MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

19. GENERAL UNDERGROUND OPERATIONS: (Continued)

Morris Mine: (Continued)

No. 24 Sub Stope:

No ore has been drawn from this stope for eighteen months. For the past few years, production from this stope alone ran about 65,000 tons per annum.

Seventh Level:

Main Deposit:

The new ore shown in our reserves was all found in the main or #33 deposit 1500 feet South-west of the Morris shaft. Two crosscuts were driven South-west from the main drift, both of them crossing the South line of Chase Lease No. 9. The second crosscut was also swung nearly due West to parallel the main dike and at the close of the year was breasted on the 1800' N-S coordinate line.

From the first crosscut, two raises were put up by #64 and two contracts Nos. 71 and 90 started mining about ninety feet above the 7th level. A third raise was also started by #64 in the second crosscut on the South line of Chase Lease No. 9.

There is no question but what there is a large tonnage of ore still to be developed in the South-west end of the main deposit.

East Deposit:

Contract #39 repaired the old raise running from the 7th level to the 6th level and holing into the East end of the East deposit on the latter level. This raise runs up about half way in ore, then cuts 100 feet of Jasper and the last 50 feet is in ore again. We dropped down 50 feet below the 6th level and cut out a new sub and started out-lining the ore area. This work was not far enough advanced to give us much information by the end of the year.

No. 61 Deposit:

Contract #65 put in a new main level drift on the 7th level in the so-called #61 deposit. This consists of two lenses separated by a horse of Jasper about ten feet thick. The drift was started in ore just West of the 1600' coordinate line. It ran West for 170 feet in ore in the North lens. We then swung to the South through the Jasper and entered the South lens, continuing in ore for another 140 feet.

Contract #64 put up a new raise 70 feet from the East end of the new drift to the 6th level. About 80 feet below the 6th level, #73 cut out a new sub in this raise and started drifting East and West to explore the limits of the ore East of the 1800 foot meredian, which has been set as the limit for any mining below the 6th level.

Contract #73 also put up a new raise on the 2050 foot West meredian for 120 feet above the 7th level, but found very little ore. We expected to find the West deposit from the 6th level going on a flat Westerly pitch but this raise proves that the West deposit dips to the South.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

19. GENERAL UNDERGROUND OPERATIONS: (Continued)

Morris Mine:
(Continued)
Seventh Level:
West Deposit:

Contract #75 is mining out the top portion of this ore area which we have, heretofore, called the West deposit assuming it to be the extention of the sub-stope on the 6th level. We know now that #75 is mining a new ore lens that pinches out 200 feet above the 7th level.

This contract mined out three subs taking the ore down to the 190 foot elevation.

The lower portion of this deposit, from the 7th level up to the 165 foot sub, is being sub-stoped. Two short crosscuts were driven in ore and stoping started 22 feet above the level. By the end of the year, we had opened up a stope 100 feet long and 90 feet high. The stope will be carried back as far as the main travelling road going up to #75 contract.

Trench Stope Area:

Five gangs were employed in the #62 deposit or Trench Area Nos. 62, 76, 90, 91 and 92. The first contract is taking the stringer that lies North-east of the trench and is separated from it by a horse of Jasper, although a narrow stringer along the foot dike does actually connect with the Trench Stope. The West top sub lies at the 280 foot elevation and they worked this and the one below out during the year.

#76 is in another stringer or offshoot from the trench West of #62, taking the ore at the 190, 200 and 210 foot elevations.

Nos. 90 and 91 in the Trench proper mined out five tiers. The trench is now cleaned out to within two tiers of the bottom.

No. 92 taking the balance of #62 deposit, that can not be reached from the South-west end of the trench, mined out seven subs. The Jasper is cutting this extention of the trench down to a very small area, it being only about 25 feet square at the 160 foot elevation.

No. 63 Deposit:

Contract #73 took the pillars left under the old shrinkage stope on the 120 foot sub. This work required only a portion of the year.

No. 74 Deposit:

Two contracts Nos. 70 and 71 took out a little ore in the two lenses comprising No. 74 Deposit on the extreme West end of Chase Lease No. 25. Two subs were taken out and work then discontinued as these men could be employed more efficiently elsewhere.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

19. GENERAL UNDERGROUND OPERATIONS: (Continued)

Morris Mine: (Continued)

Morris Shaft Sinking:

The Morris Shaft was bottomed 226½ feet below the 7th level. We expect to go 50 feet more before the bottom of the skip pit is reached. The shaft is being sunk with a bucket for hoisting rock. The old Spies Mine skip hoist was set up on the 7th level and sinking started under the ladder compartment. The rock pentice, 15 feet thick, was left in place under the cage and skip roads and the shaft sunk full size under the pentice. The 8th level plat was cut 200 feet below the 7th level and an area large enough to include the storage pockets, part of tail track and portion of the plat South of the shaft was excavated.

Bad ground was encountered near the South-east corner of the shaft and a concrete arch was thrown across the plat to make the back safe. Sinking was resumed after the arch was finished and room for the storage pocket was cut out the same time as the shaft was sunk.

MORRIS LLOYD MINE
ANNUAL REPORT
YEAR 1927

ANALYSIS OF COST SHEETS, EXPLAINING INCREASE OR DECREASE IN VARIOUS ACCOUNTS BETWEEN THE YEAR 1926 AND 1927

UNDERGROUND COSTS

ACCOUNT
SINKING IN SHAFT

Year 1927	$27,776.73
" 1926	0.00
Increase	$27,776.73

Shaft sinking was started in January 1927, no work of that character having been done since 1919.

ACCOUNT
DEVELOPMENT IN ROCK

Year 1927	$3,855.59
" 1926	9,626.79
Decrease	$5,771.20

Rock Drifting for 1927	-	9 Ft.
" " " 1926	-	868 "
Decrease for 1927	-	859 Ft.
Rock Raising for 1927	-	394 Ft.
" " " 1926	-	530 "
Decrease for 1927	-	136 Ft.

Total cost for 1927 shows large decrease due to considerably less footage driven in rock because nearly all of the material hoisted from development work was graded as ore.

ACCOUNT
DEVELOPMENT IN ORE

Year 1927	$18,672.85
" 1926	12,985.67
Increase	$ 5,687.18

Cost increased in 1927 due to greater amount of development work done as shown by the following table.

	Ore Drifting	Ore Raising
Year 1927	2,210 Ft.	2,232 Ft.
" 1926	2,249 "	1,703 "

The amount of ore drifting decreased slightly for 1927 but we show a large increase in the footage raised in ore.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

UNDERGROUND COSTS

ACCOUNT
STOPING

Year 1927	$150,188.52	Cost Per Ton	.460
" 1926	129,348.83	" " "	.446
Increase	$ 20,839.69	" " "	.014

Labor for 1927	$106,547.26	Cost Per Ton	.326
" " 1926	91,111.33	" " "	.313
Increase		" " "	.013

	Year 1927	Cost Per Ton	Year 1926	Cost Per Ton
General Supplies	$ 3,199.98	.0098	$ 2,313.64	.0079
Iron and Steel	1,876.30	.0057	1,398.52	.0048
Machinery Supplies	11,594.65	.0355	10,551.26	.0364
Explosives	24,589.05	.0752	22,356.73	.0768

All the supply accounts show an increase for 1927. The unit cost for explosives and machinery supplies however, shows a decrease for 1927. We charged out eight scraper hoists and Manganese scraper plates for eight complete units in 1927. The Iron and Steel total for the past year is up due to charging out 2200 pounds of drill steel.

All of the increase in the unit cost per ton for stoping is in the labor charge due to the large number of new ore bodies opened up during the year. It is not possible to get as good results from the miners subbing under the hanging as we will get when they have a good timber mat accumulated over their working places. We always have to proceed cautiously in new ore areas, more timbering is necessary, large quantities of rock matting must be broken to make the workings safe, more floor lagging put down and the ore does not break as well. All these items increase the cost.

ACCOUNT
TIMBERING

Year 1927	$82,821.02	Cost Per Ton	.253
" 1926	66,140.31	" " "	.228
Increase	$16,680.71	" " "	.025

Cost for 1927 increased for a number of reasons. First, we took no ore from sub stopes. For the past few years, about one-quarter of the product of the mine came from No. 24 substope, where no timbering was required. In 1926, 29,968 tons came from this stope. Secondly, the sub levels in new territory took much more timber than the average. We started sixteen contracts out of a total of thirty-six in new ore areas. We did more raising last year than for years past and all our raises are close timbered.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

UNDERGROUND COSTS

ACCOUNT
TRAMMING

Year 1927	$51,844.96	Cost Per Ton	.158
" 1926	43,806.50	" " "	.151
Increase	$ 8,038.46	" " "	.007

Tramming cost increased but product handled during past year increase 12½%. Unit cost shows a small increase. At the Lloyd shaft, two men were added to the force handling ore. A car dumper was placed at the third level plat and a chute loader employed in the Lloyd Mine. An extensive track cleaning campaign was also started, four men being employed night shift doing this work.

ACCOUNT
VENTILATION

Year 1927	$369.41
" 1926	680.47
Decrease	$311.06

For the first six months of 1926, a large ventilating fan was used blowing smoke away from the chutes on the sixth level underneath No. 24 sub stope. Early in 1927, the fan was moved out near the shaft and has since been used to ventilate the long rock raise going from the sixth to the fourth levels. This fan is only run intermittingly, particularily at the beginning of the shift to blow fresh air up to the breast of the raises.

ACCOUNT
PUMPING

Year 1927	$16,890.15
" 1926	15,078.18
Increase	$ 1,811.97

The pumps handled 223,631,596 gallons of water in 1927 compared with 205,247,760 in 1926. Cost increased $1,811.97, nearly all of which is due to increased power consumption.

Electric Power for 1927	$11,194.17
" " " 1926	9,793.29
Increase	$ 1,400.88

The labor cost increased in the early part of the year due to employing extra man on pumps while dams were being built underground and also some extra pumping when shaft sinking was first started. The cost for the last half year was normal.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

UNDERGROUND COSTS

ACCOUNT
COMPRESSORS
AND AIR PIPES

Year 1927	$30,983.84
" 1926	22,410.82
Increase	$ 8,573.02

Large increase is due to Morris-Lloyd Mine being now compelled to absorb all the compressed air charges since the Barnes-Hecker disaster.

It cost $34,147.28 to keep the plant going in 1926 compared with $28,549.21. But in 1926, the Barnes-Hecker Mine was charged with $15,600.00, whereas, in 1927 their charges were only $836.00.

ACCOUNT
UNDERGROUND
SUPERINTENDENCE

Year 1927	$14,254.92
" 1926	13,886.09
Increase	$ 368.83

Increase due to employing one additional shift boss on sixth level Morris Mine. Increase would have been larger except for the difference in wages paid the old and new mining captain appointed January 1st, 1927.

MAINTENANCE COSTS

ACCOUNT
COMPRESSORS
AND POWER DRILLS

Year 1927	$917.45
" 1926	924.67
Decrease	$ 7.22

Charged out two R.B.12 Auger Drills and two D.C.R.23 shaft sinking Jack Hammers all purchased from Ingersoll-Rand Co.

ACCOUNT
HAND TRAM EQUIPMENT

Year 1927	$136.51
" 1926	250.79
Decrease	$114.28

Decreased cost due to discontinuing use of underground tram cars and substituting scrapers.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

MAINTENANCE COSTS

ACCOUNT
ELECTRIC TRAM EQUIPMENT

Year 1927	$20,552.29
" 1926	15,141.84
Increase	$ 5,410.45

The above account can be itemized as follows:-

	1927	1926
Generator & Dynamo	$ 2,582.25	$ 6.20
Locomotives	6,865.71	3,175.28
Wiring	1,192.01	962.80
Main Line Tracks	3,121.43	3,347.91
Main Line Cars	6,790.89	7,649.65
	$20,552.29	$15,141.84

The increase is mostly confined to the first two items. We installed a larger motor generator set obtained from the Central Power Plant at Gwinn. This was billed to us at a cost of $1,285.00. It required $400.00 to repair the spare motor generator set which burned out the time the McClure Plant was out of commission and the voltage on the feeder line was low. Several changes were made on the switch-board to permit running two generators in tandem which increased the normal cost approximately $200.00. Ten locomotive armatures were repaired at a cost of approximately $200.00 each and one new spare armature was purchased. We now have seven locomotives in service.

ACCOUNT
PUMPING MACHINERY

Year 1927	$1,635.85
" 1926	7,770.01
Decrease	$6,134.16

Large decrease due to the fact that in 1926, large expenditures were incurred building concrete dams on the third, fourth and sixth levels Morris shaft.

SURFACE COSTS

ACCOUNT
HOISTING

Year 1927	$20,787.77	Cost Per Ton	.064
" 1926	18,333.79	" " "	.063
Increase	$ 2,453.98	" " "	.001

Total cost increased but unit cost shows very little change.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

SURFACE COSTS

ACCOUNT
STOCKING ORE

Year 1927	$11,112.75
" 1926	11,646.64
Decrease	$ 533.89

Small decrease due to less new stocking trestle erected in the year 1927.

ACCOUNT
SCREENING AND CRUSHING AT MINE

Year 1927	$3,290.58
" 1926	1,575.61
Increase	$1,714.97

Cost increased because we operated crushers in both the Lloyd and Morris shaft houses in 1927. In 1926, 58,976 tons were crushed at the mine compared with 85,017 tons in 1927. It cost 3.9¢ per ton to crush ore at the mine compared with .178 at the district crusher, where a considerable tonnage was prepared in 1926.

ACCOUNT
DRY HOUSE

Year 1927	$9,829.61
" 1926	9,147.53
Increase	$ 682.08

A little less coal was burned in 1927 but cost for 1927 increased because we spent more money keeping the dry clean. A surface laborer spends one-half shift washing and cleaning the building in addition to the regular dryman who also acts as fireman and gives out oil and grease.

ACCOUNT
GENERAL SURFACE EXPENSE

Year 1927	$5,683.93
" 1926	5,355.40
Increase	$ 328.53

Cost increased because of the heavy snow fall and general cleaning up compaign in 1927. Several fences were rebuilt around the Lloyd and Section Six caves.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

MAINTENANCE COSTS

ACCOUNT
HOISTING EQUIPMENT

Year 1927	$10,985.07
" 1926	6,049.46
Increase	$ 4,935.61

Cost for 1927 increased for various reasons. First, the Morris shaft cage hoist was speeded up and new herringbone gear installed at a cost of approximately $1,350.00. Then $3,167.67 was charged off for new hoisting ropes compared with $1,801.12 in 1926. Two skips and a cage were purchased from the Barnes-Hecker Mine at a price of $958.00. Experiments costing approximately $300.00 were made on idler sheaves and rollers in the Morris shaft pulley stands. We also purchased 3504 feet of new shaft runners and a new eight foot sheave with steel liners was charged off in the past year.

ACCOUNT
SHAFT REPAIRS

Year 1927	$3,901.85
" 1926	2,543.84
Increase	$1,358.01

Our normal expense for shaft repairs runs from $200.00 to $250.00 monthly. In July and August, the total ran up $1569.04 because the Lloyd shaft was retimbered from the third level to the bottom, a distance of 260 feet.

ACCOUNT
TOP TRAM EQUIPMENT

Year 1927	$2,494.03
" 1926	2,750.47
Decrease	$ 256.44

The heaviest expenditures for 1927 include $340.95 for repairs to Lloyd shaft top tram motor; one 50 H.P. Motor purchased from the Barnes-Hecker Mine at a cost of $391.25 and 3150 feet of top tram rope.

ACCOUNT
DOCKS, TRESTLES
AND POCKETS

Year 1927	$2,372.88
" 1926	437.16
Increase	$1,935.72

In 1926, no new trestle was erected. In 1927, we repaired and rebuilt portions of the Morris rock trestle. The permanent trestle at the Lloyd shaft was repaired and a considerable footage of new trestle erected at both the Morris and Lloyd shafts.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

MAINTENANCE COSTS

ACCOUNT
MINE BUILDINGS

Year 1927	$2,068.54
" 1926	1,598.57
Increase	$ 469.97

The cost of rebuilding the two timber tunnels at the Morris and Lloyd shafts was charged to this account. We made extensive repairs to the Morris dry roof and also repaired and covered with "Save All" roofing paint, the Section Six dry, Lloyd engine house and laboratory.

GENERAL MINE ACCOUNTS

ACCOUNT
INSURANCE

Year 1927	$2,233.63
" 1926	150.40
Increase	$2,083.23

Large increase due to adjusting premiums for previous years.

ACCOUNT
ENGINEERING

Year 1927	$3,262.95
" 1926	3,293.02
Decrease	$ 30.07

ACCOUNT
ANALYSIS

Year 1927	$9,486.87
" 1926	8,504.42
Increase	$ 982.45

Increased because of shifting laboratory personnel and also because the Morris-Lloyd Mine has to bear all the district expense since the Barnes-Hecker Mine disaster. The laboratory made 38,385 determinations in 1926 and 34,575 in 1927.

ACCOUNT
PERSONAL INJURY EXPENSE

Year 1927	$7,046.65
" 1926	3,489.10
Increase	$3,557.55

The personal injury expense doubled in the past year due to fatal accident in May 1927.

MORRIS-LLOYD MINE
ANNUAL REPORT
YEAR 1927

GENERAL MINE ACCOUNTS

ACCOUNT
SAFETY DEPARTMENT EXPENSE

Year 1927	$236.27
" 1926	255.13
Decrease	$ 18.86

ACCOUNT
TELEPHONES AND SAFETY DEVICES

Year 1927	$1,700.06
" 1926	980.98
Increase	$ 719.08

Cost for 1927 is larger because of the large number of new electric lights placed on all main levels; because all raises were equipped with gates; because of new hinged boards at all chutes; because of various new tools furnished miners and in general, we installed safety devices wherever needed.

ACCOUNT
LOCAL GENERAL WELFARE

Year 1927	$3,575.27
" 1926	3,287.87
Increase	$ 287.40

ACCOUNT
MINE OFFICE

Year 1927	$15,076.80
" 1926	11,997.85
Increase	$ 3,078.95

Increased because many of the items charged to this account used to be divided between the Barnes-Hecker and the Morris-Lloyd Mines. For the past year, the Morris-Lloyd Mine alone had to absorb all the expense.

BARNES-HECKER MINE

ANNUAL REPORT

YEAR 1927

The following report covers operations at the Barnes-Hecker Mine for 1927. Viz:

Bailing:

Bailing from the shaft was continued until January 11th, 1927 when it was definitely decided to seal the shaft. After that day, we did no further bailing or pumping from the cave.

Removal of Supplies:

During the early portion of the year, all the mine timber, plank and coal was loaded up and shipped to various properties, the bulk of the material going to the Morris-Lloyd Mine. The iron and steel and all warehouse supplies that could be used elsewhere were moved. The buildings were then boarded up.

Stockpiles:

Most of the ore in stock was loaded up and shipped. The ore statement shows a stockpile shortage for the Barnes grade but actually, we had an over-run.

In the latter part of November 1926, we reported an over-run of 30,000 tons in the Barnes ore stockpile which figure was included and added to the balance on hand. The balance on November 1st, 1926 was 17,856 which was increased to 47,856 on December 1st, 1926. During 1927, we shipped 30,549 tons of Barnes cleaning up the pile and making a shortage from the book figures of 17,307 tons. As a matter of fact, we had an over-run of 12,693 tons from the mine figures at the time of the disaster. The mistake occurred in reporting an over-run of 30,000 tons in November 1926, when the balance on hand at the time of the disaster should have been reported as 30,000 tons.

The Silica stockpile, of which about 1000 tons remains in the sollar, already shows an over-run of 2167 tons.

OGDEN MINE

ANNUAL REPORT

YEAR 1927.

1. GENERAL:

The Ogden Mine was opened early in April, and work was continued until November, using the same equipment as last year for loading ore.

There remains only one season's production above the floor of the pit, and 180,000 tons in the floor, if mined to a depth of fifteen feet, the limit for present hauling equipment. It will not pay to mine this ore, however, as much better results can be obtained at the Tilden Mine, if that is opened.

In spite of two dikes cutting across the ore, which made it necessary to throw back and overcast a considerable tonnage, the iron and silica content have remained practically constant. During most of the season ore was mined from the north end of the pit, where the ground is much harder and the broken ore much more abrasive than the average. This counterbalanced improvements in practice, which would have resulted in lower costs.

A third churn drill was purchased early in the year, and all drilling was done on day-shift, resulting in lower costs and fewer lost holes. Drilling was done in excess of the season's needs.

Stripping has been almost completed, only a small area near the upper contact remaining to be cleaned off with the scraper.

An otherwise perfect record for accidents was spoiled by a fatality in June, when the helper on the electric shovel took hold of a high tension circuit.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Tilden Silica	174,106 Tons
Rock	2,000 "

The mine started production on April 18th, and loading was carried on on single shift until the 7th of September. Thereafter loading was on double shift until the end of the season, October 21st. There were several delays from shortage of railroad cars, and some time was lost overcasting rock. In all the mine loaded ore on 151 days, an average of 1,153 tons per day and 902 tons per shift. All of the ore was crushed at the Maas Crusher. Production for 1927 showed an increase of 27,605 tons over that of 1926.

b. Shipments:

Grade of Ore:

Tilden Silica	175,500 Tons

c. Stockpile Inventories:

None.

There is about 27,000 tons of broken ore in the pit, some of which will require secondary blasting.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

e. **Production by Months:**

Month	Days	Tons Per Day	Total Tons
April	12	869	10,423
May	20	969	19,370
June	25	911	22,779
July	24	878	21,069
August	27	865	23,367
September	25	1,591	39,780
October	18	2,055	36,992
November	0		326
Year	151	1,153	174,106
Rock			2,000

f. **Ore Statement:**

	Year Tons	Last Year Tons
On Hand Jan. 1st, 1927	1,394	-
Output for Year	174,106	146,501
Total	175,500	146,501
Shipments	175,500	145,107
Balance on Hand	-	1,394
Increase in Output	27,605	
Increase in Shipments	30,393	

1927 - 1-9 Hour shift, 6 days per week, April 18 - Sept. 7, 1927.
2-9 Hour shifts, 6 days per week, Sept. 7 - Oct. 21, 1927.
Idle Oct. 22 to Dec. 31, 1927.

