at 255' will average over 54% iron, which is very encouraging for the territory to the East approaching the intersection of the fault dike and slate footwall. Drilling was stopped for the time being with the completion of No.101.

REPUBLIC MINE.

One drill operated continuously in this mine and a second drill was started the last of November to speed up the campaign of exploring which has been mapped out for the coming year. Nineteen holes were completed and two others started during the year. They were all located in the Pascoe Shaft workings. A total of 3241' were drilled, which compares with 2414' drilled during 1924.

All holes were drilled horizontally and according to the plan of systematic exploration that has been followed at this property for many years. This resolves itself into first making an attempt on all levels to locate the downward extension of known ore lenses where they are not found by drifting along the quartzite hanging contact but presumably dropped back into the jasper footwall. Secondly, the hanging contact zone is explored for new ore bodies by drilling where rock drifting is unwarranted until a discovery of ore is made. Lastly, a systematic exploration of the jasper formation is made back to a horizon 100' to 200' from the hanging contact. It has been the experience in this mine that all important ore bodies lie within this zone.

Hole No.527, located just West of the shaft on the 2470' level, was temporarily stopped at 41' in 1923. It was being deepened at the beginning of 1925 but was bottomed at 174' without encountering ore of merchantable width. Hole No.559, the next one to be drilled, was also located at this point. It was drilled S. 21° W., or about 47° to the left of No.527. Some enrichment was encountered but no good ore.

Holes Nos.560 and 561 were drilled from the 2570' level. The first was drilled N. 74° W. from the shaft plat to test the ground towards

the hanging contact. No enrichment was found. No.561 was a short hole drilled N. 60° E. from the Northwest hanging wall drift, being driven towards No.9 shaft territory. A small seam of ore was followed in the drift and this hole was planned to test the footwall side of it. No discovery resulted.

Nos.562 and 563 were drilled from the 2770' level. Hole No.562 was drilled S. 30° W. from the foot side of the main stope and No.563, N. 63° E., from the shaft plat. Both holes were planned to test the foot side of the main soaprock horizon. No ore was found.

Nos.564, 565 and 576 were located on the 1570' level. The first two were drilled N. 50° W. and N. 45° W., respectively, from the Southwest side of the level to explore the ground towards the hanging contact. Several seams of ore were cut but were too narrow to be of commercial importance. No.576 is being drilled S. 15° W. from the Southwest side of the shaft plat to test the ground in the footwall of the main stope on this side of the mine. It was being drilled in jasper at 255' on the last of the year. Four seams of ore, varying from 3' to 6' in width, have been cut.

Nos.566, 567 and 572 were drilled from the 1850' level. They were all drilled Northwesterly in a fan shape from the same point on the hanging side of the Southwesternmost stope on this level to explore the territory towards the quartzite hanging contact. The first hole cut 6' of good ore from 193' to 199' and the second, presumably this same seam, from 139' to 146½'. Hole No.572 was drilled on the opposite side of No.566 to test the extent of this ore in that direction but when the hole had reached a depth of 100' the floor of the drift in which the drill was working caved into a stope below. This prevented further drilling from this point.

Holes Nos.568, 569, 570 and 571 were drilled from the 2840', or bottom level, to outline the main ore body and locate the hanging contact and any possible ore that might lie along it. Holes Nos.568, 569 and 571 encountered no ore of importance but No.570 cut the East end

of the main body and had good ore from 74' to 103'. Development work in this ore so far indicates strongly that it will be very much smaller at this elevation than on the levels above. Apparently, ~~xxxxxx~~, it is dropping away from the quartzite hanging contact back into the jasper footwall which is usually a sign that it will soon discontinue in depth.

Holes Nos.573, 575, 577 and 578 were located at the shaft plat on the 1780' level. Holes Nos.573 and 575 were drilled S. 17° W and due South, respectively, to explore the ground intervening between the shaft and the large stope that extends from the 1850' to the 1710' level and above. Ore was encountered in No.573 from 4' to 9' and 93' to 100', and in No.575 from 0 to 7', 18' to 23', 115' to 116', and 132' to 137'. Nos.577and 578 were drilled S. 40° W. and S. 32° W., respectively. No.577 was planned to test the ground to the West of the big stope mentioned above but ran into an old stope at 61'2 and had to be abandoned. In hole No.578 a second attempt is being made to get by this old stope and reach the objective point. Each hole had 7' of good ore at the start and No.578 was drilling in jasper at a depth of 31' as the year closed.

No.574 was drilled S. 25° W. from the South end of the 2050' level, midway between old holes Nos.470 and 472 in a final attempt to discover a downward continuation of footwall ore from above. The result was disappointing as no enrichment was encountered.

VIRGIL MINE.

A campaign of drilling was inaugurated in the Virgil Mine in connection with the development work. The work was begun the 1st of March and 24 holes, Nos.17 to 40, inclusive, were drilled. A so-called "deep hole" type of reciprocating air drill, manufactured by the Denver Rock Drill Company, was used. The holes were drilled at a very low cost as no carbon is used. The drill is limited, however, by the hardness of the ground and to shallow depths. It

is particularly well adapted for determining the limits of ore by drilling in the ore itself and the majority of holes were of this type. All the holes were drilled with a 10° to 18° inclination upward to allow for flattening as they progressed and so that they would clear themselves of cuttings readily.

The first holes to be drilled, Nos.17 and 18, were drilled North and South, respectively, in the footwall of the main ore body on the 4th level. No.17 encountered good ore from 15' to 25' and from 30' to 40', but No.18 found none. Hole No.20 was also drilled from this level and from the Southwest end of to test the hanging wall of the main ore body where a seam of slate had appeared across the drift. Ore was encountered from 0 to 15', 20' to 25' and 30' to 35'. This was followed by hanging wall jasper. The main drift was then extended to the end of the ore, as shown in this hole.

No.19 was drilled South from near the end of the 5th level on the same meridian as No.18 on the 4th level. Iron formation was encountered from 138' to 165' but no ore.

A drift was driven in ore North and South on the 90' sub-level just above the 4th level to determine the length of the ore. The next 19 holes, Nos.21 to 39, inclusive, were drilled from this sub-level, both Easterly and Westerly, to determine the width and general shape of the ore. Most of them started in ore and were carried to the foot and hanging wall contacts and for a short distance into the rock wherever the capacity of the drill permitted. In this way the ore body was demonstrated to have a width of something like 150'.

No.40 was a short hole drilled N. 62° W. from the end of the Northwest crosscut on the 4th level. It was planned to locate the main ore contact and facilitate the lay out of this part of the level. It started in cherty slate and the rock was so hard for this type of drill that the hole had to be abandoned at a depth of 22'. Drilling was stopped temporarily with the abandonment of this hole the last of November.

EXPLORATIONS BY OTHER COMPANIES.

The principal explorations by other companies that have come to our attention during the past year are those of the Ford Motor Company, at various points, but chiefly on the Marquette Range, and the drilling by the Hanna Company and later by a group of individuals North of our Virgil Mine at Iron River.

The Ford Motor Company put down one hole on Lot 7 of Section 7, 46-29, on the West shore of Smith's Bay at Republic. They found the iron formation lacking on this limb of the fold and the hole passed from quartzite hanging directly into diorite footwall. They drilled for a time in the vicinity of the old Taylor Mine in Baraga County. I understand that the results were discouraging. The Ford Company has taken an option from the Palms Book Land Company on their holdings in Section 3, 47-28 near the old Dexter Mine and on other lands in that vicinity and have four drills at work there. They are attempting to check the Palms Book drilling which encountered some ore and also are completing the exploring of these parcels. Several ore chimneys have been discovered but they are finding it difficult to connect them up. They are also drilling in the vicinity of the old Bessie Mine, North of Humboldt, and intend to explore all their holdings along the North side of the Marquette Range.

Early in the year the Hanna Company took an option on the Spies land in Section 24, 43-35, just North of the Virgil Mine. They put down five shallow holes and threw up the option. Messrs. Odgers, McPherson and Monroe then took an option on the same property, as well as on other land to the North and East, and have done considerable drilling. They located a horizon of iron formation which apparently dips to the South and encountered 30' of good ore in one of their holes in this formation at a depth of between 700' and 800'. The Jones & Laughlin Company took a month's option from these men but did no work and I understand now that the Pickands, Mather & Company have taken over the option and will continue the work.

The Jones & Laughlin Company did some drilling on land West of their Forbes Mine. I did not learn the results. Pickands, Mather & Company also optioned the old Volunteer Mine at Palmer and drilled a portion of it lying West of the Maitland pit in search of lean siliceous ore. A good tonnage of this ore was proven up and a lease on the property was acquired. They are now preparing to strip it and expect to get it opened up during the coming season.

The C. K. Quinn Company, represented by R. S. Archibald of N egaunee, did considerable test pitting and drilling at the Empire Mine in Section 19, 47-26, the fee of which is owned by this Company. A good tonnage of lean siliceous ore, principally siderite, was developed. They have acquired a sub-lease on the property and expect to strip it and enter the shipping list the coming season.

EXAMINATION OF MINERAL LAND OFFERS.

Five mineral land offers were examined during the year and covered by special reports as follows:

No.1427 is the Mary Charlotte Mine, comprising the NE¼ of the SE¼ of Section 7, 47-26, the S½ of the NW¼ and the N½ of the SW¼, both in Section 8, 47-26 at Negaunee. Mr. Jackson and I examined both the underground workings and the records of this property quite thoroughly. We each wrote a separate detailed report but joined in a recommendation that the offer be declined unless the purchase could be made at a price materially less than $500,000. The Moroco Mine in the vicinity of Crosby, Minnesota, on the Cuyuna Range, was also offered at the same time. It was examined and reported on by Mr. Barber.

No.1515 is the N½ of the NW¼, SE¼ of the NW¼ and the NW¼ of the NE¼, all in Section 32, 41-30, Dickinson County, which is located approximately eight miles Northwest of the City of Iron

Mountain. It was originally a part of the Bad Water Indian Settlement. Mr. Jopling and I made a field examination. Explorations consist of one shaft about 60' deep and several test pits, all of which were sunk many years ago. I examined all the ledge outcrops in the vicinity. They were chiefly Limestone and hornblende schist. The dumps at the shaft and one test pit indicated the presence of an iron formation and several of the specimen pieces I gathered analyzed lean ore. We recommended acquiring an option and doing enough exploring to establish the value of this property but the offer was declined.

No.1517 is the N½ of the NE¼ of Section 26, 43-35, Iron County, and lies in the North part of the Village of Iron River. Mr. Meyers and I made a field examination of the property. No explorations were ever conducted on it and there are no outcrops but we were able to get information on most of the exploring done on adjacent lands. The offer was declined.

No.1547 is the NW¼ of Section 14, 43-32, Delta County, and is located six miles South and a little West of Trenary in Maple Ridge Township. It was claimed that a test pit was sunk some twelve years ago and exposed pieces of iron ore. W e could find no traces of this pit, nor of any other exploring. There are no outcrops. The offer was declined.

No.1567 is the Holman-Brown Mine located just North of the Village of Taconite, on the West end of the Mesabi Range. It comprises the S½ of the NE¼ of Section 21, 58-24, the S½ of the NW¼, the NE¼ of the SW¼ and the NW¼ of the SE¼ of Section 22, 58-24, Itasca County, Minnesota. I spent several weeks in Minnesota during August, Septem- b er and October examining this property and making estimates. Several reports have been written on it by Mr. Barber and an option to this Company is now being prepared.

EXPENSE STATEMENTS.

Tables VI and VII, which follow, show a detailed statement of charges to geological expense for the year and a comparative statement of these charges for the last three years. They are self-explanatory:

TABLE VI.

DETAILED STATEMENT OF CHARGES TO GEOLOGICAL EXPENSE FOR YEAR 1925.

GEOLOGICAL DEPARTMENT.

	Salaries, - - -	$18,509.26
(1)	Travel, - - - -	102.52
(2)	Operating Automobiles,	918.93
(3)	Supplies, - - -	927.03
	Office Expenses, -	13.24
	Total,	$20,470.98

EXPENSES OF H. L. SMYTH.

Travel, - - -	$137.38
Supplies, - - -	6.92
Miscellaneous, -	90.00
Total,	$234.30

SUMMARY.

Expenses of Geological Department, -	$20,470.98
" " H. L. Smyth, - - -	234.30
Grand total,	$20,705.28

(1) DETAIL OF TRAVELING EXPENSES, B - 1.

Traveling expenses, geological surveys, etc,.	$ 95.52
Livery hire, - - - - - - - - -	7.00
Total,	$102.52

NOTE: See next page for further details.

(2) DETAIL OF COST OF OPERATING AUTOMOBILES.

ITEMS.	STUDEBAKER.	¼ PROP. DODGE TRUCK.
Gasoline, oil & grease,	$138.69	$48.93
Tires, - - - -	1.95	25.44
Tools, - - - -	None	.87
Repairs, - - - -	127.05	61.41
Miscellaneous, - -	93.99	7.90
Insurance, - - -	87.84	18.60
License, - - - -	35.20	5.60
Depreciation, - -	265.46	None
Total,	$750.18	$168.75

(3) THE MORE IMPORTANT CHARGES TO SUPPLIES.

Annual Report, - -	(1/3 proportion),	$291.46
Blue print paper, -	" "	39.48
Tracing cloth, - -	" "	149.72
Drawing paper, - -	" "	14.80
Repairs to Maas transit,	" "	26.30
Blue print lamp, - -	" "	25.50
Printed forms, - -	" "	3.25
Measuring tapes, - -	" "	13.98
Maas Compass rental, - - - - - -		50.00

TABLE VII.

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

	1925.	1924.	1923.
Salaries, - - -	$18,509.26	$17,832.99	$16,295.25
Travel, - - - -	102.52	656.90	220.98
Operating automobiles,	918.93	867.82	657.20
Supplies, - - -	927.03	1,200.39	1,325.19
Office expenses, -	13.24	309.15	115.00
Total,	$20,470.98	$20,867.25	$18,613.62
Expenses of H. L. Smyth, i.e., travel, supplies, and miscellaneous,	234.30	717.06	528.39
Grand total,	$20,705.28	$21,584.31	$19,142.01

CLIFFS SHAFT MINE

The following changes were made to the top tram plant. The 50 H.P. motor was replaced by a 100 HP. motor, which was taken from the underground haulage set in the engine house. A heavier shaft, larger coupling and heavier bearings were used. The plant is in good condition and should operate for some time without any trouble.

On account of the shortage of hydro-electric power the steam driven air compressor was operated from August 7th to December 5th, and the underground steam pump operated from September 4th to December 7th.

In September we started to get equipment together for a steam generating unit to be installed in the engine house at this mine. This unit will be made up from the following equipment. A 325 H.P. Westinghouse synchronous motor was taken from the Mackinaw Mine Nordberg air compressor to be used as a generator; the steam engine formerly used on the skip hoist at the Stephenson Mine will be used to drive the generator, and the crankshaft was taken from the old steam driven skip hoist formerly used at the Maas Mine and rebuilt to fit this unit. When completed this unit will generate about 250 K.W. This unit is now being erected.

All mechanical equipment is in good condition and has given us very little trouble during the year.

At the beginning of 1925 we had four 25 H.P. scraper motors installed underground at this mine. About 900 ft. of #00 armored and lead covered shaft cable, 1,000 ft. of #4 armored and lead covered cable, 4,000 ft. of #4 armored cable and 4,000 ft. of #6 armored cable were installed originally. In 1925, ten more 25 H.P. scraper motors were added and 4,000 ft. of #6 armored cable added to take care of these installations, making a total of nearly 2½ miles of cable supplying power to scrapers.

HOLMES MINE

There were no changes or additions to the mechanical equipment at

this mine during the year. All equipment is in good condition and operated satisfactorily throughout the year.

SALISBURY MINE

The air compressor and motor, also the cooling water pump, were transferred to the Ogden Mine.

The surface drainage pump was loaned to the City of Ishpeming for use in pumping the water out of Lake Tilden.

