plant during the past year has been somewhat restricted in common with our mining operations.

On account of serious shortage of water, due to the dry year of 1923, we operated both steam plants during the first three months of the year, closing them down on April 6th. During the latter part of this period the mines were shut down one day each week in order to conserve available power. While this method of operation is a profitable one as compared to the usual.procedure of commercial plants, which endeavor to provide necessary facilities for all demands, it may be misleading when making comparison of total output.

Our service in general has been better than in any other year in reliability and quality at point of service. This is shown by the fact that practically no delays occurred on account of failure of driving motors or interrupted service due to trouble with generating equipment.

During the year the right-of-way along all our main transmission lines was cleared of brush and trees. New high tension insulators of modern design were put on in place of the old type, which were failing after about twelve years of service.

A portable outdoor Substation, mounted on a railway car, was built. This is a three phase transformer, 2500 K.V.A., 30,000/2,300 volts, with choke coils and large capacity 2300 volt circuit breaker, and sufficient cable to make connection at any place where an emergency may require.

A new outdoor Substation for the Spies Mine was provided by the Peninsular Power Company practically according to our specifications, giving greater capacity and we believe more reliable service.

A severe sleet storm occurred in May month, breaking down both circuits to Princeton, one to North Lake, five spans of the Republic line and two spans of the Negaunee line. This caused a part day loss in the Gwinn District and full day loss of service at Republic. Other operations were not seriously affected.

Automatic control for shut down in case of trouble was installed at the Au Train and Hoist plants. This seems to be reliable and has permitted

MECHANICAL DEPARTMENT

the release of one operator at the Au Train Plant. We expect to drop one operator at the Hoist Plant when the new unit is finally put on automatic control. These changes are made very carefully and slowly in order to avoid any possibility of mistake.

The pipe line at the Carp Plant shows some deterioration at the upper end and a portion of it has been covered with concrete. If this is as satisfactory as we expect, we hope to complete this arrangement on all the pipe which shows any appreciable rot during 1925. Only a comparatively small amount of pipe line is affected.

A new air inlet was built of concrete near the Carp dam, being similar in form to one in use on the McClure Plant pipe line. This gives free air inlet without danger of freezing.

A butterfly valve on the Carp pipe line near the surge tank failed and was repaired by a temporary filling piece.

The present stage of water in storage indicates that we will have plenty for our requirements this winter and will not need to operate our steam plants to tide us over as in the past.

From present records we believe that the new Hoist Storage Basin will provide for 16,000,000 additional kilowatt hours per year. If this is correct, we may expect that it will not be necessary to use the steam plants for primary power under present load conditions, and that additional power above our immediate requirements is available. We have carried Munising, Ishpeming and Negaunee commercial loads since the spring breakup from our surplus.

The usual tables and graphic charts are attached.

Work on E. & A. 447, Additional Unit at Hoist Plant, is complete. An addition of 75 ft. was made to the building and a 1750 K.V.A. vertical Allis-Chalmers generating unit installed. This is 2300 volt, 3 phase, 60 cycle, 450 R.P.M., with direct connected exciter. Full automatic control has been provided; also suitable 7-panel switchboard, bus and circuit breaker mountings

for hand control of both this and the original unit when desired.

The new unit is in satisfactory operation.

Ample capacity in control and switching has been provided for the complete plant.

ELECTRIC POWER SYSTEM

SUMMARY OF OPERATIONS - 1924.

	KILOWATT HOURS GENERATED							Used by Auxiliaries	Delivered to Line	K. W. H. Sold	Losses	Cost Per K. W. H. (Incl. Dept.)
	McClure	Carp	Hoist	Au Train	Maas	Princeton	TOTAL					
Jan.	1,663,000	788,300	486,000	83,430	0	530,300	3,551,030	80,340	3,470,690	2,911,532	16.11%	$.00818
Feb.	1 796 900	743 200	518 000	56 260	213,000	324 900	3 652 260	62 280	3 589 980	3 036 975	15.40	.00922
March	1 103 500	707 600	279 000	63 880	678 100	719 350	3 551 430	133 044	3 418 386	2 864 019	16.21	.00995
April	1 477 700	1 149 300	458 000	334 810	251 700	249 700	3 921 210	55 262	3 865 948	3 270 522	15.40	.00813
May	1 983 000	1 958 600	95 000	283 320	0	0	4 319 920	8 130	4 311 790	3 655 230	15.22	.00586
June	2 543 300	1 135 300	* 0	320 570	0	0	3 999 170	9 040	3 990 130	3 341 289	12.26	.00630
July	2 631 200	1 099 400	11 000	138 830	0	0	3 880 430	6 790	3 873 640	3 302 239	14.75	.00690
Aug.	1 987 500	1 264 300	151 000	185 400	0	0	3 588 200	7 960	3 580 240	3 040 715	15.07	.00648
Sept.	2 247 400	470 900	769 000	139 620	0	0	3 626 920	7 900	3 619 020	3 077 535	14.96	.00719
Oct.	2 446 800	443 100	801 000	111 180	0	0	3 802 080	8 520	3 793 560	3 232 195	14.79	.00650
Nov.	2 020 100	640 800	715 000	121 300	0	0	3 497 200	8 210	3 488 990	2 998 515	14.05	.00620
Dec.	2 318 300	579 900	808 000	128 340	0	0	3 834 540	9 070	3 825 470	3 278 923	14.28	.00630
TOTAL	24,218,700	10,980,700	5,091,000	1,966,940	1,142,800	1,824,250	45,224,390	396,546	44,827,844	38,009,689	15.20%	$.00722

*Hoist Plant shut down from May 1st to June 25th and from June 26th to August 16th; account of break in tunnel.

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MECHANICAL DEPARTMENT

SUMMARY OF OPERATING CONDITIONS - 1 9 2 4 .

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Precipitation	0.90	1.03	1.10	2.38	2.85	1.92	2.70	5.05	2.10	0.50	1.46	0.96

Total Precipitation for 1924 (Ishpeming) - 22.95 inches.

Average " at Marquette - 32.8 " (46 year record)

CARP RIVER HYDRO-ELECTRIC PLANT

Drainage area above Intake Dam,	66.66 sq. miles
Cubic feet Precipitation in 1924,	3,554,139,550
K. W. Hrs. generated " "	10,980,700
Cubic feet water utilized (90 cu. ft. = 1 KWH.)	988,263,000
" " " in Carp Storage Basin Jan. 1, 1924,	160,162,000
" " " " " " " Dec.31, "	221,377,400
" " " stored during year,	61,215,400
" " " wasted over Intake Dam in 1924,	17,532,000
Total run-off for the year 1924,	1,067,010,400
Run-off per square mile of drainage area,	16,006,757

	1913	1914	1915	1916	1917	1918	1919	1920	1921
Total Precipitation,	30.11	26.53	38.4	36.83	25.46	31.05	29.50	27.40	30.38
Second ft. per sq.mile,	1.03	.67	.93	1.29	.70	.79	.83	.73	.68

	1922	1923	1924
Total Precipitation,	33.67	21.90	22.95"
Second ft. per sq.mile,	1.06	.59	.50

McCLURE HYDRO-ELECTRIC PLANT

Drainage area above Intake Dam,	140.52 sq. miles
Cu. ft. Precipitation in 1924, (Hoist Plant 30.49")	9,950,380,830
K. W. Hrs. generated at McClure Plant in 1924,	24,218,700
Cubic feet water utilized (125 cu. ft. = 1 KWH.)	2,827,337,500
" " " wasted over Intake Dam in 1924,	603,792,000
" " " in Hoist Storage Basin Jan. 1, 1924,	138,716,500
" " " " " " " Dec.31, "	797,130,100
" " " stored during year,	658,413,600
Total run-off for the year 1924,	4,089,543,100
Run-off per square mile of drainage area,	29,102,925

	1920	1921	1922	1923	1924
Second ft. per sq. mile,	1.22	1.02	1.54	0.85	0.92

MECHANICAL DEPARTMENT

The following alternating current motors are installed and operating as needed:

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
ANGELINE MINE -				
Hoist	250 HP.			
U.G. Haulage Set (to Gen. Storehouse)	150		150	
				250 HP.
CLIFFS SHAFT MINE -				
Shop	25			
No. 8 Crusher	125			
No. 5 Crushers - 2 - 25 HP. motors	50			
Screens	15			
Top Tram	50			
Lower Tram #1	35			
Underground Haulage Set #1	100			
Hoist for "A" Shaft	500			
Underground Plunger Pump #1	180			
" Centrifugal Pump	250			
Compressor - Allis-Chalmers	175			
Hoist for "B" Shaft	500			
Underground Plunger Pump #2	200			
Laboratory Crusher	5			
Coal Crushing Plant	15			
" " " Exhaust Fan	½			
Cooling Water Pump for Compressors	10			
Ingersoll-Rand Compressor #1	400			
" " " #2	400			
Lower Tram #2	50			
Heating Plant Condensing Water Pump	2			
Underground Haulage Set #2	215			
Scraper on 1st Level,"B" Shaft (destroyed)	25		25	
" " 2nd " " "	15			
Conveyor Belts - New Crushing Plant, 2 motors	40			
Jaw Crusher - " " "	75			
Feeder Belt - " " "	5			
Magnetic Separator " " "	1½			
Scraper Motor - 1st Level, "B" Shaft		30		
" Hoist - 12th " "A" "		25		
" " - 8th " "B" "		25		
" " - 6th " "A" "		25		
" " - 7th " " "		25		
Battery Charging Set - "A" Shaft		7½		
				3,576½
HARD ORE SHOPS				
Machine Shop	10			
Carpenter Shop	25			
Blacksmith Shop Punch	3			
Armature Banding Machine	2			
" " "	½			
" " "	1/8			
Lathe Grinder	1			
Portable Drill	¼			
" " - Large	¼			
Commutator Slotter	1/8			
Air Compressor	10½			
Water Supply Pump	7½			
Blacksmith Shop Blower	¼			
Hacksaw	½			
Small Grinder		¼		61¼
fwd.	3,925	137¾	175	3,887¾

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	3,925 HP	137¾ HP	175 HP	3,887¾ HP.
BROWNSTONE SUBSTATION				
Test Set	½			
Oil Filter Press	¼			
Battery Charging Motor-Generator Set	3			
				3¾
HOLMES MINE				
Air Compressor	340			
" " Cooling Water Pump	3			
Skip Hoist	400			
Cage "	400			
Underground Haulage Converter	150			
Machine Shop (to Cliffs Shaft)	7½		7½	
Top Tram	25			
No. 8 Crusher	150			
No. 6 Crushers - 2 - 40 HP. motors	80			
Screens	20			
Laboratory Crusher	2			
Underground Plunger Pump	250			
" Centrifugal Pump	400			
Boiler Feed Pump (from Salisbury)		5		
Machine Shop (from Gwinn)		25		
				2,250
SALISBURY MINE				
Hoist	400			
U.G. Centrifugal Pump (stored in Lake Dry)	400		400	
" Plunger Pump " " " "	100		100	
" Ventilating Fan " " " "	7½		7½	
Compressor Cooling Water Pump	2			
Surface Drainage Pump (stored at Gen.Sthse.)	30		30	
Compressor	150			
Water Supply Pump (to Holmes boiler house)	5		5	
				552
ATHENS MINE				
Cage Hoist	400			
Compressor	325			
" Cooling Water Pump	3			
Auxiliary Compressor for Hoist Brakes	5			
Underground Ventilating Fan	15			
Sinking Pump - 2400' Station	50			
Skip Hoist Set	850			
" " " Oil Pump	1			
Shop	10			
Underground Haulage Converter	150			
Skip Pit Pump	2			
Laboratory Crusher	5			
Underground Plunger Pump #1	400			
Top Tram - 2 - 50 HP. motors	100			
Carpenter Shop	20			
Underground Plunger Pump #2	400			
Ore Crusher	25			
Battery Charging Motor-Generator Set	¼			
Underground Ventilating Fan	40			
Ingersoll-Rand Compressor	450			
Rock Tram		50		
				3,301¼
fwd.	10,502 HP	217¾	725	9,994¾ HP.

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	10,502 HP.	217¾ HP.	725 HP.	9,994¾ HP.
MAAS MINE				
Turbine Auxiliaries (Circulating Pump	40			
" (Injection "	25			
" (Exciter	33			
Underground Haulage Set	215			
Shop	10			
Underground Centrifugal Pump	350			
" Hoist	50			
" Plunger Pump #1	320			
Winze Pump - 4th Level (stored at mine)	15		15	
Compressor Cooling Water Pump	5			
Skip Pit Hoist	15			
Ore Tram - 2 - 50 HP. motors	100			
Coal Crushing Plant	15			
Underground Plunger Pump #2	250			
Ingersoll-Rand Compressor #1	400			
" " " #2	400			
Small Air Compressor for U.G. Pumps	2			
Rock Tram	50			
Skip Hoist	700			
Cage "	400			
Boiler Room Fan	½			
Skip Hoist Rheostat Pump	2			
Carpenter Shop Saw	15			
Auxiliary Compressor for Hoist Brakes		7½		
4th Level Pump		50		
Cooling Water Pump		5		
				3,460
MAAS CRUSHING PLANT				
Crusher	100			
Pan Conveyor	50			
Belt "	50			
				200
NEGAUNEE MINE				
Underground Haulage Set	215			
"Ilgner" Hoist Set	450			
Top Tram - 2 - 50 HP. motors	100			
Laboratory Crusher	5			
Auxiliary Compressor for Hoist Brakes	3			
U.G. Plunger Pumps - 2 - 300 HP. motors	600			
" Centrifugal Pump	350			
" Suction Pumps - 2 - 15 HP. motors	30			
Compressor Cooling Water Pump	3			
Nordberg Air Compressor	325			
Shop	15			
Skip Pit Pump	5			
Ore Crusher	25			
Ingersoll-Rand Compressor	400			
Commutator Grinder	1			
13th Level Plunger Pump	15			
11th " " Pumps, 2 - 75 HP. motors	150			
Exciters for U.G. Pump Motors (2)	40			
Signal System Motor-Generator Set	½			
Hoist at #2 Shaft (from Francis Mine)		25		
				2,757½
SOUTH JACKSON CRUSHING PLANT				
Hoist	75			
Compressor	100			
				175
fwd.	17,022 HP	305¼	740	16,587¼ HP.

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	17,022 HP.	305¼ HP.	740 HP.	16,587¼ HP.
BARNES-HECKER MINE				
Cage Hoist	400			
Skip "	400			
Water Supply Pump	10			
Underground Haulage Converter	150			
" Centrifugal Pump - 2nd Level	400			
" " " - 3rd "	400			
" Plunger Pump - " "	350			
Top Tram	50			
				2,160
LLOYD MINE				
Skip Hoist	400			
Cage "	400			
Top Tram - 2 - 40 HP. motors	80			
Ore Crusher	25			
Water Supply Pump installed Underground	50			
				955
MORRIS MINE				
Skip Hoist	400			
Cage "	400			
Shop	25			
Ingersoll-Rand Air Compressor #1	250			
4th Level Plunger Pumps - 2 - 350 HP.motors	700			
7th " " Pump	100			
" " Centrifugal Pump	175			
Centrifugal Pump unwatering North Lake (sent to Stephenson Mine)	125		125	
Laboratory Crusher	5			
Carpenter Shop	25			
Nordberg Air Compressor	325			
Compressor Cooling Water Pump	5			
Top Tram - 2 - 50 HP. motors	100			
Underground Haulage Set	150			
Centrifugal Water Supply Pump	50			
Heating Plant Condensing Water Pump	2			
Centrifugal Pump unwatering North Lake (from D. R. Storage Dam)		200		
Ingersoll-Rand Air Compressor #2		500		
				3,412
SECTION 6 SHAFT				
Hoist	200			
Water Supply Pump	3			
				203
AUSTIN MINE				
Laboratory Crusher	3			
Hoist	200			
Top Tram	50			
				253
fwd.	23,430 HP	1,005¼	865	23,570¼ HP.