1926 - 1-9 Hour shift, 6 days per week, June 1 to Aug. 11, 1926.
2-9 Hour shifts, 6 days per week, Aug. 11 to Oct. 23, 1926.
1-9 Hour shift, 6 days per week, Oct. 23 to Oct. 27, 1926.
Idle Oct. 27 to Dec. 31, 1926.

1925 - 1-9 Hour shift, 6 days per week, June 4 to Nov. 15, 1925.
Idle Nov. 16 to Dec. 31, 1925.

g. **Delays:**

In May there were six days, when loading was delayed, on account of shortage of railroad cars, and in June there was some delay from the same cause and also from blasting.

In July there was no work on July 2nd and 4th, and on July 22nd half a day was lost by a car jumping the track, and on July 25th nearly a day was used up changing a hoisting-rope on the shovel. Several hours a day were lost in the first week of August, through lack of railroad cars, and production was stopped entirely on August 8th and 9th. Another day was lost after the blast of August 19th, overcasting ore, and a short circuit cost another half-day on August 28th.

In September two days were lost overcasting rock, and very little production was made for three more on account of shortage of cars. Total delay from shortage of railroad cars amounted to 12½ days and from other causes 5 days.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Tilden Silica	41.03	.052	38.22

b. Average Analysis on Straight Cargoes:

Grade	Mine			Lake Erie		
	Iron	Phos.	Silica	Iron	Phos.	Moisture
Tilden Silica	41.02	.052	38.26	40.91	.052	2.97

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption - 15 cu. ft. equals one ton.
10% deduction for rock.
All ore is Tilden grade.

	Ore Tons	Less 10% for Rock Tons	Net Ore Tons
Above Floor of Pit	219,000	22,000	197,000
15 Ft. Below Pit Floor	200,000	20,000	180,000
Total	419,000	42,000	377,000

b. Prospective Ore:

By going 15 feet deeper another 180,000 tons can be obtained, but this cannot be mined with present haulage equipment.

c. Estimated Analysis:

	Iron	Phos.	Silica	Alum.	Mang.	Lime	Mag.	Sul.	Igni.	Moist.
Dried 212°	40.50	.055	38.87	.64	.160	.620	.260	.008	1.43	
Natural	39.00	.053	37.43	.62	.154	.597	.250	.008	1.38	3.70

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

5. LABOR AND WAGES:

a. Comments:

1. Labor:

There was no shortage of labor in 1927.

b. Comparative Statement of Wages and Product:

	1927	1926	Increase	Decrease
PRODUCT:	174,106	146,501	27,605	
No. of Shifts and Hours	1-9 hr.	1-9 hr.		
AVG. NO. MEN WORKING:				
Surface	7	8		1
Underground	4	5		1
Total	11	13		2
AVG. WAGES PER DAY:				
Surface	4.72	4.40	.32	
Underground	5.68	5.20	.48	
Total	4.97	4.67	.30	
WAGES PER MO. OF 25 DAYS:				
Surface	118.50	110.00	8.50	
Underground	142.00	130.00	12.00	
Total	124.75	116.75	8.00	
PRODUCT PER MAN PER DAY:				
Surface	118.52	119.64		1.12
Underground	322.42	215.60	106.82	
Total	86.66	76.94	9.72	
LABOR COST PER TON:				
Surface	.039	.037	.002	
Underground	.019	.024		.005
Total	.058	.061		.003
TOTAL NO. OF DAYS:				
Surface	1469	1243½	225½	
Underground	539¾	679½		139¾
Total	2008¼	1923	85¼	
AMOUNT FOR LABOR:				
Surface	6933.44	5025.70	1907.74	
Underground	3067.55	3524.20		456.65
Total	10000.99	8549.90	1451.09	

Mine produced from June 4th to Nov. 15th, 1925.
Mine produced from June 1st to Oct. 27th, 1926.
Mine produced from April 18th to Oct. 21st, 1927.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

6. SURFACE:

a. Buildings and Repairs:

The drill sharpening shop for churn-drills was moved to a position just south of the blacksmith shop.

b. Erie Shovel:

The boiler on the Erie Shovel was repaired in April, nearly all the old tubes being replaced.

c. Scraper-Hoist:

A new scraper-hoist was built at the Cliffs Shaft Mine during the winter, using two 25 H.P. motors. This replaced the two used in 1926, and gave very satisfactory service.

d. Steam-Shovel:

The steam-shovel had a new dipper-front in the spring, and this was renewed again late in October, after shipments had been completed. The motor-generator set was removed from the shovel in November, cleaned, painted and replaced.

On Labor Day a new pinion was put on the main hoist.

e. Drill-Sharpener:

A drill-sharpener was built during the winter, and was set up close to the blacksmith shop. A cable-way was also built to carry bits and supplies between the pit-floor and the top of the bank.

7. OPEN PIT OPERATIONS:

a. Stripping:

The Erie Shovel was used for stripping at the top of the bank for three months, and moved 1525 cu. yds. which was put on the dump at the southeast end of the pit. The shovel was then sent to the Hard Ore.

The scraper worked at the north end of the pit until late fall, and was then moved to the top of the hill, where it started pulling dirt off the ore uphill, and stocking it south of the contact. 2275 cu. yds. were moved by the scraper with two men.

The big shovel made a cut along the foot of the bank to a point ten feet from the west line, and moved 5625 cu. yds. in addition to most of the dirt that the scraper had pulled down from above. 220 cu. yds. were also washed down with the hose, making the total amount 9645 cu. yds.

There remains a small area, amounting to 1060 cu. yds. to clean off with the scraper, and the ledge must also be washed off with the hose, possibly another 1000 yds.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

7. OPEN PIT OPERATIONS: (Continued)

a. Stripping: (Continued)

STRIPPING STATEMENT:

	1927	1926	Total
Cubic Yards Stripped	9,645	15,308	32,506
Captain	$ 49.70	$ 786.13	$ 918.33
Labor At Mine	3,990.80	8,954.74	18,223.40
Supplies At Mine	1,383.21	3,308.03	6,675.38
Personal Injury Expense			21.40
Local General Welfare, Labor	.92	21.59	30.85
Local General Welfare, Supplies	1.33	12.57	25.13
Contingent Expense	36.94	126.46	404.18
Central Office - Labor	156.82	582.26	1,067.34
Central Office - Supplies	96.61	326.52	609.88
Engineering	16.85	373.25	390.10
Clerk	38.62	437.12	475.74
Superintendent	6.24	201.01	207.25
Total	5,778.04	15,129.68	29,048.98
Charged to Production	8,705.30	7,325.05	17,132.33
Balance	$ 2,927.26	$ 7,804.63	$ 11,916.65
Tons of Ore Stripped Above Pit Floor	130,000	294,000	537,000
Cost Per Cubic Yard	$ .599	$ .988	$ .894
Cost Per Ton of Ore Stripped	.044	.051	.054

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

7. OPEN PIT OPERATIONS:
(Continued) f. Drilling, Blasting and Explosives:

For primary blasting three Cyclone drills, using 5-7/8" bits, were used on single shift during most of the season. One churn drill was loaned to the Gwinn District on September 24th, and was returned in October, but was not used at the Ogden Mine thereafter. A new bulk powder (Special #1) was tried out successfully in 1927, and amounted to one fifth of all the powder used. Approximately 200,000 tons of ore was blasted during the season, over 27,000 tons being left after shipments were completed, and there were more holes drilled at the end of the season than were left over last year. All the powder used has been charged against this year's operations, but part of the drilling is carried in a deferred account.

Approximately one fifth of the powder used is for secondary blasting and four-fifths in the large primary blasts.

The following table shows the progress made:-

Blast-Hole Drilling:

	Holes			Feet		
Month	Drilled	Lost	Net	Drilled	Lost	Net
April	8	2	6	442	72	370
May	17	0	17	1,204	0	1,204
June	18	1	17	1,396	36	1,360
July	13	1	12	826	7	819
August	15	1	14	985	14	971
September	15	0	15	1,033	8	1,025
October	8	0	8	552	0	552
November	1	0	1	92	0	92
Year	95	5	90	6,530	137	6,393

Two of the five lost holes and 67 feet of the lost footage were not lost in drilling operations. One hole was caved by blasting and one was stopped, and 8 feet of lost footage was in sand, and hence not effective.

Cost of Drilling:
6,393 Feet of Holes Drilled (Not Including Lost Holes)

Operating	Labor	Supplies	Total	Cost Per Foot
Drilling At Mine	$ 5115.49	$ 469.38	$ 5584.87	$ .873
Building Roads	279.30		279.30	.043
Sharpening Bits	1442.49	464.74	1907.23	.298
Pipe and Fittings		222.16	222.16	.034
New Drill Bits		500.87	500.87	.078
Rope		517.15	517.15	.086
Drilling-Tools		387.94	387.94	.061
Electric Cable		263.73	263.73	.041
Electric Power		305.85	305.85	.047
Teaming	771.70	91.65	863.35	.133
Total	$ 7608.98	$ 3223.47	$ 10832.45	$ 1.694
Maintenance				
Drills	$ 8.55	$ 634.38	$ 642.93	$ .101
Sharpener	18.20	277.11	295.31	.046
Total	$ 26.75	$ 911.49	$ 938.24	$ .147
Grand Total	$ 7635.73	$ 4134.96	$ 11770.69	
Cost Per Foot	$ 1.194	$ .647	$ 1.841	$ 1.841

At 33 tons per foot of hole - cost per ton is $ .0558.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

7. OPEN PIT OPERATIONS: (Continued)

f. Drilling, Blasting and Explosives: (Continued)

Drilling was started on April 13th and continued until November 4th. At the beginning of the season there were seventeen holes drilled and two more started with a total of 1123 feet of hole, and at the end of the season there were twenty-one holes drilled with a total of 1467 feet of hole.

There were seven large blasts made during the year as follows:-

1.	April 13th	-	8	holes	broke	-	12,000 Tons.
2.	April 25th	-	8	"	"	-	15,000 "
3.	June 7th	-	17	"	"	-	43,000 "
4.	July 26th	-	3	"	"	-	9,000 "
5.	Aug. 19th	-	16	"	"	-	40,000 "
6.	Sept. 2nd	-	4	"	"	-	8,000 "
7.	Sept. 24th	-	30	"	"	-	73,000 "
	Total	-	86	"	"	-	200,000 "

In all 86 holes, with a total of 6049 feet, were blasted during the year, breaking 200,000 tons of ore, an average of 2325 tons per hole and 33 tons per foot of hole. On this basis the 1467 feet of hole ready to blast at the end of 1927 will break 48,000 tons of ore.

Two men were employed in drilling with small machines and in blasting, one less than in 1926.

Cost per Ton for Drilling and Blasting:

	Primary Blasting	Secondary Blasting	Total
Drilling	$ .0773	$ .0083	$ .0856
Explosives	.0474	.0120	.0594
Total	$ .1247	$ .0203	$ .1450

Secondary blasting costs are high, because so many chunks have to be blasted to make them small enough to pass through the doors of the railroad cars.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

7. OPEN PIT OPERATIONS: (Continued)

f. Drilling, Blasting and Explosives: (Continued)

Statement of Explosives Used:

Kind	Quantity	Average Price	Amount 1927	Amount 1926
40% 1¼" x 8" L.F. Extra	50	13.00	6.50	78.00
40% 1¼" Gelatin				52.00
60% 1¼" x 8" Gelatin	11,400	15.50	1767.00	46.50
60% 1⅛" x 8" Gelatin				1451.75
Hercules Special #1 - 5 x 16	12,500	14.00	1750.00	0
60% 5 x 16 Gelatin	23,950	15.50	3716.25	4347.75
80% 5 x 16 Gelatin	11,950	19.50	2330.25	409.50
80% 1¼" x 8" Gelatin	250	19.50	48.75	0
Total Powder	60,100	16.05	9618.75	6385.50
Fuse Cordeau-Dble. Countered	6,930	49.60	343.98	291.97
" " -Plain "	1,500	42.50	63.75	89.38
" " -Single "				25.15
Total Cordeau	8,430		407.73	406.50
Crescent Fuse	38,400	6.35	243.63	221.44
#6 Blasting Caps	6,500	10.65	69.21	74.53
Connecting Wire				6.52
#6 Electric Exploders				14.32
Cordeau Slitter				1.50
Total Fuse, Etc.			312.84	318.31
TOTAL ALL EXPLOSIVES			10339.32	7110.31
Product			174,106	146,501
Pounds of Powder per Ton of Ore			2.897	3.60
Cost per Ton for Powder			.0553	.044
Cost per Ton for Fuse, Caps, Etc.			.0042	.005
Cost per Ton for all Explosives			.0594	.049
Average Price per Pound for Powder			.1605	.157

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1927	1926	Increase	Decrease
PRODUCT	174,106	146,501	27,605	
Pit Operating Cost	.459	.383	.076	
Pit General Cost	.043	.014	.029	
Total Producing Cost	.502	.397	.105	
Plant Account	.067	.067		
Taxes	.022	.030		.008
Central Office	.003	.004		.001
Contingent Expense	.003	.005		.002
Stripping	.050	.050		
Cost Adjustment	.014	.008	.006	
Total Cost on Cars	.661	.561	.100	
No. Days Operating	151	126	25	
No. Shifts and Hours	1 - 9	1 - 9		
Average Daily Product	1,153	1,163		10
COST OF PRODUCTION:				
Labor	.119	.115	.004	
Supplies	.383	.282	.101	
Total	.502	.397	.105	

b. Detailed Cost Comparison:

(1) Days and Shifts:

The mine worked six days a week one nine-hour shift per day from April 18th to September 7th, 108 days, and from September 7th to October 21st, 43 days, loading was done on night shift also. In 1926 the mine worked one nine-hour shift a day for 63 days and loading was done at night also for 63 days.

PIT OPERATING ACCOUNTS:

Drilling and Blasting:

1926	$ 22629.30	$ .154
1927	25184.93	.145
Increase	$ 2555.63	
Decrease		$ .009

The increase is due to larger tonnage, and to excess ore broken in last blast - 27,000 tons.

Steam-Shovels, Operating:

1926	$ 4774.12	$ .033
1927	3480.15	.020
Decrease	$ 1293.97	$ .013

The shovel worked 188 shifts in 1926 and 193 shifts in 1927. Hoisting ropes, tooth-points and minor repairs were charged to this account in 1926, but to maintenance in 1927.

Steam-Shovels, Reprs. & Maintenance:

1926	$ 459.87	$ .003
1927	2973.18	.018
Increase	$ 2513.31	$ .015

In 1927 a new dipper front cost $ 604 in place, and in 1926 four tooth bases were charged out. In 1927 a new pinion was put on, costing over $ 300, and repairs to generator cost $ 216. New tooth points and hoisting ropes were charged to this account in 1927 and to operating in 1926.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

8. COST OF OPERATING: (Continued)

PIT OPERATING ACCOUNTS: (Continued)

Locomotives and Cars, Operating:			
1926	$	1825.51	$ .013
1927		1763.91	.010
Decrease	$	61.60	$ .003
Locomotives & Cars, Reprs. & Maint.			
1926	$	150.51	$ .001
1927		39.71	.000
Decrease	$	110.80	$ .001
Track Expense:			
1926	$	636.50	$ .004
1927		197.85	.001
Decrease	$	438.65	$ .003
Pumping and Drainage:			
1926	$	4.88	$ .000
1927			
Decrease	$	4.88	$ .000
Screening and Crushing:			
1926	$	23716.49	$ .162
1927		42769.45	.246
Increase	$	19052.96	$ .084
General Open Pit Expense:			
1926	$	1271.70	$ .007
1927		2129.43	.012
Increase	$	857.73	$ .005
Open Pit Superintendence:			
1926	$	599.87	$ .004
1927		1327.81	.007
Increase	$	727.94	$ .003

In 1926 the air-pump was repaired and a new coupler was purchased.

In 1927, owing to the longer face, it was not necessary to move track as many times as in 1926.

The increase is at the Maas Crusher. This work was not under mine supervision.

In 1927 the watchman's time was charged to this account throughout the year. In 1926 this was for only nine months.

The captain had a higher salary in 1927, and a larger proportion of his salary was charged to this account.

PIT GENERAL ACCOUNTS:

Insurance:			
1926	$	57.06	$ .000
1927		91.34	.001
Increase	$	34.28	$ .001
Engineering:			
1926	$	401.58	$ .003
1927		563.63	.004
Increase	$	162.05	$ .001
Analysis:			
1926	$	884.78	$ .006
1927		935.56	.005
Increase	$	50.78	
Decrease			$ .001

This is a Central Office charge.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

8. COST OF OPERATING: (Continued)

PIT GENERAL ACCOUNTS: (Continued)

Personal Injury Expense:			
1926	$	137.27	$ .001
1927		4398.15	.025
Increase	$	4260.88	$ .024

The increase is due to the fatal accident to Louis Tatrault.

Safety Department Expense:			
1926	$	2.00	$ .000
1927			
Decrease	$	2.00	$ .000

Local General Welfare:			
1926	$	19.83	$ .000
1927		34.99	.000
Increase	$	15.16	$ .000

Mine Office:			
1926	$	599.03	$ .004
1927		1452.47	.009
Increase	$	853.44	$ .005

In 1926 $ 437.12 of the clerk's wages were charged to stripping, and in 1927 only $ 38.62. The clerk's salary was larger in 1927.

9. EXPLORATION & FUTURE EXPLORATIONS:

Tilden Exploration:

In the North Half of the Northwest Quarter of Section 26, T. 47 N. - R. 27 W., as authorized last year, eleven diamond drill-holes were put down, proving up a deposit of silicious ore, containing, above ground level, 3,430,000 tons of ore similar to that at the Ogden Mine and 1,400,000 tons additional, that is higher in sulphur, averaging about .050 sulphur. At this place preparations are being made for opening a mine in 1928. A dam and pipe-line have been built for hydraulicking stripping, and the location of the plant, railroad and part of the pit have been cleared. It is essential that this mine should be opened in 1928, as the Ogden Mine has only one season's ore left above the floor of the pit.

OGDEN MINE
ANNUAL REPORT
YEAR 1927.

10. TAXES:

Statement of Taxes:

	1927		1926	
	Valuation	Taxes	Valuation	Taxes
Supplies and Equipment	$ 58,000.00	2,351.11	$ 54,000.00	2,486.15
Lot 3, Sec. 13, 47 - 27	150.00	6.08	150.00	6.91
Part of Lot 4, Sec. 13, 47-27	100.00	4.05	100.00	4.61
Lot 5, Sec. 13, 47 - 27	35,000.00	1,418.77	40,000.00	1,843.00
SE¼ of SW¼ Sec. 13, 47 - 27	200.00	8.11	200.00	9.21
Total	$ 93,450.00	3,788.12	$ 94,450.00	4,351.88
Collection Fees		37.88		43.52
Total		$ 3,826.00		$ 4,395.40

11. PERSONAL INJURIES:

Fatal Accident: Louis Tatrault:

Only one accident occurred at the mine during the season, but this was a fatality.

About three o'clock on June 29th, Louis Tatrault, pitman and oiler on the electric shovel, climbed up under the shovel, while it was idle waiting for more cars, and came in contact with the 2300 volt circuit in the collector rings, and was instantly killed. He apparently forgot that the current was still on, while the shovel was idle.

Tatrault was 50 years old, of French-Canadian descent, and had worked for the company for many years. He left a widow and five children.

13. NEW EQUIPMENT & PROPOSED EQUIPMENT:

a. Steam-Shovels and Crushers:

A new crushing plant should be erected at the Tilden Mine in 1928, using the 42" x 40" jaw crusher, the 10" gyratory, and one conveyor belt now at the Maas Crusher. A new 10" crusher should be purchased.

d. Scraper-Hoist:

A new scraper-hoist with two 25 H.P. motors was built in 1927 at the Cliffs Shaft Mine, and has been used for stripping.

18. NATIONALITY OF EMPLOYEES:

Nationality Statement:

American	17
English	4
French-Canadian	1
Finnish	2
Total	24

This statement is based on operations in October, and covers all men employed at the mine on both operating or deferred accounts. All are American citizens, and the report shows nationality at birth.

NEGAUNEE MINE

ANNUAL REPORT

YEAR 1927.

1. GENERAL:

The mine operated from January 1st to March 12th on a five day per week schedule, the same as in the previous year. On account of increasing the production to a basis of 500,000 tons per year, operations were started on a schedule of six days per week on March 12th, and continued on this basis for the balance of the year. A few contracts were added to the underground forces, but all mining continued to be done on day shift. Hoisting is continued on the night shift until all of the ore has been hoisted. A small night crew was added to take care of loading and handling the ore.

Stoping was continued in the same areas that were being mined in the previous year. Above the tenth level mining continued along the footwall on the Maas boundary, and in the main ore body south of #2 dike. Between the tenth and eleventh levels mining was in progress in an area north of #2 dike. The development of the twelfth level has not yet been completed. The new pump house on the twelfth level was excavated the latter part of the year. The sumps will be excavated in 1928.

The grade of ore produced in 1927 was up to the guarantee; the percentage of Bessemer was about the same as in the previous year. New territory under the hanging between the eleventh and twelfth levels will have to be opened if an increase of Bessemer output is wanted.

Labor conditions during most of the year were satisfactory. There was a small shortage of underground men in the spring and early summer. The closing of the Stephenson and Austin Mines in the Gwinn District, and the Rolling Mill and Mary Charlotte Mines in Negaunee released a large number of men, so that for the past several months there has been an oversupply of men in the district.