OGDEN MINE

The air compressor from the Salisbury Mine was installed at this mine and put in operation on June the 4th. The loading of ore from this pit was stopped on November 4th. The equipment is in good condition with the exception of the steam shovel, which will require a lot of repairs. This will be taken care of during the winter.

The Portable Substation was installed at this mine in May to furnish current for the air compressor and pumps. A 30,000 volt oxide film lightning arrester was installed at the Substation. A 2 H.P. and a 20 H.P. motor were installed for water supply. Later in the summer a 10 H.P. motor on a churn drill was added.

A temporary 2300 volt line was built 1½ miles to Lake Tilden to furnish power to the City of Ishpeming for pumping water.

ATHENS MINE

All mechanical equipment operated in a satisfactory manner. There were no changes or additions during the year.

MAAS MINE

A little trouble developed in the Prescott plunger pump on the third level. On April the 10th the pinion shaft broke. This pinion and shaft is made up in one piece and it was necessary, in order to put this pump in

operation as soon as possible, to bore out the pinion and fit a new shaft into it. This work was completed and the pump put in operation again on April 25th. A new pinion was ordered at once. On August the 9th this same pinion split. The new pinion was on hand, so that it did not take long to press it on the shaft and get the pump in operation again. This pump is now in good condition and we should have no further trouble with it.

The centrifugal pump on the same level gave us a little bearing trouble. This has been remedied and the pump is now in good condition.

The steam turbine was put in operation on July 18th on account of the shortage of water in the storage basins. It was shut down on December the 11th.

Considerable repair work is being done in the boiler plant as most of the equipment was not in very good condition.

During the year the mine was shut down for approximately three months while the shaft compartment was enlarged to our standard size and steel lined from surface to bottom. The shaft house was changed to accommodate these improvements, and permanent steel stocking trestle was erected. The old wooden pulley stands were taken down and new steel ones were erected to take their place. The tram plants were moved into a new building.

All other mechanical equipment operated satisfactorily.

A standard haulage cable was installed from surface to the first level, 900 feet. This cable was formerly in use at the Francis Mine. A new section of haulage cable was extended to the 3rd level. All shaft cables are now in good condition.

MAAS CRUSHING PLANT

This plant was put in operation on April 22nd and closed down on November 19th.

On July 10th the concaves in the crusher were adjusted so as to crush the Ogden Mine ore finer. It was necessary to put in new concaves on July 31st, as this ore is very hard and wears them very fast. On August 23rd the pinion

MAAS CRUSHING PLANT (Cont'd)

on the crusher broke. It was replaced by a new pinion which we had in stock. On August 25th one arm on the spider broke. This was repaired during the night, but would not hold. A new spider was ordered to be shipped by express. This was received and installed on the 27th. During the shut down a new set of grizzly screens, with 1½" spacing, was installed to replace the 2½" grizzly formerly used. A new head was installed on September 1st as the old head was badly worn and would not crush the ore as fine as desired. The excessive breakages on this crusher were all caused by attempting to crush finer than is practical on this size crusher.

We had a little trouble with the pan conveyor. This will be repaired during the shut down this winter.

The #7½ McCully crusher has been dismantled and the foundation for the new Allis-Chalmers jaw crusher is completed. We are rebuilding the grizzly and chutes. This is necessary on account of changing the crushers. The foundations for the Allis-Chalmers fines crusher are completed and the steel men are erecting the new crusher building. The carpenters are framing the timber for the loading pocket and belt conveyor.

NEGAUNEE MINE

On March the 28th the 8 ft. rubber lined sheave on the south top tram broke. This was replaced by a spare sheave from the Maas Mine. At the same time a new coupling was placed on the motor of this plant. These repairs caused a delay of one day on the south side only.

All other mechanical equipment operated satisfactorily.

The new ventilating fan at #2 Shaft is driven by a two speed 720/360 R.P.M., 2200 volt, 3 phase, 150/50 H.P. motor. This is a very satisfactory installation.

A 25 H.P. motor secured from the Francis Mine was placed at #2 Shaft to drive the timber hoist. This is 220 volt, 1200 R.P.M.

A new haulage cable was put in from the 10th to the 12th level, a distance of 300 ft., and signal system extended from 11th to 12th level.

SOUTH JACKSON CRUSHING PLANT

Not operated during the year.

SOUTH JACKSON MINE

This mine was not operated during the year.

BARNES-HECKER MINE

The high speed gear on the intermediate shaft on the Aldrich underground pump loosened on the shaft. It was necessary to make a new shaft and refit the gear. This pump is now in good condition.

On March the 30th we started work on the North Lake drainage ditch. We had considerable trouble on this job keeping the locomotive crane in operating condition. Clutches, gears and pinions caused a lot of this trouble and it was necessary to replace them with new parts. On May 21st the boom rope broke and the boom dropped into the ditch without doing much damage. The boom was raised and a new 5/8" rope put on May 22nd. This rope broke on May 26th and the boom again dropped into the ditch. The boom was very badly twisted and it was necessary to completely rebuild the top section. This work was completed on June the 5th and a new 7/8" special rope put on. We have had no further trouble with the boom. Work in the ditch was suspended on December 29th on account of the cold weather. We now have about 250 ft. left to complete this ditch.

All other mechanical equipment operated in a satisfactory manner.

LLOYD MINE

There were no changes or additions to the mechanical equipment at this mine . All mechanical equipment operated satisfactorily.

On July 15th the primary circuit breaker on the skip hoist shorted and destroyed the panel, metering equipment and circuit breaker. As the contactor panels of the cage hoist were obsolete, the complete starting equipment of the Mackinaw Mine hoist motor was taken out and installed at the Lloyd. The

cirduit breaker was installed on the skip hoist and the contactor panels were installed on the cage hoist.

MORRIS MINE

On January 16th we installed a new Farrell herringbone gear on the #1 Prescott pump on the 4th level to replace a gear that was worn out. This gear is operating very satisfactory.

We had a little trouble with the cage hoist foundation bolts. New bolts were put in and this hoist is in good condition again.

All other mechanical equipment operated in a satisfactory manner.

SECTION 6 SHAFT

There were no changes or additions at this shaft. All mechanical equipment operated without trouble or delay.

AUSTIN MINE

This mine was idle the entire year.

GWINN MINE

Idle the entire year, with the exception of the underground pumps.

In November the shaft on the 7th level centrifugal pump broke off in the coupling on the water end. This was repaired and pump is in good condition again.

A new lightning arrester was installed during the year. The signal system was rebuilt from the 1st to the 7th level.

GWINN CRUSHING PLANT

This plant was thoroughly overhauled during the Spring and was placed in operation the latter part of April. Operation was quite satisfactory. It was shut down on November the 12th.

After the plant was shut down the sides of the pan conveyor were cut down about 3" so as to have more clearance under the bottom roller.

GARDNER-MACKINAW MINE

Idle the entire year.

PRINCETON MINE

Idle the entire year, with the exception of the underground pumps, the operation of which was entirely satisfactory.

PRINCETON CENTRAL POWER PLANT

On account of the shortage of hydro-electric power the steam turbine was put in operation on June the 17th. Operation was entirely satisfactory. It was shut down on December 31st.

In June a new motor was installed to drive the induced draft fan because the old one began over-heating.

PRINCETON PUMP STATION

In February considerable trouble was experienced with freezing of water mains and service pipes, particularly in Gwinn. This was due to the light covering of snow on the ground, which offered very little protection against frost.

During May repairs of many leaks of various proportions, caused by frost and general decay, were made on the water mains and branches. The wooden main crossing over the bridge to the Gwinn High School was replaced by an iron pipe laid in the river bed. A like change was also made on the main highway at the bridge in Gwinn near the depot.

On account of the shortage of hydro-electric power the steam pumps were placed in operation on August 29th.

Operations at this plant were entirely satisfactory. There were no delays of consequence.

STEPHENSON MINE

In February some trouble was experienced with the Allis-Chalmers underground centrifugal pump. One wearing ring was replaced by a new one.

STEPHENSON MINE (Cont'd)

In February work was started on a new pump station and sump on the 8th level. The Aldrich pump in the 6th level pump station was moved to the 8th level station and put in operation on May 12th.

After the Aldrich pump was removed from the 6th level station, two new Cameron centrifugal pumps, which operate automatically, were installed. These have a capacity of 750 G.P.M. against 100 ft. head, and are driven by General Electric 30 H.P., 440 volt motors. Operation of these pumps has been quite satisfactory. They were placed in operation on April 23rd.

On April 4th the Aldrich pump on the 5th level developed a hot crank bearing from some unknown cause. The brasses were scraped and replaced, after which the pump operated as usual.

In May a new herringbone gear was installed on the Prescott pump on the 5th level. The valves, seats., etc., in this pump were put in first class condition. A bad crack in the partition between the suction and discharge chambers on one of the pump barrels was repaired. A similar.crack was found in each of the other three barrels, but the breaks have not opened up and show no water leakage. It is probable that they will last indefinitely.

On June 13th and 14th a new brake band and rim was put on the cage hoist, the old one being a little small to serve the hoist entirely satisfactory.

On account of the shortage of hydro-electric power the underground steam pump was started up on October 5th and ran until November 14th.

The proper shaft cables have been installed to serve the pumps on the 6th and 8th levels. Duplicate cables are being installed for safety.

New signal system was installed from the 6th to the 8th level; also electric haulage on the 7th level.

BOEING MINE

With the exception of Shovel #20, the machinery required few repairs. After loading out the stockpile, this shovel was found to be in such poor condition it was decided to scrap it, rather than attempt repairs.

One improvement on compressor that eliminated valve breakage for ten months was putting two valves together, where one was supposed to operate.

The added stiffness increased the valve life about 6 to 1 and saved trouble from valve breakage shutdowns. The main crank bearings were rebabbitted in May and again in November, and with 16 hours a day operation it is found necessary to rebabbitt these about every six months. A leaky tube in intercooler caused excessive moisture in the compressed air until tube was located and plugged.

To put skip hoist in good condition the worn herringbone pinion was replaced with a new one, which is giving satisfaction.

In the fall, the angle guides on dump plates in shaft house were found in bad shape and were replaced. At the same time the rotary dump underground was overhauled and re-riveted, and the butterfly gate under dump rebuilt.

No trouble was experienced with top tram equipment until December, when the operator went home from night shift at 11:00 P.M., leaving the controller on two notches. The night watchman discovered the condition two hours later, when the grids were red and the motor very hot. Repairs were made and equipment was ready to operate by 8:00 A.M. the next day.

In the spring some sand trouble was experienced with the underground pumps, but after the #28 shovel during the summer dug a hole in the east end of pit, 25 ft. lower than the mine level, the water carried but little sand. Some sand runs from the east end occurred in the fall, but were so far from the shaft they were stopped before reaching the sump.

In the Pit #28 shovel started April 30th and shut down December 26th. The last ore was loaded November 19th, after which the shovel was moved to top of ore bank to cut a track grade and strip ready for Spring operations. Due to bad crack in dipper bail in May, one was borrowed from the Oliver Company until a new one was secured in June. The old one was repaired by thermit welding, but has not been needed. The brake casting on hoisting drum cracked during July, but was repaired and lasted until November, when a new one was put on. The back of dipper is cracked, but will be patched in the Spring and may last another season.

When #28 shovel dug down in east end of Pit 25 ft. below the mine level it was necessary to build a floating raft to carry the pumps in case of

flood conditions. This equipment was needed on August 17th, when a cloudburst raised the water above the truck wheels and delayed pit operations from 8:00 A.M. until 3:00 P.M.

A second hand electric driven Cyclone drill, in good condition, was purchased from the Mesabi Iron Company in August for the Pit and took care of the blast holes for the remainder of the season. The transmission line to operate this and the pumps was shifted from the east end to enter the pit near the shaft house.

CROSBY MINE

Several changes were made at the Washing Plant. The two 18 ft. turbos were moved to the basement and a 16 ft. Dorr Bowl Classifier installed in their place. The 1,000 G.P.M. Allis-Chalmers centrifugal pump was moved from the mine engine house to a location near the dam of the tailings basin, and the suction and discharge lines changed to accommodate this pump. The pole pump was not used.

HILL-TRUMBULL MINE

The Washing Plant was started April 25th and closed down October 6th, operating day shift only and washing 406,094 tons of concentrates. Several improvements and repairs were made before starting. In January the repair crew was kept busy on diverting ditch which leads the water from the Hill-Annex Mine around our tailings basin and into Little Penacie Lake. Due to a new drainage pump started at that time by the Hill-Annex Mine, together with extreme cold weather, it was necessary to blast a channel through the ice and keep it clear until the weather moderated. By operating this pump for the year the Hill-Annex Mine has lowered the water in the Hill-Trumbull pit approximately 40 ft. and saved our installing and operating a pumping equipment to do this work, which means a yearly saving to us of over $25,000.00.

In February an electric railroad car puller was received and was installed in May, which allowed us to reduce our force on concentrate cars from

six to three men and paid for itself in one year. A 5 H.P. two-speed motor was installed on picking belt conveyor and assisted in increased production. Four table covers were renewed on the Deister Overstrum tables and the table equipment placed in good shape, but this was needed very little during the season. The 50 H.P. tailings pump motor was received from Ishpeming in January and one tailings pump took care of the mill for the season. The badly worn belt conveyor broke August 19th and was replaced with the spare belt on hand. By re-designing the chute under grizzly bars, much longer life is expected from this conveyor belt in the future. The head end casting on the north 25 ft. log cracked in May and was reinforced with 5/8" plate. The south log was also reinforced with 5/8" plate after the season closed. A herringbone gear and pinion, installed at head end of belt conveyor to eliminate the excessive vibration caused by the old spur gear corrected this trouble entirely.

Much experimenting was carried on at the tailings basin dyke. So far we find the most economical dyke cross section to build is 5 ft. high by 3 ft. at the top and 13 ft. at the bottom, put up with slushers in layers 18" thick and tramped thoroughly by the horses. Due to heavy rains and improper construction several sections of dyke washed out during the season, but the reasons for the trouble have been located and overcome. A 100 ft. section of wood dyke is being tried out and report on its success will be made next year.

Due to poor checking of ore cargo content between the mine and Cleveland, the chutes from picking belt to concentrate bins were changed to join with the 25 ft. log concentrate before reaching bin and a sample taken that eliminated the personal element. Much closer checking has resulted from the change. The work of grinding these samples was reduced by installing the #2 Blake crusher from the Crosby washing plant on the table floor and driving it with a 10 H.P. motor from one of the concentrate pumps.

Two comparative tests were run on Hill-Trumbull Mine ore during the season to ascertain if additional tonnage could be secured by using Dorr Bowl Classifiers to replace the 18 ft. turbos and tables. One test run in July at the LaRue Washing Plant showed no additional recovery, and the test run at the Hawkins Mine concentrator with more ore showed practically the same results.

HILL-TRUMBULL MINE (Cont'd)

After the close of the shipping season an inspection of the pan conveyor showed that it needed a complete overhauling as several of the pan pin straps were broken and the rivets loose. This work is almost completed, with additional reinforcing added that should give longer life to this equipment. After the timber "A" frame was built at top of receiving pocket to cushion the blow of ore falling on conveyor, no more 14" rollers supporting the pans were broken.

Due to sand troubles at the Washing Plant pump station suction pipes, a concrete dam was placed across the channel leading to the lake and most of the sand in the channel pumped out. The sand caused no trouble during the season.

In the Pit all of the equipment was operating by April the 30th. No, 19 shovel was kept in the direct shipping section of the pit for the season, while #26 and #27 were on wash ore. No. 22 shovel was used at the Boeing on clean-up work and the North Eddy Mine stockpile all of the season as it was not needed at the Hill-Trumbull. After the ore season was over, the #27 shovel, three locomotives and the twenty yard dump cars were kept busy removing lean ore from pit until December 1st, when the twenty yard cars and #17 locomotive were moved to the Boeing on clean-up work, which lasted until December 26th. This equipment was returned to the Hill-Trumbull on December 28th.