ELECTRICAL DEPARTMENT (cont'd)

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	23,430 HP.	1,005¼ HP.	865 HP.	23,570¼ HP.
FRANCIS MINE				
U.G. Ventilating Fan (Stored Gwinn Dry)	7½		7½	
Air Compressor (Sent to Spies Mine)	403		403	
U.G. Centrifugal Pump (" " Stephenson)	400		400	
Skip Hoist (Stored in Gwinn Dry)	400		400	
Compressor Cooling Water Pump (to Spies)	3		3	
Shop (Stored in Gwinn Dry)	5		5	
Top Tram " " " "	50		50	
U.G. Haulage Converter " " " "	150		150	
Cage Hoist " " " "	400		400	
U.G. Plunger Pump (Sold to Copper Range Co.)	350		350	
Ore Tram (Stored in Gwinn Dry)	37		37	
6th Level Plunger Pump " " " "	35		35	
" " Vent. Fan (11th Level Gwinn Mine)	100		100	
				0
GWINN MINE				
Skip Hoist	400			
Cage "	400			
Underground Centrifugal Pump	400			
" Plunger "	350			
Ore Tram	37			
Rock "	10			
Underground Haulage Set	150			
Shop	5			
11th Level Plunger Pump	50			
" " Centrifugal Pump		50		
" " Ventilating Fan (From Francis)		100		
				1,952
GWINN CRUSHING PLANT				
Crusher	85			
Pan Conveyor	50			
Belt "	40			
				175
GARDNER MINE				
Top Tram	25			
				25
MACKINAW MINE				
Hoist	400			
Air Compressor	325			
Compressor Cooling Water Pump	3			
Shop	7½			
Water Supply Pump	7½			
Top Tram	25			
U.G. Haulage Converter (To Stephenson Mine)	150		150	
				768
PRINCETON MINE #2				
Hoist	200			
Top Tram - 2 - 50 HP. motors	100			
Underground Plunger Pump	150			
" Centrifugal Pump	125			
				575
PRINCETON MINE #3				
Hoist	75			
				75
fwd.	29,340½ HP.	1,155¼	3,355½	27,140¼ HP.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	29,340½ HP.	1,155¼ HP	3,355½	27,140¼ HP.
STEPHENSON MINE				
Skip Hoist	400			
Cage "	400			
Top Tram - Bessemer	50			
" " - C. & N. W.	50			
" " - #2 Bell	50			
Rock "	25			
Aldrich 5th Level Plunger Pump	250			
Prescott " " " "	250			
5th Level Centrifugal Pump	275			
6th " " "	50			
" " Plunger "	50			
U.G. Haulage Converter (From Mackinaw)		150		
" Centrifugal Pump, 5th Level (From Francis)		400		
" " " 6th " (" N.Lake)		125		
" Sinking Pump (From Athens Mine)		35		
				2,560
PRINCETON CENTRAL POWER PLANT				
Turbine Auxiliaries (Circulating Pump	50			
(Injection "	25 (40)	15 (Correction)		
(Exciter	33			
Underground Haulage Set	215			
Air Compressor	625			
" " Cooling Water Pump	7½			
Boiler Room Fan	50	40	50	
Coal Handling Machinery	10			
" " "	5			
				1,025½
PRINCETON CENTRAL SHOPS				
Shop Motor	25			
Grinder	3			
				28
PRINCETON CENTRAL PUMP STATION				
Centrifugal Pump	100			
				100
CARP PLANT				
Auxiliaries - 2 - 15 HP. pump motors	30			
Water Supply Pump	1			
				31
HOIST PLANT				
Exciter Motor-Generator Set	20			
				20
McCLURE PLANT				
Water Supply Pump	2			
				2
DEAD RIVER STORAGE DAM				
Centrifugal Pump for Hydraulic Work	100		100	
Water Supply Pump	5		5	
Concrete Mixer	30		30	
" Hoist	50		50	
Wood Saw	10			
Air Compressor	50			
Small Pump	3		3	
Cement Bag Cleaner	½		½	
				60
fwd.	32,640½ HP.	1,920¼	3,594	30,966¾ HP.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	32,640½ HP.	1,920¼ HP.	3,594 HP.	30,966¾ HP.
ISHPEMING HOSPITAL				
Passenger Elevator	7½			
Dumb Waiter	3			
Large Washer	2			
Small "	1			
Extractor	2			
Vacuum Cleaner	3			
" Pump	1			
				19½
REPUBLIC MINE				
Screen at #9 Shaft	25			
Crusher	100			
Auxiliary Compressor for Hoist Brakes	5			
Pump in Engine House	7½			
Centrifugal Pump in Engine House	20			
Coal Tram	7½			
Pump, bottom level #9 Shaft	20			
Machine Shop	5			
Pump - 4th Level	15			
" - 3rd "	50			
Pascoe Shaft Underground Pump, cross-over	50			
#9 Shaft Rock Tram	15			
Portable Hoist	7½			
Laboratory Crusher	3			
Picking Belt	5			
Screen at Crusher	10			
Carpenter Shop	20			
#9 Shaft Hoist - 2 - 500 HP. motors	1,000			
Motor-Generator Set for U.G. Haulage	30			
U.G. Hoist - 7th Level Pascoe Shaft	100			
" " - 8th " " "	50			
#9 Shaft Top Tram - 2 - 50 HP. motors	100			
Pump - 11th Level Pascoe Shaft	10			
Drill Hoist - 7th Level Pascoe Shaft		7½		
Air Compressor (from Spies Mine)		200		
				1,863
TOTAL MINING DEPARTMENT	34,315½ HP.	2,127¾ HP	3,594 HP.	32,849¼ HP.
PIONEER FURNACE				
Furnace & Sawmill	1,195			
				1,195
L. S. & I. RR. CO.				
Shops, Sawmill, Ore Dock & Pumps	800			
				800
LAND DEPARTMENT				
Sawmill at Munising - 2 motors	125			
Grand Island	10½			
				135½
LUMBERING DEPARTMENT				
Dixon Location Water Supply Pump	5			
				5
ELECTRIC LIGHT & POWER CO., MUNISING				
City Pumping	125			
				125
REPUBLIC TOWNSHIP				
Water Supply Pump	25			25
OLIVER IRON MINING COMPANY				
Pumps at Angeline & Sec. 16 Mines	525			525
GRAND TOTAL CONNECTED LOAD	37,126 HP.	2,127¾	3,594	35,659¾ HP.
MUNISING WOODENWARE COMPANY				
Breakdown Service	695 HP.			695 HP.

MECHANICAL DEPARTMENT

The following motors are not connected to our General Power System:

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
SPIES MINE				
Hoist Motor used on Scraper		200		
Underground Triplex Pump	50			
Crusher	50			
Air Compressor (Sent to Republic Mine)	200		200	
" " (From Francis Mine)		403		
Grinder in Shop	3			
Compressor Cooling Water Pump	3			
Hoist	400			
Boiler Feed Pump	2			
Top Tram	25			
4th Level Pump	50			
Shop		5		
Compressor Cooling Water Pump (Francis)		3		
Underground Haulage Set		150		
" Plunger Pump #1		150		
" " " #2		150		
				1,644 HP.
MESABA RANGE				
BOEING MINE				
Sinking Hoist	35			
Air Compressor	225			
Underground Plunger Pump	100			
" Centrifugal Pump	125			
" Haulage Set	150			
Hoist	200			
Top Tram	50			
Compressor Cooling Water Pump	2			
Shop	10			
Centrifugal Pump in Pit	85			
" "	125			
" "	85		85	
				1,107
CROSBY MINE				
Conveyor Belt	40			
Screen	20			
Picking Belt	3			
Log Washer	20			
Chip Screen	3			
Tables	20			
Feeder Motor	20			
Turbo	7½			
				133½
HELMER MINE				
Hoist	200			
				200
fwd.	2,308½ HP.	1,061 HP.	285 HP.	3,084½ HP.

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	CONNECTED JAN. 1,1925 TOTALS
brt. fwd.	2,308½ HP.	1,061 HP.	285 HP.	3,084½ HP.
WADE MINE				
Hoist	125			
Air Compressor	150			
" " Cooling Water Pump	2			
Underground Haulage Set	150			
Machine Shop	10			
Underground Triplex Pump	50			
" Centrifugal Pump	100			
Sump Pump	5			
Ventilating Fan (Stored)	15		15	
Top Tram	50			
Locomotive Water Pump (Stored)	5		5	
Clear " "	15			
				657
HILL-TRUMBULL MINE				
Log Washer	25			
" "	40			
Turbos - 4 - 5 HP. motors	20			
Picking Belt	2			
Chip Screens 2 - 2 " "	4			
Crusher	100			
Sand Pumps- 2 - 10 " "	20			
Prescott Plunger Pump	125			
Centrifugal Pump	125			
Tables	20			
Shops	30			
Punch & Shear Machine in Shop	5			
Band Saw in Carpenter Shop	5			
Compressor in Shop	50			
Screen	20			
Conveyor	100			
Planer in Shop	3			
Variety Saw in Shop	5			
Forge Fan	2			
Electric Drill	¼			
Motor-Generator Set		65		
Conveyor		50		
Blacksmith Shop Fan		¼		
" " "		¼		
Drill		¼		
Cyclone Drill		15		
				832
TOTAL	3,686¾ HP	1,191¾ HP	305 HP	4,573½ HP.

The following motors are on hand (Dec. 31, 1924), but are not installed:

CLIFFS SHAFT MINE		
Top Tram (stator only)	50	
Signal System Motor-Generator Set	¼	
Spare Top Tram	50	
Underground Scraper Hoist	25	
" " "	25	
" " "	25	
" " "	25	
" " "	25	
" " "	25	
Shop Motor	7½	
		257¾ HP.
GENERAL STOREHOUSE		
Spare Motor-Generator Set	15	
" from Republic concrete mixer	5	
" General Electric pump	50	
" Westinghouse Motor-Generator Set	220	
" Pump from Lake Mine	75	
" from Stephenson plunger pump	250	
" " " centrifugal pump	275	
" " Salisbury compressor	150	
" " Lake Mine centrifugal pump	20	
" " Hard Ore #3 Shaft centrifugal pump	150	
" " " " " " plunger "	35	
" Auxiliary Air Compressor	2	
" General Electric	7½	
" from Holmes Mine crusher	100	
" " reclaimed Cliffs Shaft motor	50	
		1,404½
MAAS MINE		
Winze Pump	15	
		15
NEGAUNEE MINE		
Flywheel Hoist Set motor		350
MORRIS-LLOYD MINE		
Underground Haulage Set Motor	150	
Winze Plunger Pump (stored)	50	
" Triplex " "	50	
Ventilating Fan Motor from Barnes-Hecker	15	
Pump Motor	40	
McClure Plant centrifugal pump	50	
		355
AUSTIN MINE		
Top Tram		25
GWINN MINE		
Ventilating Fan (From Francis Mine)	7½	
Skip Hoist " " "	400	
Cage " " " "	400	
Shop " " "	5	
Top Tram " " "	50	
" " " " "	37	
Underground Haulage Converter " " "	150	
" Plunger Pump " " "	35	
		1,084½
MACKINAW MINE		
Quintuplex Pump	350	
Triplex "	75	
	425	
fwd.		3,916¾ HP.

brt. fwd.		3,916¾ HP.
STEPHENSON MINE		
Layne & Bowler Pump #2		350
REPUBLIC MINE		
Spare	15	
"	10	
"	30	
		55
ISHPEMING HOSPITAL		
Spare for Dumb Waiter		3
TOTAL		4,324¾ HP.

Spare motors on Mesaba Range; on hand Dec. 31st, 1924:

BOEING MINE		
Sump Pump		7½ HP.
CROSBY MINE		
Centrifugal Pump	50	
Pump Motor	85	
		135
HILL-TRUMBULL MINE		
Log Washer	25	
Conveyor	50	
Pump	20	
"	3	
Sump Pump	5	
" "	5	
Spare	3	
"	3	
		114
WADE MINE		
Pump	5	
"	5	
"	20	
"	5	
Ventilating Fan	15	
		50
TOTAL		306½ HP.

Total C.C.I.Co. load connected to General Power System -	32,849¼ HP.
" Outside " " " " " " -	2,810½ "
Breakdown service " " " " " -	695 "
TOTAL	36,354¾ HP.
Total connected load at Spies Mine -	1,644 HP.
" " " " Minnesota Mines -	2,929½ "
Total Spare Motors on hand 12/31/24 - Ishpeming Dist. -	4,324¾ "
" " " " " " - Minnesota Mines -	306½ "

The following direct current generators and exciters are installed and operating as needed:

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	JAN.1,1925 TOTALS
AU TRAIN WATER POWER PLANT				
Exciters (2)	34 KW.			34 KW.
CARP RIVER WATER POWER PLANT				
Exciters (2)	150			150
HOIST PLANT				
Exciter	17½			
"		37		
				54½
McCLURE PLANT				
Exciters (2)	110			110
MAAS PLANT				
Motor Driven Exciter	22½			
Turbo " "	22½			
Compressor Motor Exciters (2)	20			
				65
PRINCETON CENTRAL POWER PLANT				
Motor Driven Exciter	22½			
Turbo "	22½			
Compressor Motor Exciter	12			
				57
REPUBLIC MINE				
Exciter in #5 Engine House	7½			
" " Water Power Plant	17			
				24½
CLIFFS SHAFT MINE				
Compressor Motor Exciters (2)	20			20
HARD ORE & BROWNSTONE SUBSTATION				
Battery Charging Set	2			
Line Testing Set	½			
				2½
HOLMES MINE				
Compressor Motor Exciter	10			10
ATHENS MINE				
Nordberg Compressor Motor Exciter	10			
Flywheel Set Exciter	15			
Skip Hoist Generator	700			
Battery Charging Motor-Generator Set	½			
Ingersoll-Rand Compressor Motor Exciter	10			
				735½
NEGAUNEE MINE				
Skip Hoist Generator	400			
Cage " "	150			
Flywheel Set Exciter	25			
Exciters for Underground Pump Motors (2)	28			
Ingersoll-Rand Compressor Motor Exciter	10			
Nordberg " " "	10			
Bell Signal Set	½			
				623½
fwd.	1,849½ KW.	37 KW.	0	1,886½ KW.

MECHANICAL DEPARTMENT

	INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	JAN.1,1925. TOTALS
brt. fwd.	1,849½ KW.	37 KW.		1,886½ KW.
MORRIS MINE				
Ingersoll-Rand Compressor Motor Exciter	12			
Nordberg " " "	10			
Ingersoll-Rand " " "		10		
				32
FRANCIS MINE				
Compressor Motor Exciter (Sent to Spies)	10		10	
				0
MACKINAW MINE				
Compressor Motor Exciter	10			10
TOTAL	1,891½ KW.	47 KW.	10 KW.	1,928½ KW.
Underground haulage generators:				
ANGELINE MINE				
Motor-Generator Set (to Gen'l Storehouse)	100 KW.		100 KW.	0
CLIFFS SHAFT MINE				
Motor-Generator Set #1	100			
" " " #2	100			
				200
HOLMES MINE				
Converter	100			100
ATHENS MINE				
Converter	100			100
MAAS MINE				
Motor-Generator Set	100			100
NEGAUNEE MINE				
Motor-Generator Set	100			100
BARNES-HECKER MINE				
Rotary Converter	100			100
MORRIS-LLOYD MINE				
Motor-Generator Set	100			100
FRANCIS MINE				
Rotary Converter (Stored at Gwinn Mine)	100		100	0
GWINN MINE				
Motor-Generator Set	100			100
MACKINAW MINE				
Rotary Converter	100			100
PRINCETON CENTRAL POWER PLANT				
Motor-Generator Set	100			100
REPUBLIC MINE				
Battery Charging Set for Storage Battery Locomotives	20			20
TOTAL	1,320 KW.	0	200 KW	1,120 KW.

MECHANICAL DEPARTMENT

The following direct current motors are installed and operated as needed:

		INSTALLED TO JAN. 1, 1924	INSTALLED IN 1924	TAKEN OUT IN 1924	JAN. 1,1925 TOTALS
AU TRAIN WATER POWER PLANT					
Governor Control Motors	(2)	¼ HP.			¼ HP.
CARP RIVER WATER POWER PLANT					
Rheostat Control	(2)	¼			
Governor "	(2)	¼			½
McCLURE WATER POWER PLANT					
Valve Control	(2)	2			
Rheostat "	(2)	½			2½
CLIFFS SHAFT MINE					
Portable Hoist Motor		10			
Re-crushing Plant Conveyors	(2)	4			
Sturtevant Fan		1½			15½
HOLMES MINE					
Sturtevant Fans	(2)	3			3
ATHENS MINE					
Skip Hoist Motor		900			
Ventilating Fans	(2)	30			
" "	(4)		20		950
MAAS MINE					
Timber Hoist - 2nd Level		10			
" " - 4th "		10			
Bilge Pump		5			25
NEGAUNEE MINE					
Skip Hoist		500			
Cage "		200			
Timber Hoist - 9th Level		10			
" " -10th "		10			
Ventilating Fan		15			735
MORRIS MINE					
Ventilating Fan		15			15
GWINN MINE					
Hoist - 9th Level		15			
Ventilating Fan		15			
" "		15			45
PRINCETON MINE					
Bilge Pump		5			5
	TOTAL	1,776¾ HP.	20 HP.	0	1,796¾ HP.

Spare direct current motors on hand December 31st, 1924:

CLIFFS SHAFT MINE		
Motors		6½ HP.
MORRIS-LLOYD MINE		
Fan Motor from Barnes-Hecker	15	
Crane Motor	10	
Underground Loaders (2)	4	
		29
GWINN MINE		
Pump Motor		20
TOTAL		55½ HP.

Spare underground haulage generators on hand December 31st, 1924:

GENERAL STOREHOUSE		
Motor-Generator Set		150 KW.
" " " (from Angeline Mine)		100
MORRIS-LLOYD MINE		
Motor-Generator Set		100
TOTAL		350 KW.
GWINN MINE		
Rotary Converter (From Francis Mine)		100 "
		450 "

Spare generators and exciters on hand December 31st, 1924:

CLIFFS SHAFT MINE		
Signal Set		½ KW.
GENERAL STOREHOUSE & HARD ORE		
Old Hoist Exciter	22	
Motor-Generator Set used for battery charging in Hard Ore Shop	~~10~~	
		32
NEGAUNEE MINE		
Skip Hoist (armature only)		500 HP.
HOIST PLANT		
Spare exciter		18
TOTAL		50½ KW.

MESABA RANGE

Exciters and generators installed up to December 31st, 1924:

Boeing Mine	
Compressor Motor Exciter	6 K.W.

Underground haulage generators installed up to Dec. 31st, 1924:

BOEING MINE	
Motor-Generator Set	115 K.W.
HILL-TRUMBULL MINE	
Motor-Generator Set	55
WADE MINE	
Rotary Converter	100
TOTAL	270 K.W.

Direct current motors installed up to December 31st, 1924:

HILL-TRUMBULL MINE	
Feeder Motor	60 H.P.

Total Exciters and Generators installed to Dec. 31st, 1924 - 6 K.W.

" Underground Haulage Generators " " " " " - 270 K.W.

" Direct Current Motors " " " " " - 60 H.P.

SPIES MINE

Exciters installed up to December 31st, 1924:

Compressor Motor Exciter 10 K.W.

Underground haulage generators installed up to Dec. 31, 1924 - 150 K.W.