The mine is in good condition except in the crosscuts on the eleventh level, where the ground is heavy and the timber is crushing. Considerable expense was incurred in repairing these crosscuts the latter part of the year. The solution of this problem is now underway, and within a few months the ore from this territory will be handled through twelfth level raises, and by transfer raises to the footwall haulage drifts on the eleventh level, so that the crosscuts can be abandoned.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Negaunee Bessemer Ore	41,013 tons
Negaunee Ore	446,867 "
Total Ore	487,880 "
Rock	13,804 "

The total product for the year was 124,638 tons more than in 1926, due to working six days per week from March 12th to the end of the year, to more contracts added in March, and to increased efficiency underground due to the use of more mechanical loading devices.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Negaunee Bessemer	16,688	51,947	68,635	18,783
Negaunee Ore	233,799	232,128	465,927	359,914
Total	250,487	284,075	534,562	378,697
Total Last Year	167,356	211,341	378,697	
Increase	83,131	72,734	155,865	

The shipments for the year increased 155,865 tons over 1926, and were 46,682 tons more than were mined.

c. Stockpile Inventories:

The ore by grades in stock December 31st, 1927, were as follows:

Negaunee Bessemer	6,405 tons
Negaunee Ore	45,992 "
Total	52,397 "

On December 31st, 1926, there were 34,027 tons of Bessemer in stock. Shipments increased from 18,783 tons in 1926 to 68,635 tons in 1927, so that there were only 6,405 tons in stock on December 31st, 1927.

On December 31st, 1926, there were 65,052 tons of Negaunee ore in stock as compared with 45,992 tons at the end of this year. The reduction for the year was 19,060 tons.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

Tenth Level	187,547 tons	38½%
Eleventh Level	278,788 "	57 %
Twelfth Level	21,545 "	4½%
Total	487,880 "	100 %

e. Production by Months:

The production by months is as follows:

Month	Bessemer	Negaunee	Total	Rock
January	4,364	29,789	34,153	1,032
February	2,996	28,502	31,489	992
March	4,132	39,767	43,899	1,412
April	3,692	38,413	42,105	1,252
May	5,515	35,433	40,948	1,324
June	6,266	35,484	41,750	1,148
July	4,899	36,193	41,092	1,536
August	4,441	41,056	45,497	1,224
September	6,162	37,057	43,219	796
October	4,382	38,195	42,577	1,168
November	4,183	36,477	40,660	1,232
December	3,372	36,998	40,370	688
Total	54,404	433,364	487,768	13,804
Transferred from	13,391 to	13,391		
Stockpile Overrun		112	112	
Total	41,013	446,867	487,880	13,804

The product was distributed as follows:

Negaunee Bessemer Ore	41,013 tons
Negaunee Ore	440,935 "
D. S. S. & A. Right-of-way	5,932 "
Total	487,880 "

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

f. Ore Statement:

	Negaunee Bessemer		Negaunee	Total	Total Last Year
On Hand Jan. 1, 1927	34,027		65,052	99,079	114,534
Output for Year	54,404		433,364	487,768	363,242
Overrun			112	112	
Transferred from	13,391	to	13,391	-	-
Total	75,040		511,919	586,959	477,776
Shipments	68,635		465,927	534,562	378,697
Balance on Hand	6,405		45,992	52,397	99,079
Increase in Output				124,638	
Decrease in Ore on Hand				46,682	

1927 - 1-8 Hour Shift, 5 days per week, January 1st to March 12th, 1927.
1-8 Hour Shift, 6 days per week, March 12th to December 31st, 1927.

1926 - 1-8 Hour Shift, 5 days per week, January 1st to December 31st, 1926.

g. Delays:

There were no serious delays during the past year; the minor delays were as follows:

February 18th,	1/4 hour delay due to top tram car off of west trestle.
February 18th,	½ hour delay due to broken bolts on stringers in dump.
February 23rd,	1 hour delay due to broken bolts on stringers in dump.
February 23rd,	1 hour delay due to skip pulled into head frame.
February 26th,	1 hour delay due to broken stringers in shaft house.
June 21st,	4 hours delay to seven contracts due to two sets of timber broken down at #241 chute, #7 crosscut.
July 12th,	Product low due to broken air line on eleventh level.
September 28th,	1 hour delay due to #188 chute, 11th level, breaking down.
October 3rd,	3 hours delay due to broken haulage cable in shaft.
October 22nd,	1 hour delay due to fire on motor generator set.
November 10th,	½ hour delay due to repairing brush holders on generator set.
November 12th,	1 hour delay due to motor cars off track on the 11th level.
November 22nd,	4 hours delay to contracts inside #6 crosscut, eleventh level, due to several sets of timber breaking down.
November 23rd,	1 hour delay on 11th level due to main drift broken down.
December 8th,	General delay due to big snow storm, 74 men home.

h. Delays from Lack of Current:

There were no serious electrical delays during the past year.

May, -	20 hours delay due to poor power on five different days.
June 20th,	3 hours delay due to poor power.
July 1st,	½ hour delay due to no power.
July 11th,	½ hour delay due to no power.
July 28th,	1 hour delay due to no power, also poor power all day.
November 9th,	½ hour delay due to no power.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Negaunee Bessemer	62.23	.048	5.62
Negaunee	60.36	.099	6.86

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

3. ANALYSIS:

b. Average Analysis on Straight Cargoes:

Grade	Mine			Lake Erie		
	Iron	Phos.	Moist.	Iron	Phos.	Moist.
Negaunee Bess.	62.59	.045	-	63.24	.050	12.01
Negaunee	60.25	.099	-	59.99	-	11.33
Negaunee Special	62.61	.047	-	62.41	-	12.61

c. High Sulphur Ore:
There was no high sulphur ore encountered during the year.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:
Assumption: 12 cubic feet equals one ton.
10% deducted for rock.
10% deducted for loss in mining.
Percentage of Bessemer equals 11.
Above 9th Level:

No. 1 Shaft Pillar	1,148,681	tons
No. 2 Shaft Pillar	113,906	"
Total above 9th Level	1,262,587	"
Between 9th and 10th Levels	495,450	"
Between 10th and 11th Levels	1,754,325	"
Between 11th and 12th Levels	1,777,680	" (Twelfth level is not yet fully developed)
Total above 12th Level	5,290,042	tons.

This estimate and the analysis shown under Section "c" will be presented to the Tax Commission. The estimate this year shows 302,972 tons more ore between the 11th and the 12th levels than last year, but this area is not yet fully developed, so that additional ore will be shown here in 1928 when development work is completed.

b. Prospective Ore:
No prospective ore is shown in this report. Part of the ore between the 11th and 12th levels, and all ore below the 12th level, is prospective ore. The total tonnage in the mine as estimated on December 31st, 1926, was 8,047,227 tons. Deducting from this figure the tonnage produced in 1927, 487,770 tons, leaves 7,559,347 tons as the probable total ore on December 31st, 1927. If from this is deducted the developed ore, 5,290,042 tons, it leaves 2,269,305 tons as prospective ore which is not reported to the Tax Commission.

c. Estimated Analysis:
Ore Reserves: Approximate Expected Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Bessemer	52.80	.042	6.20	.220	2.30	.640	.290	.008	1.50	12.00
Negaunee	52.00	.091	6.78	.250	2.50	.910	.360	.009	1.95	12.00

Ore in Stock: Average Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Bessemer	54.88	.042	5.22	.220	2.23	.560	.250	.007	.81	11.75
Negaunee	52.88	.090	6.49	.232	2.64	1.053	.445	.010	1.93	11.75

The estimated analysis submitted in the 1926 report has been changed in a few instances to bring the results more nearly in line with the actual analysis of ore produced in 1927. No change has been made, however, in Iron, Silica, or Moisture.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

The labor conditions at the mine throughout the year were satisfactory. There was a slight shortage of miners in the spring and early summer, since which time there has been a surplus of men in the district. The surplus of men has resulted in increased efficiency on the part of the employees. The district was practically free from labor agitators.

(2) New Construction:

There was no new construction during 1927.

b. Comparative Statement of Wages and Product:

	1927	1926	INCREASE	DECREASE
PRODUCT	487,880	363,242	124,638	
No. Shifts and Hours	1-8	1-8		
AVERAGE NO. MEN WORKING:				
Surface	43	38	5	
Underground	207	186	21	
Total	250	224	26	
AVERAGE WAGES PER DAY:				
Surface	4.31	4.34		.03
Underground	5.18	5.23		.05
Total	5.02	5.07		.05
WAGES PER MONTH OF 25 DAYS:				
Surface	107.75	108.70		.95
Underground	129.50	130.75		1.25
Total	125.50	126.75		1.25
PRODUCT PER MAN PER DAY:				
Surface	35.71	31.79	3.92	
Underground	7.87	7.33	.54	
Total	6.45	5.95	.50	
LABOR COST PER TON:				
Surface	.121	.137		.016
Underground	.658	.714		.056
Total	.779	.851		.072
TONS PER MAN PER DAY (Stoping & Ore Dev.)	16.71	16.03	.68	
AVG. WAGES CONTRACT MINERS	5.60	5.63		.03
" " " LABOR	5.60	5.63		.03
TOTAL NO. OF DAYS:				
Surface	13,663½	11,425	2,238½	
Underground	61,983½	49,580	12,403½	
Total	75,647	61,005	14,642	
AMOUNT FOR LABOR:				
Surface	58,887.65	49,605.99	9,281.66	
Underground	320,995.39	259,491.57	61,503.82	
Total	379,883.04	309,097.56	70,785.48	

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

5. LABOR AND WAGES:

b. Comparative Statement of Wages and Product: (Cont.)

Proportion of Surface to Underground Men:

1927 - 1 to 4.81	1-8 hour shift five days per week, Jan. 1st to March 12th.
	1-8 hour shift six days per week, March 12th to Dec. 31st.
1926 - 1 to 4.89	1-8 hour shift five days per week.
1925 - 1 to 5.18	1-8 hour shift five days per week.
1924 - 1 to 4.33	1-8 hour shift six days per week, Jan. 1st to Aug. 1st.
	1-8 hour shift four days per week, Aug. 1st to Dec. 1st.
	1-8 hour shift five days per week, Dec. 1st to Dec. 31st.
1923 - 1 to 4.35	1-8 hour shift six days per week.
1922 - 1 to 5.11	1-4 hour shift six days per week, Jan. 1st to June 5th.
	1-8 hour shift six days per week, June 5th to Dec. 31st.
1921 - 1 to 4.70	1-8 hour shift six days per week, Jan. 1st to March 26th.
	1-8 hour shift five days per week, March 26th to May 17th.
	1-4 hour shift six days per week, May 17th to Dec. 31st.

6. SURFACE:

a. Buildings, Repairs:

The exterior woodwork on all the mine buildings was painted in May and June, at a total cost of $403.20. The following buildings were painted: Office, laboratory, crusher, engine house, dry house, and warehouse.

Several times during the year, new runners were placed in the skip roads to replace worn out old ones. New channels, to which the runners are fastened, were also placed in both skip roads.

b. Stockpiles:

In September and October four bents were put in service for rock dump at the end of the north track of the west ore trestle. The south track had previously been used for rock, and the pile had extended 600' beyond the steel trestle. The north track will shorten the tram. Preparations for erecting four additional bents were completed at the end of the year.

In October the old runway planks on the four stocking trestles were replaced with new 2" tamarack planks. Approximately 6000 feet, board measure, of plank was required for this job.

c. Roads:

During February it was necessary to haul coal from the Maas Mine, as there had not been sufficient coal stocked the previous fall. It required considerable work to keep the roads open for this purpose.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1927.

b. Development:

The development work done during 1927 was confined to the twelfth level, continuing the work which was started here in November, 1925.

Twelfth Level:

#5 crosscut was advanced 240' parallel to #4 crosscut, and then on a curve to the right for a distance of 115', where it became parallel with and 120' distant from the Maas Boundary. Work was temporarily stopped at this point. The material encountered was as follows: 20' lean ore, 285' ore, 50' Jasper. The drift stopped with ore in the breast.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

b. Development: (Cont.)

Twelfth Level:

Raises	Height	Material
#1255 double compartment	115'	Ore.
#1254 " "	115'	Ore.
#1253 " "	115'	Ore.
#1252 " "	115'	Ore.
#1251 "" "	60'	15' lean ore, 45' ore.
#1250 " "	65'	20' lean ore, 45' ore.

Raises #1251 and #1250 were being put up in December.

No. 6 Crosscut:

This crosscut advanced 420' during the year, and is now on the curve to parallel the Maas boundary. The material encountered was as follows: 151' Jasper, 80' lean ore, and 189' ore.

Raises	Height	Material
#1260 double compartment	30'	Jasper.
#1262 " "	105'	30' Jasper, 75' ore.
#1263 " "	98'	30' Jasper & lean ore, and 68' ore.
#1264 " "	35'	25' lean ore, 10' ore.

Raises #1265 to #1267, inclusive, have been cut out ready for raising to be started.

In December one contract was advancing the crosscut, and one contract was putting up #1260 and #1264 raises.

No. 7 Crosscut:

This crosscut was started from the foot-wall drift and advanced 85' in Jasper. It was stopped in September, as it is planned to use a transfer system from #6 crosscut above this area, which will make it unnecessary to develop #7 crosscut.

No. 8 Crosscut:

During the past year this crosscut advanced 350' in Jasper and a connection was made with the third level, Maas Mine. This provided a second outlet from the twelfth level, Negaunee Mine, also the main airway of the ventilation system for the two Mines.

Raises	Height	Material
#1282 double compartment	110'	105' Jasper, 5' ore.
#1284 " "	110'	90' Jasper, 20' ore.
#1286 " "	110'	71' Jasper, 39' ore.
#1288 " "	110'	70' Jasper, 40' ore.

All these raises have been carried up to the elevation of the eleventh level. #1288 raise has been continued up to the elevation of the 460' sub above the eleventh level, and in December #1286 was being put up from the eleventh level to the elevation of the 450' sub level.

Pump House:

In September the pumphouse on the twelfth level was started. The entrance is 20' north of #3 shaft, and was driven 20' west before the pumphouse was excavated. The pumphouse, which is 20' in width by 50' in length by 13' in height, has been excavated. Timber sets were being erected in December, after which the sets will be backed by plank preparatory to guniting. As soon as this work is completed, two sump drifts, approximately 200' long, paralleling the main drift, will be excavated 10' below the twelfth level. These two sump drifts will hole to the northeast end of the pumphouse, where a small sump will be excavated to a depth of 15' below the twelfth level. The small sump will be sealed off

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

b. Development: (Cont.)
Pump House: (Cont.)
from the main sump drifts by concrete dams. It is planned to use one of the main plunger pumps now on the eleventh level, and later on when more of the mine water comes to the twelfth level, the other eleventh level pump will be moved. During the time there is only one of the main pumps on the twelfth level, a small centrifugal pump will be installed as a spare, to pump the water up to the eleventh level. This centrifugal pump will be used only in case of accident to the main plunger pump.

c. Stoping:
(1) General Remarks:
The stoping work for the year 1927 was confined to the area between the ninth and twelfth levels, and to the same territories where mining was under way in 1926. Mining has been continued in two areas between the ninth and tenth levels, one on the north foot wall along the Maas boundary on the 565' and 555' sub levels, the other on the south foot wall south of #2 dike on the 545' and 530' sub levels. This latter area is just above the tenth level, and within a short time it is expected that all the ore will be taken out through eleventh level raises. The other area, where mining has been carried on during the year, is located north of #2 dike between the tenth and eleventh levels. This area has been worked on the 460', 450', and 440' sub levels during 1927. The eleventh level drifts and crosscuts under this area are showing excessive weight, and it is proving very difficult to maintain them for electric haulage. Raises from the twelfth level will be pushed up as rapidly as possible to relieve this situation. A total of eight raises have already holed to the eleventh level, and within a few months it will be possible to use them and others that it is planned to put up.
(2) Detail of Stoping:
Subs between ninth and tenth levels:
565' Sub Level:
North Foot:
Mining was continued on this sub level since it was opened in March, 1926, until it was completed in November of this year.
555' Sub Level:
North Foot:
This sub level was opened in August, 1927, from #61 raise. Four new raises have lately been put up in this area from the tenth level to facilitate the use of scrapers. There are several parallel dikes running through the ore, and with separate raises between each dike it will be possible to use a scraper for each contract without drifting through the dikes and having right angled turns on the scraper hauls. In December there were eight contracts stoping on this sub level. This sub level, as well as the 565' sub, is located near the Maas boundary. The ore which is obtained from this area is lean and hard to break, and in part of the sub level is quite wet. The output from this territory is lower in tons per man and the cost per ton is higher than in any other area in the mine.
545' Sub Level:
South Foot:
This sub level was opened the latter part of 1925, and was completed in July, 1927.
530' Sub Level:
South Foot:
Mining on this sub level was started in November, 1926, and has been continued throughout the year. In December there were seven contracts stoping between #1 and #2 dikes, and eight contracts south of #1 dike. About 15% of the ore area on the south foot at the elevation of this sub level remained to be mined at the end of the year.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

c. Stoping: (Cont.)

520' Sub Level:

This sub level was opened from #160-A raise in December of this year. It is planned to use a transfer system here, and two transfer drifts are now being driven on the 450' sub level, which is 70' below, or half-way between, the tenth and eleventh levels. From these drifts on the 450' sub, raises will be put up every 35' to the elevation of the 520' sub level. The ore will be mined from these raises by scrapers and transferred with a 25 H.P. scraper outfit on the 450' sub level to eleventh level raises. The contract working on this sub at the present time is drifting in a line with the tops of the raises that will be put up later from the 450' sub. By driving this drift in advance, it will be possible to speed up the installation of the new system.

Tenth Level:

The only work done on this level in 1927 was the putting up of raises #57, #61, #62, and #63 near the Maas boundary to the elevation of the 555' sub level.

In December one contract was working in #62 raise.

Subs between tenth and eleventh levels:

460' Sub Level:

This sub was opened in 1924 and mining has been continued ever since. This area is nearly mined out except for a few pillars on the northwest side along the limit of mining. This limit of mining has been set to leave a pillar to support the north foot wall area that is being mined above the tenth level. There are also two small pillars to be mined near #2 dike.

In December five contracts were stoping on this sub level, one of which was using #1288 raise, which was recently holed to this sub level from the twelfth level. About 98% of the ore has been mined on this sub level.

450' Sub Level:

Mining was originally started on this sub level in 1924 under the hanging by the incline slicing system, which was later abandoned. Mining was then stopped until 1926, when the regular slicing system was started. All the ore mined on this sub during 1927 has been handled with scrapers.

In December four contracts were stoping in the main area.

South of #2 dike two contracts are driving drifts from #190 and #196 raises in the south foot wall area. These drifts will be between 200' and 300' in length, and will be extended across the ore body and into the foot wall. They will be used as transfer drifts for handling ore coming from the south foot wall area on the 520' sub level and other intervening subs. 25 H.P. scraper units will be used with five foot scrapers for handling the ore in these drifts on the 450' sub level.

440' Sub Level:

Except for the incline slicing system, which was tried out and abandoned in 1924, no mining was done on this sub level until the regular slicing system was started in June, 1926, which has been continued up to the present time. This will be the last sub to be mined through the eleventh level raises, as it is next to impossible to maintain the crosscuts below on the eleventh level.

In December thirteen contracts were stoping on this sub level, twelve of which were using scrapers.

Eleventh Level:

The only work done here in 1927 outside of timbering and repairing has been in #8 and #4 crosscuts in the new raises from the twelfth level.

In December, three contracts were working here, one in #1286 raise, continuing this raise from the eleventh level to the 450' sub level, one connecting raises #1254 and #1253, and one extending #1255 raise from the eleventh level to the 425' sub level.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

c. Stoping: (Cont.)
Eleventh Level: (Cont.)

There has been constant trouble throughout the year in maintaining #5, #6, #7, and #8 crosscuts. The nearest sub levels above these crosscuts are the 440' and 450' sub levels, 31' and 42' above the eleventh level. The maintenance of the crosscuts was more of a problem the latter part of the year when it became necessary to work five timber crews repairing on night shift, also all holidays. With the completion of raises from the twelfth level, and the starting of the transfer system referred to in preceding paragraphs, it will be possible to abandon the further maintenance of these crosscuts. It will require several months to put this plan into effect.

d. Timbering:

In the timber statement which follows, it will be noticed that more 6" to 8" timber was used in 1927. There was more raising, and also more repairing of old raises. A considerable amount of treated timber was used in the new crosscuts on the 12th level, only slightly less than was used on this level in the previous year. Considerable more 12" to 14" timber was used due to the repair of drifts that have been crushing on the eleventh level.

Statement of Timber Used:

	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1927	AMOUNT 1926
6" to 8" Crib. Timber	106,364	.0421	4,474.25	2,966.77
8" to 10" Stull Timber	77,300	.0574	4,436.69	4,419.44
10" to 12" Stull Timber	62,900	.0822	5,168.34	4,756.01
12" to 14" Stull Timber	24,032	.1322	3,187.13	2,001.65
Athens Treated Timber	4,448	.2955	1,314.52	1,686.67
Total Timber - 1927	275,044	.0675	18,580.93	
Total Timber - 1926	220,433	.0713		15,830.54
7' Lagging	1,524,200	.693 C	10,566.82	7,666.40
Poles, 9½'	419,800	1.467 C	6,161.57	7,519.72
Cover. Boards 1" Sq. Ft.	34,700	20.00 M ft.	694.12	562.70
Total - 1927			17,422.51	
Total - 1926				15,748.82
Grand Total - 1927			36,003.44	
Grand Total - 1926				31,579.36
Product			487,880	363,242
Feet of Timber per ton of ore			.5638	.6068
Feet of Lagging per ton of ore			3.1241	2.8185
Feet of Lagging per foot of timber			5.5416	4.6445
Cost per ton for Timber			.0381	.0436
" " Lagging			.0217	.0211
" " Poles			.0126	.0207
" " Covering boards			.0014	.0034
" " tbr., lagging, poles & cover boards			.0738	.0868
Equivalent of stull timber to board measure			514,545	408,663
Feet of board measure per ton of ore			1.055	1.125

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

d. Timbering: (Cont.)