A. Guthrie Company completed their five year 5,000,000 yard stripping contract in Pit in November and removed all equipment with exception of Model 350 shovel, which is stored there until moved to the next contract.

In September a transmission line was extended from Shops to Pit to operate the electric churn drill. This drill for the past year has operated from a line partly built by A. Guthrie Company to pit from east end. With the new arrangement all mine power required comes from one Substation.

WADE MINE

Underground pumping continued during the year. In March a sand run filled the sump and it was necessary to clean up this trouble. In April #23 shovel loaded 5,000 tons of ore from stockpile, but was not needed the rest of the season.

REPUBLIC MINE

The 19" & 12" x 16" Ingersoll-Rand air compressor formerly used at the Spies Mine was installed at this mine to boost the air pressure. This was put in operation in April.

There were no other additions or changes during the year. All mechanical equipment operated without trouble.

SPIES MINE

Early in September the crank shaft broke on one of the Prescott underground pumps. There are duplicate pumps in this station. Telegraphic order was sent for a new crank shaft, but before this came the crank shaft on the other pump broke on October 12th. One of these pumps we were able to run with one plunger, and this, together with the Deane triplex pump on the third level, nearly took care of the water

All other equipment operated in a satisfactory manner. There were no changes or additions during the year.

DEAD RIVER STORAGE DAM

The remaining property rights to permit us to complete the storage dam were not acquired and the gap in the dam remains the same as it was the preceding year. The top of the concrete in the gap is at elevation 1334, and the steel stop logs are in place with the ability to raise the water to 1341.6. Our present rights terminate at 1341. In case these rights are acquired before the break-up next Spring, steel is ordered to complete this structure so that water can be raised to the top of the dam, elevation 1345.

ELECTRICAL DEPARTMENT

The operation of the Electric Plant was routine throughout the year, with continued effort to secure the greatest possible output with the smallest amount of water. This at times slightly reduced the quality of service on account of regulation, but the service was quite satisfactory.

Our run-off in the Carp Basin was only 28% of the five year average

and the Dead River 21%, this being but 50% and 55% respectively of our previous minimum. Precipitation was only 62% of normal, and 10% below our minimum. In spite of this condition only 15% of the total output was made by steam.

Very little commercial load was carried the last half of the year, but connection was maintained with Negaunee City at Negaunee, Michigan Gas & Electric Company at Ishpeming and Munising Electric Light & Power Company at Munising. This tended to equalize the load and improve the efficiency of operation.

No new developments were made excepting the nominal addition for the Ogden Mine, where the Portable Substation was used.

One small leak occurred in the Carp pipe line. This was repaired and is now in good condition.

Several minor interruptions occurred due to transmission line failure, caused by storms. Only two of these affected the service to any extent. The first, a lightning storm which interrupted the Republic line for a day and the Gwinn District for several hours. The second one, a snow and sleet storm, occurred on October 18th. This was the most serious storm we have ever experienced and resulted in a complete shutdown for about ten hours and with the Gwinn District off about 36 hours. Five days were required to repair all lines.

We furnished power to Ishpeming City for emergency pumping at Lake Tilden, due to shortage of water for city water supply.

Two new high capacity, high tension, circuit breakers were installed at the Brownstone Substation and one at the Maas Substation, replacing under capacity and obsolete equipment. Westinghouse equipment was purchased for the Brownstone and General Electric for the Maas.

Three General Electric oxide film high tension lightning arresters were installed, one each at the Cliffs Shaft, Maas and Gwinn Substations, replacing obsolete apparatus.

We will require three more circuit breakers and ten more arresters within the next two years.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

The service at the mines has been very satisfactory and no serious breakdowns or accidents occurred.

Development of scraper loaders has introduced some problems in underground service, but these have been pretty well worked out. Two standard forms are in use. The large ones driven by A.C. motors are in use at the Cliffs Shaft. This requires considerable cable layout underground. The other is mostly small size D.C. and operates from the haulage service. Both give excellent results.

I recommend that our system of accounts be changed to conform with the Card of Accounts used by the National Electric Light Association. Nearly all utility plants operate under this system, and in some states it is required by law. If we should form a company to operate independent of the mines, this system of accounting would be compulsory. It should be installed now because it is far more comprehensive than the system we use, which does not give the information we want from an operating standpoint.

SUMMARY OF OPERATING CONDITIONS - 1 9 2 5 .

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Precipitation	0.41	0.64	0.48	0.99	1.15	2.02	2.74	3.06	5.06	2.41	0.82	0.93

Total Precipitation for 1925 (Ishpeming) - 20.71 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 1925,	3,207,553,772
K. W. Hrs. generated " "	7,406,300
Cubic feet water utilized (90 cu. ft. = 1 KWH.)	666,567,000
" " " wasted over Intake Dam in 1925,	0
"" " " in Carp Storage Basin Jan. 1, 1925,	221,377,400
" " " " " " " Dec.31, "	88,199,600
" " " used from Storage,	133,177,800
Total run-off for the year 1925,	533,389,200
Run-off per square mile of drainage area,	8,001,600

	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	1925
Total Precipitation,	33.67	21.90	22.95	20.71
Second ft. per sq.mile,	1.06	.59	.50	.25

McCLURE HYDRO-ELECTRIC PLANT

Drainage area above Intake Dam,	140.52 sq. miles
Cu. ft. Precipitation in 1925, (Hoist Plant 24.06")	7,854,532,900
K. W. Hrs. generated at McClure Plant in 1925,	20,852,100
Cubic feet water utilized (125 cu. ft. = 1 KWH.)	2,606,512,500
" " " wasted over Intake Dam in 1925,	0
" " " in Hoist Storage Basin Jan. 1, 1925,	797,130,100
" " " " " " " Dec.31, "	534,405,100
" " " used from Storage,	262,725,000
Total run-off for the year 1925,	2,343,787,500
Run-off per square mile of drainage area,	16,679,387

	1920	1921	1922	1923	1924	1925
Second ft. per sq. mile,	1.22	1.02	1.54	0.85	0.92	0.52

ELECTRIC POWER SYSTEM

SUMMARY OF OPERATIONS - 1925.

	KILOWATT HOURS GENERATED								TOTAL GENERATED & PURCHASED	Used by Auxiliaries	Delivered to Line	KWH. Used & Sold	Losses	Cost Per K. W. H. (Incl. Depr
	McClure	Carp	Hoist	Au Train	Maas	Princeton	TOTAL	Purchased						
Jan.	2,366,000	666,200	770,000	54,470	0	0	3,856,670	0	3,856,670	9,500	3,847,170	3,281,717	14.69%	$.00646
Feb.	2 197 300	672 100	745 000	98 970	0	0	3 713 370	0	3 713 370	9 930	3 703 440	3 150 677	14.92	.00597
Mar.	2 247 600	840 400	741 000	70 070	0	0	3 899 070	0	3 899 070	9 810	3 889 260	3 309 055	14.91	.00548
Apr.	1 938 700	916 500	673 000	319 310	0	0	3 847 510	0	3 847 510	8 590	3 838 920	3 304 477	13.92	.00573
May	1 991 300	1 088 600	693 000	196 840	0	0	3 969 740	0	3 969 740	24 060	3 945 680	3 415 823	13.43	.00643
June	2 250 900	829 000	730 000	148 690	0	140,800	4 099 390	0	4 099 390	26 202	4 073 188	3 523 196	13.50	.00741
July	2 057 700	489 800	663 000	39 860	110,400	584 600	3 945 360	0	3 945 360	91 856	3 853 504	3 289 783	14.62	.01001
Aug.	1 566 600	321 400	471 000	29 710	642 900	619 200	3 650 810	0	3 650 810	131 984	3 518 826	3 013 756	14.35	.01373
Sep.	1 178 200	247 100	323 000	53 100	618 900	623 700	3 044 000	5,240	3 049 240	125 032	2 924 208	2 490 469	14.83	.01711
Oct.	856 500	374 600	238 000	95 370	579 600	605 100	2 749 170	78 935	2 828 105	127 776	2 700 329	2 298 870	14.86	.01975
Nov.	930 900	400 000	287 000	170 820	495 800	640 150	2 924 670	74 235	2 998 905	132 876	2 866 029	2 459 614	14.18	.01622
Dec.	1 270 400	560 600	393 000	240 060	277 500	574 050	3 315 610	0	3 315 610	102 614	3 212 996	2 770 336	13.77	.01293
TOTAL	20,852,100	7,406,300	6,727,000	1,517,270	2,725,100	3,787,600	43,015,370	158,410	43,173,780	800,230	42,373,550	36,307,773	14.31%	.01000

Hoist Plant vertical unit started Jan. 5, 1925.

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

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
ANGELINE MINE -				
Hoist	250 HP.			250 HP.
CLIFFS SHAFT MINE -				
Shop	25			
No. 8 Crusher	125			
No. 5 Crushers - 2 - 25 HP. motors	50			
Screens	15			
Top Tram (Stored at Cliffs Shaft)	50		50	
Lower Tram #1	35			
U.G. Haulage Set #1 (Used on Top Tram)	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			
Small Hoist in Crusher Building	15			
Conveyor Belts - New Crushing Plant, 2 motors	40			
Jaw Crusher - " " "	75			
Feeder Belt - " " "	5			
Magnetic Separator " " "	1½			
Underground Scrapers - 14 - 25 HP. motors	100	250		
" Scraper	30			
Battery Charging Set - 2nd Level, "A" Shaft	7½			3,776½
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.	3,887¾	250	50	4,087¾ HP.

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	3,887¾ HP.	250 HP.	50 HP.	4,087¾ 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			
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	5			
Machine Shop	25			
				2,250
SALISBURY MINE				
Hoist	400			
Compressor (To Ogden)	150		150	
Compressor Cooling Water Pump (To Ogden)	2		2	
				400
OGDEN MINE				
Compressor (From Salisbury)		150		
Cooling Water Pump " "		2		
Water Supply Pump		20		
Ishpeming Water Supply, Lake Tilden		30	30	
				172
ATHENS MINE				
Cage Hoist	400			
Compressor - Nordberg	325			
Compressor 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			
Ore 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.	9,994¾	452	232	10,214¾ HP.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	9,994¾ HP.	452 HP.	232 HP.	10,214¾ HP.
MAAS MINE				
Turbine Auxiliaries (Circulating Pump	40			
Turbine Auxiliaries (Injection "	25			
Turbine Auxiliaries (Exciter	33			
Underground Haulage Set	215			
Shop	10			
Underground Centrifugal Pump	350			
" Hoist	50			
" Plunger Pump #1	320			
Compressor Cooling Water Pump	5			
Skip Pit Hoist (To Negaunee Mine)	15		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 (Stored)	2		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			
Triplex Pump, 4th Level (from Morris Mine)		50		
				3,493
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 Level Plunger Pumps - 2 - 75 HP. motors	150			
Exciters for U.G. Pump Motors (2)	40			
Signal System Motor-Generator Set	½			
Timber Hoist - #2 Shaft	25			
Ventilating Fan - #2 Shaft		150		
Gravel Hoist (From Maas Mine)		15		2,922½
fwd.	16,412¼	667	249	16,830¼ HP.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	16,412¼ HP.	667 HP.	249 HP.	16,830¼ HP.
SOUTH JACKSON CRUSHING PLANT				
Hoist	75			
Compressor	100			
				175
BARNES-HECKER MINE				
Cage Hoist	400			
Skip "	400			
Water Supply Pump	10			
Underground Haulage Converter	150			
" Centrifugal Pump - 2nd Level	400			
" " " - 3rd "	400			
" Plunger " - " "	350			
Top Tram	50			
Location Water Supply Pump		2		
				2,162
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 Compressor #1	250			
4th Level Plunger Pumps - 2 - 350 HP.motors	700			
7th " " Pump	100			
" " Centrifugal Pump	175			
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	200			
Ingersoll-Rand Compressor #2	500			
Centrifugal Pump - Primer at North Lake		5		
Planer in Carpenter Shop		15		
				3,432
SECTION 6 SHAFT				
Hoist	200			
Water Supply Pump	3			
				203
AUSTIN MINE				
Laboratory Crusher	3			
Hoist	200			
Top Tram	50			
				253
fwd.	23,570¼	689	249	24,010¼ HP.

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	23,570½ HP.	689 HP.	249 HP.	24,010¼ HP.
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	100			
				1,952
GWINN CRUSHING PLANT				
Crusher	85			
Pan Conveyor	50			
Belt "	40			
				175
GARDNER MINE				
Top Tram	25			
				25
MACKINAW MINE				
Hoist	400			
Compressor (To Cliffs Shaft for Generator)	325		325	
Compressor Cooling Water Pump	3			
Shop	7½			
Water Supply Pump	7½			
Top Tram	25			
Fire Pump		20		
				463
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
STEPHENSON MINE				
Skip Hoist	400			
Cage "	400			
Top Tram - Bessemer	50			
" " - C. & N. W.	50			
" " - #2 Bell	50			
Rock Tram	25			
Aldrich 5th Level Plunger Pump	250			
Prescott " " " "	250			
5th Level Centrifugal Pump	275			
6th " " "	50			
8th " Plunger Pump	50			
Underground Haulage Converter	150			
5th Level Centrifugal Pump	400			
6th " " "	125			
Sinking Pump (Returned to Athens Mine)	35		35	
Underground Hoist (From Crosby Mine)		75		
6th Level Automatic Pumps- 2 - 30 HP. motors		60		
				2,660
fwd.	29,700¼ HP.	844	609	29,935¼ HP.

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	29,700¼ HP.	844 HP.	609 HP.	29,935¼ HP.
PRINCETON CENTRAL POWER PLANT				
Turbine Auxiliaries (Circulating Pump	50			
" (Injection "	40			
" (Exciter	33			
Underground Haulage Set	215			
Air Compressor	625			
Compressor Cooling Water Pump	7½			
Boiler Room Fan	40	50	40	
Coal Handling Machinery	10			
" " "	5			
				1,035½
PRINCETON CENTRAL SHOPS				
Shop Motor	25			
Grinder	3			
				28
PRINCETON CENTRAL PUMP STATION				
Centrifugal Pump	100			
				100
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 Ore Tram - 2 - 50 HP. motors	100			
Pump - 11th Level Pascoe Shaft	10			
Drill Hoist -7th Level Pascoe Shaft	7½			
Booster Compressor	200			
				1,863
ISHPEMING HOSPITAL				
Passenger Elevator	7½			
Dumb Waiter	3			
Large Washer	2			
Small "	1			
Extractor	2			
Vacuum Cleaner	3			
" Pump	1			
Water Supply Pump		2		
				21½
fwd.	32,736¼ HP.	896	649	32,983¼ HP.

MECHANICAL DEPARTMENT

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN.1,1926 TOTALS
brt. fwd.	32,736¼ HP.	896 HP.	649 HP.	32,983¼ HP.
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				
Wood Saw (To Gen'l Storehouse)	10		10	
Air Compressor	50			
				50
TOTAL MINING DEPARTMENT	32,849¼ HP.	896 HP.	659 HP.	33,086¼ 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
MICHIGAN GAS & ELECTRIC 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
CITY OF ISHPEMING				
Pump at Brownstone Substation		15		
				15
GRAND TOTAL CONNECTED LOAD	35,659¾ HP.	911 HP.	659 HP.	35,911¾ 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, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
SPIES MINE				
Hoist Motor used on Scraper	200			
Underground Triplex Pump	50			
Crusher	50			
Air Compressor	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	3			
Underground Haulage Set	150			
" Plunger Pump #1	150			
" " " #2	150			
U.G. Centrifugal Pump (From Lake Mine)		400		
				2,044 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 (To Crosby)	85		85	
Underground Centrifugal Pump	125			
Centrifugal Pump in Pit		125		
Blacksmith Shop Fan		¼		
Churn Drill		10		
Tool Post Grinder		¼		
				1,157½
CROSBY MINE				
Conveyor Belt	40			
Screen	20			
Picking Belt	3			
Log Washer	20			
Chip Screen	3			
Tables	20			
Feeder Motor	20			
Turbo	7½			
Plunger Pump		50		
				183½
HELMER MINE				
Hoist	200			
				200
fwd.	3,084½ HP.	585½ HP.	85 HP.	3,585 HP.