ISHPEMING DISTRICT

Total D.C. Generators and Exciters installed to 12/31/24 - 1,928½ K.W.

" Underground Haulage Generators " " " - 1,120 K.W.

" Direct Current Motors " " " - 1,796¾ H.P.

Total Spare D.C. Generators and Exciters on hand " - 50½ K.W.

" " Underground Haulage Generators " " " - 450 K.W.

" " Direct Current Motors " " " - 55½ H.P.

Spare Direct Current Motor Armature " " " - 500 H.P.

Substation transformers installed up to Dec. 31st, 1924:

33,000/2300 Volts	NO.	K.V.A.	PHASE	TOTAL K.V.A.
Brownstone Substation	3	400	1	1,200
Cliffs Shaft-Holmes Substation	5	500	1	2,500
Morris-Lloyd Substation	3	590	1	1,770
Barnes-Hecker "	3	250	1	750
Republic "	3	400	1	1,200
Maas "	6	590	1	3,540
Princeton "	3	590	1	1,770
Gwinn "	3	625	1	1,875
Munising "	3	200	1	600
McClure Plant	2	5,000	3	10,000
Carp "	3	1,900	1	5,700
Au Train "	1	1,250	3	1,250
			TOTAL	32,155 K.V.A.
13,000/2300 Volts				
Maas Substation	1	1,250	3	1,250
Hoist Plant	1	1,250	3	1,250
			TOTAL	2,500 K.V.A.
6,600/2300 Volts				
Carp Plant	6	185	1	1,110
Gwinn Substation	3	350	1	1,050
Mackinaw "	3	350	1	1,050
			TOTAL	3,210 K.V.A.

Transformers used for Underground Haulage installed to 12/31/24:

Athens Mine converter	3	35	1	105
Holmes " "	1	100	3	100
Barnes-Hecker "	1	110	3	110
~~Mackinaw~~ Stephenson Mine "	3	35	1	105
			TOTAL	420 K.V.A.

Distribution Transformers installed up to Dec. 31st, 1924:

2300/220-110 Volts	NO.	K.V.A.	PHASE	TOTAL K.V.A.
ANGELINE MINE				
Hoist Control	1	7½	1	
				7½
CLIFFS SHAFT MINE				
Office Lights	1	10	1	
" "	1	15	1	
Laboratory	1	5	1	
"A" Shaft Hoist	1	7½	1	
"B" " "	1	10	1	
Coal Crusher	2 (7½)	15	1	
Pump House Lights	1	1	1	
Crusher House Lights	2 (1)	2	1	
Crushers	3 (10)	30	1	
Underground Scrapers	2 (15)	30	1	
" "	3 (75)	225	1	
				350½
HARD ORE & BROWNSTONE				
Light & Power	1	15	1	
Light	1	¾	1	
Light & Power	1	7½	1	
Shop	1	30	1	
				53¼
HOLMES MINE				
Shop Power	3 (10)	30	1	
Engine House Lights & Power	1	5	1	
Skip Hoist Control	1	10	1	
Cage " "	1	10	1	
4th Level Pump House Lights	1	2	1	
Cage Bell Circuit	1	¾	1	
Skip " "	1	½	1	
Shaft House Lights	1	¾	1	
Pump " "	1	¾	1	
Change " "	1	¾	1	
Shaft " "	1	½	1	
Engine " "	1	7½	1	
				68½
LAKE MINE				
Engine House Lights	1	5	1	
Shaft Lights	1	¾	1	
				5¾
SALISBURY MINE				
Eng.Ho.Lights & Circulating Pump	1	5	1	
" " " " " "	1	2	1	
Hoist Control	1	7½	1	
Lights	1	½	1	
				15
			fwd.	500½

MECHANICAL DEPARTMENT

Distribution Transformers. (Cont'd)

	NO.	K.V.A.	PHASE	TOTAL K.V.A.
ATHENS MINE			brt. fwd.	500½
Crusher	3 (7½)	22½	1	
Machine Shop	2 (10)	20	1	
Surface Lights & Lab. Hot Plates	3 (10)	30	1	
Pump House Lights	1	5	1	
" " "	1	2	1	
100 G.P.M. Pump	1	40	3	
Signal System	1	1	1	
Engine House Lights	1	5	1	
" " "	1	4	1	
				129½
MAAS MINE				
Lights & Injection Pump	3 (10)	30	1	
Coal Crusher & Shop	2 (10)	20	1	
Signal System	1	½	1	
Top Tram Control	1	2	1	
4th Level Pump	3 (5)	15	1	
3rd Level Pump House	2 (5)	10	1	
Bell Signal at 55 Winze	1	1	1	
Cage Hoist Control	1	10	1	
Skip " "	1	2	1	
" " "	1	3	1	
Rock Tram "	1	1	1	
Crusher Lighting	1	2	1	
				96½
NEGAUNEE MINE				
Shop Light & Power	1	7½	1	
" " " "	2 (10)	20	1	
Engine House Lights & Power	2 (10)	20	1	
" " " " "	1	5	1	
Signal System	1	½	1	
Pump House Lights, etc.	3 (7½)	22½	1	
12th Level Pump	3 (5)	15	1	
Barn	1	5	1	
				95½
SOUTH JACKSON CRUSHING PLANT				
Hoist Brake	1	5	1	
Lights	1	2	1	
				7
BARNES-HECKER MINE				
Lights	1	5	1	
"	1	7½	1	
Top Tram Control	1	1	1	
Skip Hoist Control	1	10	1	
Cage " "	1	10	1	
Pump House Lights	1	1	1	
				34½
LLOYD MINE				
Lighting	1	3	1	
Cage Hoist Control	1	7½	1	
Skip " "	1	7½	1	
Water Supply Pump House Lights	1	2	1	
				20
			fwd.	883½

Distribution Transformers. (Cont'd)

	NO		K.V.A.	PHASE	TOTAL K.V.A.
brt. fwd.					883½
MORRIS MINE					
Cage Hoist Control & Lights	2	(5)	10	1	
Skip " " "	1		7½	1	
Signal System Lights	1		½	1	
Shop & Lights	3	(10)	30	1	
North Lake Pump & Lights	1		2½	1	
7th Level Pump House Lights	1		2	1	
Sinking Pump Trans. on Lake Pump	3	(100)	300	1	
					352½
SECTION 6 SHAFT					
Hoist Control	1		7½	1	
Lighting	2	(2)	4	1	
					11½
AUSTIN MINE					
Lighting	1		10	1	
Top Tram	2	(10)	20	1	
Shop	1		10	1	
					40
GWINN MINE					
Substation Lighting	1		1	1	
Cage Hoist Control	2	(5)	10	1	
Skip " "	1		7½	1	
Engine House Lights	1		10	1	
Shaft " "	1		1½	1	
7th Level Pump House Lights	1		4	1	
11th " " " "	1		1	1	
9th " "	3	(15)	45	1	
					80
GARDNER MINE					
Top Tram	3	(10)	30	1	
					30
MACKINAW MINE					
Machine Shop	2	(5)	10	1	
Hoist Control	1		7½	1	
Signal System	1		1	1	
Top Tram	3	(10)	30	1	
					48½
PRINCETON MINE					
Top Tram Lights	1		3	1	
#2 Pump House Lights	1		2½	1	
					5½
PRINCETON CENTRAL POWER PLANT					
Coal Crusher	3	(7½)	22½	1	
Power Plant Lighting	1		10	1	
Injection Pump	2	(15)	30	1	
Boiler Room Fan	2	(10)	20	1	
					82½
PRINCETON CENTRAL SHOPS					
Power & Light	2	(10)	20	1	
					20
				fwd.	1,554

Distribution Transformers. (Cont'd)

	NO.	K.V.A.	PHASE	TOTAL K.V.A.
brt. fwd.				1,554
PRINCETON DISTRICT LABORATORY				
Hot Plates	3 (10)	30	1	
				30
STEPHENSON MINE				
Rock Tram	3 (10)	30	1	
Skip Hoist Control	1	10	1	
Cage " "	1	10	1	
				50
REPUBLIC MINE				
G. E. Tram	2 (15)	30	1	
Lighting	3 (2)	6	1	
" & Pump	1	10	1	
" " "	1	10	1	
Engine House Lights	1	7½	1	
Hoist Control	1	25	1	
Top Tram Controls	2 (1)	2	1	
Office Lights	1	3	1	
Motor-Generator Set & Pumps	3 (7½)	22½	1	
Pascoe Shaft Hoist Control	1	7½	1	
#9 Shaft - 3rd and 4th Levels	3 (20)	60	1	
Power & Lights on Surface	3 (10)	30	1	
Water Power Plant Lights	1	1½	1	
Screen Motor & Lights	3 (3)	9	1	
Portable Hoist	1	10	1	
				234
AU TRAIN WATER POWER PLANT				
Power Plant Lights	1	1	1	
Operator's Dwelling Lights	1	2	1	
Control	1	2	1	
Power & Lights, Dixon Location	2 (5)	10	1	
" " " Grand Island	2 (5)	10	1	
				25
CARP RIVER WATER POWER PLANT				
Power & Light	1	10	1	
" " "	1	20	1	
Pump	2 (1)	2	1	
				32
HOIST PLANT				
Power & Light	1	7½	1	
" " "	2 (5)	10	1	
				17½
McCLURE PLANT				
Power & Lights	2 (10)	20	1	
				20
	GRAND TOTAL			1,962½ K.V.A.

MECHANICAL DEPARTMENT

Spare Transformers on hand Dec. 31st, 1924:

	NO.	K.V.A.	PHASE	TOTAL KVA.
GENERAL STOREHOUSE				
General Electric	1	15	1	
Fort Wayne	1	5	1	
Allis-Chalmers (from Lake Mine)	1	7½	1	
General Electric	2	(5) 10	1	
General Electric	5	(15) 75	1	
" "	1	3	1	
				115½
ANGELINE MINE				
General Electric	1	1	1	
				1
MORRIS-LLOYD MINE				
General Electric	1	15	1	
" "	1	15	1	
" "	1	15	1	
" "	1	15	1	
				60
GWINN MINE				
General Electric (Sump Pump)	1	3	1	
				3
REPUBLIC MINE				
General Electric	3	(10) 30	1	
" "	1	4	1	
				34
		GRAND TOTAL		213½ K.V.A.

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			CLIFFS SHAFT MINE		
1910	8 895	252 793	904 379 312	3 577	156 948 550
1911	8 095	246 334	898 424 112	3 647	165 101 640
1912	8 047	276 211	810 020 228	2 932	218 555 480
1913	8 027	295 105	833 987 419	2 826	276 582 240
1914	7 496	316 986	1 054 320 348	3 326	281 392 090
1915	5 181	347 955	889 280 382	2 555	283 489 900
1916	5 226	388 090	878 041 710	2 262	398 818 855
1917	4 500	377 177	885 993 944	2 349	345 847 725
1918	5 135	382 804	861 374 720	2 276	315 252 828
1919	3 494	277 901	907 895 024	2 402	298 889 689
1920	3 854	334 347	872 225 408	2 638	262 308 003
1921	2 094	67 454	273 648 228	4 057	274 901 402
1922	891	138 702	419 382 000	3 023	399 874 439
1923	2 359	305 727	734 645 710	2 403	377 383 675
1924	2 224	309 996	784 461 617	2 530	388 257 675
			HOLMES MINE		
1916	729	32 951	--- --- ---	- ---	--- --- ---
1917	739	90 225	425 227 500	4 712	--- --- ---
1918	700	130 295	368 456 686	2 840	--- --- ---
1919	947	173 178	521 145 000	3 009	(8 Months) 25 471 515
1920	682	260 118	448 965 000	1 726	26 099 690
1921	832	191 147	275 057 000	1 439	38 456 053
1922	911	231 306	346 466 000	1 497	73 009 389
1923	704	289 984	431 820 000	1 489	82 640 803
1924	879	170 228	296 460 000	1 741	75 235 295

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & Rock HOISTED	CU. FT. AIR USED	CUBIC FT.AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			HARD ORE #3 HEATING PLANT		
1915	883				
1916	922				
1917	1,038				
1918	955				
1919	970				
1920	801				
1921	1,014				
1922	1,182				
1923	1,033				
1924	1,271				
			BARNES HECKER-MINE		
					(8 Months)
1919	603	29,731	--- --- ---	- ---	5 481 940
			(From Morris-Lloyd)		
1920	410	62 426	272 817 000	4 370	137 026 242
1921	120	3 712	38 406 000	1 034	585 904 565
1922	302	32 068	156 250 000	4 872	546 633 174
1923	467	38 536	153 900 000	3 993	391 860 539
1924	465	77 868	247 500 000	3 178	324 482 326
			MORRIS-LLOYD MINE		
1914	615	242 476	655 199 000	2 701	363 889 057
1915	533	298 816	722 622 750	2 418	322 295 660
1916	1 004	304 849	--- --- ---	- ---	320 074 400
1917	886	296 589	667 908 000	2 370	319 198 700
1918	959	299 360	681 964 000	2 378	315 454 220
1919	1 132	313 887	936 264 700	2 982	340 883 140
1920	971	283 400	802 952 000	2 832	311 061 125
1921	848	234 809	681 918 000	3 067	321 064 176
1922	931	241 065	596 225 500	2 473	276 149 791
1923	1 031	273 124	826 038 000	2 460	267 210 477
1924	894	229 968	581 573 000	1 659	221 874 604

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			ATHENS MINE		
1914	231	7 404	120 048 750	- ---	--- --- ---
1915	385	21 245	242 196 750	- ---	--- --- ---
1916	419	26 930	222 840 000	- ---	--- --- ---
1917	277	23 988	211 612 500	- ---	--- --- ---
1918	609	101 394	498 600 000	- ---	--- --- ---
1919	740	155 643	414 045 000	2 660	85 503 850
1920	593	214 601	505 035 000	2 353	82 794 824
1921	515	177 065	359 055 000	2 027	73 114 028
1922	683	193 711	456 615 000	2 357	86 235 707
1923	971	246 704	635 535 000	2 576	103 329 157
1924	685	246 352	581 130 000	2 359	116 161 813
			NEGAUNEE MINE		
1908	11,294	300 007	210 799 982	696	638 488 540
1909	9 088	316 072	263 322 702	911	623 789 512
1910	7 913	364 111	361 923 373	993	610 209 058
1911	7 805	368 352	599 630 043	1 627	634 100 040
1912	8 003	298 308	825 468 516	2 767	696 210 397
1913	7 647	368 956	741 224 169	2 008	789 153 091 (#2 Shaft)
1914	5 269	337 792	613 144 000	1 798	395 877 353
1915	1 703	404 020	363 242 060	933	--- --- ---
1916	1 223	526 237	474 099 050	900	--- --- ---
1917	1 414	548 083	455 525 250	831	780 000 000
1918	1 293	524 869	443 996 750	845	828 575 874
1919	1 320	525 894	591 104 600	1 185	603 198 543
1920	1 095	569 895	729 139 000	1 279	610 132 854
1921	838	258 967	306 315 000	1 183	597 401 853
1922	1 075	300 041	414 765 000	1 382	613 603 672
1923	996	383 914	655 695 000	1 708	582 912 109
1924	1 156	322 705	558 980 000	1 732	502 525 354

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			MAAS MINE		
1909	6 494	141 510	291 338 833	2 095	231 101 590
1910	8 219	196 052	541 169 843	2 760	209 688 862
1911	7 252	--- ---	646 245 479	- ---	--- --- ---
1912	6 502	55 603	355 459 673	- ---	--- --- ---
1913	8 903	287 784	915 881 473	3 182	--- --- --- (3 Months)
1914	6 819	213 423	720 319 949	- ---	8 336 357
1915	4 325	85 150	486 626 678	- ---	190 534 750
1916	8 062	272 802	763 134 066	2 797	363 273 050
1917	8 656	333 290	879 808 672	2 639	337 467 390
1918	9 351	312 634	935 128 335	2 991	510 265 180
1919	9 639	343 810	644 597 449	1 874	573 373 848
1920	5 097	351 521	571 224 659	1 625	513 176 403
1921	735	211 616	373 275 000	1 764	517 238 661
1922	628	219 776	458 010 000	2 083	516 431 109
1923	548	228 528	472 220 000	2 066	509 330 141
1924	682	224 291	470 880 000	2 099	522 683 088
			SOUTH JACKSON MINE		
1913	483	1 940	--- --- ---	- ---	--- --- ---
1914	0	15 281	--- --- ---	- ---	--- --- ---
1915	0	56 026	--- --- ---	- ---	--- --- ---
1916	0	0	(No ore taken out)	- ---	--- --- ---
1917	0	46 994	--- --- ---	- ---	--- --- ---
1918	0	15 879	13 203 000	931	--- --- ---
1919	0	56 840	--- --- ---	- ---	--- --- ---
1920	162	69 222	30 001 500	434	--- --- ---
1921	48	5 051	1 935 000	383	--- --- ---
1922	88	16 101	4 590 000	- ---	--- --- ---
1923		12 812	5 850 000	- ---	--- --- ---
1924	119	33 262	13 680 000	411	--- --- ---