Total cost for timber, lagging, poles, and cover boards, and cost per ton:

1927	$ 36,003.44	$.0738
1926	31,579.36	.0868
1925	29,572.15	.0844
1924	25,226.86	.0781
1923	32,507.41	.0851
1922	24,766.16	.0828
1921	27,285.61	.1063
1920	37,934.19	.0666
1919	35,620.73	.0715
1918	21,403.96	.0415
1917	22,137.51	.0417
1916	21,510.67	.0400

e. Drifting and Raising:

A detailed statement of this work is given under "c - Development". Practically all of this work was done in opening and developing the twelfth level. Nearly all of the drifts driven here during 1927 required timber. There was less rock drifting in 1927, but a greatly increased amount of rock raising. The raises that will be used in handling ore from the subs a short distance above the eleventh level are located on the foot wall side of the twelfth level and, owing to the crushing of the eleventh level crosscuts, every effort is being made to complete this development work as rapidly as possible.

The following is a statement of the drifting and raising for the years 1927 and 1926:

YEAR	ORE DRIFTING	ORE RAISING	ROCK DRIFTING	ROCK RAISING
1927	588 ft.	1,021 ft.	896 ft.	445 ft.
1926	564 ft.	964 ft.	1357 ft.	57 ft.
Incr.	24 ft.	57 ft.		388 ft.
Decr.			461 ft.	

f. Explosives, Drilling and Blasting:

The pounds of powder per ton of ore increased slightly, due to the ore being harder to break.

There was more ore drifting and ore raising in 1927, both of which require more powder than stoping. Due to a decrease in the cost of fuse and powder, the cost for all explosives for the two years is practically equal.

Statement of Explosives Used:

	Quantity	Average Price	1927 Amount	1926 Amount
40% Powder	250	.1300	32.50	39.00
50% "	146,100	.1425	20,819.38	16,038.87
60% "	55,200	.1550	8,556.00	5,782.26
Total Powder - 1927	201,550	.1459	29,407.88	
Total Powder - 1926	148,370	.1473		21,860.13
Fuse	534,200	.5828 C	3,114.15	2,521.21
Blasting Caps #6	91,500	1.0827 C	990.73	708.67
Cap Crimpers	43	.668 ea.	28.71	11.33
Tamping Bags	33,500	2.15 M.	72.05	33.99
Connecting Wire	2#	.41 lb.	.82	6.79
Electric Exploders	15	.054 ea.	.81	3.27
Total Fuse, etc. 1927			4,207.27	
Total Fuse, etc. 1926				3,284.36
Total All Explosives - 1927			33,615.15	
Total All Explosives - 1926				25,144.49

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

f. Explosives, Drilling and Blasting:(Ct.)

Statement of Explosives Used:(Cont.)

	1927 Amount	1926 Amount
Product	487,880	363,242
Pounds of Powder per ton of ore	.4131	.4085
Cost per ton for Powder	.0603	.0602
" " Fuse, Caps, etc.	.0086	.0090
" " All Explosives,	.0689	.0692
Average price per lb. for Powder	.1459	.1473

g. Mining and Loading:

There has been no change in the mining methods during the past year. More ore was handled by mechanical devices than in the previous year. As the Mayne loaders wear out they are being replaced with double drum scraper hoists. Seventy-two percent of the product was handled by mechanical loading devices in 1927, as compared with 66% in 1926. Most of the increase in scraper hoists occurred in the latter months of the year, so that they had relatively little effect on the product for 1927. One 25 H.P. scraper hoist has been purchased and another ordered for use in transfer work. The transfer system consists of the development of an intermediate sub level, 50 or more feet below an operating sub level by a drift and raises. The ore is handled on the operating sub level by small scraper outfits, 6 to 7½ H.P., through raises 35' apart. The length of scraper haul will be about 70 feet. The ore is dumped through single compartment raises to the floor of the transfer drift, from which point it is handled to a main level raise with a 25 H.P. scraper outfit, namely, a hoist and a 60" scraper. The transfer system will materially reduce development work in rock, and permit a more efficient lay out for the smaller scraper outfits. It also increases the speed of mining in a given area, and therefore will reduce the time that a sub level has to be kept open with a consequent reduction in expense for repairing. Several other areas in the mine are adapted to the new system, and it is expected that other installations will be made during the coming year.

Comparison of Scrapers, Mayne Loaders, and Hand Shoveling for 1927 and 1926:

	Men - Days		Product-Tons		Tons per man per day	
	1927	1926	1927	1926	1927	1926
Hand Shoveling	10,942	10,667	139,128	118,700	12.71	11.12
Mayne Loaders	4,162	4,236	72,258	80,510	17.36	19.00
Scrapers	12,997	7,761	276,494	164,032	21.27	21.13
Total	28,081	22,664	487,880	363,242	-	-
Average for all					17.37	16.03

	Percent of Product		Inc. in tons per man over hand shoveling	
	1927	1926	1927	1926
Hand Shoveling	28%	33%	-	-
Mayne Loaders	15%	22%	37%	71%
Scrapers	57%	45%	67%	90%
Total	100%	100%		

A comparison of the number of contracts at the end of the year mining ore with mechanical loaders, and by hand, is shown below:

	Dec. 31, 1927	Dec. 31, 1926
Hand Shoveling	16	21
Mayne Loaders	5	9
Scrapers	32	21
Total	53	51

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

g. Mining and Loading: (Cont.)

The 51 contracts shown for 1926 were working on a basis of production of 363,000 tons per year, while the 53 contracts shown for the year 1927 were working on a basis of 500,000 tons per year.

i. Ventilation:

The ventilating plant located at the collar of #2 Shaft has worked very satisfactorily during the year. During severely cold weather the fan has been reversed for short periods to keep the shafts free from ice.

The primary air course from the Negaunee to the Maas was changed in 1927, from the eleventh level to the twelfth level, Negaunee Mine. The air now enters the Maas Mine on the third level instead of the second level. The connection is in rock, so that there should be very little expense for maintenance of the drift on the Negaunee Mine property. The drift on the third level, Maas Mine, is near the contact and is under heavy pressure. It is planned to drive another foot wall drift 60' further back in the foot early in 1928, which when completed will provide a solid rock drift from the Negaunee Shaft to the Maas Shaft.

j. Pumping:

The number of gallons pumped per minute in 1927 as compared with 1926 is shown by the following report:

Month	1927	1926
January	962	708
February	999	683
March	1,034	786
April	1,034	806
May	1,073	816
June	1,179	821
July	1,222	784
August	1,273	843
September	1,294	870
October	1,282	886
November	1,233	911
December	1,147	921
Total Average	1,144	819

This shows an increase of 325 gallons per minute during the year. Rainfall in 1927 was normal , but as the fall in the previous ten years had been sub-normal, it resulted in an increase in the amount of water entering the mine through the caves. The caved area is also enlarging every year, so that a larger surface area is draining into the mine. There was a gradual increase each month through September, since which time there has been a gradual decrease.

The average number of gallons pumped over the past six years is as follows:

Year	Gals. per minute
1922	943 gals.
1923	927 "
1924	796 "
1925	705 "
1926	819 "
1927	1,144 "

The increase in 1927 carried the total 21% above the previous highest average for the six year period.

k. Underground in General:

Along with the increase in tons per man per day from the use of more mechanical loaders, it is interesting to note that an increase has also been made in tons per man per day in contracts shoveling ore by hand. This is due to the selection

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

k. Underground in General: (Cont.)

of the best men for these contracts, as the older men can obtain much better tonnages with the mechanical loaders. The development of the twelfth level will be continued and probably completed in 1928. The problem demanding the most attention at the end of the year covers the abandonment of the crosscuts on the eleventh level, where the ground is very heavy and repair costs are high, and the handling of ore from the sub levels above this territory by raises from the twelfth level. Mining conditions in some areas will be improved by the installation of transfer systems referred to under "g" - "Mining and Loading."

The efficiency in the mine showed an improvement in 1927, and if possible, it is hoped to show another gain in 1928.

The pump station on the twelfth level has been excavated, and the work of cutting sump will be completed early in 1928. One of the eleventh level plunger pumps will then be moved to the twelfth level.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1927	1926	INCREASE	DECREASE
PRODUCT	487,880	363,242	124,638	
Underground Costs	1,053	1.154		.101
Surface Costs	.126	.130		.004
General Mine Accounts	.074	.093		.019
Cost of Production	1.253	1.377		.124
Loading and Shipping	.025	.019	.006	
Total Cost on Cars	1.278	1.396		.118
Depreciation - Original Cost	.090	.088	.002	
Plant & Equipment	.032	.031	.001	
Taxes	.414	.543		.129
Depletion of Appreciated Value	.310	.301	.009	
Central Office	.069	.072		.003
Welfare, Safety, Hosp.,	.019	.009	.010	
Cost Adjustment	.006	.006		
Misc. Debits & Credits	.003	.004		.001
Administrative Expense	.010	.014		.004
Total Cost at Mine	2.225	2.456		.231
No. of Days Operated	294	261	33	
No. Shifts & Hours	1-8 hr.	1-8 hr.		
Average Daily Product	1,659	1,392	267	
COST OF PRODUCTION:				
Labor	.786	.864		.078
Supplies	.467	.513		.046
Total	1.253	1.377		.124

b. Detailed Cost Comparison:

(1) Days and Shifts:

During 1927, the mine worked one eight hour shift for 294 days, and the average number of men employed during the year was 250, for a total of 75,647 days. During 1926 the mine worked one eight hour shift for 261 days, and the average number of men employed during the year was 224, for a total of 61,005 days.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

8. COST OF OPERATING:

b. Detailed Cost Comparison:

(2) Wages:

Both years the mine operated on the same wage schedule.

(3) Comparison of Production:

Production, 1927 -	487,880 tons
Production, 1926 -	363,242 "
Increase -	124,638

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate per day
1927	250	75,647	$ 379,883.04	$ 5.02
1926	224	61,005	309,097.56	5.07
Increase	26	14,642	70,785.48	
Decrease				.05

(5) Tons per man per day:

The tons of ore mined per man per day were as follows:

	1927	1926	INCREASE	DECREASE
Surface	35.71	31.79	3.92	-
Underground	7.87	7.33	.54	-
Total	6.45	5.95	.50	-

The above increase was due to increasing the production, and to more efficient operation underground.

(6) Cost of Production:

1927 - $611,493.67	Cost per ton,	$1.253	
1926 - 500,078.16	" " "	1.377	
Incr.- 111,415.51			
Decr.-	" " "	.124	

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1927 -	$383,641.19	62.7%	$227,852.48	37.3%	$.786	$.467	$1.253
1926 -	313,650.33	62.7%	186,427.83	37.3%	.864	.513	1.377
	69,990.86		41,424.65		.078	.046	.124
	Increase		Increase		Decr.	Decr.	Decr.

(7) Detail of Accounts:

UNDERGROUND COSTS:

Development in Rock

1927 Amount	$8,517.51	Cost per ton,	$.017
1926 Amount	8,736.44	" " "	.024
Decrease	218.93	" " "	.007

	Cost per ft.	Total	Drifting	Raising
No. Ft. of rock, 1927-	$6.35	1,341'	896'	445'
No. Ft. of rock, 1926-	5.68	1,539'	1,472'	67'
Increase	.67			378'
Decrease		198'	576'	

Decrease in cost per ton due to an increase in production. The cost per foot in 1927 was higher due to more main level drifting, where the cost is much higher than on the sub levels where more of the drifting was done in 1926.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Development in Ore

1927 Amount	$8,629.64	Cost per ton,	$.018
1926 Amount	7,707.26	" " "	.024
Increase	922.38	Decrease	.006

	Drifting	Raising	Total	Cost per ft.
Ft. ore development, 1927 -	588'	1,021'	1,609'	$5.37
Ft. ore development, 1926 -	564'	964'	1,528'	5.04
Increase	24'	57'	81'	.33

The decrease in the cost per ton is due to increased production, while the cost per foot increased due to the higher price paid contractors. The best miners were put on this development work in order to speed it up, and they were paid a higher price per foot in order that their wage might equal what they would make if they were stoping.

Stoping

1927 Amount	$212,240.35	Cost per ton,,	$.435
1926 Amount	169,556.31	" " "	.467
Increase	42,684.04	Decrease	.032

Detail.

	Labor		Supplies	
1927 -	$165,385.65	77.9%	$46,854.70	22.1%
1926 -	129,142.15	76.2%	40,414.16	23.8%

	Cost per ton		
	Labor	Supplies	Total
1927 -	$.339	$.096	$.435
1926 -	.356	.111	.467
Decrease	.017	.015	.032

Expenditures increased on account of a larger product, while labor cost per ton decreased due to the use of more mechanical loaders. Supply cost per ton decreased due to the charging out of less scraper hoists and equipment in 1927.

Explosives.

	1927	1926
Total pounds of powder	201,550	148,370
Average price per pound	.1459	.1473
Cost of powder	$29,407.88	$21,860.13
Cost of Fuse, caps, etc.	4,207.27	3,284.36
Cost of all explosives	33,615.15	25,144.49
Lbs. of powder per ton of ore	.4131	.4085
Cost per ton for powder	.0603	.0602
Cost per ton for fuse, caps, etc.	.0086	.0090
Cost per ton for all explosives	.0689	.0692

Decrease in cost per ton is due to a lower price per pound for powder, and also per foot for fuse.

Timbering

1927 Amount	$116,831.26	Cost per ton,	$.240
1926 Amount	106,732.28	" " "	.294
Increase	10,098.98	Decrease	.054

	1927	1926
Timber cost	18,580.93	15,830.54
Lagging, Poles & Cover Boards	17,422.51	15,748.82
Total	36,003.44	31,579.36

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Timbering (Cont.)

	1927	1926
Feet of timber per ton of ore	.5638	.6068
Feet of lagging " "	3.1241	2.8185
Cost per foot for timber	.0675	.0713
" " ton for "	.0381	.0436
" " " " lagging	.0217	.0211
" " " " poles	.0126	.0207
" " " " cover boards	.0014	.0034
" " " " timber, lagging, poles, and cover boards	.0738	.0868
Equivalent of stull timber to board measure	514,545	408,663
Feet of board measure per ton of ore	1.055	1.125

The decreased cost per ton is due to greater production, with a decrease in the amount of timber used per ton of ore. This decrease in timber used per ton of ore was made possible by greater speed in mining on account of the use of more mechanical loaders which reduced the cost for retimbering traveling and timber roads on the sub levels. It has also been possible to effect a slight saving in the size of timber, due to completing mining in a given area in a shorter time.

Tramming

1927 Amount	$46,811.86	Cost per ton,	$.096
1926 Amount	29,964.47	" " "	.083
Increase	16,847.39		.013

On account of increased production, it was necessary to put two motor crews on night shift, as compared with one-quarter shirt overtime prior to the increase. Haulage conditions are bad on the eleventh level due to crushing, which has also increased the cost.

Ventilation

1927 Amount	$3,567.07	Cost per ton,	$.007
1926 Amount	1,863.46	" " "	.005
Increase	1,703.61		.002

The increased cost is due to operating the large surface fan at No. 2 Shaft more time. Increase is also due to installing more small fans underground, to improve ventilation on the sub levels.

Pumping

1927 Amount	$40,184.91	Cost per ton,	$.082
1926 Amount	31,452.86	" " "	.087
Increase	8,732.05	Decrease,	.005

	1927	1926
Total gallons of water pumped	602,747,376	429,052,405
Gallons pumped per minute	1,147	817

There was an increase of 173,894,971 gallons of water pumped, and 330 gallons per minute.
The decreased cost per ton is due to an increase in production. There was more rainfall in 1927, and the caved area has also increased.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Compressor & Air Pipes

1927 Amount	$38,293.42	Cost per ton,	$.079
1926 Amount	28,121.40	" " "	.077
Increase	10,172.02		.002

	Compressor	Air Pipes
1927 -	30,147.83	7,972.59
1926 -	22,571.18	5,550.22
Increase	7,576.65	2,422.37

Total cu. ft. of air used in 1927 - 895,680,000 cubic feet
" " " " " " 1926 - 601,017,000 " "
Cubic feet per ton of ore in 1927 - 1,836 " "
" " " " " " 1926 - 2,007 " "

The increase in compressor cost is due to compressor operating a greater number of hours, night shift, etc.
The increased expenditures for air pipes was due to more contracts working in the mine. Several additional air scraper hoists were installed that required larger air lines, also the crushing of drifts on the 11th level required more repairs and replacements.

Back Filling

1927 Amount	$2,966.69	Cost per ton,	$.006
1926 Amount	2,378.89	" " "	.006
Increase	587.80		

There was more filling broken in 1927.

Underground Superintendence

1927 Amount	$15,032.05	Cost per ton,	$.031
1926 Amount	13,154.34	" " "	.036
Increase	1,877.71	Decrease	.005

The decrease in the cost per ton is due to the increased production. The increased expenditure was due to adding one shift boss in April to take charge of the night shift men, and to working six days per week starting March 12th.

Cave-In

1927 Amount	$ 4.22	Cost per ton,	$.000
1926 Amount	15.83	" " "	.000
Decrease	11.61		

Less repairs to fences around caves in 1927.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1927 Amount	$915.71	Cost per ton,	$.002
1926 Amount	174.22	" " "	.000
Increase	741.49		.002

The increased cost per ton in this account was due to more compressor repairs, and the purchase of seven B.B.R. #230 second-hand jackhammers from the Gwinn District at a cost of $500.00.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Hand Tramming Equipment

1927 Amount	$1,036.46	Cost per ton,	$.002
1926 Amount	2,496.50	" " "	.007
Decrease	1,460.04		.005

The decrease in the cost per ton is due to replacing hand tramming equipment with scraper outfits.

Electric Tram Equipment

1927 Amount	$15,497.46	Cost per ton,	$.032
1926 Amount	15,864.22	" " "	.044
Decrease	366.76		.012

	Sub Division.				
	Gen. & Motor		Locomotives		Wiring
1927 -	174.76		4,088.11		1,468.62
1926 -	84.52		3,715.08		1,879.82
Increase	90.24	Incr.	373.03	Decr.	411.20

	M. L. Tracks		M. L. Cars
1927 -	6,410.50		3,355.49
1926 -	5,191.73		4,993.07
Increase	1,218.77	Decr.	1,637.58

Generator and Motor: More repairs.
Locomotives: Increase due to locomotives going day and night, requiring more repairs.
Wiring: Less wiring due to less extension of haulage drifts.
M. L. Tracks: Increase due to opening up the twelfth level, more new rail used, and more expense for cleaning tracks on account of larger production; also more expense on account of repairing tracks on the eleventh level due to crushing.

Pumping Machinery

1927 Amount	$3,016.62	Cost per ton,	$.006
1926 Amount	936.34	" " "	.003
Increase	2,080.48		.003

The increase is due to cutting a new pump house on the 12th level, begun about September 16th, and nearly completed at the end of the year.

Total Underground Costs

1927 Amount	$513,545.25	Cost per ton,	$1.053
1926 Amount	419,090.32	" " "	1.154
Increase	94,454.93	Decrease	.101

SURFACE COSTS:

Hoisting

1927 Amount	$27,054.17	Cost per ton,	$.056
1926 Amount	20,826.60	" " "	.057
Increase	6,227.57	Decrease	.001

Electric Power 1927 - $19,429.50 Cost per ton, $.04
Electric Power 1926 - 14,409.60 Cost per ton, .04

The decrease in cost per ton is due to more tonnage in 1927.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Stocking Ore

1927 Amount	$5,951.89	Cost per ton,	$.012
1926 Amount	4,097.67	" " "	.011
Increase	1,854.22		.001

The increase in the cost per ton is due to more ore stocked in 1927, and to two men working night shift on the landing as compared with one-quarter overtime in 1926.

Dry House

1927 Amount	$7,795.93	Cost per ton,	$.016
1926 Amount	7,877.56	" " "	.022
Decrease	81.63		.006

Coal to Boiler House:	Tons	Cost
1927 -	1,149	$6,534.77
1926 -	1,229	6,855.17

The decrease in the cost per ton is due to less coal used in the boiler house, and a greater product in 1927.

General Surface Expense

1927 Amount	$5,586.92	Cost per ton,	$.012
1926 Amount	5,665.43	" " "	.015
Decrease	78.51		.003

The decrease in the cost per ton is due to the greater product in 1927.

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1927 Amount	$6,091.65	Cost per ton,	$.013
1926 Amount	3,846.94	" " "	.011
Increase	2,244.71		.002

	Sub Division.			
	Sheaves	Wire Rope	Mach. Parts	Skips & Skip Roads
1927 -	$604.74	$986.16	$1,625.05	$2,875.70
1926 -	-	417.63	950.26	2,479.05
Incr.	604.74	568.53	674.79	396.65

Sheaves: One new steel lined sheave put on north skip road September 18th, 1927.
Wire Rope: Two new ropes put into service in 1927, one on the north side and one on the south side, as compared with one new rope put on the south side in 1926.
Machinery Parts: More repairs in 1927.
Skips & Skip Roads: More repairs to skips and skip roads.

Shaft

1927 Amount	$3,515.91	Cost per ton,	$.007
1926 Amount	1,851.69	" " "	.005
Increase	1,664.22		.002

The increase is due to concreting the tenth and eleventh level pockets during 1927 instead of replacing the old timber pocket with new timber.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Top Tram Equipment

1927 Amount	$2,915.56	Cost per ton,	$.006
1926 Amount	1,677.24	" " "	.005
Increase	1,238.32		.001

	Sub Division. General Repairs		Wire Rope
1927 -	$2,194.47		$721.09
1926 -	1,172.45		504.79
Increase	1,022.02	Incr.	216.30

General Repairs: More machinery repairs, more sheave repairs, and cost of replacing run-way along track in 1927.
Wire Rope: Put 4100' of 5/8" wire rope on the north side, and 1700' of 5/8" rope on the south side in 1927; in 1926 there was 4000' of 5/8" wire rope put on the south side.