ELECTRICAL DEPARTMENT (Cont'd)

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	CONNECTED JAN. 1,1926 TOTALS
brt. fwd.	3,084½ HP.	585½ HP.	85 HP.	3,585 HP.
HILL-TRUMBULL MINE				
Log Washer	25			
" "	40			
Turbos - 4 - 5 HP. motors	20			
Picking Belt (Spare)	2		2	
Chip Screens - 2 - 2 HP. motors	4			
Crusher	100			
Sand Pump	10			
Sample Crusher	10			
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 (Spare)	3		3	
Variety Saw in Shop	5			
Forge Fan	2 (0½)		1½ (correction)	
Electric Drill	¼			
Motor-Generator Set	65			
Conveyor (Spare)	50		50	
Blacksmith Shop Fan (To Boeing Mine)	¼		¼	
" " "	¼			
Drill	¼			
Cyclone Drill	15			
Tailings Pump (From Gen'l Storehouse)		50		
Blacksmith Shop Fan		3		
Picking Belt		5		
Car Puller		7½		
				840¾
WADE MINE				
Hoist	125			
Air Compressor	150			
Compressor Cooling Water Pump	2			
Underground Haulage Set	150			
Machine Shop	10			
Underground Triplex Pump	50			
" Centrifugal Pump	100			
Sump Pump	5			
Top Tram	50			
Locomotive Water Pump		5		
Clear " "	15			
Blacksmith Shop Fan		3		
				665
TOTAL	4,573½ HP.	659 HP.	141¾ HP.	5,090¾ HP.

The following motors are on hand (Dec. 31, 1925), but are not installed:

CLIFFS SHAFT MINE			
Top Tram	(Stator only)	50	
Spare Top Tram		50	
Underground Scrapers -	7 - 25 HP. motors	175	
Synchronous Motor from Mackinaw Compressor		325	
			600 HP.
GENERAL STOREHOUSE			
Saw Motor from D.R.Storage Dam		10	
Centrifugal Pump from " "		3	
Motor-Generator Set for Signals (From Cl.Shaft)		¼	
Spare Motor-Generator Set		15	
" from Republic Concrete Mixer		5	
" General Electric pump		50	
" Westinghouse Motor-Generator Set		220	
" " " " " (Angeline)		150	
" Pump from Lake Mine		75	
" from Stephenson plunger pump		250	
" from Salisbury compressor		150	
" Hard Ore #3 centrifugal pump		150	
" " " " plunger "		35	
" Auxiliary Air Compressor		2	
" General Electric		7½	
" from Holmes crusher		100	
" from reclaimed Cliffs Shaft motor		50	
" Shop motor		10	
" Pump from Salisbury surface		30	
" Centrifugal Pump		100	
" Bag Cleaner from D.R.Storage Dam		½	
Stock for underground scraper		25	
" " Maas Crushing Plant		25	
			1,463¼
LAKE MINE CHANGE HOUSE			
Plunger Pump -	from Salisbury Mine	100	
Ventilating Fan - "	" "	7½	
			107½
MAAS MINE			
Winze Pump		15	
Oil Pump		2	
Pump - from Morris Mine		50	
			67
NEGAUNEE MINE			
Flywheel Hoist Set motor		350	
			350
ATHENS MINE			
Pump Motor		35	
			35
MORRIS-LLOYD MINE			
Underground Haulage Set motor		150	
Pump Motor		40	
McClure Plant Centrifugal Pump motor		50	
			240
AUSTIN MINE			
Top Tram		25	
			25
GWINN MINE CHANGE HOUSE			
Ventilating Fan	(From Francis Mine)	7½	
Skip Hoist	" " "	400	
Cage "	" " "	400	
Shop	" " "	5	
	fwd.	812½	
		fwd.	2,887¾ HP.

	brt. fwd.	2,887¾ HP.
GWINN MINE CHANGE HOUSE (Cont'd)	" " 812½	
Top Tram (From Francis Mine)	50	
" " " " "	37	
Underground Haulage Converter " "	150	
" Plunger Pump " " "	35	
		1,084½
MACKINAW MINE		
Quintuplex Pump	350	
Triplex "	75	
		425
STEPHENSON MINE		
Layne & Bowler Pump #2	350	
Pump Motor	275	
		625
REPUBLIC MINE		
Spare	15	
"	10	
"	30	
		55
ISHPEMING HOSPITAL		
Spare for Dumb Waiter	3	
		3
TOTAL		5,080¼ HP.

Spare motors on Mesaba Range; on hand Dec. 31, 1925:

BOEING MINE		
Sump Pump	7½	
Pump Motor	85	
		92½
CROSBY MINE		
Pump Motor	85	
		85
HILL-TRUMBULL MINE		
Log Washer	25	
Conveyor	50	
Pump	20	
"	3	
Sump Pump	5	
" "	5	
Spare	3	
		111
WADE MINE		
Pump	5	
"	5	
"	20	
Ventilating Fan	15	
		45
TOTAL		333½ HP.

Total C.C.I.Co. load connected to General Power System -		33,086¼ HP.
" Outside " " " " " " -		2,825½ "
Breakdown service " " " " " -		695 "
TOTAL		36,606¾ "
Total connected load at Spies Mine -		2,044 HP.
" " " " Minnesota Mines -		5,090¾ "
Total Spare Motors on hand 12/31/25 - Ishpeming District -		5,080¼ "
" " " " " " - Minnesota Mines -		333½ "

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

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	JAN. 1,1926 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.	1,886½ KW.	0	0	1,886½ KW.

MECHANICAL DEPARTMENT

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	JAN.1,1926 TOTALS
brt. fwd.	1,886½ KW.	0	0	1,886½ KW.
MORRIS MINE				
Ingersoll-Rand Compressor Motor Exciter	12			
Nordberg " " "	10			
Ingersoll-Rand " " "	10			
				32
MACKINAW MINE				
Compressor Motor Exciter	10			
				10
TOTAL	1,928½ KW.	0	0	1,928½ KW.

Underground Haulage generators:

CLIFFS SHAFT MINE				
Motor-Generator Set #1	100 KW.			
" " " #2	100			
				200 KW.
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
GWINN MINE				
Motor-Generator Set	100			
				100
PRINCETON CENTRAL POWER PLANT				
Motor-Generator Set	100			
				100
STEPHENSON MINE				
Rotary Converter	100			
				100
REPUBLIC MINE				
Battery Charging Set for Storage Battery Locomotives	20			
				20
TOTAL	1,120 KW.	0	0	1,120 KW.

ELECTRICAL DEPARTMENT (Cont'd)

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

	INSTALLED TO JAN. 1, 1925	INSTALLED IN 1925	TAKEN OUT IN 1925	JAN. 1,1926 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	10			
Re-crushing Plant Conveyors (2)	4			
Sturtevant Fan	1½			15½
HOLMES MINE				
Sturtevant Fans (2)	3			3
ATHENS MINE				
Skip Hoist	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 (Stored)	15		15	
" " (From Morris Mine)		15		735
MORRIS MINE				
Ventilating Fan - 6th Level	15			15
GWINN MINE				
Hoist - 9th Level	15			
Ventilating Fan	15			
" "	15			45
PRINCETON MINE				
Bilge Pump	5			5
TOTAL	1,796¾ HP.	15 HP.	15 HP.	1,796¾ HP.

Spare direct current motors on hand December 31st, 1925:

CLIFFS SHAFT MINE		
Motor		6½ H.P.
MORRIS-LLOYD MINE		
Crane Motor		10
GWINN MINE		
Pump Motor		20
TOTAL		36½ H.P.

Spare underground haulage generators on hand December 31st, 1925:

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

Spare generators and exciters on hand December 31st, 1925:

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, 1925:

BOEING MINE	
Compressor Motor Exciter	6 KW.

Underground haulage generators installed up to Dec. 31st, 1925:

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

Direct current motors installed up to December 31st, 1925:

HILL-TRUMBULL MINE	
Feeder Motor	60 H.P.

Total Exciters and Generators installed to Dec. 31st, 1925 -	6 K.W.
" Underground Haulage Generators " " " " " -	270 K.W.
" Direct Current Motors " " " " " -	60 H.P.

SPIES MINE

Exciters installed up to December 31st, 1925:

Compressor Motor Exciter	10 K.W.
Underground haulage generators installed up to Dec. 31, 1925 -	150 K.W.

ISHPEMING DISTRICT

Total D.C. Generators and Exciters installed to 12/31/25 -	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 " " " -	36½ H.P.
Spare Direct Current Motor Armature " " " -	500 H.P.

Substation transformers installed up to Dec. 31st, 1925:

33000/2300 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.
13000/2300 Volts				
Maas Substation	1	1,250	3	1,250
Hoist Plant	1	1,250	3	1,250
			TOTAL	2,500 K.V.A.
6600/2300 Volts				
Carp Plant	6	185	1	1,110
Gwinn Substation	3	350	1	1,050
Mackinaw "	1	350	1	350
Marquette - Jas. Pickands & Co.	2	350	1	700
			TOTAL	3,210 K.V.A.

Transformers used for Underground Haulage installed to 12/31/25:

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

Distribution Transformers installed up to Dec. 31st, 1925:

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

Distribution Transformers. (Cont'd)

	NO.		K.V.A.	PHASE	TOTAL K.V.A.
ATHENS MINE				brt. fwd.	500½
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 GP.M. Pump	1		40	3	
Signal System	1		1	1	
Engine House Lights	1		5	1	
" " "	1		4	1	
Rock Tram	1		2	1	
Top Tram Control	1		1	1	
					110
MAAS MINE					
Lights & Injection Pump	3	(10)	30	1	
Coal Crusher & Shop	2	(10)	20	1	
Signal System	1		½	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	
					79½
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	
Gravel Pit	1		7½	1	
					103
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					
Cage Hoist Control	1		7½	1	
Skip " "	1		7½	1	
Water Supply Pump House Lights	1		2	1	
					17
				fwd.	851½

Distribution Transformers. (Cont'd)

	NO.	K.V.A.	PHASE	TOTAL K.V.A.
brt. fwd.				851½
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 Transformers 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 " Pump	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.	1,522

ELECTRICAL DEPARTMENT (Cont'd)

Distribution Transformers. (Cont'd)

	NO.	K.V.A.	PHASE	TOTAL K.V.A.
brt. fwd.				1,522
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		1,930½ K.V.A.

ELECTRICAL DEPARTMENT (Cont'd)

Spare Transformers on hand Dec. 31st, 1925:

	NO.	K.V.A.	PHASE	TOTAL K.V.A.
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	
General Electric	1	3	1	
				115½
ANGELINE MINE				
General Electric	1	1	1	
				1
ATHENS MINE				
Spare	1	3	1	
Spare	1	3	1	
				6
MAAS MINE				
Spare	1	7½	1	
				7½
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		227 K.V.A.

MECHANICAL DEPARTMENT

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
1925	2 900	322 928	824 005 547	2 551	327 655 585
			HOLMES MINE		
1916	729	32 951	--- --- ---	- ---	--- --- ---
1917	739	90 225	425 227 500	4 712	--- --- ---
1918	700	130 295	368 456 686	2 840	--- --- --- (8 Months)
1919	947	173 178	521 145 000	3 009	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
1925	679	172 507	253 125 000	1 446	56 962 287

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		
1916	922				
1917	1 038				
1918	955				
1919	970				
1920	801				
1921	1 014				
1922	1 182				
1923	1 033				
1924	1 271				
1925	1 098				
			BARNES-HECKER MINE		
1919	603	29 731	--- --- ---	- ---	(8 Months) 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
1925	390	133 602	315 253 080	2 359	374 628 327
			MORRIS-LLOYD MINE		
1916	1 004	304 849	--- --- ---	- ---	320 074 400
1917	886	296 589	667 908 000	2 370	319 198 700
1918	859	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	234 909	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	381 573 000	1 659	221 874 604
1925	919	258 062	611 836 920	2 371	172 168 518

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		
1915	385	21 245	242 196 750	- ---	--- --- ---
1916	419	26 930	222 849 000	- ---	--- --- ---
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
1925	789	214 510	468 900 000	2 186	131 715 395
			NEGAUNEE MINE		
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	526 837	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
1925	1 100	342 824	660 600 000	1 927	436 422 253

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		
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	219 676	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
1925	670	144 408	372 735 000	2 581	480 918 511
			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	--- --- ---
1925	0	-- ---	-- --- --	---	--- --- ---

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	--- --- ---	- ---	--- --- ---
1925			(Mine idle entire year)		
			GWINN MINE		
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	(Mine idle entire year)		94 461 920
1924	0	205	(Mine idle entire year)		89 602 860
1925	11		(Mine idle entire year)		85 920 880
			PRINCETON MINE		
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 P.C.P.P.) (Mine idle entire year)		92 190 881
1924	6	--- ---	(Mine idle entire year)		81 134 449
1925	8	--- ---	(Mine idle entire year)		68 045 175

COMPARATIVE TABLES

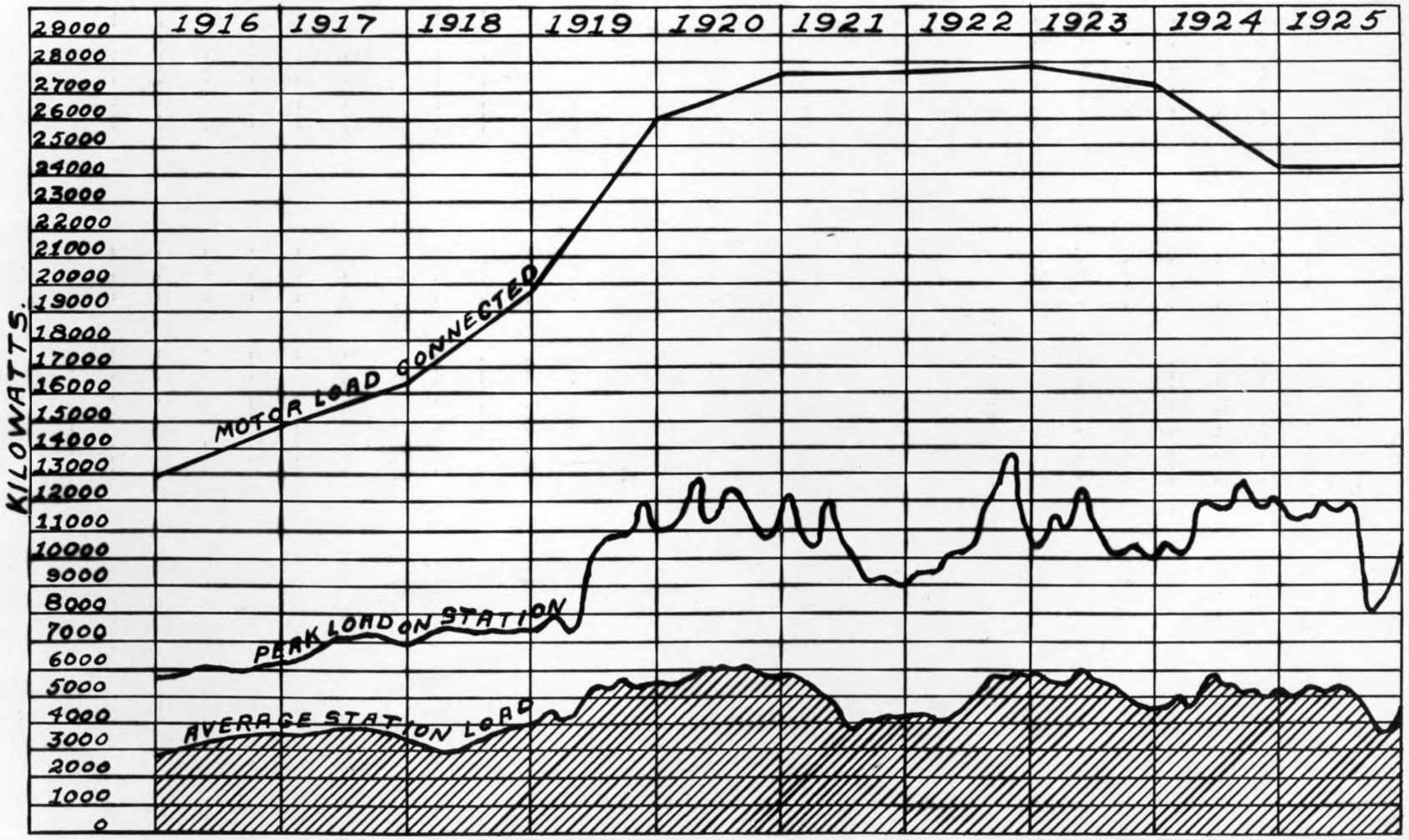
YEAR	TONS COAL BURNED	TONS ORE & ROCK HOISTED	CU. FT. AIR USED	CUBIC FT? AIR PER TON HOISTED	GALLONS OF WATER PUMPED
			PRINCETON CENTRAL POWER PLANT (Output)		
1912	4 104		661 681 550		
1913	2 360		--- --- ---		
1914	5 900		--- --- ---		
1915	7 092		--- --- ---		
1916	5 322		1 375 169 052		
1917	2 121		1 051 739 302		
1918	6 279		971 385 234		
1919	3 614		1 236 341 627		
1920	2 598		1 264 657 500		
1921	3 754		839 610 000		
1922	1 630		620 995 500		
1923	7 405		623 700 000		
1924	3 149		513 445 500		
1925	7 800		534 155 500		
			PRINCETON PUMPING STATION		
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
1925	481				301 892 325