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			AUSTIN MINE		
1916	- ---	23 697	--- --- ---	- ---	--- --- ---
1917	- ---	54 167	--- --- ---	- ---	--- --- ---
1918	- ---	759	(Mine flooded in January)		
1919	- ---	19 212	--- --- ---	- ---	--- --- ---
1920			(Mine idle entire year)		
1921			(Mine idle entire year)		
1922	- ---	56 429	126 617 590	2 243	--- --- ---
1923	14	93 238	--- --- ---	- ---	--- --- ---
1924	- ---	52	--- --- ---	- ---	--- --- ---
			GWINN MINE		
1916	871	186 839	--- --- ---	- ---	131 783 700
1917	976	191 080	--- --- ---	- ---	148 022 900
1918	844	177 051	--- --- ---	- ---	168 172 800
1919	1 132	154 002	--- --- ---	- ---	199 404 200
1920	921	115 497	(Air supplied by Francis Mine)		165 004 020
1921	386	48 216	--- --- ---	- ---	111 928 220
1922	15	42	(Air supplied by Francis Mine) 18 629 865	- ---	102 326 460
1923	5	194	(Air supplied by C.P.P.) (Mine idle entire year)		94 461 920
1924	0	205	(Mine idle entire year)		89 602 860
			PRINCETON MINE		
1916	105	2 636	--- --- ---	- ---	136 569 170
1917	101	734	--- --- ---	- ---	109 949 035
1918	334	182 760	--- --- ---	- ---	112 926 605
1919	468	219 230	--- --- ---	- ---	131 496 940
1920	476	184 912	--- --- ---	- ---	129 512 469
1921	275	105 674	--- --- ---	- ---	111 468 005
1922	0	108	18 629 865	- ---	116 542 468
1923	6	0	(Air supplied by C.P.P.) (Mine idle entire year)		92 190 881
1924	6	--- ---	(Mine idle entire year)		81 134 449

COMPARATIVE TABLES

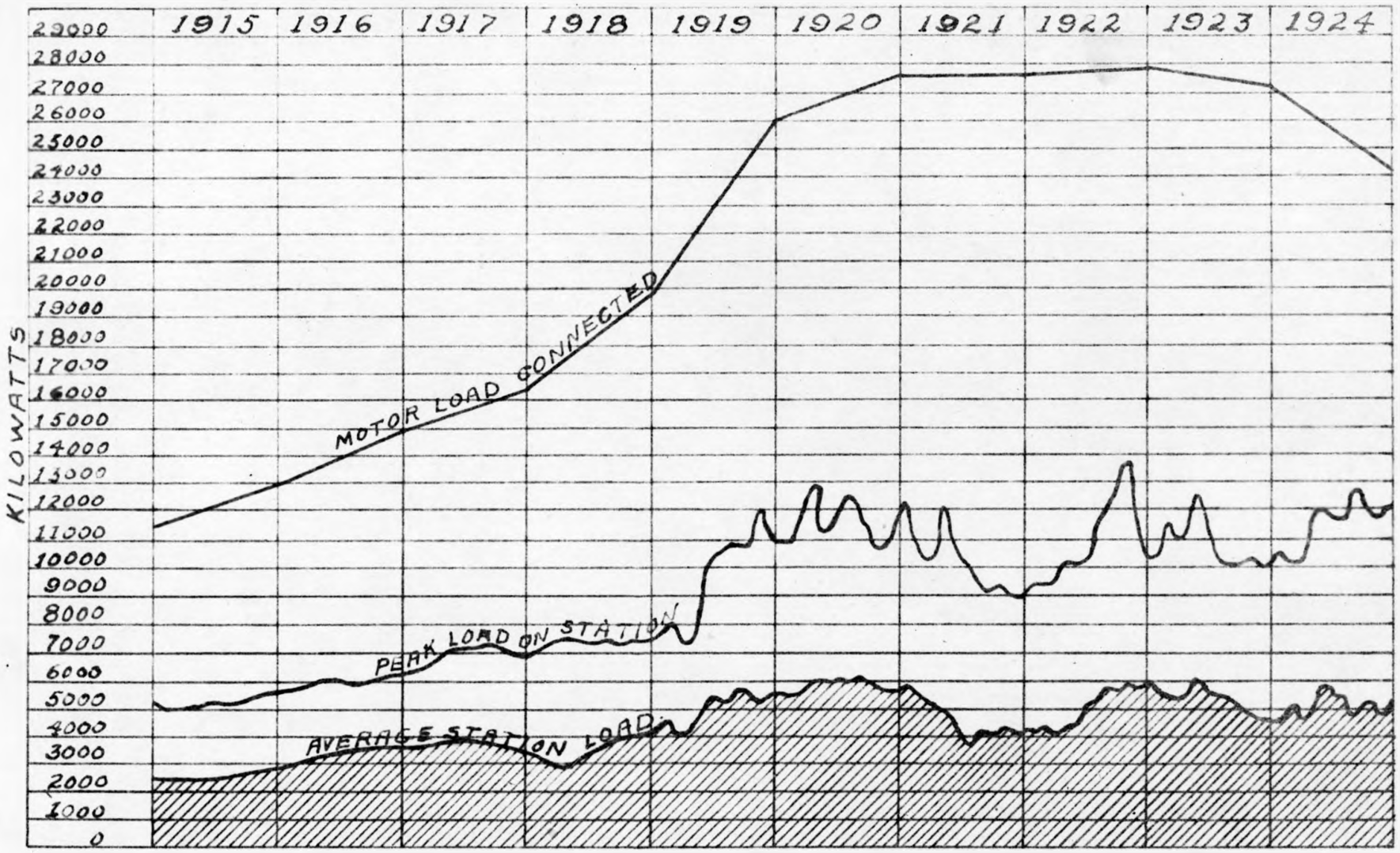
YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			PRINCETON CENTRAL POWER PLANT		
			(Output)		
1911	7 493		819 304 399		
1912	4 104		661 681 550		
1913	2 360		--- --- ---		
1914	5 900		--- --- ---		
1915	7 092		--- --- ---		
1916	5 322		1 375 169 052		
1917	2 121		1 051 739 302		
1918	6 279		971 385 234		
1919	3 614		1 236 341 627		
1920	2 598		1 264 675 500		
1921	3 754		839 610 000		
1922	1 630		620 995 500		
1923	7 405		623 700 000		
1924	3 149		513 445 500		
			PRINCETON PUMPING STATION		
1911	497				153 854 205
1912	569				158 661 990
1913	633				172 438 180
1914	675				184 799 040
1915	794				202 554 240
1916	814				224 152 095
1917	986				275 717 100
1918	917				262 232 600
1919	920				237 147 315
1920	890				233 913 900
1921	259				309 992 940
1922	71				313 859 370
1923	71				315 072 000
1924	75				316 224 000

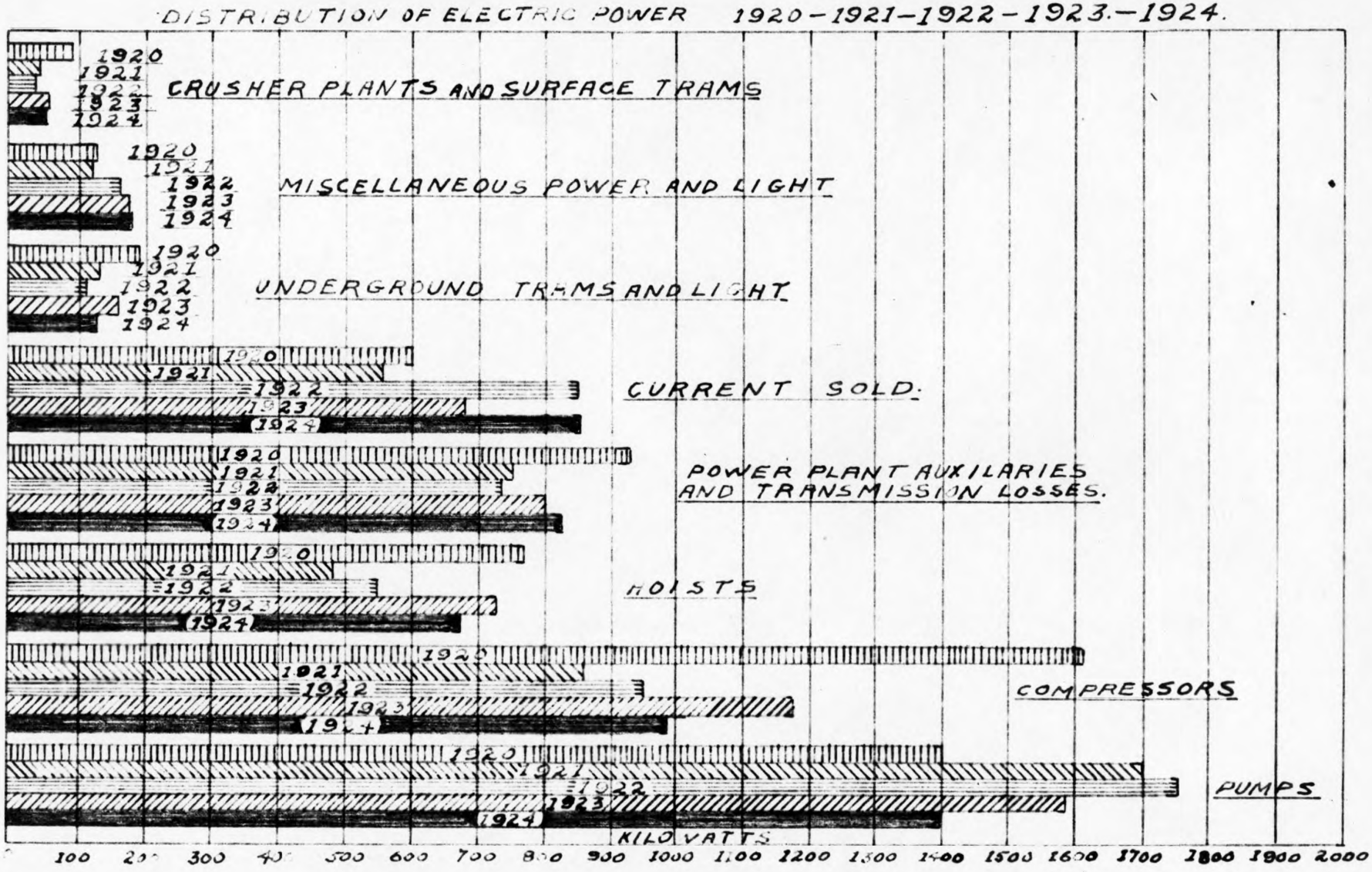
COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			STEPHENSON MINE		
1914	2 281	238 739	--- --- ---	- ---	772 327 870
1915	2 220	230 575	--- --- ---	- ---	763 638 450
1916	1 658	327 395	--- --- ---	- ---	785 501 510 (11 Months)
1917	3 073	256 756	--- --- ---	- ---	961 713 000
1918	1 560		(Mine flooded in December 1917)		
1919	724	1 662			
1920	2 064	205 366			1 381 633 440
1921	2 163	219 145			1 215 685 840
1922	1 876	221 559	413 913 500	1 868	1 258 504 848
1923	868	266 211			1 234 675 108
1924	1 363	257 389	1 131 055 767		1 131 055 767
			CROSBY MINE		
1915	250	--- ---	--- --- ---	- ---	--- --- ---
1916	2 069	127 373	--- --- ---	- ---	--- --- ---
1917	2 504	300 142	--- --- ---	- ---	--- --- ---
1918	3 097	255 787	--- --- ---	- ---	--- --- ---
1919	2 578	208 449	--- --- ---	- ---	--- --- ---
1920	1 280	263 478	--- --- ---	- ---	--- --- ---
1921	72	89 754	--- --- ---	- ---	--- --- ---
1922	362	-- ---	--- --- ---	- ---	--- --- ---
1923	---	-- ---	--- --- ---	- ---	--- --- ---
1924	---	-- ---	--- --- ---	- ---	--- --- ---
			WADE-HELMER MINE		
1921	855	70 578	--- --- ---	- ---	--- --- ---
1922	5	-- ---	--- --- ---	- ---	--- --- ---
1923	6	-- ---	--- --- ---	- ---	--- --- ---
1924	320	21 469	--- --- ---	- ---	--- --- ---

COMPARATIVE TABLES

YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT. AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			BOEING MINE		
1920	491	34 428	--- --- ---	- ---	--- --- ---
1921	212	26 190	--- --- ---	- ---	--- --- ---
1922	132	266 862	--- --- ---	- ---	--- --- ---
1923	3 851	501 895	--- --- ---	- ---	--- --- ---
1924	3 870	521 792	--- --- ---	- ---	--- --- ---
			HILL-TRUMBULL MINE		
1922		352 651	--- --- ---	- ---	--- --- ---
1923	3 829	311 012	--- --- ---	- ---	--- --- ---
1924		322 823	--- --- ---	- ---	--- --- ---
			REPUBBIC MINE		
1918	6 780	172 955	1 141,454 000	6 605	--- --- ---
1919	5 709	185 383	1 228 202 000	6 625	34 770 380
1920	3 972	181 058	1 347 129 000	7 440	35 559 650
1921	1 436	79 761	954 242 000	11 964	35 132 398
1922	1 302	113 108	1 112 788 000	9 838	41 620 635
1923	1 816	137 181	1 279 058 000	9 329	37 204 860
1924	2 668	87 668	1 158 600 000	13 215	33 955 020
			SPIES MINE		
1919	962	71 000	--- --- ---	- ---	--- --- ---
1920	377	93 519	--- --- ---	- ---	--- --- ---
1921	350	46 878	87 360 300	- ---	--- --- ---
1922	192	5 432	--- --- ---	- ---	--- --- ---
1923	495	19 732	--- --- ---	- ---	--- --- ---
1924	272	55 953	--- --- ---	- ---	--- --- ---


1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
KILOWATTS
29000
28000
27000
26000
25000
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
MOTOR LOAD CONNECTED
PEAK LOAD ON STATION
AVERAGE STATION LOAD