Docks, Trestles & Pockets

1927 Amount	$1,194.16	Cost per ton,	$.002
1926 Amount	963.96	" " "	.003
Increase	230.20	Decrease	.001

The decrease in the cost per ton was due to more product. In 1927 there was considerable trestle painting and work on rock trestles. In 1926 the cost was mostly due to preparing the stocking grounds for Bessemer ore, and repairing a brace on the permanent trestle.

Mine Buildings

1927 Amount	$1,176.49	Cost per ton,	$.002
1926 Amount	570.71	" " "	.001
Increase	605.78		.001

The increase in the cost per ton in this account is due to painting the outside woodwork on all buildings, also to more general repairs.

Total Surface Costs

1927 Amount	$61,282.68	Cost per ton,	$.126
1926 Amount	47,377.80	" " "	.130
Increase,	13,904.88	Decrease	.004

GENERAL MINE ACCOUNTS:

Insurance

1927 Amount	$206.54	Cost per ton,	$.000
1926 Amount	161.37	" " "	.000
Increase	45.17		

Engineering

1927 Amount	$2,229.98	Cost per ton,	$.005
1926 Amount	2,329.38	" " "	.006
Decrease	99.40		.001

The decrease in the cost per ton is due to a larger production.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Analysis

1927 Amount	$13,854.02	Cost per ton,	$.028
1926 Amount	11,923.89	" " "	.033
Increase	1,930.13	Decrease	.005

Cost per determination in 1927 - $.1430
Cost per determination in 1926 - .1744

This account includes our proportion of district laboratory and sampling expense. The total cost for the laboratory in 1927 was $16,280.36, and the total determinations were 113,870. In 1926 the cost was $17,042.59, and the total determinations were 97,714. This is a decrease of $762.23 in cost and an increase of 16,156 determinations. The decrease in operating cost is due to operating the laboratory day shift only in 1927, while in 1926 the laboratory operated two shifts during the shipping season.

Personal Injury Expense

1927 Amount	$5,274.34	Cost per ton,	$.011
1926 Amount	5,403.09	" " "	.015
Decrease	128.75		.004

There were no fatal accidents since 1919. The decrease in the cost per ton is due to more product in 1927.

Safety Department Expense

1927 Amount	$122.80	Cost per ton,	$.000
1926 Amount	145.61	" " "	.001
Decrease	22.81		.001

The decrease in the cost per ton is due to more product in 1927.

Telephones & Safety Devices

1927 Amount	$1,678.71	Cost per ton,	$.003
1926 Amount	1,125.00	" " "	.003
Increase	553.71		.000

The increase is due to more expense on account of installing additional safety devices.

Local General Welfare

1927 Amount	$1,442.52	Cost per ton,	$.003
1926 Amount	1,454.38	" " "	.004
Decrease	8.14		.001

The decrease in the cost per ton is due to more product in 1927.

Special Expense

1927 Amount	$97.97	Cost per ton,	$.000
1926 Amount	83.62	" " "	.000
Increase	14.35		

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

Mine Office

1927 Amount	$11,758.86	Cost per ton,	$.024
1926 Amount	10,983.70	" " "	.030
Increase	775.16	Decrease	.006

	Direct Charge	Mine Office
1927 -	$3,583.91	$8,174.95
1926 -	3,644.11	7,339.59
Decrease	60.20	Incr. 835.36

The decrease in direct charge is due to less general office expense.
The increase in mine office is due to more mine office expense, more charges to traveling expense, and a small increase in clerk's salaries.

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There were no explorations at the mine during the year.

10. TAXES:

The comparison of the total taxes for the Negaunee Mine Company for the years 1927 and 1926 are as follows:

DESCRIPTION	1927		1926	
CITY OF NEGAUNEE	VALUATION	TAXES	VALUATION	TAXES
Negaunee Mine Total by Tax Commission	6,103,000	199,677.94	6,146,500	195,151.38
Maas, Lonstorf, and Mitchell Additional Lots	6,200	202.88	6,200	196.85
Collection Fees		1,998.81		1,953.48
TOTAL OPERATING NEGAUNEE MINE		201,879.63		197,301.71
Total Rented Buildings	15,900	525.39	14,500	464.97
TOTAL NEGAUNEE MINE CO.	6,125,100	202,405.02	6,167,200	197,766.68
Tax Rate		3.272		3.175
Total City of Negaunee Tax		589,686.71		587,398.44
Negaunee Mine % of City Tax		34%		34%

11. ACCIDENTS AND PERSONAL INJURY:

The mine had no fatal accidents during the years 1927 or 1926. There were 23 minor accidents during 1927 as compared with 27 in 1926, or a decrease of four for the year.
The 23 accidents are classified as follows:
Thirteen were slight injuries, the men returning to work in less than a month.
Five were injuries that kept the men away from their work one to two months, and were comparatively slight.
Three were injuries that kept the men home over three months. They were two fractures and one eye injury.
Two were bad fractures, and the men are still on compensation.

During 1927 two men were paid compensation for injuries received prior to 1926. Two men are receiving the difference in wages, one being injured in 1926, and the other previous to 1926.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

There was no new construction in 1927.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Steam Shovels:

The ordinary overhauling of two of the steam shovels used in this district was done at the Negaunee shops last winter. This winter four shovels are being overhauled at the Negaunee shops, three belonging to this district, and one to the Gwinn District.

b. Stockpile Trestles:

(2) Wooden Trestle:

Five wooden legs were taken down, and later put back on, the portable Bessemer ore trestle on account of cleaning up most of the Bessemer ore. Four sets of stringers and corbels were taken off the south side rock trestle and used on a new north rock trestle. The rock tram is shortened over 500' by this change.

d. Tugger Hoists and Scrapers:

The mine is now supplied with the following scraper equipment:

Company	Type	Total	Year Purchased 1922	1924	1925	1926	1927
Ingersoll-Rand Co. 6 H.P.	Air	9	1	2	2	2	2
Gardner-Denver Co. 7½ H.P.	"	7			6		1
" " 7½ H.P.	Electric	8				6	2
Sullivan Mach. Co. 6 H.P.	"	10				2	8
" " 25 H.P.	"	1					1
Total -		35	1	2	8	10	14

Five new hoists were purchased and charged out in 1927, nine second-hand hoists were received from the Gwinn District, but have not yet been charged out. The limit on air hoists, with the present compressors, was reached in the summer, since which time purchases have been confined to electric hoists.

e. Mayne Loaders:

The mine is still supplied with ten Mayne Loaders, only five of which were operating during the last half of December. Most of these loaders are nearly worn out, and they are being gradually discarded and scraper outfits installed to replace them. The Mayne Loader was a big improvement over hand shoveling, and the scraper hoist was nearly an equal improvement over the Mayne Loader.

14. MAINTENANCE AND REPAIRS:

There were no extraordinary repairs made during the year. All ordinary maintenance and repairs were made as occasion required.

15. POWER:

Electric power was supplied during 1927 by the Cliffs Power and Light Company, a subsidiary of the Cleveland-Cliffs Iron Company. There were no serious delays due to lack of power during the year. The delays from this cause are listed under 2 - h.
The rate charged for current was 1½¢ per k.w. hour, the same as has been in effect for a number of years.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1927

17. CONDITION OF PREMISES:

The lawn and planted borders were kept in good condition throughout the year. The general appearance of the large lawn has been improved by the cooling pond in the center, with its miniature fountains.

All the mine buildings were painted during the early summer, which materially improved the appearance of the surface plant.

18. NATIONALITY OF EMPLOYEES:

This report has been prepared under two statements. The first gives the report as submitted quarterly. It shows the nationality of the employees as to parentage; for instance, a man has been classed as a Finn when born in this country of Finnish parentage. This naturally shows the number of Americans employed to be very small. The second statement gives a separation of the nationalities into "Foreign born" and "American born", the latter being shown as Americans.

As to parentage	1927	%		1926	%	
English	66	25		64	27	
Finnish	102	38		89	38	
Italian	34	13		28	12	
Swedish	26	10		20	9	
French, Canadian	16	6		16	7	
Americans	10	4		8	4	
Germans	5			3		
Austrians	2			2		
Danes	2			1		
Argentines	1		(All	1		(All
Norwegians	1	4	others)	1	3	others)
Total	265	100%		233	100%	

As to birth	Total	American born	Foreign born
English	66	29	37
Finnish	102	25	77
Italian	34	4	30
Swedish	26	11	15
French, Canadian	16	11	5
Americans	10	10	
Germans	5	2	3
Austrians	2		2
Danes	2	1	1
Argentines	1		1
Norwegians	1	1	
Total	265	94	171
Percentage	100%	35%	65%

MAAS MINE

ANNUAL REPORT

YEAR 1927

1. GENERAL:

Mining operations were confined in the greater part to the same areas where work was in progress in 1926. Work was started in two new areas in 1927, one in the foot wall pillar above the second level, the other under the hanging on the 215' and 200' sub levels. Only a small part of the product was obtained from this new work. It had been expected that the new areas being opened on the 215' and 200' sub levels under the hanging above the fourth level, to the southeast of the Race Course Tract, would be in ore of Bessemer grade; however, only about 10% of the ore has been Bessemer.

Mining operations have been under way during 1927 in foot wall pillars at three different elevations. Two of these areas are extremely wet, with probably 80% of the mine water entering here, and naturally, mining has been carried on under unfavorable operating conditions, and at a higher than average cost per ton. The ore obtained from opening the new territory under the hanging above the fourth level is comparatively costly, due to the irregular enrichment, to opening and repairing fourth level drifts and raises, also old drifts on these sub levels that were partially developed ten years ago.

Operating conditions during 1927 were not favorable to a reduction in cost to bring this mine more in line with the two other operating mines in this district. It will require some time to get the mine in good shape, due largely to the scattered location of mining operations during the past fifteen years, brought about by the necessity of maintaining the surface of the Race Course Tract, and also by the efforts made to increase the Bessemer product.

Under present conditions it is not possible to install mechanical loaders in the foot wall areas now being mined due to water. A plan is being worked out that will correct this situation, and during the coming year, it is expected to improve operating conditions in these areas and handle practically all of the ore with scrapers.

The development work has been planned for opening the Race Course Tract, and it is expected that rock drifting will start within 60 days. Ore development on this Tract can not be undertaken until arrangements have been made on surface for stocking this ore separately.

The two best producing areas in 1927 will soon be abandoned and the contracts transferred to the west under new hanging, to increase Bessemer production in 1928 and subsequent years up to the time the Race Course Tract is fully developed and producing 300,000 tons per year.

It would be possible to increase production by working six days per week, by adding contracts to break more ore on day shift, and hoisting on double shift, the same as at the Negaunee Mine. However, none, if any, decrease in operating cost could result until general conditions in the mine have been improved.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

Bessemer	7,885 tons
Maas	262,121 "
Total Ore	270,006 "
Rock	4,580 "

The production for the year 1927 was 25,355 tons more than for 1926.

The working schedule was the same in each year, being five 8-hour shifts per week. There were 263 shifts worked in 1927 as compared with 261 shifts in 1926.

MAAS MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Maas Bessemer	7,169	5,201	12,370	15,166
Maas	122,917	185,166	308,083	247,083
Total	130,086	190,367	320,453	262,249
Total Last Year	96,443	165,806	262,249	
Increase	33,643	24,561	58,204	

The shipments for the year were 50,447 tons more than were mined.
The south stock pile was cleaned up to make room for "C" Street in the New Location. The balance of the stockpile loading was from the north pile to make room for the ore that will be hoisted in the winter of 1927 - 1928.

c. Stockpile Inventories:

The ore by grades in stock December 31st, 1927, was as follows:

Bessemer	2,028 tons
Maas	315,377 "
Total	317,405 "

The old Bessemer solar northwest of the shaft was cleaned during the summer. Samples showed this ore to run over the Bessemer limit, and it was dumped on the Maas stockpile. The new Bessemer pile east of the shaft in the former timber yard was practically all shipped. Both grades of ore are being stocked from portable trestles erected in October and November.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

Second Level	57,218 tons	21.2%
Third Level	10,042 "	03.7%
Fourth Level	202,746 "	75.1%
Total	270,006 "	100 %

e. Production by Months:

The production by months is as follows:

Month	Bessemer	Maas	Total	Rock
January	708	21,392	22,100	40
February	456	20,100	20,556	84
March	512	21,440	21,952	396
April	0	20,076	20,076	464
May	1,131	20,979	22,110	520
June	1,145	22,927	24,072	576
July	1,345	20,293	21,638	400
August	1,434	22,650	24,084	852
September	1,316	22,625	23,941	736
October	3,244	19,957	23,201	164
November	1,048	22,648	23,696	144
December	488	22,092	22,580	204
Total	12,827	257,179	270,006	4,580

MAAS MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

e. Production by Months: (Cont.)
The production was distributed over the various leases as follows:

Month	George Maas Lease	Catholic Cemetery	C. I. M. Co.	Right of Way Adams' Strip
January	15,112	4,612	1,508	868
February	14,768	4,528	928	332
March	17,528	3,588	580	256
April	15,580	2,748	904	844
May	17,350	3,224	724	812
June	19,736	3,092	1,244	0
July	18,342	2,416	644	236
August	20,740	2,696	648	0
September	20,525	2,888	84	444
October	19,365	2,896	908	32
November	19,656	2,704	1,208	128
December	17,968	2,840	860	912
Total	216,670	38,232	10,240	4,864
Last Year	177,231	41,356	15,612	10,452

f. Ore Statement:

	Maas Bessemer	Maas	Total	Total Last Year
On Hand Jan. 1st, 1927	6,513	361,339	367,852	385,450
Output for Year	12,827	257,179	270,006	244,651
Transferred	4,942	4,942	-	-
Total	14,398	623,460	637,858	630,101
Shipments	12,370	308,083	320,453	262,249
Balance on Hand	2,028	315,377	317,405	367,852
Increase in Output			25,355	
Decrease in Ore on Hand			50,447	

1927 - 1-8 Hour Shift, 5 days per week, January 1st to December 31st, 1927.

1926 - 1-8 Hour Shift, 5 days per week, January 1st to December 31st, 1926.

g. Delays:
There were no non-electrical delays during the past year.

h. Delays from Lack of Current:
The delays from lack of current were as follows:
May 3rd, 1½ hours delay on account of the generator burning out at the McClure plant. The Maas turbine was put in operation. The hoist was maintained by hoisting overtime.
The steam turbine went on the line May 4th at 8:00 A. M., and off the line on May 6th at 2:45 P. M.
The steam turbine went on the line May 24th at 10:30 P. M., and off the line on May 28th at 5:50 P. M.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Maas Bessemer	61.62	.045	8.14
Maas	59.75	.107	8.32

MAAS MINE
ANNUAL REPORT
YEAR 1927

3. ANALYSIS:

b. Average Analysis on Straight Cargoes:

Grade	Mine Iron	Mine Phos.	Mine Silica	Lake Erie Iron	Lake Erie Phos.
Maas Bessemer		(All Mixed)		-	-
Maas	59.33	.104	7.95	(None)	

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12 cubic feet equals one ton.
10% deducted for rock.
10% deducted for loss in mining.
Percentage of Bessemer equals 10.

Developed Ore Available:

Between first and second levels	175,178 tons
Between second and third levels	1,206,071 "
Between third and fourth levels	1,696,661 "
Total -	3,077,910 "

Developed Ore Unavailable:

Between third and fourth levels	1,424,550 tons
Total developed ore -	4,502,460 "

The estimate of ore reserves has been made on the same plan as in previous years. All ore above the fourth level is shown, and it is divided into available and unavailable. The total ore shows a decrease of 157,645 tons, while the product was 270,006 tons, showing that 112,361 tons were developed during the year. This increase in developed ore was due to irregularities in the hanging, which increased the estimated tonnage in several areas. Mining has been started in the "Unavailable" area which covers the two large pillars left to support the surface adjacent to the Race Course Tract.

c. Estimated Analysis:

Ore Reserves: Approximate Expected Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Bessemer	53.39	.040	6.56	.195	1.65	.490	.225	.008	1.31	12.50
Maas	52.25	.101	6.63	.208	2.20	.850	.350	.010	1.80	12.75

Ore in Stock: Average Natural Analysis.

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Bessemer	54.16	.041	7.17	.208	2.15	.570	.257	.008	1.28	11.50
Maas	52.65	.098	7.11	.208	2.29	.923	.414	.010	1.85	12.00

A few minor changes have been made in the estimated analysis, to bring them more in line with the results obtained from output and shipments samples.

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

The labor conditions at the mine throughout the year were satisfactory. At no time was there a shortage of men.

(2) New Construction:

E. & A. #476 - A new timber tunnel was constructed on the north side of the shaft to extend along the north edge of the new timber yard; also a connection was made to the dry-house.

MAAS MINE
ANNUAL REPORT
YEAR 1927

5. LABOR AND WAGES:

a. Comments: (Cont.)

(2) New Construction:

E. & A. #504 - Moving Race Track Houses.

There were 21 houses moved in 1927. The road connecting with Cherry Street was completed. The sub grading was finished on "A", "B", and "C" Streets. Sewers and water lines were installed in the New Location, and part of the curbing and sidewalk was put in on "A" and "C" Streets.

Both of the above will be given in more detail under the heading #12, entitled "New Construction and Proposed New Construction."

b. Comparative Statement of Wages and Product:

	1927	1926	INCREASE	DECREASE
PRODUCT	270,006	244,651	25,355	
No. Shifts and Hours	1-8	1-8		
AVERAGE NO. MEN WORKING:				
Surface	37	40		3
Underground	160	155	5	
Total	197	195	2	
AVERAGE WAGES PER DAY:				
Surface	4.34	4.31	.03	
Underground	5.09	5.08	.01	
Total	4.94	4.91	.03	
WAGES PER MONTH OF 25 DAYS:				
Surface	108.50	107.75	.75	
Underground	127.25	127.00	.25	
Total	123.50	122.75	.75	
PRODUCT PER MAN PER DAY:				
Surface	25.21	22.44	2.77	
Underground	6.29	6.05	.24	
Total	5.03	4.77	.26	
LABOR COST PER TON:				
Surface	.172	.192		.020
Underground	.809	.839		.030
Total	.981	1.031		.05
AVERAGE PRODUCT MINING:				
Stoping	13.26	12.57	.69	
Ore Development	6.89	5.82	1.07	
Total	12.95	12.18	.77	
AVERAGE WAGES CONT. LABOR	5.45	5.42	.03	
TOTAL NUMBER OF DAYS:				
Surface	10,712	10,902		190
Underground	42,914 3/4	40,417 3/4	2,497	
Total	53,626 3/4	51,319 3/4	2,307	
AMOUNT FOR LABOR:				
Surface	46,476.61	46,943.37		466.76
Underground	218,513.56	205,220.72	13,292.84	
Total	264,990.17	252,164.09	12,826.08	

MAAS MINE
ANNUAL REPORT
YEAR 1927

5. LABOR AND WAGES:

b. Comparative Statement of Wages and Product: (Cont.)

Proportion of Surface to Underground Men:
1927 - 1 to 4.32
1926 - 1 to 3.87
1925 - 1 to 3.76
1924 - 1 to 4.16
1923 - 1 to 3.71
1922 - 1 to 4.34
1921 - 1 to 4.56

6. SURFACE:

a. Buildings, Repairs:

Only minor repairs were required to the buildings during the year.

(1) Cooling Pond:

A circular concrete cooling pond was built during the summer in the yard between the office, shops, and dry-house. The water was turned on September 29th, after which the old unsightly tower near the entrance to the mine was torn down, the site leveled off, and seeded. This cooling pond is used to cool water from the hoists, compressors, and Cliffs Power and Light Co. transformers.

(2) Pipe Rack:

A new and larger pipe rack from the Gwinn District was erected to replace the old pipe rack, which was inadequate.

b. Stockpiles:

The thin layer of ore on the old Bessemer solar was cleaned off in 1927. A portable stocking trestle of 20 bents was erected in the fall west of the shaft for Maas ore, and six bents were built on the Bessemer stockpile, southeast of the shaft, after stockpile loading had been completed. A few bents were erected southeast of the shaft, on a branch from the Bessemer trestle, for stocking rock.

c. Roads, Tracks:

Roads:

During the summer and fall a new road was built to the mine from the intersection of "B" and "C" Streets in the New Plat. This road runs north across the tracks leading to the shaft to the west of the stockpile grounds and timber yard, and then runs east, immediately south of the Crushing plant. It was built of mine rock, and rolled. The old road passes under the permanent stocking trestle just west of the shaft, and then over the tracks. The new road provides a much safer entrance to the mine from town.

Tracks:

New Timber Track:

The new timber track to the new timber yard was completed in the spring of 1927.

Tunnel Track:

A 30" gauge track was laid in the new tunnel.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking at the mine in 1927.

b. Development:

Development work done during last year was confined for the most part to raising on the third and fourth levels. There were two drifts driven on the second level.

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

b. Development: (Cont.)

Second Level:

After #108 raise was put up from the third level to the elevation of the second level, a drift was driven from the top of the raise a distance of 245' to connect with raises #111, #112, and #113. Material encountered in this drift was as follows: 75' of ore, and 170' of Jasper. The latter part of the year a drift was started to the south from the intersection of the old and new foot-wall drifts, which will connect with #116 raise from the third level. It is planned to put up several raises from this new drift to the 550' sub level. Material encountered in this drift was ore.

In December there was one contract working here loading ore with a scraper and slide.