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
1925	1 372	267 092			1 146 774 100
			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	--- -	-- ---	--- --- ---	- ---	--- --- ---
1925	---	-- ---	--- --- ---	- ---	--- --- ---
			WADE-HELMER MINE		
1921	855	70 578	--- --- ---	- ---	--- --- ---
1922	5	-- ---	--- --- ---	- ---	--- --- ---
1923	6	-- ---	--- --- ---	- ---	--- --- ---
1924	320	21 469	--- --- ---	- ---	--- --- ---
1925	---	-- ---	--- --- ---	- ---	--- --- ---

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	4 676	501 895	--- --- ---	- ---	--- --- ---
1924	3 870	521 792	--- --- ---	- ---	--- --- ---
1925	3 140	486 175	--- --- ---	- ---	--- --- ---
			HILL-TRUMBULL MINE		
1922	3,447	352 651	--- --- ---	- ---	--- --- ---
1923	4,096	311 012	--- --- ---	- ---	--- --- ---
1924	3,049	322 823	--- --- ---	- ---	--- --- ---
1925	3 269	521 382	--- --- ---	- ---	--- --- ---
			REPUBLIC MINE		
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
1925	2 275	90 773	871 386 000	9 599	27 210 960
			SPIES & VIRGIL MINES		
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	--- --- ---	- ---	-- --- ---
1925	313	72 542	--- --- ---	- ---	-- --- ---
			OGDEN MINE		
1925		61 514	--- --- ---	- ---	-- --- ---



MECHANICAL DEPARTMENT

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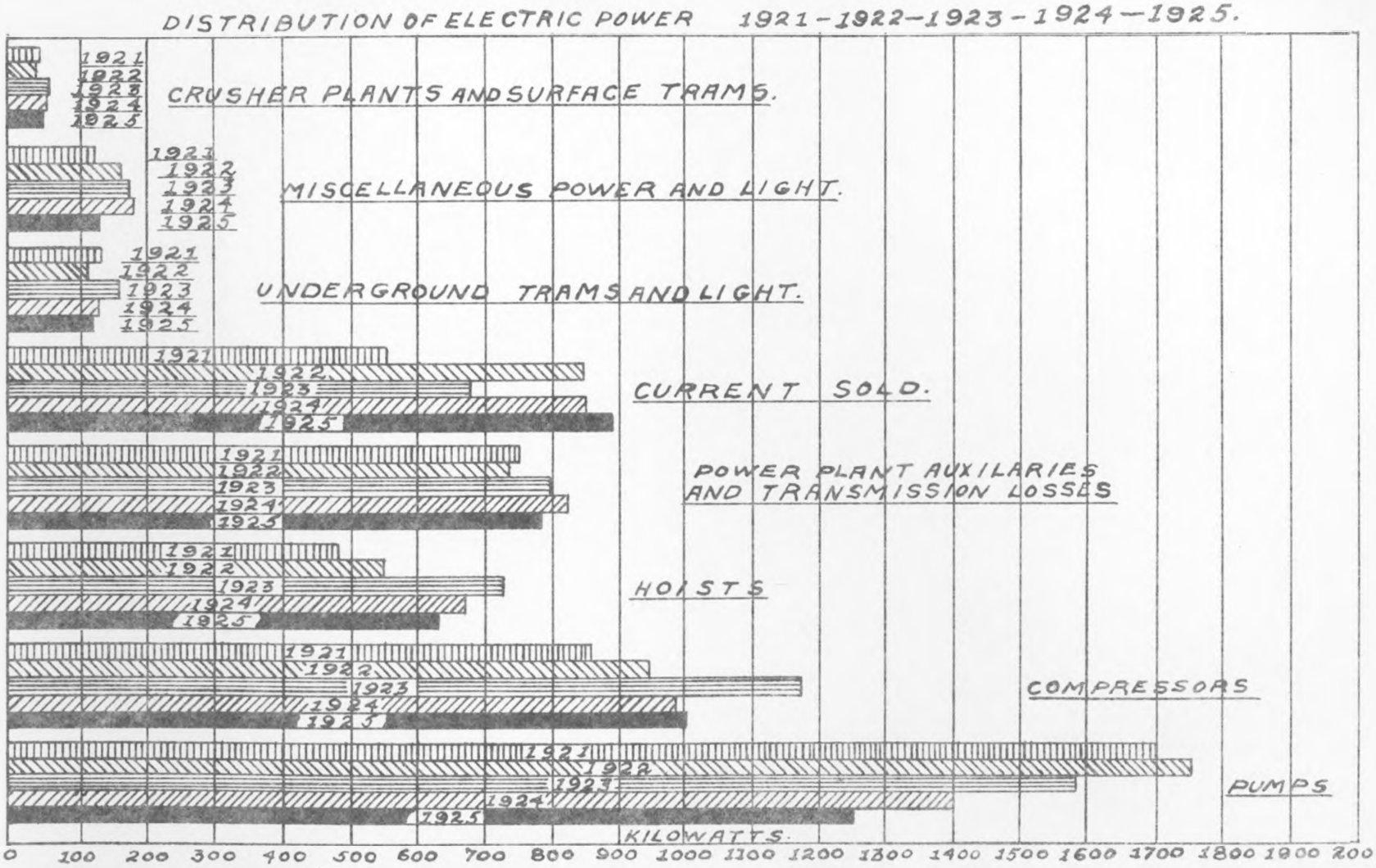

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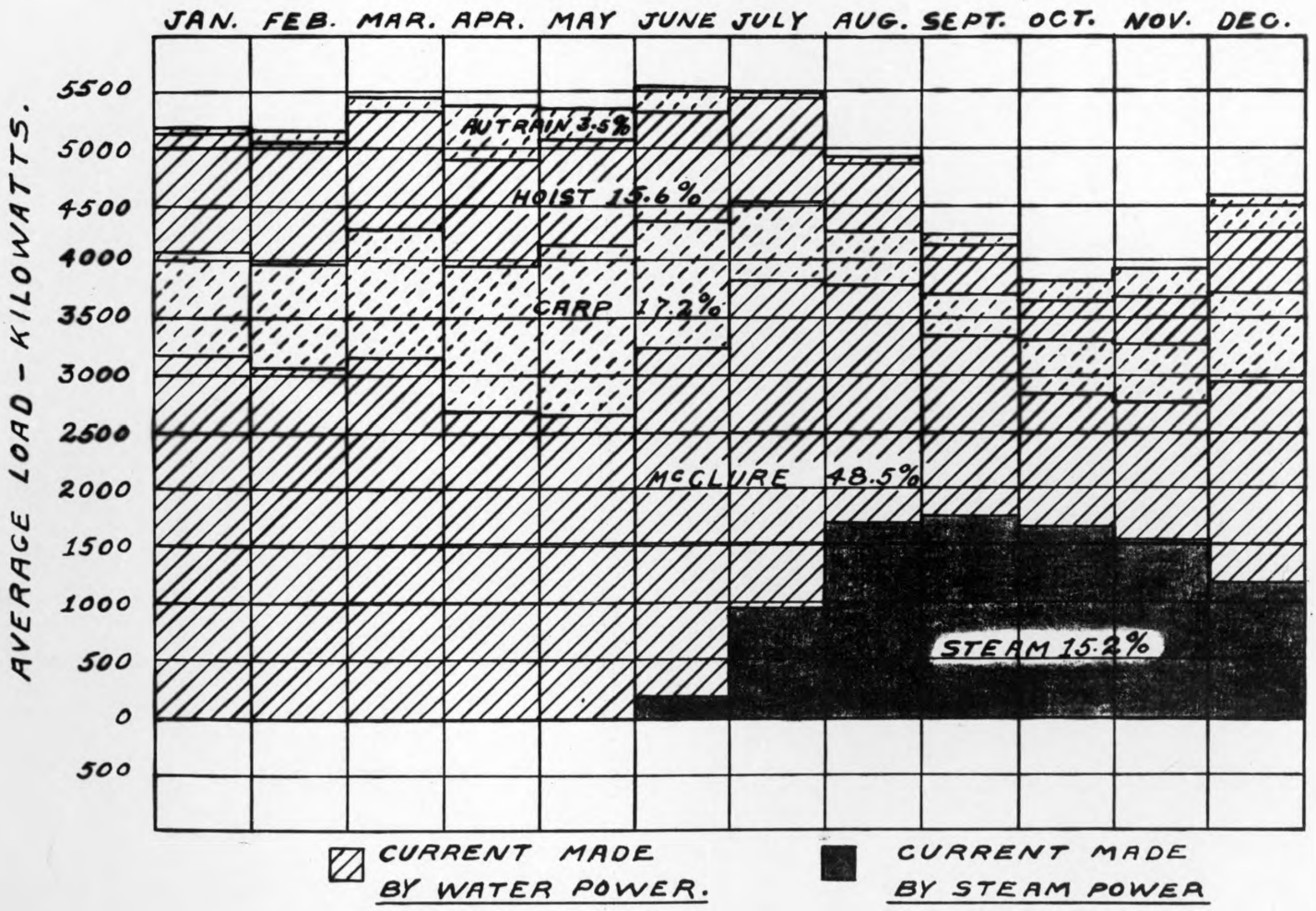
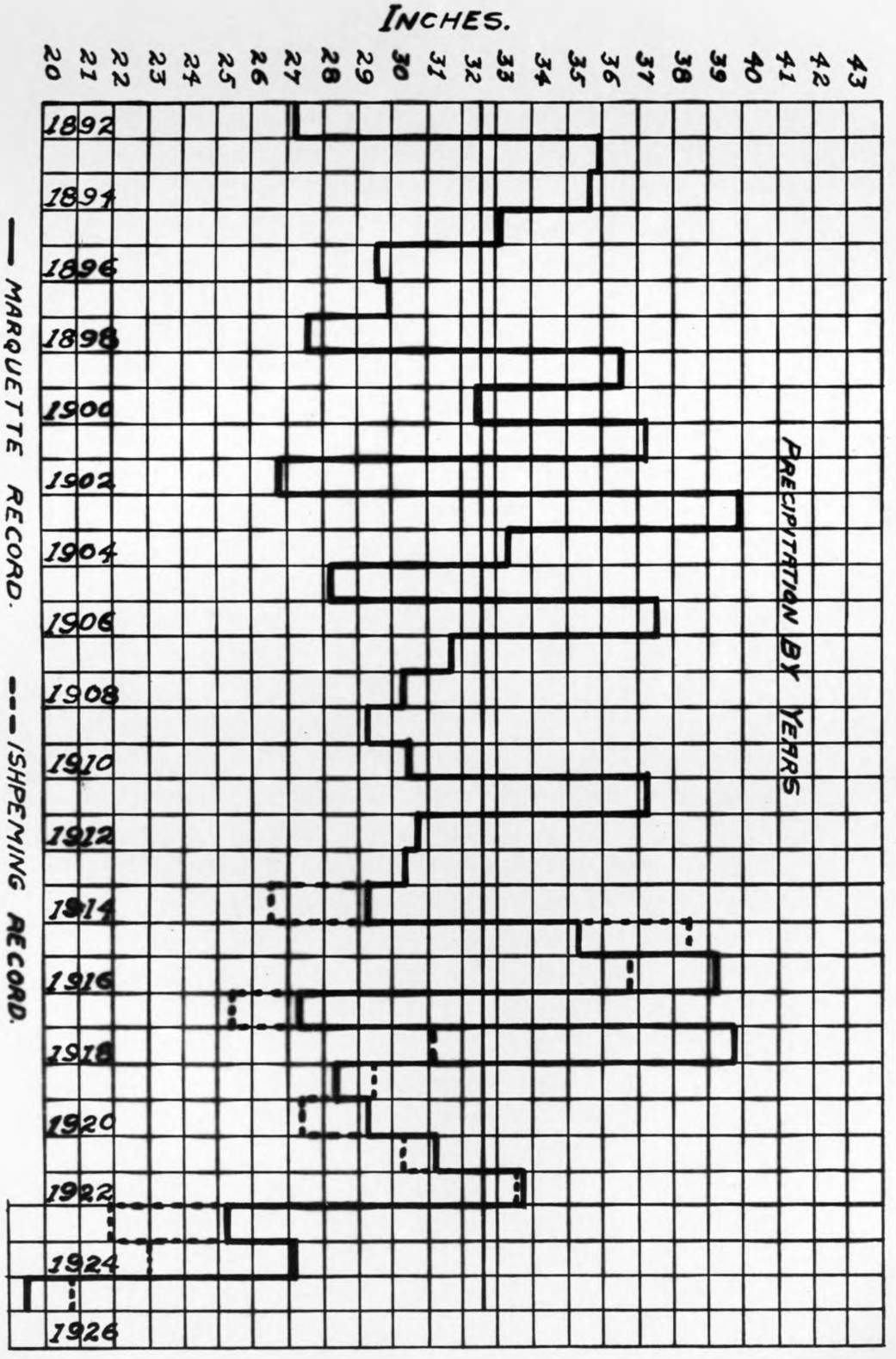
MECHANICAL DEPARTMENT

1925.