MECHANICAL DEPARTMENT

1924

JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

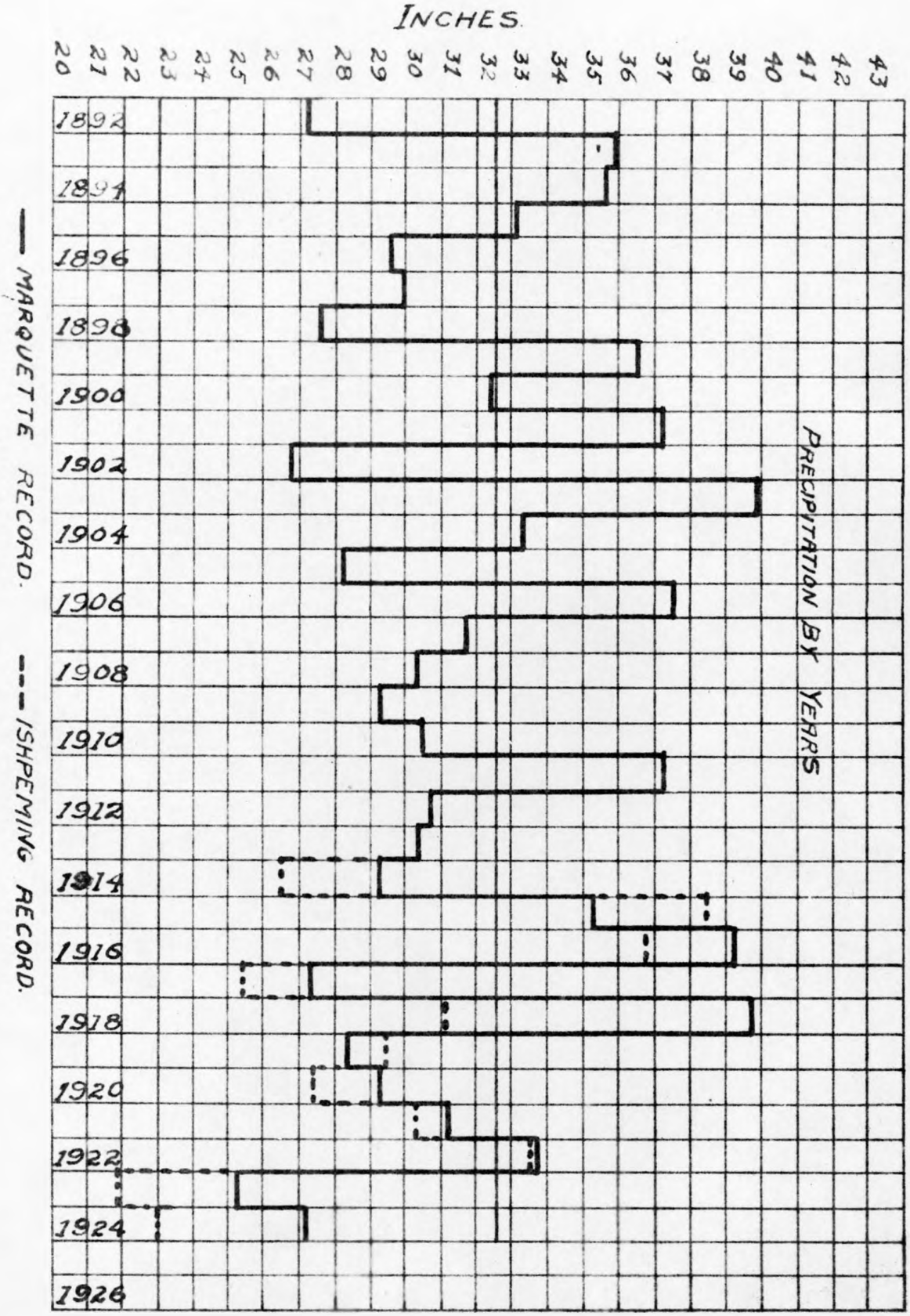
KILOWATT EQUIVALENT - AVERAGE LOAD - KILOWATTS

6000
5000
4000
3000
2000
1000
0
1000
2000
3000
4000
5000
6000

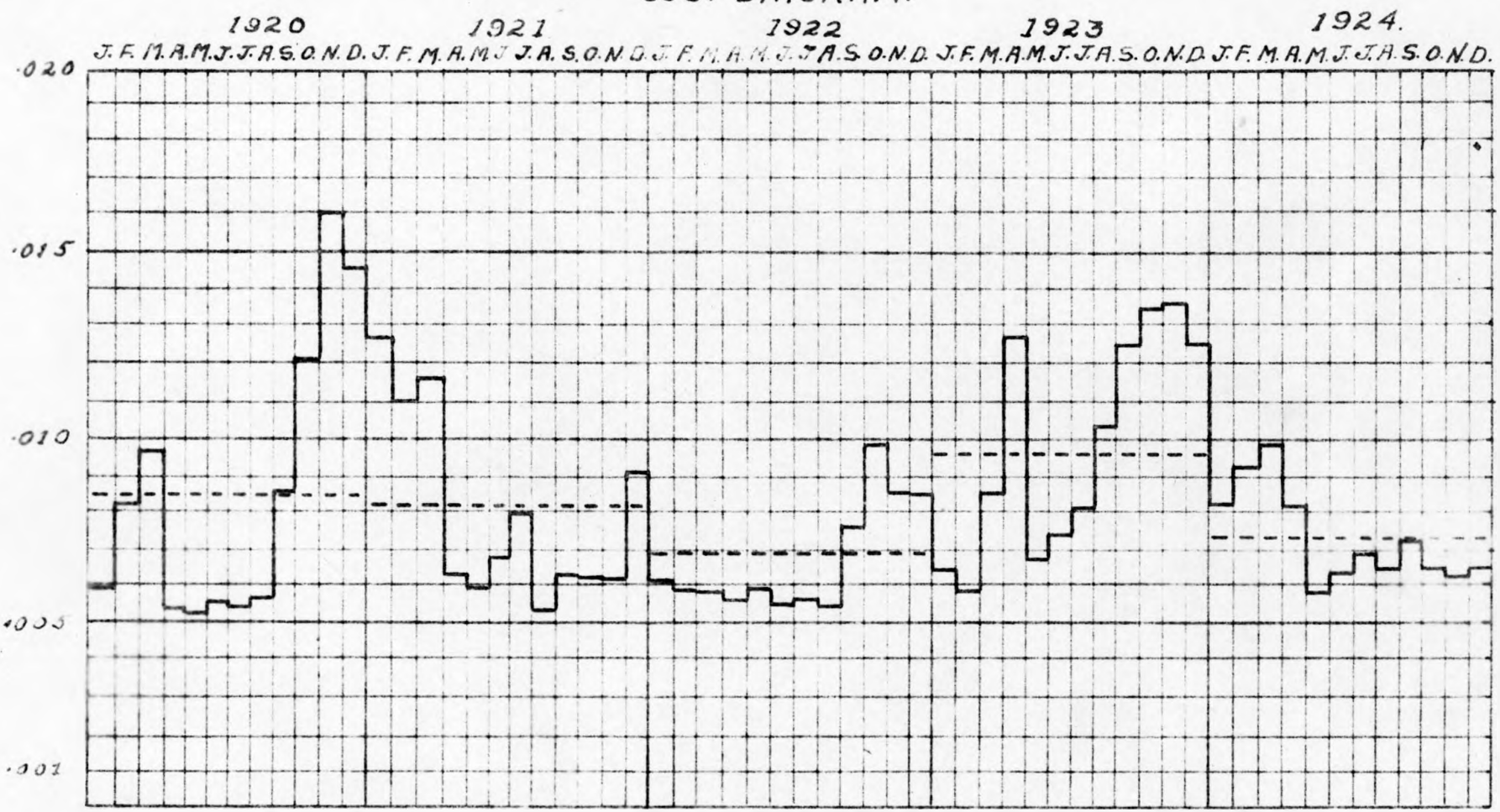
HOIST
AUTRAIN
CARR
HOIST
McCLURE
STEAM
McCLURE
CARR

CURRENT MADE BY WATER POWER.
CURRENT MADE BY STEAM POWER.
WATER LOST BY OVERFLOW.

MECHANICAL DEPARTMENT


INCHES.
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
1892
1894
1896
1898
1900
1902
1904
1906
1908
1910
1912
1914
1916
1918
1920
1922
1924
1926
PRECIPITATION BY YEARS
— MARQUETTE RECORD. --- ISHPEMING RECORD.

COST DIAGRAM.



MECHANICAL DEPARTMENT

495

ANNUAL REPORT

OF THE

SAFETY DEPARTMENT.

1924

The Annual Report of the Safety Department for 1924 is herewith given under the following subjects; fatal, serious and slight accidents, safety inspection, special safety precautions, safety conditions at the mines, first aid and mine rescue work and training, and statistical tables. Mine inspection was directed by William Conibear, first aid and mine resuce training was given by J. Henry Williams and the clerical work was performed by Miss Elsie Baker.

Fatal Accident Record.

Five men were killed at our mines last year. Two occurred at the Athens and one each at the Cliffs-Shaft, Morris-Lloyd and Boeing mines. Two fatalities were caused by falls of ground, two by mechanical haulage and one by a workman falling down a raise. The Central Safety Committee classified the haulage accidents preventable and the others were regarded as trade risks, although this classification for the fatality caused by a workman falling down a raise was not entirely satisfactory. It is very probable that if a similar accident occurs again it will be classified preventable, as safety belts are now provided for men who repair raises. The fatalities that were caused by falls of ground occurred at the Boeing and Morris-Lloyd mines. The Boeing mine accident was in a timbered drift, on a sub-level under a very heavy over-burden of sand and gravel, which crushed the drift without warning. The Morris-Lloyd mine fatality occurred in a stope that was just being developed above a main level. The ground was heavy and broke in large pieces. As a miner was engaged in trimming the back, shortly after a blast, he was struck by a chunk of ore. These places had been inspected by the mining captains a short time before

the accidents occurred and were considered safe.

It is to be regretted that we sustained two deaths by the operation of underground locomotives. We cannot however expect to eliminate all accidents by this cause. The prevention of many accidents depends largely upon all employees observing habits of caution in the daily routine of their occupations, but occasionally some men are thoughtless or reckless and accidents result thereby. It has been the Company's policy in the past to deal leniently with men who have not been as careful of their safety as they should have been, but recently when instances of this kind have occurred more drastic action was taken by suspending offenders a week or ten days to remind them and other workmen that such action will not be tolerated. This method of disciplining workmen has been used several years by the Oliver Iron Mining Co. and Pickands, Mather & Co.

There were employed in the mines last year, approximately 2,650 employees on the basis of 300 working days per man. This number is subject to slight alteration due to the fact that this report is being made shortly after the first of the year when complete figures for all the mines are not available. The five accidents give a fatality rate of 1.88 per 1000 men employed. Our annual average rate since 1911, when safety work was begun, has been 2.35 per 1000 employees. This is the seventh year during this period that the annual rate has been below the average for the entire period. The average annual fatality rate from 1898 to 1910, inclusive, was 4.95 per 1000 men employed. Table XI. gives a comparison of the fatality rates of the coal and metal mines of the United States, Michigan and Minnesota.

Description of Fatal Accidents.

Number One.

Joseph Harrington, a locomotive brakeman, was injured at the Cliffs-Shaft mine, 7:55 a. m., January 28th, 1924, which resulted in his death the following day.

The locomotive operator, Charles Gustafson, was pushing a train of

empty cars from the 10th level station,"A"shaft, following miners who were going to their working places. At the time of the accident Gustafson was watching the men ahead and Harrington was riding on the end of the locomotive. Resting on the locomotive were several bundles of drills, which were being transported for the miners, Shortly after leaving the shaft, a bundle of drills rolled over, struck the side of the drift and knocked Harrington off the locomotive. Gustafson stopped the train as soon as he saw what had occurred. Harrington was able to walk to the shaft station, and was immediately taken to surface. He walked to the change house and insisted on going home, although a sleigh was provided to take him to the hospital. A physician was sent to his house, and an examination showed that he was ruptured. He refused to be taken to the hospital although he was in a critical condition. Late in the evening of the same day he was taken to the Ishpeming Hospital where an operation was performed at 10:30 p. m., but peretonitis had set in. He survived during the night but died the following morning. It was reported that if he had gone to the hospital immediately after the accident the chances for recovery were fairly good.

Harrington was of Irish descent, single, aged 33 years. The accident was classified preventable by the Central Safety Committee, because too many bundles of drills had been piled on the locomotive. In order to prevent a repetition of a similar accident, pins have been placed on both sides of locomotives to prevent drills or other material from rolling off.

Number Two.

William Prout, a timberman, was killed at the Athens mine, February 18th, 1924, by falling 90 feet in a raise.

Prout and his partner, Albert Warren, were changing the partition between the ladder compartment and the timber slide of the raise to provide more room in the timber slide. Work had been started at the bottom of the raise and they were near the top when the accident occurred. Before the partition planks were removed at an elevation, a staging was placed across the raise, consisting of a 2-inch board, 4 feet, 4 inches long and 8 inches wide.

It was bevelled at the end to fit between the cribbing, and wedges were driven to hold it in position.

When the accident occurred these men had completed removing the second set of planks below a sub-level where the work was to be finished. Warren was climbing the ladder and had just reached the sub-level when he heard a noise. Looking down the raise he saw that Prout had fallen. Warren did not know whether Prout was standing on the stage or the ladder when he started to climb to the sub-level and did not know what caused his partner to fall. Prout's axe and the staging plank were found at the bottom of the raise. He may have started to remove the plank and while doing this lost his balance.

In order to prevent a repetition of a similar accident, safety belts have been provided for men when repairing or cleaning raises, although this accident was classified unavoidable. Prout was English, married, aged 35.

Number Three.

Steve Pavich, a miner, was injured at the Boeing mine, 9:30 a. m., February 26th, 1924, which resulted in his death 3:00 o'clock a. m., March 3rd, 1924.

Pavich and his partner, Mike Chobek, had just started a new slice on a sub-level not far beneath a heavy sand and gravel over-burden. The first set of timber in this new drift was set up, blocked and carried back poles. The miners were preparing to put up the second set of timber. When the accident occurred, Pontus Johnson, a miner who worked close by, came into the place to borrow powder. Johnson stated that he was there about a minute, when the place caved without any warning. He grabbed Chobeck by the coat and pulled him across the chute and to safety. Pavich was caught under falling timber and ore.

Captain Prudom immediately had supervision of the rescue work. Pavich was extricated after several hours work. It was thought that he had a fair chance to recover but due to the heavy pressure he had suffered to his spinal column his injuries proved fatal.

Pavich was a Croatian, single, aged 29 years. The accident was classified a trade risk.

Number Four.

William Remillard, a timberman, was instantly killed at the Athens mine, 11:40 a. m., May 23rd, 1924, by being crushed between a locomotive and the timber under a chute.

Remillard worked on a sub-level above the 6th level the day the accident occurred. At twenty minutes to twelve he left the sub-level and climbed the raise to the main level. A locomotive train was on the track of the main level when Remillard reached the bottom of the raise, and it was about to proceed to the shaft. Without notifying the locomotive crew, Remillard stepped between two cars, opposite the bottom of the ladder, to reach the other side of the drift. As he did this the train started. Mark Dixon, a shift boss, and Isaac Hulkoff, a timber trammer, were standing on the other side of the track. Dixon yelled to Remillard a warning and at the same time waved his light to the locomotive operator to stop the train. Remillard, seeing his danger, attempted to step back, at the same time replying that he was all right. Dixon shouted to him: "You are not all right." Almost immediately Remillard was squeezed between a car and the chute. The motorman heard Dixon's stop signal and stopped the train before it had moved the length of the car, but he was not in time to avoid the accident.

The shift boss and the motorman both testified that they had warned Remillard on several occasions to keep away from the cars. On reaching main levels, when climbing down raises, miners must use the same precaution as pedestrians when approaching railroad crossings if danger is to be avoided.

Remillard was of French descent, aged 41 years, and is survived by a wife and three children. It was a preventable fatality.

Number Five

George Salmi, a miner, was killed by a fall of ground at the Morris-Lloyd mine, September 20th, 1924.

Salmi and his partner, John Tyni, were working a small shrinkage stope that had just been opened in a small lense of ore above the seventh level.

On the day of the accident they drilled a number of holes in the back of the stope and blasted them at noon. After lunch Tyni stayed on the level to blast a chunk in one of the chutes and told his partner to wait so they could go up in the stope together. Salmi asked where the sharp drills were, and getting them, went up a ladderway about 20 feet and into a drift to the stope, where he left the drills. He then went into the stope. After blasting the chunk, Tyni went up the stope but he did not see his partner's light. John Korponen, another miner, followed Tyni. They found Salmi lying on the ground, unconscious and a small amount of ore on his legs. They took him out of the stope immediately but he died in a few minutes.

Salmi's pick was found by his side and it was apparent that he had started to trim the back of the stope and was caught by a fall of ground. The mining captain and foreman were in the stope at 11:00 a. m., the same day and they reported it was in safe condition.

Salmi was a Finn, aged 37 years,and married. His death was considered a trade risk.

Table I.

Classification of Fatal Accidents 1911 to 1924, inclusive.

By the Central Safety Committee.

I. Trade Risk			49	
II. Negligence of Company:				
	Violation of Rules	4		
	Failure to Provide Safety Devices	4		
	Improper Method of Doing Work	3		
	Failure to Instruct Men	1		
	Failure to Provide Tools	1	13	
III. Negligence of Workmen:				
A. Injured Men:	Improper Method of Work	7		
	Carelessness	6		
	Violation of Rules	4		
	Failure to Use Tools or Appliances	2		
	Failure to Use Safety Devices	1	20	
B. Other Workmen:	Improper Method of Work	9		
	Violation of Rules	3		
	Carelessness	2	14	96.

Table II.

Showing number of fatalities and rates per 1000 employees for thirteen years prior to safety work and for fourteen years of Safety Work.

Year	Fatalities	Rate	Year	Fatalities	Rate
1898	6	5.63	1911	5	1.89
1899	4	3.41	1912	4	1.71
1900	4	2.80	1913	11	4.12
1901	9	6.83	1914	10	4.10
1902	8	5.38	1915	5	2.15
1903	8	5.15	1916	8	2.61
1904	4	2.97	1917	6	1.73
1905	12	6.54	1918	13	3.45
1906	10	4.13	1919	11	2.79
1907	17	5.97	1920	5	1.21
1908	6	2.52	1921	6	2.60
1909	13	5.15	1922	1	.43
1910	20	6.88	1923	6	2.19
			1924	5	1.88
	121	4.95		96	2.35
Average Tons of ore mined per fatality		176,356			394,360

Serious and Slight Accidents.

The serious and slight accidents that occur year after year with respect to causes, frequency and severity rates show slight fluctuations. So regular and constant have been the principal causes of accidents in the past years that if one could accurately forecast the number of men that would probably be employed during a forecoming year, the number of men that probably would be injured could be fairly accurately estimated. It is frequently stated by prominent safety experts that 80% of all accidents are preventable, but practical means by which this desideratum can be obtained are not given. The following figures illustrate the similarity of the accidents that are occurring.

	1921	1922	1923	1924
1. Falls of ground.	79	82	86	83
2. By squeezing finger, hand or foot between chunks of ore, pieces of timber, etc.	45	48	54	56
3. By strains or sprains.	41	46	23	18
4. By chunks rolling down pile, off cars, etc.	27	27	31	27
5. By stumbling or slipping.	16	13	29	29

	1921.	1922	1923.	1924.
6. By tools or material falling.	15	17	25	26
7. Shaft accidents.	1	3	4	2
8. Use of explosives.	1	2	0	0

Mining is an occupation that demands strenuous muscular effort, which frequently is exerted under unfavorable conditions. Strains, sprains, abrasions and lacerations are often sustained because of these factors. It is not practical to prohibit the handling of large chunks of ore and rock or to always maintain drifts so that men are not obliged to drag timber through small openings. Our miners work by contract, which is productive of efficiency and gives them higher wages than is paid at mines where the Company system is in vogue. Thus many men exert themselves to capacity and, as xx occasionally happens, difficulities are encountered which delay the progress of a day's work and necessitates a "speeding-up" in order to provide a satisfactory working place for the succeeding day. There can be no question that skillful employees are sometimes injured because in their eagerness to perform what they consider a standard day's work they become unconscious of danger that would not be overlooked if a failure to perform a definite amount of work made no difference in their wages. Theoretically, efficiency and safety should be cooperative factors but practically they often prove to be otherwise

The severeity rate of our accidents last year is slightly higher than the rate for 1923 due to the mines having been idle two days a week, whereas the time lost by accidents continued until injured men returned to work. Our fatal, serious and slight accidents have always been less than those reported by the Bureau of Mines in its annual reports of the metal mining industry of the entire country. This is not only true if compared to the mining industry at large, but also of the iron and copper mines of Michigan and Minnesota and the metal mines of other states. 78% of the total number of the accidents for 1924 were classified trade risk by the Central Safety Committee, which corresponds with the classification of accidents for 1923.

It is apparent that the accident frequency rate of a mine is related

to its mining conditions. The Boeing mine sustained a high frequency rate on the basis of the number of men employed. The labor turn-over at this mine is large, which is a factor that should be considered in estimating this poor record. This mine and the Athens mine head the list in the number of accidents that occurred by falls of ground. The Athens mine ore body is treacherous and is associated with foot and angle walls of similar character. Skillful mining and constant supervision are very essential to eliminate these accidents. One-half of the Cliffs-Shaft mine accidents were caused by handling of large chunks of ore and rock, either at working places or in the transportation of the same. Similar causes were responsible for one-half of the Republic mine injuries. These mines also suffered accidents by those causes, which are characteristic of all mines, but the accidents occuring at our other mines do not show a preponderance of one or two causes.

The following is a brief description of the most serious accidents which occurred at the mines the past year. These injuries are mainly hernia cases, fractures, and severe bruises. Only one accident entailed a loss of limb.