Third Level:

The old foot wall drift on this level had not been used for several years, and had become very badly crushed, so it was necessary to re-timber it before putting up raises to take out the foot wall pillar above the third level. This work was started in 1926, in which year most of the raises were put up. Work was completed the early part of 1927, but during the balance of the year it has been very hard to maintain this drift and keep the raises open due to heavy crushing in this territory. It has been decided to drive a new foot wall drift 60' to the north, and raises will be put up from this new drift to connect with the old raises. It is expected that the new foot wall drift will be far enough back in the foot so that it will not be subjected to crushing. During the year the following raises were put up:

Raises	Total Height	Advance in 1927	Material
#111 double compartment	250'	250'	220' ore, 30' Jasper.
#112 " "	250'	165'	200' ore, 50' Jasper.
#113 " "	250'	120'	190' ore, 60' Jasper.
#116 " "	220'	220'	220' ore.

In the main crosscut from the shaft just north of the fork in the foot wall drift, two single compartment rock raises were put up to the west, a distance of 130' to an elevation of 430'. From the top of #2 raise a drift was driven in Jasper 80' west to explore for the ore found in #7 diamond drill hole from surface. This drift, however, was entirely in Jasper, and a raise put up from the breast 70' high cut alternate seams of lean ore and Jasper. The ore in the drill hole was encountered at elevations from 426' to 438', and from 451' to 463', indicating two runs of ore each twelve feet in thickness with Jasper between. The drill hole from surface was not surveyed, so that it was impossible to determine its exact location, but by using other holes that were surveyed as a basis for calculation, it was figured that this raise should be very close to it, and in any event, would cut any ore body that existed in this vicinity. The raise crossed the ore formation but did not find the ore indicated by the drill hole, so that it would appear that no ore existed here. This exploratory work was done during June, July, and August, and was stopped because it did not seem advisable to spend further money in searching for these two narrow runs of ore, as it is very doubtful if they exist.

Fourth Level:

There has been a total of four raises put up from the fourth level during the past year. These raises are located as follows: #219 raise in the foot wall drift just east of the Winze; #417 in #400 drift; and #600 and #601 raises in the main shaft crosscut, south of the Race Course Tract.

Raises	Height	Material
#219 double compartment	165'	30' Jasper, 90' ore, 45' Jasper.
#417 " "	137'	137' ore.
#600 " "	100'	100' ore.
#601 " "	100'	100' ore.

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

b. Development: (Cont.)
Fourth Level: (Cont.)

Two drifts on the fourth level, known as #600 and #500 side drifts, in which no work has been done for several years, were repaired during the past year. Due to lack of ventilation until recently, the timber in the old drifts in the Maas Mine has decayed to the point that the greater part of it has to be replaced when work is resumed in the drifts.

c. Stoping:

(1) General Remarks:

Mining has been in operation between the first and fourth levels during 1927. In addition to the areas that were being mined in 1926, two new areas were opened up during the past year, one in the foot wall pillar above the second level and the other under the hanging on the 215' and 200' sub levels above the fourth level near the Race Course Tract. The areas mined in the foot wall pillar above the second level have included the Roman Catholic Cemetery Tract, the D. S. S. & A. Railroad Pillar, and also the Maas Lease. The other areas, all of which are below the third level, are nearly all located on the Maas lease.

(2) Detail of Stoping:

Subs between first and second levels:

588' Sub Level:

This sub level was opened in 1925, and mining was completed in July. The mining here was entirely in the Roman Catholic Cemetery and the Railroad Pillar.

575' Sub Level:

This sub level was re-opened in 1927 after being abandoned for ten years, and work has been continued during the balance of the year. About 90% of the ore has been mined.

In December three contracts were mining through transfer raises to the 535' sub level. They were working near the foot wall, where the ore is wet and low grade.

565' Sub Level:

This sub level was originally opened in 1916. No further work was done until in December, 1926. Mining has been in progress here the entire year under the hanging in the Roman Catholic Cemetery and the Railroad Pillar.

In December four contracts were stoping.

535' Sub Level:

In the early part of the year #19 raise from the third level was put up to the elevation of this sub level, after which a drift was driven to the northeast a distance of 170' across the ore and into the foot wall. Five raises have been put up from this drift to the 565' and 575' sub levels. They are used as transfer raises. The ore from these raises is handled by means of a 15 H.P. scraper outfit in the transfer drift on the 535' sub level.

The area being mined on the foot wall on the 575' and 565' sub levels is quite lean and is cut by four East-West dikes. Under the old system, using the raises in the second level foot wall drift, it was necessary for each contract to cut through all of these dikes at least once, and then mine the ore between the dikes at right angles to these drifts. Under this plan considerable rock was encountered, and it was also not feasible to use scrapers. Under the new system, a raise comes up between each of the dikes, and a scraper outfit can be used for mining the ore. It is only necessary to have one drift through the dikes for a traveling and timber road for all the contracts, as compared with a drift through the dikes by every contract working on the sub level under the old system. Every effort is being made to speed up mining in this territory, as it is expected that the dikes will disappear on the next sub level, or at least on the second sub level below.

525' Sub Level:

This sub level was opened in March of this year after the new raises from the third level reached this elevation. These raises came up in the hanging and it

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

c. Stoping: (Cont.)

Subs between first and second levels: (Cont.)

525' Sub Level:

was necessary to drive from 40' to 50' before reaching the ore. This territory is very wet, as 50% or more of the mine water comes in at this point, which together with the long rock drifts from the raises, makes it impractical to use scrapers in this territory. It is expected that the Jasper will cut out when subs are opened at lower elevations, and it is also planned to drive foot wall drifts, and try to cut off the water. If this is successful, it will eventually be possible to use scraper outfits in this territory.

In December there were six contracts working here, all using tram cars.

Subs between second and third levels:

401' Sub Level:

In the early part of the year a connection was made on this sub level from #115 to #119 raise. This drift has since crushed.

Subs between third and fourth levels:

300' Sub Level:

This sub level was opened in 1923, and most of the ore was mined by the end of 1926. Work was continued under the hanging at #707 and #5-S raises until in June.

Development work on the 270' sub level south of the dike showed a considerable body of ore, and test raises put up to the hanging showed that the ore extended up to the elevation of this sub level. In November of this year work was started again on this sub level in the new territory developed south of the dike. The ore being mined here is now being handled through a transfer raise to the 270' sub level. This method of handling the ore is only temporary, as a raise is now being put up from the fourth level, which will hole directly under the transfer raise, after which the ore will go directly to the fourth level.

One contract was stoping here in December.

280' Sub Level:

This sub level was opened in the fall of 1925. Mining was continued during 1926 and also throughout the past year. This sub level has been mined in three sections; one of these sections lies to the west of the transfer chute to the fourth level, and one to the east of the chute and south of the foot wall pillar. Mining is 98% completed in these two areas. The ore has been handled by electric haulage on the 245' sub, and then through a transfer raise to the fourth level. This has materially increased the expense of handling this ore.

The third area being mined on this sub level is under the hanging in what is known as the Bessemer area, and the ore goes directly through raises to the fourth level. The ore in this territory is dry and scrapers are being used in every contract. The last two pillars in this area were being mined in December.

270' Sub Level:

This sub level was opened in 1923 near #705 and #706 raises, and in addition some exploratory drifting was done to the south of #244 raise. When a small area had been mined adjacent to #705 and #706 raises, work was temporarily stopped until in the fall of 1926, when mining was again started in the west foot wall section at the elevation of this sub level. Mining in this section and also in the section east of the transfer raise to the fourth level has been carried on throughout the year. The section to the east has been mined entirely with scrapers. The ore to the west on the foot wall side is quite wet, so it is not possible to use scrapers. The ore from both of these sections has to be handled on a transfer sub level by electric haulage to transfer raises from the fourth level. A plan is being worked out that will make it possible to mine in this territory without transferring the ore by electric haulage on the 245' sub level. Drifts from the top of the fourth level raises on the 245' sub level will be started shortly, and from these drifts raises will be put up to the 270' sub and the dirt transferred on the 245' sub by large scraper units direct to fourth level

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

c. Stoping: (Cont.)

Subs between third and fourth levels: (Cont.)

270' Sub Level:

raises. Two transfer drifts will handle the ore on the hanging side of the sub level, where it is expected that scrapers can be used. The ore on the foot side will continue to be handled by electric haulage, but instead of two motor crews and several chutemen, it will be possible to get along with one motor crew of three men, which will reduce the number of men engaged in haulage on this sub level from twelve to three. It is planned to stop mining in this territory at the elevation of the 270' sub level, and transfer the contracts now working in this territory to a new territory that is being opened below the third level along the Negaunee Mine Boundary and south of the Race Course Tract on the 200' and lower sub levels. This transfer of contracts will be made to increase Bessemer production.

In December there were six contracts working in the west foot wall section, and seven contracts in the east section.

245' Sub Level:

Four small pillars were mined in January 1927, which completed the area being mined on this sub level.

230' Sub Level:

An area around #705 raise and extending over to #417 raise, approximately 400' in length, was opened in September 1926, and mining was continued during 1927. At the end of the year there were six small pillars remaining to be mined in this area. To the southwest of #417 raise one contract has worked for several months under the hanging in a new territory where it was supposed the ore would be of Bessemer grade. However, only about 10% of the ore graded Bessemer, and in addition the iron was low. The area to the northeast of #417 raise will be temporarily abandoned upon completion of this sub level. Mining will be continued under the hanging to the southwest of #417 raise by four contracts, who will complete the mining of ore under the hanging in this territory before dropping down to start mining on the 215' sub level.

215' Sub Level:

This sub level was opened in February, 1927, in the South pillar that had been left to support the Race Course surface. A traveling and ventilation drift was driven from #706 raise to #422 raise, a distance of approximately 300', and the territory to the south and west of #422 and #417 raises has been opened for mining. Considerable of this territory is in new ground under the hanging, and at the end of the year mining had been nearly completed. The ore is irregular, due to rolls in the hanging, and most of the ore has run low in iron and above the Bessemer limit in phosphorus. Mining in this territory has also been handicapped due to drifts that were opened many years ago on the 200' sub level preparatory to mining, but which were abandoned when this territory was set aside as a pillar to support the surface on the Race Course Tract. These old drifts on the 200' sub were encountered on the 215' sub level due to the timber rotting and drifts caving to a height of 15' to 20', which carried them up to the elevation of the 215' sub level. These old drifts have made it difficult to mine on the 215' sub level. The hanging over the entire area that has been recently developed on the 215' sub is very irregular, the ore is low grade, and has not run over 10% Bessemer.

In December three contracts were mining the few small pillars that still remain in this area.

200' Sub Level:

This sub level was opened in 1918, and it was planned to mine the ore here under the hanging, which was assumed to be very flat in this territory. A number of test raises were put up at different points, and several small areas of ore were found to extend 60' to 80' above the sub level. This sub level was then temporarily abandoned, and mining was started under the hanging at these higher elevations.

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

c. Stoping: (Cont.)

200' Sub Level: (Cont.)

Shortly after this work was under way, it was decided to leave pillars to support the surface in and adjacent to the Race Course Tract. These pillars reduced the area available for mining, so that most of the contracts were taken out of this territory. Mining was resumed in August of this year in the south pillar left to support the Race Course Tract. Before mining could be started it was necessary to repair the raises from the fourth level to the 200' sub, a distance of 90', and re-open the old drifts on this sub level. This work required several months and was not yet completed when this territory started to take weight the last week in December. A large block of hanging settled over this territory, crushing all the drifts that had recently been re-opened. This will delay the opening of this territory, as it is planned to move contracts here from other areas where mining has been completed. Mining and rapid development of this area will be held up until these drifts are again re-opened. It is hoped there will be no further trouble from crushing, as it seems probable that a considerable block of hanging has broken, which should make a good mat over the timber.

The condition that brought about the crushing was undoubtedly due to the irregularity in elevations of the mining operations above and adjacent to this area. Small areas of ore would extend up into the hanging with Jasper between. Broken hanging would follow these areas as they were mined, leaving pillars of Jasper around them which would not break until they were undercut at lower elevations. When a sufficient area had been opened in this way, the mass of hanging which was still intact broke away, causing excessive pressure on the timber while the ground was moving. The last day of the year, an inspection showed that the ground was quiet, and it is expected that there will be no further trouble here.

Three contracts were working here when this area crushed in December.

d. Timbering:

The timber in the operating part of the mine did not require as much repairing as in the previous year. Crushing of the third level foot wall drift has continued, and constant repairing has been necessary to keep this drift open. It is the main inlet for air from the Negaunee Mine, and in addition is used for haulage, so that it must be kept in good condition. On account of the short life of the timber, it was decided to discontinue using treated timber, as new sets often broke down within a month or less.

The opening of new territory under the hanging above the fourth level made it necessary to repair some fourth level drifts that had been idle for years, and treated timber was used here. A number of old raises, in which the timber had rotted, were also repaired. The repairing of these old raises together with an increase of 642 feet in the amount of ore and rock raising in 1927, account for the increase in the amount of 6" to 8" timber used during the year.

Statement of Timber Used:

	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1927	AMOUNT 1926
6" to 8" Crib. Timber	105,614	.0423	4,471.23	3,564.41
8" to 10" Stull Timber	58,568	.0614	3,592.49	3,883.56
10" to 12" " "	26,118	.0885	2,311.84	2,584.06
12" to 14" " "	3,108	.1186	368.67	682.33
12" to 14" Treated Timber	3,087	.308	950.91	2,035.59
Total Timber - 1927	196,495	.0595	11,695.14	
Total Timber - 1926	183,316	.0695		12,749.95
		per 100'		
7' Lagging	1,054,308	.743	7,833.93	5,342.08
Poles, 9½'	210,527	1.546	3,255.64	3,141.73
Total - 1927	1,264,835	.877	11,089.57	
Total - 1926	1,029,908	.824		8,483.81

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

d. Timbering: (Cont.)

Statement of Timber Used: (Cont.)

	LINEAR FEET	AVG. PRICE PER FOOT	AMOUNT 1927	AMOUNT 1926
Covering Boards, 1927 -	16,000	1.95	312.60	
Covering Boards, 1926 -	52,000	1.79		929.80
Grand Total - 1927			23,097.31	
Grand Total - 1926				22,163.56
Product			270,006	244,651
Feet of timber per ton of ore			.7277	.7492
Feet of lagging per ton of ore			3.905	3.047
Feet of lagging per foot of timber			5.36	4.07
Cost per ton for Timber			.0433	.0521
" " Lagging			.029	.0219
" " Covering boards			.0011	.0038
" " Poles			.0121	.0128
" " All timber			.0855	.0906
Equivalent of stull timber to board measure			298,669	308,265
Feet of board measure per ton of ore			1.11	1.26

Total cost for timber, lagging, poles, and cover boards, and cost per ton:

1927	$23,097.31	$.0855
1926	22,163.56	.0906
1925	11,011.51	.0736
1924	17,199.67	.0760
1923	18,150.64	.0796

The cost per ton for poles increased in 1926, but was a little lower in 1927. More poles are used for covering down in drifts where scraper hoists load the ore. The scrapers are pulled over the poles, which prevents the scraper from digging up the bottom of the drift, and in this way decreases the friction and permits the scraper to bring its full load to the raise. The cost for all sizes of timber above 6" to 8" shows a decrease in 1927, due to less treated and other timber used in general repair work throughout the mine.

e. Drifting and Raising:

The following is a statement of the drifting and raising for the years 1927 and 1926:

YEAR	ORE DRIFTING	ORE RAISING	ROCK RAISING	ROCK DRIFTING
1927	-	1,249 ft.	581 ft.	405 ft.
1926	-	1,107 ft.	41 ft.	90 ft.
Increase	-	142 ft.	540 ft.	315 ft.

There was a large increase in both rock drifting and raising in 1927, also an increase in ore raising. Considerable raising was done from the third level foot wall drift during the first half of the year, while in the last half of the year most of the raising was done from fourth level drifts.

f. Explosives, Drilling and Blasting:

Statement of Explosives Used:

	Quantity	Average Price	1927 Amount	1926 Amount
50% Am. Gel.	99,950	.1425	14,242.84	14,277.24
60% " "	6,350	.1550	984.25	634.00
Total Powder - 1927	106,300	.14324	15,227.09	
Total Powder - 1926	103,200	.1445		14,911.24

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

f. Explosives, Drilling and Blasting: (Cont.)

Statement of Explosives Used: (Cont.)

	Quantity	Average Price	1927 Amount	1926 Amount
Fuse	343,300	.5950 C	2,041.44	2,238.96
Blasting Caps #6	62,800	1.065 C	669.19	643.51
Cap Crimpers	32	.667 ea.	21.35	16.66
Tamping Bags	5,000	2.15 M.	10.75	-
Total Fuse, etc. 1927			2,742.73	
Total Fuse, etc. 1926				2,899.13
Total All Explosives - 1927			17,969.82	
Total All Explosives - 1926				17,810.37
Product			270,006	244,651
Pounds of Powder per ton of ore			.3937	.4218
Cost per ton for Powder			.0564	.0609
" " Fuse, Caps, etc.			.0102	.0119
" " All Explosives			.0666	.0728
Average price per pound for powder			.14324	.1445

Due to a decrease of 6.7% in pounds of powder per ton of ore, a decrease of 9% in the cost per pound for powder, and 11% per 100' of fuse, the cost for all explosives decreased 8.5% in 1927.

g. Mining and Loading:

The slicing system of mining was continued during 1927, the same as has been used for several years. The number of scraper outfits in use in the mine was increased from 15 on January 1st to 28 at the end of the year. Additional units will be purchased as places are available for them. If the water can be cut off from the foot wall areas that are being mined, it will be possible to increase the percentage of ore loaded by scraper to at least 75% of the product. The present product of 270,000 tons per year can then be obtained from less miners with a decided decrease in cost per ton.

The following statement shows the ore handled each month with scrapers:

MONTH	DAYS	% OF TOTAL TIME BY MINERS	TONS	% OF PRODUCT
January	502	30.7	9,594	43.4
February	452	28.2	8,280	40.3
March	542	32.8	9,552	43.5
April	478	30.0	8,290	41.3
May	536	33.0	9,982	45.1
June	572	32.7	10,736	44.6
July	452	28.0	8,648	40.0
August	590	35.2	11,556	48.0
September	544	33.3	10,716	44.7
October	608	36.3	11,364	49.0
November	638	37.2	11,868	50.0
December	660	39.5	12,432	55.0
Total	6,574	33.2	123,018	45.6

Average tons per man per day with scrapers - 18.71
Average tons per man per day, hand shoveling - 10.56
Increase in tons per man per day with scrapers over hand shoveling - 77.2%
In 1927, 45.6% of the ore was loaded by scraper hoists.

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

i. Ventilation:

The ventilating system worked satisfactorily during the year. During severely cold weather the fan is reversed for short periods, to prevent the blocking of No. 2 Shaft, Negaunee Mine, with ice.

Ventilation of working places in the mine has been good, with the exception of the east end of the 270' sub level. The last of the year a small fan was installed on the fourth level to force more air into this territory. Mining will soon be completed on this sub level, and the contracts transferred to a new territory further to the west, so that temporary relief was all that was necessary.

j. Pumping:

The number of gallons pumped per minute in 1927 as compared with 1926 is shown by the following table:

MONTH	1927	1926
January	951	941
February	957	996
March	963	985
April	995	983
May	964	972
June	1,023	997
July	1,063	992
August	1,039	976
September	1,053	951
October	1,080	919
November	1,012	951
December	1,055	991
Average	1,013	970

The amount of water pumped per minute averaged the same as in 1926 for the first five months of the year. It then increased and continued to average higher for the balance of the year. The increase was due to more rainfall, and to the extension of the caved area.

The average number of gallons pumped per minute over the past six years is as follows:

YEAR	Gals. Per Minute
1927	1,013 gals.
1926	970 "
1925	915 "
1924	990 "
1923	966 "
1922	985 "

k. Underground in General:

During the past year some progress has been made in mining the foot wall pillars above the second level. Operating conditions in this territory are not good due to water conditions. On the foot side of the sub level the ore is cut by several parallel dikes, and the ore is lean and hard to break. The ore body is opening out gradually on the hanging side, and by the time mining operations reach the second level, the ore body will be free from dikes and somewhat wider. The second level, however, will not be reached in regular mining operations for several years. A study of this territory is being made, and it is expected that some plan will be developed that will materially improve operating conditions. Scrapers are now being used where-ever conditions permit, but to speed

MAAS MINE
ANNUAL REPORT
YEAR 1927

7. UNDERGROUND:

k. Underground in General: (Cont.)

up mining they should be used in every contract.

Mining along the Negaunee boundary has been nearly completed on the 230' sub level, and no further mining is planned in this area on account of this sub level being some distance below the workings in the Negaunee Mine.

Slow progress was made in 1927 in opening new territory in the supporting pillars near the Race Course Tract and the old Baldwin Kiln Road. This was due to the irregularity of the hanging wall, that made it necessary to work on several sub levels. The old raises in this area have to be retimbered. All drifts on sub levels opened here years ago have crushed, so that it takes time to develop this area for mining.

An increase in the Bessemer output has been requested, so that operations in this territory will be increased as rapidly as possible. The contracts now working on the 270' and 230' sub levels will be transferred to this territory when they finish mining.

Plans have been made for developing the Race Course Tract for a production of 300,000 tons per year starting in 1931, and this work will be started early in 1928. The balance of the houses on this land will be moved in 1928, and it is also expected that the old Baldwin Kiln Road will be vacated by the City of Negaunee.