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
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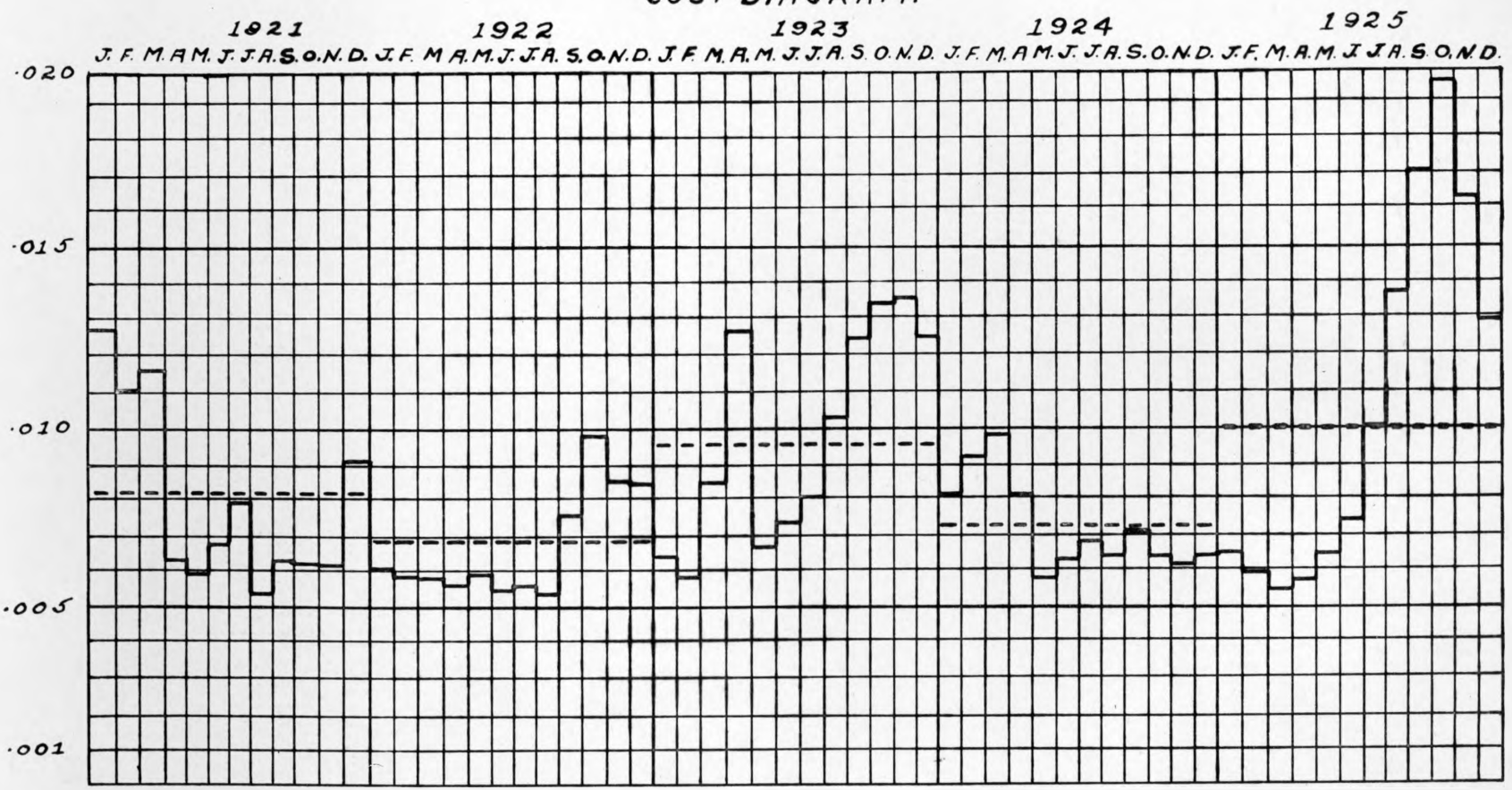
1918
1920
1922
1924
1926
PRECIPITATION BY YEARS
— MARQUETTE RECORD. --- ISHPEMING RECORD.

COST DIAGRAM.



MECHANICAL DEPARTMENT

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ANNUAL REPORT

OF THE

SAFETY DEPARTMENT

1925

The work of the Safety Department for 1925 is herewith outlined under the following subjects; fatal, serious and slight accidents, safety inspection, special safety measures, first aid and mine rescue work and statistical tables. Safety inspection was directed by William Conibear, first aid and mine rescue training was under the supervision of J. H. Williams and clerical work was performed by Elsie Baker.

The Safety Inspector begs to report that the Company has established a high standard of safety in the operation of its mines. There has been no tendency whatever to lessen safety activities in order that production might be increased.

The working conditions and discipline at the mines are exceedingly satisfactory. Employees are contented and show a willingness to comply with the orders and rules that are being issued for their safety. Violations are becoming less frequent each year. It is true that many accidents may be charged to carelessness but often it is a man's interest in his work that contributes to this occurrence rather than a willful negligence.

There are employers who have adopted a policy of getting injured men back to work before they are able to be of much service. This procedure may be a means of establishing a better accident record but from an economic and humanitarian standpoint it is questionable. It has been adopted not only by a number of mine operators but also is in vogue at several large industrial plants. These organizations take pride in advertising marked reductions in the number of their accidents. It is this Company's policy if a miner has been home a long time because of a serious injury, to give him an opportunity to

work with a timber-repair crew for a short time in order that he might prepare himself for the harder work that usually falls upon a miner; also, men, who have been partly crippled, are given light occupations, such as track cleaners, rock pickers, etc. With these exceptions, injured men are not employed at our mines, but are carried on the compensation roll until qualified to resume their regular occupations.

The value of the Company's safety work may be summarized by calling attention to the fact that if the average fatality rate of our mines from 1898 to 1910, had prevailed from 1911 to 1925, we would have lost 120 more men than were killed during these latter years. As one-half of the fatalities since 1910 were regarded preventable accidents efforts to reduce accidents should be carried on consistently, with the expectation that better results are possible.

Fatal Accident Record

The Company lost two men by accidents at its mines in 1925. On the basis of the number of men employed, the fatality rate was .81 men per 1000. This is the second lowest rate in the history of the Company. The lowest record was made in 1922, when but one man was killed.

Since the inauguration of this department the Company has lost ninety-eight men by accidents. Forty-nine or one-half were classified preventable accidents by the Central Safety Committee. No fatality in the past four years was charged as due to failure on the part of the Company to provide safe working conditions.

The Company's average annual fatality rate from 1911 to 1925 was 2.28 per 1000 men employed. The average annual rate for all the Lake Superior mines from 1911 to 1922 was 3.09. The rate for the U. S. metal mines for the same period was 3.75 and for the U. S. coal mines 4.03. These accident statistics represent a time when special efforts were made by most mine operators to eliminate accidents.

The Company's annual fatality rate from 1898 to 1910 was 4.95 and the rate for the iron mines of Michigan from 1901 to 1910 was 4.69. These figures are given to show that the Company's policy of maintaining a high standard of safety at its mines has resulted in saving many lives.

Description of Fatal Accidents

Number One

Richard Hooper, a hoisting engineer, was electrocuted at the Republic mine, 4:55 A. M., August 22nd, 1925.

This fatality occurred in the power plant at No. 9 Shaft. Hooper had just hoisted the first cage of men and had started to lower the cage for the second load, when he noticed something was wrong with the current. The cage rider, Dewey Thomas, reported that after giving the signal to lower for a second load of men the cage dropped about three inches and stopped. After a short time he gave a stop signal and then called the engine house by telephone and asked Hooper if there was any trouble. Hooper replied that the controller would not work. Thomas asked him if he wanted Albert Peppin, the mine electrician, called. Hooper replied,"Wait a minute", and after a minute he called Thomas and asked him to get Peppin. Thomas ran to Peppin's house, a short distance from the shaft, and told him of the trouble. Thomas returned to the shaft and telephoned to Hooper that Peppin was going to the engine house immediately to investigate the trouble.

After telephoning this message, Thomas started towards the engine house and on his way met Peppin. They had gone only a short distance when they heard a noise, which Peppin observed sounded like a transformer burning out. They then started to run towards the engine house. When they got to within about 150 feet from the transformer station they noticed smoke on top of the tower. As they approached nearer they saw Hooper's body was lying across the top of the tower near the live current switch. He was dead when they reached the station.

Peppin reported that when he and Thomas reached the tower they found the switch open and properly locked in place. There was no reason for

Hooper to climb the tower as the fuses are plainly visible from the ground.

Hooper was an American, single, aged 49 years. The accident was classified by the Central Safety Committee due to a violation of rules, as only electricians and are permitted to work on electric wires.

Number Two

John Mountjoy, a timber foreman employed at the Morris-Lloyd mine, met death by suffocation 2:10 P. M., September 3rd, 1925. The accident occurred in the measuring pocket, just below the storage pocket on the 6th level, Morris shaft.

A chunk of ore had lodged in the measuring pocket. Mountjoy took a short ladder and suspended it from the skip-tender's platform and went in the measuring pocket to release the chunk. The skip-tender and a motorman stood on the platform watching Mountjoy while he was working in the pocket. A few minutes later, Wm. Nault, the underground foreman, came to the station and went down to the platform. While climbing the ladder he saw that Mountjoy was in a dangerous place and ordered him to get out of the pocket. As Nault walked along the platform he reached the motorman, who was in a stooping position. The latter moved to get out of his way and in doing so his clothes caught the handle of the air lever, which operates the fingers of the storage pocket. This opened the door and ore rushed into the measuring pocket, completely covering Mountjoy. Nault immediately reached for the lever and shut off the air but he was not quick enough to prevent the measuring pocket from filling. Mountjoy was covered by four or five feet of ore and it was impossible to remove his body before life was extinct.

This unfortunate accident would have been avoided if Mountjoy had obeyed orders that had been given to him by Foreman Nault. Furthermore, it was possible to shut off the air, as a valve had been provided for that purpose. The valve was within easy range of anyone standing on the skiptender's platform. It is always dangerous to get in a measuring pocket when there is ore in the storage pocket as chunks can pass through the fingers.

Mountjoy was an American, forty years of age, and had a wife and three children. The accident was classified by the Central Safety Committee as due to violation of instructions and therefore was preventable.

SAFETY DEPARTMENT.

TABLE I.

Classification of Fatal Accidents 1911 to 1925, 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	6	
	Failure to Use Tools or Appliances	2	
	Failure to Use Safety Devices	1	22
B. Other Workmen:	Improper Method of Work	9	
	Violation of Rules	3	
	Carelessness	2	14
			98.

Table II.

Showing number of fatalities and rates per 1000 employees for thirteen years prior to safety work and for fifteen 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	.45
1910	20	6.88	1923	6	2.19
			1924	5	1.88
			1925	2	.81
Average	121	4.95		98	2.18
Tons of ore mined per fatality		176,356			418,812

Serious and Slight Accidents

A study of the serious and slight accidents, which occur year after year xxxxxxxxx, has not enabled us to find a solution whereby it is possible to reduce them very materially. The number each year since 1921, on the basis of the number of men employed, appears in the following table.

Table III

Year	Number of Injuries per 1000 Employees	Percentage Classified Preventable.
1921	156	18%
1922	168	26%
1923	166	23%
1924	152	23%
1925	152	27%

As this report is being written the number of days of labor performed in December, 1925, is not available. Comparing the record for the first eleven months of 1925 with that of 1924, the number of accidents per 1000 days of labor was .609 in 1924 and .613 in 1925. The number of days lost per 1000 days of labor, or the severity rate, was 15.19 in 1924 and 14.81 in 1925. It is probable that the figures for December, 1925, will draw these rates closer, and therefore they probably will be almost identical.

There were eight minor injuries which became lost time accidents because of infection. Six of them resulted in loss of working days varying from eight to fifteen days each, one caused a loss of fifty-two days and another one a hundred and two days. First aid treatment was not rendered when these accidents occurred, due to negligence of the injured man, who thought their injuries too slight to require it. A description of these cases were posted in the bulletin boards and a warning was issued against the danger of neglecting slight injuries.

Special attention was given to the danger of accidents by falls of ground and miners were instructed to be more careful if possible. There were thirty less accidents by this cause than the year previous. The number of injuries by men having fingers, hands and feet squeezed between pieces of

timber, chunks of ore, etc., fell from fifty-six to nineteen. Scraper ropes are used to haul timber from the top of raises to the working places, and this factor has helped to reduce these accidents. However, other causes show slight increases which offset these reductions.

The most serious accident for the year occurred at the Maas mine, when two miners were injured by an explosion of powder. While mucking ore one of them struck a piece of powder that was hidden in the loose dirt. It is very probable that the powder carried a detonator, which caused the explosion when struck by the man's pick. Both men suffered severe face lacerations. One will completely recover but the other's eye sight was partly damaged beyond recovery. No practical means of preventing a repetition of a similar accident is known.

A brief description of the accidents which caused a loss of more than one month follows.

Athens Mine. Carl Almli fell twenty feet in a raise, sustaining a bruised ankle. The ladder was in good condition. Time lost 46 days.

Oral Remillard was caught between a chain and the side of a drift when a train of cars were shunted over a switch. He stepped from a safety zone to a dangerous position but there was no time for his partners to warn him before the accident occurred. Time lost 229 days.

Chas. Roche had dirt enter his left eye while hoisting timber in a raise. The dirt flew off the hoisting rope. Time lost 44 days.

Axel Maki had an arm caught between the top of a locomotive car and a chute iron. He gave the signal to move the car but failed to take his arm off the car. Time lost 66 days.

John Rantala, while climbing a raise, brought his hand in contact with the sharp blade of an axe, which severed the arteries of his wrist. His partner had dropped the axe from the top of the raise but failed to warn him. This accident occurred May 7th and the man was incapacitated the balance of the year.

John Scanlon had a foot caught in the loop of slack rope when hoisting timber in a raise. He was pulled up the raise and suffered a fractured thigh. The accident occurred September 10th and he was unable to work at the

end of the year.

Barnes-Hecker. Edwin Pope was caught between two locomotive cars while attempting to couple the cars. The regular brakeman was home and Pope thought that the new brakeman was too slow doing the work. Time lost 82 days.

Edward Hillman had a foot fractured while prying a puffer along a drift. It tipped over. Time lost 54 days.

Arthur Gauthier scrapped his hand while barring ore at a chute. He failed to have it treated and it became infected. Time lost 52 days.

Aderion Trudell was caught under a slide of ore causing severe bruises. He was working in front of a steam shovel. Time lost 109 days.

Albert Vickman was knocked off a staging plank in a raise by a fall of ground. He fell a distance of 50 feet. Time lost 38 days.

Arvid Kallio was struck by a chunk of ore which fell through the lagging in a drift. Time lost 57 days.

Charles Coron was struck by a brake stick which slipped while he was lowering railroad ore cars. He suffered a fracture of a small bone in his left hand. Time lost 33 days.

Peter Carlyon was injured October 26th by a piece of ore which fell from the breast of a drift. Carlyon had worked forty years in the mine and this was the first time he was injured. He sustained a bruised knee and was home the balance of the year.

William Carlyon slipped on a rail and injured his back. Time lost 37 days.

Boeing Mine. George Miller slipped and fell on a rail, spraining his back. Time lost 44 days.

Veto Lampugnano, while attempting to guide a cable on to a drum, got his hand caught, which caused a fracture of two fingers of the left same. Time lost 33 days.

Sidney Kemp had an arm caught in the spokes of a sheave, while oiling a steam shovel. July 30th he sustained a severe fracture of the right arm, which kept him idle the balance of the year.

George Maurin reported December 11th that he slipped March 31st, which caused hernia. He lost 42 days.

Cliffs-Shaft Mine. John Karvonen wrenched a leg while lifting a machine off a tripod. Time lost 46 days.

Victor Kempinen went to get carbide to refill his lamp, walking in the dark. He fell in a hole, which was being filled with rock. Time lost 35 days.

Joseph Olds was injured by a bar slipping and striking his nose. He lost 85 days.

Christ Hanson fell off a sled and was kicked by a mule. This accident occurred June 16th and he had not returned to work at the end of the year. He is an old employee and will probably have to be pensioned.

Captain John Olds was struck by a piece of ore while watching men barring a stope. He had two toes crushed. Time lost 39 days.

Archie LaForest had a finger fractured by a chunk of ore rolling down a pile. He lost 96 days.

Arvid Jernquist was barring ground and a piece fell on his head. This accident occurred August 31st and incapacitated the man the rest of the year.

Simon Carlson fell off a stage and had two ribs fractured. Time lost 39 days.

Caleb Torma had his hand caught between the rope and a drum of a scraper hoist. He lost the end of a little finger. This accident occurred November 19th and kept him home the rest of the year.

William Anderson sustained a hernia while lifting a plate of iron. He lost 111 days.

Holmes Mine. Thomas Ikola was knocked off a staging in a raise by a fall of ground. He fell 5 feet, wrenching a knee. Time lost 37 days.

Lauri Huttunen was struck by a chunk of ore while standing on a stage putting in timber. Time lost 37 days.

William Tippett was struck by a small piece of timber falling from the gob. Time lost 49 days.

August Larson was struck by a chunk falling from the back. Time lost 96 days.

Chas. Hager was knocked over by a scraper rope. Time lost 68 days.