Athens Mine. Victor Erickson, a timberman, was injured September 23rd while walking backward, at the same time pulling a locomotive motor car. He bruised his leg against a timber in the drift.

Boeing Mine. Geo. Glumac, a miner, suffered hernia March 14th while in the act of lifting a piece of timber.

John Niemi, a miner, when carrying a drilling machine in a raise lost his balance, causing him to fall a distance of 32 feet. He sustained severe cuts and bruises to his body.

Mike Sabin, a miner, was injured October 29th by sustaining a strain when lifting a piece of timber. This injury resulted in hernia.

John Zelinski, an open pit trammer, was injured October 30th by losing his balance and falling a distance of 14 feet down a bank of the pit. The accident caused a number of severe bruises.

Barnes-Hecker Mine. Florian Laparch, a teamster, was injured July 3rd while skidding poles in a swamp. He strained himself and later was operated on for hernia.

Albert Tippett, a motorman, was injured December 12th by stepping off a locomotive on the edge of powder box, which turned over. He suffered a fractured knee cap, which was weak due to a previous injury.

Hill-Trumbull Mine. Harry A. Taylor, a surface laborer, was injured at the washing plant June 5th when greasing a belt. His arm was severed by being drawn between the belt and a pulley.

Cliffs-Shaft Mine. Wilfred Argall, a trammer, was injured April 11th when pushing a car of rock. He had his right hand squeezed between a chunk of rock and the top of the car, which caused a severe laceration.

Alfred Hendrickson, a trammer, was injured April 16th by a piece of ore falling from the back, rolling over and striking his thigh. His injury was a severe contusion.

John Isaacson, a miner, was injured July 17th while drilling a block hole. A piece of the chunk, which he was drilling cracked, causing the drilling machine to knock him down. He sustained a fractured leg.

Hilmer Perlstrom, a laborer, was injured November 18th by falling off the surface stock pile trestle. He was prying tram car door, and lost his balance. He sustained bruises.

Maas Mine. Peter Haikkonen, a miner, was injured January 26th, while operating a tugger hoist. He had his hand squeezed between the drum and rope, which caused a laceration of the palm of his hand.

John Pizziola, a timberman, was injured September 20th. He claimed to have strained himself while at work. He was operated on for hernia.

Peter Louisa, a miner, was injured November 17th by a chunk rolling down, striking him on the knee. A bruised knee caused three months idleness and is an illustration of the severity that often is sustained by a heavy blow to a sensitive part of the body.

Joseph Petrone, a miner, was injured December 1st by a fall of ground. He sustained a compound fracture of the leg.

Morris-Lloyd Mine. John Polomaki, a miner, was injured December 3rd by falling a short distance in a raise, due to a ladder rung slipping loose. It caused a fractured ankle.

Leo Busseri, a timber cutter, was injured October 29th. A rail slipped from his hand and fell on his foot. He sustained a fractured foot.

Negaunee Mine. Dan Matthews, a chuteman, was injured February 26th by being squeezed between a piece of timber and a chute platform. The timber was pushed ahead by the motor train. Another instance of a fractured leg, that should not have occurred.

Republic Mine. Eino Lintholm, a filler, was injured April 25th by a fall of ground. His injuries were very severe abrasions and contusions.

Princeton Mine. R. E. Trenary, a timberman, was injured October 16th while taking a truck of timber off a cage. He suffered a bad fractured leg.

Stephenson Mine. John Bignigni, a miner, was injured March 4th by falling 65 feet in a raise. A rib was fractured.

Charles Gravadoni, a miner, was injured June 25th by falling in a raise. A run of sand and water caused this accident. He sustained a fractured foot.

Spies Mine. John Salo, a trammer, was injured March 31st while lifting a car of wet dirt at the shaft station. He lost the tip of his finger.

James Webb, a trammer, was injured April 9th when tramming a car of dirt, which jumped the track and caught his finger between the car and side of drift. He sustained bruised fingers.

General Storehouse. Edward Stonebreaker, a laborer, was injured February 21st. He sprained his wrist while working at a coal chute.

Dead River Storage Dam. Edward Rudness, a carpenter, was injured June 10th by a piece of rock falling on his hand. He received a fractured finger.

Carp River Power Plant. Toivo Aartila, a power plant operator, was injured June 24th, when a steel rod, which he was handling, came in contact with a tension wire. This man was very fortunate to escape with only a burnt hand.

Table III.

Table giving the number of accidents by mines, and the number receiving compensation.

Mine	Number of Accidents	Received Compensation	No Compensation
Athens	33	22	11
Barnes-Hecker	22	12	10
Boeing	45	27	18
Cliffs-Shaft	49	30	19
Francis	9	5	4
Hill-Trumbull	9	6	3
Holmes	21	16	5
Maas	24	20	4
Morris-Lloyd	46	27	19
Negaunee	22	17	5
Republic	53	36	17
Salisbury	10	7	3
Spies	10	9	1
Stephenson	41	28	13
Idle mines.	1	1	0
Elec. Power Station	1	1	0
General Storehouse	4	3	1
Miscellaneous	4	2	2

Table IV.

Number of Accidents, number classified Preventable and Percentage Preventable 1912 - - 1924.

Year	Number of Accidents	Preventable Accidents	Percentage Preventable.
1912	207	51	25
1913	316	77	24
1914	443	118	37
1915	427	97	23
1916	592	120	20
1917	639	149	23
1918	590	124	21
1919	670	159	22
1920	708	132	19
1921	351	63	18
1922	344	90	26
1923	453	104	23
1924	404	92	23

Safety Inspection

The Company's mines in Marquette County were inspected by the Safety Inspector, a Committee composed of a Superintendent and two Mining Captains, a Committee of Shift Bosses, a Committee on Mechanical and Surface Equipment and Workmen Committees.

Safety Inspector

The local mines were inspected regularly each month by the Safety Inspector, either making a personal inspection or accompanying the Committees. Examination of the places where the fatal and very serious accidents occurred were made and special investigations were given to ventilation, mine fire equipment, etc. The Spies mine was inspected twice, but no inspection was made of our mines in Minnesota.

The Safety Inspector, in the discharge of his duties as chairman of the Lake Superior Chapter of the National Safety Council, visited Ironwood twice. The first trip was in May when the Executive Committee met to arrange a program for the Annual Meeting, which was held August 12th and 13th. Mine ventilation of the Marquette Range was a subject presented by C. W. Nicolson of our Engineering Department. Seven hundred copies of the Proceedings of this Conference were published and distributed to the mining profession. The Lake Superior Mining Institute distributed copies of the Proceedings to its members.

A Conference of mining men was held at Duluth, Minn., November 7th, 1924 by request of the Committee that was appointed by the Governor of Minnesota to investigate the Milford mine accident of February 15th, 1924, when forty-one miners were drowned. The Safety Inspector, Capt. Thomas Wivell of the Wade mine and two miners of the Boeing mine were present as representatives of the Cleveland-Cliffs Iron Co. It was decided at this Conference that drastic changes in the laws of the State relative to mine safety were not necessary, but a committee was appointed to recommend to the Investigating Committee a method by which county mine inspectors in Minnesota might be of more value in assisting mining companies in preventing accidents.

Superintendent and Mining Captain Committee.

Superintendent W. W. Graff, Gwinn District, Captain Joseph Thomas, Maas Mine, and Capt. Wm. Tamblin, Holmes Mine, were the members of this Committee. The local mines were inspected periodically throughout the summer, when this work did not interfer with the usual duties of the members of the Committee.

Foremen Committee.

Shift Bosses Matt Renowden, Cliffs-Shaft Mine, Joseph Skues, Maas Mine, Wm. Denney, Holmes Mine, were members of this committee. The local mines were inspected the first eleven days in October.

Committee on Mechanical and Surface Equipment.

The members of this committee were Wm. Vicklund, mechanic, Morris-Lloyd mine, Ed. Heiz, surface foreman, Athens mine, and Richard Lemin, electrician, Holmes mine. An inspection of the surface equipment of the mines was made in September.

Workmen Committees.

The ten mines that were operating in this County last May were inspected by Workmen Committees. These committees comprised thirty employees, which brings the total who have served in this capacity to 519.

Central Safety Committee.

A regular monthly meeting of this Committee was held last year. There were no special meetings. The classification of accidents and the subjects that were given special attention are reported herein.

Table V.

The following table gives the number of foremen and workmen by mines, who have served on Safety Inspection Committees since the beginning of Safety Work.

Mine	Foremen	Workmen.
Athens	4	15
Austin	1	13
Barnes-Hecker	0	6

Cliffs-Shaft	9	51
Francis	1	15
Gardner-Mackinaw	1	6
Gwinn	3	33
Holmes	8	21
Lake	6	45
Maas	9	42
Morris-Lloyd	8	54
Negaunee	11	54
Princeton	3	21
Republic	6	36
Salisbury	5	39
Stephenson	7	47
Miscellaneous	11	21
	93	519

Special Safety Measures.

Examination of Employees on Rules and Regulations.

The Committee that has supervision of this work, Messrs. Rough, Moulton and Conibear, examined 45 employees in December, Notices were posted in the bulletin boards announcing that an examination would be held and all employees were asked to be prepared for a test of their familarity with the Company's rules and regulations for the prevention of accidents. A list of five to ten names of men who have been injured frequently was sent to each mining captain with the suggestion they be selected for examination. The forty-five men who appeared before the Committee had been injured 181 times since 1911. The reports of the accidents were read to the men and the Company's classification code was explained. With two or three exceptions, the accidents appear to be properly classified.

We do not know the value of this method of adding to the enforcement of our safety rules but if we were to judge by the comments that have been heard in regard to it, there can be no doubt that it is productive of more interest in safety by the workmen.

Table VI.

The following table gives the number of men by occupation who have been examined on Rules and Regulations.

Miners	337
Foremen	60
Surface Laborers	53
Motormen	34
Timbermen	35

Cage Riders	17
Shaftmen	7
Trammers	8
Electricians, mechanics, etc	22
Miscellaneous	5
	578

Committee on Ventilation and Fire Hazards.

This committee was appointed in 1922 and consists of Messrs. Eaton, Bush and Conibear. It submitted to the Central Safety Committee rules and regulations for the prevention and control of mine fires at the Holmes, Cliffs-Shaft and Athens mines. Special fire rules, which are to be given to employees, were printed and were ready for distribution at the close of the year. Fire regulations for the other mines are being prepared.

Safety Belts.

We suffered several severe accidents at the Athens mine by workmen falling in raises while repairing them. It was decided by the Central Safety Committee to provide a safety belt as a device for reducing the hazards of this work. Several patented belts were purchased and tested in the Negaunee district mines. Timbermen reported that they could work much more safely in high raises when wearing belts and that they did not interfere with their work. All the mines have one or more belts, which are kept either in the warehouse or pump station when not used, in order to prevent deterioration in a damp atmosphere.

Sollars in Raises.

It is an old rule of the Company's that sollars must be placed in the ladderways of a shaft every 24 feet. We have had them installed in high raises, which were used for traveling, but not in those raises which had both a ladder-road and a timber slide in one compartment. A number of the mines, for instance, the Athens, Morris-Lloyd and Barnes-Hecker, have main levels at 200 foot intervals. The raises connecting the levels are high and rather dangerous for traveling when the timber slide and ladderway are in the same compartment. To reduce the hazard of workmen falling long distances, it has been decided to place a partition between the ladderway and the timber slide and also sollars in the ladderway every 25 or 30 feet. In case the compartment

of a raise is not large enough for the installation of a partition, trap doors can be hung in the timber slide and kept closed, except when timber is hoisted. This work has not been completed at all the mines at the end of the year.

Fire Doors.

A fire-proof door, made of Tonkin metal and held in a frame of angle iron, has been standardized by the Company and is being installed on each level, near the shaft station, of all mines. The work of installation has been completed at several mines. The doors are to be kept latched open, and have an air line that runs from the latch to the shaft and then to surface. All doors, adjacent to a shaft, are on one circuit, and it is possible to turn air into the line at each shaft station and at the collar of a shaft. This is to be done immediately when fire is discovered and will cause the latches to lift, releasing the doors, which automatically close by their counterweights. The shaft then becomes a safety zone in time of fire where workmen may retreat and be taken to surface.

Ventilation

The system of ventilation that was installed at the Athens mine last year, a brief outline of which was then reported, has proven satisfactory. There are places that occasionally have rather high temperatures, especially during hot summer season, or immediately after the mine has been idle several days, but the air throughout the mine has been kept free from impurities and contains practically the normal oxygen content of surface atmosphere. No complaints have been received from the miners, who have worked in the hot places. Poor air rather than warm air, is the usual objectionable feature of mine ventilation. As there were three idle days each week during the summer months, the Athens was operated under unfavorable conditions and it is therefore very certain that the poor air problem of this mine has been solved.

Attention was called last year to the necessity of establishing mechanical ventilation at the Maas and Negaunee mines in the near future. Ventilation did not become very serious thepast year, but it was poor in sev-

eral of the Maas mine sub-levels and especially detrimental to the life of the timber. These mines have several underground connections, and the solution of the poor air problem at the Maas mine necessarily involves a consideration of the ventilation of the Negaunee mine.

The Company's mining engineers of the Negaunee district were assigned the work of studying the ventilation of the two mines and, as a result of their investigation, it has been decided to place an American Blower Co. reversible fan, of approximately 125,000 cubic feet capacity, at the collar of No. 2 shaft of the Negaunee mine. This shaft will be used as intake for both mines. The air will be divided at the 9th level into several splits. Two-thirds of the volume of air will be directed through the Negaunee mine workings and then passed on to the Maas mine. The balance will pass directly to the Maas mine workings. All of it will reach surface through the Maas mine shaft. Double ventilation doors, similar to those used at the Athens and Holmes mines, will be established on all of the Negaunee mine main levels in order to isolate No. 3 shaft. This is necessary not only for shunting the air into the Maas mine, but also to provide a hoisting shaft for a passageway for employees in case of an underground fire that will be practically free from smoke and gas. It will probably be necessary to erect several doors in the main levels of the Maas mine to maintain sufficient pressure to force the air into all the sub-levels. The fan station at the collar of shaft was started late in the fall, but the continuation of work has been postponed until spring. There are no unfavorable air conditions during cold weather.

When the Francis mine was abandoned two concrete bulk-heads were erected in the drift which connected it with the Gwinn mine. This practically killed the movement of air in the Gwinn mine, which became so poor that the crew of men, who have been keeping it repaired, were unable to continue work. Profiting from our experience in ventilating the Athens mine, it was decided to adopt a similar system at the Gwinn mine. The cage compartment was gunited off from the skip compartment and the Francis mine fan has been installed at the bottom of the cage compartment. Air is now being drawn through the cage

compartment, passes throughout the main levels and returns to surface via the 5th level and the skip compartment.

Fire-proofing of the Athens and Gwinn mine shafts and mechanical control of ventilation made these mines as comparatively safe for employees in case of fire as those mines which have two or more outlets to surface. In ventilating the Negaunee and Maas mines it will be necessary to make the Maas shaft an air up-cast. As a reversible fan is to be installed at the collar of No. 2 shaft, Negaunee mine, it will be possible to change the air current, thus making the Maas mine shaft down-cast. It is easy to conceive a fire in either the Maas or Negaunee mine that might represent as much danger to the workmen employed underground as a fire would represent danger to the men employed either in the Athens or the Gwinn mine. The same condition is true if fire occurred either in the Holmes mine or Section 16 mine. A careful enforcement of our rules and regulations for the prevention of mine fires and a strict observation of the orders that have been formulated to govern employees in time of fire are measures that must be given constant attention.

Since August of 1924 two mine fires have occurred in Houghton and Gogebic counties and one near Hibbing, Minnesota. These fires were heavy financial losses to the mine operators. The Calumet and Hecla fire has been burning three months, resulting in the idleness of three shafts and the tying-up of a large tonnage of rich ore.

A number of working places in the Holmes mine have had high temperatures from time to time, due to places being isolated by ground crushing. Doors have been erected in the main levels and small fans operated to provide cold air. As a general rule these warm places are of short duration.

Ventilation in our other mines has been practically normal, with the exception of shaft sinking at the Republic mine, where the Pascoe Shaft is very deep and the air is occasionally poor.

Safety Conditions at the Mines.

It is important that there be no slackening in the maintanence of the general safety conditions at the mines if preventable accidents are to be

kept at a minimum. The regular tours of inspections by the Safety Inspector and the various Committees are made with this object in view. While many accidents are occurring yet it must be acknowledged that there would be more if the Company's safety work was not carried on systematically and thoroughly. Brief references are given to each mine accidents, although the safety conditions that are enumerated may appear to be remote as relating to the causes of these accidents. There are many measures that are being enforced at considerable expenditure of money in order to prevent an increase in the number of accidents. If practical safety devices and means could be invented and found that would reduce the accidents that are occurring, there would be no delay on the part of the Company in adopting them. A brief outline of the safety condition follows.

Athens Mine. There were thirty- four accidents at this mine of which six were classified preventable. Eleven were caused by falls of ground; five by men lifting chunks, etc.; four by chunks rolling down piles and the remainder fall to eleven causes.

The ore body of this mine demands careful mining methods. It is heavy and has a jasper hanging that readily falls when ore is extracted. A captain, a foreman and three shift bosses are employed, so that ample supervision is provided. Due to the method of developing the ore body, a considerable territory has been opened under the hanging wall from the upper to the lowest elevation of the mine. Many drifts and high raises must be maintained in heavy ground, but they are not left to deteriorate to the extent that they represent danger to workmen. Ventilation is mechanical, a large fan operating practically continuously and smaller auxiliary fans assisting. Warm temperatures may be found but not poor air. The air course is occasionally reversed in cold weather to eliminate ice in the cage compartment, but it is not probable that this practice represents a menace in case of fire. The humidity of the mine atmosphere is very high and, as our fire preventive measures are reducing fire hazards, it is very probable that even if a fire originated in a place where the air movement was high, there would be little delay in reversing the fan so as to make the cage compartment again down-cast.