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1927	1926	INCREASE	DECREASE
PRODUCT	270,006	244,651	25,355	
Underground Costs	1.354	1.398		.044
Surface Costs	.153	.176		.023
General Mine Accounts	.127	.122	.005	
Cost of Production	1.634	1.696		.062
Original Cost	.073	.076		.003
Plant & Equipment	.046	.046		
Development	.039	.039		
Taxes	.286	.331		.045
Central Office	.093	.096		.003
Welfare, Safety, etc.	.027	.012	.015	
Cost Adjustment	.032	.030	.002	
Cost on Stockpile	2.230	2.326		.096
Loading and Shipping	.047	.048		.001
Total Cost on Cars	2.277	2.374		.097
No. Days Operating	263	261	2	
No. Shifts and Hours	1-8 hr.	1-8 hr.		
Average Daily Product	1,027	937	90	
COST OF PRODUCTION:				
Labor	.999	1.052		.053
Supplies	.635	.644		.009
Total	1.634	1.696		.062

The labor cost per ton decreased 5% in 1927, due largely to the use of more scraper outfits for loading ore. The supply cost per ton for the two years was practically equal.

b. Detailed Cost Comparison:

(1) Days and Shifts:

The mine operated on one eight hour shift five days per week in both years.

MAAS MINE
ANNUAL REPORT
YEAR 1927

8. COST OF OPERATING:

b. Detailed Cost Comparison:

(1) Days and Shifts: (Cont.)

During the year 1927 the mine worked one eight hour shift for 263 days, and the average number of men employed during the year was 197, for a total of 53,626 3/4 days. During 1926 the mine worked one eight hour shift for 261 days, and the average number of men employed during the year was 195, for a total of 51,319 3/4 days.

(2) Wages:

Both years the mine operated on the same wage schedule.

(3) Comparison of Production:

Production, 1927 -	270,006 tons
Production, 1926 -	244,651 "
Increase -	25,355 "

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate per day
1927	197	53,626 3/4	$ 264,990.17	$4.94
1926	195	51,319 3/4	252,164.09	4.91
Increase	2	2,307	12,826.08	.03

(5) Tons per man per day:

The tons of ore mined per man per day were as follows:

	1927	1926	INCREASE	DECREASE
Surface	25.21	22.44	2.77	
Underground	6.29	6.05	.24	
Total	5.03	4.77	.26	

(6) Cost of Production:

1927 - $441,221.38	Cost per ton,	$1.634
1926 - 414,841.55	" " "	1.696
Incr.- 26,379.83		
Decr.-	" " "	.062

	Total Cost				Cost per ton		
	Labor	%	Supplies	%	Labor	Supplies	Total
1927 -	$269,849.49	61.2%	$171,371.89	38.8%	$.999	$.635	$1.634
1926 -	257,277.90	62.0%	157,563.65	38.0%	1.052	.644	1.696
	12,571.59 Increase		13,808.24 Increase		.053 Decr.	.009 Decr.	.062 Decr.

The cost per ton decreased in 1927 due to more efficient operation underground and to a larger product.

(7) Detail of Accounts:

UNDERGROUND COSTS:

Development in Rock

1927 Amount	$5,543.78	Cost per ton, $.021
1926 Amount	1,012.78	" " " .004
Increase	4,531.00	.017

There was 986 feet of rock drifting in 1927, at a cost of $5.62 per foot, as compared with 131 feet in 1926, costing $7.73 per foot. The decrease in cost per foot is due to nearly all drifting on sub levels in 1927, while in 1926 most of the drifting was on the main level.

MAAS MINE
ANNUAL REPORT
YEAR 1927

Development in Ore

1927 Amount	$6,883.37	Cost per ton,	$.025
1926 Amount	7,429.29	" " "	.030
Decrease	545.92		.005

	Raising	TOTAL	Cost per ft.
Ore development, 1927 -	1,249'	1,249'	$5.51
Ore development, 1926 -	1,107'	1,107'	6.71

There was no ore drifting during the year, all the development being in ore raising. The cost per foot for raising was lower in 1927 due to more feet of small uncribbed raises that were put up to test the height of ore in new territory under the hanging.

Stoping

1927 Amount	$141,320.14	Cost per ton,	$.523
1926 Amount	136,637.69	" " "	.558
Increase	4,682.45	Decrease,	.035

Detail.

	Labor			Supplies	
1927 -	$112,305.37	79.5%		$29,014.77	20.5%
1926 -	106,057.16	77.6%		30,580.53	22.4%
Incr.	6,248.21	1.9%	Decr.	1,565.76	1.9%

	Cost per ton		
	Labor	Supplies	Total
1927 -	$.416	$.107	$.523
1926 -	.434	.124	.558
Decrease	.018	.017	.035

In 1927, four Ingersoll Rand double drum scraper hoists costing $2,668, and one Sullivan 15 H.P. Electric scraper hoist costing $1,160 were charged out as compared with nine Ingersoll Rand double drum hoists in 1926, costing $5,998.50. The decrease in expense in this item in 1927 amounted to $2,170.50, or to $.008 per ton. The decrease in the cost per ton is due to the use of more scraper hoists and larger production.

Explosives.

	1927	1926
Total pounds of powder	106,300	103,200
Average price per pound	.14324	.1445
Cost of powder	$15,227.09	$14,911.24
Cost of fuse, caps, etc.	2,742.73	2,899.13
Cost of all explosives	17,969.82	17,810.37
Lbs. of powder per ton of ore	.3937	.4218
Cost per ton for powder	.0564	.0609
Cost per ton for fuse, caps, etc.	.0102	.0119
Cost per ton for all explosives	.0666	.0728

The above statement shows a 6.7% decrease in pounds of powder per ton of ore, and an 8.5% decrease in cost per ton for all explosives. The cost per pound for powder, and also per hundred feet for fuse was lower in 1927. There was relatively less development in ore in respect to product in 1927.

Timbering

1927 Amount	$84,292.97	Cost per ton,	$.312
1926 Amount	78,847.76	" " "	.322
Increase	5,445.21	Decrease	.010

MAAS MINE
ANNUAL REPORT
YEAR 1927

Timbering (Cont.)

	1927	1926
Feet of timber per ton of ore	.7277	.7492
Feet of lagging " "	3.905	3.047
Cost per foot for timber	.0595	.0695
" " ton for timber	.0433	.0521
" " " " lagging	.029	.0219
" " " " poles	.0121	.0128
" " " " cover boards	.0011	.0038
" " " " timber, lagging, poles, and cover boards	.0855	.0906
Equivalent of stull timber to board measure	298,669	308,265
Feet of board measure per ton of ore	1.11	1.26

The decrease in cost per ton is due to the use of less treated and other timber above 6" to 8" in size for general repair work throughout the mine.

Tramming

1927 Amount	$30,350.99	Cost per ton,	$.112
1926 Amount	28,591.43	" " "	.117
Increase	1,759.56	Decrease	.005

The increase in expenditures is due to the mine operating three more days in 1927, and to a larger product. The decrease in the cost per ton is due to the larger product.

Ventilation

1927 Amount	$2,519.05	Cost per ton,	$.009
1926 Amount	1,656.36	" " "	.007
Increase	862.69		.002

The expense for both years represents the Maas Mine proportion of the expense of operating a joint ventilation system at the Negaunee Mine. The expense in 1927 was higher due to operating the fan more time than in the previous year.

Pumping

1927 Amount	$43,581.98	Cost per ton,	$.162
1926 Amount	40,050.42	" " "	.164
Increase	3,531.56	Decrease	.002

	1927	1926
Total gallons of water pumped	534,129,791	508,242,996
Gallons pumped per minute	1,013	970

The increase in expenditures is due to pumping more water in 1927. The cost for power in 1927 was $35,049.30 as against $31,837.80 in 1926.

Compressor & Air Pipes

1927 Amount	$25,639.40	Cost per ton,	$.095
1926 Amount	21,441.24	" " "	.088
Increase	4,198.16		.007

MAAS MINE
ANNUAL REPORT
YEAR 1927

Compressors & Air Pipes (Cont.)

	Sub Division. Compressor	Air Pipes
1927 -	$20,782.39	$4,857.01
1926 -	16,732.91	4,708.33
Increase	4,049.48	148.68

Total cu. ft. of air used in 1927 - 521,730,000 cubic feet
" " " " " " " 1926 - 420,930,000 cubic feet

The increase in air consumption is due to an increase in the number of air scraper hoists, and a larger product.

Back Filling

1927 Amount	$ 66.00	Cost per ton,	$.000
1926 Amount	138.00	" " "	.001
Decrease	72.00		.001

There was less breaking of capping for filling in 1927.

Underground Superintendence

1927 Amount	$11,511.79	Cost per ton,	$.043
1926 Amount	11,404.65	" " "	.047
Increase	107.14	Decrease	.004

The increase in expenditures was due to the mine operating three more days in 1927.

MAINTENANCE ACCOUNTS:

Compressors & Power Drills

1927 Amount	$104.25	Cost per ton,	$.001
1926 Amount	103.01	" " "	.000
Increase	1.24		.001

The charge in both years was for small repairs to the electric compressors.

Hand Tramming Equipment

1927 Amount	$839.14	Cost per ton,	$.003
1926 Amount	1,388.94	" " "	.006
Decrease	549.80		.003

The decrease is due to less labor and supplies for the repair of sub level cars in 1927 on account of the increase in the number of scraper outfits in the mine.

Electric Tram Equipment

1927 Amount	$ 8,959.53	Cost per ton,	$.033
1926 Amount	10,138.47	" " "	.041
Decrease	1,178.94		.008

	Sub Division. Gen. & Motor	Locomotives	Wiring
1927 -	57.94	1,398.14	1,062.38
1926 -	40.67	2,171.83	1,526.84
Increase	17.27	Decr. 773.69	Decr. 464.46

MAAS MINE
ANNUAL REPORT
YEAR 1927

Electric Tram Equipment (Cont.)

	M. L. Tracks		M. L. Cars
1927 -	2,224.57		4,216.50
1926 -	2,875.27		3,523.86
Decrease	650.70	Incr.	692.64

Four cars were purchased from the Gwinn District and charged to M. L. Cars in 1927, at a total cost of $576.00. There was less repairs to locomotives, less expense for wiring, less extensions and renewals of main line tracks, and less repairs made to main line cars.

Pumping Machinery

1927 Amount	$3,968.59	Cost per ton,	$.015
1926 Amount	3,084.65	" " "	.013
Increase	883.94		.002

The increase is due to General Shop labor on Prescott pump, $307.29, General Shop labor on #5 Knowles pump, $262.36, and to the purchase of four porcelain plungers for the Prescott pump, $456.00. The discharge line on surface was extended to the culvert under the fill for the crusher tracks.

Total Underground Costs

1927 Amount	$365,580.98	Cost per ton,	$1.354
1926 Amount	341,924.69	" " "	1.398
Increase	23,656.29	Decrease	.044

SURFACE COSTS:

Hoisting

1927 Amount	$17,181.43	Cost per ton,	$.064
1926 Amount	15,983.37	" " "	.065
Increase	1,198.06	Decrease	.001

This account absorbed 50% of the charges of a new cooling pond constructed in 1927, while the balance of the increase is due to a larger product.

Stocking Ore

1927 Amount	$6,250.02	Cost per ton,	$.023
1926 Amount	7,538.90	" " "	.031
Decrease	1,288.88		.008

Twenty-six bents of stocking trestle were erected in the fall of 1927, twenty for Maas grade and six for Bessemer grade, as compared with a total of 28 erected in 1926. The decrease in expense is due to more ore shipped from pocket in 1927.

Dry House

1927 Amount	$6,956.72	Cost per ton,	$.026
1926 Amount	8,201.08	" " "	.033
Decrease	1,244.36		.007

The 1926 cost included two new hot water tanks costing $363.00, and a proportion of the cost of a new 4" water main to the mine, $600.00.

MAAS MINE
ANNUAL REPORT
YEAR 1927

Dry House (Cont.)

Coal to Boiler House:

	Tons	Cost
1927 -	767	$4,265.11
1926 -	829	4,612.52
Decrease -	62	347.41

General Surface Expense

1927 Amount	$5,987.83	Cost per ton, $.022
1926 Amount	5,112.92	" " " .021
Increase	874.91	.001

The increase in 1927 was due to the building of the new road from "B" Street in the New Location east along the L. S. & I. Railroad tracks to the Maas Mine; also to the re-arrangement of planting borders, and to the transfer of shrubbery from the Gwinn District Office grounds for planting along the new tunnel, and the main line of the L. S. & I. Railway.

MAINTENANCE ACCOUNTS:

Hoisting Equipment

1927 Amount	$3,457.48	Cost per ton, $.013
1926 Amount	3,215.89	" " " .013
Increase	241.59	.000

	Sub Division.		
	Electric Hoists	Wire Rope	Skips & Skip Roads
1927 -	$607.67	$845.18	$2,004.63
1926 -	295.19	1,407.14	1,513.56
Incr.	312.48		491.07
Decr.		561.96	

There were two hoisting ropes replaced in 1927, as compared with three in 1926.

One complete contactor for the skip hoist rheostat was replaced in 1927 at a cost of $200.00.

Increase also includes repairs to cooling water pump.

A cage purchased from the Gwinn District was remodelled to fit the Maas Shaft.

Shaft

1927 Amount	$315.06	Cost per ton, $.001
1926 Amount	36.19	" " " .001
Increase	278.87	.000

The third level ore pocket was repaired in 1927.

Top Tram Equipment

1927 Amount	$ 697.70	Cost per ton, $.003
1926 Amount	2,838.43	" " " .011
Decrease	2,140.73	.008

	Sub Division.			
	Engine & Motors	Tracks & Cars	Wire Rope	Sheaves, etc.
1927 -	$186.09	$ 325.98	$102.88	$ 82.75
1926 -	145.40	2,229.01	274.60	189.42
Increase -	40.69			
Decrease -		1,903.03	171.72	106.67

MAAS MINE
ANNUAL REPORT
YEAR 1927

Top Tram Equipment (Cont.)

The 1926 charge against Tracks and Cars was high due to building four new top tram cars.

Less new rope was required in 1927, also less replacements of sheaves and rollers.

Docks, Trestles & Pockets

1927 Amount	$ 50.75	Cost per ton,	$.000
1926 Amount	165.13	" " "	.001
Decrease	114.38		.001

The expense incurred in both years was due to small repairs to ore pockets in the shaft house.

Mine Buildings

1927 Amount	$320.84	Cost per ton	$.001
1926 Amount	21.17	" " "	.000
Increase	299.67		.001

The increase was due to replacing an old pipe rack with a larger one from the Gwinn District, and a small charge for maintenance of other buildings.

Total Surface Costs

1927 Amount	$41,217.83	Cost per ton,	$.153
1926 Amount	43,113.08	" " "	.176
Decrease	1,895.25		.023

GENERAL MINE ACCOUNTS:

Insurance

1927 Amount	$2,681.98	Cost per ton,	$.010
1926 Amount	219.84	" " "	.001
Increase	2,462.14		.009

The 1927 cost was charged with $2,562.78 for adjusting Fire and Boiler Insurance premiums, which should have been charged off previous to December, 1926.

Engineering

1927 Amount	$2,427.82	Cost per ton,	$.009
1926 Amount	2,338.89	" " "	.010
Increase	88.93	Decrease	.001

The increase in this account is due to more time by the engineer on Maas Mine surveys.

Analysis

1927 Amount	$8,235.70	Cost per ton,	$.030
1926 Amount	8,351.79	" " "	.034
Decrease	116.09		.004

This account includes the operating laboratory charge.

	No. of Dets.	Cost per Det.	Total Cost
1927 -	33,012	$ .1429	$ 4,757.94
1926 -	29,266	.17441	5,110.56
Increase -	3,746		
Decrease -		.03151	352.62

MAAS MINE
ANNUAL REPORT
YEAR 1927

Analysis (Cont.)

The Negaunee District Laboratory operated day shift only in 1927, and also made more determinations at a lower cost per determination than in the previous year.

Personal Injury Expense

1927 Amount	$10,215.66	Cost per ton, $.038
1926 Amount	7,111.84	" " " .029
Increase	3,103.82	.009

There was $5,558.00 charged to this account in April, 1927, on account of the total disability of Isaac Salmi, Accident Report #371.

Also, there were less accidents in 1927 on which compensation had to be paid.

Safety Department Expense

1927 Amount	$ 79.89	Cost per ton, $.000
1926 Amount	114.41	" " " .000
Decrease	34.52	

Telephones & Safety Devices

1927 Amount	$312.37	Cost per ton, $.001
1926 Amount	251.91	" " " .001
Increase	60.46	.000

There was more expense for safety devices in 1927.

Local General Welfare

1927 Amount	$1,038.80	Cost per ton $.004
1926 Amount	1,191.29	" " " .005
Decrease	152.49	.001

There was less expense in 1927 for local general welfare.

Mine Office

1927 Amount	$ 9,430.35	Cost per ton, $.035
1926 Amount	10,223.81	" " " .042
Decrease	793.46	.007

There was a charge of $200 for exchange in 1926, while in 1927 there was no charge. The proportion of district expense charged direct from the Central Office decreased $518.00 in 1927, due to a portion of the District Superintendent's salary being charged to the Gwinn District in the last half of the year.

Total General Mine Accounts

1927 Amount	$34,422.57	Cost per ton, $.127
1926 Amount	29,803.78	" " " .122
Increase	4,618.79	.005

The increase is due to a charge of $5,558 in Personal Injury Expense on account of total disability, Accident Report #371, and a charge of $2,562.78 in Insurance Account, as an adjustment of Fire and Boiler Insurance premiums that should have been charged off prior to December, 1926.

MAAS MINE
ANNUAL REPORT
YEAR 1927

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

Some exploring was done during June, July, and August, by drifts and raises, to find the ore shown by diamond drill hole #7 above the second level. An enriched Jasper formation was found, but no runs of ore corresponding with the drill hole records. This work was finally abandoned.

10. TAXES:

DESCRIPTION	1927		1926	
CITY OF NEGAUNEE	VALUATION	TAXES	VALUATION	TAXES
MAAS MINE - (Lease and Und. ½ fee)				
257.18 acres of minerals covered by State Tax Comm.	1,160,000	37,952.88	1,333,700	42,344.98
Stockpile, Supplies and Equipment	1,150,000	37,625.70	1,160,274	36,838.71
TOTAL VALUE PLACED BY TAX COMMISSION -	2,310,000	75,578.58	2,493,974	79,183.69
Harris Addition, Anthony Property, Corbit's Addition, Ed. Lobb's Addition, and Kirkwood and Kellan's Addition -	23,650	773.74	31,600	1,003.33
Collection Fees		763.54		801.87
TOTAL MAAS MINE -	2,333,650	77,115.86	2,525,574	80,988.89
Tax Rate		3.272		3.175
Total City of Negaunee Tax		589,686.71		587,398.44
Maas Mine % of City Tax		13%		14%

11. ACCIDENTS AND PERSONAL INJURY:

There were no fatal accidents at the Maas Mine in 1927 or 1926. There were eleven minor accidents in 1927 as compared with 26 in 1926, a decrease of 15 for the year.

The eleven accidents were classified as follows:

Three were slight injuries, the men returning to work in less than a month.

Four were injuries that kept the men at home from one to two months.

Four were injuries that kept the men at home for more than two months. Three of these were fractures, one of which was a bad fracture of the arm.

Two men received compensation during the entire year for injuries received in previous years, and one man received compensation to April 11th for an injury received on November 13, 1926. Two men were paid the difference in wages during 1927.

One man was awarded full compensation in 1927 for permanent disability due to loss of vision, the accident occurring on April 11th, 1925. The amount charged out in 1927 on account of this case was $5,558.00. Regular compensation payments in 1927 amount to $3,388.69, or a total of $8,946.69 for the year.

MAAS MINE
ANNUAL REPORT
YEAR 1927

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

a. E. & A. #476 - Remodeling Shaft:

Total expended in 1925 was		$87,843.10
" " " 1926 was		8,117.67
" " " 1927 was		7,828.87
Total -		103,788.87

This E. & A. was completed in 1927.

Timber Yard and Tracks:

During April the new timber track fill (constructed during 1926) was completed. The trestle stringers were then removed, the top of the fill resurfaced, and the track relaid. A little extra filling was necessary along the north side of the track. The total expense for this work in 1927 was $572.71.

Tunnel To Timber Yard and Dry House:

A new timber tunnel was built from the north side of the shaft westerly into the new timber yard. A small revolving grab bucket excavator was used to make the cut for the tunnel, and also the back fill after the tunnel was finished. The total length of the tunnel is 465 feet, 165 feet of which is wholly of concrete, the remainder having a concrete floor and four foot walls, with a roof and upper walls of galvanized iron, similar to the Athens and Negaunee Mines timber tunnels.

A connection of similar construction, 92' long, was built between the new tunnel and the dry. This cross tunnel provides a covered passage between the dry and the shaft collar for the underground men. Work on the tunnel started in May, and was practically completed in August.

Electric haulage was installed in the tunnel early in December. It is expected that one of the storage battery locomotives from the Republic Mine, with the recharging apparatus, can be obtained in 1928 to replace the present electric haulage locomotive. The storage battery locomotive is safer, as it eliminates the overhead trolley. It can also run beyond the tunnel to the lagging and pole piles. At the present time, hand tramming is necessary beyond the end of the tunnel.

Expenditures in 1927 were as follows:

Excavating and refilling -	$ 720.58
Forms -	1,363.09
Concreting -	2,609.63
Frame tunnel -	1,418.23
Wiring and tracks -	1,143.86
Total -	7,255.39

b. E. & A. #504 - Moving Race Course Houses: (Not Completed)

(1) New Road from Cherry Street:

This road extends from the east end of Cherry Street to the County Road east of the mine, and is about one-half mile long. Construction was started in May and was completed in July. There is a 20' width of penetration tar macadam on top of a mine rock sub-base, with 3' mine rock shoulders on each side. This road will eventually take the place of the old Baldwin Kiln Road on the east side of the Race Course Tract.

(2) Streets in the New Plat:

"A" Street.

This street was graded in June. The mine rock base was completed in July. The final surface of penetration macadam is to be applied next summer.

"B" Street.

The grading of this street was finished in June. The mine rock base was completed in July. The final surface is to be applied next year.