SAFETY DEPARTMENT.

Chas. Hanson was struck by a pole to which a scraper block was attached. Time lost 57 days.

Arsene Tousignant was struck by a piece of timber when his cant hook slipped. He was injured November 20th and was home the balance of the year.

Maas Mine. Matt Hakka had a finger squeezed March 24th. Due to neglect it became infected. Time lost 60 days.

Isaac Salmi and John Kangas were injured April 11th and were unable to return to work at the end of the year. While loading ore Salmi picked into some loose powder which exploded. The accident caused face and head injuries but fortunately did not cause fatalities or total disabilities.

William Bess was injured by a piece of ore falling from the side of a drift, causing a bruised foot. Time lost 38 days.

Isaac Hill was injured May 22nd and was unable to return to work at the end of the year. He was climbing down a raise and was struck by falling dirt, which was thrown into the raise by a blast on a sub-level at the top of the raise.

Morris-Lloyd Mine. Dominic Baldine had a finger squeezed between a chain and a ladder while lowering a car in a raise. Time lost 89 days.

Vincenso Elveti sustained a fractured toe by a piece of timber falling off a timber truck. Time lost 39 days.

John Bozio struck his finger with an axe. He failed to report the injury and it became infected. Time lost 34 days.

Thomas Hampton jumped off a steam shovel when a steam pipe broke. A sprained ankle kept him idle from October 27th to the end of the year.

William Anderson was struck by a chunk of ore falling from the top of raise while he was engaged in drilling ground. Time lost 39 days.

Alfred Anderson had a finger squeezed by a chunk falling from the chute while loading a car. Time lost 166 days.

John Bjorne was struck on the head by a chunk falling from the back of a drift. Time lost 48 days.

Negaunee Mine. Oliver Lacombe claimed to have been injured by a piece of ore striking him on the back. The accident was reported January 12th and he has not returned to work.

Mike Denofrio fell from chute platform while loading motor cars. Time lost 46 days.

Joe Young, Sr. had his right hand caught between the impeller and the head of a pump while making repairs. The injury was not treated and became infected. Time lost 132 days.

Oscar Anttila was prying a chunk of ore and it rolled on his ankle, causing dislocation. It incapacitated him from September 3rd to the end of the year.

Republic Mine. Alfred Rittola was caught in a skip wheel while riding a skip in Pascoe shaft, where there is no cage. His coat was hanging over the side of the skip and caught in the skip wheel. His hand was bruised. Time lost 62 days.

Peter Koskella strained himself while lifting a chunk of ore. This resulting in a double rupture. Time lost 140 days.

Frank Voegtline was struck by ore falling in a stope. Time lost 198 days.

Vertie Kerkela was caught by ore running from a filling place. He sustained contusions of both ankles. The accident was reported August 25th and he had not returned to work at the close of the year.

Oscar Lahtinen cut his wrist when lifting a big chunk of ore into a bucket. Time lost 42 days.

Spies Mine. Sam Soldo strained his side while lifting a machine, causing hernia. Time lost 108 days.

Carl Wolberg was struck by a fall of ground while working in raise. Time lost 63 days.

Neil Halonen was struck when a motor car accidentally dumped. He had a big toe lacerated. Time lost 36 days.

Erbie Juneau was struck by a chain block, which became loose when lifting a crank shaft of a pump. Time lost 37 days. He had a finger broken.

Stephenson Mine. Antono Paris was struck by a chunk of ore rolling from the breast of a drift. Time lost 38 days.

John Dellangello was knocked over by a rope while lowering a car into a sump. Time lost 67 days.

Hill-Trumbull Mine. Dan Markovich had a foot caught by a steam shovel drum. Time lost 58 days.

Ogden Mine. Victor Anderson had an ankle sprained when it was struck by a long drill. Time lost 71 days.

Gwinn Mine. Jacob Hakka strained his shoulder while cutting lagging in the back of a drift. Time lost 58 days.

General Storehouse.

Table III.

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

Mine	Number of Accidents	Received Compensation	No Compensation.
Athens	29	19	10
Barnes-Hecker	29	20	9
Boeing	25	23	2
Cliffs-Shaft	68	44	24
Hill-Trumbull	3	2	1
Holmes	24	18	6
Maas	21	19	2
Morris-Lloyd	44	26	18
Negaunee	35	25	10
Republic	32	23	9
Spies	16	12	4
Stephenson	31	23	8
General Storehouse	1	1	0
Miscellaneous	3	3	0
Ogden	2	2	0
	363	260	103

Table IV.

Number of Accidents, number classified Preventable and Percentage Preventable 1912 - - - 1925.

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

Table IV. (Cont'd.)

1920	708	132	19
1921	351	63	18
1922	344	90	26
1923	453	104	23
1924	407	92	23
1925	363	101	27

Safety Inspection

Safety inspection tours of the mines were made by the Safety Inspector, a Committee consisting of one Superintendent and two Mining Captains, a Committee on Mechanical and Surface Equipment and Committees of Workmen.

Safety Inspector

The local mines were inspected once or twice a month by the Safety Inspector. Two inspections of the Spies mine and one of the Boeing and Hill-Trumbull mines were made.

The Safety Inspector, as chairman of the Lake Superior Chapter of the National Safety Council, attended the Lake Superior Safety Conference, which was held at Hibbing, Minnesota, August 25th & 26th, 1925. Mr. Eaton and Captain Rough also represented the Company at the Conference. Mr. Eaton presented a paper on "Underground Transport" and the writer gave a review of the "Metal Mine Accidents of all mines in the Lake Superior District". Five hundred copies of the Proceedings were printed and distributed to the mining profession. The next meeting of the organization willbe held at Ironwood, Michigan. Mr. A. A. Bawden, Safety Inspector, Pickands, Mather & Co., Gogebic Range, is the new chairman.

A paper on the subject, "Safety Practices of the Cleveland-Cliffs Iron Company" was prepared and presented by the writer at the National Safety Conference, which was held at Cleveland, September 30th, 1925.

Superintendent and Mining Captain Committee.

Superintendent W. R. Meyers, Republic Mine, Captain Fred Ware, Negaunee Mine and Captain Alfred Bone, Stephenson Mine, were members of this Committee. The local mines and the Spies mine were inspected during the summer months.

Committee on Mechanical and Surface Equipment.

The members of this Committee were Leo Voelker, foreman electrician, Ishpeming district, Edward Prideaux, mechanic, Athens mine, and Alfred Peppin, steam shovel operator and mine electrician, Republic mine. Inspection of the local mines was started October 15th but was incompleted, due to important work demanding the attention of the members of the Committee. The Cliffs-Shaft and Holmes mines were not inspected.

Workmen Committees.

The mines that were operated in Marquette County last May and June were inspected by Workmen Committees. Twenty-four workmen served on Committees, which brought the total number of men, who have served in this capacity, to 543.

Central Safety Committee.

A monthly meeting of this Committee was held last year. All accidents were classified in accordance with the statistical data given in this report. 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	5	18
Austin	1	13
Barnes-Hecker	0	9
Cliffs-Shaft	9	54
Francis	1	15
Gardner-Mackinaw	1	6
Gwinn	3	33
Holmes	8	24
Lake	6	45
Maas	9	42
Morris-Lloyd	8	57
Negaunee	12	57
Princeton	3	21
Republic	8	39
Salisbury	5	39
Stephenson	8	50
Miscellaneous	12	21
	99	543

Mine Safety Committee

A recommendation of the Safety Inspector that a committee of employees at each mine be appointed to investigate and report upon all accidents that occur at that mine was approved by the Central Safety Committee. A Committee is known as "The Mine Safety Committee" and consists of three members, who are appointed by the mine superintendent, Mining engineers, foremen and miners are largely drawn upon to serve in this capacity. Committees were appointed the latter part of October and the first of November and since then fifty-four reports have been received. It is the duty of a Committee to give a brief report of an accident and to submit suggestions and recommendations, if possible, for the prevention of the repetition of accidents. A number of recommendations were offered and several men were given a few days suspension from work by the superintendents because they had been careless. Before a penalty is inflicted it must be approved first by the General Manager or General Superintendent.

It is expected that the investigations conducted by these committees will influence employees to be more careful workmen and that there will be less disregard given to slight injuries, which often become infection cases and prove serious accidents.

Rules and Regulations.

Our supply of rules and regulations for the prevention of accidents in the Finnish language was exhausted and 1000 copies were received from the printer.

535 receipts for rule books were received at the office of the Safety Department; 391 English; 101 Finnish and 43 Italian.

Examination of Employees on Rules and Regulations.

Continuing the practice which was started in 1915, a number of employees were examined to determine their proficiency with the Company's Rules and Regulations for the prevention of accidents. Notices first were posted calling to the attention of employees that an examination would be held. This work was in charge of a Committee consisting of Messrs. Rough, Moulton and

Conibear. Forty-nine men were summoned before the Committee and were carefully examined. In Table VI. is given the number and occupations of men who have been examined since 1915.

It is the opinion of the members of the Committee that this method of interesting employees in their safety is very effective and should be continued at least once a year.

Table VI.

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

Miners	370
Foremen	60
Surface Laborers	60
Motormen	35
Timbermen	36
Cage Riders	17
Shaftmen	7
Trammers	8
Carpenters	4
Electricians, mechanics, etc.	22
Miscellaneous	8
	627

Inspection Reports

A total of 8,840 safety inspection reports were received, carefully examined and filed last year at the office of the Safety Department. They indicate the thoroughness of the Company's measures to provide safety at the mines. These reports and the number of each kind received during the year are given in the following table.

Table VII.

List and Number of All Reports for the Prevention of Accidents.*

Cage Rider's	4,342
Hoisting Ropes	3,124
Cage Safety Catches	111
Ladderways	434
Skip Cage Roads	454
Fire Hose Equipment	45
Fire Extinguishers	23
Workmen's Inspection	9
Superintendent's Inspection	10
Safety Inspector	89
First Aid	135
Mine Rescue	26
Electrical Equipment	31
Mechanical and Surface Equipment	7
	8,840

*Personal injury reports not included.

Fire Doors

The construction of fire doors in the local mines was about completed, there remaining a few minor installations to be made at two or three mines. These will probably be finished without further delay. A station has been provided in a drift of the 2570 foot level, Pascoe shaft, Republic mine, where men may find a place of refuge if fire should accidentally prevent escape to surface.

Safety Belts

A new type of safety belt was introduced and received approval. It is used by men repairing raises and when doing work which exposes them to falls.

Ventilation

The ventilation in the mines was highly satisfactory throughout the entire year.

First Aid Work

Nine new First Aid teams were organized during the year. Those at the Maas, Negaunee, Athens, Stephenson, Cliffs Shaft, Holmes, Morris Lloyd and Barnes Hecker mines commencing in January, the Spies mine in May. Training was carried along regularly each month at these mines with the exception of the Maas mine when training work was suspended during July, August, September and October on account of the transfer of these men to other mines on account of repairing the shaft.

One hundred and thirteen first aid practices were held in which ninety-four men took part. Thirty-five of these men completed the Company's First Aid Course and were awarded Certificates.

On August 21st a First Aid Demonstration was held at Mr. Mather's Cottage in which teams from the Morris Lloyd, Holmes, Cliffs Shaft, Negaunee and Stephenson mines took part. These teams were composed of men who had been trained in 1924.

From 1912 to and including 1925, 607 men have received more or less First Aid training. 481 have completed the course, receiving certificates or entitled to same. 8 are deceased, 4 are pensioned, 140 have left the employ of the Company, leaving a total of 321 men holding Certificates now employed by

the Company. 280 of these men also have the Bureau of Mine certificates.

First aid supplies amounting to $363.94 were purchased for the year 1925 and were distributed as needed, an ample supply for all contingencies being maintained at each mine.

Mine Rescue Work.

Ninety-four Mine Rescue practices were held during the year in which seventy-eight men received training.

From 1912 to and including 1925, 385 men received more or less Mine Rescue training. Of this number 7 are deceased, 1 is pensioned, 80 were disqualified and 137 have left the service of the Company, leaving a total of 160 men now in the employ of the Company qualified to wear Mine Rescue Apparatus. 148 of these men also hold the Bureau of Mines Mine Rescue Certificates.

The Mine Rescue apparatus maintained by the Company consists of 26 sets of Paul self contained breathing apparatus equipped with mouth breathing device, 26 extra oxygen cylinders for same, 10 large storage cylinders, 253 cans caustic soda regenerators, 15 refillable cans, 25 flash light lamps, 7 pulmotors and 4 lungmotors and 3 oxygen pumps.

Table VIII.

Showing number of First Aid Men Trained 1912 to 1925.

Number receiving training	607
Number receiving Certificates	461
Number entitled to Certificates	20
Number deceased	8
Number pensioned	4
Number left Company holding Certificates or entitled to same	140
Total number now in employment of Company holding Certificates	321

Table IX.

Showing number of Mine Rescue Men trained 1912 to 1925.

Number receiving training	385
Number deceased	7
Number pensioned	1
Number disqualified	80
Number left employment of Company	137
Total number now employed by the Company	160

Table X.

First Aid Supplies for Year 1925.

150 lbs. Assorted Roller Bandages	$ 139.50
9 doz. First Aid packets	34.56
4 doz. Boxes Handy Fold Gauze 6" x 36"	34.20
2 doz. Boxes Handy Fold Gauze 12" x 36"	15.30
1 doz. Boxes Handy Fold Picric Gauze 12"x 18"	6.75
5 doz. Z. O. Tape 1"	22.50
4 doz. Z. O. Tape 1/2"	14.40
5 doz. Carbolated vaseline	6.00
4 doz. Aromatic Spirts of Ammonia	17.28
9 Gross Leather Finger cots	59.20
8 Qts. Alcohol for Iodine	4.80
4 Doz. Absorbent Cotton 1/4 lb. Pkgs.	9.45
	$ 363.94

Table XI.

Mine Rescue Supplies for 1925.

3 gals. Glycerine	7.20
2 gals. Euthymol	5.95
10 Cylinders Oxygen	38.78
3 Canary Birds	7.00
	$ 58.93

Table XII.

Comparison of Fatality Rates for Coal Mines, Metal Mines, etc.

Year	U. S. Coal Mines	U. S. Metal Mines	Minn. Metal Mines.	Mich. Metal Mines.	Marquette* County	C.C.I.Co. 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	4.39	3.01	2.11	2.06	3.62	2.19
1924					0.00	1.88
1925					.89	.81
Average	4.35	3.68	3.05	3.30	2.76	2.25

*Exclusive Cleveland-Cliffs Company.

Table XIII.

Giving the number of accidents and number receiving compensation
1919 - - - 1925.

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
1925	363	260	103

Table XV.

Classification of Non-Fatal Accidents
1925.

A. Fall of Ground or Timber.			
By fall from back or side (drift, raise or stope		54	
By fall or run from chute		2	
By fall of stray chunk or stick in raise or stope		6	62
B. Shaft Accidents.			
By being struck or caught by skip		1	
By falling from skip		1	2
C. Use of Explosives.			
By picking into dynamite		2	
By chunk blown into raise		1	3
D. Mine and Railroad Cars.			
By being caught between cars and drift		2	
By riding or attempting to ride cars		1	
By squeezing finger, hand or foot between box and truck, car and drift, chute, etc.		20	
By cars falling back or off track		4	
By being struck by motor or car		3	30
E. Miscellaneous Causes.			
By falling down raise, stope or mill		3	
By falling from ladder, trestle or stage		7	
By falling with machine or tripod, drill breaking, etc.		2	
By squeezing finger, hand or foot between pieces of timber, chunks of ore, etc.		45	
By straining or wrenching arm, back, side or leg by lifting		19	
By stumbling or slipping causing a fall, etc.		27	
By chunk rolling down dirtpile, stockpile, off car, etc.		31	
By being struck by glancing dirt, tool or timber, etc.		35	
By being struck by hand tool.		25	
By tools or material falling or slipping from hand, staging or platform, etc.		15	
By running nail into hand, foot or leg		4	
By catching finger, hand or foot in machinery		29	
By infection from various causes		8	
By blistering hand, etc.		2	
By sliver in finger, etc.		3	
By miscellaneous causes underground		4	
By miscellaneous " surface		5	264 361.