Boeing Mine. This mine suffered forty-five accidents of which twelve were classified preventable. Thirteen were caused by falls of ground; seven by workmen stumbling or slipping and the others by thirteen various ways.

In addition to the supervision by the local officials, the mine was inspected several times by Supt. Elliott and Captain Rough.

Barnes-Hecker.Mine. This mine had twenty-one accidents and of this number seven were classified preventable. One accident was caused by a fall of ground and others represent twelve causes.

The labor turn-over at this mine is somewhat higher than the other mines in Marquette County, due to isolation of the mine. The ore body is comparatively soft and the rocks associated with it yield readily to the caving method of mining. The second outlet to the Morris-Lloyd has been completed and placed in first class condition. A number of the high raises are not yet equipped with sollars and casing.

Cliffs-Shaft Mine. Forty-eight accidents occurred at the Cliffs-Shaft mine and seven of them were classified preventable. Four resulted by falls of ground; ten by workmen having fingers, hand and foot squeezed between chunks of ore; eleven by chunks rolling down pile and off car; six by workmen stumbling or slipping and the balance divided among nine causes.

The work of repairing the ladderways in this mine was completed in November. The ladder compartments of both shafts were overhauled from surface to the 15th level; many new ladders installed; sollars cleaned and casing placed around the pipe and skip compartments. Doors were hung in the pipe compartment partition at short intervals, in order that men may reach the pipes in this compartment without removing boards from the partition, which in the past were often not replaced. The outlet to surface through the incline pit was also repaired and air doors erected in it near the main workings.

The use of scrapers is lessening the amount of ore that is being handled by trammers, and there has been a reduction in the number of accidents by this cause. Large electric lights made it possible to better observe high backs, although the foremen always give this special attention, using large carbide lamps that enables them to discern fractured ground. We have been very

fortunate in having a low accident rate by falls of ground at the Cliffs-Shaft.

Holmes Mine. Thirty accidents were reported at the Holmes mine, and but one was classified preventable. Seven were caused by falls of ground and the other thirteen represent eleven causes.

There was a marked reduction in the number of accidents by falls of ground last year. This is due in part to the fact that the mine operated on a one shift basis, when men can be held more responsible for keeping their places safer than when operating two shifts. Mr. Elliott also assisted materially by instructing the mining captain and shift bosses to give more attention to the prevention of accidents by falls of ground. Due to the curtailment in operation there has been practically no labor turn-over, another factor that adds to the safety condition of the mine.

Maas Mine. The Maas had twenty-three accidents and seven of them were classified preventable. Five resulted by falls of ground and eighteen by ten other causes.

Mining is here distributed over a large area under varying conditions. The ore in the upper portions is hard and is capped by a hard jasper. Both ore and jasper break in large chunks which demand good timber and careful inspection. This territory however is not large and the shift boss in charge of it has ample time to cover all working places several times a shift. On a recent trip by the Inspector there was heard a considerable movement of ground in the hanging. It did not crush the timber, but indicated that although the jasper is hard it is caving satisfactory.

It has been already stated in this report that ventilation was poor last summer, but the elimination of this detrimental feature of mining has been assured for next year. It will also solve the ice problem, which causes trouble in the shaft during the cold months.

Negaunee Mine. The Negaunee mine is less than the average of our mines in the number and severity of its accidents. Twenty-two occurred there last year; and six of them were classified preventable. Falls of ground were responsible for five; chunks rolling down piles caused four and the balance is

divided among nine causes.

The safety conditions in this mine are very satisfactory. The ore body is large and has a fairly good gob. New ground is being developed slowly and hence there are but few places where men work under the jasper hanging. When such places are open it is a strict policy of the Company to break sufficient hanging to assure a protective covering, in case of subsequent falls. The general condition of the mine are fine. Descipline is strict and careful observation of all safety rules is always demanded by the captain and the foremen.

Republic Mine. This mine suffered more accidents in proportion to the number of men employed than any other mine. Fifty-three were injured during the year, and fourteen of them were regarded as preventable by the Central Safety Committee. Four were due to falls of ground; twenty by men having fingers and hands squeezed between chunks of ore; seven by men stumbling and slipping; five by chunks rolling down piles and the balance by eleven miscellaneous causes.

The working conditions in this mine differ from those found in other mines. The ore is very heavy, large chunks must be handled and the filling places do not provide ample vision, so that fillers always have an opportunity to avoid movements in the dirt pile when shoveling ore. Large timber is used in making stulls, which greatly exceed in size the timber used elsewhere. Shaft sinking is a continual process. The humidity of a mine is not very high and caution must be taken to prevent underground fires. The Safety Inspector has recommended a safety zone in one of the lower levels of the Pascoe shaft, so that the men may retreat there in case a fire should cut off their escape to No. 9 shaft. The drift from the bottom of No. 9 shaft to Pascoe shaft, which is the main connection between the two shafts, is near an old stope, the hanging of which cracked and indicated danger. A new drift was swung in the hanging around the stope to eliminate the danger in case the main drift collapsed. The upper portion of No. 9 shaft was repaired but the work of over-hauling the ladderway was not completed at the end of the year. It is necessary to handle

men in skips at the Pascoe shaft, but if employees are careful and proper supervision is given to it by the foreman accidents can be avoided.

Stephenson Mine. The Stephenson mine had forty-one accidents. Seven of them being regarded preventable. The frequency and severity rates are high. Falls of ground were responsible for eight; chunks rolling down pile for five; handling of timber or large chunks of ore five, and the remainder are distributed among thirteen other causes. As stated in a previous report, the labor element in this mine is largely Italian, who are more inclined to take slight accidents more seriously than other workmen.

An effort was made last year to tap the water that is supposed to be above the hanging of the northwest lease of this property. While this work has not yet proved entirely successful, mining has been carried on with great caution for the safety of the men who work in this territory. The auxilary shaft was completed and the usualy safety devices that are demanded by our rules for shaft equipment have been installed. The underground hoist room and the drift from it to the collar of this shaft have been made fire-proof. The second outlet to the Austin mine was repaired, although the ladderway to surface in the new Austin shaft was not completely cased from the skip compartment. The passageway to the shaft through the tunnel is not used during the winter months. In order that men need not stand around the collar of shaft exposed to cold weather, a bell has been installed in the dry to notify them when to proceed to the shaft for immediate passageway underground.

Spies Mine. There were ten accidents at the Spies mine last year, representing eight causes. Three were classified preventable.

Development work was the major work performed in this mine last year. Equipping the shaft and the pump station with safety devices was not completed at the end of the year. However, fair progress has been made in surface fire equipment and fire prevention, but there remains work to be done around the shaft house and in the power plant.

Open Pits and Caves. Two inspections were made of the test pits, caved areas, and shafts on the Company's abandoned properties in the vicinity of Negaunee,

Ishpeming and Gwinn. It is a State Law that these must be fenced. Wherever a defective fence was found, it was reported to the superintendent of the district, who had it repaired promptly.

First Aid Work.

The First Aid teams trained during 1924 were organized in October and November 1923, but owing to the unsettled labor situation, the personnel of some of the teams became so changed that it was thought expedient to continue the training through 1924. This also would make the training period correspond with the Company's fiscal year.

One hundred and eight practices were held in which 76 men of the local mines participated. Since 1912, 558 men have received more or less First Aid training. Of this number 406 have been awarded Company certificates, 20 others have practically completed the course but, due to the closing down of some of the mines and other reduction in forces, severed their connection with the Company before receiving certificates, making a total of 426 men who have received or are entitled to Company certificates, 8 are deceased, 4 are pensioned and 114 have left the Company, leaving a total of 300 men holding certificates now in employ of Company.

In response to a request from the Bureau of Mines for an opportunity to give some training in this vicinity, arrangements were made to have the Bureau of Mines Car, No. 10. in charge of Mr. W. H. Carrick, Engineer, Mr. W. H. Murray, Foreman Miner and Mr. M. A. Orfald, Foreman, First Aid Miner, stationed at Ishpeming, from July 29th to August 8th. Thirty-three were given a half day at the Car, where they were trained and examined by these men. They were awarded Government certificates.

Mine Rescue Work.

Mine Rescue apparatus was used at the Francis mine May 20th. The air became poor owing to the removal of the pipe lines when the mine was dismantled, and it was necessary to wear Rescue apparatus in order to recover equipment from one of the sub-levels.

One hundred and eight practices were held last year in which eighty-six men took part. Training was conducted monthly at the local mines during the time they were operated.

Twelve men, who had not previously been trained or examined by the Bureau of Mines, were given a half-day at the car, where they were examined and awarded Government certificates.

Since 1912, 372 men have received more or less training in mine rescue apparatus. One hundred and seventeen have left the Company, 78 have been disqualified, 6 are deceased and 1 pensioned; leaving in the employment of the Company 170 men qualified to wear the apparatus.

Table VII.

Showing number of First Aid Men Trained.
1912 to 1924.

Number receiving training	558
Number receiving Certificates	406
Others entitled to Certificates	20
Number deceased	8
Number pensioned	4
Number left employment of Company holding certificates or entitled to same	114
Total number now in employment of Company holding Certificates	300

Table VIII.

Showing number of Mine Rescue Men Trained.
1912 to 1924.

Number receiving training	372
Number deceased	6
Number Pensioned	1
Number disqualified	78
Number left employment of Company	117
Total number now in employment of Company	170

Table IX.

First Aid Supplies for Year 1924.

100	lbs. Asst. Roller Bandages	$ 101.00
4	doz. Handy Fold Gauze (5 x 36)	34.20
7	doz. First Aid Packets	30.24
5	Gross Leather Finger Cots	30.00
6	doz. Z. O. Tape	24.30
2	doz. Handy Fold Gauze (18 x 36)	15.30
2	doz. Metal First Aid Packets	14.40
2	gals. Iodine	12.00

12	lbs. Absorbent Cotton	9.45	
2	doz. Pairs Scissors	9.26	
3	doz. Aromatic Spirits of Ammonia	8.40	
5	doz. Carbolated Vaseline	6.00	
2	doz. Glass Stoppered Bottles	4.40	
		$ 298.95	
	Supplies for Pulmotor	22.29	
	Supplies for Lungmotor	20.00	
	T o t a l		$341.24.

Table X.

Mine Rescue Supplies.

300	lbs. Cardoxide	$ 105.00
12	Cylinders Oxygen	46.14
1	Dividing Piece (Extra)	15.00
3	Canary Birds	7.00
2	Gals. Euthymol	5.95
36	ft. Rubber Gasket Tubing	3.24
1	gal. Glycerine	2.00
T o t a l		$ 184.33

Table XI.

Comparison of Fatality Rates for Coal Mines. Metal Mines. etc.
(Based on 300 working days per man.)

Year.	U. S. Coal Mines	U. S. Metal Mines	Minn. Metal Mines	Mich. Metal Mines.	Marquette* County	C. C. I. Company.
1911	4.97	4.45	5.46	4.28	5.42	1.89.
1912	4.46	4.09	3.15	3.22	3.32	1.71
1913	4.70	3.72	3.16	3.12	2.46	4.12
1914	4.66	3.92	2.93	3.97	5.00	4.10
1915	4.44	3.89	2.71	3.74	4.09	2.16
1916	3.94	3.62	2.59	3.76	4.27	2.61
1917	4.25	4.44	3.04	3.40	3.03	1.73
1918	3.94	3.57	3.25	3.31	.42	3.45
1919	4.27	3.43	3.09	2.99	4.20	2.79
1920	3.62	3.16	2.61	3.25	3.06	1.21
1921	4.11	3.09	2.51	3.63	0.00	2.60
1922	4.89	3.54	3.03	2.17	1.66	.43
1923					3.62	2.19
1924					0.00	1.88
Average	4.35	3.74	3.13	3.40	2.89	2.35

*Exclusive Cleveland-Cliffs Company.

Table XII.

Giving the number of accidents and
number receiving compensation 1919-1924.

Year	Number of Accidents.	Received Compensation	No Compensation.
1919	670	349	321
1920.	715	435	280
1921	350	228	122
1922	347	238	109
1923	460	286	174
1924	404	269	135

SAFETY DEPARTMENT.

Table XIII.

Classification of Non-Fatal Accidents 1923 and 1924.

	1923	1924
A. Fall of Ground or Timber:		
Back or side (drift, raise or stope.)	74	75
Stray chunk from chute or raise.	11	7
Lagging, sprags, or timber from back or side.	1	1
Total	86	83
B. Shaft Accidents.		
Rock or timber falling down shaft, etc. Total	1	2
C. Use of Explosives.	0	0
D. Mine and Railroad Cars:		
Caught between cars or motor and drift.	16	3
Riding or attempting to ride cars.	--	1
Squeezing finger, hand or foot between box and truck, car and drift, chute, etc.	18	20
Run over by railroad car or haulage car.	1	1
Cars falling back or off track.	-	3
Falling from car.		2
Car running over foot.	3	1
Struck by car handle, car rebounding, etc.	1	-
Miscellaneous causes.	5	2
	44	33
E. Miscellaneous Causes:		
Falling down raise, stope or mill.	5	9
Falling from ladder, trestle or stage.	9	11
Falling with machine or tripod, drill breaking, etc.	1	5
Squeezing finger, hand or foot between pieces of timber, chunks of ore, etc.	54	56
Straining or wrenching arm, back, side or leg by lifting, etc.	23	18
Chunk rolling down dirtpile, stockpile, off car, etc.	31	29
Being struck by glancing dirt, tool or timber, etc.	53	35
Being struck by pick, shovel, hammer, timber, etc.	31	19
Tools or material falling or slipping from hand, staging or platform, etc.	25	26
Running nail into hand, foot or leg.	3	7
Stumbling or slipping causing a fall, etc.	29	28
Catching finger, hand or foot in blocks, gears, brakes, struck by windlass, parts of machinery, etc.	20	21
Blood poison or infection from various causes.	13	4
Contact with electric wire.	1	2
Being scalded or burnt.	1	1
Blistering hand.	2	2
Sliver in finger, etc.	2	-
Miscellaneous underground causes.	4	5
Miscellaneous surface accidents.	6	2
	313	281
GRAND TOTAL -	447	399

SAFETY DEPARTMENT.

Table XIV.

Classification of Causes of Fatal Accidents.
From Dec. 1st, 1898 to January 1st, 1925.

A. Fall of Ground or Timber:		
Back or side (drift, raise or stope.)	82	
Fall of chunk or ore from chute.	1	
Stray chunk or stick down raise or stope.	2	
Run of mud or sand.	9	
Run of ore in stope.	1	
		95
B. Shaft Accidents:		
Falling down shaft.	12	
Rock or timber falling down shaft.	2	
Being struck or caught by cage, skip, bucket or tool.	8	
Falling from cage, skip or bucket.	11	
Falling from ladder in shaft.	5	
Being carried or pushed into shaft by car.	3	
Attempting to jump on or off cage, skip or bucket.	3	
Being struck by crosshead.	5	
		49
C. Use of Explosives:		
Explosion of powder.	14	
Premature blast.	3	
Fall of ground or timber due to blast.	4	
Being overcome by gas.	3	
Erysipelas resulting from blast.	1	
		25
D. Mine and Railroad Cars:		
Being caught by haulage cars.	11	
Riding or attempting to ride cars.	5	
Falling with car from trestle.	4	
Being run over by railroad car.	6	
By miscellaneous causes.	1	
		27
E. Miscellaneous Causes:		
Falling in raise or pocket.	6	
Falling from ladder, trestle or stage.	4	
Falling with machine or tripod.	2	
Being caught under pump rod.	2	
Contact with trolley wire.	2	
Asphyxiation due to mine fires.	3	
Being pulled into sheave.	1	
Contact with electric wire.	1	
		21
T o t a l -		217

Average Percent of Accidents by Causes.

A. 44% B. 23% C. 12% D. 12% E. 09%.

SAFETY DEPARTMENT.

Table XV.

Classification of Fatal and Minor Accidents.

For the Year 1924.

By the Central Safety Committee.

I. TRADE RISKS, (Incidental & Non-Preventable)		314
II. NEGLIGENCE OF COMPANY:		
Failure to Use Proper Tools or Appliances Provided.	1	
Failure to Provide Proper Tools, Appliances or Place to Work.	3	4
III. NEGLIGENCE OF WORKMEN:		
Failed to Use Proper Appliances or Tools Provided	3	
A. Injured Men: Violation of Rules.	6	
Improper Act or Selection of Improper Method of Doing Work. (By Workman.)	26	
Carelessness. (By Workman.)	37	72
Improper Act or Selection of Improper Method of Doing Work. (By Workman.)	11	
Carelessness. (By Workman.)	3	14
T o t a l -		404.

Table ____

Expenses of the Safety Department for 1924.

Supplies.

Office Equipment, printing, etc.....	$ 101.33	
Central Safety Committee, etc.....	9.35	
Mine Rescue and First Aid.....	20.49	
T o t a l .		$ 131.17

Traveling.

Inspector.....	339.23	
Mine Rescue Foreman.....	243.82	
Committees.....	234.91	
T o t a l .		817.96
S a l a r i e s		7140.60
G r a n d T o t a l		$ 8089.73

Respectfully submitted,

William Courtney
Safety Inspector.