MAAS MINE
ANNUAL REPORT
YEAR 1927

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION: (Cont.)

b. E. & A. #504 - Moving Race Course Houses: (Cont.)

(2) Streets in the New Plat:

"C" Street.

The grading and the mine rock base for this street were finished in June. The final surfacing is to be applied next year.

New Baldwin Kiln Road.

The sub grade on the east 30' of this road has been started between "A" and "C" Streets, but it cannot be finished until the grades are set by the City. This road will be completed next summer by a joint operation with the City.

(3) Cement Sidewalks:

"A" Street. Completed approximately 300' at the west end of the street on the south side.

"B" Street. There were no sidewalks built on this street in 1927.

"C" Street. Completed 250' in front of five houses on the north side of this street, also the walks to the houses.

(4) Curbing:

"A" Street. 300' of curbing is in place on both the north and south sides of the west end of this street.

"B" Street. There was no curbing built on this street in 1927.

"C" Street. 250' of curbing was laid in front of houses on the north side of the street.

Baldwin Kiln Road. No curbing was laid on this street in 1927.

(5) Sewer System:

The main storm sewer was completed in August. The sanitary sewer was completed in August, with laterals to the lot lines on "A", "B", and "C" Streets.

(6) Water System:

Four inch water mains were laid throughout the plat, and six fire hydrants were installed. Water service lines were laid to the front line of all lots in the new location.

(7) Transferring 21 Houses to New Location:

There were seven houses moved in August, 12 in September, and two in October, making a total of 21 houses moved to the new location. A crew of carpenters, plasterers, etc., were engaged until the end of the year repairing the interior of houses, also repairing porches, doors, etc., and working on sheds.

Foundations for the houses were completed in August.

In addition to moving 21 houses from Main Street to the New Location, one house located on the corner of "A" Street and the proposed new Baldwin Kiln Road was moved back 20' to make room for the new Baldwin Kiln Road. This work was done by day labor, under supervision of the Company foreman.

(8) Superintendence and Engineering:

A capable surface foreman was employed to superintend grading, leveling, lots, etc. An engineer was employed on part time to supervise the installation of the sewer and water systems, also sidewalks and curbs.

An engineer was employed during the time the houses were being moved to supervise the foundation and moving of houses, etc.

Considerable work remains to be done to complete this E & A. More grading must be done on some of the lots now occupied by houses, the lawns leveled and seeded, and the lots fenced. More work is required on the interior of part of the houses to put them in as good a condition as they were in prior to moving. A number of sheds on rear of lots will have to be repaired.

MAAS MINE
ANNUAL REPORT
YEAR 1927

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Proposed Steel Trestle:

The following paragraph is copied from last year's annual report. It is just as important a recommendation now as it was last year, and in fact, is more so, due to the closer approach of the time when arrangements will have to be made for stocking the ore from the Race Course Tract.

Within a few years mining will start on the Race Course Tract. Under the terms of the lease, this ore has to be stocked separately. At present all ore is stocked from temporary wooden trestles, and while it would be possible to continue stocking in this manner, it would make it very much simpler and less expensive if a steel trestle were provided. It is possible that some arrangement can be made with the Mitchell interests which will permit our mixing the ore with the other Maas ore. It has been suggested that they might be satisfied if the ore were weighed underground as it comes to the shaft.

If a steel trestle were built, the rock could be stocked from a wooden trestle beyond the east end of the permanent stocking trestle. The Race Course ore could then be stocked at one end of each permanent stocking trestle, and the Maas ore at the other end of each trestle.

b. Tugger Hoists and Scrapers:

The mine is now supplied with the following scraper equipment:

Company	Type	Total	Year Purchased 1923	1924	1925	1926	1927
Ingersoll-Rand Co. 6 H.P.	Air	21	1	2	2	10	6
Sullivan Mach. Co. 6½ H.P.	"	1					1
" " " 6½ H.P.	Electric	5					5
" " " 15 H.P.	"	1					1
Total -		28	1	2	2	10	13

14. MAINTENANCE AND REPAIRS:

The only unusual expense for maintenance and repairs for the year were at the Maas Crusher, the same as in 1926. The steel conveying belt was badly worn, and it was dismantled in November after crushing was finished. The links connecting the various sections of the belt were removed and new links were riveted on. This work was done in November and December. The cost will be heavy for both labor and supplies. The belt will be assembled in March, as weather conditions were too severe to attempt outdoor work in January. Many repairs were necessary throughout the operating season due to crushing Ogden ore, which is hard and tough.

15. POWER:

There was no shortage of current during the year. The Maas steam turbine plant was operated twice during the year, each time for only a few days, on account of accidents to the water power generating units.

17. CONDITION OF PREMISES:

On account of the construction of the new timber yard and tunnels, it was not possible to keep the premises looking as neat as usual throughout the year. The building of the cooling pond in the yard between the dry and office buildings made this area unsightly for a short time. After these various improvements had

MAAS MINE
ANNUAL REPORT
YEAR 1927

17. CONDITION OF PREMISES: (Cont.)

been completed, the grounds were given attention. The planting area was thinned where needed, and a considerable amount of shrubbery transplanted to new locations on the grounds. Several truck loads of shrubs were obtained from the Gwinn District Office grounds, and used for a border along the tunnel and as a screen along the L. S. & I. Railway Company's main line tracks. All material was cleaned up around the mine buildings, and put under cover. The old water cooling tower near the former entrance to the mine was removed and the ground leveled and seeded to grass.

The new road to the mine is a big improvement from the standpoint of safety, but to make the view of the grounds attractive as one enters from the west on the new road, it will be necessary to rearrange the planting in this area, do some grading along the road, and also improve the grounds around the Maas Crushing Plant. This work should be undertaken early in the spring of 1928, so as to have it completed before summer.

18. NATIONALITY OF EMPLOYEES:

This has been prepared under two statements. The first statement gives the report as has been ordinarily submitted to the Company, that is, it shows the nationality of employees according to parentage. The second statement divides the employees according to country of birth.

Nationality of Employees:		Country of Birth:		Percent
Americans	33	United States	68	33
English	58	England	56	27
Finnish	62	Finland	46	22
Italians	21	Italy	19	9
Swedish	13	Sweden	10	5
French	6	Denmark	2	1
Danish	4	Ireland	1)	
Irish	5	Scotland	1)	1
Germans	4	Canada(French)	5	2
Scotch	2	Total	208	100
Total	208			

19. MAAS CRUSHER:

	1927	1926
PRODUCT	221,866	270,678
Composed of:		
Hard Ore (Ogden)	177,880	150,595
Hematite	43,986	120,083

The crusher operated 201 shifts in 1927 as follows:
129 1 - 9 hour shifts
8 2 - 9 hour shifts
28 1 - 11 hour shifts
14 2 - 11 hour shifts.
Average tons crushed per shift, 1,104 tons.

The crusher operated 277 shifts in 1926 as follows:
88 1 - 9 hour shifts
43 2 - 9 hour shifts
44 2 - 11 hour shifts
15 1 - 11 hour shifts.
Average tons crushed per shift, 977 tons.

MAAS MINE
ANNUAL REPORT
YEAR 1927

19. MAAS CRUSHER: (Cont.)

Cost at Crusher for 1927 and 1926:

	1927	Cost per ton	1926	Cost per ton
PRODUCT	221,866		270,678	
General Expense	$6,542.31	$.029	$1,295.43	$.005
Maintenance	20,208.06	.091	3,303.56	.012
Operating	13,385.57	.061	20,335.49	.075
Depreciation	11,093.30	.050	13,533.90	.050
Switching	2,858.40	.013	3,678.60	.014
Total	54,087.60	.244	42,146.98	.156

General Expense increased in 1927 due to the fatal accident to Nels Fish, Accident Report #2, Maas Crusher. The charge for this was $5,600.00.

Maintenance cost increased due to charging out actual repairs listed in the following paragraph, also repairs to steel conveyor belt (not yet completed), and to charging out a proportion of the cost of alterations made to the plant in the winter of 1926 - 1927.

The maintenance of the crusher plant was higher in 1927 than in 1926, due to crushing more Ogden Silica Ore. The main items for each year were as follows:

YEAR 1927.		YEAR 1926.	
New Conveyor belt	$1,823.52	New Conveyor belt	$1,800.00
Two new toggles	229.50	Three new toggles	366.00
New main shaft for reduction crusher	1,687.24	Screen Section	514.60
Jaw Plates	567.93	Head Mantle	460.00
Wearing plates renewed	238.52	Wearing plates renewed	384.00
Concaves for reduction crusher	394.44	Total	3,524.60
Total	4,941.15		

A number of repairs were made last winter to the plant to overcome difficulties in operation that had developed during the operating season of 1926. These covered a change in the front of the railroad pocket to permit a freer flow of ore to the steel conveyor belt, a tightening device for the first rubber conveying belt, a change in design of the chute leading to the revolving screen, and a larger pulley to operate and increase the speed of the belt leading to the hard ore pocket. A number of other minor changes were made last summer and fall to improve the working conditions and increase efficiency.

The heaviest items that must be completed before the crushing season of 1928 comprise a complete set of new links for the steel pan conveyor, the refacing of the driving sprocket for the steel conveyor belt, the renewing of the lining plates in a number of chutes, new sills under the first loading pocket, a cover for the railroad loading pocket, etc.

The plant is not properly designed for crushing two kinds of ore, and I doubt if a plant can ever be built that will do this work as efficiently as individual units. Many difficulties were overcome in 1926 and 1927, and the plant can now handle all of the Ogden Silica Ore that will be sold in 1928. The new Tilden Pit will have its own crushing plant, so that the Maas plant will only be used, as far as hard silicious ores are concerned, to finish crushing the balance of the ore that will come from the Ogden Pit.

Fatal Accident at Maas Crusher:

I regret to report that a fatal accident occurred at the Maas Crusher at 7:45 A. M., September 28th, 1927, Nels Fish, Crusher Engineer, being instantly killed by being caught in the gear that drives the first belt conveyor. Fish

MAAS MINE
ANNUAL REPORT
YEAR 1927

19. MAAS CRUSHER: (Cont.)

Fatal Accident at Maas Crusher: (Cont.)
gave the signal to throw the switch at the engine house on the ground when he was standing on a platform near the motor which drives the belt conveyor. This motor is located at the top of the first loading pocket building. He then walked in past the motor, and it is supposed was engaged in screwing down a grease cup when the current came on and the machinery started. The oil switch located near the motor was not operating due to the fact that a stick was inserted under the control, so that the belt could be started by a switch in the crusher engine house on the ground level about 150' distant. This stick had been used for some time, and Fish was thoroughly familiar with it. The accident was due to two causes. First, the wrong method of doing work by the foreman who instituted the practice of blocking the switch; and second, through Fish's own carelessness in giving the signal to start the motor, after which he went to screw down a grease cup. The foreman was discharged.

ATHENS MINE

ANNUAL REPORT

YEAR 1927

1. GENERAL:

The mine operated throughout the year on one eight hour shift, five days per week, the same as in 1926. Usual holidays were observed, but the men were permitted to make up the loss of time by working Saturdays. This gave them a monthly average of practically 22 days, as compared with 25 days when working on the full time basis.

During the entire year stoping was continued in two of the same territories that were being mined in 1926, namely, above the fourth level on the south foot wall, and just above and below the sixth level on both the north and south sides of the fault dike. Mining at the west end of the mine, above the tenth level near the Bunker Hill Pillar, was abandoned in the summer, and a new territory was opened to take its place below the fourth level on the north side of the fault dike. The only development work done during 1927 was in putting up raises to open this new territory for mining.

There was a small decrease in the amount of water pumped in 1927. Either one of two explanations may apply. First, the water is gradually draining from some underground reservoir tapped by the underground workings; or second, it may be due to the gradual blocking of cracks that permit it to find its way to this great depth in the solid rock capping.

The grade of ore held up to the guarantee except on the Mitchell Lease, where the product in 1927 dropped just below 60.00 iron. This was due to mining under the Jasper hanging, and will soon correct itself. Shipments decreased as compared with 1926, but exceeded production.

Labor conditions were satisfactory during the year. The labor turnover at this mine is exceedingly small, with the result that there is always a waiting list of applicants.

The mine is in good condition, and production could be increased on short notice by adding a night shift. The maximum capacity of the hoist is 100 tons per hour.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

There is only one grade of ore at this mine, namely, Athens ore. Part of this ore came from the parcels owned in fee, the balance from the Mitchell Lease. The distribution of the product is as follows:

Athens Ore	187,457 tons
Mitchell Lease	45,291 "
Total Ore	232,748 "
Rock	473 "

During the year 24 tons of ore were transferred from Corbit Lease to Athens fee. The product for the year was 6,333 tons more than for the year 1926.

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Athens Ore	4,199	196,277	200,476	334,759
Mitchell Lease	0	46,602	46,602	36,664
Lucky Star				121
Total	4,199	242,879	247,078	371,544
Total Last Year	19,237	352,307	371,544	
Decrease	15,038	109,428	124,466	

ATHENS MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

c. Stockpile Inventories:

The ore in stock December 31, 1927, was as follows:

Athens Fee	151,321 tons
Mitchell Lease	14,739 "
Corbit Lease	12 "
Lucky Star	40 "
Total	166,112 tons

On December 31st, 1926, there was in stock 180,442 tons, or 14,330 tons more than there was on hand at the same date this year.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

Fourth Level	56,501 tons
Eighth Level	169,377 "
Tenth Level	6,870 "
Total	232,748 tons

e. Production by Months:

The production by months is as follows:

Month	Athens	Mitchell Lease	Total	Rock
January	16,583	3,665	20,248	64
February	16,658	3,174	19,832	
March	17,457	4,163	21,620	
April	14,352	4,001	18,353	224
May	11,510	3,694	15,204	38
June	16,436	3,916	20,352	
July	14,229	2,768	16,997	
August	17,651	4,080	21,731	
September	15,877	4,077	19,954	
October	15,265	3,075	18,340	147
November	16,254	4,557	20,811	
December	15,185	4,121	19,306	
Total	187,457	45,291	232,748	473
Total - 1926	191,355	35,060	226,415	484
Decrease	3,898			11
Increase		10,231	6,333	

f. Ore Statement:

	Athens	Mitchell Lease	Corbit Lease	Lucky Star	Total	Total Last Year
On Hand Jan. 1, 1927	164,316	16,050	36	40	180,442	325,571
Output for Year	187,457	45,291	0	0	232,748	226,415
Transferred	24		24			
Total	351,797	61,341	12	40	413,190	551,986
Shipments	200,476	46,602	0	0	247,078	371,544
Balance on Hand	151,321	14,739	12	40	166,112	180,442
Increase in Output					6,333	
Decrease in Ore on Hand					14,330	

1927 - 1-8 hour shift, 5 days per week, January 1st to December 31st, 1927.

1926 - 1-8 hour shift, 5 days per week, January 1st to December 31st, 1926.

ATHENS MINE
ANNUAL REPORT
YEAR 1927

2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays:

The non-electrical delays that occurred during the year were as follows:

May 13th. (There was 8 hours delay each day on the 16th, 17th, 18th, 19th, and 20th.)
The current was cut off by an electrical storm while a skip of ore was being hoisted. The brakeman could not hold the skip with the brake, which resulted in a loaded skip going to the bottom of the shaft, pulling the empty skip into the head sheave, breaking the sheave and the rope on the empty skip. The broken rope lashed onto the pulley stand and bent the top of it beyond repair. Sufficient repairs were made to resume operations on May 23rd. The cost of repairs made by the Worden-Allen Company of Milwaukee, were as follows: Labor, $1,163.01; supplies, $3,588.61; total, $4,751.62. The accident occurred at 7:15 P. M., while hoisting overtime.

July 16th. On this date there was a two hours delay on account of a fourth level drift being broken down.

h. Delays from Lack of Current:

There were no serious delays from lack of current during the year.
May 3rd, 1½ hours delay on account of no current, due to a storm.
July 1st, 1 hour delay on account of no current, due to a storm.

3. ANALYSIS:

a. Average Mine Analysis on Output:

Grade	Iron	Phos.	Silica
Athens	61.02	.125	5.71
Mitchell Lease	59.69	.125	6.87
Corbit Lease	(No production)		
Lucky Star	(No production)		

b. Average Analysis on Straight Cargoes:

	Mine			Lake Erie	
Grade	Iron	Phos.	Moist.	Iron	Moist.
Athens	61.68	.122	-	-	-
Mitchell Lease	(All mixed)			-	-
Corbit Lease	(No shipments)				
Lucky Star	(No shipments)				

c. High Sulphur Ore:

No high sulphur ore has been found on the sub levels below the -270' sub level. None was encountered in mining or development work during the year.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12.75 cubic feet equals one ton. (12 cu. ft. in previous years.)
10% deduction for rock.
10% deduction for loss in mining.

Percentage of Bessemer equals 0.

Fourth level and above	1,134,619 tons
Fourth level to sixth, north side of dike	375,816 "
Sixth level to 660' sub level, north side	338,230 "
Sixth level to 660' sub level, south side	395,693 "
660' sub level to eighth level	1,184,395 "
Eighth level to ninth level	464,050 "
Ninth level to tenth level	380,938 "
Below tenth level	57,534 "
Total developed ore	4,331,275 tons

ATHENS MINE
ANNUAL REPORT
YEAR 1927

4. ESTIMATE OF ORE RESERVES:

b. Prospective Ore:

Fourth level to sixth, south side of dike	1,874,316 tons
Total all ore	6,205,591 tons

The estimate for 1927 is based on the assumption that 12.75 cubic feet equal one ton, whereas the previous estimates had assumed 12 cubic feet to the ton. This figure of 12.75 is based on certain volumetric measurements taken in the past, and is believed to be more nearly correct. Applying this figure to the 1926 estimate, and deducting ore mined in 1927, the estimate above shows a reduction of 118,046 tons below the 1926 estimate. This reduction is due to the new sub level immediately below the fourth level, which is narrower than had been anticipated, and to the large amount of paintrock found on the sub levels above the tenth level. Owing to the use of 12.75 cubic feet per ton, the estimate of total ore shows a decrease of 509,720 tons as compared with 1926. Deducting the product in 1927, leaves 276,972 tons decrease due to the use of the larger factor, and to changes in the total volume due to development work.

c. Estimated Natural Analysis:

Ore Reserves: Approximate Expected Natural Analysis.

	Iron	Phos.	Silica	Alum.	Mang.	Lime	Mag.	Sul.	Igni.	Moist.
Athens Ore	52.50	.120	5.00	2.65	.410	.865	.870	.012	1.39	13.25

Ore in Stock: Average Natural Analysis.

	Iron	Phos.	Silica	Alum.	Mang.	Lime	Mag.	Sul.	Igni.	Moist.
Athens Ore	53.11	.111	4.95	2.64	.411	.865	.870	.012	1.39	13.25

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

The labor conditions at the mine throughout the year were very satisfactory. At no time was there a shortage of men.

(2) New Construction:

New Timber Treating Plant.

A new two compartment concrete vat with necessary piping for treating timber was constructed during the summer. A new derrick and hoist, for handling and decking the timber, was also erected. Owing to the large reserve of treated timber, the new plant has not been used. A sectional cover was made in November to keep snow and ice from accumulating in the vat during the winter.

b. Comparative Statement of Wages and Product:

	1927	1926	INCREASE	DECREASE
PRODUCT	232,748	226,415	6,333	
No. Shifts and Hours	1-8	1-8		
AVERAGE NO. MEN WORKING:				
Surface	35	34	1	
Underground	123	125		2
Total	158	159		1
AVERAGE WAGES PER DAY:				
Surface	4.48	4.48		
Underground	5.08	5.09		.01
Total	4.94	4.95		.01

ATHENS MINE
ANNUAL REPORT
YEAR 1927

5. LABOR AND WAGES:

b. Comparative Statement of Wages and Product: (Cont.)

	1927	1926	INCREASE	DECREASE
WAGES PER MONTH OF 25 DAYS:				
Surface	98.56	98.56		
Underground	111.76	111.98		.22
Total	108.68	108.90		.22
PRODUCT PER MAN PER DAY:				
Surface	23.09	23.00	.09	
Underground	7.02	6.74	.28	
Total	5.38	5.21	.17	
LABOR COST PER TON:				
Surface	.194	.195		.001
Underground	.724	.755		.031
Total	.918	.950		.032
AVG. PRODUCT BRK'G. & TRM'G.	16.70	15.58	1.12	
AVG. WAGES CONTRACT MINERS	5.66	5.66		
TOTAL NUMBER OF DAYS:				
Surface	10,080	9,846¼	233 3/4	
Underground	33,154 3/4	33,600¼		445½
Total	43,234 3/4	43,446½		211 3/4
AMOUNT FOR LABOR:				
Surface	45,162.40	44,091.73	1,070.67	
Underground	168,557.42	170,933.58		2,376.16
Total	213,719.82	215,025.31		1,305.49

Proportion of Surface to Underground Men:

1927 - 1 to 3.51 one 8-hour shift five days per week.
1926 - 1 to 3.68 one 8-hour shift five days per week.
1925 - 1 to 3.80 one 8-hour shift five days per week.
1924 - 1 to 3.99
1923 - 1 to 3.44
1922 - 1 to 3.75
1921 - 1 to 3.88

6. SURFACE:

a. Buildings, Repairs:

1. Shaft House and Pulley Stand.

Under "Delays" a full description is given of the accident on May 13th that resulted in serious damage to the top of the shaft house, to one of the head sheaves, and to one of the pulley stands, causing a delay of ten days while repairs were being made. Owing to holidays, the mine was idle five working days.

2. Buildings.

During the summer the exterior woodwork of all the mine buildings was painted.

3. Timber Treating Plant.

A description of the improvements made at the plant during the year is given in detail under "5-a-2, New Construction."

4. Flag Pole.

A steel flagpole was erected on the lawn east of the office in October.