Table XVI.

Classification of Causes of Fatal Accidents
From Dec. 1st, 1898, to January 1st. 1926.

A. Fall of Ground or Timber.		
Back or side (drift, raise or stope.)	82	
Fall of chunk or ore from chute	2	
Stray chunk or stick down raise or stope	2	
Run of mud or sand	9	
Run of ore in stope	1	96
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 electric wire	4	
Asphyxiation due to mine fires	3	
Being pulled into sheave	1	22
	Total -	219

Average Percentage of Accidents by Causes.

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

Table XVII.

Classification of Fatal and Minor Accidents

for the Year 1925

By the Central Safety Committee

I. TRADE RISKS, (Incidental & Non-Preventable			264
II. NEGLIGENCE OF COMPANY:			
	Failure to use Proper Tools or Appliances Provided	4	
	Failure to Provide Safety Devices	1	
	Failure to Provide Proper Tools, Appliances or Place to Work.	7	12
III. NEGLIGENCE OF WORKMEN:			
	Failed to use Safety Devices Provided	1	
	Failed to use Proper Appliances or Tools Provided	2	
A. Injured Men:	Violation of Rules	5	
	Improper Act or Selection of Improper Method of Doing Work. (By Workman.)	31	
	Carelessness (By Workman.)	39	78
B. Other Workmen:	Violation of Rules	2	
	Improper Act or Selection of Improper Method of Doing Work. (By Workman.)	3	
	Carelessness (By Workman.)	4	9
	T o t a l -		363

SAFETY DEPARTMENT.

Table XVIII.

Expenses of the Safety Department for

1925

Supplies

Office Equipment, printing, etc.	$ 27.97	
Mine Rescue and First Aid	33.40	
		$61.37

Travelling

Inspector	451.58	
Mine Rescue Foreman	259.64	
Committees	149.86	861.08

Salaries	7440.00
Grand Total -	$ 8362.45

Respectfully submitted,

William Coulson
Safety Inspector.

ANNUAL REPORT

OF THE PENSION DEPARTMENT

FOR THE YEAR 1925

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PENSION SYSTEM:

The year 1925 completed the seventeenth year of the operation of the Pension System:

The following pensions were granted during the year:

No.	Name	Mine	Date pension began	Monthly Payment
180	Claus Berg	Holmes	Jan. 1,1925	$ 26.50
181	John A. Peterson	Princeton	Jan. 1,1925	51.75
182	Thomas Dawe	Gen. Roll	Apr. 1,1925	28.09
183	Hogan Anderson	Maas	June 1,1925	29.92
184	Charles Tyni	Holmes	Aug. 1,1925	21.90
185	Christ Hansen	Negaunee	Aug. 1,1925	27.60
186	John A. Limdberg	Stephenson	Aug. 1,1925	62.14
187	John Sandell	Cliffs Shaft	Sept.1,1925	34.52
188	Silas Harper	Cliffs Shaft	Nov. 1,1925	18.00
189	Paul Ritchie	Cliffs Shaft	Nov. 1, 1925	19.52

The following Old Age Pensions ceased during the year:

No.	Name	Date Pensioned	Date Died
27	Walter Vicary	Sept. 1, 1911	Apr. 14, 1925
61	Andrew Dinette	Apr. 1, 1915	Mar. 15, 1925
139	John August Carlson	June 1, 1921	Dec. 3, 1925
140	John Endahl	June 1, 1921	Mar. 25, 1925

	1924	1925
Number of pensions granted during the year	16	10
Number of deaths	6	4
Number of Old Age Pensions in force Dec.31st	105	111
Average Annual pension	$319.20	$325.68

PENSION DEPARTMENT

PENSION SYSTEM (Continued)

The following were added to the Furnace Department roll during the year:

No.	Name	Employed at	Date pensionded.	Monthly Payments
9	Thomas Novack	Marquette	Mar. 1, 1925	$ 21.28
10	Patrick Deasy	Marquette	Apr. 1, 1925	23.18
11	George J. Slining	Marquette	Oct. 1, 1925	168.30
12	James Hannigan	Gladstone	Oct. 1, 1925	47.96
13	Edward Bassler	Marquette	Nov. 1, 1925	48.03
14	Frank LaPointe	Gladstone	Nov. 1, 1925	46.80

Thomas Novack, No. 9, who was pensioned on March 1, 1925, died on June 19th, 1925.

Joseph DeVet, Sr., Pension No. 6, was re-employed as a watchman at Gladstone and was dropped from the pension roll on Sept. 30th, 1925.

On December 31st there were 9 pensioners on the Furnace Department roll with an average annual pension of $604.68.

Total amount paid to Old Age Pensioners, 1908 to 1925 inclusive:

Mining Department	$ 222,718.05	
Furnace Department	10,609.96	
Total		$233,328.01

Total amount paid to Widows and Orphans, 1908 to 1925 inclusive:

Mining Department	$ 22,404.00	
Furnace Department	900.00	
Total		$ 23,304.00
Total pension payments		256.632.01

Mining Department pensions paid in 1925 were as follows:

Old Age Pensions	$ 34,926.34	
Widows and Orphans	163.00	
Total		$ 35,089.34

The estimated Old Age Pensions for the Mining Department for 1925 was $33,000.00.

PENSION DEPARTMENT

PENSION SYSTEM (Continued)

Pension Payments for the years 1908 to 1925 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	311300	6978.95
1913	5133.62	3025.00	8158.62
1914	6179.57	3403.00	9582.57
1915	7910.35	2372.00	10282.35
1916	8787.02	1694.00	10481.02
1917	9327.22	1266.00	10593.22
1918	8889.14	944.00	9833.14
1919	9605.02	888.00	10493.02
1920	12613.29	814.00	13427.29
1921	21856.64	14.00	21870.64
1922	29063.85	168.00	29231.85
1923	29564.57	168.00	29732.57
1924	31987.64	168.00	32155.64
1925	34926.34	163.00	35089.34
Totals	$ 222718.05	22404.00	245122.05

PENSION DEPARTMENT

PENSION SYSTEM (Continued)

Pension Payments for the years 1910 to 1925 inclusive are as follows:

FURNACE DEPARTMENT

Year	Old Age	Widows and 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
1925	2833.39		2833.39
Totals	$ 10609.96	900.00	11509.96

PENSION SYSTEM (Continued)

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

Ishpeming	76	Detroit	2
Negaunee	7	Grand Rapids	1
Marquette	2	California	3
Gwinn	6	Connecticut	1
Michigamme	1	Minnesota	2
Iron Mountain	1	North Dakota	1
Pelkie	1	Illinois	1
Flint	2	Massachusetts	1
Lansing	1	Canada	2
		Italy	1

The Republic Mine Pensioners now live as follows:

Republic	19	Evanston, Ill.	1

The Furnace Department Pensioners are living in the following places:

Marquette	3	Kipling	2
Negaunee	1	Gladstone	3

PENSION SYSTEM (Continued)

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

No	Name	Date Pension began	Monthly Payments
22	John Sepola	Sept. 1, 1925	$ 29.10
23	Isaac Antilla	Sept. 1, 1925	38.54

There were no deaths during the year.

There are 20 pensioners on the Republic Mine Roll, the average annual pension being $445.92

The payments made from October 1st, 1920 to December 31st, 1925 are as follows:

1920	$ 278.61
1921	3427.97
1922	5672.84
1923	6641.51
1924	8172.95
1925	8379.08
Total	$32572.97

Estimated possible pensions for the year 1925, $6493.00

PENSION SYSTEM (Continued

During the year we have been in frequent communication with Mr. Ingalls Kimball, Director of Group Activities of the Metropolitan Life Insurance Company of New York.

We have also been at work upon computations covering the cost of pensions for all of our employees, based on the experience of previous years and the future probable cost.

The work on these estimates is being continued at the close of the year.

PENSION DEPARTMENT

WORKMEN'S COMPENSATION:

The work of the Compensation Department has continued in the care of Mr. T. H. Bargh as Cashier since December 1912, a period of thirteen years.

It is with the greatest possible regret that we are obliged to record the death of Mr. Bargh on January 11th, 1926. I cannot conceive of a man more faithful and painstaking in his work or more careful of fulfilling the obligations laid upon him. The Company and this Department could not have a more earnest and zealous worker nor one more careful of the Company's interest an yet with it a most considerate feeling for those men suffering from accidental injuries with whom he was meeting daily.

So long as there are any who have been intimately associated with him in his work, the loss of his loyal endeavors will be constantly remembered.

Throughout the year the same procedure of handling all cases as used in previous years has continued. Special effort is made to see all injured men as soon as possible after the injury has occurred and this has, very generally, made it possible to effect a settlement.

In a 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 for the Departments of Labor & Industry of Michigan and Minnesota. Through this plan the men generally continue well satisfied with the working of the Compensation Laws.

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

OTTO REICHEL - DEAD RIVER DAM ACCIDENT REPORT #11

Reichel was injured on the McClure Pipe Line on December 11th, 1918 and was in St. Luke's Hospital from that day until January 6th, following. He then returned to work and was employed by us during the year up to the last of September.

He expected that his condition would improve and at that time made no claim for further compensation although he continued to have headaches and dizziness.

A hearing was held on February 3rd,1925, at which it was clearly shown that he was still suffering from the effects of the accident and a settlement was effected at that time.

ISAAC SALMI - MAAS MINE ACCIDENT REPORT #371
JOHN KANGAS - MAAS MINE ACCIDENT REPORT #372

These two men were injured by a blast on April 11th and Dr. Paull came immediately from Marquette to the Negaunee Hospital and on the advice of all the physicians, the two men were that night taken to the Ishpeming Hospital. To make sure that everything possible was done for these men and in view of the fact that the physicians did not feel it safe to take them to Milwaukee or Chicago, we had Dr. Nelson M. Black of Milwaukee come to Ishpeming for consultation.

It was found that Kangas was not so seriously injured and would probably recover the sight of both eyes.

Salmi's eyes were much worse and when he was able to be safely moved we sent him to Dr. Black and he was kept in the Hospital there for some time. He has recovered his sight to the extent that he is able to get around the streets without help but will probably never see well enough to resume his mining work and will most likely become a total disability case.

He is to go again to Milwaukee as soon as Dr. Black feels it is safe to try some operative work on the eyes.

MATT MILLIMAKI - PRINCETON MINE ACCIDENT REPORT #170

Millimaki was injured at the Princeton Mine on August 4th, 1921 and since that time we have been paying him compensation at the rate of $14.00 per week. Three hearings had been held in the case the last one for a lump sum at which I represented the Company, it being impossible for any of the attorneys to be present. This petition was for all compensation remaining to be paid and the petition was denied.

Later his attorney suggested that he would accept a partial disability payment and a conference was held on October 7th at Marquette before a Deputy Commissioner from the Department of Labor & Industry and a settlement was agreed upon on a partial disability basis, we paying him $2,002.06 which was a saving to us of about $1,000.00 from the probable cost.

ANTONIO PARIS - STEPHENSON MINE ACCIDENT REPORT #713.

Paris was injured by a chunk of ore on March 5th, 1925 and has complained of his condition since that time. Early in November he was taken to Chicago by Dr. MacIntyre where he was examined by Dr. Allen B. Kanavel, and it was found by him that there was not much that could be done for him. Upon his return he expressed a desire to return to Italy and arrangements were made for this, we paying $470.06 to provide for the cost of his trip home and $300.00.

He should be able to do any ordinary work after a short time.

CHARLES GRAVIDONI - STEPHENSON MINE ACCIDENT REPORT #692.

Gravidoni was injured on June 25th, 1924. He returned to work in January, 1925 and worked quite steadily until the first half of April at which time he asked for a leave of absence. On his return in about one

month he worked regularly for a while but left for the West in August, refusing to take his final check or sign the settlement receipt.

We petitioned for a stop order to close the case and a hearing was held on October 7th at which I represented the Company in the necessary absence of the attorneys.

The stop order was granted and we were ordered to hold the last check until such time as he might return or be located.

In December the Department of Labor & Industry sent us his address at Gold Hill, Nevada, and we sent the check and receipts to him but they were returned without any information and we again sent them by registered mail asking for a return card and we have now received information that he has left Gold Hill and his address is unknown.

JOHN KUUSISTO - MAAS MINE ACCIDENT REPORT #252.

Kuusisto, a young single man of twenty-five, was accidentally killed on June 11th, 1920. We found evidence of some small amounts of money having been sent by him to his parents in Finland which would show a partial dependency. His friends tried to secure evidence to show amounts of money forwarded but did not seem to meet with much success and letters Rogatory were sent to Finland in 1923.

These letters have just been returned and a hearing set for January 15th, 1926.

ERICK KYLONEN - LAKE MINE ACCIDENT REPORT #78

Kylonen a young single man lost his life by a blast on August 5th, 1913. We found in his effects a receipt for a small amount of money sent to his parents in Finland which would indicate a partial dependency. We communicated with Finland in an endeavor to secure information as to the

total amount of money forwarded and two attorneys also tried but we were all unsuccessful.

Letters Rogatory were sent by the Department of Labor & Industry in the fall of 1924 and these have just been returned and a hearing has been set for January 16th at Marquette to consider the amount to be paid. Undoubtedly something should be paid under the law but it will be quite small.

JOHN POLOMAKI - MORRIS LLOYD MINE ACCIDENT REPORT #616

Polomaki had an ankle broke on September 23rd, 1924 and did not recover sufficiently to do the hard work in the contract where he was working at the time of the injury. He applied for additional compensation and a hearing was held in Marquette on June 17th and we were ordered to pay one more week of compensation and $150.00 for incidental expenses and directed to send him to some outside physician. It was agreed to send him to Dr. Yates at Milwaukee and he went down the following day, June 18th.

He was examined by Dr. Yates on the 19th and arrangements made at the Hospital for Polomaki to go there and be operated upon on Saturday morning, June 20th.

When Dr. Yates arrived for the operation, Polomaki had disappeared the night before and nothing could be learned of his whereabouts and Dr. Yates telegraphed us to that effect. Polomaki showed up in our office Saturday morning stating that as Dr. Yates would not guarantee his complete recovery he decided to come home.

He resumed his work in the mine and has continued at different occupations until the present time and is still working. There is some disability and it is probable that we may be obliged to make him some additional payments as he is not disposed to do as well as we all think he could.

WORKMEN'S COMPENSATION (Continued)

ISAAC PIHLAJA - CLIFFS SHAFT MINE ACCIDENT REPORT #702

This man was injured on Sept. 19th, 1922, suffering a broken leg. He was discharged by the Doctor on June 29th, 1923. At this time he was serving a sentance of 30 days in the County Jail for driving a car while intoxicated.

He did not return to work at that time for the Company and petitioned for compensation. A hearing was held in Marquette on February 4th, 1924 and payments ordered up to October 17th, 1923.

In June, 1925, he presented a petition for total disability and a hearing was held in Marquette on July 12th but as his attorney did not have proper evidence to submit, he was allowed to withdraw the petition.

Another petition was filed in August and a hearing held on Nov. 22nd. The petition was denied by the Deputy Commiasioner and an appeal was taken from this decision by the attorney for Pihlaja.

A hearing before the Full Board was held on March 4th and their decision sustained the Deputy Commissioner with the recommendation that Pihlaja go to work and see if he could do his work satisfactorily. He applied for work at the Cliffs Shaft in April and has been at work ever since and has been getting along all right.

He is a good worker when not drinking and since his return to work has kept in good shape.

JOHN BIGNIGNI - STEPHENSON MINE ACCIDENT REPORT #673

This man was partially incapacitated for work as a miner from the accident which occurred on March 4th, 1924. He desired to return to Italy and a petition for a lump sum payment on account of partial disability was presented to the Department of Labor & Industry in February of 1925 and the petition was granted and Bignigni was paid $2905.60, returning to Italy in April.

PENSION DEPARTMENT