ANNUAL REPORT

OF THE PENSION DEPARTMENT

FOR THE YEAR 1924

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PENSION SYSTEM:

The year 1924 completed the sixteenth year of the operation of the Pension System.-

The following pensions were granted during the year:

No.	Name	Mine	Date Pension began	Monthly Payment
164	Consta Paavola	Lake	Jan. 1, 1924	$ 18.00
165	J. H. Dunstan	Salisbury	Feb. 1, 1924	60.55
166	Alphonse Pepin	Stephenson	Jan. 1, 1924	21.38
167	Andrew Fandrem	H.O. Shops	Feb. 1, 1924	43.41
168	August Nyquist	Princeton	Feb. 1, 1924	37.93
169	Jacob Christianson	Holmes	Apr. 1, 1924	26.62
170	Andrew Anderson	Negaunee	May 1, 1924	32.13
171	John Asplund	Salisbury	May 1, 1924	32.25
172	Enoch Rogers	Hospital	June 1, 1924	34.71
173	D. J. Campbell	Cliffs Shaft	June 1, 1924	32.03
174	John Fagerberg	Francis	June 1, 1924	33.76
175	John E. Carlson	Holmes	Sept. 1, 1924	27.38
176	Ole Stolen	Salisbury	Oct. 1, 1924	28.82
177	Thomas Creer	Salisbury	Oct. 1, 1924	46.56
178	Adolph Danielson	Salisbury	Oct. 1, 1924	26.37
179	Matt Mackie	Various	Oct. 1, 1924	37.00

The following Old Age Pensions ceased during the year:

No.	Name	Date Pensioned	Date Died.
66	Rasmus Anderson	Aug. 1, 1915	Apr. 15, 1924
111	William Edyvean	Apr. 1, 1921	June 12, 1924

PENSION DEPARTMENT

No.	Name	Date Pensioned	Date Died
137	John Koskie	June 1, 1921	Sept. 10, 1924
138	W. H. Trathen	June 1, 1921	May 9, 1924
160	Erick Johnson	Feb. 1, 1923	Mar. 1, 1924
173	D. J. Campbell	June 1, 1924	Aug. 31,1924

	1923	1924
Number of pensions granted during the year	4	16
Number of deaths	8	6
Number of Old Age Pensions in force Dec. 31st	95	105
Average annual pension	$305.28	$319.20

George Bushman, Pension No. 8, who was employed as retort foreman at the Kipling plant, was added to the Furnace Department roll on June 1, 1924. His monthly pension is $33.10.

James Barry, No. 5, who was pensioned on June 1, 1921, died on Dec. 19th, 1924.

There are five pensioners on the Furnace Department roll with an average annual pension of $358.32.

Total amount paid to Old Age Pensioners, 1908 to 1924 inclusive:

Mining Department	$187,791.71	
Furnace Department	7,776.57	
Total -		$195,568.28

Total amount paid to Widows and Orphans, 1908 to 1924 inclusive:

Mining Department	$22,241.00	
Furnace Department	900.00	
Total -		$ 23,141.00
Total Pension Payments		$218,709.28

Mining Department pensions paid in 1924 were as follows:

Old Age Pensions	$31,987.64	
Widows and Orphans	168.00	
Total -		$32,155.64

The estimated Old Age Pensions for the Mining Department for 1924 was $ 33,000.00.

PENSION SYSTEM (Continued):

Pension Payments for the years 1908 to 1924 inclusive are as follows:

Mining Department:

Year	Old Age	Widows & Orphans	Total
1908	69.10	48.00	117.10
1909	351.92	464.00	815.92
1910	896.44	1043.00	1939.44
1911	1690.37	2649.00	4339.37
1912	3865.95	3113.00	6978.95
1913	5133.62	3025.00	8158.62
1914	6179.57	3403.00	9582.57
1915	7910.35	2372.00	10282.35
1916	8787.02	1694.00	10481.02
1917	9327.22	1266.00	10593.22
1918	8889.14	944.00	9833.14
1919	9605.02	888.00	10493.02
1920	12613.29	814.00	13427.29
1921	21856.64	14.00	21870.64
1922	29063.85	168.00	29231.85
1923	29564.57	168.00	29732.57
1924	31987.64	168.00	32155.64
Totals	$187791.71	22241.00	210032.71

PENSION DEPARTMENT

PENSION SYSTEM (Continued)

Pension payments for the years 1910 to 1924 inclusive are as follows:

Furnace Department

Year	Old Age	Widows & Orphans	Total
1910	111.75		111.75
1911	268.20	120.00	388.20
1912	268.20	180.00	448.20
1913	268.20	180.00	448.20
1914	268.20	180.00	448.20
1915	268.20	180.00	448.20
1916	268.20	60.00	328.20
1917	268.20		268.20
1918	268.20		268.20
1919	130.55		130.55
1920	223.80		223.80
1921	781.63		781.63
1922	1118.04		1118.04
1923	1179.38		1179.38
1924	2085.82		2085.82
Totals	$7776.57	900.00	8676.57

PENSION SYSTEM (Continued)

At the present time the pensioners on the Mining Department Roll live in the following localities:

Ishpeming	74	Lansing	1
Negaunee	7	Detroit	3
Marquette	1	California	3
Gwinn	6	Illinois	1
Michigamme	1	Minnesota	2
Pelkie, Baraga Co.	1	Connecticut	1
Flint	1	Canada	2
		Italy	1

Of the Republic Mine pensioners, seventeen live at Republic and one at Evanston, Illinois.

One of the Furnace Department pensioners lives at Marquette, one at Skandia and three at Kipling, all in Michigan.

James Noctor, Pension No. 2, Railroad Department, who was pensioned on April 1st, 1921, died on May 23rd, 1924. Two pensioners remain on this roll, one living at Negaunee and one at Ishpeming.

PENSION SYSTEM (Continued)

The following men were put on the Republic Mine Pension Roll during 1924:

No.	Name	Date Pension began	Monthly Payments.
20	Frank Pascoe	Dec. 1, 1923	$58.32
21	Frank Vierela	Aug. 1, 1924	33.25

The following Republic Mine pensioners died during the year:

No.	Name	Date Pension began	Date died
3	Olaf Johnson	Oct. 1, 1920	Mar. 19, 1924
15	John Powers	Nov. 1, 1922	July 7, 1924

There are eighteen pensioners on the Republic Mine roll, the average annual pension being $450.48.

The payments made from October 1st, 1920 to December 31st, 1924, are as follows:

1920	$ 278.61
1921	3427.97
1922	5672.84
1923	6641.51
1924	8172.96
Total	$24193.89

Estimated possible pensions for the year 1924 - $6606.00.

PENSION SYSTEM (Continued)

In May we had a visit from Mr. Ingalls Kimball of the Metropolitan Life Insurance Company of New York and discussed matters concerning general plans of pension systems at considerable length. During the year we have been studying the matter of various pension systems and are at work at the close of the year on another computation of pensionable men during the next few years and when this is completed, Mr. Kimball will make some estimate of the costs to check up our computations.

WORKMEN'S COMPENSATION:

The work of the Compensation Department has continued in the care of Mr. T. H. Bargh as Cashier since December, 1912, three months after the law went into effect. The general plan of handling all cases as carried on in previous years was continued in 1924. Special effort is made to see all injured men as soon as possible after the injury has occurred and very generally this has made it possible to readily effect a settlement. In the majority of cases the first compensation payment is ready by the time the agreement is presented, which materially aids in effecting a settlement and securing the man's signature to the agreement blanks furnished by the Department of Labor & Industry. Through this plan the men very generally are well satisfied with the working of the Compensation Law.

During the year various cases have come up for consideration and in some cases for hearings before the Department of Labor & Industry. Reference is made in the following paragraphs to the more important cases.

Jim Possillippo - Stephenson Mine Accident No. 537. This man was injured on April 7th, 1921 while lifting a heavy piece of timber and he has not recovered sufficiently to resume his former occupation as miner and must do only very light work. He left for Italy on January 27th, 1923, after we had made a settlement agreement with him, paying to him a partial disability payment. He returned to this country in July and he is now living in New York City where he has secured some light employment and the partial disability payments will be continued until the 500 weeks period is up unless he should, at aome later period, become sufficiently well to resume his employment which in all probability will not occur.

Gust Wirtanen - Stephenson Mine Accident No. 510. This man was injured on February 17th, 1921, receiving a Potts fracture of the ankle. He is now living in Chicago doing some light work but is not able to return to

his regular employment as a miner and partial disability payments are being continued to him.

Matt Millimaki - Princeton Mine Accident No. 170. Millimaki was injured on August 4th, 1921, suffering a fracture of the leg just above the ankle. Since that period he claims he has been unable to work steadily and while employed by us for some time, he did not get along at all well. A hearing was held in his case on November 6th, 1923, and this was decided in our favor.

Since the time of that hearing he has complained that he was unable to work. A hearing on appeal before the Full Board was held on January 29th, 1924 and as a result of this hearing the Commission decided that Millimaki was entitled to compensation which must be paid during his inability to work as a miner. In June, Millimaki asked for a lump sum settlement in order to buy a farm and other property but as we did not consider he was totally disabled we objected to the granting of this petition. A hearing was held on this petition on July 12th before Deputy Commissioner Beatty. In discussing the matter with the Commissioner his attitude was forcibly stated and at that time Mr. LeGendre, attorney for Millimaki, asked to have the petition dismissed at that time as he did not have what he considered proper testimony to introduce.

Another petition for a lump sum settlement was later presented and a hearing in this case was held on November 25th. We were represented in this hearing by Mr. Clancey and testimony was offered by Drs. MacIntyre and Smith for the Company, and by Dr. Harkin for Millimaki.

On considering the testimony, Commissioner Ravens decided that this man was not shown to be totally disabled and therefore denied the lump sum settlement. This decision has been appealed from and a hearing before the Full Board will probably be held some time early in 1925.

Dominic Francesca - Maas Mine Accident No. 320. This man was injured October 31st, 1922, the injury being to his back. After working for some time he became in poor physical condition and later his mind was affected and he was sent to Newberry where he remained for several months. The physician at Newberry and also his physician here thought it desirable for him to return to Italy and he was sent home on Sept. 19th, 1923. We are having regular monthly reports from his physician in Italy and there has been no change in his condition and he probably will continue as a compensation case until the end of the period although of course there is the possibility of his growing worse and not living for that length of time.

J. E. McNamee - Stephenson Mine Accident No. 436. McNamee was injured on January 15th, 1918 and returned to work for us in August of that year. He was installing a telephone line at the Central Power Station at Princeton and fell with the ladder, injuring his leg and ankle. He applied for compensation on account of total disability, although at work and the decision of the Deputy Commissioner was against him. An appeal to the Full Board was made which was heard June 26th, 1923. The Board's decision was also in our favor, the decision being based on the fact that he was employed as a motorman which was similar to his regular work which was electrician's helper. Later he was taken off the motor and put at other work and in April, 1924, he petitioned to have his case re-opened. This petition was heard on June 5th at Marquette and because McNamee was taken off electrical work it was decided that he was entitled to compensation during the period he was employed as chuteman. The Commissioner also recommended he be given another trial as electrician's helper. This was agreed to and he was transferred from the Gwinn district to Ishpeming and employed in the department here where he and his work could be closely supervised.

He has now continued work the balance of the year in a satisfactory manner.

Philip Nault - Francis Mine Accident No. 93. This man was injured on June 28th, 1920, at the Gwinn district crusher, from which injury a hernia later developed and he was operated on for the hernia but did not recover satisfactorily as he continued to have trouble with one of his legs. He was sent to different physicians and finally was taken to Ann Arbor for treatment. He was not able to resume his work at the mine and bought a farm at Wilson, Michigan and we continued to pay him compensation. He did very well with his farm being assisted by relatives living there and hiring help to do the hard work. In September he applied for a lump sum payment of the compensation remaining due him provided he could not work, in order to pay off the indebtedness on his farm and put things in good shape. A conference was held in Marquette on November 13th, 1924 with Commissioners Gloster and Kennedy, and the whole matter was presented to them and they authorized that the lump sum settlement be made, we to pay off all indebtedness directly, sending him the receipts for payments made and paying to him the balance as the Commissioners felt sure from the testimony that he would be able to make a living on his farm if free from the indebtedness and interest payments. The lump sum payment amounted to $3,169.87 of which the farm loan and other indebtedness was paid amounting to $2900.00 and the balance, amounting to $269.87, was sent to him and the case is accordingly closed.

Isaac Pihlaja - Cliffs Shaft Mine Accident No. 702. This man was injured on Sept. 19th, 1922, and was discharged by the Doctor as of June 29th, 1923. During this period Pihlaja served 30 days in the County Jail for driving a car while intoxicated. He never returned to work for the Company or asked for employment. He petitioned for compensation payments and a hearing was held at Marquette on February 4th, 1924 and on the strength of

the representation made, and the statement that he could work on October 17th, 1923, the Commissioner allowed compensation payments up to that date. In June of this year, Pihlaja presented another petition for total disability, claiming to be unable to return to his work as a miner. A hearing on this petition was held on July 12th at Marquette before Deputy Commissioner Beatty. E. F. LeGendre of Calumet represented Pihlaja who discussed the case with the Commissioner and not having proper evidence to present was permitted to withdraw the petition at that time.

Another petition was presented in August to which a reply was made by Mr. Clancey. A hearing on this petition was held on November 22nd, at Marquette and E. F. LeGendre asked for an opportunity of taking further medical testimony which was granted by the Commissioner. This testimony was taken at Marquette on December 17th, at which time Mr. LeGendre introduced no new medical testimony which was contrary to the understanding with the Commissioner. He had Dr. Harkin again testify to Pihlaja's condition and we had the testimony of Dr. Vandeventer and Dr. Lund of Marquette. The petition was denied by the Commissioner and an appeal has been taken from this decision and the Full Board hearing will probably be held some time early in 1925.

Joseph Harrington - Cliffs Shaft Mine Accident No. 793. Harrington died on January 29th, 1924 at the hospital from an injury received on January 28th. He was a single man living with his mother and compensation to be paid was properly based on the amount of contributions made by him to the support of the family in comparison to his earnings. We found some difficulty in making a settlement with the mother as one of his brothers who was quite a worthless chap was desirous of obtaining some portion of the compensation. A consultation was held in Marquette with Commissioners

Gloster and Kennedy from Lansing who convinced the other brother of Joseph who is quite reasonable, of the amount to be paid and settlement was affected on the basis of $7.36 per week and this payment is to be made to the mother for a period of 300 weeks.

Steve Pavich - Boeing Mine Accident #56. Pavich was injured on February 26th, from which injuries he died on March 3rd, leaving a wife but no children. The compensation agreement was promptly signed and she is to receive $16.06 per week until a total sum of $7500.00 is paid except in the event of her re-marriage before the end of such period at which time she will, as a widow of Steve Pavich, receive one half of the Compensation remaining to be paid but not to exceed two years compensation. At the time of Pavich's death they were considerably in debt, largely on account of repairs which were just being completed on his house and a petition for a lump sum payment sufficient to pay off this indebtedness was presented to the Industrial Commission of Minnesota which was granted. She later petitioned for another lump sum in order to pay for a very valuable tomb stone ordered for her husband's grave and the Commission did not approve of this and did not allow the payment to be made.

It is quite likely she may re-marry before the period of payments is ended as she seems to be quite a capable woman and the bonus which goes with the widow because of the provisions of the compensation law is liable to make her especially attractive.

Battista Bertino - Morris-Lloyd Mine Accident No. 603. Bertino suffered an injury to his eye on April 17th, 1924, from which injury the sight was lost in this eye and to protect the other eye it was subsequently removed. After a number of interviews in the matter, payment was finally agreed upon for the loss of the eye and he petitioned for a lump sum payment and this was granted by the Department of Labor & Industry and he left this district to return to Indiana to be with his children, his wife having been dead some years.

PENSION DEPARTMENT

Erick Kielinen - Lake Mine Accident No. 93. Kielinen lost his life through an accident at the Lake Mine in August, 1913. At the time of his death we could learn of only one payment being sent to his parents in Finland, this being forwarded from Cobalt, Canada, previous to his entering our employment. This payment was exceedingly small and inquiries were made of the parents to see if any showing could be made of other amounts but we were never able to learn of any. Letters rogatory were sent some few years ago by an attorney at Lansing but we never learned anything further from that. This case came up again in October, 1924, and other letters regatory were sent to Finland with a list of additional questions to be answered, these being prepared by Mr. Clancey. Since that time we have not heard further from the case.

Unless a greater showing of payments made than that furnished to us at the time of his death any compensation payments to be made would be exceedingly small.

WORKMEN'S COMPENSATION (Continued)

The annual statement of Workmen's Compensation which is attached, shows the payments made during the year on account of accidents which occurred in 1924 and also those which occurred in the years 1915 to 1923.

In those cases for which a definite amount is still to be paid at the end of 1924, these amounts are set up in the column of the annuat statement as "Compensation Still Pending."

In the case of some accidents, especially those which occurred late in the year, it is impossible to know definitely just how long the disability may continue and in these cases an estimate is made based on reports of the physicians and the corresponding amounts are included in "Compensation Still Pending". The number of such cases is small in comparison to the total so that the amount involved in these estimates does not affect the percentage of cost to a great extent.

The total amount of compensation to be paid after December 31st, 1924 is $56,929.59, this being the total for all mines of the Company.

Of the above amount there is pending for the years 1919 to 1923, $26,905.62, and for the year 1924, $30,023.97.

The compensation payments for accidents which occurred in 1924 including medical payments for the year amount to a percentage of .01885 of the year's payroll.

The percentage of compensation costs since the laws went into effect are given in the following table:

Year	Percentage of Payrolls
1912 - 4 months	.00648
1913	.01104
1914	.0160
1915	.01095
1916	.01903
1917	.01268
1918	.01214
1919	.00901
1920	.0079
1921	.01444
1922	.01570
1923	.01590
1924	.01885

PENSION DEPARTMENT